HYDAC ELECTRONIC

HYDAC is best known for hydraulics, systems and fluid engineering. For over 50 years, HYDAC has been developing and manufacturing components and system solutions for specific applications in these fields. Over 30 years ago, inspired by its industry and application experience, HYDAC expanded its portfolio to include sensors, measuring instruments and electronic controls.

The range of sensors includes products for the measurement of pressure, temperature, distance, position, level, flow volume, speed as well as contamination and oil condition. In addition to products for standard applications, the product portfolio also covers special applications such as potentially explosive atmospheres or applications with increased functional safety.

Almost all these products are developed, manufactured and marketed by HYDAC ELECTRONIC. Suitability for the application is tested on HYDAC test rigs. As a Tier 1 automotive supplier, HYDAC ELECTRONIC is certified in accordance with the rigorous quality standard ISO/TS 16949 and therefore fulfills the very high requirements regarding product quality, production processes and continuous improvement processes.

Our international sales network provides customers with worldwide product availability, expert advice and support. An extensive service package completes our offer.

Computer simulation of a HYDAC pressure transmitter.

Production and automatic function testing.

Development and manufacturing plant in Saarbrücken-Gersweiler.

HYDAC Servicenter, a complete package of services.

Technical advice and training.
# 1. Introduction
- Industries / Applications / Product Range

## 2. Electronic pressure transmitters for general applications
- **HDA 4800**
- **HDA 4700**
- **HDA 4700 Approvals for shipping**
- **HDA 4700 CANopen**
- **HDA 4400**
- **HDA 4400 Approvals for shipping**
- **HDA 4300**
- **HDA 4300 Approvals for shipping**
- **HDA 4100**
- **HDA 4100 Approvals for shipping**
- **HDA 7446**
- **HDA 7400 CANopen**
- **HDA 3800 for Iron and Steel Works Applications**

## 3. Electronic pressure switches for general applications
- **EDS 3400**
- **EDS 3400 Menu navigation according to VDMA**
- **EDS 3400 IO-Link**
- **EDS 3300**
- **EDS 3300 Menu navigation according to VDMA**
- **EDS 3300 IO-Link**
- **EDS 3100**
- **EDS 3100 Menu navigation according to VDMA**
- **EDS 3100 IO-Link**
- **EDS 300**
- **EDS 300 Approvals for shipping**
- **EDS 8000**
- **EDS 601**
- **EDS 1700**
- **EDS 4400 Programmable**
- **EDS 820 IO-Link**

## 4. Pressure sensors with flush membrane for general applications
- **HDA 4700**
- **HDA 4400**
- **HDA 4300**
- **HDA 7400**
- **EDS 3400**
- **EDS 3300**

## 5. Electronic temperature transmitters for general applications
- **ETS 7200**
- **ETS 4100**
- **ETS 4500**

## 6. Electronic temperature switches for general applications
- **ETS 3200 pressure-resistant for inline installation**
- **ETS 3200 pressure-resistant for inline installation, menu navigation to VDMA**
- **ETS 3200 pressure-resistant for inline installation, IO-Link**
- **ETS 3200 for tank installation**
- **ETS 3200 for tank installation, menu navigation to VDMA**
- **ETS 3200 for tank installation, IO-Link**
- **ETS 3800 for separate temperature probe**
- **ETS 3800 for separate temperature probe, with menu navigation to VDMA**
- **ETS 3800 for separate temperature probe, IO-Link**
- **ETS 320 pressure-resistant for inline installation**
- **ETS 380 for separate temperature probe**
- **ETS 1700 for separate temperature probe**
- **TFP 100 (separate temperature probe)**
### 7. Sensors for distance and position
for mobile and stationary applications
- HLT 1000-R2
- HLT 2100-R1
- HLT 2500-F1
- HLT 2500-L2
- HLS 528

### 8. Level sensors
for general applications
- ENS 3000
- ENS 3000 IO-Link
- HNS 3000
- HNS 526
- HNT 1000

### 9. Flow transmitters / flow switches
for general applications
- EVS 3110
- EVS 3100
- HFS 2100
- HFS 2500
- HFT 2100
- HFT 2500

### 10. Speed sensors
for general applications
- HSS 110
- HSS 120
- HSS 130
- HSS 210
- HSS 220

### 11. Sensors
for applications with increased functional safety
- HDA 4700 for applications with increased functional safety
- HLT 1000 for applications with increased functional safety

### 12. Sensors
for potentially explosive atmospheres
- HDA 4700 ATEX, CSA, IECEx Flameproof enclosure
- EDS 4400 ATEX, CSA, IECEx Flameproof enclosure, programmable
- ETS 4500 ATEX, CSA, IECEx Flameproof enclosure
- HDA 4700 ATEX Intrinsically safe
- HDA 4400 ATEX Intrinsically safe
- HDA 4300 ATEX Intrinsically safe
- HDA 4100 ATEX Intrinsically safe
- EDS 4400 ATEX Intrinsically safe programmable
- EDS 4300 ATEX Intrinsically safe programmable
- EDS 4100 ATEX Intrinsically safe programmable
- HDA 4700 CSA Intrinsically safe
- HDA 4400 CSA Intrinsically safe
- HDA 4300 CSA Intrinsically safe
- HDA 4100 CSA Intrinsically safe
- HDA 4700 IECEx Intrinsically safe
- HDA 4400 IECEx Intrinsically safe
- HDA 4300 IECEx Intrinsically safe
- HDA 4100 IECEx Intrinsically safe
- HDA 4700 with Flush Membrane ATEX Intrinsically safe
- HDA 4400 with Flush Membrane ATEX Intrinsically safe
- HDA 4300 with Flush Membrane ATEX Intrinsically safe
- HDA 4700 with Flush Membrane IECEx Intrinsically safe
- HDA 4400 with Flush Membrane IECEx Intrinsically safe
- HDA 4300 with Flush Membrane IECEx Intrinsically safe
- HDA 4700 with Flush Membrane ATEX, CSA, IECEx Flameproof enclosure
- HFS 2100 ATEX Intrinsically safe
- HFS 2500 ATEX Intrinsically safe
13. Display and monitoring units
   - HDA 5500

14. Service instruments
   - HMG 500
   - HMG 510
   - HMG 3010
   - HDA 4748-H
   - ETS 4148-H
   - EVS 31X0-H

15. Condition monitoring products
   - CMU 1000
   - CSI-B-2
   - HLB 1300
   - AS 1000
   - AS 3000
   - AS 3000 IO-Link
   - EY 1356

16. OEM products for large volume production
   - HDA 8700
   - HDA 8400
   - HDA 8000 for applications with increased functional safety
   - HDA 7400
   - HDA 9300
   - EDS 810
   - EDS 710
   - EDS 410
   - ECS 4400 ATEX, CSA, IECEx Flameproof enclosure
   - EDS 4400 ATEX Intrinsically safe
   - EDS 4300 ATEX Intrinsically safe
   - EDS 4100 ATEX Intrinsically safe
   - HTT 8000
   - HTS 8000
   - HLS 100 for applications with increased functional safety
   - Special products
     - IES 2010 / 2015 / 2020
     - IWE 40
     - HLS 200 for applications with increased functional safety

17. Accessories
   - Electrical accessories
     - for electrical connection type "4" (Binder, Series 714M18)
     - for electrical connection type "5" (EN 175301-803 (DIN 43650) /ISO 4400)
     - for electrical connection type "6" (M12×1, 4 pole)
     - for electrical connection type "7" (DIN 43561)
     - for electrical connection type "8" (M12×1, 5 pole)
     - for electrical connection type "P" (M12×1, 8 pole)
   - Mechanical accessories
     - Connection adapters for pressure sensors
     - Mounting accessories for EDS 8000, HDA 8000, EDS 810
     - Mounting accessories for EDS 3000, ETS 3000, AS 3000, ENS 3000, HNS 3000
     - Mounting accessories for EDS 300, ETS 300
     - Mounting accessories for EDS 1700, ETS 1700
     - Mounting accessories for EDS 601
     - Tank mounting sleeve for ETS 3000
     - Connection blocks for ENS 3000
     - Connection blocks for HLB 1300
     - Connection blocks for AS 1000, AS 3000
   - Accessories for sensors for distance and position
     - Magnets for HLT 1000, HLT 2000, HNT 1000
     - Electrical accessories for HLT 2000
   - Accessories for service instruments
     - Accessories for HMG 30X0
     - Accessories for HMG 500/510
Industries and applications

There is almost no hydraulic or pneumatic medium or system that could not be monitored and controlled by HYDAC measurement technology - quickly, precisely and safely. It is not surprising, therefore, that the individually designed HYDAC Measuring Technology is employed by well-known manufacturers and operators in all industries. These applications range from analysis and diagnostics of operating fluids in the laboratory and on site, to controlling complex industrial systems and to miniaturised systems in construction and road vehicles.

**Excavators**
- Electronic controls and sensors to complete the system electronics.
  - Load limit control
  - Electro-hydraulic load sensing
  - Integrated operating data logging
  - Controls of special equipment
  - Cut-off devices
  - Safety cut-off devices

**Wheel Loaders**
- Electronic controls and sensors to complete the system electronics.
  - Load limit control
  - Electro-hydraulic load sensing
  - Integrated operating data logging
  - Controls of special equipment
  - Cut-off devices
  - Safety cut-off devices

**Road Construction Machinery**
- Sensor technology and system electronics to generate modern control concepts or ready-to-install total concepts.
  - Load spectra
  - Condition monitoring
  - Safety systems
  - Load limiting
  - Function controls
  - Energy management

**Telescopic Cranes**
- Sensor technology and system electronics to generate modern control concepts or ready-to-install total concepts.
  - Load torque limiting
  - Load spectra
  - Load sensing
  - Load limit control
  - Energy management
  - Condition monitoring

**Municipal Machines**
- Sensors, system electronics and condition monitoring.
  - Working hydraulics
  - Axle suspension systems
  - Cab suspension systems
  - Levelling systems

**Tractors**
- Sensors, system electronics and condition monitoring.
  - Cab suspension
  - Central hydraulics
  - Front axle suspension
  - Transmission shift control
  - Level control
  - Anti-roll stabilisation

**Agricultural Technology**
- Electronic controls and sensors to complete the system electronics.
  - Load limit control
  - Electro-hydraulic load sensing
  - Integrated operating data logging
  - Controls of special equipment
  - Cut-off devices
  - Safety cut-off devices
Mining
Electronic measurement technology for underground applications.
- Pump station / Media supply
- Mining of raw materials
- Heading
- Material-handling and passenger transportation
- Analysis and diagnostics
- Condition monitoring

Iron - Steel - Metal
Measuring technology and electronics.
- Pump stations
- Valve stations
- Accumulator stations
- Heat exchangers
- Condition monitoring

Machine Tools
Sensors, system electronics and condition monitoring.
- Hydraulic weight counter-balance
- Hydrostatic slide bearing
- Pressure boost station
- Central processing of cooling lubricants
- Tool clamping device

Pulp and Paper Industry
Sensors, system electronics and condition monitoring.

Automotive Production
Measurement technology and condition monitoring for machine tools and presses,
Cooling lubricant supply and test rigs.

Shipping
Measuring technology, electronics and condition monitoring for:
- Engines
- Control of motion sequences
- Steering gear/Propeller
- Ballast water treatment
- Deck superstructures

Aviation and Aerospace Industry
Sensors, system electronics and condition monitoring.
- Rocket test rigs
- Test rigs for aircraft hydraulics
- Satellite test rigs
- Flight simulators

Wind Turbines
Sensors, system electronics and condition monitoring.
- Condition monitoring of hydraulic and lubrication oils
- Measurement technology
- Safety and yaw brakes
- Pitch control
- Performance testing stations for transmission systems

Power Plant Technology
Sensors, system electronics and condition monitoring.
- Condition monitoring of hydraulic and lubrication oils
- Hydraulic drive and control systems including electronic controls

Transformers
Measuring technology, electronics and condition monitoring.
- Insulating oil conditioning
- Insulating oil monitoring
- Cooling

Oil and Gas Industry
Sensors, system electronics and condition monitoring for offshore, subsea or onshore applications.

Condition Monitoring
Data logging and interpretation providing information on the condition of machines, systems and their components.
ELECTRONIC PRESSURE TRANSMITTERS

The right pressure transmitter for every application! The wide ranging product choice from HYDAC offers solutions for all industries, whether systems or machinery manufacture, mobile technology or for laboratory applications. The pressure transmitters are available with a variety of output signals, connectors and fluid port connection options.

Pressure transmitters for general applications:

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDA 4800</td>
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<tr>
<td>HDA 4700</td>
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<td>HDA 4700 Approvals for shipping</td>
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<td>HDA 4700 CANopen</td>
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<td>HDA 7400 CANopen</td>
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<tr>
<td>HDA 3800 Iron and steel works</td>
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</table>

Further pressure transmitters for special applications can be found in the sections "Pressure Sensors with Flush Membrane", "Service Instruments", "Sensors for Potentially Explosive Atmospheres" and "OEM Products for Large Volume Production".

<table>
<thead>
<tr>
<th>Electronic Pressure Transmitters</th>
<th>HDA 4800</th>
<th>HDA 4700</th>
<th>HDA 4400</th>
<th>HDA 4300</th>
<th>HDA 4100</th>
<th>HDA 3800</th>
<th>HDA 7400</th>
<th>HDA 8700</th>
<th>HDA 8400</th>
<th>HDA 9000</th>
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<tr>
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<td>0.25</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
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<td>1.0</td>
<td>0.5</td>
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<td>✓</td>
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<tr>
<td>High pressure (from 40 bar)</td>
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<td>Absolute pressure</td>
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<td>Flush membrane</td>
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<td>CANopen Version</td>
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<td>Approval for potentially explosive atmospheres</td>
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<td>Increased functional safety</td>
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</tbody>
</table>

Note: Not all feature combinations are possible. For precise information, please consult the relevant data sheet.
Description:
The pressure transmitter series HDA 4800 has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Outstanding technical specifications and robust construction make the HDA 4800 particularly suited to the field of test rig and diagnostic technology. It is also suitable for a broad range of industrial applications. Since the accuracy of a pressure transmitter varies greatly with the temperature of the fluid, the instrument has excellent characteristics in this respect. The output signals 4 .. 20 mA, 0 .. 10 V and 0 .. 20 mA (source) are available as standard.

Special features:
- Accuracy ≤ ± 0.125 % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent long term stability

Technical data:

**Input data**
- Measuring ranges: 6; 16; 60; 100; 250; 400; 600 bar
- Overload pressures: 15; 32; 120; 200; 500; 800; 1000 bar
- Burst pressures: 100; 200; 300; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. connection: Stainless steel
  Seal: FPM

**Output data**
- Output signal, permitted load resistance:
  - 4 .. 20 mA, 2 conductor: \( R_L = \frac{(U_B - 10 V)}{20 mA} \) [kΩ]
  - 0 .. 10 V, 3 conductor: \( R_L = \frac{2 \text{kΩ}}{20 mA} \)
  - 0 .. 20 mA, 3 conductor source: \( R_L = \frac{(U_B - 4 V)}{20 mA} \)
- Accuracy to DIN 16086:
  - Max. setting: ≤ ± 0.125 % FS typ.
  - ≤ ± 0.25 % FS max.
- Accuracy at min. setting:
  - ≤ ± 0.06 % FS typ.
  - ≤ ± 0.125 % FS max.
- Temperature compensation:
  - Zero point: ≤ ± 0.005 % FS / °C typ.
  - ≤ ± 0.01 % FS / °C max.
- Temperature compensation:
  - Over range:
    - ≤ ± 0.005 % FS / °C typ.
    - ≤ ± 0.01 % FS / °C max.
- Non-linearity at max. setting:
  - ≤ ± 0.15 % FS max.
- Hysteresis:
  - ≤ ± 0.1 % FS max.
- Repeatability:
  - ≤ ± 0.05 % FS
- Rise time:
  - ≤ 1 ms
- Long-term drift:
  - ≤ ± 0.1 % FS typ. / year

**Environmental conditions**
- Compensated temperature range:
  - -25 .. +85 °C
- Operating temperature range:
  - -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range:
  - -40 .. +100 °C
- Fluid temperature range:
  - -40 .. +100 °C / -25 .. +100 °C
- Certificate No. E318391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
  - ≤ 20 g
- Protection class to IEC 60529:
  - IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18)
  - IP 67 (M12x1, when an IP 67 connector is used)

**Other data**
- Supply voltage:
  - 10 .. 30 V DC 2-conductor
  - 12 .. 30 V DC 3 conductor
- for use acc. to UL spec.:
  - limited energy - according to 9.3 UL 61010; Class 2;
  - UL 1310/1858; LPS UL 60950
- Residual ripple of supply voltage:
  - ≤ 5 %
- Current consumption:
  - ≤ 15 mA
- Life expectancy:
  - > 10 million cycles
  - 0 .. 100 % FS

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line
- ≤ ± 25 °C with FPM seal, -40 °C on request
- Environmental conditions according to 1.4.2 UL 61010-1: C22.2 No 61010-1
Model code: HDA 4 8 4 X – X – XXX – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
5 = Male, 3 pole+ PE, EN175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor
E = 0 .. 20 mA, 3 conductor

Pressure ranges in bar
006, 016; 060; 100; 250; 400; 600

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

Pin connections:

Binder series 714 M18

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 4844-A</th>
<th>HDA 4844-B</th>
<th>HDA 4844-E</th>
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<tbody>
<tr>
<td>1</td>
<td>n.c.</td>
<td>+U_a</td>
<td>+U_b</td>
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<tr>
<td>2</td>
<td>Signal+</td>
<td>Signal</td>
<td>Signal</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>n.c.</td>
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EN175301-803 (DIN 43650)

<table>
<thead>
<tr>
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<th>HDA 4845-B</th>
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<td>1</td>
<td>Signal+</td>
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<td>+U_b</td>
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<tr>
<td>2</td>
<td>Signal-</td>
<td>0 V</td>
<td>0 V</td>
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<tr>
<td>3</td>
<td>n.c.</td>
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M12x1

<table>
<thead>
<tr>
<th>Pin</th>
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<th>HDA 4846-B</th>
<th>HDA 4846-E</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_a</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
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<td>Signal</td>
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</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Pressure Transmitter**

**HDA 4700**

**Description:**
The pressure transmitter series HDA 4700 has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. The 4...20 mA or 0...10 V output signals enable connection to all measurement and control devices of HYDAC ELECTRONIC GMBH as well as standard evaluation systems (e.g. PLC controls). The main areas of application are in the mobile or industrial sectors of hydraulics and pneumatics, particularly in applications with restricted installation space.

**Special features:**
- Accuracy ≤ ± 0.25 % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

**Technical data:**

**Input data**
- Measurement ranges:
  - 6; 16; 60; 100; 250; 400; 600; 1000 bar
  - 15; 32; 120; 200; 500; 800; 1000; 1600 bar
- Burst pressures:
  - 100; 200; 300; 500; 1000; 2000; 2000; 3000 bar
- Mechanical connection:
  - G1/4 A DIN 3852
  - G1/2 A DIN 3852
- Torque value:
  - 20 Nm (G1/4); 45 Nm (G1/2)
- Parts in contact with medium:
  - Mech. conn.: Stainless steel
  - Seal: FPM

**Output data**
- Output signal, permitted load resistance:
  - 4..20 mA, 2 conductor: \( R_{\text{Lmin}} = (U_B - 8 \text{ V}) / 20 \text{ mA} [\Omega] \)
  - 0..10 V, 3 conductor: \( R_{\text{Lmax}} = 2 \text{ k}\Omega \)
- Accuracy to DIN 16086:
  - Max. setting: ≤ ± 0.5 % FS max.
  - Accuracy at min. setting:
    - (B.F.S.L.): ≤ ± 0.25 % FS max.
- Temperature compensation:
  - ≤ ± 0.008 % FS / °C typ.
  - ≤ ± 0.015 % FS / °C max.
- Over range:
  - ≤ ± 0.015 % FS / °C max.
- Non-linearity at max. setting:
  - ≤ ± 0.3 % FS max.
- Temperature compensation:
  - ≤ ± 0.008 % FS / °C typ.
- Temperature compensation:
  - ≤ ± 0.008 % FS / °C max.
- Over range:
  - ≤ ± 0.015 % FS / °C max.
- Non-linearity at max. setting:
  - to DIN 16086:
  - ≤ ± 0.3 % FS max.
- Hysteresis:
  - ≤ ± 0.1 % FS max.
- Repeatability:
  - ≤ ± 0.05 % FS
- Rise time:
  - ≤ 1 ms
- Long-term drift:
  - ≤ ± 0.1 % FS typ. / year

**Environmental conditions**
- Compensated temperature range:
  - -25 .. +85 °C
- Operating temperature range:
  - -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range:
  - -40 .. +100 °C
- Fluid temperature range:
  - -40 .. +100 °C / -25 .. +100 °C
- EC mark:
  - EN 61000-6-1 / 2 / 3 / 4
- other data:
  - Certificate No. E518391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
  - ≤ 20 g
- Protection class to IEC 60529:
  - IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18)
  - IP 67 (M12x1, when an IP 67 connector is used)

**Other data**
- Supply voltage:
  - 8 .. 30 V DC 2 conductor
  - 12 .. 30 V DC 3 conductor
  - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
- Residual ripple of supply voltage:
  - ≤ 5 %
- Current consumption:
  - ≤ 25 mA
- Life expectancy:
  - > 10 million cycles
- Weight:
  - ~ 145 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) 1000 bar only with mechanical connection G 1/2 A DIN 3852 and vice versa

2) 25 °C with FPM seal, -40 °C on request

3) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Model code: HDA 4 7 X X – X – XXX – 000

Mechanical connection
2 = G1/2 A DIN 3852 (only for “1000 bar” press. range)
4 = G1/4 A DIN 3852 (male)

Electrical connection
4 = Male, 4 pole Binder series 714 M18
(connector not supplied)
5 = Male, 3 pole + PE, EN175301-803
(DIN 43650)
(connector supplied)
6 = Male M12x1, 4 pole
(connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Pressure ranges in bar
006; 016; 060; 100; 250; 400; 600
1000 bar (only in conjunction with mechanical connection type “2”)

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label
or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the
Accessories brochure.

Dimensions:

Pin connections:

Binder series 714 M18

Pin HDA 47X4-A HDA 47X4-B
1 n.c. +U_B
2 Signal+ Signal
3 Signal- 0 V
4 n.c. n.c.

EN175301-803 (DIN 43650)

Pin HDA 47X5-A HDA 47X5-B
1 Signal+ +U_B
2 Signal- 0 V
3 n.c. Signal
4 n.c. n.c.

M12x1

Pin HDA 47X6-A HDA 47X6-B
1 Signal+ +U_B
2 n.c. n.c.
3 Signal- 0 V
4 n.c. Signal

Note:
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described. For applications or operating conditions not described, please contact the relevant
technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6997 509-01
Fax +49 (0)6997 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series. With its stainless steel measurement cell and thin-film strain gauge, the HDA 4700 is designed to measure relative pressures in the high pressure range. The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA. The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing. For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

**Approvals:**
- American Bureau of Shipping
- Lloyds Register of Shipping
- Det Norske Veritas
- Germanischer Lloyd
- Bureau Veritas

Other approvals on request

**Technical data:**

**Input data**

<table>
<thead>
<tr>
<th>Measurement ranges</th>
<th>6; 16; 40; 60; 100; 250; 400; 600 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>15; 32; 80; 120; 200; 500; 800; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>100; 200; 300; 500; 1000; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.: Stainless steel Seal: FPM</td>
</tr>
</tbody>
</table>

**Output data**

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>4 .. 20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086, Max. setting</td>
<td>≤ ± 0.25 % FS typ.</td>
</tr>
<tr>
<td>Accuracy at min. setting (B.F.S.L.)</td>
<td>≤ ± 0.15 % FS typ.</td>
</tr>
<tr>
<td>Temperature compensation Zero point</td>
<td>≤ ± 0.008 % FS / °C typ.</td>
</tr>
<tr>
<td>Temperature compensation Range</td>
<td>≤ ± 0.015 % FS / °C max.</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>≤ ± 0.3 % FS max.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.05 % FS</td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 1 ms</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.1 % FS typ. / year</td>
</tr>
</tbody>
</table>

**Environmental conditions**

| Compensated temperature range          | -25 .. +85 °C |
| Operating temperature range            | -40 .. +85 °C / -25 .. +85 °C |
| Storage temperature range              | -40 .. +100 °C |
| Fluid temperature range                | -40 .. +100 °C / -25 .. +100 °C |
| Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz | ≤ 20 g |
| Protection class to IEC 60529          | IP 65 (for male EN175301-803 (DIN 43850)) IP 67 (for M12x1 male, when an IP 67 connector female is used) |

**Other data**

| Supply voltage                         | 10 .. 32 V DC |
| Residual ripple of supply voltage      | ≤ 5 % |
| Life expectancy                        | > 10 million cycles |
| Weight                                 | ~ 150 g |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range B.F.S.L = Best Fit Straight Line 1° -25 °C with FPM seal, -40 °C on request
Model code: 

HDA 4 7 4 X – A – XXXX – S00

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar
0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600

Modification number
S00 = With approvals for shipping

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 4745-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
</tr>
<tr>
<td>2</td>
<td>Signal-</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 4746-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

Note:
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Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0) 6897 509-01
Fax +49 (0) 6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electronic Pressure Transmitter
HDA 4700
CANopen

Description:
The HDA 4700 CAN is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. The measured pressure value is digitized and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

This pressure transmitter, which is based on the HDA 4700, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications in the mobile and industrial sectors.

Special features:
- CANopen interface
- Accuracy ≤ ± 0.25 % FS typ.
- Robust thin-film cell
- Excellent EMC characteristics
- Very compact design

Technical data:

Input data
- Measuring ranges 1) 40; 100; 250; 400; 600; 1000 bar
- Overload pressures 80; 200; 500; 800; 1000; 1600 bar
- Burst pressures 200; 500; 1000; 2000; 3000 bar
- Mechanical connection 1) G1/4 A DIN 3852; G1/2 A DIN 3852
- Torque value 20 Nm (G1/4); 45 Nm (G1/2)
- Parts in contact with medium Mech. conn.: Stainless steel Seal: FPM

Output data
- Output signal CANopen protocol
- Accuracy to DIN 16086, Max. setting ≤ ± 0.25 % FS typ.
- Accuracy at min. setting ≤ ± 0.15 % FS typ.
- Temperature compensation ≤ ± 0.008 % FS / °C typ.
- Zero point ≤ ± 0.015 % FS / °C max.
- Temperature compensation ≤ ± 0.008 % FS / °C typ.
- Over range ≤ ± 0.015 % FS / °C max.
- Non-linearity at max. setting to DIN 16086 ≤ ± 0.3 % FS max.
- Hysteresis ≤ ± 0.1 % FS max.
- Repeatability ≤ ± 0.08 % FS
- Rise time ≤ 1 ms
- Long-term drift ≤ ± 0.1 % FS typ. / year

Environmental conditions
- Compensated temperature range -25..+85 °C
- Operating temperature range 1) -40..+85 °C / -25..+85 °C
- Storage temperature range -40..+100 °C
- Fluid temperature range 2) -40..+100 °C / -25..+100 °C

mark EN 61000-6-1 / 2 / 3 / 4
- mark 3) Certificate No. E518391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz ≤ 20 g
- Protection class to IEC 60529 IP 67

Other data
- Supply voltage 10..35 V DC
- Life expectancy > 10 million cycles
- Weight approx. 150 g

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

1) Full Scale = relative to complete measuring range
2) Special models available on request.
3) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

Special models available on request.
1) 1000 bar only with mechanical connection G1/2 A DIN 3852 and vice versa
2) -25 °C with FPM seal, -40 °C on request
Model code: HDA 4 7 X 8 – K – XXXX – 000

Mechanical connection
2 = G1/2 A DIN 3852 (only for "1000 bar" press. range)
4 = G1/4 A DIN 3852 (male)

Electrical connection
8 = Male M12x1, 5 pole (connector not supplied)

Signal
K = CANopen

Pressure ranges in bar
0040; 0100; 0250; 0400; 0600
1000 (only in conjunction with mechanical connection type "2")

Modification number
000 = Standard (Baud Rate: 250k Node Id: 1)

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Protocol data for CANopen:

- Communication profile: CiA DS 301 V4.2
- Device profile: CiA DS 404 V1.3
- Layer setting services and protocol: CiA DSP 305 V2.2
- Automatic bit-rate detection: CiA AN 801
- Baud rates: 10 kbit .. 1 Mbit corresp. to DS305 V2.2

Transmission services:
- PDO
- Transfer
  Measured value as 16/32 bit, float status synchronous, asynchronous, cyclical, measured value change, exceeding boundaries

Node ID/Baud rate: Can be set via Manufacturer Specific Profile

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Housing</td>
<td>shield/housing</td>
</tr>
<tr>
<td>2</td>
<td>+U_b</td>
<td>supply +</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>supply -</td>
</tr>
<tr>
<td>4</td>
<td>CAN_H</td>
<td>bus line dominant high</td>
</tr>
<tr>
<td>5</td>
<td>CAN_L</td>
<td>bus line dominant low</td>
</tr>
</tbody>
</table>

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Internet: www.hydac.com
Electronic Pressure Transmitter
HDA 4400

Description:
The pressure transmitter series HDA 4400 has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane. The 4...20 V or 0...10 V output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

The main areas of application are in the mobile or industrial sectors of hydraulics and pneumatics, particularly in applications with restricted installation space.

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

Technical data:

**Input data**

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>16; 60; 100; 250; 400; 600; 1000 bar</th>
</tr>
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<td>Overload pressures</td>
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<td>Burst pressures</td>
<td>200; 300; 500; 1000; 2000; 3000 bar</td>
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<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852; G1/2 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm (G1/4); 45 Nm (G1/2)</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.: Stainless steel Seal: FPM</td>
</tr>
</tbody>
</table>

**Output data**

Output signal, permitted load resistance

| 4...20 mA, 2 conductor |

\[ R_{\text{L}} = \frac{(U_B - 8 \text{ V})}{20 \text{ mA}} \] [kΩ]

| 0...10 V, 3 conductor |

\[ R_{\text{Lmin.}} = 2 \text{ kΩ} \]

Accuracy to DIN 16086

| ≤ ± 0.5 % FS typ. |

| ≤ ± 1 % FS max. |

Accuracy at min. setting

| ≤ ± 0.25 % FS typ. |

| ≤ ± 0.5 % FS max. |

Temperature compensation

| ≤ ± 0.015 % FS / °C typ. |

| ≤ ± 0.025 % FS / °C max. |

Zero point

| ≤ ± 0.3 % FS max. |

| ≤ ± 0.1 % FS |

Non-linearity at max. setting
to DIN 16086

| ≤ ± 0.3 % FS max. |

| ≤ ± 0.4 % FS max. |

Repeatability

| ≤ ± 0.1 % FS |

Rise time

| ≤ 1 ms |

Long-term drift

| ≤ ± 0.3 % FS typ. / year |

Environmental conditions

Compensated temperature range

| -25...+85 °C |

Operating temperature range

| -25...+85 °C |

Storage temperature range

| -40...+100 °C |

Fluid temperature range

| -40...+100 °C / -25...+100 °C |

Marking

| EN 61000-6-1/2/3/4 |

Vibration resistance to DIN EN 60068-2-6 at 10...500 Hz

| ≤ 20 g |

Protection class to IEC 60529

| IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) |
| ([M]arkable) Certificate No. E318391 |

Other data

Supply voltage

| 8...30 V DC, 2 conductor |

| 12...30 V DC, 3 conductor |

for use acc. to UL spec.

- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950

Residual ripple of supply voltage

| ≤ 5 % |

Current consumption

| ≤ 25 mA |

Life expectancy

| > 10 million cycles |

| 0...100 % FS |

Weight

| ~ 145 g |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) 1000 bar only with mechanical connection G 1/2 A DIN 3852 and vice versa

2) -25 °C with FPM seal, -40 °C on request

3) Environmental conditions in accordance with 1.4.2 UL 61010-1; C22.2 No 61010-1
**Model code:**

HDA 4 4 X X – X – XXX – 000

**Mechanical connection**

2 = G1/2 A DIN 3852 (only for “1000 bar” press. range)
4 = G1/4 A DIN 3852 (male)

**Electrical connection**

4 = Male, 4 pole Binder series 714 M18
   (connector not supplied)
5 = Male, 3 pole + PE, EN175301-803 (DIN 43650)
   (connector supplied)
6 = Male M12x1, 4 pole
   (connector not supplied)

**Signal**

A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

**Pressure ranges in bar**

016; 060; 100; 250; 400; 600
1000 bar (only in conjunction with mechanical connection type “2”)

**Modification number**

000 = Standard

**Note:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Pin connections:**

Binder series 714 M18

- Pin HDA 44X4-A
  - 1 n.c. +U_B
  - 2 Signal+ Signal
  - 3 Signal- 0 V
  - 4 n.c. n.c.

EN175301-803 (DIN 43650)

- Pin HDA 44X5-A
  - 1 Signal+ +U_B
  - 2 Signal- 0 V
  - 3 n.c. Signal

- Pin HDA 44X6-A
  - 1 Signal+ +U_B
  - 2 n.c. n.c.
  - 3 Signal- 0 V

**Dimensions:**

- Male electr. conn.
  - Binder series 714 -4pole

- Male electr. conn.
  - Binder series 714 -4pole

- Male electr. conn.
  - Binder series 714 -4pole

**Note:**

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The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

**Approvals:**
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- Germanischer Lloyd
- Bureau Veritas

**Technical data:**

### Input data

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<th>Input data</th>
<th>Measuring ranges</th>
<th>6; 16; 40; 60; 100; 250; 400; 600 bar</th>
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<td></td>
</tr>
<tr>
<td>Burst pressures</td>
<td>100; 200; 200; 300; 500; 1000; 2000; 2000 bar</td>
<td></td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
<td></td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
<td></td>
</tr>
</tbody>
</table>

### Parts in contact with medium

| Parts in contact with medium | Mech. connector: Stainless steel Seal: FPM |

### Output data

<table>
<thead>
<tr>
<th>Output data</th>
<th>Output signal, permitted load resistance</th>
<th>4 .. 20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086, Max. setting</td>
<td>≤ ± 0.5 % FS typ.</td>
<td></td>
</tr>
<tr>
<td>Accuracy at min. setting (B.F.S.L.)</td>
<td>≤ ± 0.25 % FS typ.</td>
<td></td>
</tr>
<tr>
<td>Temperature compensation Zero point</td>
<td>≤ ± 0.015 % FS / °C typ.</td>
<td></td>
</tr>
<tr>
<td>Temperature compensation Range</td>
<td>≤ ± 0.025 % FS / °C max.</td>
<td></td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>≤ ± 0.3 % FS max.</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.4 % FS max.</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.1 % FS</td>
<td></td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 1 ms</td>
<td></td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
<td></td>
</tr>
</tbody>
</table>

**Environmental conditions**

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th>Compensated temperature range</th>
<th>-25 .. +85 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-40 .. +85 °C / -25 .. +85 °C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +100 °C</td>
<td></td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +100 °C / -25 .. +100 °C</td>
<td></td>
</tr>
</tbody>
</table>

**CE mark**

| CE mark | EN 61000-6-1 / 2 / 3 / 4 |

**Vibration resistance to**

<table>
<thead>
<tr>
<th>Vibration resistance to</th>
<th>DIN EN 60068-2-6 at 10 .. 500 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20 g</td>
<td></td>
</tr>
</tbody>
</table>

**Protection class to IEC 60529**

<table>
<thead>
<tr>
<th>Protection class to IEC 60529</th>
<th>IP 65 (for male EN175301-803 (DIN 43650))</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67 (for M12x1 male when an IP 67 connector is used)</td>
<td></td>
</tr>
</tbody>
</table>

**Other data**

<table>
<thead>
<tr>
<th>Other data</th>
<th>Supply voltage</th>
<th>10 .. 32 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
<td></td>
</tr>
<tr>
<td>Life expectancy</td>
<td>&gt; 10 million cycles</td>
<td></td>
</tr>
<tr>
<td>0 .. 100 % FS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>~ 150 g</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1): -25 °C with FPM seal, -40 °C on request

Other approvals on request
Model code: HDA 4 4 4 X – A – XXXX – S00

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar
0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600

Modification number
S00 = With approvals for shipping

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Pin connections:

EN175301-803 (DIN 43650)

Pin  HDA 4445-A
1  Signal+
2  Signal-
3  n.c.
4  Housing

Pin  HDA 4446-A
1  Signal+
2  n.c.
3  Signal-
4  n.c.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electronic Pressure Transmitter  
HDA 4300

Description:
The pressure transmitter series HDA 4300 has a ceramic pressure measurement cell with a thick-film strain gauge which has been specially developed for measuring relative pressure in the low pressure range. The output signals 4 .. 20 mA or 0 .. 10 V allow connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as industry standard control and monitoring instruments.

The main areas of application are low-pressure applications in hydraulics and pneumatics, particularly in refrigeration and air-conditioning technology, the food and pharmaceutical industries.

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

Technical data:

Input data:

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>1; 2.5; 4; 6; 10; 16; 25; 40 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>3; 8; 12; 20; 32; 50; 80; 120 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>5; 12; 18; 30; 48; 75; 120; 180 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852; G1/2 B DIN-EN 837</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm (G1/4); 45 Nm (G1/2)</td>
</tr>
</tbody>
</table>

Output data:

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>4 .. 20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086 Max. setting</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td>Accuracy at min. setting  (B.F.S.L.)</td>
<td>≤ ± 0.5 % FS max.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>≤ ± 0.02 % FS / °C typ.</td>
</tr>
<tr>
<td>Zero point</td>
<td>≤ ± 0.03 % FS / °C max.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>≤ ± 0.02 % FS / °C typ.</td>
</tr>
<tr>
<td>Over range</td>
<td>≤ ± 0.03 % FS / °C max.</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>≤ ± 0.5 % FS max.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.4 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.1 % FS</td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 1 ms</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
</tr>
</tbody>
</table>

Environmental conditions:

- Compensated temperature range: -25 .. +85 °C
- Operating temperature range: -25 .. +85 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 .. +100 °C / -25 .. +100 °C

Certificate No. E318391

Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

Other data:

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>8 .. 30 V DC 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>for use acc. to UL spec.</td>
<td>limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Current consumption</td>
<td>≤ 25 mA</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>&gt; 10 million cycles, 0 .. 100 % FS</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 150 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

1) -25 °C with FPM or EPDM seal. -40 °C on request
2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Model code:

HDA 4 3 X X – X – XXXX – 000 – X 1

Mechanical connection
1 = G1/2 B DIN-EN 837 (male)
4 = G1/4 A DIN 3852 (male)

Electrical connection
4 = Male, 4 pole Binder series 714 M18
(connector not supplied)
5 = Male, 3 pole + PE,
DIN EN175301-803 (DIN 43650)
(connector supplied)
6 = Male M12x1, 4 pole,
(connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Pressure ranges in bar
01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040
0005 (-1 .. 5); 0009 (-1 .. 9)

Modification number
000 = Standard

Seal material (in contact with fluid)
F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for refrigerants)

Material of connection (in contact with fluid)
1 = Stainless steel

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Pin connections:

Binder series 714 M18

Pin HDA 43X4-A HDA 43X4-B
1 n.c. +U_B
2 Signal+ Signal
3 Signal- 0 V
4 n.c. n.c.

EN175301-803 (DIN 43650)

Pin HDA 43X5-A HDA 43X5-B
1 Signal+ +U_B
2 Signal- 0 V
3 n.c. Signal
4 Housing Housing

M12x1

Pin HDA 43X6-A HDA 43X6-B
1 Signal+ +U_B
2 n.c. n.c.
3 Signal- 0 V
4 n.c. Signal

Note:
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Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electronic Pressure Transmitter
HDA 4300
with Approvals for Shipping

Description:
This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series. The HDA 4300 has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range. The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

Approvals:
- American Bureau of Shipping
- Lloyd's Register of Shipping
- Det Norske Veritas
- Germanischer Lloyd
- Bureau Veritas

Other approvals on request

Technical data:

### Input data

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>1; 2.5; 4; 6; 10; 16; 25; 40 bar -1 .. 5; -1 .. 9 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>3; 8; 12; 20; 32; 50; 80; 120 bar 20; 32 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>5; 12; 18; 30; 48; 75; 120; 180 bar 30; 48 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)</td>
</tr>
</tbody>
</table>

### Output data

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>4 .. 20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_Lmax._ = (U_B - 10 V) / 20 mA [kΩ]</td>
<td></td>
</tr>
<tr>
<td>Accuracy to DIN 16086, Max. setting</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td>Accuracy at min. setting (B.F.S.L.)</td>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>≤ ± 0.02 % FS / °C typ.</td>
</tr>
<tr>
<td>Zero point</td>
<td>≤ ± 0.03 % FS / °C max.</td>
</tr>
<tr>
<td>Temperature compensation Over range</td>
<td>≤ ± 0.02 % FS / °C typ.</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>≤ ± 0.5 % FS max.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.4 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.1 % FS</td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 1 ms</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
</tr>
</tbody>
</table>

### Environmental conditions

| Compensated temperature range           | -25 .. +85 °C           |
| Operating temperature range            | -30 .. +85 °C / -25 .. +85 °C |
| Storage temperature range              | -30 .. +100 °C          |
| Fluid temperature range                | -30 .. +100 °C / -25 .. +100 °C |
| C mark                                  | EN 61000-6-1 / 2 / 3 / 4 |
| Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz | ≤ 20 g |
| Protection class to IEC 60529          | IP 65 (for male EN175301-803 (DIN 43650)) |
|                                        | IP 67 (for M12x1 male, when an IP 67 connector is used) |

### Other data

| Supply voltage                          | 10 .. 32 V DC           |
| Residual ripple of supply voltage       | ≤ 5 %                   |
| Life expectancy                         | > 10 million cycles     |
|                                         | 0 .. 100 % FS           |
| Weight                                  | ~ 150 g                 |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L = Best Fit Straight Line

11 -25 °C with FPM or EPDM seal, -30 °C on request
Model code: HDA 4 3 4 X – A – XXXX – S00 – X 1

**Mechanical connection**
4 = G1/4 A DIN 3852 (male)

**Electrical connection**
5 = Male, 3 pole + PE,
EN175301-803 (DIN 43650)
(connector supplied)
6 = Male M12x1, 4 pole
(connector not supplied)

**Signal**
A = 4 .. 20 mA, 2 conductor

**Pressure ranges in bar**
01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040
0005 (-1 .. 5); 0009 (-1 .. 9)

**Modification number**
S00 = With approvals for shipping

**Seal material (in contact with fluid)**
F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for refrigerants)

**Material of connection (in contact with fluid)**
1 = Stainless steel

**Note:**
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

**Dimensions:**

**Pin connections:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 4345-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

**Pin connections:**

EN175301-803 (DIN 43650)

**Note:**
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Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
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Internet: www.hydac.com
Electronic Pressure Transmitter
HDA 4100

Description:
The pressure transmitter series HDA 4100 has a ceramic pressure measurement cell with thick-film strain gauge which has been specially developed for measuring absolute pressure in the low-pressure range. The 4 .. 20 mA or 0 .. 10 V output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as standard control and evaluation systems. The main areas of application are low-pressure applications in hydraulics and pneumatics, particularly in refrigeration and air-conditioning technology, the food and pharmaceutical industries.

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

Technical data:

Input data:
- Measuring ranges
  - 1: 2.5 bar
  - 2: 8 bar
- Overload pressures
  - 3: 12 bar
- Burst pressures
  - 4: 16 bar
- Mechanical connection
  - G1/4 A DIN 3852; G1/2 B DIN-EN 837
- Torque value
  - 5N (G1/4); 45N (G1/2)
- Parts in contact with medium
  - Mech. connection: Stainless steel
  - Sensor cell: Ceramic
  - Seal: Copper (G1/2) / FPM / EPDM

Output data:
- Output signal, permitted load resistance
  - 4 .. 20 mA, 2 conductor
  - 0 .. 10 V, 3 conductor
- Accuracy to DIN 16086,
  - Max. setting
    - ≤ ± 0.5 % FS typ.
  - Accuracy at min. setting (B.F.S.L.)
    - ≤ ± 0.25 % FS typ.
    - ≤ ± 0.5 % FS max.
  - Temperature compensation
    - ≤ ± 0.02 % FS / °C typ.
    - ≤ ± 0.03 % FS / °C max.
  - Zero point
    - ≤ ± 0.03 % FS / °C typ.
  - Temperature compensation
    - ≤ ± 0.02 % FS / °C typ.
  - Over range
    - ≤ ± 0.03 % FS / °C typ.
  - Non-linearity at max. setting
    - ≤ ± 0.5 % FS max.
  - Hysteresis
    - ≤ ± 0.4 % FS max.
  - Repeatability
    - ≤ ± 0.1 % FS
  - Rise time
    - ≤ 1 ms
  - Long-term drift
    - ≤ ± 0.3 % FS typ. / year

Environmental conditions:
- Compensated temperature range
  - -25 .. +85 °C
- Operating temperature range
  - -25 .. +85 °C
- Storage temperature range
  - -40 .. +100 °C
- Fluid temperature range
  - -40 .. +100 °C / -25 .. +100 °C
- Mark
  - Certificate No. E318391
- Vibration resistance to
  - DIN EN 60068-2-6 at 10 .. 500 Hz
  - ≤ 20 g
- Protection class to IEC 60529
  - IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18)
  - IP 67 (M12x1, when an IP 67 connector is used)

Other data:
- Supply voltage
  - 8 .. 30 V DC 2 conductor
  - limited energy - according to 9.3 UL 61010; Class 2;
    - UL 1310/1585; LPS UL 60950
- Residual ripple of supply voltage
  - ≤ 5 %
- Current consumption
  - ≤ 20 mA
- Life expectancy
  - > 10 million cycles
  - 0 .. 100 % FS
- Weight
  - ~ 145 g

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- 1) -25 °C with FPM seal, -40 °C on request
- 2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Model code:

HDA 4 1 X X - X - XXXX - 000 - X 1

Mechanical connection
1 = G1/2 B DIN-EN 837 (male)
4 = G1/4 A DIN 3852 (male)

Electrical connection
4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Pressure ranges in bar
01.0; 02.5

Modification number
000 = Standard

Seal material (in contact with fluid)
F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for refrigerants)

Material of connection (in contact with fluid)
1 = Stainless steel

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Dimensions:

Pin connections:

Binder series 714 M18

Pin | HDA 41X4-A | HDA 41X4-B |
--- | --- | --- |
1 | n.c. | +Ub |
2 | Signal+ | Signal |
3 | Signal- | 0 V |
4 | n.c. | n.c. |

EN175301-803 (DIN 43650)

Pin | HDA 41X5-A | HDA 41X5-B |
--- | --- | --- |
1 | Signal+ | +Ub |
2 | Signal- | 0 V |
3 | n.c. | Signal |
4 | Housing | Housing |

M12x1

Pin | HDA 41X6-A | HDA 41X6-B |
--- | --- | --- |
1 | Signal+ | +Ub |
2 | n.c. | n.c. |
3 | Signal- | 0 V |
4 | n.c. | Signal |

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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Telephone +49 (0)6897 509-01
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E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.
The HDA 4100 has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range.
The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.
The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.
For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

Approvals:
● American Bureau of Shipping
● Lloyds Register of Shipping
● Det Norske Veritas
● Germanischer Lloyd
● Bureau Veritas

Other approvals on request

Electronic Pressure Transmitter
HDA 4100
with Approvals for Shipping

Technical data:

Input data

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>1; 2.5 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>3; 8 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>5; 12 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)</td>
</tr>
</tbody>
</table>

Output data

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>4 .. 20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086, Max. setting</td>
<td>≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Accuracy at min. setting (B.F.S.L.)</td>
<td>≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.</td>
</tr>
<tr>
<td>Temperature compensation, Zero point</td>
<td>≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.</td>
</tr>
<tr>
<td>Temperature compensation, Over range</td>
<td>≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>≤ ± 0.5 % FS max.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.25 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.1 % FS</td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 1 ms</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
</tr>
</tbody>
</table>

Environmental conditions

<table>
<thead>
<tr>
<th>Compensated temperature range</th>
<th>-25 .. +85 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-30 .. +85 °C / -25 .. +85 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-30 .. +100 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-30 .. +85 °C / -25 .. +85 °C</td>
</tr>
<tr>
<td>mark</td>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz</td>
<td>≤ 20 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 65 (for male EN175301-803 (DIN 43650))</td>
</tr>
<tr>
<td></td>
<td>IP 67 (for M12x1 male, when an IP 67 connector is used)</td>
</tr>
</tbody>
</table>

Other data

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>10 .. 32 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>&gt; 10 million cycles</td>
</tr>
<tr>
<td>0 .. 100 % FS</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>~ 150 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line
1) -25 ºC with FPM or EPDM seal, -30 ºC on request
Model code:
HDA 4 1 4 X – A – XXXX – S00 – X 1

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar
01.0; 02.5

Modification number
S00 = With approvals for shipping

Seal material (in contact with fluid)
F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for refrigerants)

Material of connection (in contact with fluid)
1 = Stainless steel

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Dimensions:

Pin connections:

EN175301-803 (DIN 43650)

Pin	HDA 4145-A
1	Signal+
2	Signal-
3	n.c.
4	Housing

Pin	HDA 4146-A
1	Signal+
2	n.c.
3	Signal-
4	n.c.

Note:
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HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
The pressure transmitter series HDA 7400 combines excellent technical specifications with a highly compact design.

The HDA 7446 was specifically developed for OEM applications e.g. in mobile applications. A strain gauge sensor cell is the basis for a robust, long-life pressure transmitter.

Various pressure ranges between 0 .. 40 bar and 0 .. 600 bar provide versatility when adapting to particular applications.

For integration into modern controls (e.g. with PLC), the analogue output signals 4 .. 20 mA or 0 .. 10V are also available on the standard version. Other output signals are available on request.

**Special features:**
- Accuracy ≤ ± 0.5 % FS typ.
- Highly robust sensor cell
- Very compact design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

**Input data**
- Measuring ranges: 40; 60; 100; 250; 400; 600 bar
- Overload pressures: 60; 120; 200; 500; 800; 1000 bar
- Burst pressures: 200; 300; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel
  Seal: FPM

**Output data**
- Output signal, permitted load resistance: 4 .. 20 mA, 2 conductor
  \( R_{\text{Lmax.}} = \frac{(U_B - 8 \text{ V})}{20 \text{ mA}} \) [kΩ]
  0 .. 10 V, 3 conductor
  \( R_{\text{Lmin.}} = 2 \text{ kΩ} \)
- Accuracy to DIN 16086
  Max. setting ≤ ± 0.5 % FS typ.
  Min. setting ≤ ± 0.25 % FS typ.
- Temperature compensation
  ≤ ± 0.015 % FS / °C typ.
  ≤ ± 0.025 % FS / °C max.
- Over range ≤ ± 0.025 % FS / °C max.
- Non-linearity at max. setting to DIN 16086 ≤ ± 0.3 % FS max.
- Hysteresis ≤ ± 0.4 % FS max.
- Repeatability ≤ ± 0.1 % FS
- Rise time ≤ 2 ms
- Long-term drift ≤ ± 0.3 % FS typ. / year

**Environmental conditions**
- Compensated temperature range: -25 .. +85 °C
- Operating temperature range: -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 .. +100 °C / -25 .. +100 °C
- \( \mathbf{C} \) mark: EN 61000-6-1 / 2 / 3 / 4
- \( \mathbf{UL} \) mark: Certificate No. E318391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz ≤ 20 g
- Protection class to IEC 60529 IP 67 (for M12x1, when an IP 67 connector is used)

**Other data**
- Supply voltage: 8 .. 30 V DC 2 conductor
- for use acc. to UL spec.: - limited energy - according to 9.3 UL 61010; Class 2;
  UL 1310/1585; LPS UL 60950
- Residual ripple of supply voltage ≤ 5 %
- Current consumption ≤ 25 mA
- Life expectancy > 10 million cycles
- Weight ≤ 60 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

**B.F.S.L. = Best Fit Straight Line**

-25 °C with FPM seal, -40 °C on request

Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Model code: HDA 7 4 4 6 – X – XXX – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
6 = Male M12x1, 4 pole
   (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Pressure ranges in bar
040; 060; 100; 250; 400; 600

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

Pin connections:

M12x1

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 7446-A</th>
<th>HDA 7446-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+Uₖ</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Note:
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HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
The HDA 7400 CAN is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. The measured pressure value is digitized and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

This pressure transmitter, which is based on the HDA 7400, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications in the mobile and industrial sectors.

**Special features:**
- CANopen interface
- Accuracy ≤ ± 0.5 % FS typ.
- Robust thin-film cell
- Excellent EMC characteristics
- Very compact design

**Technical data:**

- **input data**
  - Measuring ranges: 40; 100; 250; 400; 600 bar
  - Overload pressures: 80; 200; 500; 800; 1000 bar
  - Burst pressures: 200; 500; 1000; 2000; 2000 bar
  - Mechanical connection: G1/4 A DIN 3852
  - Torque value: 20 Nm
  - Parts in contact with medium: Mech. conn.: Stainless steel Seal: FPM

- **Output data**
  - Output signal: CANopen protocol
  - Accuracy to DIN 16086
    - Max. setting: ≤ ± 0.5 % FS typ.
    - ± 1 % FS max.
  - Accuracy at min. setting
    - (B.F.S.L.) ≤ ± 0.25 % FS typ.
    - ≤ ± 0.5 % FS max.
  - Temperature compensation
    - ≤ ± 0.015 % FS / °C typ.
  - Zero point
    - ≤ ± 0.025 % FS / °C max.
  - Temperature compensation
    - ≤ ± 0.025 % FS / °C typ.
    - ≤ ± 0.025 % FS / °C max.
  - Over range
    - ≤ ± 0.03 % FS max.
  - Non-linearity at max. setting to DIN 16086
    - ≤ ± 0.3 % FS max.
  - Hysteresis
    - ≤ ± 0.4 % FS max.
  - Repeatability
    - ≤ ± 0.1 % FS
  - Rise time
    - ≤ 2 ms
  - Long-term drift
    - ≤ ± 0.3 % FS typ. / year

- **Environmental conditions**
  - Compensated temperature range: -25...+85 °C
  - Operating temperature range\(^1\)
    - -40...+85 °C / -25...+85 °C
  - Storage temperature range
    - -40...+100 °C
  - Fluid temperature range\(^2\)
    - -40...+100 °C / -25...+100 °C
  - Mark\(^3\)
    - EN 61000-6-1 / 2 / 3 / 4
  - Certificate No. E318391
  - Vibration resistance to DIN EN 60068-2-6 at 10...500 Hz
  - ≤ 20 g
  - Protection class to IEC 60952
    - IP 67
  - Residual ripple of supply voltage ≤ 5 %
  - Current consumption ≤ 25 mA
  - Life expectancy > 10 million cycles
  - 0...100 % FS
  - Weight ~ 60 g

**Note:** Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

\(^1\) -25 °C with FPM seal, -40 °C on request

\(^2\) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

\(^3\) Certificate No. E318391
Model code: 

HDA 7 4 4 8 – K – XXXX – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
8 = Male M12x1, 5 pole
(connector not supplied)

Signal
K = CANopen

Pressure ranges in bar
0040; 0100; 0250; 0400; 0600

Modification number
000 = Standard (Baud Rate: 250k Node Id: 1)

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Protocol data for CANopen:

Communication profile
CiA DS 301 V4.2

Device profile
CiA DS 404 V1.3

Layer setting services and protocol
CiA DSP 305 V2.2

Automatic bit-rate detection
CiA AN 801

Baud rates
10 kbit .. 1 Mbit corresp. to DS305 V2.2

Transmission services
- PDO
- Transfer
  Measured value as 16/32 bit, float status synchronous, asynchronous, cyclical, measured value change, exceeding boundaries

Node ID/Baud rate
Can be set via Manufacturer Specific Profile

Dimensions:

Note:
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HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
This high-precision pressure transmitter was specially developed and adapted for the sophisticated measurement demands of steelworks technology.

The instrument has a very robust sensor cell with a thin-film strain gauge on a stainless steel membrane. Its outstanding specifications in respect of temperature effect (temperature drift for zero point and range are in each case max. ≤ ± 0.01 % FS / °C) and accuracy (≤ ± 0.15 % FS typ.) make it ideally suited for use in the environmental conditions found in steelworks.

The excellent EMC characteristics guarantee signal stability during the harshest high-frequency, electromagnetic interference.

Special features:
- Accuracy ≤ ± 0.15 % FS typ.
- Specially designed for use in steelworks and rolling mills
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent long term stability

Technical data:

Input data:

<table>
<thead>
<tr>
<th>Measurement ranges</th>
<th>16; 60; 100; 150; 250; 300; 350; 400; 500; 600 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>32; 120; 200; 500; 800; 900; 900; 900; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>200; 300; 500; 1000; 2000; 2000; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td></td>
<td>G1/2 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm (G1/4 A)</td>
</tr>
<tr>
<td></td>
<td>45 Nm (G1/2 A)</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.: Stainless steel</td>
</tr>
<tr>
<td></td>
<td>FPM (G1/4 A)</td>
</tr>
<tr>
<td></td>
<td>NBR O-ring (G1/2 A)</td>
</tr>
</tbody>
</table>

Output data:

| Output signal, permitted load resistance | 4 .. 20 mA, 2 conductor |
|                                         | R_Lmax_ = (U_B - 10 V) / 20 mA [kΩ] |
|                                         | 0 .. 20 mA, (3 conductor rising) |
|                                         | R_Lmax_ = (U_B - 10 V) / 20 mA [kΩ] |
| Accuracy to DIN 16086                   | ≤ ± 0.15 % FS typ. |
| Max. setting                            | ≤ ± 0.3 % FS max. |
| Accuracy at min. setting                | ≤ ± 0.15 % FS max. |
| (B.F.S.L.)                              | ≤ ± 0.15 % FS max. |
| Temperature compensation                | ≤ ± 0.005 % FS / °C typ. |
| Zero point                              | ≤ ± 0.01 % FS / °C max. |
| Temperature compensation                | ≤ ± 0.005 % FS / °C typ. |
| Over range                              | ≤ ± 0.01 % FS / °C max. |
| Non-linearity at max. setting            | ≤ ± 0.2 % FS max. |
| to DIN 16086                            | (from 100 bar ≤ ± 0.15 % FS max.) |
| Hysteresis                              | ≤ ± 0.1 % FS max. |
| Repeatability                           | ≤ ± 0.05 % FS |
| Rise time                               | ≤ 1.5 ms |
| Long-term drift                         | ≤ ± 0.1 % FS typ. / year |

Environmental conditions:

| Compensated temperature range           | -25 .. +85 °C |
| Operating temperature range             | -40 .. +85 °C / -25 .. +85 °C |
| Storage temperature range               | -40 .. +100 °C |
| Fluid temperature range                 | -40 .. +100 °C / -25 .. +100 °C |
| mark                                    | EN 61000-6-1 / 2 / 3 / 4 |

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
Protection class to IEC 60529: IP 68

Other data:

| Supply voltage 2 conductor              | 10 .. 30 V DC |
| Supply voltage 3 conductor              | 12 .. 30 V DC |
| Residual ripple of supply voltage       | ≤ 5 % |
| Current consumption 3 conductor         | approx. 25 mA |
| Life expectancy                         | > 10 million cycles, 0 .. 100 % FS |
| Weight                                  | ~ 210 g |

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- Other measuring ranges on request
- -25 °C with FPM seal, -40 °C on request
Model code:

HDA 3 8 X 0 – X – XXX – 124 (XXM)

Mechanical connection
0 = G1/2 A DIN 3852 (male)
4 = G1/4 A DIN 3852 (male)

Electrical connection
0 = Flying lead

Signal
A = 4 .. 20 mA, 2 conductor
E = 0 .. 20 mA, 3 conductor

Pressure ranges in bar
016; 060; 100; 150; 250; 300; 350; 400; 500; 600

Modification number
124 = Iron & steel works

Cable length in metres
06; 10; 15

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Dimensions:

Cable assignment:

<table>
<thead>
<tr>
<th>Core</th>
<th>HDA 38X0-A</th>
<th>HDA 38X0-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>black</td>
<td>n.c. +U_b</td>
<td>Signal</td>
</tr>
<tr>
<td>brown</td>
<td>Signal+</td>
<td>Signal</td>
</tr>
<tr>
<td>blue</td>
<td>Signal-</td>
<td>0 V</td>
</tr>
</tbody>
</table>

Cable type:
Öfflon cable 3 x 0.75 mm² shielded.
Outer sheath FEP black
Outer diameter 5.9 ± 0.15mm

Note:
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HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
## ELECTRONIC PRESSURE SWITCHES

Electronic pressure switches for general applications:

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<th>Model</th>
<th>Page</th>
</tr>
</thead>
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<td>EDS 3400</td>
<td>37</td>
</tr>
<tr>
<td>EDS 3400</td>
<td>41</td>
</tr>
<tr>
<td>EDS 3300</td>
<td>45</td>
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<tr>
<td>EDS 3300</td>
<td>49</td>
</tr>
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<td>EDS 3100</td>
<td>51</td>
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<td>EDS 3100</td>
<td>53</td>
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<td>EDS 300</td>
<td>57</td>
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<td>EDS 300</td>
<td>59</td>
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<td>EDS 300</td>
<td>61</td>
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<tr>
<td>EDS 8000</td>
<td>65</td>
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<tr>
<td>EDS 601</td>
<td>67</td>
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<tr>
<td>EDS 1700</td>
<td>69</td>
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<tr>
<td>EDS 4400</td>
<td>71</td>
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<td>EDS 4300</td>
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<tr>
<td>EDS 820</td>
<td>75</td>
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<tr>
<td>EDS 820</td>
<td>77</td>
</tr>
</tbody>
</table>

Further electronic pressure switches for special applications can be found in the Sections "Pressure Sensors with Flush Membrane", "Sensors for Potentially Explosive Atmospheres" and "OEM Products for Large Volume Production".

### Electronic Pressure Switches

<table>
<thead>
<tr>
<th>Feature</th>
<th>EDS 3400</th>
<th>EDS 3300</th>
<th>EDS 3100</th>
<th>EDS 300</th>
<th>EDS 8000</th>
<th>EDS 601</th>
<th>EDS 1700</th>
<th>EDS 4400</th>
<th>EDS 4300</th>
<th>EDS 4100</th>
<th>EDS 820</th>
<th>EDS 810</th>
<th>EDS 710</th>
<th>EDS 410</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (max. error)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
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<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
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<td>1.0</td>
</tr>
<tr>
<td>Low pressure (up to 40 bar)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
</tr>
<tr>
<td>High pressure (from 40 bar)</td>
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<td>✔️</td>
<td>✔️</td>
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<td>Relative pressure</td>
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<tr>
<td>Absolute pressure</td>
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<td>Number of switching outputs</td>
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<td>4</td>
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</tr>
<tr>
<td>Analogue output</td>
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<td>✔️</td>
<td>✔️</td>
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<tr>
<td>VDMA Menu Navigation</td>
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<td>Flush membrane</td>
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<tr>
<td>IO Link Interface</td>
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<td>ECE type authorisation (approved for road vehicles)</td>
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<tr>
<td>Approvals for Shipping</td>
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<td>UL Approval</td>
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</tr>
</tbody>
</table>

**Note:** Not all feature combinations are possible. For precise information, please consult the relevant data sheet.

Electronic pressure switches offer a multitude of advantages in comparison to mechanical pressure switches and contact pressure gauges. Their superiority is shown through greater accuracy, freedom from wear, long-term stability, simpler operation and the high number of switching cycles, among other things.
Description:
The EDS 3400 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high-pressure range. The instrument has a stainless steel measurement cell with thin-film strain gauge. The instrument can have one or two switching outputs and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3400 is that the display can be moved in two planes. The device can be installed in almost any position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in bar, psi or MPa.

The user can select the particular unit of measurement. When changing to a different measurement unit, the instrument automatically converts all the switching settings to the new unit of measurement. In addition, the EDS 3400 is also available in a DESINA®-compliant version. The main applications of the EDS 3400 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Special features:
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ ± 1 % FS
- Optional switchable analogue output (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two planes (axes)
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function

Technical data:

Input data:
- Measuring ranges: 40; 100; 250; 400; 600 bar
- Overload pressures: 80; 200; 500; 800; 1000; 2000; 2000 bar
- Burst pressures: 200; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Threaded port: DIN 3852-G1/4
- Torque value: 20 Nm
- Parts in contact with medium: Mechanical connection: Stainless steel Seal: FPM (G1/4 A DIN 3852)

Output data:
- Accuracy to DIN 60866:
  - ≤ ± 0.5 % FS typ.
  - ≤ ± 1 % FS max.
- (display, analogue output)
- Temperature drift:
  - ≤ ± 0.025 % FS / °C max. zero point
  - ≤ ± 0.025 % FS / °C max. range

Analogue output (optional):
- Selectable:
  - 4 .. 20 mA load resistance max. 500 Ω
  - 0 .. 10 V load resistance min. 1 kΩ

Switch outputs:
- Type: PNP transistor output
- Switching current: max. 1.2 A
- Switching cycles: > 100 million
- Reaction time: < 10 ms
- Long-term drift:
  - ≤ ± 0.3 % FS typ. / year

DESINA® diagnostic signal (Pin 2):
- Function: OK: HIGH level / not OK: LOW level
- Level: HIGH: approx. +U B / LOW: < +0.3 V

Environmental conditions:
- Compensated temperature range:
  - -10 .. +70 °C
- Operating temperature range:
  - -25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
- Storage temperature range:
  - -40 .. +80 °C
- Fluid temperature range:
  - -25 .. +80 °C
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
  - ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (11 ms):
  - ≤ 50 g
- Protection class to IEC 60529:
  - IP 67

Other data:
- Supply voltage:
  - 9 .. 35 V DC without analogue output
  - 18 .. 35 V DC with analogue output
- for use acc. to UL spec.:
  - limited energy - according to 9.3 UL 61010; Class 2;
  - UL 1310/1585; LPS UL 60950
- Current consumption:
  - max. 2.455 A total
  - max. 35 mA with inactive switching outputs
  - max. 55 mA with inactive switching outputs and analogue output
- Display:
  - 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight:
  - ~ 120 g

Note:
- Excess voltage, override protection and short circuit protection are provided.
- FS (Full Scale) = relative to the complete measurement range
Setting options:
All settings available on the EDS 3400 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Switch point in bar</th>
<th>Hysteresis in bar</th>
<th>Incremen* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 40</td>
<td>0.6 ... 40</td>
<td>0.2 ... 39.6</td>
<td>0.1</td>
</tr>
<tr>
<td>0 ... 100</td>
<td>1.6 ... 100</td>
<td>0.6 ... 99.0</td>
<td>0.2</td>
</tr>
<tr>
<td>0 ... 250</td>
<td>4.0 ... 250</td>
<td>1.5 ... 247.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0 ... 400</td>
<td>6.0 ... 400</td>
<td>2.0 ... 396</td>
<td>1</td>
</tr>
<tr>
<td>0 ... 600</td>
<td>9.0 ... 600</td>
<td>3.0 ... 594</td>
<td>1</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Lower switch value in bar</th>
<th>Upper switch value in bar</th>
<th>Incremen* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 40</td>
<td>0.6 ... 39.2</td>
<td>0.9 ... 39.6</td>
<td>0.1</td>
</tr>
<tr>
<td>0 ... 100</td>
<td>1.6 ... 98.2</td>
<td>2.4 ... 99</td>
<td>0.2</td>
</tr>
<tr>
<td>0 ... 250</td>
<td>4.0 ... 245.5</td>
<td>6.0 ... 247.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0 ... 400</td>
<td>6.0 ... 392</td>
<td>9.0 ... 396</td>
<td>1</td>
</tr>
<tr>
<td>0 ... 600</td>
<td>9.0 ... 589</td>
<td>14 ... 594</td>
<td>1</td>
</tr>
</tbody>
</table>

All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 ... 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Optional analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in the measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

EDS 3400 for self diagnostics:

The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

Model code:

**EDS 3 4 X X – X – XXXX – 000**

**Mechanical connection**

- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

**Electrical connection**

- 6 = Male M12x1, 4 pole only possible on output models "1", "2" and "3"
- 8 = Male M12x1, 5 pole only possible on output model "5"

**Output**

1 = 1 switching output only in conjunction with electrical connection type "6"
2 = 2 switching outputs only in conjunction with electrical connection type "6"
3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"

**Pressure ranges in bar**

0040; 0100; 0250; 0400; 0600

**Modification number**

D00 = DESINA®-compliant pin configuration for self-diagnostics

**EDS 3 4 X 8 – X – XXXX – D00**

**Mechanical connection**

- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

**Electrical connection**

- 8 = Male M12x1, 5 pole

**Output**

1 = 1 switching output
3 = 1 switching output and 1 analogue output

**Pressure ranges in bar**

0040; 0100; 0250; 0400; 0600

**Modification number**

D00 = DESINA®-compliant pin configuration for self-diagnostics

**Note:**

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Pressure Switch
EDS 3400
with Menu Navigation to VDMA

Description:
The EDS 3400 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high-pressure range. The device has a stainless steel measurement cell with thin-film strain gauge. The device can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V). A special design feature of the EDS 3400 is that the display can be moved in two planes. The unit can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the individual measurement unit. When changing to a different measurement unit, the EDS 3400 automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3400 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Special features:
- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ ± 1 % FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Rotation in two planes (axes) for optimum alignment
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions

Technical data:

### Input data
- Measuring ranges: 40; 100; 250; 400; 600 bar
- Overload pressures: 80; 200; 500; 800; 1000 bar
- Burst pressure: 2000; 5000; 10000; 20000 bar
- Mechanical connection: G1/4 A DIN 3852
- Threaded port: DIN 3852-G1/4
- Torque value: 20 Nm
- Parts in contact with medium: Stainless steel
- Sensor cell: Stainless steel
- Seal: FPM

### Output data
- Accuracy to DIN 16086: ≤ ± 0.5 % FS typ.
- Max. setting: ≤ ± 1 % FS max.
- Repeatability: ≤ ± 0.25 % FS max.
- Temperature drift: ≤ ± 0.205 % FS / °C max. zero point
  ≤ ± 0.205 % FS / °C max. range
- Analogue output (optional):
  - Signal selectable: 4 .. 20 mA
  - 0 .. 10 V, load resistance max. 500 Ω
  - 0 .. 10 V, load resistance min. 1 kΩ

### Switch outputs
- Type: PNP transistor output
- Switching current: max. 1.2 A
- Switching cycles: > 100 million
- Reaction time: < 10 ms
- Long-term drift: ≤ ± 0.3 % FS typ. / year

### Environmental conditions
- Compensated temperature range: -10 .. +70 °C
- Operating temperature range: -25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -25 .. +80 °C

### Marking
- Certificate No.: E318391
- Mark 1: EN 61000-6-1 / 2 / 3 / 4
- Mark 2: Certificate No. E318391
- Mark 3: Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
  ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (11 ms)
  ≤ 50 g
- Protection class to IEC 60529: IP 67

### Other data
- Supply voltage:
  9 .. 35 V DC without analogue output
  18 .. 35 V DC with analogue output
  limited energy - according to
  9.3 UL 61010; Class 2;
  UL 1310/1585; LPS UL 60950
- Current consumption:
  max. 2.455 A total
  max. 35 mA with inactive switching outputs
  max. 55 mA with inactive switching outputs
- Display: 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight: 120 g

Note: Excess voltage, override protection and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range

1) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Lower limit of RP/FL in bar</th>
<th>Upper limit of SP/FH in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0..40</td>
<td>0.4</td>
<td>40.0</td>
</tr>
<tr>
<td>0..100</td>
<td>1.0</td>
<td>100.0</td>
</tr>
<tr>
<td>0..250</td>
<td>2.5</td>
<td>250.0</td>
</tr>
<tr>
<td>0..400</td>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>0..600</td>
<td>6</td>
<td>600</td>
</tr>
</tbody>
</table>

*All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = pressure window lower value
FH = pressure window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00..99.99 seconds
- Analogue output signal selectable 4..20 mA or 0..10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

Pin connections:

M12x1, 4 pole

Pin code:

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 34X6-1</th>
<th>EDS 34X6-2</th>
<th>EDS 34X6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
<td>+U_b</td>
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<tr>
<td>2</td>
<td>n.c.</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Electronic Pressure Switch
EDS 3400 with IO-Link Interface

Description:
The EDS 3400 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high-pressure range.
The device is equipped with a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).
Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.
The pressure switch series EDS 3400 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Special features:
● 1 PNP transistor switching output
● 1 universal output, configurable as PNP transistor switching output or analogue output
● Accuracy ≤ ± 1 % FS
● 4-digit digital display
● Optimum alignment: can be rotated in two axes

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>40; 100; 250; 400; 600 bar</td>
</tr>
<tr>
<td>Overload range</td>
<td>80; 200; 500; 800; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>200; 500; 1000; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel</td>
</tr>
<tr>
<td></td>
<td>Sensor cell: Stainless steel</td>
</tr>
<tr>
<td></td>
<td>Seal: FPM</td>
</tr>
</tbody>
</table>

Output data:

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output 1: PNP Transistor switching output</td>
<td></td>
</tr>
<tr>
<td>Output 2: can be configured as PNP transistor switching output or analogue output</td>
<td></td>
</tr>
<tr>
<td>Accuracy to DIN 16086</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td>Max. setting (display, analogue output)</td>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.25 % FS max.</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>≤ ± 0.025 % FS / °C max. zero point</td>
</tr>
<tr>
<td></td>
<td>≤ ± 0.025 % FS / °C max. range</td>
</tr>
</tbody>
</table>

Analogue output:

| Signal                      | 4 .. 20 mA load resistance max. 500 Ω |
|                            | 0 .. 10 V load resistance min. 1 kΩ |

Switch outputs:

| Type                         | PNP transistor switching output |
|                             | Switching current max. 250 mA per output |
|                             | Switching cycles > 100 million |
|                             | Reaction time < 10 ms |
|                             | Long term drift ≤ ± 0.3 % FS typ. / year |

Parameterisation:

Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the EDS 3400

Environmental conditions:

| Compensated temperature range | -10 .. +70 °C |
| Operating temperature range   | -25 .. +80 °C |
| Storage temperature range     | -40 .. +80 °C |
| Fluid temperature range       | -25 .. +80 °C |

Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz) ≤ 10 g

Shock resistance according to DIN EN 60068-2-29 (11 ms) ≤ 50 g

Protection class to IEC 60529 IP 67

Other data:

| Supply voltage               | 9 .. 35 V DC without analogue output |
| Current consumption          | ≤ 0.535 A with active switching outputs |
|                             | ≤ 35 mA with inactive switching outputs |
|                             | ≤ 55 mA with inactive switching output and analogue output |
| Display                      | 4-digit, LED, 7-segment, red, height of digits 7 mm |
| Weight                       | ~ 120 g |

Note: Excess voltage, override protection and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
Setting options:
All terms and symbols used for setting the EDS 3400 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Lower limit of RP/FL in bar</th>
<th>Upper limit of SP/FH in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 40</td>
<td>0.4</td>
<td>40.0</td>
</tr>
<tr>
<td>0 .. 100</td>
<td>1.0</td>
<td>100.0</td>
</tr>
<tr>
<td>0 .. 250</td>
<td>2.5</td>
<td>250.0</td>
</tr>
<tr>
<td>0 .. 400</td>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>0 .. 600</td>
<td>6</td>
<td>600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Min. difference between RP and SP &amp; FL and FH in bar</th>
<th>Increment* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 40</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>0 .. 100</td>
<td>1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>0 .. 250</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0 .. 400</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>0 .. 600</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.
SP = switch point
RP = switch-back point
FL = pressure window lower value
FH = pressure window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable: 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L+</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>2</td>
<td>I/Q</td>
<td>Switching output (SP2) / analogue output</td>
</tr>
<tr>
<td>3</td>
<td>L-</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>C/Q</td>
<td>IO-Link communication / switching output (SP1)</td>
</tr>
</tbody>
</table>

IO-Link-specific data:

- Baud rate: 38.4 kBaud *
- Cycle time: 2.5 ms
- Process data width: 16 Bit
- Frame type: 2.2
- Specification: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:
http://www.hydac.com/de-en/service/downloads-software-on-request/

Model code:

EDS 3 4 X 6 – L – XXXX – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)
9 = Threaded port DIN 3852-G1/4

Electrical connection
6 = Male M12x1, 4 pole (connector not supplied)

Output
L = IO Link Interface

Pressure ranges in bar
0040; 0100; 0250; 0400; 0600

Modification number
000 = Standard

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
**Description:**
The EDS 3300 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low-pressure range. It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V). A special design feature of the EDS 3300 is that the display can be moved in two planes (axes). The instrument can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular unit of measurement. When changing to a different measurement unit, the instrument automatically converts all the switching settings to the new unit of measurement. In addition, the EDS 3300 is also available in a DESINA®-compliant version.

The main applications of the EDS 3300 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

**Special features:**
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ ± 1 % FS
- Optional switchable analogue output (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function

**Technical data:**

**Input data**
- Measuring ranges: -1 .. 1; 1; 2.5; 6; 10; 16 bar
- Overload pressures: ± 3; 8; 18; 30; 48 bar
- Burst pressures: 5; 5; 12; 30; 50; 80 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm (G1/4)

**Output data**
- Accuracy to DIN 16086, ≤ ± 0.5 % FS typ.
- Max. setting (display, analogue output): ≤ ± 1 % FS max.
- Repeatability: ≤ ± 0.25 % FS max.
- Temperature drift: ≤ ± 0.025 % FS / °C max. zero point
- Analogue output (optional): 4 .. 20 mA / 0 .. 10 V
- Switch outputs:
  - Type: PNP transistor output
  - Switching current: max. 1.2 A
  - Switching cycles: > 100 million
  - Reaction time: < 10 ms
  - Long-term drift: ≤ ± 0.3 % FS typ. / year

**Environmental conditions**
- Compensation temperature range: -10 .. +70 °C
- Operating temperature range: -25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -25 .. +80 °C

**Mark**
- EN 61000-6-1 / 2 / 3 / 4

**Other data**
- Supply voltage: 9 .. 35 V DC without analogue output
- Current consumption: max. 2.455 A total
- Display: 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight: ~ 120 g

**External visual notes:**
- Excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range

Note: Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All settings offered by the EDS 3300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switch outputs:

**Switching point function**

<table>
<thead>
<tr>
<th>Switch point</th>
<th>Hysteresis</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 ... 1</td>
<td>-0.97 ... 1</td>
<td>-0.99 ... 0.98</td>
</tr>
<tr>
<td>0 ... 1</td>
<td>0.016 ... 1</td>
<td>0.006 ... 0.99</td>
</tr>
<tr>
<td>0 ... 2.5</td>
<td>0.04 ... 2.5</td>
<td>0.015 ... 2.475</td>
</tr>
<tr>
<td>0 ... 6</td>
<td>0.09 ... 6</td>
<td>0.3 ... 5.94</td>
</tr>
<tr>
<td>0 ... 10</td>
<td>0.16 ... 10</td>
<td>0.06 ... 9.9</td>
</tr>
<tr>
<td>0 ... 16</td>
<td>0.25 ... 16</td>
<td>0.1 ... 15.8</td>
</tr>
</tbody>
</table>

**Window function**

<table>
<thead>
<tr>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 ... 1</td>
<td>-0.97 ... 0.96</td>
<td>-0.95 ... 0.98</td>
</tr>
<tr>
<td>0 ... 1</td>
<td>0.016 ... 0.982</td>
<td>0.024 ... 0.99</td>
</tr>
<tr>
<td>0 ... 2.5</td>
<td>0.04 ... 2.455</td>
<td>0.06 ... 2.475</td>
</tr>
<tr>
<td>0 ... 6</td>
<td>0.09 ... 5.89</td>
<td>0.14 ... 5.94</td>
</tr>
<tr>
<td>0 ... 10</td>
<td>0.16 ... 9.82</td>
<td>0.24 ... 9.9</td>
</tr>
<tr>
<td>0 ... 16</td>
<td>0.25 ... 15.7</td>
<td>0.4 ... 15.8</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 ... 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4...20 mA or 0...10 V
- Pressure can be displayed in the measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

EDS 3300 for self diagnostics:

The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an “ERROR” message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

Model code:

**EDS 3 3 X X – X – XXXX – 000 – X 1**

- **Mechanical connection**
  1 = G1/2 B DIN-EN 837 (male)
  4 = G1/4 A DIN 3852 (male)
  9 = Threaded port DIN 3852-G1/4

- **Electrical connection**
  6 = Male M12x1, 4 pole
  8 = Male M12x1, 5 pole

- **Output**
  1 = 1 switching output
  2 = 2 switching outputs
  3 = 1 switching output and 1 analogue output
  5 = 2 switching outputs and 1 analogue output

- **Pressure ranges in bar**
  0001 (-1 ... 1); 01.0; 02.5; 06.0; 0010; 0016

- **Modification number**
  000 = Standard

- **Seal material (in contact with fluid)**
  F = FPM seal (e.g.: for hydraulic oils)
  E = EPDM seal (e.g.: for water, refrigerants)

- **Material of connection (in contact with fluid)**
  1 = Stainless steel

**EDS 3 3 X X – X – XXXX – D00 – X 1**

- **Mechanical connection**
  1 = G1/2 B DIN-EN 837 (male)
  4 = G1/4 A DIN 3852 (male)
  9 = Threaded port DIN 3852-G1/4

- **Electrical connection**
  8 = Male M12x1, 5 pole

- **Output**
  1 = 1 switching output
  3 = 1 switching output and 1 analogue output

- **Pressure ranges in bar**
  0001 (-1 ... 1); 01.0; 02.5; 06.0; 0010; 0016

- **Modification number**
  D00 =DESINA®-compliant pin configuration for self-diagnostics

- **Seal material (in contact with fluid)**
  F = FPM seal (e.g.: for hydraulic oils)
  E = EPDM seal (e.g.: for water, refrigerants)

- **Material of connection (in contact with fluid)**
  1 = Stainless steel

**Model code: DESINA®-compliant or can be connected to DESINA®:**

**EDS 3 3 X X – X – XXXX – D00 – X 1**

- **Mechanical connection**
  1 = G1/2 B DIN-EN 837 (male)
  4 = G1/4 A DIN 3852 (male)
  9 = Threaded port DIN 3852-G1/4

- **Electrical connection**
  8 = Male M12x1, 5 pole

- **Output**
  1 = 1 switching output
  3 = 1 switching output and 1 analogue output

- **Pressure ranges in bar**
  0001 (-1 ... 1); 01.0; 02.5; 06.0; 0010; 0016

- **Modification number**
  D00 =DESINA®-compliant pin configuration for self-diagnostics

- **Seal material (in contact with fluid)**
  F = FPM seal (e.g.: for hydraulic oils)
  E = EPDM seal (e.g.: for water, refrigerants)

- **Material of connection (in contact with fluid)**
  1 = Stainless steel

**Note:**
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Electronic Pressure Switch**

**EDS 3300**

**with Menu Navigation to VDMA**

**Description:**

The EDS 3300 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low-pressure range. It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3300 is that the display can be rotated in two planes. The unit can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular measurement unit. When changing to a different measurement unit, the EDS 3300 automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3300 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

**Special features:**

- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ ± 1 % FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two planes (axes)
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions

**Technical data:**

**Input data:**

- Measuring ranges: -1; 1; 2.5; 6; 10; 16 bar
- Overload pressures: 3; 3; 8, 18, 30, 48 bar
- Burst pressures: 5; 5; 12; 30; 50; 80 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm

**Output data:**

- Accuracy to DIN 16086, Max. setting (display, analogue output): ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.
- Repeatability: ≤ ± 0.25 % FS max.
- Temperature drift: ≤ ± 0.025 % FS / °C max. zero point
- ≤ ± 0.025 % FS / °C max. range

**Analogue output (optional):**

- Selectable: 4 .. 20 mA load resistance max. 500 Ω
- 0 .. 10 V load resistance min. 1 kΩ

**Switch outputs:**

- Type: PNP transistor output
- Switching current: max. 1.2 A
- Switching cycles: > 100 million
- Reaction time: < 10 ms
- Long-term drift: ≤ ± 0.3 % FS typ. / year

**Environmental conditions:**

- Compensated temperature range: -10 .. +70 °C
- Operating temperature range: -25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -25 .. +80 °C
- Mark: EN 61000-6-1 / 2 / 3 / 4
- Certificate No. E318391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz: ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (11 ms): ≤ 50 g
- Protection class to IEC 60529: IP 67

**Other data:**

- Supply voltage: 9 .. 35 V DC without analogue output
- 18 .. 35 V DC with analogue output
- Limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
- CE mark
- Certificate No. E318391
- Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

**Display:**

- 4-digit, LED, 7 segment, red, height of digits 7 mm

**Current consumption:**

- max. 2.455 A total
- max. 35 mA with inactive switching outputs
- max. 55 mA with inactive switching outputs and analogue output

**Weight:**

- 120 g

**Note:** Excess voltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range.
Setting options:
All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3300 can easily be adjusted via three buttons.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit of RP/FL</th>
<th>Upper limit of SP/FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>in bar</td>
<td>in bar</td>
<td>in bar</td>
</tr>
<tr>
<td>-1..1</td>
<td>-0.98</td>
<td>1.00</td>
</tr>
<tr>
<td>0..1</td>
<td>0.010</td>
<td>1.000</td>
</tr>
<tr>
<td>0..2.5</td>
<td>0.025</td>
<td>2.500</td>
</tr>
<tr>
<td>0..6</td>
<td>0.06</td>
<td>6.00</td>
</tr>
<tr>
<td>0..10</td>
<td>0.10</td>
<td>10.00</td>
</tr>
<tr>
<td>0..16</td>
<td>0.20</td>
<td>16.00</td>
</tr>
</tbody>
</table>

All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = pressure window lower value
FH = pressure window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa.

The scaling can also be adapted to indicate force, weight, etc.

Pin connections:
M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 33X6-1</th>
<th>EDS 33X6-2</th>
<th>EDS 33X6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>n.c</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

Model code:

EDS 3 3 X 6 – X – XXXX – V00 – X 1

Mechanical connection
4 = G1/4 A DIN 3852 (male)
9 = Threaded port DIN 3852-G1/4

Electrical connection
6 = Male M12x1, 4 pole

Output
1 = 1 switching output
2 = 2 switching outputs
3 = 1 switching output and 1 analogue output

Pressure ranges in bar
0001 (-1 .. 1 bar); 01.0; 02.5; 06.0; 0010; 0016

Modification number
V00 = Menu navigation in accordance with VDMA (Standard Sheet 24574)

Seal material (in contact with fluid)
F = FPM seal (e.g. for hydraulic oils)
E = EPDM seal (e.g. for water, refrigerants)

Connection material (in contact with fluid)
1 = Stainless steel

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

Setting options:
All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3300 can easily be adjusted via three buttons.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit of SP and RP</th>
<th>Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>in bar</td>
<td>Min. difference between RP and SP, FL and FH</td>
<td>in bar</td>
</tr>
<tr>
<td>-1..1</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>0..1</td>
<td>0.010</td>
<td>0.002</td>
</tr>
<tr>
<td>0..2.5</td>
<td>0.025</td>
<td>0.005</td>
</tr>
<tr>
<td>0..6</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>0..10</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>0..16</td>
<td>0.20</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = pressure window lower value
FH = pressure window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa.

The scaling can also be adapted to indicate force, weight, etc.

Pin connections:
M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 33X6-1</th>
<th>EDS 33X6-2</th>
<th>EDS 33X6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>n.c</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Pressure Switch**

**EDS 3300 with IO-Link Interface**

**Description:**
The EDS 3300 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low-pressure range. The device is equipped with a switching output and additional output that can be configured as switching or analogue output (4...20 mA or 0...10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 3300 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

**Special features:**
- IO Link Interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Accuracy ≤ ± 1 % FS
- 4-digit digital display
- Display can be rotated in two axes for optimal alignment

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>-1...1; 1...2.5; 6; 10; 16 bar</td>
</tr>
<tr>
<td>Overload range</td>
<td>3; 3; 8; 16; 30; 48 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>5; 5; 12; 30; 50; 80 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852 Threaded port DIN 3852-G1/4</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signals</td>
<td>Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output</td>
</tr>
<tr>
<td>Accuracy to DIN 16086</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td>Max. setting (display, analogue output)</td>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.25 % FS max.</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>≤ ± 0.025 % FS / °C max. zero point ≤ ± 0.025 % FS / °C max. range</td>
</tr>
</tbody>
</table>

**Analogue output**

| Signal | selectable: 4...20 mA load resistance max. 500 Ω 0...10 V load resistance min. 1 kΩ |

**Switch outputs**

| Type | PNP transistor switching output |
| Switching current | max. 250 mA per output |
| Switching cycles | > 100 million |
| Reaction time | < 10 ms |
| Long term drift | ≤ ± 0.3 % FS typ. / year |

**Parameterisation**

Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the EDS 3300

**Environmental conditions**

| Compensated temperature range | -10...+70 °C |
| Operating temperature range | -25...+80 °C |
| Storage temperature range | -40...+80 °C |
| Fluid temperature range | -25...+80 °C |

**Mark**

EN 61000-6-1 / 2 / 3 / 4

**Vibration resistance according to DIN EN 60068-2-6 (0...500 Hz)**

≤ 10 g

**Shock resistance according to DIN EN 60068-2-29 (11 ms)**

≤ 50 g

**Protection class to IEC 60529**

IP 67

**Other data**

| Supply voltage | 9...35 V DC without analogue output 18...35 V DC with analogue output |
| Current consumption | ≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output |
| Display | 4-digit, LED, 7-segment, red, height of digits 7 mm |
| Weight | ~ 120 g |

Note: Excess voltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range
Setting options:
All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Lower limit of RP / FL in bar</th>
<th>Upper limit of SP / FH in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 .. 1</td>
<td>-0.98</td>
<td>1.00</td>
</tr>
<tr>
<td>0 .. 1</td>
<td>0.010</td>
<td>1.000</td>
</tr>
<tr>
<td>0 .. 2.5</td>
<td>0.025</td>
<td>2.500</td>
</tr>
<tr>
<td>0 .. 6</td>
<td>0.06</td>
<td>6.00</td>
</tr>
<tr>
<td>0 .. 10</td>
<td>0.10</td>
<td>10.00</td>
</tr>
<tr>
<td>0 .. 16</td>
<td>0.20</td>
<td>16.00</td>
</tr>
</tbody>
</table>

Measuring range Min. difference between RP and SP & FL and FH in bar

| -1 .. 1                | 0.02                          | 0.01                          |
| 0 .. 1                 | 0.010                         | 0.002                         |
| 0 .. 2.5               | 0.025                         | 0.005                         |
| 0 .. 6                 | 0.06                          | 0.01                          |
| 0 .. 10                | 0.10                          | 0.02                          |
| 0 .. 16                | 0.20                          | 0.05                          |

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable to 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L+</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>2</td>
<td>I/Q</td>
<td>Switching output (SP2) / analogue output</td>
</tr>
<tr>
<td>3</td>
<td>L-</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>C/Q</td>
<td>IO-Link communication / switching output (SP1)</td>
</tr>
</tbody>
</table>

IO-Link-specific data:

| Baud rate | 38.4 kbaud * |
| Cycle time | 2.5 ms |
| Process data width | 16 Bit |
| Frame type | 2.2 |
| Specification | V1.1 |

Model code:

EDS 3 3 X 6 – L – XXXX – 000 – X 1

Mechanical connection
4 = G1/4 A DIN 3852 (male)
9 = Threaded port DIN 3852-G1/4

Electrical connection
6 = Male M12x1, 4 pole (connector not supplied)

Output
L = IO Link Interface

Pressure ranges in bar
0001 (-1 .. 1 bar); 01.0; 02.5; 06.0; 0010; 0016

Modification number
000 = Standard

Seal material (in contact with fluid)
F = FPM seal (e.g. for hydraulic oils)
E = EPDM seal (e.g. for water, refrigerants)

Material of connection (in contact with fluid)
1 = Stainless steel

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

Model: EDS 3 3 X 6 – L – XXXX – 000 – X 1

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com

Download the IO Device Description (IODD) from: http://www.hydac.com/de-en/service/downloads-software-on-request/
Description:
The EDS 3100 is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low-pressure range. It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 ... 20 mA or 0 ... 10 V).

A special design feature of the EDS 3100 is that the display can be rotated in two planes. The instrument can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular unit of measurement. When changing to a different measurement unit, the instrument automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3100 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Special features:
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ ± 1 % FS
- Optional switchable analogue output (4 ... 20 mA / 0 ... 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switchback hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function

Technical data:

Input data:
- Measuring ranges: 1; 2.5 bar
- Overload pressures: 5; 12 bar
- Torque value: 20 Nm (G1/4) / 45 Nm (G1/2)

Output data:
- Accuracy to DIN 16086, ≤ ± 0.5 % FS typ.
- Max. setting (display, analogue output) ≤ ± 1 % FS max.
- Repeatability ≤ ± 0.25 % FS max.
- Temperature drift ≤ ± 0.025 % FS / °C max. zero point
- ≤ ± 0.025 % FS / °C max. range

Analogue output (optional):
- Selectable: 4 ... 20 mA
- 0 ... 10 V
- Load resistance max. 500 Ω
- Load resistance min. 1 kΩ

Switch outputs:
- Type: PNP transistor output
- Switching current: up to 1.2 A
- Switching cycles: > 100 million
- Reaction time: < 10 ms
- Long-term drift: ≤ ± 0.3 % FS typ. / year

DESINA® diagnostic signal (Pin 2):
- Function: OK: HIGH level / not OK: LOW level
- Level: HIGH: approx. +U B / LOW: < +0.3 V

Environmental conditions:
- Compensated temperature range: -10 ... +70 °C
- Operating temperature range: -25 ... +80 °C (-25 ... +60 °C acc. to UL spec.)
- Storage temperature range: -40 ... +80 °C
- Fluid temperature range: -25 ... +80 °C
- Mark: EN 61000-6-1 \text{ EN 61326-1} / \text{ EN 61400-4-5} / \text{ EN 61400-4-7}
- Vibration resistance to DIN EN 60068-2-6 at 10 ... 500 Hz: ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (11 ms): ≤ 50 g
- Protection class to IEC 60529: IP 67

Other data:
- Supply voltage: 9 ... 35 V DC without analogue output
- for use acc. to UL spec.: 18 ... 35 V DC with analogue output
- - limited energy - according to 9.3 UL 61010; Class 2;
- UL 13101585; LPS UL 60950
- Current consumption: max. 2.455 A total
- max. 35 mA with inactive switching outputs
- max. 55 mA with inactive switching outputs and analogue output
- Display: 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight: ~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to the complete measurement range

Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
**Setting options:**
All settings available on the EDS 3100 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

**Setting ranges for the switch outputs:**

### Switching point function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Switch point in bar</th>
<th>Hysteresis in bar</th>
<th>Increment* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 1</td>
<td>0.016 .. 1</td>
<td>0.006 .. 0.99</td>
<td>0.002</td>
</tr>
<tr>
<td>0 .. 2.5</td>
<td>0.04 .. 2.5</td>
<td>0.015 .. 2.475</td>
<td>0.005</td>
</tr>
</tbody>
</table>

### Window function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Lower switch value in bar</th>
<th>Upper switch value in bar</th>
<th>Increment* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 1</td>
<td>0.016 .. 0.982</td>
<td>0.024 .. 0.99</td>
<td>0.002</td>
</tr>
<tr>
<td>0 .. 2.5</td>
<td>0.04 .. 2.455</td>
<td>0.06 .. 2.475</td>
<td>0.005</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

### Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switch direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

**EDS 3100 for self diagnostics:**

The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification.

A diagnostic signal enables errors to be detected and an “ERROR” message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

**Model code:**

EDS 3 1 X X – X – XXXX – 000 – X 1

### Mechanical connection

1 = G1/2 B DIN-EN 837 (male)
4 = G1/4 A DIN 3852 (male)
9 = Threaded port DIN 3852-G1/4

### Electrical connection

6 = Male M12x1, 4 pole only possible on output models "1", "2" and "3"
8 = Male M12x1, 5 pole only possible on output model "5"

### Output

1 = 1 switching output only in conjunction with electrical connection type "6"
2 = 2 switching outputs only in conjunction with electrical connection type "6"
3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"

### Pressure ranges in bar

01.0; 02.5

### Modification number

D00 = DESINA®-compliant pin configuration for self-diagnostics

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for water, refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

### Note:
For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.
Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Pin connections:

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 31X6-1</th>
<th>EDS 31X6-2</th>
<th>EDS 31X6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 31X8-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>DESINA®-compliant</th>
<th>Can be connected to DESINA®</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Diagnostics</td>
<td>Diagnostics</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>n.c.</td>
<td>Analogue</td>
</tr>
</tbody>
</table>
Description:
The EDS 3100 is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low-pressure range.

It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3100 is that the display can be rotated in two planes. The unit can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular measurement unit. When changing to a different measurement unit, the EDS 3100 automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3100 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Special features:
- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ ± 1 % FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two planes (axes)
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions

Technical data:

Input data:
- Measuring ranges: 1; 2.5 bar
- Overload pressures: 3; 8 bar
- Burst pressures: 5; 12 bar
- Mechanical connection: G1/4 A DIN 3852, Threaded port DIN 3852-G1/4
- Torque value: 20 Nm
- Parts in contact with medium: Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)

Output data:
- Accuracy to DIN 16086, Max. setting (display, analogue output) ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.
- Repeatability: ≤ ± 0.25 % FS max.
- Temperature drift: ≤ ± 0.025 % FS / °C max. zero point ≤ ± 0.025 % FS / °C max. range

Analogue output (optional):
- Signal: selectable:
  - 4 .. 20 mA load resistance max. 500 Ω
  - 0 .. 10 V load resistance min. 1 kΩ

Switch outputs:
- Type: PNP transistor output
- Switching current: max. 1.2 A
- Switching cycles: > 100 million
- Reaction time: < 10 ms
- Long-term drift: ≤ ± 0.3 % FS typ. / year

Environmental conditions:
- Compensated temperature range: -10 .. +70 °C
- Operating temperature range: -25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -25 .. +80 °C
- Mark: EN 61000-6-1 / 2 / 3 / 4
- Certificate No. E318391
- Vibration resistance to DIN EN 60668-2-6 at 10 .. 500 Hz: ≤ 10 g
- Shock resistance to DIN EN 60668-2-29 (11 ms): ≤ 50 g
- Protection class to IEC 60529: IP 67

Other data:
- Supply voltage: 9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
- Current consumption: max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
- Display: 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight: ~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.

1) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All terms and symbols used for setting the EDS 3100 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3100 can easily be adjusted via three buttons.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Lower limit of RP / FL in bar</th>
<th>Upper limit of SP / FH in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 1</td>
<td>0.010</td>
<td>1.000</td>
</tr>
<tr>
<td>0 ... 2.5</td>
<td>0.025</td>
<td>2.500</td>
</tr>
</tbody>
</table>

Measuring range
- Min. difference between RP and SP in bar
- Increment in bar
- 0 ... 1: 0.010, 0.002
- 0 ... 2.5: 0.025, 0.005

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 ... 99.99 seconds
- Analogue output signal selectable 4 ... 20 mA or 0 ... 10 V
- Pressure can be displayed in measurement units bar, psi, MPa.
  The scaling can also be adapted to indicate force, weight, etc.

Pin connections:
M12x1, 4 pole

Pin connections:
<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 31X6-1</th>
<th>EDS 31X6-2</th>
<th>EDS 31X6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_a</td>
<td>+U_b</td>
<td>+U_c</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The EDS 3100 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low-pressure range. The instrument is equipped with a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 3100 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Special features:
- IO Link Interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Accuracy ≤ ± 1 % FS
- 4-digit digital display
- Can be rotated in two axes for optimal alignment

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
</tr>
<tr>
<td>Overload pressures</td>
</tr>
<tr>
<td>Burst pressures</td>
</tr>
<tr>
<td>Mechanical connection</td>
</tr>
<tr>
<td>Torque value</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signals</td>
</tr>
<tr>
<td>Output 1: PNP transistor switching output</td>
</tr>
<tr>
<td>Output 2: can be configured as PNP transistor switching output or analogue output</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086</td>
</tr>
<tr>
<td>Max. setting (display, analogue output)</td>
</tr>
<tr>
<td>Repeatability</td>
</tr>
<tr>
<td>Temperature drift</td>
</tr>
</tbody>
</table>

Analogue output

<table>
<thead>
<tr>
<th>Analogue output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selectable:</td>
</tr>
<tr>
<td>4 .. 20 mA load resistance max. 500 Ω</td>
</tr>
<tr>
<td>0 .. 10 V load resistance min. 1 kΩ</td>
</tr>
</tbody>
</table>

Switch outputs

<table>
<thead>
<tr>
<th>Switch outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Switching current</td>
</tr>
<tr>
<td>Switching cycles</td>
</tr>
<tr>
<td>Reaction time</td>
</tr>
<tr>
<td>Long term drift</td>
</tr>
</tbody>
</table>

Parameterisation

<table>
<thead>
<tr>
<th>Parameterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the EDS 3100</td>
</tr>
</tbody>
</table>

Environmental conditions

<table>
<thead>
<tr>
<th>Environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensated temperature range</td>
</tr>
<tr>
<td>Operating temperature range</td>
</tr>
<tr>
<td>Storage temperature range</td>
</tr>
<tr>
<td>Fluid temperature range</td>
</tr>
</tbody>
</table>

IEC - mark

<table>
<thead>
<tr>
<th>IEC - mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 61060-6-1 / 2 / 3 / 4</td>
</tr>
</tbody>
</table>

Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)

<table>
<thead>
<tr>
<th>Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 10 g</td>
</tr>
</tbody>
</table>

Shock resistance according to DIN EN 60068-2-29 (11 ms)

<table>
<thead>
<tr>
<th>Shock resistance according to DIN EN 60068-2-29 (11 ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 50 g</td>
</tr>
</tbody>
</table>

Protection class to IEC 60529

<table>
<thead>
<tr>
<th>Protection class to IEC 60529</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67</td>
</tr>
</tbody>
</table>

Other data

<table>
<thead>
<tr>
<th>Other data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
</tr>
<tr>
<td>Current consumption</td>
</tr>
<tr>
<td>Display</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>Note</td>
</tr>
</tbody>
</table>

Note: Excess voltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range
Setting options:
All terms and symbols used for setting the EDS 3100 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Lower limit of RP / FL in bar</th>
<th>Upper limit of SP / FH in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 1</td>
<td>0.010</td>
<td>1.000</td>
</tr>
<tr>
<td>0 .. 2.5</td>
<td>0.025</td>
<td>2.500</td>
</tr>
</tbody>
</table>

Measuring range in bar | Min. difference between RP and SP / FL and FH in bar | Increment* in bar |
------------------------|-------------------------------------------------------|-------------------|
| 0 .. 1                 | 0.010                                                 | 0.002             |
| 0 .. 2.5               | 0.025                                                 | 0.005             |

* All ranges given in the table are adjustable by the increments shown.
SP = switch point
RP = switch-back point
FL = pressure window lower value
FH = pressure window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable: 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.
- Mechanical connection
  4 = G1/4 A DIN 3852 (male)
  9 = Threaded port DIN 3852-G1/4
- Electrical connection
  6 = Male M12x1, 4 pole (connector not supplied)
- Output
  L = IO Link Interface
- Pressure ranges in bar
  01.0; 02.5
- Modification number
  000 = Standard
- Seal material (in contact with fluid)
  F = FPM seal (e.g. for hydraulic oils)
  E = EPDM seal (e.g. for water, refrigerants)
- Material of connection (in contact with fluid)
  1 = Stainless steel

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

**Model code:**

| EDS 3 | 1 | X | 6 – L – XXXX – 000 – X 1 |

**IO-Link-specific data:**

- Baud rate: 115.2 kbaud *
- Cycle time: 2.5 ms
- Process data width: 16 Bit
- Frame type: 2.2
- Specification: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:
http://www.hydac.com/de-en/service/downloads-software-on-request/

**Pin connections:**

- M12x1, 4 pole
  - Pin: L+
  - Signal: Supply voltage
  - Description: IO-Link
  - Pin: I/Q
  - Signal: Switching output (SP2) / analogue output
  - Description: Standard IO
  - Pin: L-
  - Signal: Ground
  - Description: I/Q
  - Pin: C/Q
  - Signal: IO-Link communication / switching output (SP1)

**Dimensions:**

- Display turns thru 270°
- Housing turns thru 340°
- Male electr. conn. M12x1 4 pole

**Note:**
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The EDS 300 is a compact, electronic pressure switch with integral digital display.
Four different output models are available: with one switching point, with two switching points and both models can also have an additional analogue output signal 4 .. 20 mA.
The switching points and the associated hystereses can be adjusted using the keypad. For optimum adaptation to a particular application, the instrument has many additional adjustment parameters, e.g. switching delay times, N/O / N/C function of the outputs.
The main applications of the EDS 300 are to indicate pressures and limits in hydraulics and pneumatics and anywhere where high switching frequency or constant switching accuracy would overburden a mechanical pressure switch. The unit is ideal for building accumulator charging circuits or pump and compressor controls.

Special features:
- Integrated pressure sensor with thin-film strain gauge on stainless steel membrane
- Compact, robust construction
- Accuracy ± 1 % FS
- 3-digit digital display
- Easy to operate thanks to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Window function
- Many useful additional functions

Technical data:

### Input data
- Measuring ranges: 16; 40; 100; 250; 400; 600 bar
- Overload pressures: 32; 80; 200; 500; 800; 1000 bar
- Burst pressures: 200; 200; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel
  Seal: FPM

### Output data
- Accuracy to DIN 16086:
  - ± 0.5 % FS typ.
  - ± 1 % FS max.
- Repeatability: ± 0.5 % FS max.
- Temperature drift:
  - ± 0.03 % FS / °C max. zero point
  - ± 0.03 % FS / °C max. range

### Analogue output (optional)
- Signal: 4 .. 20 mA
- Load resistance: ≤ 400 Ω

### Switch outputs
- Type: PNP transistor output
- Switching current: max. 1.2 A per switch output
- Switching cycles: > 100 million
- Reaction time: approx. 10 ms

### Environmental conditions
- Compensation temperature range: -10 .. +70 °C
- Operating temperature range: -25 .. +80 °C
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -25 .. +80 °C
- CE mark: EN 61000-6-1 / 2 / 3 / 4
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
  - ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (11 ms):
  - ≤ 50 g
- Protection class to IEC 60529: IP 65

### Other data
- Supply voltage: 20 .. 32 V DC
- Current consumption: approx. 100 mA (inactive switch output)
- Display:
  - 3-digit, LED, 7 segment, red, height of digits 9.2 mm
- Weight: ~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
Setting options:
All settings available on the EDS 300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switch outputs:
Switching point function

<table>
<thead>
<tr>
<th>Meas. range</th>
<th>Switch point</th>
<th>Hysteresis</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 16</td>
<td>0.3 .. 16</td>
<td>0.1 .. 15.8</td>
<td>0.1</td>
</tr>
<tr>
<td>0 .. 40</td>
<td>0.6 .. 40</td>
<td>0.2 .. 39.6</td>
<td>0.2</td>
</tr>
<tr>
<td>0 .. 100</td>
<td>1.5 .. 100</td>
<td>0.5 .. 99.0</td>
<td>0.5</td>
</tr>
<tr>
<td>0 .. 250</td>
<td>3.0 .. 250</td>
<td>1.0 .. 248</td>
<td>1.0</td>
</tr>
<tr>
<td>0 .. 400</td>
<td>6.0 .. 400</td>
<td>2.0 .. 396</td>
<td>2.0</td>
</tr>
<tr>
<td>0 .. 600</td>
<td>15.0 .. 600</td>
<td>5.0 .. 590</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Meas. range</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 16</td>
<td>0.2 .. 15.9</td>
<td>0.3 .. 16</td>
<td>0.1</td>
</tr>
<tr>
<td>0 .. 40</td>
<td>0.4 .. 39.8</td>
<td>0.6 .. 40</td>
<td>0.2</td>
</tr>
<tr>
<td>0 .. 100</td>
<td>1.0 .. 99.5</td>
<td>1.5 .. 100</td>
<td>0.5</td>
</tr>
<tr>
<td>0 .. 250</td>
<td>2.0 .. 249.0</td>
<td>3.0 .. 250</td>
<td>1.0</td>
</tr>
<tr>
<td>0 .. 400</td>
<td>4.0 .. 398.0</td>
<td>6.0 .. 400</td>
<td>2.0</td>
</tr>
<tr>
<td>0 .. 600</td>
<td>10.0 .. 595.0</td>
<td>15.0 .. 600</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
● Switching mode of the switching outputs adjustable (switching point function or window function)
● Switching direction of the switching outputs adjustable (N/C or N/O function)
● Switch-on and switch-off delay adjustable from 0.0 .. 75.0 seconds
● Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
● Display filter for smoothing the display value during pressure pulsations
● Analogue output signal selectable 4 .. 20 mA
● Subsequent correction of zero point in the range ± 3 % FS possible

Model code:

<table>
<thead>
<tr>
<th>EDS 3 4 X – X – XXX – 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical connection</td>
</tr>
<tr>
<td>4  = G1/4 A DIN 3852 (male)</td>
</tr>
<tr>
<td>Electrical connection</td>
</tr>
<tr>
<td>4  = Male 4 pole Binder series 714 M18 (connector not supplied)</td>
</tr>
<tr>
<td>5  = Male 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)</td>
</tr>
<tr>
<td>6  = Male M12x1, 4 pole only possible on output models &quot;1&quot;, &quot;2&quot; and &quot;3&quot; (connector not supplied)</td>
</tr>
<tr>
<td>8  = Male M12x1, 5 pole only possible on output model &quot;5&quot; (connector not supplied)</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th></th>
<th>1 = 1 switching output only in conjunction with electrical connection type &quot;5&quot; or &quot;6&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 = 2 switching outputs only in conjunction with electrical connection &quot;4&quot; or &quot;6&quot;</td>
</tr>
<tr>
<td></td>
<td>3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type &quot;4&quot; or &quot;6&quot;</td>
</tr>
<tr>
<td></td>
<td>5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type &quot;8&quot;</td>
</tr>
</tbody>
</table>

Pressure ranges in bar

| 016; 040; 100; 250; 400; 600 |

Modification number

| 000  = Standard |

Notes:
Special models on request. For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The EDS 300 is a compact, electronic pressure switch with digital display. The pressure measurement is based on a strain gauge sensor cell in stainless steel. All parts in contact with the medium are in stainless steel, and are welded together. Since no seals are required in the sensor interior, leakage is eliminated.

Two relay switch outputs with N/O function and an additional analogue output signal (4 .. 20 mA) enable the pressure switch to be incorporated into modern controls. The switch points and the corresponding hystereses can easily be adjusted via the keypad. For optimum adaptation to a particular application, the instrument has many additional setting parameters, e.g. switching direction of the relays or switching delay times.

Areas of application are pressure or limit monitoring on marine transmissions, diesel engines, pumps and general hydraulic and pneumatic systems.

Approvals:
- American Bureau of Shipping
- Lloyds Register of Shipping
- Det Norske Veritas
- Germanischer Lloyd
- Bureau Veritas

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>-1..5; 6; 16; 40; 100; 250; 400; 600 bar</td>
</tr>
<tr>
<td>Overload pressures</td>
<td>15; 15; 32; 80; 200; 500; 800; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>100; 100; 200; 200; 500; 1000; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.: Stainless steel</td>
</tr>
<tr>
<td></td>
<td>Seal: FPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086, (display, analogue output)</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td>Max. setting</td>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.5 % FS max.</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>≤ ± 0.03 % FS / °C max. zero point</td>
</tr>
<tr>
<td></td>
<td>≤ ± 0.03 % FS / °C max. range</td>
</tr>
</tbody>
</table>

| analogue output                  | 4 .. 20 mA load resistance ≤ 400 Ω |

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>relay contacts (N/O)</td>
</tr>
<tr>
<td>Switching voltage</td>
<td>max. 60 V AC / DC</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 1 A per switch output</td>
</tr>
<tr>
<td>Switching capacity</td>
<td>max. 30 W / 30 VA</td>
</tr>
<tr>
<td></td>
<td>(for inductive load, use varistors)</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>20 million at minimum load</td>
</tr>
<tr>
<td></td>
<td>0.5 million at maximum load</td>
</tr>
<tr>
<td>Reaction time</td>
<td>approx. 10 ms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensated temperature range</td>
<td>-10 .. +70 °C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-25 .. +80 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +80 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-25 .. +80 °C</td>
</tr>
<tr>
<td>T mark</td>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>Vibration resistance to</td>
<td>5 .. 25 Hz: 3.2 mm</td>
</tr>
<tr>
<td>DIN EN 60068-2-6 at 10 .. 500 Hz</td>
<td>25 .. 500 Hz: 4 g</td>
</tr>
<tr>
<td>Shock resistance to</td>
<td>≤ 50 g</td>
</tr>
<tr>
<td>DIN EN 60068-2-29 (1 ms)</td>
<td></td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 65</td>
</tr>
</tbody>
</table>

Other data:
- Supply voltage                   | 20 .. 32 V DC |
- Current consumption              | approx. 100 mA (inactive switch output) |
- Display                          | 4-digit, LED, 7 segment, red, height of digits 9.2 mm |
- Weight                           | ~ 300 g |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range.
Setting options:
All settings available on the EDS 300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switch outputs:
Switching point function

<table>
<thead>
<tr>
<th>Measure range in bar</th>
<th>Switch point in bar</th>
<th>Hysteresis in bar</th>
<th>Increment* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 ... 5</td>
<td>-0.85 ... 5</td>
<td>-0.95 ... 4.9</td>
<td>0.05</td>
</tr>
<tr>
<td>0 ... 6</td>
<td>0.15 ... 6</td>
<td>0.05 ... 5.9</td>
<td>0.05</td>
</tr>
<tr>
<td>0 ... 16</td>
<td>0.3 ... 16</td>
<td>0.1 ... 15.8</td>
<td>0.1</td>
</tr>
<tr>
<td>0 ... 40</td>
<td>0.6 ... 40</td>
<td>0.2 ... 39.6</td>
<td>0.2</td>
</tr>
<tr>
<td>0 ... 100</td>
<td>1.5 ... 100</td>
<td>0.5 ... 99.0</td>
<td>0.5</td>
</tr>
<tr>
<td>0 ... 250</td>
<td>3.0 ... 250</td>
<td>1.0 ... 248</td>
<td>1.0</td>
</tr>
<tr>
<td>0 ... 400</td>
<td>6.0 ... 400</td>
<td>2.0 ... 396</td>
<td>2.0</td>
</tr>
<tr>
<td>0 ... 600</td>
<td>15.0 ... 600</td>
<td>5.0 ... 590</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Scale of the display range adjustable (bar or psi)
- Switching direction of the relays adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.0 .. 75.0 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Subsequent correction of zero point in the range ± 3 % FS possible

Pin connections:

DIN 43651

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 347-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ue</td>
</tr>
<tr>
<td>2</td>
<td>Centre relay 1 and 2</td>
</tr>
<tr>
<td>3</td>
<td>Relay contact 1 (SP 1)</td>
</tr>
<tr>
<td>4</td>
<td>0 V</td>
</tr>
<tr>
<td>5</td>
<td>Analogue</td>
</tr>
<tr>
<td>6</td>
<td>Relay contact 2 (SP 2)</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Model code:
EDS 347 7 - 4 - XXX - SXX

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
7 = Male 6 pole + PE, DIN 43651 (connector ZBE 10 not supplied)

Output
4 = 2 switch outputs and 1 analogue output

Pressure ranges in bar
006; 016; 040; 100; 250; 400; 600

Modification number
S00 = Version in bar (except -1 .. 5)
S13 = Vacuum version -1 .. 5 bar (in conjunction with pressure range 006)

Notes:
Special models on request.
For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

Note: The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
EDS 8000 is an electronic pressure switch in compact design which is simple to adjust. Models with one or two transistor switch outputs (PNP or NPN) are available. The switch points are set using the two keys and a four-digit display. During operation the switch position is indicated by either a red or a green backlight in the display.
For optimum adaptation to a particular application, the instrument has many additional adjustment parameters, e.g. switching delay times, N/O / N/C function of the outputs.
EDS 8000 is available in various pressure ranges between 0 .. 25 bar and 0 .. 600 bar.
The main applications of the EDS 8000 are to indicate pressures and limits in hydraulics and pneumatics, or any application where high switching frequency or consistent switching accuracy would overburden a mechanical pressure switch.

Special features:
- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs
- Robust stainless steel measurement cell
- Accuracy class ≤ ± 1 % FS
- 4-digit display
- Multi-colour switch display
- Protection class IP 67
- Simple operation with key programming
- Many useful additional functions

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
</tr>
<tr>
<td>Overload pressures</td>
</tr>
<tr>
<td>Burst pressures</td>
</tr>
<tr>
<td>Mechanical connection</td>
</tr>
<tr>
<td>Torque value</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086</td>
</tr>
<tr>
<td>Max. setting (display)</td>
</tr>
<tr>
<td>Repeatability</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Long-term stability</td>
</tr>
</tbody>
</table>

Switch outputs

Type: 1 or 2 transistor switching outputs
PNP or NPN

Switching current: max. 250 mA per output

Switching cycles: > 100 million

Reaction time: < 10 ms

Environmental conditions

Compensated temperature range: -25 ... + 85 °C
Ambient temperature range: -40 ... + 100 °C / -25 ... + 100 °C
Storage temperature range: -40 ... + 85 °C
Fluid temperature range: -40 ... +125 °C / -25 ... +125 °C
Nominal temperature range of display (read-out): -15 ... 70 °C

Mark: EN 61000-6-1 / 2 / 3 / 4

Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz): approx. 10 g

Shock resistance to DIN EN 60068-2-29 (11 ms): approx. 50 g

Protection class to IEC 60529: IP 67 (when an IP 67 connector is used)

Other data

Supply voltage: 9.6 ... 32 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950

Current consumption: max. 0.535 A total
max. 35 mA (with inactive switch output)

Display: 4-digit, LED, 7 segment, height of digits 4.5 mm

Life expectancy: > 10 million cycles (0 ... 100 %)

Weight: ~ 70 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range
1 -25 °C with FPM seal, -40 °C on request

2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All the terms and symbols used for setting the EDS 8000 as well as menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-1) for pressure switches. The EDS 8000 is easy and convenient to set up using the two buttons.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Lower limit of RP / FL in bar</th>
<th>Upper limit of SP / FH in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...20</td>
<td>0.25</td>
<td>25.00</td>
</tr>
<tr>
<td>0...40</td>
<td>0.4</td>
<td>40.0</td>
</tr>
<tr>
<td>0...100</td>
<td>1.0</td>
<td>100.0</td>
</tr>
<tr>
<td>0...250</td>
<td>2.5</td>
<td>250.0</td>
</tr>
<tr>
<td>0...400</td>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>0...600</td>
<td>6</td>
<td>600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Min. difference betw. RP &amp; SP and FL &amp; FH in bar</th>
<th>Increment* in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...20</td>
<td>0.25</td>
<td>0.05</td>
</tr>
<tr>
<td>0...40</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>0...100</td>
<td>1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>0...250</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0...400</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>0...600</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

SP = Switching point
RP = Switch-back point
FL = Pressure window lower value
FH = Pressure window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Display filter for smoothing the display value during pressure pulsations
- Pressure can be displayed in bar, psi, MPa

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>EDS 8446-1</th>
<th>EDS 8446-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_B</td>
<td>+U_B</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>SP 2</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

Model code:

EDS 8 4 4 6 - X - XXXX – X00

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
6 = Male M12x1, 4 pole (connector not supplied)

Output
1 = 1 switching output
2 = 2 switching outputs

Pressure ranges in bar
0025; 0040; 0100; 0250; 0400; 0600

Modification number
000 = Standard
N00 = Version with NPN switching outputs

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, etc, can be found in the Accessories brochure.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.
**Description:**
The EDS 601 is an electronic two-way pressure switch with display and analogue output. Its digitally adjustable switching points and switching hystereses make it ideally suited to applications which require frequent change-overs or accurate switch point setting. The variety of setting parameters ensures versatility for use in all control and monitoring tasks in hydraulics, pneumatics, process control and general test and control technology.

**Special features:**
- Two-channel pressure switch with change-over contacts
- Accuracy ≤ ± 1 % FS
- 4-digit LED display
- Signal output 4 .. 20 mA or 0 .. 10 V selectable
- Can be installed as a pressure gauge or as a front panel mounted unit
- Digitally adjustable parameters
- Optional permanent display of the switching point or of the pressure peak value
- Can be set to display values in any unit of measurement e.g.: kN, kg, psi, ...

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
</tr>
<tr>
<td>Overload pressures</td>
</tr>
<tr>
<td>Burst pressures</td>
</tr>
<tr>
<td>Mechanical connection</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086; Max. setting</td>
</tr>
<tr>
<td>(display, analogue output)</td>
</tr>
<tr>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
</tr>
<tr>
<td>Temperature drift</td>
</tr>
<tr>
<td>≤ ± 0.05 % FS / °C max. range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analogue output (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal</td>
</tr>
<tr>
<td>4 .. 20 mA</td>
</tr>
<tr>
<td>0 .. 10 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Switching voltage</td>
</tr>
<tr>
<td>Switching current</td>
</tr>
<tr>
<td>Switching capacity</td>
</tr>
<tr>
<td>Switching cycles</td>
</tr>
<tr>
<td>1 million with load</td>
</tr>
<tr>
<td>Reaction time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensated temperature range</td>
</tr>
<tr>
<td>Operating temperature range</td>
</tr>
<tr>
<td>Storage temperature range</td>
</tr>
<tr>
<td>Fluid temperature range</td>
</tr>
<tr>
<td>Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)</td>
</tr>
<tr>
<td>Shock resistance to DIN EN 60068-2-29 (1 ms)</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
</tr>
<tr>
<td>Current consumption</td>
</tr>
<tr>
<td>Switch-on current</td>
</tr>
<tr>
<td>Display</td>
</tr>
<tr>
<td>Connection supply voltage / analogue output</td>
</tr>
<tr>
<td>Connection relay outputs</td>
</tr>
<tr>
<td>Housing material</td>
</tr>
<tr>
<td>Weight</td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range
Setting options:
The EDS 601 combines a multitude of functions with easy operation so that frequently-used parameters can be changed quickly.

Switch point settings:
- Switching point relay 1 and 2 (1 % .. 100 % FS)
- Switching hysteresis 1 and 2 (0.5 % .. 99 % FS)

Basic settings:
- Switching direction relay 1 and 2 (pull-in/release)
- Switching delay relay 1 and 2 (0.00 .. 90 seconds)
- Switch-off delay relay 1 and 2 (0.00 .. 90 seconds)
- Primary display (pressure / switch point / peak value)
- Display filter (slow / medium / fast)
- Output signal (current / voltage)

Measuring range setting:
- Number of decimal places (0 .. 3; 4 digits in total)
- Lower measuring range limit (-995 .. 9995)
- Upper measuring range limit (-995 .. 9995)

Calibration options:
- Zero point of internal sensor
- Final value of internal sensor
- Zero point voltage output (approx. 0 .. 3 V)
- Final value voltage output (approx. 3.5 .. 10 V)
- Zero point current output (approx. 0 .. 7 mA)
- Final value current output (approx. 7.5 .. 24 mA)

Pin connections:

<table>
<thead>
<tr>
<th>EN175301-803 (DIN 43650) (voltage supply / analogue output)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIN 43651 (relay outputs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>PE</td>
</tr>
</tbody>
</table>

Dimensions:

<table>
<thead>
<tr>
<th>HYDAC ELECTRONIC GMBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hauptstraße 27, D-66128 Saarbrücken</td>
</tr>
<tr>
<td>Telephone +49 (0)6897 509-01</td>
</tr>
<tr>
<td>Fax +49 (0)6897 509-1726</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:electronic@hydac.com">electronic@hydac.com</a></td>
</tr>
<tr>
<td>Internet: <a href="http://www.hydac.com">www.hydac.com</a></td>
</tr>
</tbody>
</table>
Electronic Pressure Switch
EDS 1700

**Description:**
With its integrated pressure measurement cell, 4-digit display and 4 switching outputs, the EDS 1700 offers the user all the advantages of a modern electronic pressure switch. 4 switching points and switch-back points can be adjusted very simply and independently of one another using the keypad. For optimum integration in monitoring systems (e.g. with PLC), an analogue output (4 .. 20 mA or 0 .. 10V) is also available. The main areas of application of the EDS 1700 are in hydraulics and pneumatics. The instrument is ideal for use where frequent switching cycles (several million), stable switching point accuracy or simple and precise adjustability are required.

**Special features:**
- Integrated pressure sensor with strain gauge on stainless steel membrane
- Accuracy 0.5 % or 1 % FS
- 4-digit digital display
- Simple operation via key programming
- 4 limit relays, switching points and switch back points can be adjusted independently
- Analogue output signal selectable
- Many useful additional functions
- Optional mounting position (pressure connection on the top/bottom, keypad and display can be turned through 180°)
- Can be set to display values in any unit of measurement e.g.: kN, kg, psi, ...

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th>16; 40; 100; 250; 400; 600 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>32; 80; 200; 500; 800; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>200; 200; 500; 1000; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>Threaded port G1/4 DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th>EDS 1700-P: ± 0.5 % FS max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(display, analogue output)</td>
<td>EDS 1700-N: ± 1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>EDS 1700-P: ± 0.25 % FS max.</td>
</tr>
<tr>
<td>Temperature drift EDS 1700-P</td>
<td>≤ ± 0.02 % FS / °C max. zero point &amp; range</td>
</tr>
<tr>
<td>Temperature drift EDS 1700-N</td>
<td>≤ ± 0.03 % FS / °C max. zero point &amp; range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analogue output</th>
<th>4 .. 20 mA ohmic resistance ≤ 400Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 .. 10 V ohmic resistance ≥ 2 kΩ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th>4 relays with change-over contacts (2 groups, common supply of each group connected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Switching voltage</td>
</tr>
<tr>
<td></td>
<td>0.1 .. 250 V AC / DC</td>
</tr>
<tr>
<td>Switching current</td>
<td>0.009 .. 2 A per switch output</td>
</tr>
<tr>
<td></td>
<td>Switching capacity max. 50 W / 400 VA (for inductive load, use varistors)</td>
</tr>
<tr>
<td></td>
<td>Switching cycles 20 million at minimum load</td>
</tr>
<tr>
<td></td>
<td>1 million at maximum load</td>
</tr>
<tr>
<td>Reaction time</td>
<td>approx. 20 ms</td>
</tr>
</tbody>
</table>

**Environmental conditions**
- Compensated temperature range -10 .. +70 °C
- Operating temperature range -25 .. +60 °C
- Storage temperature range -40 .. +80 °C
- Fluid temperature range -25 .. +80 °C

<table>
<thead>
<tr>
<th>CE mark</th>
<th>EN 61000-6-1 / 2 / 3 / 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)</td>
<td>≤ 5 g</td>
</tr>
<tr>
<td>Shock resistance to DIN EN 60068-2-29 (1 ms)</td>
<td>≤ 10 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 65</td>
</tr>
</tbody>
</table>

**Other data**
- Supply voltage 22 .. 32 V DC
- Current consumption approx. 200 mA
- Residual ripple of supply voltage ≤ 10 %
- Display 4-digit, LED, 7 segment, red, height of digits 13 mm
- Electrical connection 14-pole, terminal block
- Housing material aluminium, anodised
- Weight ~ 800 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
Setting options:
The core of the unit is a microprocessor which provides many useful extra functions in addition to normal pressure switch operation. It is possible, for example, to activate switching delay times to prevent fast pressure peaks from triggering an unwanted switching cycle. All settings are made using the keypad.

Setting ranges of the switching points:
- Switching point relay 1 to 4: 1.5 % .. 100 % FS
- Switch-back relay 1 to 4: 1 % .. 99 % FS or alternatively switch-back hysteresis 1 to 4: 1 % .. 99 % FS

Note: FS (Full Scale) = relative to the full measurement range

Additional setting options:
- Switching direction of the relays 1 to 4 (N/C or N/O)
- Switch-on delay relays 1 to 4 in the range 0.00 .. 90 seconds
- Switch-off delay relays 1 to 4 in the range 0.00 .. 90 seconds
- Display of the actual pressure, a switching point or of the peak value
- Display filter (slow / medium / fast)
- Display range scale individually adaptable (bar, psi, user-selectable)
- Measurement unit (bar, psi) is displayed
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Programming disable

Terminal assignment:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>0 V</td>
</tr>
<tr>
<td>3</td>
<td>Analogue output Signal +</td>
</tr>
<tr>
<td>4</td>
<td>Analogue output Signal - (0 V)</td>
</tr>
<tr>
<td>5</td>
<td>Relay 1 N/C</td>
</tr>
<tr>
<td>6</td>
<td>Relay 1 N/O</td>
</tr>
<tr>
<td>7</td>
<td>Centre relay 1 and 2</td>
</tr>
<tr>
<td>8</td>
<td>Relay 2 N/C</td>
</tr>
<tr>
<td>9</td>
<td>Relay 2 N/O</td>
</tr>
<tr>
<td>10</td>
<td>Relay 3 N/C</td>
</tr>
<tr>
<td>11</td>
<td>Relay 3 N/O</td>
</tr>
<tr>
<td>12</td>
<td>Centre relay 3 and 4</td>
</tr>
<tr>
<td>13</td>
<td>Relay 4 N/C</td>
</tr>
<tr>
<td>14</td>
<td>Relay 4 N/O</td>
</tr>
</tbody>
</table>

Model code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 1</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
</tr>
<tr>
<td>XXX</td>
<td></td>
</tr>
<tr>
<td>000</td>
<td></td>
</tr>
</tbody>
</table>

Mechanical connection
9 = Threaded port G1/4 DIN 3852

Display
1 = 4-digit bar
2 = 4-digit psi

Accuracy
P = 0.5 %
N = 1 %

Pressure ranges in bar
016; 040; 100; 250; 400; 600

Modification number
000 = Standard

Note:
Special models on request.
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as mechanical adapters etc. can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Cable gland PG 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
</tr>
<tr>
<td>95.8</td>
</tr>
<tr>
<td>54</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The programmable electronic pressure switch in the series EDS 4400 has been specially developed to combine the advantages of a compact, robust and cost-effective device with the benefits of a programmable pressure switch. The EDS 4400 can be easily programmed using the HPG 3000 programming unit. Once the programming unit is disconnected from the EDS 4400, the pressure switch retains all the settings. This prevents unauthorised or incorrect adjustment of the settings.

The following parameters can be changed:
- Switching point
- Hysteresis
- Switching direction (N/O / N/C)
- Switching delay times

The EDS 4400 is suitable for high-pressure applications (starting at 40 bar) and has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane. In contrast to pressure switches which are factory-set according to customer requirements and are not field-adjustable, the programmable EDS 4400 is highly versatile and replaces a wide range of models. This is advantageous in respect of stock management.

Special features:
- Option of 1 or 2 switching outputs
- Option of PNP or NPN switching outputs
- High switching output capacity
- Accuracy ≤ ± 1 % FS
- Flexible user-programming
- Compact and robust design
- Also available in ATEX version for potentially explosive locations

Technical data:

### Input data
- Measuring ranges: 40; 100; 250; 400; 600 bar
- Overload pressures: 80; 200; 500; 800; 1000 bar
- Burst pressures: 200; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel
  Seal: FPM

### Output data
- Accuracy to DIN 16086: ≤ ± 0.5 % FS typ.
- Max. setting: ≤ ± 1 % FS max.
- Repeatability: ≤ ± 0.1 % FS max.
- Temperature drift: ≤ ± 0.03 % FS / °C max. zero point
  ≤ ± 0.03 % FS / °C max. range

### Switch output
- 1 or 2 transistor switch outputs PNP or NPN
  N/C or N/O

### Output load
- PNP:
  max. 1.2 A with 1 switching output
  max. 1 A each with 2 switching outputs

- NPN:
  max. 0.5 A with 1 switching output
  max. 0.3 A each with 2 switching outputs

### Switching points / Hysteresis
- User-programmable with HYDAC Programming Unit HPG 3000

### Rising switch point and falling switch point delay
- 8 ms to 2000 ms
  User-programmable with HYDAC Programming Unit HPG 3000

### Long-term drift
- ≤ ± 0.3 % FS typ. / year

### Environmental conditions
- Compensated temperature range
- -25 .. +85 °C
- Operating temperature range
- -25 .. +85 °C
- Storage temperature range
- -40 .. +100 °C
- Fluid temperature range\(^1\)
  -40 .. +100 °C / -25 .. +100 °C

### Mark
- EN 61000-6-1 / 2 / 3 / 4
- Certificate No. E318391

### Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
- ≤ 20 g

### Shock resistance to DIN EN 60068-2-29 (1 ms)
- ≤ 100 g

### Protection class to IEC 60529
- IP 67 (M12x1, when an IP 67 connector is used)

### Other data
- Supply voltage for use acc. to UL spec.
  - 8 .. 32 V DC
  - limited energy - according to 9.3 UL 61010; Class 2;
    UL 1310/1858; LPS UL 60950

- Current consumption
  ≤ 25 mA with inactive switching outputs
  ≤ 1.225 A with 1 switching output
  ≤ 2.025 A with 2 switching outputs

- Residual ripple of supply voltage
  ≤ 5 %

- Life expectancy
  > 10 million cycles, 0 .. 100 % FS

- Weight
  ~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range

\(^1\) -25 °C with FPM seal, -40 °C on request

\(^2\) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Increment in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 40</td>
<td>0.1</td>
</tr>
<tr>
<td>0 .. 100</td>
<td>0.2</td>
</tr>
<tr>
<td>0 .. 250</td>
<td>0.5</td>
</tr>
<tr>
<td>0 .. 400</td>
<td>1</td>
</tr>
<tr>
<td>0 .. 600</td>
<td>1</td>
</tr>
</tbody>
</table>

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

<table>
<thead>
<tr>
<th>Minimum value in ms</th>
<th>Maximum value in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch-on delay Ton1/Ton2</td>
<td>8</td>
</tr>
<tr>
<td>Switch-off delayToF1/ToF2</td>
<td>8</td>
</tr>
</tbody>
</table>

The increment for all instruments is 8 ms.

Pin connections:
M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Process connection</th>
<th>HPG connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U B</td>
<td>+U B</td>
</tr>
<tr>
<td>2</td>
<td>Out 2</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>Out 1</td>
<td>n.c.</td>
</tr>
<tr>
<td>5</td>
<td>n.c.</td>
<td>Comport</td>
</tr>
</tbody>
</table>

Model code:
EDS 4 4 4 8 – XXXX – X – P X – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
8 = Male M12x1, 5 pole

Pressure ranges in bar
0040; 0100; 0250; 0400; 0600

Number of switching outputs
1 = 1 switching output
2 = 2 switching outputs

Output technology
P = Programmable switching output

Output technology 2
P = PNP switching output
N = NPN switching output

Modification number
000 = Standard

Note:
For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

Programming Unit:
(must be ordered separately)

HPG 3000 – 000
Portable Programming Unit
Part. No. 909422

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The programmable electronic pressure switch in the series EDS 4300 was specially developed to combine the advantages of a compact, robust and cost-effective instrument with the benefits of a programmable pressure switch.

The EDS 4300 can be easily programmed using the HPG 3000 programming unit. Once the programming unit is disconnected from the EDS 4300, the pressure switch retains all the settings. This prevents unauthorised or incorrect adjustment of the settings.

The following parameters can be changed:
- Switching point
- Hysteresis
- Switching direction (N/O / N/C)
- Switching delay times

The EDS 4300 is suitable for low pressure applications (up to 16 bar) and has a pressure measurement cell with thick-film strain gauge on a ceramic membrane.

In contrast to pressure switches which are factory-set according to customer requirements and not field-adjustable, the programmable EDS 4300 is highly versatile and replaces a wide range of models. This is advantageous in respect of stock management.

Special features:
- Option of 1 or 2 switching outputs
- Option of PNP or NPN switching outputs
- High switching output capacity
- Accuracy ± 1 % FS
- Flexible user-programming
- Compact and robust design
- Also available in ATEX version for potentially explosive locations

Technical data:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>1; 2.5; 6; 10; 16 bar; -1 .. 1; -1 .. 9 bar</td>
</tr>
<tr>
<td>Overload pressures</td>
<td>3; 8; 20; 32; 50 bar; 3; 32 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>5; 12; 30; 48; 75 bar; 5; 48 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)</td>
</tr>
<tr>
<td>Accuracy to DIN 16086</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td>Max. setting</td>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>≤ ± 0.03 % FS °C max. zero point; ≤ ± 0.03 % FS °C max. range</td>
</tr>
<tr>
<td>Switch output</td>
<td>1 or 2 transistor switch outputs PNP or NPN N/C or N/O</td>
</tr>
<tr>
<td>Output load PNP</td>
<td>max. 1.2 A with 1 switching output max. 0.5 A on version with 1 switching output</td>
</tr>
<tr>
<td></td>
<td>max. 1 A each with 2 switching outputs NPN:</td>
</tr>
<tr>
<td></td>
<td>max. 0.3 A each on version with 2 switching outputs</td>
</tr>
<tr>
<td>Switching points / Hysteresis</td>
<td>user-programmable with HYDAC Programming Unit HPG 3000</td>
</tr>
<tr>
<td>Rising switch point and falling switch point delay</td>
<td>8 ms to 2000 ms; Freely programmable with HYDAC Programming Unit HPG 3000</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
</tr>
<tr>
<td>Environmental conditions</td>
<td>Certificat No. E-18391</td>
</tr>
<tr>
<td>Vibration resistance to DIN EN 6006-2-9 at 10 .. 500 Hz</td>
<td>≤ 20 g</td>
</tr>
<tr>
<td>Shock resistance to DIN EN 6006-2-9 (1 ms)</td>
<td>≤ 100 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67 (M12X1, when an IP 67 connector is used)</td>
</tr>
<tr>
<td>Supply voltage for use acc. to UL spec.</td>
<td>8 .. 32 V DC</td>
</tr>
<tr>
<td></td>
<td>- limited energy - according to 9.3 UL 81010; Class 2: UL 1510/1565; LPS UL 60950</td>
</tr>
<tr>
<td>Current consumption</td>
<td>≤ 25 mA with inactive switching outputs</td>
</tr>
<tr>
<td></td>
<td>≤ 1.225 A with 1 switching output</td>
</tr>
<tr>
<td></td>
<td>≤ 2.025 A with 2 switching outputs</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>&gt; 10 million cycles, 0 .. 100 % FS</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 145 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range
-25 °C with FPM or EPDM seal; -40 °C on request

1) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

2) -25 °C with FPM or EPDM seal, -40 °C on request

3) -25 °C with FPM or EPDM seal, -40 °C on request
**Setting options:**
In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

**Setting ranges for the switch outputs:**

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Increment in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 .. 1</td>
<td>0.01</td>
</tr>
<tr>
<td>0 .. 1</td>
<td>0.002</td>
</tr>
<tr>
<td>0 .. 2.5</td>
<td>0.005</td>
</tr>
<tr>
<td>0 .. 6</td>
<td>0.01</td>
</tr>
<tr>
<td>-1 .. 9</td>
<td>0.02</td>
</tr>
<tr>
<td>0 .. 10</td>
<td>0.02</td>
</tr>
<tr>
<td>0 .. 16</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The switch point (upper switch value) on all instruments is between 5% and 100% of the measuring range and the switch-back point (lower switch value) is between 1% and 96% of the measuring range.

<table>
<thead>
<tr>
<th>Minimum value in ms</th>
<th>Maximum value in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>2040</td>
</tr>
</tbody>
</table>

The increment for all instruments is 8 ms.

**Pin connections:**
M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Process connection</th>
<th>HPG connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ua</td>
<td>+Ua</td>
</tr>
<tr>
<td>2</td>
<td>Out 2</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>Out 1</td>
<td>n.c.</td>
</tr>
<tr>
<td>5</td>
<td>n.c.</td>
<td>Comport</td>
</tr>
</tbody>
</table>

**Model code:**

EDS 4 3 4 8 – XXXX – X – P X – 000 – X 1

**Mechanical connection**
4 = G1/4 A DIN 3852 (male)

**Electrical connection**
8 = Male M12x1, 5 pole

**Pressure ranges in bar**
01.0; 02.5; 06.0; 0010; 0016
0001(-1 .. 1); 0009(-1 .. 9)

**Number of switching outputs**
1 = 1 switching output
2 = 2 switching outputs

**Output technology**
P = Programmable switching output

**Output technology 2**
P = PNP switching output
N = NPN switching output

**Modification number**
000 = Standard

**Seal material (in contact with fluid)**
F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for water or refrigerants)

**Material of connection (in contact with fluid)**
1 = Stainless steel

**Note:**
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Dimensions:**

<table>
<thead>
<tr>
<th>Male electr. conn.</th>
<th>5 pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12x1</td>
<td>5 pole</td>
</tr>
<tr>
<td>male electr. conn.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>female electr. conn.</th>
<th>5 pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12x1</td>
<td>5 pole</td>
</tr>
<tr>
<td>female electr. conn.</td>
<td></td>
</tr>
</tbody>
</table>

**Programming Unit:**
(must be ordered separately)

HPG 3000 – 000
Portable Programming Unit
Part. No. 909422

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

**HYDAC ELECTRONIC GMBH**
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
EDS 820 with IO-Link communication interface is a compact electronic pressure switch for relative pressure measurement in the high-pressure range.

The device has two PNP transistor switch outputs, one of which can serve as the IO communication output. Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control.

Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 820 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

**Special features:**
- IO-Link interface or PNP transistor switch output
- 1 additional PNP transistor switching output
- Accuracy ≤ ± 1.0 % FS
- Highly robust sensor cell
- Status LED display for active switch outputs

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>25; 40; 60; 100; 250; 400; 600 bar</td>
</tr>
<tr>
<td>Overload range</td>
<td>50; 80; 120; 200; 500; 800; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>100; 200; 300; 500; 1250; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G¼ A DIN 3852 with 0.5 mm orifice</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signals</td>
<td>Pin 4: IO Link interface or user-configurable switching output</td>
</tr>
<tr>
<td></td>
<td>Pin 2: user-configurable switching output</td>
</tr>
<tr>
<td>Accuracy to DIN 16086, Max. setting</td>
<td>≤ ± 0.5 % FS typ.</td>
</tr>
<tr>
<td></td>
<td>≤ ± 1.0 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td></td>
</tr>
<tr>
<td>Temperature drift</td>
<td>≤ ± 0.03 % FS / °C max. zero point</td>
</tr>
<tr>
<td></td>
<td>≤ ± 0.03 % FS / °C max. range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PNP transistor output</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 250 mA per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
<tr>
<td>Reaction time</td>
<td>&lt; 10 ms</td>
</tr>
<tr>
<td>Long term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameterisation</th>
<th>Via IO-Link interface, with HYDAC programming device HPG 3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental conditions</td>
<td></td>
</tr>
<tr>
<td>Compensated temperature range</td>
<td>-25 .. +85 °C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 .. +85 °C / -25 .. +85 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +100 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +125 °C / -25 .. +125 °C</td>
</tr>
</tbody>
</table>

| Vibration resistance acc. to DIN EN 60068-2-6 at 0 .. 500 Hz  | ≤ 25 g |
| Shock resistance according to DIN EN 60068-2-29 (11 ms)     | ≤ 50 g |
| Protection class to IEC 60529                                   | IP 67 (M12x1 male connection, for use with an IP 67 connector) |

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>10 .. 32 V DC</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Current consumption</td>
<td>≤ 25 mA with inactive switching outputs</td>
</tr>
<tr>
<td></td>
<td>≤ 0.275 A with 1 active switching output</td>
</tr>
<tr>
<td></td>
<td>≤ 0.525 A with 2 active switching outputs</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 65 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, overrate and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

1) -25 °C for EPM seal, -40 °C on request
Pin connections:

M12x1, 4 pole

Pin | Signal | Description
--- | --- | ---
1 | L+ | Supply voltage
2 | I/Q | Switching output (SP2) / analogue output
3 | L- | Gnd
4 | C/Q | IO-Link communication / switching output (SP1)

Status LEDs:
The pressure switch has 3 status LEDs on the electrical connection:

- 2 LEDs (yellow) for the switching statuses of SP1 and SP2 and 1 LED (green) for the operating status

![Status LEDs diagram]

LED 1 (SP 1) Yellow Switching output 1 active (high)
LED 2 (SP 2) Yellow Switching output 2 active (high)
LED 3 (Com) Green, Supply voltage OK permanent switch in SIO mode
Green, Supply voltage OK switch in IO-Link mode

IO-Link-specific data:

- Baud rate: 38.4 kBaud *
- Cycle time: 2.5 ms
- Process data width: 16 Bit
- Frame type: 2.2
- Specification: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from: http://www.hydac.com/de-en/service/downloads-software-on-request/

Model code:

EDS 8 2 4 – XXXX – L – 000

- Mechanical connection: 4 = G1/4 A DIN 3852 (male)
- Pressure ranges in bar: 0025; 0040; 0060; 0100; 0250; 0400; 0600
- Output: L = IO Link Interface
- Modification number: 000 = Standard

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

![Dimensions diagram]

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
PRESSURE SENSORS WITH FLUSH MEMBRANES

Depending on the application and the medium used, it is not always possible to use standard pressure connections. This is the case, for example, with media which can cause the standard pressure connection to become blocked, clogged or frozen, or for applications where the medium changes frequently and residues can result in mixing or contamination of the media.

For such applications, HYDAC ELECTRONIC provides pressure sensors with flush membranes. On these, the pressure connection is closed off at the end with a flush-fitting, fully-welded stainless steel membrane and is filled internally with a special pressure transfer fluid. The process pressure being measured is transmitted hydrostatically to the sensor cell via the transfer pressure fluid.

Electronic pressure transmitters with flush membrane:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDA 4700</td>
<td>81</td>
</tr>
<tr>
<td>HDA 4400</td>
<td>83</td>
</tr>
<tr>
<td>HDA 4300</td>
<td>85</td>
</tr>
<tr>
<td>HDA 7400</td>
<td>87</td>
</tr>
</tbody>
</table>

Electronic pressure switches with flush membrane:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 3400</td>
<td>89</td>
</tr>
<tr>
<td>EDS 3300</td>
<td>93</td>
</tr>
</tbody>
</table>

You can find more sensors with flush membranes for special applications in the Section on "Sensors for potentially explosive atmospheres".
Description:
Pressure transmitter HDA 4700 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4700 with flush membrane has a stainless steel measurement cell with a thin film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The 4 .. 20 mA or 0 .. 10 V enable connection to all HYDAC measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

Special features:
- Pressure connection has a flush membrane
- Accuracy ≤ 0.25 % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Small, compact design

Technical data:

Input data:
- Measuring ranges: 40, 60, 100, 250, 400, 600 bar
- Overload pressures: 80, 120, 200, 500, 800, 1000 bar
- Burst pressures: 1)
  - G1/2 A DIN 3852: 2000 bar
  - G1/2 with add. front O-ring seal, cooling section: 2000 bar

Mechanical connection:
- G1/2 with add. front O-ring seal, cooling section

Pressure transfer fluid:
- Silicone-free oil

Torque value:
- 45 Nm

Parts in contact with medium:
- Stainless steel
- FPM
- FPM

Output data:
- Output signal, permitted load resistance:
  - 4 .. 20 mA, 2 conductor: R_{L_{max}} = (U_{B} - 8 V) / 20 mA [kΩ]
  - 0 .. 10 V, 3 conductor: R_{L_{min}} = 2 kΩ

Accuracy to DIN 16086:
- ≤ ± 0.25 % FS typ.
- ≤ ± 0.15 % FS typ.

Temperature compensation (B.F.S.L.):
- ≤ ± 0.008 % FS / °C typ.
- ≤ ± 0.015 % FS / °C max.

Temperature compensation:
- ≤ ± 0.008 % FS / °C typ.
- ≤ ± 0.015 % FS / °C max.

Non-linearity at max. setting to DIN 16086:
- ≤ ± 0.3 % FS max.

Hysteresis:
- ≤ ± 0.05 % FS max.

Repeatability:
- ≤ ± 0.05 % FS max.

Rise time:
- ≤ 1 ms

Long-term drift:
- ≤ ± 0.1 % FS typ. / year

Environmental conditions:
- Compensated temperature range:
  - -25 °C .. +85 °C
- Operating temperature range:
  - -40 °C .. +85 °C / -25 °C .. +85 °C
- Storage temperature range:
  - -40 °C .. +100 °C
- Fluid temperature range:
  - -40 °C .. +100 °C / -25 °C .. +100 °C
  - -40 °C .. +150 °C / -25 °C .. +150 °C for G1/2 with cooling section

Mark:
- Mark: EN 61000-6-1 / 2 / 3 / 4
- Mark: Certificate No. E318391

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
- ≤ 20 g

Protection class to IEC 60529:
- IP 65 (for EN175301-803 (DIN 43650))
- IP 67 (for M12x1, when an EN175301-803 (DIN 43650) female connector is used)

Other data:
- Supply voltage:
  - 5 .. 30 V DC
  - 12 .. 30 V DC
- for use acc. to UL spec.
  - limited energy - according to 9.3 UL 61010; Class 2;
  - UL 1510/1565; LPS UL 60950

Residual ripple of supply voltage:
- ≤ 5 %

Current consumption:
- ≤ 25 mA

Life expectancy:
- > 10 million cycles (0 .. 100 % FS)

Weight:
- ~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range, B.F.S.L = Best Fit Straight Line
1) G1/2 with additional front O-ring seal max. 1500 bar
2) Other seal materials on request
3) -25 °C with FPM seal, -40 °C on request
4) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1
**Model code:**

HDA 4 7 Z X – X – XXXX – XXX – 000

**Mechanical process connection**

**Z** = Flush membrane

**Electrical connection**

5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (female connector supplied)

6 = Male M12x1, 4 pole (female connector not supplied)

**Signal**

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

**Pressure ranges in bar**

0040; 0060; 0100; 0250; 0400; 0600

**Mechanical connection**

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G12 = G1/2 with additional front O-ring seal and cooling section

**Modification number**

000 = Standard

**Note:**

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories such as female electrical connectors can be found in the Accessories brochure.

**Dimensions:**

**Pin connections:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 47Z5-A</th>
<th>HDA 47Z5-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_a</td>
</tr>
<tr>
<td>2</td>
<td>Signal-</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

**M12x1**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 47Z6-A</th>
<th>HDA 47Z6-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_a</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

**HYDAC ELECTRONIC GMBH**

Hauptstraße 27, D-66128 Saarbrücken

Telephone +49 (0)6897 509-01

Fax +49 (0)6897 509-1726

E-mail: electronic@hydac.com

Internet: www.hydac.com
Electronic Pressure Transmitter
HDA 4400 with Flush Membrane

Description:
Pressure transmitter HDA 4400 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4400 with flush membrane has a stainless steel measurement cell with a thin film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The output signals 4 .. 20 mA or 0 .. 10 V enable connection to all HYDAC measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

Special features:
- Pressure connection has a flush membrane
- Accuracy ≤ 0.5 % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Small, compact design

Technical data:

Input data

- Measuring ranges: 40; 60; 100; 250; 400; 600 bar
- Overload pressures: 80; 120; 200; 500; 800; 900 bar
- Burst pressures: 200; 300; 500; 1000; 2000; 2000 bar

- Mechanical connection: G1/2 A DIN 3852
- Pressure transfer fluid: Silicone-free oil
- Torque value: 45 Nm for G1/2, 20 Nm for G1/4

Parts in contact with medium:
- Mech. conn.: Stainless steel
- Seal: FPM
- O-ring: FPM

Output data

- Output signal, permitted load resistance:
  - 4 .. 20 mA, 2 conductor: R_{Lmax} = (U_B - 8 V) / 20 mA [kΩ]
  - 0 .. 10 V, 3 conductor: R_{Lmin} = 2 kΩ
- Accuracy to DIN 16086:
  - ± 1 % FS max.
  - ± 0.5 % FS typ.
- Accuracy at min. setting (B.F.S.L.):
  - ± 2.5 % FS typ.
  - ± 0.5 % FS max.

Environmental conditions

- Compensation temperature range: -25 .. +85 °C
- Operating temperature range: -25 .. +85 °C
- Storage temperature range: -40 .. +100 °C

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
- ≤ 20 g

Protection class to IEC 60529:
- IP 65 (for EN175301-803 (DIN 43550))
- IP 67 (for M12x1, providing an IP 67 female connector is used)

Other data

- Supply voltage: 8 .. 30 V DC 2 conductor
- for use acc. to UL spec.:
  - 12 .. 30 V DC 3 conductor
- Current consumption: ≤ 25 mA
- Life expectancy: > 10 million cycles (0 .. 100 % FS)
- Weight: ~ 150 g

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range, B.F.S.L. = Best Fit Straight Line
- G1/2 with additional front O-ring seal max. 1500 bar
- Other seal materials on request
- -25 °C with FPM seal, -40 °C on request
- Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1
**Model code:**

HDA 4 4 Z X – X – XXXX – XXX – 000

**Mechanical process connection**

Z = Flush membrane

**Electrical connection**

5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650)
   (female connector supplied)
6 = Male M12x1, 4 pole
   (female connector not supplied)

**Signal**

A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

**Pressure ranges in bar**

0040; 0060; 0100; 0250; 0400; 0600

**Mechanical connection**

G01 = G1/2 A, DIN 3852
G02 = G1/2 with additional front O-ring seal
G04 = G1/4 with additional front O-ring seal
G12 = G1/2 with additional front O-ring seal and cooling section

**Modification number**

000 = Standard

**Note:**

Special models on request.
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories such as female electrical connectors can be found in the Accessories brochure.

**Dimensions:**

**Pin connections:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44Z5-A</th>
<th>HDA 44Z5-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_a</td>
</tr>
<tr>
<td>2</td>
<td>Signal-</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

**M12x1**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44Z6-A</th>
<th>HDA 44Z6-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_a</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

**Note:**

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Pressure Transmitter**

**HDA 4300 with Flush Membrane**

**Description:**
Pressure transmitter HDA 4300 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4300 with a flush membrane has a ceramic measurement cell with a thick film strain gauge for relative pressure measurement in the low pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The 4 .. 20 mA or 0 .. 10 V enable connection to all HYDAC measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

**Technical data:**

**Input data**

| Measuring ranges | -1; -1; 3; 1; 2.5; 4; 6; 10; 16; 25 bar |
| Overload pressures | 3; 32; 5; 12; 20; 32; 50; 80 bar |
| Burst pressures | 5; 48; 5; 12; 18; 30; 48; 75; 120 bar |

**Mechanical connection**

G1/2 A DIN 3852
G1/2 with add. front O-ring seal
G1/4 with add. front O-ring seal
G1/2 with add. front O-ring seal and cooling section

**Pressure transfer fluid**
Silicone-free oil

**Output data**

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 .. 20 mA, 2 conductor</td>
</tr>
<tr>
<td>R_L = (U_B - 8 V) / 20 mA [kΩ]</td>
</tr>
<tr>
<td>0 .. 10 V, 3 conductor</td>
</tr>
<tr>
<td>R_L = 2 kΩ</td>
</tr>
</tbody>
</table>

Accuracy to DIN 16086
Max. setting ≤ ± 0.5 % FS typ.
Acc. at min. setting ≤ ± 0.1 % FS max.
Temperature compensation ≤ ± 0.2 % FS / °C typ.
Zero point ≤ ± 0.03 % FS / °C max.
Temperature compensation ≤ ± 0.02 % FS / °C typ.
Over range ≤ ± 0.03 % FS / °C max.
Non-linearity at max. setting ≤ ± 0.5 % FS max.
Hysteresis ≤ ± 0.4 % FS max.
Repeatability ≤ ± 0.1 % FS max.
Rise time ≤ 1 ms
Long-term drift ≤ ± 0.3 % FS typ. / year

**Environmental conditions**

| Compensated temperature range | -25 ... +85 °C |
| Operating temperature range | -25 ... +85 °C |
| Storage temperature range | -40 ... +100 °C |
| Fluid temperature range | -40 ... +100 °C / -25 ... +150 °C for G1/2 with cooling section |

**Electrical data**

| Supply voltage | 8 ... 30 V DC 2 conductor |
| Current consumption | ≤ 25 mA |
| Life expectancy | > 10 million cycles (0 ... 100 % FS) |
| Weight | ~ 150 g |

**Special features:**

- Pressure connection has a flush membrane
- Accuracy ≤ 0.5 % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Very compact design

**Note:** Reverse polarity protection of the supply voltage, excess voltage, and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range, B.F.S.L. = Best Fit Straight Line

1) Other seal materials on request
2) -25 °C with FPM seal, -40 °C on request
3) Environmental conditions according to 1.4.2 UL 61010-1; 61010-2; C22.2 No. 61010-1
Model code: HDA 4 3 Z X – X – XXXX – XXX – 000

Mechanical process connection
Z = Flush membrane

Electrical connection
5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (female connector supplied)
6 = Male M12x1, 4 pole (female connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Pressure ranges in bar
01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0001 (-1..1); 0009 (-1..9)

Mechanical connection
G01 = G1/2 A DIN 3852
G02 = G1/2 with additional front O-ring seal
G04 = G1/4 with additional front O-ring seal
G12 = G1/2 with additional front O-ring seal and cooling section

Modification number
000 = Standard

Note:
Special models on request.
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories such as female electrical connectors can be found in the Accessories brochure.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electronic Pressure Transmitter
HDA 7400 with Flush Membrane

Description:
Pressure transmitter HDA 7400 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 7400 with flush membrane has a stainless steel measurement cell with a thin-film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The output signals 4 .. 20 mA or 0 .. 10 V permit connection to all HYDAC measuring and control devices, as well as connection to standard evaluation systems (e.g. PLC controls).

Special features:
● Pressure connection has a flush membrane
● Accuracy ≤ 0.5 % FS typ.
● Highly robust sensor cell
● Very compact design
● Very small temperature error
● Excellent EMC characteristics

Technical data:

Input data:
- Measuring ranges: 25; 40; 60; 100; 250; 400; 600 bar
- Overload pressures: 50; 80; 120; 200; 500; 800; 1000 bar
- Burst pressures: 125; 200; 300; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Pressure transfer fluid: Silicone-free oil
- Torque value: 20 Nm
- Parts in contact with fluid:
  - Connection part: Stainless steel
  - Seal: FPM
  - O-ring: FPM

Output data:
- Output signals, permitted load resistance:
  - 4 .. 20 mA, 2 conductor
    \[ R_{\text{Lmax}} = \frac{(U_B - 8 \text{ V})}{20 \text{ mA}} \text{ k} \Omega \]
  - 0 .. 10 V, 3 conductor
    \[ R_{\text{Lmin}} = 2 \text{ k} \Omega \]
- Accuracy to DIN 16086:
  - max. setting
    \[ \leq \pm 0.5 \% \text{ FS typ.} \]
    \[ \leq \pm 1.0 \% \text{ FS max.} \]
- Accuracy at minimum setting:
  - (B.F.S.L.)
    \[ \leq \pm 0.25 \% \text{ FS typ.} \]
    \[ \leq \pm 0.5 \% \text{ FS max.} \]
- Temperature compensation:
  - zero point
    \[ \leq \pm 0.015 \% \text{ FS} / ^\circ \text{C typ.} \]
    \[ \leq \pm 0.025 \% \text{ FS} / ^\circ \text{C max.} \]
  - over range
    \[ \leq \pm 0.015 \% \text{ FS} / ^\circ \text{C typ.} \]
    \[ \leq \pm 0.025 \% \text{ FS} / ^\circ \text{C max.} \]
- Non-linearity at max. setting to DIN 16086:
  \[ \leq \pm 0.3 \% \text{ FS max.} \]
- Hysteresis:
  \[ \leq \pm 0.4 \% \text{ FS max.} \]
- Repeatability:
  \[ \leq \pm 0.1 \% \text{ FS max.} \]
- Rise time:
  \[ \leq 2 \text{ ms} \]
- Long term drift:
  \[ \leq \pm 0.3 \% \text{ FS} / \text{ year typ.} \]

Environmental conditions:
- Compensated temperature range:
  \[ -25 .. +85 ^\circ \text{C} \]
- Operating temperature range:
  \[ -25 .. +85 ^\circ \text{C} \]
- Storage temperature range:
  \[ -40 .. +100 ^\circ \text{C} \]
- Fluid temperature range:
  \[ -40 .. +100 ^\circ \text{C} / -25 .. +100 ^\circ \text{C} \]
- Certificate No.:
  - EN 61000-6-1 / 2 / 3 / 4
  - E318391
- Vibration resistance according to DIN EN 60068-2-6 at 10 .. 500 Hz:
  \[ \leq 20 \text{ g} \]
- Protection class to IEC 60529:
  - IP 67 (when an IP 67 female connector is used)

Other data:
- Supply voltage:
  - 8 .. 30 V DC, 2 conductor
  - 12 .. 30 V DC, 3 conductor
  - limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
- Residual ripple of supply voltage:
  \[ \leq 5 \% \]
- Current consumption:
  \[ \leq 25 \text{ mA} \]
- Life expectancy:
  \[ > 10 \text{ million cycles} (0 .. 100 \% \text{ FS}) \]
- Weight:
  \[ \sim 80 \text{ g} \]

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- 1) Other seal materials on request
- 2) -25 °C with FPM seal, -40 °C on request
- 3) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1
Model code:

HDA 7 4 Z 6 – X XXXX – XXX – 000

Mechanical process connection

Z = Flush membrane

Electrical connection

6 = Male M12x1, 4 pole
    (female connector not supplied)

Signal

A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Pressure ranges in bar

0025; 0040; 0060; 0100; 0250; 0400; 0600

Mechanical connection

G04 = G1/4 with additional front O-ring seal
G05 = G1/4 A DIN 3852

Modification number

000 = Standard

Notes:

Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

Pin connections:

M12x1

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 74Z6-A</th>
<th>HDA 74Z6-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U&lt;sub&gt;B&lt;/sub&gt;</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Dimensions:

![Diagram showing dimensions and mechanical and electrical connections]

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Pressure Switch**

**EDS 3400 with Flush Membrane**

**Description:**
The electronic pressure switch EDS 3400 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the EDS 3400 with flush membrane has a stainless steel measurement cell with a thin film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid. Depending on the type, the instrument can have up to 2 switching outputs and a switchable analogue output (4..20 mA or 0..10 V).

**Special features:**
- Pressure connection has a flush membrane
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ 1 % FS
- Optional analogue output selectable (4..20 mA / 0..10 V)
- 4-digit digital display
- Rotation in two planes (axes) for optimum alignment
- Measured value can be displayed in bar, psi or MPa
- Simple operation with key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Option of Desina®-compliant pin configuration with diagnostic function

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>40; 100; 250; 400; 600 bar</td>
</tr>
<tr>
<td>Overload pressures</td>
<td>80; 250; 500; 800; 1000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>200; 500; 1000; 2000; 4000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/2 A DIN 3852</td>
</tr>
<tr>
<td>Pressure transfer fluid</td>
<td>Silicone-free oil</td>
</tr>
<tr>
<td>Torque value</td>
<td>45 Nm for G1/2, G1/2 A</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.:</td>
</tr>
<tr>
<td>Seal:</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>O-ring:</td>
<td>FPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086</td>
<td>± 0.3 % FS typ.</td>
</tr>
<tr>
<td>Max. setting (display, analogue output)</td>
<td>≤ ± 1 % FS max.</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>± ± ± ± % FS / °C max. zero point</td>
</tr>
<tr>
<td>± ± ± ± % FS / °C max.</td>
<td>± ± ± ± % FS / °C range</td>
</tr>
<tr>
<td>Analogue output (optional)</td>
<td>4..20 mA</td>
</tr>
<tr>
<td>Output signal (selectable)</td>
<td>4..20 mA</td>
</tr>
<tr>
<td>Load resistance max.</td>
<td>500 U</td>
</tr>
<tr>
<td>Load resistance min.</td>
<td>1 kΩ</td>
</tr>
<tr>
<td>Switch outputs</td>
<td>PNP transistor output</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 1.2 A per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
<tr>
<td>Reaction time</td>
<td>&lt; 10 ms</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>≤ ± 0.3 % FS typ. / year</td>
</tr>
</tbody>
</table>

**DESINA® diagnostic signal (Pin 2)**

<table>
<thead>
<tr>
<th>Function</th>
<th>OK: HIGH level / not OK: LOW level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>HIGH: approx. +U B / LOW: &lt; +0.3 V</td>
</tr>
</tbody>
</table>

**Environmental conditions**

| Compensated temperature range                   | -10 .. +70 °C / -10 .. +60 °C for UL spec. |
| Operating temperature range                     | -25 .. +80 °C / -25 .. +60 °C for UL spec. |
| Storage temperature range                       | -40 .. +80 °C               |
| Fluid temperature range                         | -40 .. +80 °C / -25 .. +80 °C |
|                                                  | -40 .. +150 °C / -25 .. +150 °C for G1/2 with cooling section |

**Mark**

| Certificate No.                                 | E318391                   |

**Vibration resistance to DIN EN 60668-2/6 at 10 .. 500 Hz**

| Shock resistance to DIN EN 60668-2-29 (11 ms) | ≤ 50 g |

**Protection class to IEC 60529**

| Protection class to IEC 60529                   | IP 67                      |

**Other data**

| Supply voltage                                  | 9 .. 35 V DC without analogue output |
| Current consumption                             | max. 2.455 A total            |
| for use acc. to UL spec.                        | max. 35 mA with inactive switching output |
|                                                 | max. 55 mA with inactive switching output and analogue output |
| Display                                         | 4-digit, LED, 7 segment, red, height of digits 7 mm |
| Weight                                          | ~ 120 g                     |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. FS (Full Scale) / relative to the full measuring range

1) G1/2 with additional front O-ring seal max. 1500 bar
2) Other seal materials on request
3) -25 °C with FPM seal, -40 °C on request
4) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1
Setting options:
All settings offered by the EDS 3400 are grouped in 2 easy-to-navigate menus.

In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switch outputs:

Switching point function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Switch point in bar</th>
<th>Hysteresis in bar</th>
<th>Incremen*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0..40</td>
<td>0.6..40</td>
<td>0.2..39.6</td>
<td>0.1</td>
</tr>
<tr>
<td>0..100</td>
<td>1.6..100</td>
<td>0.6..99.0</td>
<td>0.2</td>
</tr>
<tr>
<td>0..250</td>
<td>4.0..250</td>
<td>1.5..247.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0..400</td>
<td>6.0..400</td>
<td>2.0..396</td>
<td>1</td>
</tr>
<tr>
<td>0..600</td>
<td>9.0..600</td>
<td>3.0..594</td>
<td>1</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Lower switch value in bar</th>
<th>Upper switch value in bar</th>
<th>Incremen*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0..40</td>
<td>0.6..39.2</td>
<td>0.9..39.6</td>
<td>0.1</td>
</tr>
<tr>
<td>0..100</td>
<td>1.6..98.2</td>
<td>2.4..99</td>
<td>0.2</td>
</tr>
<tr>
<td>0..250</td>
<td>4.0..245.5</td>
<td>6.0..247.5</td>
<td>0.5</td>
</tr>
<tr>
<td>0..400</td>
<td>6.0..392</td>
<td>9.0..396</td>
<td>1</td>
</tr>
<tr>
<td>0..600</td>
<td>9.0..589</td>
<td>14..594</td>
<td>1</td>
</tr>
</tbody>
</table>

Additional functions:

Switching mode of the switching outputs adjustable (switching point function or window function)
Switching direction of the switching outputs adjustable (N/C or N/O function)
Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
Choice of display (current pressure, peak value, switch point 1, switch point 2, display off)
Display filter for smoothing the display value during pressure pulsations
Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
Pressure can be displayed in the measurement units bar, psi, MPa.
The scaling can also be adapted to indicate force, weight, etc.

EDS 3400 for self diagnostics:

The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification.
A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

Model code:

| Model code: | EDS 3 4 Z X – X – XXXX – XXX – 000 |
|            | Mechanical process connection  |
|            | Z = Flush membrane |
|            | Electrical connection |
|            | 6 = Male M12x1, 4 pole |
|            | only possible on output models "1", "2" and "3" |
|            | 8 = Male M12x1, 5 pole |
|            | only possible on output model "5" |
| Output     | 1 = 1 switching output |
|            | only in conjunction with electrical connection type "6" |
| Output     | 2 = 2 switching outputs |
|            | only in conjunction with electrical connection type "6" |
| Output     | 3 = 1 switching output and 1 analogue output |
|            | only in conjunction with electrical connection type "6" |
| Output     | 5 = 2 switching outputs and 1 analogue output |
|            | only in conjunction with electrical connection type "6" |
| Pressure ranges in bar | 0040; 0100; 0250; 0400; 0600 |
| Mechanical connection | G01 = G1/2 A DIN 3852 |
| Mechanical connection | G02 = G1/2 with additional front O-ring seal |
| Mechanical connection | G04 = G1/4 with additional front O-ring seal |
| Mechanical connection | G05 = G1/4 A DIN 3852 |
| Mechanical connection | G12 = G1/2 with add. front O-ring seal and cooling section |
| Modification number | 000 = Standard |

Model code:

| Model code: | DESINA®-compliant or can be connected to DESINA®: |
|            | EDS 3 4 Z 8 – X – XXXX – XXX – D00 |
|            | Mechanical process connection  |
|            | Z = flush membrane |
|            | Electrical connection |
|            | 8 = M12x1, 5 pole, male |
| Output     | 1 = 1 switching output |
|            | only in conjunction with electrical connection type "6" |
| Output     | 3 = 1 switching output and 1 analogue output |
| Pressure ranges in bar | 0040; 0100; 0250; 0400; 0600 |
| Mechanical connection | G01 = G1/2 A DIN 3852 |
| Mechanical connection | G02 = G1/2 with additional front O-ring seal |
| Mechanical connection | G04 = G1/4 with additional front O-ring seal |
| Mechanical connection | G05 = G1/4 A DIN 3852 |
| Mechanical connection | G12 = G1/2 with add. front O-ring seal and cooling section |
| Modification number | D00 = DESINA®-compliant pin configuration for self-diagnostics |

Note:
Special models on request.
For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Electronic Pressure Switch**

**EDS 3300 with Flush Membrane**

**Description:**
The electronic pressure switch EDS 3300 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the EDS 3300 with flush membrane has a ceramic measurement cell with a thick film strain gauge for relative pressure measurement in a low pressure range. The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

Depending on the type, the instrument can have up to 2 switching outputs and a switchable analogue output (4 .. 20 mA or 0 .. 10 V).

**Special features:**
- Pressure connection has a flush membrane
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy ≤ 1% FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Rotation in two planes (axes) for optimum alignment
- Measured value can be displayed in bar, psi or MPa
- Simple operation with key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function

**Technical data:**

**Input data:**
- Measuring ranges: 1 .. 1; 1.25; 5; 10; 16 bar
- Overload pressures: ≥ 3; 6; 15; 30; 60 bar
- Burst pressures: 5; 15; 30; 60; 80 bar
- Mechanical connection: G1/2 A DIN 3852
- Pressure transfer fluid: Silicone-free oil
- Pressure connection has a flush membrane

**Output data:**
- Accuracy to DIN 16086, Max. setting (display, analogue output): ≤ ± 0.5 % FS typ.
- Repeatability: ≤ ± 0.25 % FS max.
- Temperature drift: ≤ ± 0.05 % FS / °C max. zero point
- Temperature range: -40 .. +80 °C / -25 .. +80 °C

**Analogue output (optional):**
- Output signal (selectable) 4 .. 20 mA load resistance max. 500 Ω
- Switch outputs: PNP transistor output
- Switching current: max. 1.2 A per output
- Switching cycles: > 100 million
- Reaction time: < 10 ms
- Long-term drift: ≤ ± 0.3 % FS typ. / year

**DESINA® diagnostic signal (Pin 2):**
- Function: OK: HIGH level / not OK: LOW level
- Environmental conditions:
  - Temperature range: -10 .. +70 °C, -10 .. +60 °C for UL spec.
  - Operating temperature range: -25 .. +60 °C, -25 .. +60 °C for UL spec.
  - Storage temperature range: -40 .. +80 °C
  - Fluid temperature range:
    -40 .. +150 °C / -25 .. +80 °C
    -45 .. +150 °C / -25 .. +80 °C
    - with cooling section
- Environmental conditions:
  - Certificate No. E318391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
- Shock resistance to DIN EN 60068-2-29 (11 ms)
- Protection class to IEC 60529: IP 67
- Other data:
  - Supply voltage: 9 .. 35 V DC without analogue output
  - for use acc. to UL spec.: 18 .. 35 V DC with analogue output
  - - limited energy - according to UL 61010-1; Class 2
  - UL 1310/1585; LPS UL 60950
  - Current consumption:
    - max. 2.455 A total
    - max. 35 mA with inactive switching output
  - max. 5.5 mA with inactive switching output
  - and analogue output
- Display:
  - 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight:
  - ~ 120 g
Setting ranges for the switch outputs:

Switching point function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Switch point in bar</th>
<th>Hysteresis in bar</th>
<th>Increment in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 ... 1</td>
<td>-0.97 ... 1</td>
<td>-0.99 ... 0.98</td>
<td>0.01</td>
</tr>
<tr>
<td>0 ... 1</td>
<td>0.016 ... 1</td>
<td>0.006 ... 0.99</td>
<td>0.002</td>
</tr>
<tr>
<td>0 ... 2.5</td>
<td>0.04 ... 2.5</td>
<td>0.015 ... 2.475</td>
<td>0.005</td>
</tr>
<tr>
<td>0 ... 6</td>
<td>0.09 ... 6</td>
<td>0.3 ... 5.94</td>
<td>0.01</td>
</tr>
<tr>
<td>0 ... 10</td>
<td>0.16 ... 10</td>
<td>0.06 ... 9.9</td>
<td>0.02</td>
</tr>
<tr>
<td>0 ... 16</td>
<td>0.25 ... 16</td>
<td>0.1 ... 15.8</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Meas. range in bar</th>
<th>Lower switch value in bar</th>
<th>Upper switch value in bar</th>
<th>Increment in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1 ... 1</td>
<td>-0.97 ... 0.96</td>
<td>-0.95 ... 0.98</td>
<td>0.01</td>
</tr>
<tr>
<td>0 ... 1</td>
<td>0.016 ... 0.982</td>
<td>0.024 ... 0.99</td>
<td>0.002</td>
</tr>
<tr>
<td>0 ... 2.5</td>
<td>0.04 ... 2.455</td>
<td>0.06 ... 2.475</td>
<td>0.005</td>
</tr>
<tr>
<td>0 ... 6</td>
<td>0.09 ... 5.89</td>
<td>0.14 ... 5.94</td>
<td>0.01</td>
</tr>
<tr>
<td>0 ... 10</td>
<td>0.16 ... 9.82</td>
<td>0.24 ... 9.9</td>
<td>0.02</td>
</tr>
<tr>
<td>0 ... 16</td>
<td>0.25 ... 15.7</td>
<td>0.4 ... 15.8</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi or MPa. The scaling can also be adapted to indicate force, weight, etc.

EDS 3300 for self diagnostics:

The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

Model code:

EDS 3 3 Z X – X – XXXX – XXX – 000

Mechanical process connection
- Z = Flush membrane

Electrical connection
- 6 = Male M12x1, 4 pole
- 8 = Male M12x1, 5 pole

Output
- 1 = 1 switching output
- 2 = 2 switching outputs
- 3 = 1 switching output and 1 analogue output
- 5 = 2 switching outputs and 1 analogue output

Pressure ranges in bar
- 01.0; 02.5; 06.0; 0010; 0016

Modification number
- 000 = Standard

Model code: DESINA®-compliant or can be connected to DESINA®:

EDS 3 3 Z 8 – X – XXXX – XXX – D00

Mechanical process connection
- Z = Flush membrane

Electrical connection
- 8 = Male M12x1, 5 pole

Output
- 1 = 1 switching output
- 3 = 1 switching output and 1 analogue output

Pressure ranges in bar
- 01.0; 02.5; 06.0; 0010; 0016
- 0001 (-1 .. 1)

Modification number
- 000 = DESINA®-compliant pin configuration for self-diagnostics

Note:
- Special models on request.
- For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
- Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.
**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
ELECTRONIC TEMPERATURE TRANSMITTERS

As with the pressure transmitters, HYDAC ELECTRONIC also has temperature transmitters appropriate for every application. The transmitters are available with a variety of output signals, connectors and fluid port connection options.

Electronic temperature transmitters for general applications:

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETS 7200</td>
<td>97</td>
</tr>
<tr>
<td>ETS 4100</td>
<td>99</td>
</tr>
<tr>
<td>ETS 4500</td>
<td>101</td>
</tr>
</tbody>
</table>

Other temperature transmitters for special applications can be found in the sections "Service Instruments" and "OEM Products for Large Volume Production".
**Description:**
The ETS 7200 is an electronic temperature transmitter which, because of its compact design, is particularly suited to measuring temperature in hydraulic applications in the industrial and mobile sectors. Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25°C to +100°C.

The sensor has various analogue output signals as standard, e.g. 4 .. 20 mA or 0 ... 10V to enable integration into modern control systems through an M12x1 connector.

The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 7200 ideal for use in harsh conditions.

**Special features:**
- Accuracy ≤ ± 2 % FS
- Ideal for OEM applications
- Very compact design
- Excellent EMC characteristics
- Long-term stability
- Standard protection class IP 67

**Technical data:**

### Input data
- Measuring principle: Silicon semiconductor device
- Measuring range: -25 .. +100 °C
- Probe length: 10 mm
- Probe diameter: 6.7 mm
- Pressure resistance: 600 bar
- Overload pressure: 900 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel
  - Seal: FPM

### Output data
- Output signal, permitted load resistance
  - 4 .. 20 mA, 2 conductor
  - R_Lmin. = (U_B - 8 V) / 20 mA [kΩ]
  - 0 .. 10 V, 3 conductor
  - R_Lmin. = 2 kΩ

- Accuracy (at room temperature)
  - ± 1.0 % FS typ.
  - ± 2.0 % FS max.

- Temperature drift (environment)
  - ± 0.02 % FS / °C

- Rise time to DIN EN 60751
  - t50: 4 s
  - t90: 8 s

### Environmental conditions
- Ambient temperature range: -25 .. +80 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range
  - -40 .. +100 °C / -25 .. +100 °C
- EN mark
  - EN 61000-6-1 / 2 / 3 / 4
  - Certificate No. E318391
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
- Protection class to IEC 60529
  - IP 67

### Other data
- Supply voltage
  - 8 .. 30 V DC 2 conductor
  - 12 .. 30 V DC 3 conductor
- for use acc. to UL spec.
  - limited energy - according to
  - 9.3 UL 61010; Class 2;
  - UL 1310/1585; LPS UL 60950
- Residual ripple of supply voltage ≤ 5 %
- Current consumption ≤ 25 mA
- Weight ~ 50 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1. -25 °C with FPM seal, -40 °C on request
2. Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Model code:

ETS 7 2 4 6 – X – 010 – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
6 = Male M12x1, 4 pole
   (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Probe length
010 = 10 mm

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the
technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors can be found
in the Accessories brochure.

Pin connections:

M12x1

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 7246-A</th>
<th>ETS 7246-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_B</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Dimensions:

Note:
The information in this brochure relates to
the operating conditions and applications
described.
For applications or operating conditions
not described, please contact the relevant
technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
The ETS 4100 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry.
The temperature sensor, based on a PT 1000 and corresponding evaluation electronics, is capable of measuring temperatures in the range -25 °C to +100 °C.
The sensor has analogue output signals of 4 .. 20 mA and 0 .. 10 V available as standard for integration into modern control systems. The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 4100 ideal for use in harsh conditions.

**Special features:**
- Accuracy ≤ ± 0.8 % FS
- Ideal for industrial applications
- Robust design
- Excellent EMC characteristics
- Excellent long term stability
- Standard protection class IP 65 / IP 67

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring principle</td>
<td>PT 1000</td>
</tr>
<tr>
<td>Measuring range</td>
<td>-25 .. +100 °C</td>
</tr>
<tr>
<td>Probe length</td>
<td>6; 50; 100; 250; 350 mm</td>
</tr>
<tr>
<td>Probe diameter</td>
<td>4.5; 8; 8; 8; 8 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>600 bar (probe length 6 mm) 125 bar (probe length 50 mm) 125 bar (probe length 100 mm) 125 bar (probe length 250 mm) 125 bar (probe length 350 mm)</td>
</tr>
</tbody>
</table>

| Mechanical connection | G1/4 A DIN 3852 |
| Torque value | 20 Nm |
| Parts in contact with medium | Mech. conn.: Stainless steel Seal: FPM |

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal, permitted load resistance</td>
<td>4 .. 20 mA, 2 conductor 0 .. 10 V, 3 conductor</td>
</tr>
<tr>
<td>Accuracy (at room temperature)</td>
<td>≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>≤ ± 0.01 % FS / °C</td>
</tr>
<tr>
<td>Rise time to DIN EN 60751</td>
<td>t90: ~ 8 s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-40 .. +85 °C / -25 .. +85 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +100 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +125 °C / -25 .. +125 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>M12x1, 4 pole, Binder Series 714 M18, 4 pole, EN 175301-803 (DIN 43650)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8 .. 32 V DC 2 conductor 12 .. 32 V DC 3 conductor</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Current consumption 3 conductor</td>
<td>~ 25 mA</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 200 g (probe length 6 mm) ~ 215 g (probe length 50 mm) ~ 235 g (probe length 100 mm) ~ 280 g (probe length 250 mm) ~ 315 g (probe length 350 mm)</td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other seal materials on request

2) -25 °C with FPM seal, -40 °C on request
**Model code:**

ETS 4 1 4 X – X – XXX – 000

**Mechanical connection**

4 = G1/4 A DIN 3852 (male)

**Electrical connection**

4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

**Signal**

A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

**Probe length**

006 = 6 mm
050 = 50 mm
100 = 100 mm
250 = 250 mm
350 = 350 mm

**Modification number**

000 = Standard

**Note:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

---

**Dimensions:**

**Pin connections:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 4144-A</th>
<th>ETS 4144-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n.c.</td>
<td>+U_E</td>
</tr>
<tr>
<td>2</td>
<td>Signal+</td>
<td>Signal</td>
</tr>
<tr>
<td>3</td>
<td>Signal -</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

Binder series 714 M18

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 4145-A</th>
<th>ETS 4145-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_E</td>
</tr>
<tr>
<td>2</td>
<td>Signal-</td>
<td>0 V</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>4</td>
<td>Signal</td>
<td>Housing</td>
</tr>
</tbody>
</table>

EN175301-803 (DIN 43650)

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 4146-A</th>
<th>ETS 4146-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_E</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

**Note:**

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Temperature Transmitter**

**ETS 4500**

**Description:**
The ETS 4500 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry. Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 to +100 °C. The sensor has analogue output signals of 4...20 mA and 0...10 V available as standard for integration in modern control systems. The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 4500 ideal for use in harsh conditions.

**Special features:**
- Accuracy ≤ ± 2 % FS
- Ideal for industrial applications
- Robust design
- Excellent EMC characteristics
- Excellent long term stability
- Standard protection class IP 65 / IP 67

**Technical data:**

**Input data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring principle</td>
<td>Silicon semiconductor device</td>
</tr>
<tr>
<td>Measuring range</td>
<td>-25 °C to +100 °C</td>
</tr>
<tr>
<td>Probe length</td>
<td>10.7; 50; 100; 250; 350 mm</td>
</tr>
<tr>
<td>Probe diameter</td>
<td>8 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>600 bar (probe length 10.7 mm), 125 bar (probe length 100 mm), 125 bar (probe length 250 mm), 125 bar (probe length 350 mm)</td>
</tr>
</tbody>
</table>

**Mechanical connection**

- G1/4 A DIN 3852

**Output data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal, permitted load resistance</td>
<td>4...20 mA, 2 conductor</td>
</tr>
<tr>
<td></td>
<td>R_Lmax = (U_B - 8 V) / 20 mA [kΩ]</td>
</tr>
<tr>
<td></td>
<td>0...10 V, 3 conductor</td>
</tr>
<tr>
<td></td>
<td>R_Lmin = 2 kΩ</td>
</tr>
<tr>
<td>Accuracy (at room temperature)</td>
<td>≤ ± 1.0 % FS typ.</td>
</tr>
<tr>
<td></td>
<td>≤ ± 2.0 % FS max.</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>≤ ± 0.02 % FS / °C</td>
</tr>
<tr>
<td>Rise time to DIN EN 60751</td>
<td>t_ec: ~ 4 s</td>
</tr>
<tr>
<td></td>
<td>t_ec: ~ 8 s</td>
</tr>
</tbody>
</table>

**Environmental conditions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range²</td>
<td>-40 °C to +85 °C / -25 °C to +85 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 °C to +100 °C</td>
</tr>
<tr>
<td>Fluid temperature range²</td>
<td>-40 °C to +125 °C / -25 °C to +125 °C</td>
</tr>
</tbody>
</table>

**Vibration resistance to DIN EN 60068-2-6 at 10...500 Hz**

- ≤ 25 g

**Protection class to IEC 60529**

- IP 65 (for male EN175301-803 (DIN 43650))
- IP 67 (for male M12x1 male, when an IP 67 connector is used)

**Other data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>M12x1, 4 pole</td>
</tr>
<tr>
<td></td>
<td>EN 175301-803 (DIN 43650)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8...32 V DC, 2 conductor</td>
</tr>
<tr>
<td></td>
<td>12...32 V DC, 3 conductor</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Current consumption 3 conductor</td>
<td>~ 25 mA</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 200 g (probe length 10.7 mm), ~ 215 g (probe length 50 mm), ~ 235 g (probe length 100 mm), ~ 280 g (probe length 250 mm), ~ 315 g (probe length 350 mm)</td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other seal materials on request

² -25 °C with FPM seal, -40 °C on request
Model code:

ETS 4 5 4 X – X – XXX – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
5 = Male, 3 pole + PE,
   EN 175301-803 (DIN 43650)
   (connector supplied)
6 = Male M12x1, 4 pole
   (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor
B = 0 .. 10 V, 3 conductor

Probe length
010 = 10 mm
050 = 50 mm
100 = 100 mm
250 = 250 mm
350 = 350 mm

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Probe length (Z) [mm]</th>
<th>Probe diameter [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.7</td>
<td>8</td>
</tr>
<tr>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>250</td>
<td>8</td>
</tr>
<tr>
<td>350</td>
<td>8</td>
</tr>
</tbody>
</table>

Pin connections:

EN175301-803 (DIN 43650)

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 4545-A</th>
<th>ETS 4545-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_B</td>
</tr>
<tr>
<td>2</td>
<td>Signal-</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
<tr>
<td></td>
<td>Housing</td>
<td>Housing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 4546-A</th>
<th>ETS 4546-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal+</td>
<td>+U_B</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal-</td>
<td>0V</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
<td>Signal</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
For measuring and monitoring the temperature of the medium, HYDAC offers a wide variety of electronic temperature switches with an integrated or separate temperature probe.

### Electronic Temperature Switches

<table>
<thead>
<tr>
<th>Electronic Temperature Switches</th>
<th>ETS 3200</th>
<th>ETS 3800</th>
<th>ETS 320</th>
<th>ETS 380</th>
<th>ETS 1700</th>
<th>HTS 8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (max. error)</td>
<td>1°C</td>
<td>1°C</td>
<td>1°C</td>
<td>1°C</td>
<td>1°C</td>
<td>3%</td>
</tr>
<tr>
<td>Pressure resistant to 600 bar</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated probe</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separate probe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Number of switching outputs</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Analogue output</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Digital display</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Programmable</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Tank</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Factory-set (not field-adjustable)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>VDMA Menu Navigation</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available as individual unit</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>OEM product for large volume production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>IO Link Interface</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UL Approval</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Not all feature combinations are possible. For precise information, please consult the relevant data sheet.
Electronic Temperature Switch
ETS 3200 Pressure Resistant for Inline Mounting

Description:
The ETS 3200 is a compact electronic temperature switch with a 4-digit display. Pressure resistant to 600 bar, this model has an integrated 18 mm temperature probe and can be screwed directly inline or into a hydraulic block. Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities. The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

Special features:
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using the keypad
- Display of temperature and unit of measurement in °C or °F

Technical data:

| Input data | Measuring range | -25 .. 100 °C (-13 ... 212 °F) |
| Pressure resistance | 600 bar |
| Mechanical connection | G1/2 A DIN 3852 |
| Torque value | 45 Nm |
| Parts in contact with medium | Mech. conn.: Stainless steel |
| Seal: FPM |

| Output data | Accuracy (display, analogue output) | ≤ ± 1.0 °C (≤ ± 2.0 °F) |
| Temperature drift (environment) | ≤ ± 0.015 % FS / °C max. zero point |
| ≤ ± 0.015 % FS / °C max. range |
| Analogue output (optional) | Signal selectable: 4 .. 20 mA ohmic resist. max. 500 Ω 0 .. 10 V ohmic resistance min. 1 kΩ corresponds in each case to -25 .. +100 °C |

| Switch outputs | Type | PNP transistor switching outputs |
| Switching current | max. 1.2 A per output |
| Switching cycles | > 100 million |
| Rise time to DIN EN 60751 | t50 : 3 s  t90 : 9 s |

Environmental conditions:

| Ambient temperature range | -25 .. +80 °C (-25 ... +60 °C acc. to UL spec.) |
| Storage temperature range | -40 .. +80 °C |
| Fluid temperature range1) | -40 .. +100 °C / -25 .. +100 °C |

| Certificate | EN 61000-6-1 / 2 / 3 / 4 |

Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz) ≤ 10 g

Shock resistance to DIN EN 60068-2-29 (11 ms) ≤ 50 g

Protection class to IEC 60529 IP 67

Other data:

| Supply voltage | 9 .. 35 V DC without analogue output |
| for use acc. to UL spec. | 18 .. 35 V DC with analogue output |
| max. limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950 |

Current consumption |
max. 2.455 A total |
max. 35 mA with inactive switching outputs |
max. 55 mA with inactive switching outputs |
and analogue output |

Residual ripple of supply voltage | ≤ 5 % |

Display |
4-digit, LED, 7 segment, red, height of digits 7 mm |

Weight | ~ 135 g |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
1) -25 °C with FPM seal, -40 °C on request
2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

Setting ranges of the switching points and switch-back hysterases:
Switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.0 .. 97.5</td>
<td>-22.0 .. 98.5</td>
<td>0.5</td>
</tr>
<tr>
<td>°F</td>
<td>-9 .. 208</td>
<td>-7 .. 209</td>
<td>1</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.0 .. 100.0</td>
<td>1.0 .. 123.5</td>
<td>0.5</td>
</tr>
<tr>
<td>°F</td>
<td>-9 .. 212</td>
<td>2 .. 222</td>
<td>1</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

Model code:

ETS 3 2 2 X – X – 018 – 000

Mechanical connection
2 = G1/2 A DIN 3852 (male)

Electrical connection
6 = Male M12x1, 4 pole
only possible on output models “2” and “3”
8 = Male M12x1, 5 pole
only possible on output model “5”

Output
2 = 2 switching outputs
only in conjunction with electrical connection type “6”
3 = 1 switching output and 1 analogue output
only in conjunction with electrical connection type “6”
5 = 2 switching outputs and 1 analogue output
only in conjunction with electrical connection type “8”

Probe length in mm
018

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

Setting options:
All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

Pin connections:

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3226-2</th>
<th>ETS 3226-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3228-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The ETS 3200 is a compact electronic temperature switch with a 4-digit display. Pressure resistant to 600 bar this model has an integrated 18 mm temperature probe and can be installed directly inline or on the hydraulic block. Different output versions with one or two switching outputs, and with the possible option of an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated switch-back points can be adjusted very quickly and easily using the keypad. For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

**Special features:**
- Menu navigation according to VDMA
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4.. 20 mA / 0 .. 10 V)
- 4-digit display
- Display can be rotated in two axes for optimal alignment
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of measured value and units of measurement in °C or °F

**Technical data:**

### Input data
- Measuring range: -25 .. 100 °C (-13 .. 212 °F)
- Sensor length: 18 mm
- Pressure resistance: 600 bar
- Hydraulic connection: G1/2 A DIN 3852
- Torque value: 45 Nm
- Parts in contact with medium: Mech. connection: Stainless steel
  Seal: FPM

### Output data
- Accuracy (display, analogue output): ≤ ± 1.0 °C (≤ ± 2.0 °F)
- Temperature drift (environment): ≤ ± 0.015 % FS / °C max. zero point
  ≤ ± 0.015 % FS / °C max. range
- Analogue output (optional):
  - Signal: selectable: 4 .. 20 mA load ≤ 500 Ω
  0 .. 10 V load min. 1 kΩ
corresp. in each case to -25 .. +100 °C

### Switch outputs
- Type: PNP transistor switching output
- Switching current: max. 1.2 A per output
- Switching cycles: > 100 million
- Rise time to DIN EN 60751
  - $t_{50}$: 3 s
  - $t_{90}$: 9 s

### Environmental conditions
- Ambient temperature range: -25 .. +60 °C
  (-25 .. +60 °C acc. to UL spec.)
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -40 .. +100 °C / -25 .. +100 °C
- CE mark: EN 61000-6-1 / -2 / -3 / -4
- mark:
  - Certificate No.: E318391
  - Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)
    ≤ 10 g
  - Shock resistance according to DIN EN 60068-2-29 (11 ms)
    ≤ 50 g
  - Protection class to IEC 60529
    IP 67

### Other data
- Supply voltage:
  - 9 .. 35 V DC (without analogue output)
  - 18 .. 35 V DC (with analogue output)
- 18 .. 35 V DC (with analogue output)
- for use acc. to UL specifications:
  - limited energy – according to 9.3 UL 61010;
  - Class 2; UL 1310/1585; LPS UL 60950
- Current consumption:
  - ≤ 2.455 A total
  - ≤ 35 mA with inactive switching outputs
  - ≤ 55 mA with analogue output and inactive switching outputs
- Residual ripple of supply voltage: ≤ 5 %
- Display:
  - 4-digit, LED, 7-segment, red,
  - height of digits 7 mm
- Weight (complete unit including probe): ~ 135 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

1) -25 °C with FPM seal, -40 °C on request
2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1
Setting options:
All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches. The ETS 3200 can easily be adjusted via three push-buttons.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit RP / FL</th>
<th>Upper limit SP / FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25..+100 °C</td>
<td>-23.8 °C</td>
<td>100.0 °C</td>
</tr>
<tr>
<td>-13..+212 °F</td>
<td>-11 °F</td>
<td>212 °F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Min. difference between RP and SP, FL and FH Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25..+100 °C</td>
<td>1.2 °C 0.2 °C</td>
</tr>
<tr>
<td>-13..+212 °F</td>
<td>2 °F 1 °F</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = temperature window lower value
FH = temperature window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

Pin connections:

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3226-2</th>
<th>ETS 3226-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ua</td>
<td>+Ua</td>
</tr>
<tr>
<td>2</td>
<td>SP2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP1</td>
<td>SP1</td>
</tr>
</tbody>
</table>

Model code:

ETS 3 2 2 6 – X – 018 – V00

Type 2 = With integrated temperature sensor
Mechanical connection 2 = G1/2 A DIN 3852, (male)
Electrical connection 6 = Male M12x1, 4 pole
Output 2 = 2 switching outputs
3 = 1 switching output and 1 analogue output
Probe length in mm 018
Modification number V00 = Menu navigation in accordance with VDMA (Standard 24574-2)

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display. Pressure-resistant up to 600 bar with an integrated 18 mm temperature probe, this model can be mounted directly inline or on the hydraulic block. The device has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3200 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Special features:
- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output can be configured as PNP transistor switching output or analogue output
- 4-digit display
- Display can be rotated in two axes for optimal alignment

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-25 .. 100 °C (-13 .. 212 °F)</td>
</tr>
<tr>
<td>Sensor length</td>
<td>16 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>600 bar</td>
</tr>
<tr>
<td>Hydraulic connection</td>
<td>G1/2 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>45 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel Seal: FPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signals</td>
<td></td>
</tr>
<tr>
<td>Output 1: PNP transistor switching output</td>
<td></td>
</tr>
<tr>
<td>Output 2: can be configured as PNP transistor switching output or analogue output</td>
<td></td>
</tr>
<tr>
<td>Accuracy (display, analogue output)</td>
<td>≤ ± 1.0 °C (≤ ± 2.0 °F)</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analogue output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal</td>
<td>selectable: 4 .. 20 mA load resist. ≤ 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresp. in each case to -25 .. +100 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PNP transistor switching output</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 250 mA per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
<tr>
<td>Rise time to DIN EN 60751</td>
<td>t0.5: 3 s t0.9: 9 s</td>
</tr>
</tbody>
</table>

| Parameterisation    | Via IO-Link interface, with HYDAC programming device XX-3000 or push-buttons on the ETS 3200 |

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-25 .. +80 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +80 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +100°C / -25 .. +100°C</td>
</tr>
<tr>
<td>Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)</td>
<td>≤ 10 g</td>
</tr>
<tr>
<td>Shock resistance according to DIN EN 60068-2-29 (11 ms)</td>
<td>≤ 50 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Display</td>
<td>4-digit, LED, 7-segment, red, height of digits 7 mm</td>
</tr>
<tr>
<td>Weight (complete unit including probe)</td>
<td>~ 135 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

-25 °C with FPM seal, -40 °C on request
Setting options:
All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit of</th>
<th>Upper limit of</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP / FL</td>
<td>-25 °C -100 °C</td>
<td>100.0 °C</td>
</tr>
<tr>
<td>FL / FH</td>
<td>-13 °C -212 °F</td>
<td>212 °F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Min. difference between RP and SP &amp; FL and FH</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25 °C -100 °C</td>
<td>1.2 °C</td>
<td>0.2 °C</td>
</tr>
<tr>
<td>-13 °C -212 °F</td>
<td>2 °F</td>
<td>1 °F</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown. SP = switch point, RP = switch-back point, FL = temperature window lower value, FH = temperature window upper value

Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 s to 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display of fault)

Pin connections:

- M12x1, 4 pole
- M12x1, 4 pole (connector not supplied)

**Model code:**

ETS 3 2 2 6 – L – 018 – 000

**Type:**

2 = With integrated temperature sensor

**Mechanical connection:**

2 = G1/2 A DIN 3852 (male)

**Electrical connection:**

6 = Male M12x1, 4 pole

**Output:**

L = IO Link interface

**Probe length in mm:**

018

**Modification number:**

000 = Standard

**Notes:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

**IO-Link-specific data:**

- Baud rate: 38.4 kBaup
- Cycle time: 2.5 ms
- Process data width: 16 Bit
- Frame type: 2.2
- Specification: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

http://www.hydac.com/de-en/service/downloads-software-on-request/

**Dimensions:**

**Note:**

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Temperature Switch ETS 3200 for Tank Installation**

**Description:**
The ETS 3200 is a compact electronic temperature switch with digital display. With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths. Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities. The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad. For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

**Special features:**
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA, 0 .. 10 V)
- 4-digit display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using the keypad.
- Display of temperature and unit of measurement in °C or °F

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-25 .. 100 °C ( -13 .. 212 °F)</td>
</tr>
<tr>
<td>Probe lengths</td>
<td>100; 250; 350 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>50 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/2 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>45 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.: Stainless steel Seal: FPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (display, analogue output)</td>
<td>≤ ± 1.0 °C (≤ ± 2.0 °F)</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>≤ ± 0.015 % FS / °C max. zero point</td>
</tr>
<tr>
<td>Analogue output (optional)</td>
<td>≤ ± 0.015 % FS / °C max. range</td>
</tr>
<tr>
<td>Signal</td>
<td>selectable: 4 .. 20 mA ohmic res. max. 500 Ω 0 .. 10 V ohmic resistance min. 1 kΩ corresponds in each case to -25 .. +100 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PNP transistor switching outputs</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 1.2 A per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
<tr>
<td>Rise time to DIN EN 60751</td>
<td>( \tau_{50} ): 8 s ( \tau_{90} ): 15 s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +80 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +100 °C / -25 .. +100 °C</td>
</tr>
<tr>
<td>( \mathcal{E} ) mark</td>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>-mark</td>
<td>Certificate No. E318391</td>
</tr>
<tr>
<td>Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)</td>
<td>≤ 10 g</td>
</tr>
<tr>
<td>Shock resistance to DIN EN 60068-2-29 (11 ms)</td>
<td>≤ 50 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950</td>
</tr>
<tr>
<td>for use acc. to UL spec.</td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Display</td>
<td>4-digit, LED, 7 segment, red, height of digits 7 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 150 g (probe length 100 mm) ~ 185 g (probe length 250 mm) ~ 210 g (probe length 350 mm)</td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) -25 °C with FPM seal, -40 °C on request

2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

Setting ranges of the switching points and switch-back hystereses:
Switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Switching point</th>
<th>Hysteresis</th>
<th>Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.0 .. 100.0</td>
<td>1.0 .. 123.5</td>
<td>0.5</td>
</tr>
<tr>
<td>°F</td>
<td>-9 .. 212</td>
<td>2 .. 222</td>
<td>1</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.0 .. 97.5</td>
<td>-22.0 .. 98.5</td>
<td>0.5</td>
</tr>
<tr>
<td>°F</td>
<td>-9 .. 208</td>
<td>-7 .. 209</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

Pin connections:
M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3226-2</th>
<th>ETS 3226-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3228-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

Model code:

ETS 3 2 2 X – X – XXX – 000

Mechanical connection

2 = G1/2 A DIN 3852 (male)

Electrical connection

6 = Male M12x1, 4 pole
only possible on output models "2" and "3"
8 = Male M12x1, 5 pole
only possible on output model "5"

Output

2 = 2 switching outputs
only in conjunction with electrical connection type "6"
3 = 1 switching output and 1 analogue output
only in conjunction with electrical connection type "6"
5 = 2 switching outputs and 1 analogue output
only in conjunction with electrical connection type "8"

Probe length in mm

100; 250; 350

Modification number

000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, protective sleeves for tank mounting, splash guards, etc. can be found in the Accessories brochure.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Electronic Temperature Switch**

ETS 3200 for Tank Installation with Menu Navigation to VDMA

**Description:**
The ETS 3200 is a compact electronic temperature switch with a 4-digit display.
With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths. Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities. The switching points and the associated switch-back points can be adjusted very quickly and easily using the keypad. For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

**Special features:**
- Menu navigation according to VDMA
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Display can be rotated in two axes for optimal alignment
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of measured value and unit of measurement in °C or °F

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-25 .. 100 °C (-13 .. 212 °F)</td>
</tr>
<tr>
<td>Probe length</td>
<td>100, 250, 350 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>50 bar</td>
</tr>
<tr>
<td>Hydraulic connection</td>
<td>G1/2 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>45 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. connection: Stainless steel</td>
</tr>
<tr>
<td>Seal:</td>
<td>FPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (display, analogue output)</td>
<td>± 1.0 °C (± 2.0 °F)</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>± 0.015 % FS / °C max. zero point</td>
</tr>
<tr>
<td>± 0.015 % FS / °C max. range</td>
<td></td>
</tr>
</tbody>
</table>
| Analogue output (optional) | Signal selectable: \( 4 \ldots 20 \text{ mA} \) \( \text{load} \leq 500 \text{ Ω} \)
\( 0 \ldots 10 \text{ V} \) \( \text{load min. 1 kΩ} \) \( \text{corresp. in each case to} \ -25 \ldots +100 \text{ °C} \)

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PNP transistor switching output</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 1.2 A per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
</tbody>
</table>
| Rise time to DIN EN 60751 | \( t_{50} = 8 \text{ s} \)
| \( t_{90} = 15 \text{ s} \) |

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-25 .. +80 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +80 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +100 °C / -25 °C .. +100 °C</td>
</tr>
<tr>
<td>( \text{CE mark: } \text{EN 61000-6-1 / -2 / -3 / -4} )</td>
<td></td>
</tr>
<tr>
<td>( \text{Mark}^2 )</td>
<td>Certificate No.: E318391</td>
</tr>
<tr>
<td>Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)</td>
<td>≤ 10 g</td>
</tr>
<tr>
<td>Shock resistance according to DIN EN 60068-2-29 (11 ms)</td>
<td>≤ 50 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
</table>
| Supply voltage for use acc. to UL specifications | 9 .. 35 V DC (without analogue output)
18 .. 35 V DC (with analogue output) – limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950 |
| Current consumption | ≤ 2.455 A total
≤ 35 mA with inactive switching outputs
≤ 55 mA with analogue output and inactive switching outputs |
| Residual ripple of supply voltage | ≤ 5 % |
| Display | 4-digit, LED, 7-segment, red, height of digits 7 mm |
| Weight (complete unit including probe) | ~ 150 g (probe length 100 mm)
~ 185 g (probe length 250 mm)
~ 210 g (probe length 350 mm) |

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range

1) -25 °C with FPM seal, -40 °C on request

2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All terms and symbols used for setting the
ETS 3200 as well as the menu structure comply with the specifications in the
VDMA Standard (VDMA 24574-2) for temperature switches.
The ETS 3200 can easily be adjusted via three push-buttons.

Setting ranges for the
switching outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit of RP / FL</th>
<th>Upper limit of SP / FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25. - +100 °C</td>
<td>-23.8 °C</td>
<td>100.0 °C</td>
</tr>
<tr>
<td>-13. - +212 °F</td>
<td>-11 °F</td>
<td>212 °F</td>
</tr>
</tbody>
</table>

Measuring range: Min. difference below RP and SP & FL and FH

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Min. difference between RP and SP &amp; FL and FH Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25. - +100 °C</td>
<td>1.2 °C</td>
</tr>
<tr>
<td>-13. - +212 °F</td>
<td>2 °F</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = temperature window lower value
FH = temperature window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00...99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display of f)

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3226-2</th>
<th>ETS 3226-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP1</td>
<td>SP1</td>
</tr>
</tbody>
</table>

Model code:

ETS 32 2 6 X XXX - V00

Type
2 = With integrated temperature sensor

Mechanical connection
2 = G1/2 A DIN 3852 (male)

Electrical connection
6 = Male M12x1, 4 pole

Output
2 = 2 switching outputs
3 = 1 switching output and 1 analogue output

Probe length in mm
100; 250; 350

Modification number
V00 = Menu navigation in accordance with VDMA (Standard 24574-2)

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display.
With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.
The instrument has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).
Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.
The temperature switch series ETS 3200 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

**Special features:**
- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- 4-digit display
- Display can be rotated in two axes for optimum alignment

**Technical data:**

### Input data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-25 .. 100 °C (-13 .. 212 °F)</td>
</tr>
<tr>
<td>Probe length</td>
<td>100; 250; 350 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>50 bar</td>
</tr>
<tr>
<td>Hydraulic connection</td>
<td>G1/2 DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>45 Nm</td>
</tr>
<tr>
<td>Parts in contact with</td>
<td>Mech. connection: Stainless steel Seal: FPM</td>
</tr>
</tbody>
</table>

### Output data

<table>
<thead>
<tr>
<th>Output signals</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output 1: PNP transistor switching output</td>
<td></td>
</tr>
<tr>
<td>Output 2: can be configured as PNP transistor switching output or analogue output</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accuracy (display, analogue output)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ ± 1.0 °C (≤ ± 2.0 °F)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature drift (environment)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ ± 0.015 % FS / °C max. zero point</td>
<td></td>
</tr>
<tr>
<td>≤ ± 0.015 % FS / °C max. range</td>
<td></td>
</tr>
</tbody>
</table>

### Analogue output

<table>
<thead>
<tr>
<th>Signal</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 .. 20 mA, load ≤ 500 Ω</td>
<td></td>
</tr>
<tr>
<td>0 .. 10 V, ohmic resist. min. 1 kΩ corresp. in each case to -25 .. +100 °C</td>
<td></td>
</tr>
</tbody>
</table>

### Switch outputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP transistor switching output</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switching current</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. 250 mA per output</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switching cycles</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 100 million</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rise time to DIN EN 60751</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>t100: 8 s</td>
<td></td>
</tr>
<tr>
<td>t90: 15 s</td>
<td></td>
</tr>
</tbody>
</table>

### Parameterisation

Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ETS 3200

### Environmental conditions

<table>
<thead>
<tr>
<th>Environmental condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-25 .. +80 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +80 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +100 °C / -25 °C .. 100 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 10 g</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock resistance according to DIN EN 60068-2-29 (11 ms)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 50 g</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection class to IEC 60529</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67</td>
<td></td>
</tr>
</tbody>
</table>

### Other data

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 .. 35 V DC (without analogue output)</td>
<td></td>
</tr>
<tr>
<td>18 .. 35 V DC (with analogue output)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current consumption</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 0.535 A with active switching outputs</td>
<td></td>
</tr>
<tr>
<td>≤ 35 mA with inactive switching outputs</td>
<td></td>
</tr>
<tr>
<td>≤ 55 mA with inactive switching output and analogue output</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residual ripple of supply voltage</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 5 %</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-digit, LED, 7-segment, red, height of digits 7 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight (complete unit including probe)</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 150 g (probe length 100 mm)</td>
<td></td>
</tr>
<tr>
<td>~ 185 g (probe length 250 mm)</td>
<td></td>
</tr>
<tr>
<td>~ 210 g (probe length 350 mm)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

-25 °C with FPM seal, -40 °C on request
Setting options:
All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit of RP / FL</th>
<th>Upper limit of SP / FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25 .. +100 °C</td>
<td>-23.8 °C</td>
<td>100.0 °C</td>
</tr>
<tr>
<td>-13 .. +212 °F</td>
<td>-11 °F</td>
<td>212 °F</td>
</tr>
</tbody>
</table>

Measuring range | Min. difference betw. RP and SP & FL and FH | Increment* |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-25 .. +100 °C</td>
<td>1.2 °C</td>
<td>0.2 °C</td>
</tr>
<tr>
<td>-13 .. +212 °F</td>
<td>2 °F</td>
<td>1 °F</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = temperature window lower value
FH = temperature window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

Pin connections:

Pin | Signal | Description
---|--------|-------------
1  | L+     | Supply voltage
2  | I/Q    | Switching output (SP2) / analogue output
3  | L-     | Gnd
4  | C/Q    | IO-Link communication / switching output (SP1)

IO-Link-specific data:

- **Baud rate**: 38.4 kBaud *
- **Cycle time**: 2.5 ms
- **Process data width**: 16 Bit
- **Frame type**: 2.2
- **Specification**: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.


Model code:

ETS 3 2 2 6 – L – XXX – 000

<table>
<thead>
<tr>
<th>Type</th>
<th>= With integrated temperature probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>G1/2 A DIN 3852, (male)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical connection</th>
<th>= Male M12x1, 4 pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>(connector not supplied)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
</tr>
<tr>
<td>= IO Link interface</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probe length in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>100; 250; 350</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>000 = Standard</td>
</tr>
</tbody>
</table>

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Probe length (dim. Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
</tr>
<tr>
<td>250</td>
</tr>
<tr>
<td>300</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The ETS 3800 is a compact electronic temperature switch with a 4-digit display.

The version for a separate temperature probe has a measuring range of -30 ... +150°C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly-available PT 100 temperature probes.

Different output versions with one or two switching outputs, and with the possible option of an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

Special features:
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of temperature and unit of measurement in °C or °F

Technical data:

Input data:
- Measuring range\(^1\): -30 .. +150 °C (-22 .. 302 °F)
- Connection, separate temperature probe: Female cable connection M12x1, 4 pole

Output data:
- Accuracy (display, analogue output): ± 1.0 °C (+ PT100 error)
- Temperature drift (environment): ≤ ± 0.015 % FS / °C max. zero point
- ≤ ± 0.015 % FS / °C max. range

Analogue output (optional):
- Signal selectable:
  - 4 .. 20 mA load resist. max. 500 Ω
  - 0 .. 10 V load resistance min. 1 kΩ
  - corresponds in each case to -30 .. +150 °C

Switch outputs:
- Type: PNP transistor switching outputs
- Switching current: max. 1.2 A per output
- Switching cycles: > 100 million

Environmental conditions:
- Ambient temperature range: -25 .. +80 °C
- Storage temperature range: -40 .. +80 °C
- EN mark: EN 61000-6-1 / 2 / 3 / 4
- UL mark\(^2\): Certificate No. E318391
- Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz): ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (11 ms): ≤ 50 g
- Protection class to IEC 60529: IP 67

Other data:
- Supply voltage: 9 .. 35 V DC without analogue output
  - 18 .. 35 V DC with analogue output
    - limited energy - according to 9.3 UL 61010; Class 2:
      - UL 1310/1585; LPS UL 60950
- Current consumption:
  - max. 2.455 A total
  - max. 35 mA with inactive switch outputs
  - max. 55 mA with inactive switch outputs and analogue output
- Residual ripple of supply voltage: ≤ 5 %
- Display:
  - 4-digit, LED, 7 segment, red, height of digits 7 mm
- Weight: ~ 87 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

\(^1\) Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 3800 may be reduced.

\(^2\) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Setting options:
All the settings available on the ETS 3800 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

Setting ranges of the switching points and switch-back hysterases:
Switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Switching point</th>
<th>Hysteresis</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-27.0 .. 150.0</td>
<td>1.0 .. 178.0</td>
<td>0.5</td>
</tr>
<tr>
<td>°F</td>
<td>-17 .. 302</td>
<td>2 .. 320</td>
<td>1</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-27.0 .. 146.5</td>
<td>-25.5 .. 148.0</td>
<td>0.5</td>
</tr>
<tr>
<td>°F</td>
<td>-17 .. 296</td>
<td>-14 .. 298</td>
<td>1</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

Pin connections:

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3866-2</th>
<th>ETS 3866-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3868-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

Model code:

ETS 3 8 6 X – X – 000 – 000

Mechanical connection
6 = Female cable connection M12x1, 4 pole

Electrical connection
6 = Male M12x1, 4 pole
8 = Male M12x1, 5 pole

Output
2 = 2 switching outputs
3 = 1 switching output and 1 analogue output
5 = 2 switching outputs and 1 analogue output

Probe length in mm
000 = Separate temperature probe

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
- A male cable connector M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, L1CY 4 x 0.25 mm² are supplied with the instrument.
- Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

Separate temperature probe:
(not supplied with the instrument)
- TFP 106 - 000 with electr. conn. 4-pol. M12x1
  Part No.: 921330
- Tank installation sleeve for TFP 100
  Part No.: 906170

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electronic Temperature Switch
ETS 3800
for Separate Temperature Probe with Menu Navigation to VDMA

Description:
The ETS 3800 is a compact electronic temperature switch with a 4-digit display. The model for separate temperature probe has a measuring range of -30...+150°C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to use commercially available PT 100 temperature probes. Different output models with one or two switching outputs, and with the possible option of an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated switch-back points can be adjusted very quickly and easily using the keypad. For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

Special features:
- Menu navigation according to VDMA
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4...20 mA / 0...10 V)
- 4-digit display
- Display can be rotated in two axes for optimal alignment
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of temperature and unit of measurement in °C or °F

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-30 ... 150 °C (-22 ... 302 °F)</td>
</tr>
<tr>
<td>Connection, separate temperature probe</td>
<td>Female cable connection M12x1, 4 pole</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (display, analogue output)</td>
<td>± 1.0 % FS (+PT100 error)</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>± 0.015 % FS / °C max. zero point</td>
</tr>
<tr>
<td></td>
<td>± 0.015 % FS / °C max. range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analogue output (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal selectable: 4...20 mA load ≤ 500 Ω</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PNP transistor switching output</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 1.2 A per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
</tr>
<tr>
<td>Storage temperature range</td>
</tr>
<tr>
<td>Mark</td>
</tr>
<tr>
<td>Certificate No.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>9 ... 35 V DC (without analogue output)</td>
</tr>
<tr>
<td></td>
<td>18 ... 35 V DC (with analogue output)</td>
</tr>
<tr>
<td>for use acc. to UL specifications</td>
<td>limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950</td>
</tr>
<tr>
<td>Current consumption</td>
<td>≤ 2.455 A total</td>
</tr>
<tr>
<td></td>
<td>≤ 35 mA with inactive switching outputs</td>
</tr>
<tr>
<td></td>
<td>≤ 55 mA with analogue output and inactive switching outputs</td>
</tr>
</tbody>
</table>

| Residual ripple of supply voltage | ≤ 5 % |
| Display                        | 4-digit, LED, 7-segment, red, height of digits 7 mm |
| Weight                         | ~ 87 g (excluding connector and probe) |

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- Depending on the temperature range of the connected temperature sensor, the measurement range of the ETS 3800 may be reduced.
- Environmental conditions according to 1.4.2 UL 61010-1; C22.2 no. 61010-1
Setting options:
All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches. The ETS 3800 can easily be adjusted via three push-buttons.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measurement range</th>
<th>Lower limit of RP / FL</th>
<th>Upper limit of SP / FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30 .. +150 °C</td>
<td>-28.0 °C</td>
<td>150.0 °C</td>
</tr>
<tr>
<td>-22 .. +302 °F</td>
<td>-19 °F</td>
<td>302 °F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement range</th>
<th>Min. difference between RP and SP &amp; FL and FH</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30 .. +150 °C</td>
<td>2.0 °C</td>
<td>0.5 °C</td>
</tr>
<tr>
<td>-22 .. +302 °F</td>
<td>3 °F</td>
<td>1 °F</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

SP = switch point
RP = switch-back point
FL = temperature window lower value
FH = temperature window upper value

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display of f)

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 3866-2</th>
<th>ETS 3866-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ub</td>
<td>+Ub</td>
</tr>
<tr>
<td>2</td>
<td>SP2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP1</td>
<td>SP1</td>
</tr>
</tbody>
</table>

Model code:

ETS 38 6 6 – X – 000 – V00

Type

8 = For separate temperature probe

Mechanical connection

6 = Female cable connection M12x1, 4 pole

Electrical connection

6 = Male M12x1, 4 pole

Output

2 = 2 switching outputs
3 = 1 switching output and 1 analogue output

Probe length in mm

000 = Separate temperature sensor

Modification number

V00 = Menu navigation in accordance with VDMA (Standard 24574-2)

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
A male cable connector M12x1, 4 pole, to connect the separate temperature probe, and a 3 m sensor cable, LIYCY 4 x 0.25 mm² are supplied with the instrument.

Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

Separate temperature probe:
(not supplied with the instrument)
- TFP 106 - 000 with male elect. conn. 4 pole M12x1 Part No.: 921330
- Tank installation sleeve for TFP 100 Part No.: 906170

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Electronic Temperature Switch
ETS 3800
for Separate Temperature Probe with IO-Link Interface

Description:
The ETS 3800 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display. The version for a separate temperature probe has a measuring range of -30 ... +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation. It is also possible, however, to evaluate commonly-available PT 100 temperature probes. The instrument has one switching output and an additional output that can be configured as either switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3800 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Special features:
- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- 4-digit digital display
- Optimum alignment of the display – can be rotated in two axes

Technical data:

Input data:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>-30 .. 150 °C (-22 .. 302 °F)</td>
</tr>
<tr>
<td>Connection, separate temperature probe</td>
<td>Female cable connection M12x1, 4 pole</td>
</tr>
</tbody>
</table>

Output data:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (display, analogue output)</td>
<td>± 1.0 % FS (+ PT100 error)</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>≤ ± 0.015 % FS / °C max. zero point</td>
</tr>
<tr>
<td>≤ ± 0.015 % FS / °C max. range</td>
<td></td>
</tr>
</tbody>
</table>

Analogue output (optional):

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal</td>
<td>selectable: 4 .. 20 mA load resist. ≤ 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresp. in each case to -30 .. +150 °C</td>
</tr>
</tbody>
</table>

Switch outputs:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PNP transistor switching output</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 250 mA per output</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
</tbody>
</table>

Parameterisation:

Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ETS 3800

Environmental conditions:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-25 .. +80 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +80 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)</td>
<td>≤ 10 g</td>
</tr>
<tr>
<td>Shock resistance according to DIN EN 60068-2-29 (11 ms)</td>
<td>≤ 50 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67</td>
</tr>
</tbody>
</table>

Other data:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage (without analogue output)</td>
<td>9 .. 35 V DC</td>
</tr>
<tr>
<td>Supply voltage (with analogue output)</td>
<td>18 .. 35 V DC</td>
</tr>
<tr>
<td>Current consumption with active switching outputs</td>
<td>≤ 0.535 A</td>
</tr>
<tr>
<td>≤ 35 mA with inactive switching outputs</td>
<td></td>
</tr>
<tr>
<td>≤ 55 mA with inactive switching output and analogue output</td>
<td></td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Display</td>
<td>4-digit, LED, 7-segment, red, height of digits 7 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 87 g (excluding connector and probe)</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

Depending on the temperature range of the connected temperature sensor, the measurement range of the ETS 3800 may be reduced.

1) Depending on the temperature range of the connected temperature sensor, the measurement range of the ETS 3800 may be reduced.
Setting options:
All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measurement range</th>
<th>Lower limit of SP / FH</th>
<th>Upper limit of SP / FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30..+150 °C</td>
<td>-28.0 °C</td>
<td>150.0 °C</td>
</tr>
<tr>
<td>-22..+302 °F</td>
<td>-19 °F</td>
<td>302 °F</td>
</tr>
</tbody>
</table>

Min. difference between SP and RP & FL and FH:
-30..+150 °C 2.0 °C 0.5 °C
-22..+302 °F 3 °F 1 °F

* All ranges given in the table are adjustable by the increments shown. SP = switch point; RP = switch-back point; FL = temperature window lower value; FH = temperature window upper value.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L+ Supply voltage</td>
</tr>
<tr>
<td>2</td>
<td>I/Q Switching output (SP2) / analogue output</td>
</tr>
<tr>
<td>3</td>
<td>L- Gnd</td>
</tr>
<tr>
<td>4</td>
<td>C/Q IO-Link communication / switching output (SP1)</td>
</tr>
</tbody>
</table>

Separate temperature sensor:
(not supplied with instrument)
- TFP 106 - 000 Part No.: 921330 with male electr. conn. M12x1 (connector not supplied)
- Tank inst. sleeve Part No.: 906170

Model code:

**ETS 3806 L 000 000**

Type
8 = For separate temperature probe

Mechanical connection
6 = Female cable connection M12x1, 4 pole

Electrical connection
6 = Male M12x1, 4 pole (connector not supplied)

Output
L = IO-Link interface

Sensor length in mm
000 = Separate temperature probe

Modification number
000 = Standard

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
A male cable connector M12x1, 4 pole, to connect the separate temperature sensor and a 3 m sensor cable, LIYCY 4 x 0.25 mm² are supplied with the instrument.

Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 42</td>
<td>25.2</td>
</tr>
<tr>
<td>65.7</td>
<td>70.7</td>
</tr>
<tr>
<td>11</td>
<td>40.4</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Electronic Temperature Switch
ETS 320 Pressure-Resistant for Inline Installation

Description:
The ETS 320 is a compact electronic temperature switch with a 3-digit display.
Pressure-resistant to 600 bar with an integrated 18 mm temperature probe, this model can be installed directly inline or on the hydraulic block and has a measuring range of -25 .. +100 °C.
Different output models with one or two switching outputs, and with the possible option of an additional analogue output signal of 4 .. 20 mA offer a variety of application opportunities.
The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.
For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

Special features:
- Compact temperature switch with integral temperature probe
- 2 transistor switching outputs, up to 1.2 A load per output
- Optional analogue output signal 4 .. 20 mA
- 3-digit display
- Switching point or window function
- Switching / switch-back points and many useful additional functions can be set using the keypad

Technical data:

**Input data**
- Measuring range: -25 .. 100 °C (-13 .. 212 °F)
- Probe length: 18 mm
- Pressure resistance: 600 bar
- Mechanical connection: G1/2 A DIN 3852
- Torque value: 45 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel, Seal: FPM

**Output data**
- Accuracy (display, analogue output): \( \pm 1.0 °C \) (\( \pm 2.0 °F \))
- Temperature drift (environment): \( \pm 0.015 \% \) FS / °C max. zero point, \( \pm 0.015 \% \) FS / °C max. range

**Analogue output (optional)**
- Signal: 4 .. 20 mA load resistance max. 400 Ω corresponds to -25 .. +100 °C

**Switch outputs**
- Type: PNP transistor switching outputs
- Switching current: max. 1.2 A per output
- Switching cycles: > 100 million
- Rise time to DIN EN 60751: tc: 3 s t90: 9 s

**Environmental conditions**
- Ambient temperature range: -25 .. +80 °C
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -40 .. +100 °C/ -25 .. +100 °C (for the probe)

**Mark**
- EN 61000-6-1 / 2 / 3 / 4

**Other data**
- Supply voltage: 20 .. 32 V DC
- Current consumption: approx. 100 mA without switch output
- Residual ripple of supply voltage: \( \leq 5 \% \)
- Display: 3-digit, LED, 7 segment, red, height of digits 9.2 mm
- Weight: \( \approx 300 \) g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
- \(-25 °C \) with FPM seal, \(-40 °C \) on request
**Setting options:**
All the settings available on the ETS 320 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

**Setting ranges of the switching points and switch-back hysterese:**
Switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Switching point</th>
<th>Hysteresis</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-22.0 .. 100.0</td>
<td>1.0 .. 178.0</td>
<td>1.0</td>
</tr>
<tr>
<td>°F</td>
<td>-10.0 .. 212.0</td>
<td>2.0 .. 320.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.0 .. 99.0</td>
<td>-22.0 .. 100.0</td>
<td>1.0</td>
</tr>
<tr>
<td>°F</td>
<td>-12.0 .. 210.0</td>
<td>-10.0 .. 212.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

**Additional functions:**
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

**Setting options:**
All the settings available on the ETS 320 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

**Setting ranges of the switching points and switch-back hysterese:**
Switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Switching point</th>
<th>Hysteresis</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-22.0 .. 100.0</td>
<td>1.0 .. 178.0</td>
<td>1.0</td>
</tr>
<tr>
<td>°F</td>
<td>-10.0 .. 212.0</td>
<td>2.0 .. 320.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.0 .. 99.0</td>
<td>-22.0 .. 100.0</td>
<td>1.0</td>
</tr>
<tr>
<td>°F</td>
<td>-12.0 .. 210.0</td>
<td>-10.0 .. 212.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

**Additional functions:**
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

**Pin connections:**

**M12x1, 4 pole**

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 326-2</th>
<th>ETS 326-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

**M12x1, 5 pole**

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 328-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

**Model code:**

ETS 3 2 X – X – 100 – X00

**Mechanical connection**

2 = G1/2 A DIN 3852 (male)

**Electrical connection**

6 = Male M12x1, 4 pole
   only possible on output models “2” and “3”
8 = Male M12x1, 5 pole
   only possible on output model “5”

**Output**

2 = 2 switching outputs
   only in conjunction with electrical connection type “6”
3 = 1 switching output and 1 analogue output
   only in conjunction with electrical connection type “6”
5 = 2 switching outputs and 1 analogue output
   only in conjunction with electrical connection type “8”

**Measuring range**

-25 .. +100 °C (-13 .. +212 °F)

**Modification number**

000 = Display in °C
400 = Display in °F

**Note:**
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors, clamps for wall-mounting, etc. can be found in the Accessories brochure.

**Dimensions:**

**Note:**
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Electronic Temperature Switch
ETS 380
for Separate Temperature Probe

Description:
The ETS 380 is a compact electronic temperature switch with a 3-digit display.
The version for a separate temperature probe has a measuring range of -30 .. +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly available PT 100 temperature probes. Different output models with one or two switching outputs, and with the possible option of an additional analogue output signal of 4 .. 20 mA open up a multitude of application opportunities.

The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

Special features:
- 2 transistor switching outputs, up to 1.2 A load per output
- Optional analogue output signal 4 .. 20 mA
- 3-digit display
- Switching point or window function
- Switching / switch-back points and many useful additional functions can be set using the keypad

Technical data:

Input data
- Measuring range\(^1\) -30 .. +150 °C (-22 .. 302 °F)
- Connection, separate temperature probe Female cable connection M12x1, 4 pole

Output data
- Accuracy (display, analogue output) ≤ ± 1.0 °C (≤ ± 2.0 °F)
- Temperature drift (environment) ≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range

Analogue output (optional)
- Signal 4 .. 20 mA
- Ohmic resistance max. 400 Ω corresponds to -30 .. +150 °C

Switch outputs
- Type PNP transistor switching outputs
- Switching current max. 1.2 A per output
- Switching cycles > 100 million

Environmental conditions
- Ambient temperature range -25 .. +80 °C
- Storage temperature range -40 .. +80 °C
- Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz) ≤ 10 g
- Shock resistance to DIN EN 60068-2-29 (1 ms) ≤ 50 g
- Protection class to IEC 60529 IP 65

Other data
- Supply voltage 20 .. 32 V DC
- Current consumption approx. 100 mA without switch output
- Residual ripple of supply voltage ≤ 5 %
- Display 3-digit, LED, 7 segment, red, height of digits 9.2 mm
- Weight ~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
\(^1\) Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 380 may be reduced.
Setting options:
All the settings available on the ETS 380 are combined in 2 easy-to-navigate menus.
To prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges of the switching points and switch-back hystereses:
Switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Switching point</th>
<th>Hysteresis</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-27.0 .. 150.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>°F</td>
<td>-16.0 .. 302.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-28.0 .. 149.0</td>
<td>-27.0 .. 150.0</td>
<td>1.0</td>
</tr>
<tr>
<td>°F</td>
<td>-18.0 .. 300.0</td>
<td>-16.0 .. 302.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

Pin connections:

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 386-2</th>
<th>ETS 386-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

M12x1, 5 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>ETS 388-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

Model code:

ETS 3 8 X – X – 150 – X00

Mechanical connection
8 = Electrical connection for separate temperature probe

Electrical connection
6 = Male M12x1, 4 pole
   only possible on output models “2” and “3”
8 = Male M12x1, 5 pole
   only possible on output model “5”

Output
2 = 2 switching outputs
   only in conjunction with electrical connection type “6”
3 = 1 switching output and 1 analogue output
   only in conjunction with electrical connection type “6”
5 = 2 switching outputs and 1 analogue output
   only in conjunction with electrical connection type “8”

Measuring range
-30 .. +150 °C (-22 .. +302 °F)

Modification number
000 = Display in °C
400 = Display in °F

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
A male connection M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYC 4 x 0.5 mm² are supplied with the instrument. Other accessories, such as electrical connectors, clamps for wall-mounting, etc. can be found in the Accessories brochure.

Separate temperature probe:
(not supplied with the instrument)
- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18
  Part no. 904969
  (connector not supplied)
- TFP 106 - 000 with male electr. conn. 4 pole M12x1
  Part no. 921330
  (connector not supplied)
- Tank installation sleeve for TFP 100
  Part no. 906170

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The electronic temperature switch ETS 1700 is used mainly together with the temperature probe TFP 100, which was specially developed for tank mounting.

The 4-digit display can indicate the actual temperature, one of the switching points or the maximum temperature value.

The maximum temperature indicates the highest temperature which has occurred since the unit was switched on or was last reset.

The 4 switching outputs can be used to control heating and cooling processes in hydraulic systems, for example. Four switching and switch-back points which are independent of each other can be adjusted very simply via the keypad.

An analogue output (4 .. 20 mA or 0 .. 10 V) is also available for integration into monitoring systems (e.g. with PLC).

Special features:
- 4-digit display
- Simple operation due to key programming
- 4 limit relays, switching points and switch back points can be adjusted independently
- Optional analogue output signal (4 .. 20 mA or 0 .. 10 V)
- Many useful additional functions
- Optional mounting position (sensor connection on the top/bottom, keypad and display can be turned through 180°)

Technical data:

### Input data
- Measuring range: 0 .. +100 °C, (+32 .. 212 °F)

### Output data
- Accuracy (display, analogue output): ≤ ± 1.0 °C (≤ ± 2.0°F)
- Repeatability: ≤ ± 0.25 % FS
- Temperature drift (environment): ≤ ± 0.03 % FS / °C max. zero point
- ≤ ± 0.03 % FS / °C max. range

### Analogue output (optional)
- Selectable signal: 4 .. 20 mA, load resistance max. 400 Ω
  0 .. 10 V, load resistance min. 2 kΩ
  Corresponds in each case to 0 .. +100 °C

### Switch outputs
- Type: 4 relays with change-over contacts in 2 groups (common supply of each group connected)
- Switching voltage: 0.1 .. 250 V AC / DC
- Switching current: 0.009 .. 2 A per output
- Switching capacity: 400 VA, 50 W (for inductive load, use varistors)
- Switching cycles: > 20 million at minimum load
  > 1 million at maximum load

### Environmental conditions
- Ambient temperature range: -25 .. +60 °C
- Storage temperature range: -40 .. +80 °C
- CE mark: EN 61000-6-1 / 2 / 3 / 4
- Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz): ≤ 5 g
- Shock resistance to DIN EN 60068-2-29 (1 ms): ≤ 10 g
- Protection class to IEC 60529: IP 65

### Other data
- Supply voltage: 22 .. 32 V DC
- Current consumption: approx. 200 mA
- Residual ripple of supply voltage: ≤ 10 %
- Display: 4-digit, LED, 7 segment, red, height of digits 13 mm
- Weight: ~ 800 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

1 Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 1700 may be reduced.

FS (Full Scale) = relative to complete measuring range
Setting options:
The microprocessor integrated into the ETS 1700 enables many useful extra functions in addition to the switching functions, when compared with a normal mechanical temperature switch. It is possible, for example, to activate switching delay times or to change the relay switching direction. All settings are made via the keypad.

Setting ranges of the switching points and switch-back hystereses:
- Switching point relays 1 to 4: 1.5 .. 100 % of the measuring range
- Switching point relays 1 to 4: 1 .. 99 % of the measuring range or alternatively
- Switch-back hystereses 1 to 4: 1 .. 99 % of the measuring range

Additional functions:
- Switching direction of the relays 1 to 4 (N/C or N/O function)
- Switch-on delay relays 1 to 4 in the range from 0.0 .. 900.0 seconds
- Switch-off delay relays 1 to 4 in the range from 0.0 .. 900.0 seconds
- Switch-back mode (alternatively switch-back point or switch-back hysteresis)
- Display of the actual temperature, a switching point or of the peak value
- Display range individually selectable in °C or °F
- Measurement unit (°C, °F) is displayed
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Programming lock

Terminal assignment:

Device connection

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>U_b</td>
</tr>
<tr>
<td>2</td>
<td>0 V</td>
</tr>
<tr>
<td>3</td>
<td>Analogue output Signal +</td>
</tr>
<tr>
<td>4</td>
<td>Analogue output Signal - (0 V)</td>
</tr>
<tr>
<td>5</td>
<td>Relay 1 N/C</td>
</tr>
<tr>
<td>6</td>
<td>Relay 1 N/O</td>
</tr>
<tr>
<td>7</td>
<td>Centre relay 1 and 2</td>
</tr>
<tr>
<td>8</td>
<td>Relay 2 N/C</td>
</tr>
<tr>
<td>9</td>
<td>Relay 2 N/O</td>
</tr>
<tr>
<td>10</td>
<td>Relay 3 N/C</td>
</tr>
<tr>
<td>11</td>
<td>Relay 3 N/O</td>
</tr>
<tr>
<td>12</td>
<td>Centre relay 3 and 4</td>
</tr>
<tr>
<td>13</td>
<td>Relay 4 N/C</td>
</tr>
<tr>
<td>14</td>
<td>Relay 4 N/O</td>
</tr>
</tbody>
</table>

Probe connection

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>U_b</td>
</tr>
<tr>
<td>2</td>
<td>Signal +</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
</tr>
<tr>
<td>4</td>
<td>Signal -</td>
</tr>
<tr>
<td>5</td>
<td>0 V</td>
</tr>
</tbody>
</table>

Model code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
</table>
| ETS 170 0 X – 100 – 000 | Finish code: 0 = For PT 100 sensors
| Display | 1 = 4-digit display °C, 2 = 4-digit display °F |
| Measuring range | 0 .. 100 °C, (+32 .. 212 °F) |
| Modification number | 000 = Standard |

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
PG cable glands, mounting bolts, a 5 pole female connector (Binder series 681) for connecting the separate temperature probe and a 3 m sensor cable (LIYC 4 x 0.25 mm²) are supplied with the instrument. Other accessories, such as vibration mounts etc. can be found in the Accessories brochure.

Separate temperature probe:
(not supplied with the instrument)
- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18 Part No.: 904696 (female connector supplied)
- TFP 106 - 000 with male electr. conn. 4 pole M12x1 Part No.: 921330 (female connector not supplied)
- Tank installation sleeve for TFP 100 Part. No.: 906170

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Temperature Probe
TFP 100

Description:
The TFP 100 temperature probe was developed primarily for tank installation. The PT 100 precision resistor in 4-conductor design can be connected directly to HYDAC temperature switches ETS 3800, ETS 380 and ETS 1700.
The standardised electrical connection also means that other evaluation or control systems (e.g. PLC) can easily be connected.
For adaptation to different applications and fluids, a nickel-plated brass installation sleeve which is pressure resistant up to 10 bar is available as an accessory.

Special features:
- Measurement circuit configured as four-conductor circuit
- Simple to install
- For universal application

Technical data:

Temperature probe TFP 100

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>-40 .. +125 °C (-40 .. +257 °F)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Male Binder series 714 M18, 4 pole</td>
</tr>
<tr>
<td></td>
<td>Male M12x1, 4 pole</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Brass</td>
</tr>
<tr>
<td>€ mark</td>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>Sensor current</td>
<td>0.3 .. 1.0 mA</td>
</tr>
<tr>
<td>Tank installation sleeve for TFP 100</td>
<td>(Accessory, not supplied)</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>10 bar</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>CuZn39Pb3 (brass), nickel-plated</td>
</tr>
</tbody>
</table>

Model code:

Separate temperature probe

Electrical connection

4 = Male, 4 pole Binder series 714 M18m (connector supplied)
6 = Male, 4 pole M12x1 (connector not supplied)

Modification number

000 = Standard

Dimensions:

Tank installation sleeve for TFP 100

(to be ordered separately)
Part No.: 906 170

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
SENSORS FOR DISTANCE AND POSITION

Using various measuring techniques, HYDAC offers different distance and position sensors for a wide array of mobile and stationary applications. Linear position sensors operate on the physical principle of magnetostriction. This measuring principle determines with high accuracy the position, distance and/or speed signal, if required, and is based on elapsed time measurement. Utilizing this non-contact and wear-free measuring technique, HYDAC offers different versions in a pressure-resistant stainless steel housing for part or full integration in hydraulic cylinders.

Linear position transducers for mobile applications:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLT 1000-R2</td>
<td>131</td>
</tr>
</tbody>
</table>

Linear position transducers for stationary applications:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLT 2100-R1</td>
<td>133</td>
</tr>
<tr>
<td>HLT 2500-F1</td>
<td>137</td>
</tr>
<tr>
<td>HLT 2500-L2</td>
<td>141</td>
</tr>
</tbody>
</table>

The ultrasonic distance sensor is a non-contact, highly compact sensor for measuring the distance to fluids and objects. By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

Electronic ultrasonic distance sensor:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLS 528</td>
<td>145</td>
</tr>
</tbody>
</table>

Further distance and position sensors for special applications can be found in the Chapter "OEM Products for High Volume Production".

<table>
<thead>
<tr>
<th>Sensors for distance and position</th>
<th>HLT 1000-R2</th>
<th>HLT 2100-R1</th>
<th>HLT 2500-F1</th>
<th>HLT 2500-L2</th>
<th>HLS 528</th>
<th>EWE 10</th>
<th>IWE 40</th>
<th>HLS 100</th>
<th>HLS 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range in mm</td>
<td>50 to 2,500</td>
<td>50 to 4,000</td>
<td>50 to 4,000</td>
<td>50 to 4,000</td>
<td>up to 6,000</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>For cylinder installation</td>
<td>✔</td>
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<td></td>
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</tr>
<tr>
<td>Number of switching outputs</td>
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<td>2</td>
<td>2</td>
<td>1 (PWM)</td>
<td>2</td>
<td></td>
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<td></td>
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<td>Analogue output</td>
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<tr>
<td>CANopen Version</td>
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<td>Available as individual units</td>
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<tr>
<td>OEM product for large volume production</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>✔</td>
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<tr>
<td>Enhanced functional safety</td>
<td>✔</td>
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<td>✔</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

Note: Not all feature combinations are possible. For precise information, please consult the relevant data sheet.
Linear Position Transducer
HLT 1000-R2

Description:
The sensor works on the principle of magnetostriction. This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement. On the basis of this non-contact and wear-free measurement system, HYDAC offers a version in pressure-resistant stainless steel housing for complete integration in hydraulic cylinders. The different output signals (analogue/CANopen) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls). The main areas of application are in mobile hydraulics.

Special features:
- High accuracy, e.g. ≤ ± 0.05 % FS for CANopen
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data |
|---|---|
| Measuring ranges | 50 .. 2500 mm |
| Measured variable | Distance, position, speed |
| Mechanical connection | Cylinder-integrated |
| Housing | Stainl. steel: pressure resistance 450 bar |

| Output data |
|---|---|
| Signal output | Current: 4 .. 20 mA or 20 .. 4 mA |
| Voltage: | 0 .. 10 V or 10 .. 0 V |
| 0.25 .. 4.75 V or 4.75 .. 0.25 V |

| Measuring accuracy |
|---|---|
| Resolution | 12 bit min. 0.1 mm 0.1 mm |
| Non-linearity | ≤ ± 0.05 % FS ≤ ± 0.05 % FS |
| Hysteresis | ≤ ± 0.1 mm ≤ ± 0.1 mm |
| Repeatability | ≤ ± 0.1 mm ≤ ± 0.1 mm |
| Temperature coefficient | ≤ ± 0.01 % FS / °C ≤ ± 0.003 % FS / °C |

| Environmental conditions |
|---|---|
| Operating temperature range | -40 .. +85 °C |
| Relative humidity | 90 %, non-condensing |
| Storage temperature range | -40 .. +85 °C, dry |
| Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz | ≤ 20 g at 5 kHz |
| ≤ 15 g |
| Shock resistance to DIN EN 60068-2-2 (11 ms) | ≤ 50 g |

| EMC |
|---|---|
| - Emitted interference | DIN EN 61000-6-3 |
| - Interference resistance | DIN EN 61000-6-2 |

| Housing / Protection class to IEC 60529 |
|---|---|
| Stainless steel, pressure-resistant |

| Other data |
|---|---|
| Electrical connection | Flying leads Separate male panel mount connection M12x1 |
| Supply voltage | 12 .. 30 V DC |
| Current consumption without load | max. 100 mA |
| Weight | Depends on length |

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

1) Other versions are possible.
Model code:

Mobile HLT 1 1 0 0 – R2 – XXX – XXX – XXXX – 000

Design/Geometry type
1 = Rod

Mechanical connection
R2 = Cylinder-integrated

Electrical connection

Cable output
K01 = Flying lead, length 1 m
K02 = Flying lead, length 2 m
K05 = Flying lead, length 5 m
K10 = Flying lead, length 10 m

Separate male panel mount connection M12x1
(4 pole for signal output analogue
5 pole for signal output CANopen)
L06 = 60 mm cable length
L18 = 180 mm cable length
L24 = 240 mm cable length

Signal output
C01 = Analogue 4 .. 20 mA, 3 conductor
C02 = Analogue 20 .. 4 mA, 3 conductor
B01 = Analogue 0 .. 10 V
B02 = Analogue 10 .. 0 V
G01 = Analogue 0.25 .. 4.75 V
G02 = Analogue 4.75 .. 0.25 V
CAN = CANopen

Measuring range in mm (50 to 2500 mm)
Example
0150 = 150 mm

Modification
000 = Standard

Notes:
Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Items supplied:
• HLT 1100-R2
• Installation instructions German/English
• HLT 1100 CD incl. case

Accessories:
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure.
The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.

Dimensions:

Pin connections:

Cable outlet

Core Analogue CANopen
brown +U_B +U_B
white 0 V 0 V
green Analogue CAN_L
yellow n.c. CAN_H

M12x1, 4 pole

Pin Signal Description
1 +U_B supply+
2 n.c.
3 0 V supply-
4 CAN_H bus line dominant high
5 CAN_L bus line dominant low

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The sensor works on the principle of magnetostriction. The measuring principle determines with high accuracy the position, distance and/or speed, and is based on elapsed time measurement. Utilizing this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders. The different output signals (analogue/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls). The HLT 2100-R1 is primarily used in stationary applications as a semi-integrated solution in hydraulic cylinders.

Special features:
- Accuracy \( \leq 0.05 \% \) FS typ.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

### Input data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>50 .. 4000 mm</td>
</tr>
<tr>
<td>Measured variable</td>
<td>Distance, position, speed</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>Threaded flange M18x1.5</td>
</tr>
<tr>
<td>Housing</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Hydraulic tube</td>
<td>Stainless steel</td>
</tr>
<tr>
<td></td>
<td>Pressure resist. 450 bar, 750 bar peak</td>
</tr>
</tbody>
</table>

### Output data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output analogue</td>
<td>Current: ( 4 \ldots 20 ) mA or ( 20 \ldots 4 ) mA</td>
</tr>
<tr>
<td></td>
<td>Voltage: ( 0 \ldots 10 ) V or ( 10 \ldots 0 ) V</td>
</tr>
<tr>
<td></td>
<td>Profibus, CANopen, Device Net, SSI, EtherCAT</td>
</tr>
</tbody>
</table>

### Measuring accuracy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>max. 0.005 mm, 16 bit</td>
</tr>
<tr>
<td>Non-linearity</td>
<td>( \pm 0.1 ) mm to 1,500 mm</td>
</tr>
<tr>
<td></td>
<td>( \pm 0.15 ) mm &gt; 1,500 mm</td>
</tr>
<tr>
<td>Repeatability</td>
<td>( \leq 0.005 ) mm - ( \leq 0.05 ) mm (length-dependent)</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>( &lt; 0.004 % ) FS / °C (analogue)</td>
</tr>
<tr>
<td></td>
<td>( &lt; 0.0015 % ) FS / °C (digital)</td>
</tr>
</tbody>
</table>

### Installation position and travel speed

No restrictions

### Environmental conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>0 .. +70 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>98 %, non-condensing</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-30 .. +85 °C</td>
</tr>
<tr>
<td>Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz</td>
<td>( \leq 10 ) g</td>
</tr>
<tr>
<td>Shock resistance to DIN EN 60068-2-27</td>
<td>( \leq 100 ) g / 11 ms / half sine</td>
</tr>
</tbody>
</table>

### EMC

- Emitted interference: DIN EN 61000-6-3
- Interference resistance: DIN EN 61000-6-2

### Housing / Protection class to IEC 60529

Aluminium / IP 65

### Other data

#### Electrical connection

- Analogue
  - Flying lead, length 1 m
  - Male M16, 6 pole
  - Male M16, 8 pole
- CANopen, Device Net
  - Female M12x1, 5 pole
  - Male M12x1, 5 pole
- Profibus
  - Female M12x1, 5 pole + male M12x1, 5 pole
  - Male M8, 4 pole
- Synchronous Serial Interface
  - CONTACT male, 12 pole
- EtherCAT
  - 2 female M12x1, 4 pole
  - Male M8, 4 pole
- Supply voltage
  - 24 V DC \( \pm 10 \) %
- Current consumption without load
  - \( < 250 \) mA
- Weight
  - Depends on length

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

1) Other versions are possible.
Model code:
Stationary HLT 2100 – R1 – XXX – XXX – XXXX – 000
Design/Geometry type
1 = Rod
Mechanical connection
R1 = Threaded flange M18x1.5
Electrical connection
Signal output analogue
K01 = Flying lead, length 1 m
M06 = Male M16, 6 pole
M08 = Male M16, 8 pole
Signal output CANopen, Device Net
C61 = Female M12x1, 5 pole + male M12x1, 5 pole
Signal output Profibus
P61 = Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole
Signal output Synchronous Serial Interface
S01 = CONTACT male, 12 pole
Signal output EtherCAT
E51 = 2 female M12x1, 4 pole + male M8, 4 pole
Signal output
C01 = Analogue 4 .. 20 mA, 3 conductor
C02 = Analogue 20 .. 4 mA, 3 conductor
B01 = Analogue 0 .. 10 V
B02 = Analogue 10 .. 0 V
ETC = EtherCAT
SSI = Synchronous Serial Interface
CAN = CANopen
PRO = Profibus
DVN = Device Net
Measuring range in mm (50 to 4000 mm)
Example
0150 = 150 mm
Modification
000 = Standard

Notes:
Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Items supplied:
• HLT 2100-R1
• Installation instructions German/English
• HLT 2000 CD incl. case

Accessories:
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure. The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The sensor works on the principle of magnetostriction.
The measuring principle determines with a high degree of accuracy the position, distance and/or a velocity signal based on elapsed time.
Utilizing this non-contact and wear-free measuring system, HYDAC offers a flat housing version in aluminium.
The different output signals (anologue/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls).
The HLT 2500-F1 is primarily used in stationary applications, especially when a semi-integrated solution in hydraulic cylinders is not possible.

Special features:
- Accuracy ≤ ± 0.05 % FS typ.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

Input data

| Measuring ranges | 50 ... 4000 mm |
| Measured variable | Distance, position, speed |
| Housing | Flat housing |

Output data

| Signal output analogue | Current: 4 .. 20 mA or 20 ... 4 mA |
| Signal output digital | Voltage: 0 .. 10 V or 10 .. 0 V |
| | Profibus, CANopen, Device Net, SSI, EtherCAT |

Measuring accuracy

- Resolution: max. 0.005 mm, 16 bit
- Non-linearity: ± 0.1 mm to 1,500 mm
- ± 0.15 mm > 1,500 mm
- Repeatability: ≤ 0.005 mm - ≤ 0.05 mm (length-dependent)
- Temperature coefficient: < 0.004 % FS / °C (anologue)
- < 0.0015 % FS / °C (digital)

Installation position and travel speed

- No restrictions

Environmental conditions

- Operating temperature range: 0 .. +70 °C
- Relative humidity: 98 %, non-condensing
- Storage temperature range: -30 .. +85 °C, dry
- Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz: ≤ 10 g
- Shock resistance to DIN EN 60068-2-27: ≤ 100 g / 11 ms / half sine
- EMC: DIN EN 61000-6-1 / 2 / 3 / 4

Other data

- Analogue: Female M12x1, 5 pole, male M12x1, 5 pole
- CANopen, Device Net: Female M12x1, 5 pole + male M12x1, 5 pole
- Profibus: Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole
- Synchronous Serial Interface: CONTACT male, 12 pole
- EtherCAT: 2 female M12x1, 4 pole + male M8, 4 pole

Supply voltage

- 24 V DC ± 10 %

Current consumption without load

- < 250 mA

Weight

- Depends on length

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.
FS (Full Scale) = relative to the complete measuring range
1 Other versions are possible.
**Model code:**

<table>
<thead>
<tr>
<th>Stationary</th>
<th>HLT 250 0 - F1 - XXX - XXX - XXXX - 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design/Geometry type</td>
<td>5 = Profile</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>F1 = Flat housing</td>
</tr>
<tr>
<td>Electrical connection</td>
<td></td>
</tr>
<tr>
<td>Signal output analogue</td>
<td></td>
</tr>
<tr>
<td>K01 = Flying lead, length 1 m</td>
<td></td>
</tr>
<tr>
<td>M06 = Male M16, 6 pole</td>
<td></td>
</tr>
<tr>
<td>M08 = Male M16, 8 pole</td>
<td></td>
</tr>
<tr>
<td>Signal output CANopen, Device Net</td>
<td></td>
</tr>
<tr>
<td>C61 = Female M12x1, 5 pole + male M12x1, 5 pole</td>
<td></td>
</tr>
<tr>
<td>Signal output Profibus</td>
<td></td>
</tr>
<tr>
<td>P61 = Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole</td>
<td></td>
</tr>
<tr>
<td>Signal output Synchronous Serial Interface</td>
<td></td>
</tr>
<tr>
<td>S01 = CONTACT male, 12 pole</td>
<td></td>
</tr>
<tr>
<td>Signal output EtherCAT</td>
<td></td>
</tr>
<tr>
<td>E51 = 2 female M12x1, 4 pole + male M8, 4 pole</td>
<td></td>
</tr>
<tr>
<td>Signal output</td>
<td></td>
</tr>
<tr>
<td>C01 = Analogue 4 .. 20 mA, 3 conductor</td>
<td></td>
</tr>
<tr>
<td>C02 = Analogue 20 .. 4 mA, 3 conductor</td>
<td></td>
</tr>
<tr>
<td>B01 = Analogue 0 .. 10 V</td>
<td></td>
</tr>
<tr>
<td>B02 = Analogue 10 .. 0 V</td>
<td></td>
</tr>
<tr>
<td>ETC = EtherCAT</td>
<td></td>
</tr>
<tr>
<td>SSI = Synchronous Serial Interface</td>
<td></td>
</tr>
<tr>
<td>CAN = CANopen</td>
<td></td>
</tr>
<tr>
<td>PRO = Profibus</td>
<td></td>
</tr>
<tr>
<td>DVN = Device Net</td>
<td></td>
</tr>
</tbody>
</table>

**Measuring range in mm** (50 to 4000 mm)

Example: 0150 = 150 mm

**Modification**

000 = Standard

**Notes:**

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Items supplied:**

- HLT 2500-F1
- Installation instructions German/English
- HLT 2000 CD incl. case

**Accessories:**

Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure. The recommended position magnet ZBL MF 38-18, part no. 6084456, must be ordered separately.
Dimensions:
Signal output: analogue (K01)

Signal output: analogue (M06, M08)

Signal output: Synchronous Serial Interface (S01):

Signal output: CANopen
Device Net (C61)

Signal output: Profibus (P61)

Signal output: EtherCAT (E51)

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The sensor works on the principle of magnetostriction. The measuring principle determines with a high degree of accuracy the position, distance and/or a velocity signal based on elapsed time. Utilizing this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slides or with a sliding magnet for positioning by the operator. The different output signals (analogue/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls). The HLT 2500-L2 is primarily used in stationary applications, especially when a semi-integrated solution in hydraulic cylinders is not possible.

**Special features:**
- Accuracy $\leq 0.05 \%$ FS typ.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Contact-free and wear-free
- Persuasive price / performance ratio

**Technical data:**

**Input data**
- Measuring ranges: 50 .. 4000 mm
- Measured variable: Distance, position, speed
- Mechanical connection: With magnet in position slide V
- Housing: Aluminium

**Output data**
- Signal output analogue: Current: 4 .. 20 mA or 20 .. 4 mA
- Signal output digital: Voltage: 0 .. 10 V or 10 .. 0 V
- Profibus, CANopen, Device Net, SSI, EtherCAT

**Measuring accuracy**
- Resolution max. 0.005 mm, 16 bit
- Non-linearity
  - $\leq 0.1 \text{ mm}$
  - $\leq 0.15 \text{ mm}$
- Repeatability
  - $\leq 0.005 \text{ mm}$
  - $\leq 0.05 \text{ mm}$ (length-dependent)
- Temperature coefficient
  - $< 0.004 \%$ FS / °C (analogue)
  - $< 0.0015 \%$ FS / °C (digital)

**Installation position and travel speed**
- No restrictions

**Environmental conditions**
- Operating temperature range: 0 .. +70 °C
- Relative humidity 98 %, non-condensing
- Storage temperature range: -30 .. +85 °C, dry
- Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz: $\leq 10 \text{ g}$
- Shock resistance to DIN EN 60068-2-27: $\leq 100 \text{ g} / 11 \text{ ms} / \text{ half sine}$

**EMC**
- Emitted interference: DIN EN 61000-6-3
- Interference resistance: DIN EN 61000-6-2

**Housing / Protection class to IEC 60529**
- Aluminium / IP 65

**Other data**
- Electrical connection
  - Analogue: Flying lead, length 1 m
  - CANopen, Device Net: Female M12x1, 5 pole + male M12x1, 5 pole
  - Profibus: Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole
  - Synchronous Serial Interface: CONTACT male, 12 pole
  - EtherCAT: 2 female M12x1, 4 pole + male M8, 4 pole
- Supply voltage: 24 V DC $\pm 10 \%$
- Current consumption without load: $< 250 \text{ mA}$
- Weight: Depends on length

**Note:** Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

1) Other versions are possible.
**Model code:**

Stationary | HLT 2500 - L2 - XXX - XXX - XXXX - 000

- **Design/Geometry type**
  - 5 = Profile

- **Mechanical connection**
  - L2 = With magnet in position slide V

- **Electrical connection**
  - **Signal output analogue**
    - K01 = Flying lead, length 1 m
    - M06 = Male M16, 6 pole
    - M08 = Male M16, 8 pole
  - **Signal output CANopen, Device Net**
    - C61 = Female M12x1, 5 pole + male M12x1, 5 pole
  - **Signal output Profibus**
    - P61 = Female M12x1, 5 pole + male M12x1, 5 pole
    - + male M8, 4 pole
  - **Signal output Synchronous Serial Interface**
    - S01 = CONTACT male, 12 pole
  - **Signal output EtherCAT**
    - E51 = 2 female M12x1, 4 pole + male M8, 4 pole

- **Signal output**
  - C01 = Analogue 4 .. 20 mA, 3 conductor
  - C02 = Analogue 20 .. 4 mA, 3 conductor
  - B01 = Analogue 0 .. 10 V
  - B02 = Analogue 10 .. 0 V
  - ETC = EtherCAT
  - SSI = Synchronous Serial Interface
  - CAN = CANopen
  - PRO = Profibus
  - DVN = Device Net

- **Measuring range in mm (50 to 4000 mm)**
  - Example
    - 0150 = 150 mm

- **Modification**
  - 000 = Standard

**Notes:**
Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Items supplied:**
- HLT 2500-L2
- ZBL MS35-39, position magnet
- Installation instructions German/English
- HLT 2000 CD incl. case

**Accessories:**
Appropriate accessories, such as position magnets and mounting material can be found in the Accessories section of the Electronics brochure.
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The distance sensor HLS 528 is a non-contact, highly compact sensor for measuring distances to fluids and objects.
By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.
The HLS 528 is available for measuring ranges up to 6000 mm and is available in three signal output versions (2 switching outputs; 1 analogue output, either 4...20 mA or 0...10 V, plus 1 or 2 switching outputs).
The sensor can be adjusted simply and conveniently using two push-buttons and a self-explanatory menu structure. A 3-digit display indicates the latest distance and 2 three-colour LEDs also show the operating condition.

Special features:
- Contact-free distance measurement
- Measurement range up to 6000 mm
- Various signal output versions available
- Very high resolution and measurement rate
- Integrated temperature compensation
- 3-digit display to show the latest distance
- 2 three-colour LEDs to display the operating status
- Switching and switch-back points can be adjusted independently
- Selectable analogue output (optional)
- Only for use in depressurised applications

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating range 250; 350; 1300; 3400; 6000 mm</td>
</tr>
<tr>
<td>Blind zone 0..30; 0..85; 0..200; 0..350; 0..600 mm</td>
</tr>
<tr>
<td>Maximum range 350; 600; 2000; 5000; 8000 mm</td>
</tr>
<tr>
<td>Resolution ≤ 0.18 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy ≤ ± 1 % of the latest measured value</td>
</tr>
<tr>
<td>Repeatability ± 0.15 % of the latest measured value</td>
</tr>
<tr>
<td>Versions 2 switch outputs 1 switch outp. +1 analog. outp. / 2 switch outputs + 1 analogue output</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analogue output (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal; selectable (short-circuit resistant, invertible)</td>
</tr>
<tr>
<td>4...20 mA, ( R_{\text{max}} = 100 \Omega ) ((U_b \leq 20 V))</td>
</tr>
<tr>
<td>500 ( \Omega ) ((U_b &gt; 20 V))</td>
</tr>
<tr>
<td>0...10 V, ( R_{\text{max}} = 100 \text{k}\Omega ((U_b \geq 18 V))</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching output (short-circuit resistant) 2 x PNP</td>
</tr>
<tr>
<td>( I_{\text{max}} = 2 \times 200 mA )</td>
</tr>
<tr>
<td>1 x PNP ( I_{\text{max}} = 200 mA )</td>
</tr>
<tr>
<td>2 x PNP ( I_{\text{max}} = 2 \times 200 mA )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature -25 °C .. +70 °C</td>
</tr>
<tr>
<td>Storage temperature range -40 °C .. +85 °C</td>
</tr>
<tr>
<td>( \text{mark} ) DIN EN 60947-5-2</td>
</tr>
<tr>
<td>Protection class to EN 60529 IP 67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage 9..30 V DC without analogue output</td>
</tr>
<tr>
<td>18..30 V DC with analogue output</td>
</tr>
<tr>
<td>Time delay before availability &lt; 300 ms</td>
</tr>
<tr>
<td>Residual ripple ± 10%</td>
</tr>
<tr>
<td>No-load current consumption ≤ 80 mA</td>
</tr>
<tr>
<td>Electrical connection Male M12x1, 5 pole</td>
</tr>
<tr>
<td>Housing Brass, nickel-plated; Ultrasonic transducer with PEEK film</td>
</tr>
<tr>
<td>Controls 2 push-buttons</td>
</tr>
<tr>
<td>Display 3-digit, LED-display, 2 three-colour-LEDs</td>
</tr>
<tr>
<td>Weight 150; 150; 150; 210; 270 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.
Setting options:
All the settings available on the HLS 528 are grouped in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the instrument, a key-lock can be set.

Setting ranges of the switching points and switch-back hystereses:
Switching point function distance

<table>
<thead>
<tr>
<th>Operational scanning range</th>
<th>Switching point*</th>
<th>Hysteresis*</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 mm</td>
<td>30 .. 350 mm</td>
<td>1 .. 320 mm</td>
</tr>
<tr>
<td>350 mm</td>
<td>85 .. 600 mm</td>
<td>1 .. 515 mm</td>
</tr>
<tr>
<td>1300 mm</td>
<td>200 .. 999 mm</td>
<td>1 .. 999 mm</td>
</tr>
<tr>
<td></td>
<td>100 .. 200 cm</td>
<td>100 .. 180 cm</td>
</tr>
<tr>
<td>3400 mm</td>
<td>350 .. 999 mm</td>
<td>1 .. 999 mm</td>
</tr>
<tr>
<td></td>
<td>100 .. 500 cm</td>
<td>100 .. 465 cm</td>
</tr>
<tr>
<td>6000 mm</td>
<td>600 .. 999 mm</td>
<td>1 .. 999 mm</td>
</tr>
<tr>
<td></td>
<td>100 .. 800 cm</td>
<td>100 .. 740 cm</td>
</tr>
</tbody>
</table>

Window function distance

<table>
<thead>
<tr>
<th>Operational scanning range</th>
<th>Lower switch value*</th>
<th>Upper switch value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 mm</td>
<td>30 .. 348 mm</td>
<td>32 .. 350 mm</td>
</tr>
<tr>
<td>350 mm</td>
<td>85 .. 598 mm</td>
<td>87 .. 600 mm</td>
</tr>
<tr>
<td>1300 mm</td>
<td>200 .. 999 mm</td>
<td>202 .. 999 mm</td>
</tr>
<tr>
<td></td>
<td>100 .. 198 cm</td>
<td>100 .. 200 cm</td>
</tr>
<tr>
<td>3400 mm</td>
<td>350 .. 999 mm</td>
<td>352 .. 999 mm</td>
</tr>
<tr>
<td></td>
<td>100 .. 498 cm</td>
<td>100 .. 500 cm</td>
</tr>
<tr>
<td>6000 mm</td>
<td>600 .. 999 mm</td>
<td>602 .. 999 mm</td>
</tr>
<tr>
<td></td>
<td>100 .. 798 cm</td>
<td>100 .. 800 cm</td>
</tr>
</tbody>
</table>

* The increment for all units is 1 mm or cm.

Recording ranges
(for different objects):
The dark-grey areas specify the range in which the normal reflector (round bar) is detected safely. This is the typical working range of the sensors. The light grey areas illustrate the range in which a very large reflector, e.g. a very large plate, is still detected, provided it is aligned optimally to the sensor. Ultrasonic reflections cannot be evaluated outside the light grey area.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>HLS 528-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Us</td>
</tr>
<tr>
<td>2</td>
<td>D1 (switching output 1)</td>
</tr>
<tr>
<td>3</td>
<td>-Us (0 V)</td>
</tr>
<tr>
<td>4</td>
<td>D2 (switching output 2)</td>
</tr>
<tr>
<td>5</td>
<td>Synchronisation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>HLS 528-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Us</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>-Us (0 V)</td>
</tr>
<tr>
<td>4</td>
<td>D (switching output)</td>
</tr>
<tr>
<td>5</td>
<td>Synchronisation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>HLS 528-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Us</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>-Us (0 V)</td>
</tr>
<tr>
<td>4</td>
<td>D2 (switching output 2)</td>
</tr>
<tr>
<td>5</td>
<td>D1 (switching output 1)</td>
</tr>
</tbody>
</table>
Model code:

**Mechanical connection**

2 = M30x1.5

**Electrical connection**

8 = Male M12x1, 5 pole (connector not supplied)

Output

2 = 2 switching outputs
3 = 1 switching output and 1 analogue output
5 = 2 switching outputs and 1 analogue output

Operational scanning range in mm

0250; 0350; 1300, 3400, 6000

Modification number

000 = Standard

Type of protection, front face of sensor

F = Foil

Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:

Operational scanning range:

- 250 mm
- 350 mm, 1300 mm
- 3400 mm, 6000 mm

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
In industry, level sensors are used for the most diverse tasks. In the main, sensors which are based on capacitive, magnetostrictive or ultrasonic measurement are used. HYDAC ELECTRONIC has level sensors for each of these measurement principles in its product range.

Electronic level switches for general applications:

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENS 3000 (capacitive)</td>
<td>149</td>
</tr>
<tr>
<td>ENS 3000 IO-Link (capacitive)</td>
<td>153</td>
</tr>
<tr>
<td>HNS 3000 (magnetostrictive)</td>
<td>155</td>
</tr>
<tr>
<td>HNS 526 (based on ultrasound)</td>
<td>157</td>
</tr>
</tbody>
</table>

Electronic level measuring transmitter for general applications:

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HNT 1000 (magnetostrictive)</td>
<td>161</td>
</tr>
</tbody>
</table>
Description:
The ENS 3000 is an electronic level switch with integrated display. The instrument has 1, 2 or 4 switching outputs and an analogue output signal is available as an option. In addition to the standard minimum and maximum switching signals, with the 4 switching output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump. The ENS 3000 can be used for oil as well as water. The fluid type can be selected for specific applications via the menu. The main applications of the ENS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank. The ENS 3000 is available in standard probe lengths of 250 mm, 410 mm, 520 mm and 730 mm. The instrument is also available with or without an integrated temperature sensor.

Special features:
- 1, 2 or 4 independent PNP transistor switching outputs
- Selectable for use with oil or water
- User-selectable switch outputs based on the measured value
- Switching and switch-back points can be adjusted independently
- Selectable analogue output (optional)
- 4-digit display
- Simple to operate due to menu-based key operation

Technical data:

<table>
<thead>
<tr>
<th>Description</th>
<th>ENS 3000 Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The ENS 3000 is an electronic level switch with integrated</td>
</tr>
<tr>
<td></td>
<td>display. The instrument has 1, 2 or 4 switching outputs and</td>
</tr>
<tr>
<td></td>
<td>an analogue output signal is available as an option.</td>
</tr>
<tr>
<td></td>
<td>In addition to the standard minimum and maximum switching</td>
</tr>
<tr>
<td></td>
<td>signals, with the 4 switching output version it is possible</td>
</tr>
<tr>
<td></td>
<td>to set additional warning signals to prevent problems such</td>
</tr>
<tr>
<td></td>
<td>as tank overflow or aeration of the pump. The ENS 3000 can</td>
</tr>
<tr>
<td></td>
<td>be used for oil as well as water. The fluid type can be</td>
</tr>
<tr>
<td></td>
<td>selected for specific applications via the menu. The main</td>
</tr>
<tr>
<td></td>
<td>applications of the ENS 3000 are primarily in hydraulics, e.g.</td>
</tr>
<tr>
<td></td>
<td>for fluid level monitoring of a tank. The ENS 3000 is</td>
</tr>
<tr>
<td></td>
<td>available in standard probe lengths of 250 mm, 410 mm,</td>
</tr>
<tr>
<td></td>
<td>520 mm and 730 mm. The instrument is also available with</td>
</tr>
<tr>
<td></td>
<td>or without an integrated temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>Special features:</td>
</tr>
<tr>
<td></td>
<td>● 1, 2 or 4 independent PNP transistor switching outputs</td>
</tr>
<tr>
<td></td>
<td>● Selectable for use with oil or water</td>
</tr>
<tr>
<td></td>
<td>● User-selectable switch outputs based on the measured value</td>
</tr>
<tr>
<td></td>
<td>● Switching and switch-back points can be adjusted</td>
</tr>
<tr>
<td></td>
<td>independently</td>
</tr>
<tr>
<td></td>
<td>● Selectable analogue output (optional)</td>
</tr>
<tr>
<td></td>
<td>● 4-digit display</td>
</tr>
<tr>
<td></td>
<td>● Simple to operate due to menu-based key operation</td>
</tr>
</tbody>
</table>

Technical data:

<table>
<thead>
<tr>
<th>Description</th>
<th>ENS 3000 Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input data</td>
<td>Sensor type: Capacitive fluid level sensor</td>
</tr>
<tr>
<td></td>
<td>Probe lengths: 250; 410; 520 mm</td>
</tr>
<tr>
<td></td>
<td>Active zone: 170; 290; 390; 590 mm</td>
</tr>
<tr>
<td></td>
<td>Max. speed of change in fluid level: 40; 60; 80; 100 mm/s</td>
</tr>
<tr>
<td></td>
<td>Repeatability: ≤ ± 2 % FS</td>
</tr>
<tr>
<td></td>
<td>Switching point accuracy: ≤ ± 2 % FS</td>
</tr>
<tr>
<td>Temperature (optional)</td>
<td>Sensor type: Semiconductor sensor</td>
</tr>
<tr>
<td></td>
<td>Measuring range: -25 to +100 °C</td>
</tr>
<tr>
<td></td>
<td>Accuracy: ≤ ± 1.5 °C</td>
</tr>
<tr>
<td></td>
<td>Reaction time (t&lt;sub&gt;I&lt;/sub&gt;): 180 s</td>
</tr>
<tr>
<td>Output data</td>
<td>Analogue output (optional)</td>
</tr>
<tr>
<td></td>
<td>With 1 or 2 SP selectable: 4 V .. 20 mA ohmic resistance ≤ 500 D</td>
</tr>
<tr>
<td></td>
<td>0 .. 10 V ohmic resistance ≤ 1 kΩ corresponds to measuring</td>
</tr>
<tr>
<td></td>
<td>range selected</td>
</tr>
<tr>
<td></td>
<td>With 4 SP (only with temperature sensor): 0 .. 10 V ohmic</td>
</tr>
<tr>
<td></td>
<td>resistance ≤ 1 kΩ corresponds to measuring range selected</td>
</tr>
<tr>
<td>Switch outputs</td>
<td>Type: PNP transistor output programming as N/O / N/C</td>
</tr>
<tr>
<td></td>
<td>Assignment: On version with temperature measurement, user</td>
</tr>
<tr>
<td></td>
<td>can select temperature or fluid level</td>
</tr>
<tr>
<td></td>
<td>Switching current: 1 or 2 SP: max. 1.2 A per output</td>
</tr>
<tr>
<td></td>
<td>4 SP: max. 0.25 A per output</td>
</tr>
<tr>
<td></td>
<td>Switching cycles: &gt; 100 million</td>
</tr>
<tr>
<td>Environmental conditions</td>
<td>Compensated temperature range: 0 .. +60 °C</td>
</tr>
<tr>
<td></td>
<td>Operating temperature range: 0 .. +60 °C</td>
</tr>
<tr>
<td></td>
<td>Storage temperature range: 40 .. +90 °C</td>
</tr>
<tr>
<td></td>
<td>Fluid temperature range: 0 .. +60 °C</td>
</tr>
<tr>
<td>mark</td>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>DIN 43649</td>
<td>Certificate No. E318391</td>
</tr>
<tr>
<td>Vibration resistance to</td>
<td>≤ 5 g</td>
</tr>
<tr>
<td>DIN EN 60068-2-6 (0 .. 500 Hz)</td>
<td>Shock resistance to</td>
</tr>
<tr>
<td>DIN 40868-2-29 (1 ms)</td>
<td>≤ 25 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67</td>
</tr>
<tr>
<td>Other data</td>
<td>Max. tank pressure: 0.5 bar (short-term 3 bar, t &lt; 1 min)</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>9 .. 35 V DC without analogue output</td>
</tr>
<tr>
<td>for use acc. to UL spec.</td>
<td>18 .. 35 V DC with analogue output</td>
</tr>
<tr>
<td></td>
<td>- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1985; LPS UL 60950</td>
</tr>
<tr>
<td>Current consumption</td>
<td>max. 2.47 A total</td>
</tr>
<tr>
<td></td>
<td>max. 80 mA with inactive switching outputs and 2 analogue</td>
</tr>
<tr>
<td></td>
<td>outputs</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Fluids</td>
<td>Hydraulic oils (mineral based), synth. oils, fluids containing</td>
</tr>
<tr>
<td></td>
<td>water</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Ceramic</td>
</tr>
<tr>
<td></td>
<td>Display: 4-digit, LED, 7 segment, red, height of digits 7 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 180; 220; 250; 300 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, overloads and short circuit protection are provided. F5 (Full Scale) = relative to complete measuring range
- Specified for calm, non-turbulent fluid
- Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1
- Other fluids on request
Setting options:
All settings available on the ENS 3000 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

Setting ranges of the switching points and switch-back hystereses:
Fluid level switching point function

<table>
<thead>
<tr>
<th>Probe length in cm</th>
<th>Meas. range in cm</th>
<th>Switching point in cm</th>
<th>Hysteresis in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>17.0</td>
<td>0.3 .. 17.0</td>
<td>0.1 .. 16.8</td>
</tr>
<tr>
<td>41.0</td>
<td>29.0</td>
<td>0.5 .. 29.0</td>
<td>0.2 .. 28.7</td>
</tr>
<tr>
<td>52.0</td>
<td>39.0</td>
<td>0.6 .. 39.0</td>
<td>0.2 .. 38.6</td>
</tr>
<tr>
<td>73.0</td>
<td>59.0</td>
<td>0.9 .. 59.0</td>
<td>0.3 .. 58.4</td>
</tr>
</tbody>
</table>

The increment for all units is 0.1 cm.

Fluid level window function

<table>
<thead>
<tr>
<th>Probe length in cm</th>
<th>Lower switch value in cm</th>
<th>Upper switch value in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>0.3 .. 16.7</td>
<td>0.4 .. 16.8</td>
</tr>
<tr>
<td>41.0</td>
<td>0.5 .. 28.4</td>
<td>0.7 .. 28.7</td>
</tr>
<tr>
<td>52.0</td>
<td>0.6 .. 38.3</td>
<td>0.9 .. 38.6</td>
</tr>
<tr>
<td>73.0</td>
<td>0.9 .. 57.9</td>
<td>1.4 .. 58.4</td>
</tr>
</tbody>
</table>

The increment for all units is 0.1 cm.

Fluid level offset function

<table>
<thead>
<tr>
<th>Probe length in cm</th>
<th>Meas. range in cm</th>
<th>Offset in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.0</td>
<td>17.0</td>
<td>0 .. 68.0</td>
</tr>
<tr>
<td>41.0</td>
<td>29.0</td>
<td>0 .. 116.0</td>
</tr>
<tr>
<td>52.0</td>
<td>39.0</td>
<td>0 .. 156.0</td>
</tr>
<tr>
<td>73.0</td>
<td>59.0</td>
<td>0 .. 177.0</td>
</tr>
</tbody>
</table>

The increment for all units is 0.1 cm.

Temperature switching point function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Meas. range</th>
<th>Switching point</th>
<th>Hysteresis</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-25 .. +100</td>
<td>-23.0 .. +100.0</td>
<td>1.0 .. 123.5</td>
</tr>
</tbody>
</table>

The increment for all units is 0.5 °C.

Temperature window function

<table>
<thead>
<tr>
<th>Unit</th>
<th>Lower switch value</th>
<th>Upper switch value</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-23.5 .. +67.5</td>
<td>-22.0 .. +68.5</td>
</tr>
</tbody>
</table>

The increment for all units is 0.5 °C.

* All ranges given in the table are adjustable by the increments shown.

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to fluid level or temperature, as required
- Switch-on and switch-off delay adjustable from 0.00 .. 9999 seconds
- Display can be adjusted (actual fluid level, actual temperature, peak values, switching point 1, 2, 3, 4 or display off)
- Analogue output can be assigned to fluid level or temperature as required (depending on model)

Pin connections:

**M12x1, 4 pole**

<table>
<thead>
<tr>
<th>Pin</th>
<th>ENS 3X16-2</th>
<th>ENS 3X16-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
<td>SP 1</td>
</tr>
</tbody>
</table>

**M12x1, 5 pole**

<table>
<thead>
<tr>
<th>Pin</th>
<th>ENS 3X18-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>Analogue</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 2</td>
</tr>
</tbody>
</table>

**M12x1, 8 pole**

<table>
<thead>
<tr>
<th>Pin</th>
<th>ENS 3X1P-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
</tr>
<tr>
<td>2</td>
<td>SP 2</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP 1</td>
</tr>
<tr>
<td>5</td>
<td>SP 3</td>
</tr>
<tr>
<td>6</td>
<td>SP 4</td>
</tr>
<tr>
<td>7</td>
<td>Analogue fluid level</td>
</tr>
<tr>
<td>8</td>
<td>Analogue temperature</td>
</tr>
</tbody>
</table>
Model code: ENS 3 X 1 X – X – XXXX – 000 – K

Temperature sensor
1 = With temperature sensor
2 = Without temperature sensor

Mechanical connection
1 = 22 mm collar to fit cutting ring coupling G22L

Electrical connection
6 = Male M12x1, 4 pole only possible on output models "2" and "3"
8 = Male M12x1, 5 pole only possible on output model "5"
P = Male M12x1, 8 pole only possible on output model "8"

Output
2 = 2 switching outputs only in conjunction with electrical connection type "6"
3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"
8 = 4 switching outputs and 2 analogue outputs only in conjunction with electrical connection type "P"

Probe length (physical) in mm
0250; 0410; 0520; 0730

Modification number
000 = Standard

Probe material
K = Ceramic

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Designation</th>
<th>[mm]</th>
<th>[mm]</th>
<th>[mm]</th>
<th>[mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactive zone (lower end)</td>
<td>approx. 22</td>
<td>approx. 28</td>
<td>approx. 34</td>
<td>approx. 60</td>
</tr>
<tr>
<td>Measuring range</td>
<td>170</td>
<td>290</td>
<td>390</td>
<td>590</td>
</tr>
<tr>
<td>Probe length</td>
<td>250</td>
<td>410</td>
<td>520</td>
<td>730</td>
</tr>
<tr>
<td>Total length</td>
<td>340</td>
<td>500</td>
<td>610</td>
<td>820</td>
</tr>
<tr>
<td>Inactive zone (upper end)</td>
<td>approx. 33</td>
<td>approx. 67</td>
<td>approx. 71</td>
<td>approx. 65</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The ENS 3000 with IO-Link communication interface is an electronic level switch with integrated display. The instrument has a switching output and additional output that can be configured as switching or analogue (4..20 mA or 0..10 V). The ENS 3000 can be used not only for oil but also for water and is available with or without temperature sensor. Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The level switch series ENS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Special features:
- IO-Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Selectable for use with oil or water
- 4-digit display
- Display rotates in two axes for optimal alignment

Technical data:
- **Input data**
  - Sensor type: Capacitive level sensor
  - Probe length: 250; 410; 520; 730 mm
  - Measuring range: 170; 290; 390; 590 mm
  - Max. speed of change in the fluid level: 40; 60; 80; 100 mm/s
  - Repeatability\(^1\): \(\leq \pm 2 \% \text{ FS}\)
  - Switching point accuracy: \(\leq \pm 2 \% \text{ FS}\)

- **Temperature (optional)**
  - Sensor type: Semi-conductor sensor
  - Measuring range: -25 .. +100 °C
  - Accuracy: \(\pm 1.5 \degree\text{ C}\)
  - Reaction time (\(t_{90}\)): 180 s

- **Output data**
  - Output signals:
    - Output 1: PNP transistor switching output
    - Output 2: can be configured as PNP transistor switching output or analogue output
  - Analogue output:
    - Signal selectable: 4 .. 20 mA load resistance max. 500 Ω
    - 0 .. 10 V load resist. min. 1 kΩ
  - Corresponds to measuring range selected

- **Switch outputs**
  - Type: PNP transistor switching output
  - Assignment: On version with temperature measurement user-selectable temperature or fluid level
  - Switching current: max. 250 mA per output
  - Switching cycles: \(\geq 100\text{ million}\)

- **Parameterisation**
  - Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ENS 3000

- **Environmental conditions**
  - Compensated temperature range: 0 .. +60 °C
  - Operating temperature range: 0 .. +60 °C
  - Storage temperature range: -40 .. +80 °C
  - Fluid temperature range: 0 .. +60 °C

- **C- mark**
  - EN 61000-6-1 / 2 / 3 / 4

- **Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)**
  - \(\leq 5\) g

- **Shock resistance according to DIN EN 60068-2-29 (11 ms)**
  - \(\leq 25\) g

- **Protection class to IEC 60529**
  - IP 67

- **Other data**
  - Max. tank pressure: 0.5 bar (short-term 3 bar, \(t < 1\) min)
  - Supply voltage:
    - 9 .. 35 V DC without analogue output
    - 18 .. 35 V DC with analogue output
  - Current consumption:
    - \(\leq 0.590\) A with active switching outputs
    - \(\leq 0.90\) A with inactive switching outputs
    - \(\leq 0.110\) A with inactive switching outputs and analogue output
  - Residual ripple of supply voltage: \(\leq 5\) %
  - Fluids\(^2\):
    - Hydraulic oils (mineral based), synth. oils, fluids containing water
  - Parts in contact with medium:
    - Ceramic
  - Display:
    - 4-digit, LED, 7-segment, red, height of digits 7 mm
  - Weight:
    - \(180 .. 300\) g, dependent on the probe length

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- Specified for calm, non-turbulent fluid
- Other fluids on request
Setting options:
All terms and symbols used for setting the ENS 3000 as well as the menu structure comply with the specifications in the VDMA Standard for level switches.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range/ probe length</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>Lower limit</th>
<th>Upper limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>in cm</td>
<td>in cm</td>
<td>in cm</td>
<td>in cm</td>
<td>in cm</td>
</tr>
<tr>
<td>17.0 / 25.0</td>
<td>0.2 / 0.3</td>
<td>17.0 / 16.8</td>
<td>0.2 / 0.3</td>
<td>17.0 / 16.8</td>
</tr>
<tr>
<td>29.0 / 41.0</td>
<td>0.3 / 0.5</td>
<td>29.0 / 28.7</td>
<td>0.3 / 0.5</td>
<td>29.0 / 28.7</td>
</tr>
<tr>
<td>39.0 / 52.0</td>
<td>0.4 / 0.6</td>
<td>36.0 / 36.6</td>
<td>0.4 / 0.6</td>
<td>36.0 / 36.6</td>
</tr>
<tr>
<td>56.0 / 73.0</td>
<td>0.6 / 0.9</td>
<td>56.0 / 56.4</td>
<td>0.6 / 0.9</td>
<td>56.0 / 56.4</td>
</tr>
</tbody>
</table>

Measuring range Min. difference Increment*
<table>
<thead>
<tr>
<th>in cm</th>
<th>in cm</th>
<th>in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.0 / 25.0</td>
<td>0.1 / 0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>29.0 / 41.0</td>
<td>0.2 / 0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>39.0 / 52.0</td>
<td>0.2 / 0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>56.0 / 73.0</td>
<td>0.3 / 0.5</td>
<td>0.1</td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.
SP = switch point
RP = switch-back point
FL = level window lower value
FH = level window upper value

Additional functions:
● Switching mode of the switching outputs adjustable (switching point function or window function)
● Switching direction of the switching outputs adjustable (N/C or N/O function)
● Switching outputs can be assigned to the fluid level or temperature
● Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
● Optional analogue output signal to 4 .. 20 mA or 0 .. 10 V
● Analogue output can be assigned to fluid level or temperature as required (depending on version)

Pin connections:

### IO-Link-specific data:
- Baud rate: 38.4 kbaud *
- Cycle time: 2.5 ms
- Process data width: 16 Bit
- Frame type: 2.2
- Specification: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:
http://www.hydac.com/de-en/service/downloads-software-on-request/

### Model code:
ENS 3 X 1 6 – L – XXXX – 000 – K

#### Temperature sensor
1 = With temperature sensor
2 = Without temperature sensor

#### Mechanical connection
1 = Collar Ø 22
6 = Male M12x1, 4 pole (connector not supplied)

#### Electrical connection
L = IO-Link interface

#### Probe length, physical
- 0250; 0410; 0520; 0730 mm

#### Modification number
000 = Standard

#### Probe material
K = Ceramic

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical connection adaptors, splash guards, etc. can be found in the Accessories brochure.

### Dimensions:

#### Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L+</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>2</td>
<td>I/Q</td>
<td>Switching output (SP2) / analogue output</td>
</tr>
<tr>
<td>3</td>
<td>L-</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>C/Q</td>
<td>IO-Link communication / switching output (SP1)</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The HNS 3000 is an electronic level switch with integrated display. The float-based sensor for high-precision analogue monitoring of the fluid level has 1, 2 or 4 switching outputs and an analogue output signal is available as an option.
In addition to the conventional minimum and maximum switching signal, with the 4 output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump.
The main applications of this HNS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank.
The sensor is available in probe lengths from 250 to 2500 mm. The instrument is also available with or without temperature sensor.
Depending on the application, several different floats are available, e.g. stainless steel for aggressive media or plastic.

Special features:
- 1, 2 or 4 independent PNP transistor switching outputs
- User-selectable switch outputs based on the measured value
- Switching and switch-back points can be adjusted independently
- Selectable analogue output available as an option
- 4-digit display
- Various types of float available

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
</tr>
<tr>
<td>Measuring ranges</td>
</tr>
<tr>
<td>Probe length</td>
</tr>
<tr>
<td>Max. speed of change in fluid level</td>
</tr>
<tr>
<td>Repeatability</td>
</tr>
<tr>
<td>Switching point accuracy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature (optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
</tr>
<tr>
<td>Measuring range</td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Reaction time (tw)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue output (optional)</td>
</tr>
<tr>
<td>With 1 or 2 SP selectable</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>With 4 SP (only with temperature sensor)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Assignment</td>
</tr>
<tr>
<td>Switching current</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Switching cycles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. tank pressure</td>
</tr>
<tr>
<td>Operating temperature range</td>
</tr>
<tr>
<td>Storage temperature range</td>
</tr>
<tr>
<td>Fluid temperature range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration resistance to DIN EN 60682-2-27</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5 mm (5 .. 8.2 Hz)</td>
</tr>
<tr>
<td>2.0 g (8.2 .. 150 Hz)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock resistance to DIN EN 60682-2-27</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 g (11ms)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection class to IEC 60529</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage (U_s)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Current consumption (without output)</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
</tr>
<tr>
<td>Fluids</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
</tr>
<tr>
<td>Float</td>
</tr>
<tr>
<td>Display</td>
</tr>
</tbody>
</table>

| Weight (dependent on the probe length) | ~ 1000 g |

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- Other probe lengths on request

FS (Full Scale) = relative to the complete measuring range
1) Specified for calm, non-turbulent fluid
Pin connections:

**M12x1, 4 pole**

- Pin 1: +U_B
- Pin 2: SP 2
- Pin 3: 0 V
- Pin 4: SP 1

**Model code:**

HNS 3 X X X - X - XXXX - 000

**Temperature sensor**
1 = With temperature sensor
2 = Without temperature sensor

**Mechanical connection**
2 = G3/4 A DIN 3852 (male)

**Electrical connection**
6 = Male M12x1, 4 pole
   only for output models "2" and "3"
8 = Male M12x1, 5 pole
   possible only for output model "5"
P = Male M12x1, 8 pole
   only for output model "8"

**Output**
2 = 2 switching outputs
   only in conjunction with electrical connection type "6"
3 = 1 switching output and 1 analogue output
   only in conjunction with electrical connection type "6"
5 = 2 switching outputs and 1 analogue output
   only in conjunction with electrical connection code type "8"
8 = 4 switching outputs and 2 analogue outputs
   only in conjunction with electrical connection type "P"

**Probe length (physical) in mm**
- 0250; 0280; 0370; 0410; 0520; 0730

**Modification number**
000 = Standard

**Notes:**
Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**
Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

**Dimensions:**

- M12x1, 4 pole
- M12x1, 5 pole
- M12x1, 8 pole

**Pin HNS 3X26-2**
- Pin 1: +U_B
- Pin 2: SP 2
- Pin 3: 0 V
- Pin 4: SP 1

**Pin HNS 3X26-3**
- Pin 1: +U_B
- Pin 2: Analogue
- Pin 3: 0 V
- Pin 4: SP 1

**Pin HNS 3X28-5**
- Pin 1: +U_B
- Pin 2: Analogue
- Pin 3: 0 V
- Pin 4: SP 1
- Pin 5: SP 2

**Pin HNS 3X2P-8**
- Pin 1: +U_B
- Pin 2: SP 2
- Pin 3: 0 V
- Pin 4: SP 1
- Pin 5: SP 3
- Pin 6: SP 4
- Pin 7: Analogue level
- Pin 8: Analogue temperature

**Note:**
The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.
**Description:**
The level switch HNS 526 is a non-contact, highly compact sensor for fluid level measurement in stationary applications.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

The HNS 526 is available for measurement ranges up to 6400 mm and is obtainable in different signal output variants (2 switching outputs; 1 switching output and 1 analogue output, either 4 .. 20 mA or 0 .. 10 V).

The sensor can be adjusted simply and conveniently via two push-buttons and a self-explanatory menu structure according to VDMA.

The actual fluid level can be displayed in a 3-digit digital display either in absolute value or in percent (selectable); 2 three-colour LEDs also indicate the operating status.

**Special features:**
- Non-contact distance measurement
- Measurement range up to 6400 mm
- Various signal output versions available
- Very high resolution and measurement rate
- Integrated temperature compensation
- 3-digit digital display to show the actual distance
- 2 three-colour LEDs to display the operating status
- Switching and switch-back points can be adjusted independently
- Selectable analogue output (optional)
- Only for use in depressurised applications
- Must be installed vertically to the fluid surface

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th>280; 480; 1600; 4000; 6400 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating range</td>
<td></td>
</tr>
<tr>
<td>Blind zone</td>
<td>0 .. 30; 0 .. 85; 0 .. 200; 0 .. 350; 0 .. 600 mm</td>
</tr>
<tr>
<td>Maximum range</td>
<td>350; 600; 2000; 5000; 8000 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>≤ 0.18 mm</td>
</tr>
</tbody>
</table>

**Output data**

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>≤ ± 1 % of the actual measured value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeatability</td>
<td>± 0.15 % of the actual measured value</td>
</tr>
</tbody>
</table>

**Analogue output (optional)**

<table>
<thead>
<tr>
<th>Signal (short-circuit resistant)</th>
<th>selectable:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 .. 20 mA, ( R_{\text{Lmax}} = 100 , \Omega ) (( U_B \leq 20 , \text{V} ))</td>
<td></td>
</tr>
<tr>
<td>0 .. 10 V, ( R_{\text{Lmax}} = 500 , \Omega ) (( U_B &gt; 20 , \text{V} ))</td>
<td></td>
</tr>
</tbody>
</table>

**Switch outputs**

<table>
<thead>
<tr>
<th>Type</th>
<th>PNP transistor output (short-circuit resistant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching current</td>
<td>max. 200 mA per switching output</td>
</tr>
<tr>
<td>Switching direction</td>
<td>N/O or N/C, adjustable</td>
</tr>
<tr>
<td>Switching cycles</td>
<td>&gt; 100 million</td>
</tr>
<tr>
<td>Reaction time</td>
<td>32; 64; 92; 172; 240 ms</td>
</tr>
</tbody>
</table>

**Environmental conditions**

| Operating temperature | -25 °C .. +70 °C |
| Storage temperature range | -40 °C .. +85 °C |

**EC mark**

- DIN EN 60947-5-2
- DIN EN 60947-5-7

| Vibration resistance to DIN EN 60068-2-6 (10 .. 55 Hz) | ≤ 2 g |
| Shock resistance to DIN EN 60068-2-27 (11 ms)        | ≤ 30 g |

| Protection class to EN 60529 | IP 67 |

**Other data**

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>9 .. 30 V DC without analogue output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time delay before availability</td>
<td>&lt; 300 ms</td>
</tr>
<tr>
<td>Residual ripple</td>
<td>± 10%</td>
</tr>
<tr>
<td>No-load current consumption</td>
<td>≤ 80 mA</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Male M12x1.4 pole</td>
</tr>
<tr>
<td>Housing</td>
<td>Brass, nickel-plated; Ultrasonic transducer with PEEK film</td>
</tr>
<tr>
<td>Controls</td>
<td>2 push-buttons</td>
</tr>
<tr>
<td>Display</td>
<td>3-digit, LED-display, 2 three-colour-LEDs</td>
</tr>
<tr>
<td>Weight</td>
<td>150; 150; 150; 210; 270 g</td>
</tr>
</tbody>
</table>

**Note:** Reverse polarity protection of the supply voltage and short circuit protection are provided.
Setting options:
All the terms and symbols used for setting the HNS 526 as well as the menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-4) for level switches.
In order to prevent unauthorised adjustment of the device, a key-lock can be set.

Setting ranges of the switching points or switch-back points:
Switching point function distance and window function distance

<table>
<thead>
<tr>
<th>Oper. scanning range</th>
<th>SP1, SP2, FH1, FH2 *</th>
<th>RP1, RP2, FL1, FL2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>280 mm</td>
<td>2...32 cm</td>
<td>1...31 cm</td>
</tr>
<tr>
<td></td>
<td>2...13 inch</td>
<td>1...12 inch</td>
</tr>
<tr>
<td>480 mm</td>
<td>2...59 cm</td>
<td>1...58 cm</td>
</tr>
<tr>
<td></td>
<td>2...23 inch</td>
<td>1...22 inch</td>
</tr>
<tr>
<td>1600 mm</td>
<td>2...180 cm</td>
<td>1...179 cm</td>
</tr>
<tr>
<td></td>
<td>2...71 inch</td>
<td>1...70 inch</td>
</tr>
<tr>
<td>4000 mm</td>
<td>2...465 cm</td>
<td>1...464 cm</td>
</tr>
<tr>
<td></td>
<td>2...183 inch</td>
<td>1...182 inch</td>
</tr>
<tr>
<td>6400 mm</td>
<td>2...740 cm</td>
<td>1...739 cm</td>
</tr>
<tr>
<td></td>
<td>2...291 inch</td>
<td>1...290 inch</td>
</tr>
</tbody>
</table>

Switching point function:
SP1, SP2 = switching points 1 or 2
RP1, RP2 = switch-back points 1 or 2

Window function.
FH1, FH2 = upper switch values 1 or 2
FL1, FL2 = lower switch values 1 or 2

* The increment for all devices is 1 cm or 1 inch.

Recording ranges
(for different objects):
The grey areas show the detection range for a very large reflector, e.g. a fluid surface, providing the sensor is ideally positioned. Outside the grey area, it is not possible to evaluate the ultrasonic reflections.

Operational scanning range 280 mm:
Operational scanning range 480 mm:
Operational scanning range 1600 mm:
Operational scanning range 4000 mm:
Operational scanning range 6400 mm:

Additional functions:
- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>HNS 526-2</th>
<th>HNS 526-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U1</td>
<td>+U1</td>
</tr>
<tr>
<td>2</td>
<td>SP2</td>
<td>I/U</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>SP1</td>
<td>SP1</td>
</tr>
</tbody>
</table>
**Model code:**

- **Mechanical connection**
  - 2 = M30x1.5

- **Electrical connection**
  - 6 = Male M12x1, 4 pole
    (connector not supplied)

- **Output**
  - 2 = 2 switching outputs
  - 3 = 1 switching output and 1 analogue output

- **Operational scanning range in mm**
  - 0280; 0480; 1600, 4000, 6400

- **Modification number**
  - 000 = Standard

- **Design, front face of sensor**
  - F = Foil

**Note:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Dimensions:**

- **Operational scanning range:**
  - 280 mm
  - 480 mm, 1600 mm
  - 4000 mm
  - 6400 mm

**HYDAC ELECTRONIC GMBH**

Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The level transmitter HNT 1000 is a float-based sensor for highly accurate analogue recording of fluid levels. The sensor is available in probe lengths from 250 to 2500 mm. HYDAC offers the HNT 1000 in a pressure-resistant stainless steel housing for in-tank installation. Depending on the application, a variety of different floats are available, e.g. stainless steel for aggressive media or plastic. The output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

Special features:
- Probe lengths from 200 to 2500 mm
- Process connection: G3/4 A threaded connection
- High degree of accuracy
- Very robust housing
- Highly resistant to shock and vibration
- Excellent EMC characteristics
- Various float variants available

Technical data:

**Input data**
- Sensor type: magnetostrictive
- Measuring ranges: 178; 208; 298; 338; 448; 658 mm
- Probe length: 250; 280; 370; 410; 520; 730 mm
- Max. speed of change in fluid level: No orientation restrictions

**Output data**
- Output signal:
  - 4 ... 20 mA load ≤ 500 Ω
  - 0 ... 10 V load ≥ 1 kΩ
- Accuracy to DIN 16086: ≤ ± 1 % FS
- Non-linearity at max. setting to DIN 16086: ≤ ± 1 % FS
- Repeatability: ≤ ± 1 % FS
- Hysteresis: ≤ ± 1 % FS
- Rise time: ≤ 30 ms

**Environmental conditions**
- Max. tank pressure: 3 bar (short-term 10 bar, t < 1 min)
- Operating temperature range: -40 ... +85 °C
- Storage temperature range: -40 ... +100 °C
- Fluid temperature range: -40 ... +120 °C
- Vibration resistance to DIN EN 60068-2-6: 7.5 mm (5 ... 8.2 Hz) 2.0 g (8.2 ... 150 Hz)
- Shock resistance to DIN EN 60068-2-27: 20 g (11 ms)
- Protection class to IEC 60529: IP67

**Other data**
- Supply voltage (U₀): 9 ... 36 V DC
- Current consumption (without output): ≤ 100 mA
- Residual ripple of supply voltage: ≤ 250 mV
- Fluids: Hydraulic oils, cooling lubricants
- Parts in contact with medium: Stainless steel (1.4301 / 1.4571)
- Float: PP (polypropylene); 0.6 kg/dm³
- Weight (dependent on probe and cable lengths): ~ 1000 g

Note:
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
1) Other probe lengths on request
2) Specified for calm, non-turbulent fluid
Pin connections:

**M12x1, 4 pole**

- Pin 1: +U_b
- Pin 2: n.c.
- Pin 3: 0 V
- Pin 4: Signal

**M12x1, 5 pole**

- Pin 1: +U_b
- Pin 2: n.c.
- Pin 3: 0 V
- Pin 4: Signal
- Pin 5: n.c.

**Core HNT 1221**

- Brown: +U_b
- White: 0 V
- Green: Signal
- Yellow: n.c.

**Cable outlet**

Model code:

HNT 1 2 2 X – X – XXXX – 000

- **Temperature sensor**
  - 2: Without temperature sensor
- **Mechanical connection**
  - 2: G 3/4 A DIN 3852 (male)
- **Electrical connection**
  - 1: Flying lead, 2 m
  - 6: Male M12x1, 4 pole
  - 8: Male M12x1, 5 pole
- **Output**
  - B: 0 .. 10 V, 3 conductor
  - C: 4 .. 20 mA, 3 conductor
- **Probe length (physical) in mm**
  - 0250; 0280; 0370; 0410; 0520; 0730
- **Modification number**
  - 000: Standard
- **Notes:**
  - Special models on request.
  - On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.
- **Accessories:**
  - Appropriate accessories, such as electrical female connectors, can be found in the Accessories section of the Electronics brochure.

Dimensions:

**Male connector M12x1, 4 pole**

- Ø 44
- SW 32
- 100 %
- G 3/4 A

**Probe length**

- Immersion depth at density 1
- Male connector

**Cable outlet**

- Ø 23.5
- SW 32
- 100 %
- G 3/4 A

**Probe length**

- Immersion depth at density 1
- Core

Note:

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
FLOW RATE TRANSMITTERS
FLOW SWITCHES

To measure the flow rate in machines and systems HYDAC ELECTRONIC offers various flow rate transmitters and flow switches.

The flow rate transmitter of the EVS 3000 series operates according to the turbine principle (measuring the rpm of an impeller rotating in the fluid flow). Depending on the model, additional connection ports are available for pressure and/or temperature transmitters.

The HYDAC flow switches and transmitters in the HFS 2000 and HFT 2000 series are based on the variable area float principle. The test medium deflects a spring-loaded float in the direction of the flow, depending on the flow rate. A reed contact is attached to the outside of the instrument. When the magnet inside the float reaches the preset position, the reed contact will switch.

Electronic flow rate transmitters for general applications:

<table>
<thead>
<tr>
<th>Transmitter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 3110</td>
<td>165</td>
</tr>
<tr>
<td>EVS 3100</td>
<td>167</td>
</tr>
</tbody>
</table>

Electromechanical flow switches and transmitters for general applications:

<table>
<thead>
<tr>
<th>Switch/Transmitter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFS 2100</td>
<td>169</td>
</tr>
<tr>
<td>HFS 2500</td>
<td>173</td>
</tr>
<tr>
<td>HFT 2100</td>
<td>177</td>
</tr>
<tr>
<td>HFT 2500</td>
<td>181</td>
</tr>
</tbody>
</table>

Further flow rate transmitters for special applications can be found in the section "Service Instruments".

<table>
<thead>
<tr>
<th>Flow rate sensors, flow switches</th>
<th>EVS 3110</th>
<th>EVS 3100</th>
<th>HFS 2100</th>
<th>HFS 2500</th>
<th>HFT 2100</th>
<th>HFT 2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy (max. error)</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Pressure-resistant</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Water-based media</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Oil / viscous fluids</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Direction of flow optional</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation position optional</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Max. number of switching contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analogue output</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Display</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>ATEX Intrinsically safe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Note:
Not all feature combinations are possible. For precise information, please consult the relevant data sheet.
**Description:**
The flow rate transmitters in the EVS 3110 series (stainless steel series) are specially designed for use in hydraulic and other fluid technology systems.
They operate according to the turbine principle, i.e. the speed of an impeller turning in the fluid flow is measured and converted into a 4 ... 20 mA analogue signal.
On the EVS 3110 stainless steel range, the impeller has a carbide bearing and the resulting increased robustness also makes it suitable for use in pulsating, dynamic applications.
Two further G1/4 threaded holes in the turbine housing allow additional devices to be connected, e.g. temperature and pressure transmitters.

**Special features:**
- Suitable for pressures up to 400 bar
- Viscosities of 1 .. 100 cSt
- Output signal 4 .. 20 mA
- Additional connection of temperature and / or pressure transmitters possible

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th>Measuring ranges1) and operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 311X-A-0020</td>
<td>1.2 .. 20.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 311X-A-0060</td>
<td>6.0 .. 60.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 311X-A-0300</td>
<td>15.0 .. 300.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 311X-A-0600</td>
<td>40.0 .. 600.0 l/min 400 bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th>Additional connection options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal, permitted load resistance</td>
<td>2 x G1/4 female threads for pressure and / or temperature sensors</td>
</tr>
</tbody>
</table>

| Accuracy | ≤ 2 % of the actual value |

**Environmental conditions**
- Compensated temperature range: -20 .. +70 °C
- Operating temperature range: -20 .. +70 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -20 .. +90 °C

**CE mark**
EN 61000-6-1 / 2 / 3 / 4

**Protection class to IEC 60529**
IP 65 (Binder 714 M18)
IP 67 (M12x1, when an IP 67 connector is used)

**Other data**
- Housing material: Stainless steel
- Test medium2) Water-based fluids
- Viscosity range: 1 .. 100 cSt
- Calibration viscosity: 5 cSt
- Supply voltage: 10 .. 32 V DC
- Residual ripple of supply voltage: ≤ 5 %
- Weight:
  - ~ 1790 g (1.2 .. 20.0 l/min)
  - ~ 2100 g (6.0 .. 60.0 l/min)
  - ~ 3320 g (15.0 .. 300.0 l/min)
  - ~ 3500 g (40.0 .. 600.0 l/min)

**Note:**
1) Other measuring ranges on request
2) Other fluids on request
Model code: EVS 3 1 1 X – A – XXXX – 000

Housing material
1 = Stainless steel

Electrical connection
4 = Male 4 pole Binder series 714 M18
   (connector not supplied)
6 = Male M12x1, 4 pole
   (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor

Measuring range
0020 = 1.2 .. 20 l/min
0060 = 6.0 .. 60 l/min
0300 = 15.0 .. 300 l/min
0600 = 40.0 .. 600 l/min

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 311X-A-0020</td>
<td>1.2 .. 20</td>
<td>117</td>
<td>135</td>
<td>47 / 46</td>
<td>G¼&quot;</td>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>EVS 311X-A-0060</td>
<td>6 .. 60</td>
<td>144</td>
<td>135</td>
<td>48.5 / 46</td>
<td>G½&quot;</td>
<td>130</td>
<td>11</td>
</tr>
<tr>
<td>EVS 311X-A-0300</td>
<td>15 .. 300</td>
<td>155</td>
<td>150</td>
<td>63.5 / 60</td>
<td>G1¼&quot;</td>
<td>500</td>
<td>22</td>
</tr>
<tr>
<td>EVS 311X-A-0600</td>
<td>40 .. 600</td>
<td>181</td>
<td>150</td>
<td>63.5 / 60</td>
<td>G1½&quot;</td>
<td>600</td>
<td>30</td>
</tr>
</tbody>
</table>

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0) 6897 509-01
Fax +49 (0) 6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Electronic Flow Rate Transmitter**

**EVS 3100**

for Oils / Viscous Fluids

**Description:**
The flow rate transmitters of the EVS 3100 series (aluminium series) are specially designed for use in hydraulic and other fluid technology systems. They operate according to the turbine principle, i.e. the speed of an impeller turning in the fluid flow is measured and converted into a 4 ... 20 mA analogue signal.

Two further G1/4 threaded holes in the turbine housing allow additional units to be connected, e.g. temperature and pressure transmitters.

**Special features:**
- Pressure resistant to 400 bar (depending on model)
- Viscosities of 1 .. 100 cSt
- Output signal 4 .. 20 mA
- Additional connection of temperature and / or pressure transmitters possible

**Technical data:**

### Input data

<table>
<thead>
<tr>
<th>Measuring ranges1 and operating pressure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 310X-A-0020</td>
<td>1.2 .. 20.0 l/min</td>
</tr>
<tr>
<td>EVS 310X-A-0060</td>
<td>6.0 .. 60.0 l/min</td>
</tr>
<tr>
<td>EVS 310X-A-0300</td>
<td>15.0 .. 300.0 l/min</td>
</tr>
<tr>
<td>EVS 310X-A-0600</td>
<td>40.0 .. 600.0 l/min</td>
</tr>
</tbody>
</table>

### Output data

- Output signal, permitted load resistance: 4 .. 20 mA, 2 conductor, \( R_{\text{max}} = \frac{(U_B - 10 \text{ V})}{20 \text{ mA}} \) [kΩ]
- Accuracy: \( \leq 2 \% \) of the actual value

### Environmental conditions

- Compensated temperature range: -20 .. +70 °C
- Operating temperature range: -20 .. +70 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -20 .. +90 °C

### Protection class to IEC 60529

<table>
<thead>
<tr>
<th>IP 65 (Binder 714 M18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67 (M12x1, when an IP 67 connector is used)</td>
</tr>
</tbody>
</table>

### Other data

- Housing material: Aluminium
- Measuring medium2: Hydraulic oils
- Viscosity range: 1 .. 100 cSt
- Calibration viscosity: 30 cSt
- Supply voltage: 10 .. 32 V DC
- Residual ripple of supply voltage: \( \leq 5 \% \)
- Weight:
  - \( \sim 730 \) g (1.2 .. 20.0 l/min)
  - \( \sim 860 \) g (6.0 .. 60.0 l/min)
  - \( \sim 1410 \) g (15.0 .. 300.0 l/min)
  - \( \sim 1530 \) g (40.0 .. 600.0 l/min)

**Note:**
1) Other measuring ranges on request
2) Other fluids on request
Model code: 

EVS 310 X – A – XXXX – 000

Housing material
0 = Aluminium

Electrical connection
4 = Male 4 pole Binder series 714 M18 
   (connector not supplied)
6 = Male M12x1, 4 pole 
   (connector not supplied)

Signal
A = 4 .. 20 mA, 2 conductor

Measuring range
0020 = 1.2 .. 20 l/min
0060 = 6.0 .. 60 l/min
0300 = 15.0 .. 300 l/min
0600 = 40.0 .. 600 l/min

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Model</th>
<th>Meas. range</th>
<th>L</th>
<th>H</th>
<th>D / SW</th>
<th>G</th>
<th>Torque value</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 310X-A-0020</td>
<td>1.2 .. 20</td>
<td>117</td>
<td>135</td>
<td>47 / 46</td>
<td>G1/4&quot;</td>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>EVS 310X-A-0060</td>
<td>6 .. 60</td>
<td>144</td>
<td>135</td>
<td>48.5 / 46</td>
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<td>130</td>
<td>11</td>
</tr>
<tr>
<td>EVS 310X-A-0300</td>
<td>15 .. 300</td>
<td>155</td>
<td>150</td>
<td>63.5 / 60</td>
<td>G11/4&quot;</td>
<td>500</td>
<td>22</td>
</tr>
<tr>
<td>EVS 310X-A-0600</td>
<td>40 .. 600</td>
<td>181</td>
<td>150</td>
<td>63.5 / 60</td>
<td>G11/4&quot;</td>
<td>600</td>
<td>30</td>
</tr>
</tbody>
</table>

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Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electro-mechanical Flow Switch
HFS 2100
for Oils / Viscous Fluids

Description:
The HYDAC flow switches of the HFS 2100 series are based on a variable area float principle and are position-independent. The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A reed contact is fitted to the outside of the device and is therefore separate from the flow circuit. When the magnet inside the float reaches the preset position, the reed contact will switch.

To protect it from external influences, the switch is encapsulated in a casing designed to allow steplessly variable adjustment.

The instruments are designed to be capable of monitoring threshold values reliably, even when the viscosity fluctuates. The kinematic viscosity may vary between 30 and 600 cSt.

The main areas of application are:
- Central lubrication systems
- Oil circuit lubrication systems
- Transformers
- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Chemical industry
- Research & development

Medium:
- Oils / viscous fluids

Special features:
- Accuracy ≤ ± 10 % FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- ATEX version also available for potentially explosive areas.

Medium:
- Oils / viscous fluids

Special features:
- Accuracy ≤ ± 10 % FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- ATEX version also available for potentially explosive areas.

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th>Size 1</th>
<th>Size 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching ranges [l/min]</td>
<td>0.5 .. 1.6</td>
<td>0.5 .. 1.5</td>
</tr>
<tr>
<td></td>
<td>0.8 .. 3.0</td>
<td>1 .. 4</td>
</tr>
<tr>
<td></td>
<td>2 .. 8</td>
<td>3 .. 10</td>
</tr>
<tr>
<td></td>
<td>5 .. 15</td>
<td>8 .. 24</td>
</tr>
<tr>
<td></td>
<td>10 .. 30</td>
<td>15 .. 45</td>
</tr>
<tr>
<td></td>
<td>15 .. 60</td>
<td>30 .. 90</td>
</tr>
<tr>
<td></td>
<td>35 .. 110</td>
<td></td>
</tr>
</tbody>
</table>

Operating pressure
- Brass version 300 bar
- Stainless steel version 350 bar

Pressure drop [bar]
- 0.02 .. 0.2

Parts in contact with medium
- Brass version Stainl. st. 1.4571; FPM 1; Brass, (nickel-pl.); Brass; Hard ferrite
- Stainless steel version Stainl. st. 1.4571; FPM 1; Hard ferrite

Output data
- Switching outputs 1 or 2 reed contacts
- Change-over or N/O type
- Accuracy ≤ ± 10 % FS
- Change-over contact 2) max.
- Male connection EN175301-803 (DIN 43650) max.
- 250 V / 1.5 A / 50 VA 250 V / 1.5 A / 50 VA
- Male connection M12x1 max.
- 125 V / 3 A / 60 VA
- N/O contact 3) max.
- Male connection EN175301-803 (DIN 43650) max.
- 250 V / 3 A / 100 VA
- Male connection M12x1 max.
- 125 V / 3 A / 60 VA

Fluid temperature range
- Male connection EN175301-803 (DIN 43650) 1 -20 .. +85 °C
- Male connection M12x1 1 -20 .. +120 °C (optional -20 .. +160 °C)

Viscosity range
- 30 .. 600 cSt

Protection class to IEC 60529
- IP 65

Other data
- Housing material Brass (nickel-pl.) or stainl. steel 1.4571
- Electrical connection Male connection EN175301-803 (DIN 43650)
- Male connection M12x1

Note:
- FS (Full Scale) = relative to the complete measuring range
- 1) Other seal materials available on request
- 2) The contact opens / switches when the flow falls below the pre-set switching point.
- 3) 3% possible when calibrated to a certain viscosity
- 4) Minimum load 3 VA
Model code:

HFS 21XX-XX-XXXX-XX-XX-000

Measuring principle
2 = Variable area float

Measuring medium
1 = Oils / viscous fluids

Mechanical connection
4) 5)
1 = 1/4”
2 = 3/8”
3 = 1/2”
4 = 3/4”
5 = 1”

Electrical connection
5 = Male EN175301-803 (DIN 43650)
3 pole + PE, (connector supplied)
6 = Male M12x1, 4-pole (connector not supplied)

Switching contacts 6)
1S = 1 N/O contact
2S = 2 N/O contacts
1W = 1 Change-over contact
2W = 2 Change-over contacts

Switching ranges in l/min 5)
Oil 10 % -Size 1-
00.5-01.6; 00.8-03.0; 02.0-07.0

Oil 10 % -Size 2-
00.5-01.5; 0001-0004; 0002-0008; 0003-0010; 0005-0015; 0008-0024; 0010-0030; 0015-0045; 0020-0060; 0030-0090; 0035-00110

Accuracy
7 = ≤ ± 10.0 % FS

Housing material
B = Brass, nickel-plated
S = Stainless steel

Mechanical indicator
0 = Without indicator
1 = With indicator

Modification number
000 = Standard

4) Mechanical connection options depend on housing type (see Dimensions)
5) Other models available on request.
6) When the model with 2 switching contacts is selected, the second contact is fitted on the side of the instrument, at 90° to the first contact.

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Notes on installation:
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!
## Dimensions without indicator:

### OIL - Size 1 - without indicator

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.6</td>
<td>8</td>
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<tr>
<td></td>
<td>15</td>
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</tr>
<tr>
<td>0.8 .. 3.0</td>
<td>15</td>
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<tr>
<td>2.0 .. 7.0</td>
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</tbody>
</table>

\(^1\) Standard

### OIL - Size 2 - without indicator

<table>
<thead>
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<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
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</thead>
<tbody>
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<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.5</td>
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<td>1 .. 4</td>
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<td></td>
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<tr>
<td>2 .. 8</td>
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</tr>
<tr>
<td>3 .. 10</td>
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<td>5 .. 15</td>
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<td>15 .. 45</td>
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<td>20 .. 60</td>
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<tr>
<td>30 .. 90</td>
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<tr>
<td>35 .. 110</td>
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\(^1\) Standard
**Dimensions with indicator:**

**OIL -Size 1- with indicator**

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.6</td>
<td>15</td>
<td>30</td>
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<tr>
<td>0.8 .. 3.0</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td>15</td>
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</table>

**OIL -Size 2- with indicator**

<table>
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<th>Weight (approx.) [g]</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.5</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>1 .. 4</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>2 .. 8</td>
<td>15</td>
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<tr>
<td>3 .. 10</td>
<td>15</td>
<td>34</td>
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<td>5 .. 15</td>
<td>20</td>
<td>34</td>
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<tr>
<td>8 .. 24</td>
<td>25</td>
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<tr>
<td>10 .. 30</td>
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<td>15 .. 45</td>
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<tr>
<td>20 .. 60</td>
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<td>40</td>
</tr>
<tr>
<td>30 .. 90</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>35 .. 110</td>
<td>35</td>
<td>40</td>
</tr>
</tbody>
</table>

\* Standard

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The HYDAC Flow Switch in the series HFS 2500 is based on the variable area float principle. The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A reed contact is fitted to the outside of the instrument and is therefore separate from the flow circuit. When the magnet inside the float reaches the pre-set position, the reed contact will switch. To protect it from external influences, the switch is encapsulated in a casing designed to allow steplessly variable adjustment.

The instruments in the HFS 2500 series are available in two versions, with 5% accuracy and with 10% accuracy.

Areas of application are to monitor flow rate in fluids (water / water-based) in the following areas, amongst others:
- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Medical technology
- Pharmaceutical industry
- Chemical industry
- Research & development

Fluid:
- Water / water-based media

Special features:
- Accuracy ≤ ± 5 % or ≤ ± 10 % FS
- Any mounting position
- High level of function reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- ATEX version also available for potentially explosive atmospheres

Technical data:

### Input data

<table>
<thead>
<tr>
<th>Switching ranges [l/min]</th>
<th>5 % accuracy</th>
<th>10 % accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 1</td>
<td>Size 2</td>
<td>Size 3</td>
</tr>
<tr>
<td>0.2 .. 4.0</td>
<td>0.005 .. 0.06</td>
<td>0.02 .. 0.2</td>
</tr>
<tr>
<td>0.6 .. 5.0</td>
<td>0.04 .. 0.13</td>
<td>0.2 .. 0.6</td>
</tr>
<tr>
<td>0.5 .. 8.0</td>
<td>0.1 .. 0.6</td>
<td>0.4 .. 1.8</td>
</tr>
<tr>
<td>1 .. 14</td>
<td>2 .. 1.2</td>
<td>0.8 .. 3.2</td>
</tr>
<tr>
<td>1 .. 28</td>
<td>0.4 .. 2.0</td>
<td>2 .. 7</td>
</tr>
<tr>
<td>2 .. 40</td>
<td>0.5 .. 3.0</td>
<td>3 .. 13</td>
</tr>
<tr>
<td>4 .. 55</td>
<td>1.0 .. 5.0</td>
<td>4 .. 20</td>
</tr>
<tr>
<td>1 .. 70</td>
<td>8 .. 30</td>
<td></td>
</tr>
</tbody>
</table>

### Operating pressure

<table>
<thead>
<tr>
<th>Brass version</th>
<th>Stainless steel version</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 bar</td>
<td>300 bar</td>
</tr>
<tr>
<td>300 bar</td>
<td>350 bar</td>
</tr>
<tr>
<td>300 bar</td>
<td>300 bar</td>
</tr>
<tr>
<td>250 bar</td>
<td></td>
</tr>
</tbody>
</table>

### Pressure drop [bar]

<table>
<thead>
<tr>
<th>Size 1</th>
<th>Size 2</th>
<th>Size 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02 .. 0.8</td>
<td>0.02 .. 0.2</td>
<td>0.02 .. 0.3</td>
</tr>
<tr>
<td>0.02 .. 0.4</td>
<td></td>
<td>0.02 .. 0.4</td>
</tr>
</tbody>
</table>

### Mechanical connection

See dimensions

### Parts in contact with medium

<table>
<thead>
<tr>
<th>Brass version</th>
<th>Stainless steel version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless steel 1.4571; NBR</td>
<td>Stainless steel 1.4571; FPM</td>
</tr>
<tr>
<td>Brass; nickel-plated; Brass; Hard ferrite</td>
<td></td>
</tr>
</tbody>
</table>

### Output data

<table>
<thead>
<tr>
<th>Switching outputs</th>
<th>1 or 2 reed contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change-over or N/O type</td>
<td></td>
</tr>
</tbody>
</table>

### Accuracy

≤ ± 5 % or ≤ ± 10 % FS

### Repeatability

2 % FS max.

### Switching capacity

<table>
<thead>
<tr>
<th>Change-over contact</th>
<th>max.</th>
<th>max.</th>
<th>max.</th>
<th>max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male connection -250 V</td>
<td>-200 V</td>
<td>-250 V</td>
<td>-250 V</td>
<td></td>
</tr>
<tr>
<td>EN175301-803 (DIN 43650) -1.5 A</td>
<td>-1 A</td>
<td>-1.5 A</td>
<td>-1.5 A</td>
<td></td>
</tr>
<tr>
<td>Male connection M12x1 -50 VA</td>
<td>-20 VA</td>
<td>-50 VA</td>
<td>-50 VA</td>
<td></td>
</tr>
<tr>
<td>N/O contact</td>
<td>max.</td>
<td>max.</td>
<td>max.</td>
<td>max.</td>
</tr>
<tr>
<td>Male connection -250 V</td>
<td>-200 V</td>
<td>-230 V</td>
<td>-250 V</td>
<td></td>
</tr>
<tr>
<td>EN175301-803 (DIN 43650) -3 A</td>
<td>-1 A</td>
<td>-3 A</td>
<td>-3 A</td>
<td></td>
</tr>
<tr>
<td>Male connection M12x1 -100 VA</td>
<td>-20 VA</td>
<td>-60 VA</td>
<td>-100 VA</td>
<td></td>
</tr>
</tbody>
</table>

### Environmental Conditions

**Operating temperature range** -20 .. +70 °C

**Fluid temperature range**

<table>
<thead>
<tr>
<th>Male connection</th>
<th>-20 .. +100 °C (optional)</th>
<th>-20 .. +85 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN175301-803 (DIN 43650)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Other data

<table>
<thead>
<tr>
<th>Housing material</th>
<th>Brass (nickel-plated) or stainless steel 1.4571</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>Male connection EN175301-803 (DIN 43650)</td>
</tr>
</tbody>
</table>
Model code:
HFS 25XX-XX-XXXX-XXXX - X - X - X - 000

Measuring principle
2 = Variable area float

Test medium
5 = Water or water-based

Mechanical connection (a)
1 = 1/4"
2 = 3/8"
3 = 1/2"
4 = 3/4"
5 = 1"
6 = 1 1/4"
7 = 1 1/2"

Electrical connection
5 = Male EN175301-803 (DIN 43650)
3 pole + PE
(connector supplied)
6 = Male M12x1, 4-pole
(connector not supplied)

Switching contacts (b)
1S = 1 N/O contact
2S = 2 N/O contacts
1W = 1 Change-over contact
2W = 2 Change-over contacts

Switching ranges in l/min (c)
Water 5 %
0.02-0.04; 0.06-0.08; 0.10-0.20; 0.30-0.50; 0.50-0.80; 0.80-1.00
Water 10 % - Size 1 - (only available without mech. indicator)
0.005-0.04; 0.04-0.13; 0.01-0.06; 0.02-0.12; 0.04-0.20; 0.05-0.30; 0.10-0.50
Water 10 % - Size 2 -
0.02-0.06; 0.04-0.18; 0.08-0.32; 0.20-0.70; 0.30-0.80; 0.40-1.00; 0.80-0.30
Water 10 % - Size 3 -
0.01-0.03; 0.015; 0.02; 0.06; 0.10; 0.20; 0.30

Accuracy
6 = ± 5.0 % FS
7 = ± 10.0 % FS

Housing material
B = Brass (nickel-plated)
S = Stainless steel

Mechanical indicator
0 = Without indicator
1 = With indicator

Modification number
000 = Standard

(a) Mechanical connection options depend on housing type (see Dimensions)
(b) Other models available on request.
(c) When the model with 2 switching contacts is selected, the second contact is fitted on the side of the instrument at 90° to the first contact.

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Notes on installation:
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!
## Dimensions without Indicator:

<table>
<thead>
<tr>
<th>Type</th>
<th>Installation dimensions</th>
<th>Weight (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
</tr>
<tr>
<td>Water 5 % Accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2 .. 4.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.6 .. 5.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.5 .. 8.0</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>1 .. 14</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>1 .. 28</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>2 .. 40</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>4 .. 55</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>1 .. 70</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>8 .. 90</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>5 .. 110</td>
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<td>10 .. 150</td>
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<tr>
<td>35 .. 250</td>
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</table>

## Water 10 % Accuracy - Size 1 -

<table>
<thead>
<tr>
<th>Type</th>
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<th>Weight (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>D</td>
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<tr>
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<td>18</td>
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<tr>
<td>0.04..0.13</td>
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<td>18</td>
</tr>
<tr>
<td>0.1..0.6</td>
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<td>18</td>
</tr>
<tr>
<td>0.2..1.2</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>0.4..2.0</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>0.5..3.0</td>
<td>17</td>
<td>18</td>
</tr>
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<td>1.0..5.0</td>
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<td>18</td>
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</table>

## Water 10 % Accuracy - Size 2 -

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<th>Weight (approx.)</th>
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<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
</tr>
<tr>
<td>0.02 .. 0.2</td>
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<td>31</td>
</tr>
<tr>
<td>0.2 .. 0.6</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>0.4 .. 1.8</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>0.8 .. 3.2</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>3.0 .. 13.0</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>4.0 .. 20.0</td>
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<td>31</td>
</tr>
<tr>
<td>8.0 .. 30.0</td>
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<td>31</td>
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</tbody>
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## Water 10 % Accuracy - Size 3 -

<table>
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<tr>
<th>Type</th>
<th>Installation dimensions</th>
<th>Weight (approx.)</th>
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<tbody>
<tr>
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<td>SW</td>
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<tr>
<td>10 .. 30</td>
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<td>15 .. 45</td>
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<tr>
<td>20 .. 60</td>
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<td>47</td>
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<tr>
<td>30 .. 90</td>
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<td>47</td>
</tr>
<tr>
<td>60 .. 150</td>
<td>41</td>
<td>47</td>
</tr>
</tbody>
</table>

*) Standard
### Dimensions with indicator:

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
</tr>
<tr>
<td>Water 5 % Accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2 .. 4.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.6 .. 5.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.5 .. 8.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>1 .. 14</td>
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<td>1 .. 28</td>
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<td>10 .. 150</td>
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<td>35 .. 220</td>
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<tr>
<td>35 .. 250</td>
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<td>50</td>
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<tr>
<td>Water 10 % Accuracy - Size 2 -</td>
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<td>0.2 .. 0.6</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>0.4 .. 1.8</td>
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<td>30</td>
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<tr>
<td>0.8 .. 3.2</td>
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<td>30</td>
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<tr>
<td>2.0 .. 7.0</td>
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<tr>
<td>3.0 .. 13.0</td>
<td>30</td>
<td>30</td>
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<tr>
<td>4.0 .. 20.0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>8.0 .. 30.0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Water 10 % Accuracy - Size 3 -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 .. 30</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>15 .. 45</td>
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<td>47</td>
</tr>
<tr>
<td>20 .. 60</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>30 .. 90</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>60 .. 150</td>
<td>41</td>
<td>47</td>
</tr>
</tbody>
</table>

* Standard

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The HFT 2100 series of HYDAC flow transmitters is based on the variable area float principle.
Irrespective of the installation position, the test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate.
A Hall sensor which detects the position of the float, is fitted to the outside of the instrument and is therefore separate to the flow circuit.
In proportion to the deflection of the float, the sensor produces an analogue signal which corresponds to the particular measuring range.
The device is calibrated for vertical installation and for an upwards flow direction. The transmitter is designed to give reliable measurements within its accuracy range, even with changes in viscosity. The kinematic viscosity may vary between 30 and 600 cSt.

The areas of application include:
- Central lubrication systems
- Oil circuit lubrication systems
- Transformers
- Cooling systems and circuits
- Lubrication circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Chemical industry
- Research & development

**Medium:**
- Oils / viscous fluids

**Special features:**
- Accuracy ≤ ± 10 % FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High pressure resistance
- Threaded connection

**Technical data:**

### Input data

<table>
<thead>
<tr>
<th>Measuring ranges [l/min]</th>
<th>Size 1</th>
<th>Size 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 .. 1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8 .. 3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 .. 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 .. 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 .. 24</td>
<td></td>
<td></td>
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<tr>
<td>10 .. 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 .. 45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 .. 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 .. 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 .. 110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Operating pressure

| Brass version            | 300 bar | 250 bar |
| Stainless steel version  | 350 bar | 300 bar |

### Pressure drop [bar]

| 0.02 .. 0.2              |        |        |
| 0.02 .. 0.4              |        |        |

### Mechanical connection

See dimensions

### Parts in contact with medium

- Brass version
  - Stainl. st. 1.4571; FPM 1)
  - Brass, nickel-plated; Brass; Hard ferrite

- Stainless steel version
  - Stainl. st. 1.4571; FPM 1)
  - Hard ferrite

### Output data

- Output signal
  - 4 .. 20 mA, 3 conductor
  - 0 .. 10 V, 3 conductor
- Accuracy 2)
  - ≤ ± 10 % FS
- Repeatability
  - 1 % FS max.

### Environmental conditions

- Operating temperature range: -20 .. +70 °C
- Fluid temperature range: -20 .. +70 °C
- Viscosity range: 30 .. 600 cSt

### CE mark

Directive 2004 / 108 / EC

### Protection class

IEC 60529: IP 67

### Other data

- Supply voltage
  - 18 .. 30 V
- Power consumption
  - < 1 W
- Electrical connection
  - Male connection M12x1
- Housing material
  - Measuring body: Brass (nickel-plated) or st. steel 1.4571
  - Transmitter: Brass (nickel-plated)

**Note:** FS (Full Scale) = relative to the complete measuring range

1) Other seal materials available on request

2) 3 % possible with calibration to a certain viscosity
Model code:

**HFT 2 1 X 6 – X – XXXX–XXXX – 7 – X – 0 – 000**

- **Measuring principle**: Variable area float
- **Measuring medium**: Oils / viscous fluids
- **Mechanical connection**:
  - 1 = 1/4 "
  - 2 = 3/8 "
  - 3 = 1/2 "
  - 4 = 3/4 "
  - 5 = 1 "
- **Electrical connection**: Male M12x1, 4 pole (connector not supplied)
- **Output signal**:
  - B = 0 .. 10 V, 3 conductor
  - C = 4 .. 20 mA, 3 conductor
- **Measuring ranges in l/min**:
  - Oil 10 % - Size 1 - 00.5-01.6; 00.8-03.0; 02.0-07.0
  - Oil 10 % - Size 2 - 00.5-01.5; 0001-0004; 0001-0008; 0003-0010; 0005-0015; 0008-0024; 0010-0030; 0015-0045; 0020-0060; 0030-0090; 0035-0110
- **Accuracy**: \( \leq \pm 10.0 \% \) FS
- **Housing material**: Brass, nickel-plated; Stainless steel
- **Mechanical indicator**: Without indicator
- **Modification number**: Standard

2) Mechanical connection options depend on housing type (see Dimensions)
3) Other models available on request.

**Notes on installation:**
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

**Accessories:**
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

---

**Pin connections:**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HFT 21X6-C</th>
<th>HFT 21X6-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Ua</td>
<td>+Ua</td>
</tr>
<tr>
<td>2</td>
<td>reserved</td>
<td>reserved</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>4 .. 20 mA</td>
<td>0 .. 10 V</td>
</tr>
</tbody>
</table>

**Notes on installation:**
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!
## Dimensions:

### Size 1

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 .. 1.6</td>
<td>DN 8 SW 24 G 1/4&quot; L 98</td>
<td>610</td>
</tr>
<tr>
<td></td>
<td>10 SW 24 G 3/8&quot; L 119</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td>15 SW 30 G 1/2&quot; L 90</td>
<td>560</td>
</tr>
<tr>
<td>0.8 .. 3.0</td>
<td>15 SW 30 G 1/2&quot; L 90</td>
<td>560</td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Standard

### Size 2

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 .. 1.5</td>
<td>DN 8 SW 34 G 1/4&quot; L 152</td>
<td>1510</td>
</tr>
<tr>
<td></td>
<td>15 SW 34 G 1/2&quot; L 152</td>
<td>1435</td>
</tr>
<tr>
<td></td>
<td>20 SW 34 G 3/4&quot; L 152</td>
<td>1350</td>
</tr>
<tr>
<td></td>
<td>25 SW 40 G 1&quot; L 130</td>
<td>1170</td>
</tr>
<tr>
<td>1 .. 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 .. 8</td>
<td>15 SW 34 G 1/2&quot; L 152</td>
<td>1435</td>
</tr>
<tr>
<td></td>
<td>20 SW 34 G 3/4&quot; L 152</td>
<td>1350</td>
</tr>
<tr>
<td></td>
<td>25 SW 40 G 1&quot; L 130</td>
<td>1170</td>
</tr>
<tr>
<td>3 .. 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 .. 15</td>
<td>15 SW 34 G 1/2&quot; L 152</td>
<td>1435</td>
</tr>
<tr>
<td></td>
<td>20 SW 34 G 3/4&quot; L 152</td>
<td>1350</td>
</tr>
<tr>
<td></td>
<td>25 SW 40 G 1&quot; L 130</td>
<td>1170</td>
</tr>
<tr>
<td>8 .. 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 .. 30</td>
<td>15 SW 34 G 3/4&quot; L 152</td>
<td>1350</td>
</tr>
<tr>
<td></td>
<td>20 SW 40 G 1&quot; L 130</td>
<td>1170</td>
</tr>
<tr>
<td>15 .. 45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 .. 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 .. 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 .. 110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Standard

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**Note:**
The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
**Description:**
The HFT 2500 series of HYDAC flow transmitters is based on the variable area float principle and is position-independent.
The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate but irrespective of the installation position. A Hall sensor is fitted to the outside of the device and is therefore also outside the flow circuit. It determines the position of the float.
The sensor emits an analogue signal proportional to the deflection of the float which corresponds to the relevant measurement range.
The device is calibrated for vertical installation and for a flow direction from bottom to top.
Areas of application are to monitor flow rate in fluids (water / water-based) in the following areas, amongst others:
- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Medical technology
- Pharmaceutical industry
- Chemical industry
- Research & development

**Medium:**
- Water or water-based media

**Special features:**
- Accuracy ≤ ± 3 % FS
- Any mounting position
- High level of functional reliability
- High pressure resistance
- Threaded connection

**Technical data:**

### Input data

<table>
<thead>
<tr>
<th>Measuring ranges [l/min]</th>
<th>Size 1</th>
<th>Size 2</th>
<th>Size 3</th>
<th>Size 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.005 .. 0.06</td>
<td>0.02 .. 0.2</td>
<td>10 .. 30</td>
<td>0.2 .. 4.0</td>
<td>8 .. 90</td>
</tr>
<tr>
<td>0.04 .. 0.13</td>
<td>0.2 .. 0.6</td>
<td>15 .. 45</td>
<td>0.6 .. 5.0</td>
<td>5 .. 110</td>
</tr>
<tr>
<td>0.1 .. 0.6</td>
<td>0.4 .. 1.8</td>
<td>20 .. 60</td>
<td>0.5 .. 8.0</td>
<td>10 .. 150</td>
</tr>
<tr>
<td>0.2 .. 1.2</td>
<td>0.8 .. 3.2</td>
<td>30 .. 90</td>
<td>1 .. 14</td>
<td>35 .. 220</td>
</tr>
<tr>
<td>0.4 .. 2.0</td>
<td>2 .. 7</td>
<td>60 .. 150</td>
<td>1 .. 28</td>
<td>35 .. 250</td>
</tr>
<tr>
<td>0.5 .. 3.0</td>
<td>3 .. 13</td>
<td>2 .. 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0 .. 5.0</td>
<td>4 .. 20</td>
<td></td>
<td>4 .. 55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 .. 30</td>
<td></td>
<td></td>
<td>1 .. 70</td>
</tr>
</tbody>
</table>

### Operating pressure

| Brass version | 300 bar | 300 bar | 250 bar | 200 bar |
| Stainless steel version | 350 bar | 350 bar | 300 bar | 300 bar |

### Pressure drop [bar]

| Brass version | 0.02 .. 0.2 | 0.02 .. 0.3 | 0.02 .. 0.4 | 0.02 .. 0.8 |
| Stainless steel version |          |          |            |            |

### Mechanical connection
See dimensions

### Parts in contact with medium

- Brass version: Stainless steel 1.4571; NBR \(^1\); Brass (nickel-pl.); Brass; Hard ferrite
- Stainless steel version: Stainless steel 1.4571; FPM \(^1\); Hard ferrite

### Output data

- Output signal: 4 .. 20 mA, 3-conductor
- 0 .. 10 V, 3-conductor
- Accuracy: ≤ ± 3 % FS
- Repeatability: 1 % FS

### Environmental conditions

- Operating temperature range: -20 .. +70 °C
- Fluid temperature range: -20 .. +70 °C
- Protection class to Directive 2004 / 108 / EC: IP 67

### Other data

- Supply voltage: 18 .. 30 V DC
- Power consumption: < 1 W

### Housing material

- Measuring body: Brass (nickel-plated) or stainless steel 1.4571
- Transmitter: Brass (nickel-plated)

### Electrical connection
Male connection M12x1

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1) Other seal materials available upon request.

---

**Note:** FS (Full Scale) = relative to the complete measuring range.
Model code: HFT 25X6 – X – XXXX–XXXX – 5 – X – 0 – 000

Measuring principle
2 = Variable area float

Test medium
5 = Water / water-based

Mechanical connection 2)
1 = 1/4 "
2 = 5/8 "
3 = 1/2 "
4 = 3/4 "
5 = 1 "
6 = 1 1/4 "
7 = 1 1/2 "

Electrical connection
6 = Male M12x1, 4 pole (connector not supplied)

Output signal
B = 0 .. 10 V, 3 conductor
C = 4 .. 20 mA, 3 conductor

Measuring ranges in l/min
Size 1
0.005–0.06; 0.04–0.13; 0.01–0.4; 0.2–1.2; 0.4–2.0; 0.5–3.0; 1–5.0

Size 2
0.02–0.2; 0.06–0.6; 0.1–1.8; 0.4–3.2; 0.8–7.0; 3.0–13; 4–20; 8–30

Size 3
0.01–0.02; 0.01–0.6; 0.04–0.8; 0.2–1.2; 0.4–2.0; 0.6–3.0; 1–5.0

Size 4
0.02–0.4; 0.06–0.8; 0.1–1.2; 0.4–2.0; 1–5.0; 0.2–0.5; 0.4–1.5; 0.8–3.0; 1–5.0

Accuracy
5 = ≤ ± 3.0 % FS

Housing material
B = Brass (nickel-plated)
S = Stainless steel

Mechanical indicator
0 = Without indicator

Modification number
000 = Standard

2) Mechanical connection options depend on housing type
(see Dimensions)

Note:
Special models on request.
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Notes on installation:
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>HFT 25X6-C</th>
<th>HFT 25X6-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Us</td>
<td>+Us</td>
</tr>
<tr>
<td>2</td>
<td>reserved</td>
<td>reserved</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>4 .. 20 mA</td>
<td>0 .. 10 V</td>
</tr>
</tbody>
</table>

Pin connections:

M12x1

<table>
<thead>
<tr>
<th>Pin</th>
<th>HFT 25X6-C</th>
<th>HFT 25X6-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Us</td>
<td>+Us</td>
</tr>
<tr>
<td>2</td>
<td>reserved</td>
<td>reserved</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>4 .. 20 mA</td>
<td>0 .. 10 V</td>
</tr>
</tbody>
</table>
### Dimensions:

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
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<tr>
<td>Size 1</td>
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</tr>
<tr>
<td>0.005..0.06</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>0.04..0.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1..0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2..1.2</td>
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<td></td>
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<td>0.4..2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5..3.0</td>
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<td>1.0..5.0</td>
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<tr>
<td>Size 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.02 .. 0.2</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>0.2 .. 0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.4 .. 1.8</td>
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<td></td>
</tr>
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<td>0.8 .. 3.2</td>
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<td></td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
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<td>3.0 .. 13.0</td>
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<td>4.0 .. 20.0</td>
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<td>8.0 .. 30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 .. 30</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>15 .. 45</td>
<td>40</td>
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<td>20 .. 60</td>
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<tr>
<td>30 .. 90</td>
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<td>40</td>
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<tr>
<td>60 .. 150</td>
<td>40</td>
<td>40</td>
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<tr>
<td>Size 4</td>
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<td>0.2 .. 4.0</td>
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<td>0.6 .. 5.0</td>
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<td>0.5 .. 8.0</td>
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<td>1 .. 14</td>
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<td>1 .. 28</td>
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<td></td>
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<tr>
<td>2 .. 40</td>
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<tr>
<td>4 .. 55</td>
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<td>8 .. 90</td>
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<td>5 .. 110</td>
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<td>34</td>
<td>40</td>
</tr>
<tr>
<td>35 .. 220</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>35 .. 250</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

* Standard

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
SPEED SENSORS

The contact-free speed sensors of the HSS series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

Speed sensors for general applications:

<table>
<thead>
<tr>
<th>Model</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Speed Sensor HSS 110</td>
<td>185</td>
</tr>
<tr>
<td>Electronic Speed Sensor HSS 120</td>
<td>187</td>
</tr>
<tr>
<td>Electronic Speed Sensor HSS 130</td>
<td>189</td>
</tr>
<tr>
<td>Electronic Speed Sensor HSS 210</td>
<td>191</td>
</tr>
<tr>
<td>Electronic Speed Sensor HSS 220</td>
<td>193</td>
</tr>
</tbody>
</table>
Description:
The contact-free speed sensors of the HSS 110 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.
So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.
For integration into standard controls, standard output signals are available.
Due to their extremely compact design, the robust housing and protection class IP 6K9K, the devices can be used in almost any application and any mounting position.
The main fields of application are detection of speed and rotation direction on gear wheels with small module and high resolution, especially in vehicles and mobile machines with electrical and hydraulic drives.

Special features:
- 1-channel Hall differential sensor
- Different signal outputs available
- Extremely compact design
- Wide frequency range
- Alignment required on installation
- Large air gap

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Probe length</td>
</tr>
<tr>
<td>Probe diameter</td>
</tr>
<tr>
<td>Max. pressure on sensing surface</td>
</tr>
<tr>
<td>Air gap / installation distance</td>
</tr>
<tr>
<td>Module 1: 0.2 ... 0.8 mm</td>
</tr>
<tr>
<td>Module 1.25: 0.2 ... 1.4 mm</td>
</tr>
<tr>
<td>Module 1.5: 0.2 ... 1.8 mm</td>
</tr>
<tr>
<td>Module 2: 0.2 ... 2.4 mm</td>
</tr>
<tr>
<td>Module 3: 0.2 ... 2.9 mm</td>
</tr>
<tr>
<td>Mechanical connection</td>
</tr>
<tr>
<td>Type of installation</td>
</tr>
<tr>
<td>Torque value max.</td>
</tr>
<tr>
<td>Housing material</td>
</tr>
<tr>
<td>Seal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variants</td>
</tr>
<tr>
<td>1-channel frequency</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>1-channel frequency / direction of rotation (PWM)</td>
</tr>
<tr>
<td>Types</td>
</tr>
<tr>
<td>1 NPN frequency output</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>1 PWM output, 4 ... 20 mA</td>
</tr>
<tr>
<td>Switching capacity / current rating</td>
</tr>
<tr>
<td>NPN: ≤ 40 mA</td>
</tr>
<tr>
<td>PWM: ≤ 200 mA</td>
</tr>
<tr>
<td>Direction of rotation</td>
</tr>
<tr>
<td>Flange on left, gear turns to right, for duration of PWM signal pulse</td>
</tr>
<tr>
<td>Signal level</td>
</tr>
<tr>
<td>LOW: ≤ 0.6 V / 4 ... 9 mA PWM</td>
</tr>
<tr>
<td>HIGH: +U0 / 12 ... 17 mA PWM</td>
</tr>
</tbody>
</table>

Environmental conditions
- Operating temperature range: -40 ... +140 °C
- Media resistance of housing: Salt water; various hydraulic oils; diesel oils; cleaning agent; salt spray
- Mark: DIN EN 60947-5-2
- Vibration resistance to EN 60068-2-64: 0.05 g² / Hz, 20 ... 2,000 Hz
- Shock resistance to EN 60068-2-27: 100 g, 6 ms, 3x in each direction
- Protection class to IEC 60529 to ISO 20653: IP 67, IP 6K9K

Other data
- Electrical connection: Flying leads, 3-core, cable length 1 m
- Supply voltage |
| NPN: 12.5 ... 32 V DC |
| PWM: 4.5 ... 20 V DC |
- Residual ripple of supply voltage: ≤ 5 %
- Current consumption: < 30 mA at 30 V DC
- Average life expectancy: 200,000 h (MTTF)
- Weight: ~ 50 g

Note: Reverse polarity protection of the supply voltage and short circuit protection (max. 50 mA) are provided.
Pin connections:

<table>
<thead>
<tr>
<th>Core</th>
<th>HSS 110-1</th>
<th>HSS 110-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>+U_a</td>
<td>+U_b</td>
</tr>
<tr>
<td>black</td>
<td>0 V</td>
<td>PWM</td>
</tr>
<tr>
<td>blue</td>
<td>Frequency</td>
<td></td>
</tr>
</tbody>
</table>

Mounting position tolerance:

Model code:

HSS 1 1 0 – X – 018 – 000

Signal type
1 = Output 1: Frequency
4 = Output 1: Frequency and direction of rotation PWM

Probe length
018 = 18.4 mm

Modification number
000 = Standard

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Dimensions:

Specification for installation cavity:

| Ø 10.31 ±0.03 | 1.8  |
| M6             |      |
| Ø 10.31        | 13.2 |

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The contact-free speed sensors of the HSS 120 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux. So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing. The instruments are available for different insertion depths. For integration into standard controls, standard output signals are available. Due to their extremely compact design, the robust housing and protection class IP 69K, the instruments can be used in almost any application and any mounting position. The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in vehicles and mobile machines with hydraulic drives.

Special features:
- 2-channel Hall differential sensor
- Wide frequency range
- Alignment required when installing
- Large air gap

Technical data:

**Input data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>0.1 ... 20,000 Hz</td>
</tr>
<tr>
<td>Probe length</td>
<td>30; 35; 45 mm</td>
</tr>
<tr>
<td>probe diameter</td>
<td>15 / 12 mm</td>
</tr>
<tr>
<td>Max. pressure on sensing surface</td>
<td>15 bar, dynamic</td>
</tr>
<tr>
<td>Air gap / installation distance</td>
<td>Probe length: 30 mm 35 / 45 mm</td>
</tr>
<tr>
<td></td>
<td>Module 1: 0.2 ... 1.0 mm 0.2 ... 1.3 mm</td>
</tr>
<tr>
<td></td>
<td>Module 1.25: 0.2 ... 1.5 mm 0.2 ... 1.8 mm</td>
</tr>
<tr>
<td></td>
<td>Module 1.5: 0.2 ... 1.7 mm 0.2 ... 2.0 mm</td>
</tr>
<tr>
<td></td>
<td>Module 2: 0.2 ... 2.2 mm 0.2 ... 2.5 mm</td>
</tr>
<tr>
<td></td>
<td>Module 2.5: 0.2 ... 3.2 mm 0.2 ... 3.5 mm</td>
</tr>
</tbody>
</table>

**Mechanical connection**

- Flange, single, asymmetrical, cable outlet 90° (30 mm) / axial (35, 45 mm)

**Type of installation**

- Dependent on direction (with asymmetrical flange)

**Torque value**

- 10 Nm

**Housing material**

- Brass

**Seal**

- FPM

**Output data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variant</td>
<td>2-channel speed (90° / 270° phase shift for module 2)</td>
</tr>
<tr>
<td>Type</td>
<td>2 NPN frequency outputs</td>
</tr>
<tr>
<td>Switching capacity</td>
<td>≤ 50 mA</td>
</tr>
<tr>
<td></td>
<td>≥ 10 kΩ ohmic load</td>
</tr>
<tr>
<td></td>
<td>≤ 2.2 nF capacitive load</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Flange on left, gear turns to right: channel A lagging; channel B leading</td>
</tr>
<tr>
<td>Signal level</td>
<td>LOW: ≤ 0.5 V</td>
</tr>
<tr>
<td></td>
<td>HIGH: +UB</td>
</tr>
</tbody>
</table>

**Environmental conditions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-40 ... +140 °C</td>
</tr>
<tr>
<td></td>
<td>(-40 ... +160 °C for max. 500 operating hours)</td>
</tr>
<tr>
<td>Media resistance of housing</td>
<td>Salt water; various hydraulic oils; diesel oils; cleaning agent; salt spray</td>
</tr>
<tr>
<td>Vibration resistance to EN 60068-2-64</td>
<td>30 g, 10 ... 500 Hz</td>
</tr>
<tr>
<td></td>
<td>100 min in each direction</td>
</tr>
<tr>
<td>Shock resistance to EN 60068-2-27 / -29</td>
<td>50 g, 11 ms, 3x in each direction</td>
</tr>
<tr>
<td></td>
<td>100 g, 6 ms, 3x in each direction</td>
</tr>
<tr>
<td>Protection class to IEC 60529 to ISO 20653</td>
<td>IP 67</td>
</tr>
<tr>
<td></td>
<td>IP 69K</td>
</tr>
</tbody>
</table>

**Other data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>Flying leads, 4-core, cable length 1 m</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>7 ... 30 V DC</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Current consumption</td>
<td>&lt; 30 mA at 30 V DC</td>
</tr>
<tr>
<td>Average life expectancy</td>
<td>200,000 h (MTTF)</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 80 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage and short circuit protection (max. 50 mA) are provided.
Pin connections:

<table>
<thead>
<tr>
<th>Core</th>
<th>HSS 120-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>brown</td>
<td>+Ua</td>
</tr>
<tr>
<td>blue</td>
<td>Frequency 1 (A)</td>
</tr>
<tr>
<td>black</td>
<td>0 V</td>
</tr>
<tr>
<td>white</td>
<td>Frequency 2 (B)</td>
</tr>
</tbody>
</table>

Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.

<table>
<thead>
<tr>
<th>Angle</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°</td>
<td>Module 1</td>
</tr>
<tr>
<td>-15°</td>
<td>Module 1.25</td>
</tr>
<tr>
<td>-10°</td>
<td>Module 1.5</td>
</tr>
<tr>
<td>± 0°</td>
<td>Module 2</td>
</tr>
<tr>
<td>± 0°</td>
<td>Module 2.5</td>
</tr>
<tr>
<td></td>
<td>+15°</td>
</tr>
</tbody>
</table>

Specification for installation cavity:

Dimensions:

Probe length (A): 35 mm, 45 mm

Model code:

HSS 1 2 0 – 2 – XXX – 000

Signal technology

2 = Outputs 1 and 2: Frequency (90° phase shift)

Probe length

030 = 30 mm
035 = 35 mm
045 = 45 mm

Modification number

000 = Standard

Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The contact-free speed sensors of the HSS 130 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux. So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.
The instruments are available in different insertion depths. For integration into standard controls, standard output signals are available. Due to their extremely compact design, the robust housing and protection class IP 69K, the devices can be used in almost any application and any mounting position.
These devices are mainly used for detection of speed and rotation direction on rotary sensors, also under extreme environmental conditions.

Special features:
- 2-channel Hall differential sensor
- Single-core seal
- Very high EMC resistance
- Large air gap

Technical data:

Input data
- Frequency range: 0.1 .. 20,000 Hz
- Probe length: 16; 32 mm
- Probe diameter: 18 mm
- Max. pressure on sensing surface: 10 bar, dynamic
- Air gap / installation distance:
  - Module 1: 0.2 .. 1.3 mm
  - Module 1.25: 0.2 .. 1.8 mm
  - Module 1.5: 0.2 .. 2.0 mm
  - Module 2: 0.2 .. 2.5 mm
  - Module 2.5: 0.2 .. 3.5 mm
- Mechanical connection: Double flange, asymmetrical, cable outlet at 90°
- Type of installation: Dependent on direction (with asymmetrical flange)
- Torque value: 10 Nm
- Housing material:
  - Brass / plastic (PA6 GF30)
  - FPM
- Output data:
  - Variants:
    - 2-channel speed (90° phase shift)
    - 2-channel speed / direction of rotation
  - Types:
    - 2 NPN frequency outputs
    - 1 NPN frequency output + 1 NPN direction of rotation output
  - Switching capacity: ≤ 500 mA
  - Direction of rotation:
    - Cable outlet at 90°, gear rotation to right:
      - channel A leading; channel B lagging
    - or rotational direction signal (right: HIGH / left: LOW)
  - Signal level:
    - LOW: ≤ 2 V
    - HIGH: ≥ U - 2 V
- Environmental conditions:
  - Operating temperature range: -40 .. +125 °C
  - Media resistance of housing:
    - Saltwater, various hydraulic oils
  - CE mark:
    - DIN EN 60947-5-2
  - Vibration resistance to:
    - EN 60068-2-36:
      - 5 .. 57 Hz (1.5 mm p-p)
      - 57 .. 2000 Hz (10 g)
  - Shock resistance to:
    - EN 60068-2-27:
      - 15 g, 11 ms, in each direction
      - 25 g, 6 ms, in each direction
  - Protection class:
    - to IEC 60529:
      - IP 67
      - IP 6K9K
- Other data:
  - Electrical connection:
    - Flying leads, 4-core, 43 cm cable length
  - Supply voltage:
    - 8 .. 32 V DC
  - Residual ripple of supply voltage: ≤ 5 %
  - Current consumption:
    - < 33 mA at 24 V, both outputs LOW
    - < 23 mA at 24 V, both outputs HIGH
  - Average life expectancy: 120,000 h (MTTF)
  - Weight:
    - ~ 110 g

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.
Pin connections:

<table>
<thead>
<tr>
<th>Core</th>
<th>HSS 130-2</th>
<th>HSS 130-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>brown</td>
<td>(+U_a)</td>
<td>(+U_a)</td>
</tr>
<tr>
<td>blue</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>black</td>
<td>Frequency</td>
<td>Frequency</td>
</tr>
<tr>
<td>white</td>
<td>Frequency</td>
<td>Direction of rotation</td>
</tr>
</tbody>
</table>

Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.

<table>
<thead>
<tr>
<th>Module</th>
<th>Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>-12°</td>
<td>Module 1</td>
</tr>
<tr>
<td>-9°</td>
<td>Module 1.25</td>
</tr>
<tr>
<td>-7°</td>
<td>Module 1.5</td>
</tr>
<tr>
<td>-3°</td>
<td>Module 1.75</td>
</tr>
<tr>
<td>±0°</td>
<td>Module 2</td>
</tr>
<tr>
<td>±4°</td>
<td>Module 2.25</td>
</tr>
<tr>
<td>±8°</td>
<td>Module 2.5</td>
</tr>
<tr>
<td>+13°</td>
<td>Module 2.75</td>
</tr>
<tr>
<td>+17°</td>
<td>Module 3</td>
</tr>
</tbody>
</table>

Signal technology:

2 = Outputs 1 and 2: Frequency
   (90° phase shift)
3 = Output 1: Frequency
   Output 2: Direction of rotation

Probe length:

- 016 = 16 mm
- 032 = 32 mm

Modification number:

- 000 = Standard

Notes:

- On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Model code:

HSS 1 3 0 – X – XXX – 000

Dimensions:

General tolerances for chipping processes: ISO 2768-mH
Tolerance: ISO 8015
Surface quality: ISO 1302

Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The contact-free speed sensors of the HSS 210 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux. So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 67, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in vehicles and mobile machines with hydraulic drives.

**Special features:**
- 2-channel Hall differential sensor
- Wide frequency range
- Alignment required when installing
- Large air gap
- Simple installation

**Technical data:**

**Input data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>0.1 .. 20,000 Hz</td>
</tr>
<tr>
<td>Installation depth</td>
<td>0 .. 50 mm adjustable</td>
</tr>
<tr>
<td>Max. pressure on sensing surface</td>
<td>5 bar, static / dynamic</td>
</tr>
<tr>
<td>Air gap / installation distance</td>
<td>Module 1: 0.2 .. 1.0 mm Module 1.25: 0.2 .. 1.5 mm</td>
</tr>
<tr>
<td></td>
<td>Module 1.5: 0.2 .. 1.7 mm Module 2: 0.2 .. 2.2 mm</td>
</tr>
<tr>
<td></td>
<td>Module 2.5: 0.2 .. 3.2 mm</td>
</tr>
</tbody>
</table>

**Mechanical connection**

- Screw-in thread M12x1

**Type of installation**

- Dependent on direction

**Torque value**

- 13 Nm

**Housing material**

- Brass

**Output data**

**Variants**

- 2-channel speed (90° phase shift)
- 2-channel speed / direction of rotation

**Types**

- 2 push-pull frequency outputs
- 1 push-pull frequency output + 1 push-pull direction of rotation output

**Switching capacity**

- ≤ 50 mA

**Direction of rotation**

- Marking on housing in direction of rotation, gear rotation to right: channel A leading; channel B lagging or direction of rotation signal (right: HIGH / left: LOW)

**Signal level**

- LOW: ≤ 2 V
- HIGH: ≥ U_L - 2 V

**Environmental conditions**

- Operating temperature range: -40 .. +125 °C
- Media resistance of housing: Oils: HETG; HEES, HFD; HVLP; HLP
- Mark: DIN EN 60947-5-2
- Vibration resistance to EN 60068-2-64: 0.05 g/Hz, 20 .. 2,000 Hz
- Shock resistance to EN 60068-2-27: 30 g, 11 ms
- Protection class to IEC 60529: IP 67 (when an IP 67 female connector is used)

**Other data**

- Electrical connection: Male M12x1, 4 pole
- Supply voltage: 8 .. 30 V DC
- Residual ripple of supply voltage: ≤ 5 %
- Current consumption: < 30 mA at 30 V DC
- Average life expectancy: 200,000 h (MTTF)
- Weight: ~ 40 g

**Note:** Reverse polarity protection of the supply voltage and short circuit protection are provided.
**Model code:**
HSS 2 1 0 – X – 050 – 000

**Signal technology**

2 = Outputs 1 and 2: Frequency 
(90° phase shift)
3 = Output 1: Frequency 
Output 2: Direction of rotation

**Installation depth**
050 = 50 mm max.

**Modification number**
000 = Standard

**Notes:**
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Dimensions:**

**Adjustment angle for other modules:**
It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.

<table>
<thead>
<tr>
<th>Module</th>
<th>Adjustment Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1</td>
<td>+15°</td>
</tr>
<tr>
<td>Module 1.25</td>
<td>+18°</td>
</tr>
<tr>
<td>Module 1.5</td>
<td>+23°</td>
</tr>
<tr>
<td>Module 2</td>
<td>+30°</td>
</tr>
<tr>
<td>Module 2.5</td>
<td>+38°</td>
</tr>
</tbody>
</table>

**Pin connections:**

Pin | HSS 210-2 | HSS 210-3 |
--- | --------- | --------- |
1  | +U_a     | +U_b     |
2  | Frequency 1 (A) | Frequency |
3  | 0 V       | 0 V      |
4  | Frequency 2 (B) | Direction of rotation |

**Key for alignment**

**Note:**
The information in this brochure relates to the operating conditions and applications described. 
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

**HYDAC ELECTRONIC GMBH**
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The contact-free speed sensors of the HSS 220 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux. So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available. Due to their extremely compact design, the robust housing and protection class IP 68, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in rail vehicles and mobile machines.

Special features:
- 2-channel Hall differential sensor
- Wide frequency range
- Alignment required when installing
- Large air gap
- Simple installation

Technical data:

**Input data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>0.1 .. 20,000 Hz</td>
</tr>
<tr>
<td>Installation depth</td>
<td>0 .. 46 mm adjustable</td>
</tr>
<tr>
<td>Max. pressure on sensing surface</td>
<td>10 bar, static</td>
</tr>
<tr>
<td>Air gap / installation distance</td>
<td>Module 1: 0.2 .. 1.3 mm</td>
</tr>
<tr>
<td></td>
<td>Module 1.25: 0.2 .. 1.8 mm</td>
</tr>
<tr>
<td></td>
<td>Module 1.5: 0.2 .. 2.0 mm</td>
</tr>
<tr>
<td></td>
<td>Module 2: 0.2 .. 2.5 mm</td>
</tr>
<tr>
<td></td>
<td>Module 2.5: 0.2 .. 3.5 mm</td>
</tr>
</tbody>
</table>

**Mechanical connection**

<table>
<thead>
<tr>
<th>Type of installation</th>
<th>Screw-in thread M18x1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque value</td>
<td>12 Nm</td>
</tr>
<tr>
<td>Housing material</td>
<td>X12CrNiS18 8</td>
</tr>
</tbody>
</table>

**Output data**

<table>
<thead>
<tr>
<th>Variant</th>
<th>2-channel speed (90° phase shift)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types</td>
<td>2-channel speed / direction of rotation</td>
</tr>
<tr>
<td></td>
<td>2 NPN frequency outputs</td>
</tr>
<tr>
<td></td>
<td>1 NPN frequency output +</td>
</tr>
<tr>
<td></td>
<td>1 NPN direction of rotation output</td>
</tr>
</tbody>
</table>

| Switching capacity             | ≤ 50 mA (36 V, 125 °C, 50 % duty cycle) |
|                               | ≤ 500 mA (24 V, 25 °C, 50 % duty cycle) |

| Direction of rotation          | Marking on housing at 90° to rotational direction, gear rotation to right: channel A leading, channel B lagging or direction of rotation signal (right: HIGH / left: LOW) |

| Signal level                  | LOW: ≤ 2 V                             |
|                               | HIGH: ≥ +U0 - 2 V                      |

**Environmental conditions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-40 .. +125 °C</td>
</tr>
<tr>
<td>Media resistance of housing</td>
<td>Saltwater, various hydraulic oils</td>
</tr>
<tr>
<td>Vibration resistance to EN 60068-2-6</td>
<td>15 g / 1 .. 2000 Hz</td>
</tr>
<tr>
<td>Shock resistance to EN 60068-2-27</td>
<td>30 g, 11 ms</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 68 (when female connector is fitted)</td>
</tr>
</tbody>
</table>

**Other data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>Male M12x1, 4 pole</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>8 .. 32 V DC</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Current consumption</td>
<td>&lt; 33 mA at 24 V, both outputs LOW</td>
</tr>
<tr>
<td></td>
<td>&lt; 23 mA at 24 V, both outputs HIGH</td>
</tr>
<tr>
<td>Average life expectancy</td>
<td>200,000 h (MTTF)</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 80 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.
Pin connections:

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>HSS 220-2</th>
<th>HSS 220-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_R</td>
<td>+U_R</td>
</tr>
<tr>
<td>2</td>
<td>Frequency 2</td>
<td>Direction of rotation</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>Frequency 1</td>
<td>Frequency</td>
</tr>
</tbody>
</table>

Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.

-12° Module 1
-9° Module 1.25
-7° Module 1.5
-3° Module 1.75
±0° Module 2 ±0° Module 2.5 +4°
Module 2.5 +8° Module 2.75 +13° Module 3 +17°

Model code:

HSS 220-0 - X - 046 - 000

Signal technology
2 = Outputs 1 and 2: Frequency (90° phase shift)
3 = Output 1: Frequency
Output 2: Direction of rotation

Installation depth
046 = 46 mm max.

Modification number
000 = Standard

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Dimensions:

Note:

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
"Failsafe" is the keyword for vehicle designers of mobile machinery. No single error is allowed to cause a breakdown or malfunction of part or all of the system in safety-critical applications.

For use in safety-critical applications, these pressure transmitters are certified for Performance Level "d" (PLd) according to DIN EN ISO 13849. The linear position transducers PLd comply with DIN EN 13849-1 and also with the comparable safety level SIL 2 in accordance with the standard applicable worldwide for electronic products IEC 61508.

Pressure transmitters for applications with increased functional safety

<table>
<thead>
<tr>
<th>Product</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDA 4700</td>
<td>197</td>
</tr>
</tbody>
</table>

Linear position transducer for applications with increased functional safety

<table>
<thead>
<tr>
<th>Product</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLT 1100 - R2</td>
<td>199</td>
</tr>
</tbody>
</table>

Further sensors for applications with increased functional safety can be found in the Chapter "OEM Products for High Volume Production".
Electronic Pressure Transmitter
HDA 4700
for Applications with Increased Functional Safety

Description:
This version of the pressure transmitter series HDA 4700 has been specially developed for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to PL d - Cat 3 (in accordance with ISO 13849).
The pressure transmitters are designed with two channels. Each channel consists of a sensor element and evaluation electronics. As a result, the pressure transmitter develops two separate and independent output signals in proportion to the pressure.
The safety function is tested by evaluating and comparing the two analogue output signals in a higher-level system.
The main areas of application are as sensor elements in mobile, safety-oriented systems such as load torque displays or load torque limitation in truck-mounted cranes or working platforms.

Special features:
- Two-channel, redundant pressure measurement
- Two separate, independent output signals
- Accuracy ≤ ± 0.25 % FS typ.
- Highly robust sensor cell
- Outstanding performance in terms of temperature effect and EMC
- Small, compact design
- PL d, Cat. 3 certification

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th>25</th>
<th>40</th>
<th>60</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges signal 1 in bar</td>
<td>25</td>
<td>40</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Measuring ranges signal 2 in bar</td>
<td>25 / 40</td>
<td>40 / 60</td>
<td>60 / 100</td>
<td>100 / 160</td>
</tr>
<tr>
<td>Burst pressures in bar</td>
<td>200</td>
<td>300</td>
<td>500</td>
<td>800</td>
</tr>
<tr>
<td>Overload pressures in bar</td>
<td>80</td>
<td>120</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Overload pressures in bar</td>
<td>80</td>
<td>120</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Overrange</td>
<td>≤ ± 0.015 % / °C max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>≤ ± 0.3 % FS max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.1 % FS max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.05 % FS.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 2 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term stability</td>
<td>≤ ± 0.1 % FS typ. / year</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental conditions
- Compensated temperature range: -25 .. +85 °C
- Operating temperature range (fail safe): -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range: -40 .. +85 °C
- Fluid temperature range: -40 .. +85 °C / -25 .. +85 °C

Vibration resistance according to DIN EN 60068-2-6 at 5 .. 2000 Hz
≤ 20 g

Protection class to IEC 60529 to ISO 20653
- IP 67 (when female connector is fitted)
- IP 69K (when female connector is fitted)

Other data
- Electrical connection: M12x1, 4 pole; DT04, 4 pole
- Supply voltage: 7 .. 35 V DC (max. load resistance 250 Ω)
- Life expectancy: > 10 million load cycles (0 .. 100 %)
- Weight: ~ 180 g

Safety-related data
- Performance level
  - Based on: DIN EN ISO 13849-1:2008
  - PL d
  - Architecture: Category 3

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided

Additional notes:
1) Other seal materials on request
2) Other output signals on request
3) -25 °C with FPM seal, -40 °C on request
**Model code:**

HDA 474X - C C - XXXX - XXXX - Pd - 000

**Mechanical connection**

4 = G1/4 ADIN 3852 (male)

**Electrical connection**

6 = Male M12x1, 4 pole (connector not supplied)

V = Male Deutsch DT04, 4 pole (connector not supplied)

**Signal 1**

C = 4 .. 20 mA, 3 conductor

**Signal 2**

C = 4 .. 20 mA, 3 conductor

**Pressure ranges for Signal 1 in bar**

(max. oper. pressure)

0025; 0040; 0060; 0100; 0160; 0250; 0400; 0600

**Pressure ranges for Signal 2 in bar**

0025; 0040; 0060; 0100; 0160; 0250; 0400; 0600; 1000

Press. range for signal 2 = Pressure range for signal 1 or max. 1 pressure level higher

**Functional safety**

Pd = PL d – Cat 3 according to DIN EN 13849-1

**Modification number**

000 = Standard

**Note:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Dimensions:**

![Dimensions Diagram]

**Pin connections:**

- **HDA 4746-CC**
  - Pin 1: +U_b
  - Pin 2: Signal 2
  - Pin 3: 0 V
  - Pin 4: Signal 1

- **HDA 474V-CC**
  - Pin 1: +U_b
  - Pin 2: 0 V
  - Pin 3: Signal 2
  - Pin 4: Signal 1

**Block circuit diagram:**

![Block Circuit Diagram]

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Linear Position Transducer
HLT 1100-R2
for Applications with Increased Functional Safety

**Description:**
This version of the linear position sensor series HLT 1100 has been specially developed for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).
The sensor works on the principle of magnetostriction.
This measuring principle determines with high-precision the position, the distance and/or the velocity and is based on elapsed time measurement.
Based on this non-contact and wear-free measuring system, HYDAC offers this version in a pressure-resistant stainless steel housing for full integration in hydraulic cylinders.

**Special features:**
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- SIL 2 / PL d certification

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>200 .. 2500 mm</td>
</tr>
<tr>
<td>Measured variable</td>
<td>Distance</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>450 bar</td>
</tr>
<tr>
<td>Peak pressure</td>
<td>630 bar</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Stainless steel (1.4301 / 1.4571)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
<td>4 .. 20 mA, CANopen</td>
</tr>
<tr>
<td>Resolution</td>
<td>12 bit</td>
</tr>
<tr>
<td>Load resistance to GND</td>
<td>200 .. 500 Ohm</td>
</tr>
<tr>
<td>Accuracy to DIN 16088</td>
<td>≤ ± 0.5 % FS</td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ± 0.1 % FS</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ± 0.1 % FS</td>
</tr>
<tr>
<td>Non-linearity</td>
<td>≤ ± 0.1 % FS</td>
</tr>
<tr>
<td>Dynamics</td>
<td>≤ 30 ms (10 .. 90 %)</td>
</tr>
</tbody>
</table>

**Environmental conditions**
- Operating temperature range: -40 .. +85 °C
- Storage temperature range: -40 .. +100 °C
- Media temperature range: -40 .. +120 °C
- Protection class to IEC 60529: IP67
- Vibration resistance to DIN EN 60068-2-6: 7.5 mm (5 .. 8.2 Hz), 2.0 g (8.2 .. 150 Hz)
- Shock resistance to DIN EN 60068-2-27: 20 g (11ms)
- CE mark: EN 61000-6-1 / 2 / 3 / 4

**Other data**
- Supply voltage (Vin) nominal: 9 .. 36 VDC
- Residual ripple of supply voltage: ≤ 250 mV
- Current consumption (without output): ≤ 100 mA
- Electrical connection: PUR cable, 3-core; flying leads
- Separate panel mount connection M12x1
- Measurement principle: magnetostrictive
- Installation position and travel speed: No restrictions
- Weight (dependent on measurement and cable lengths): ~ 1000 g

**Safety-related data**
- Performance level: Based on DIN EN ISO 13849-1:2008, PL d, Category 2
- Safety Integrity Level: Based on DIN EN 61508:2002, SIL 2

Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.
FS (Full Scale) = relative to the full measuring range
Model code:
Mobile  HLT 1 1 0 0 – R2 – XXX – XXX – XXXX – S2PD – 000
Design/ Geometry type
1 = Rod
Mechanical connection
R2 = Cylinder-integrated
Electrical connection
Cable output
K01 = Flying lead, length 1 m
K02 = Flying lead, length 2 m
K05 = Flying lead, length 5 m
K10 = Flying lead, length 10 m
Separate panel mount connection M12x1
(4 pole for signal output analogue
5 pole for signal output CANopen)
L06 = 60 mm cable length
L18 = 180 mm cable length
L24 = 240 mm cable length
Signal output
C01 = Analogue 4 .. 20 mA, 3 conductor
CAN = CANopen
Measuring range in mm (200 to 2500 mm)
Example
0250 = 250 mm
Functional safety
S2PD = SIL 2 acc. to IEC 61508
and PLd – Cat 2 acc. to DIN EN 13849-1
Modification
000 = Standard
Notes:
Special models on request. On instruments with a different modification number,
please read the label or the technical amendment details supplied with the
instrument.

Accessories:
Appropriate accessories, such as position magnets, etc. can be found in the
Accessories section of the Electronics brochure.
The recommended position magnet ZBL MR33, part no. 6084207, must be
ordered separately.

Dimensions:

Pin connections:

Cable outlet

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_b</td>
<td>supply+</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
<td>supply-</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CAN_H</td>
<td>bus line dominant high</td>
</tr>
<tr>
<td>5</td>
<td>CAN_L</td>
<td>bus line dominant low</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and
applications described.
For applications and operating conditions not described, please contact the relevant
technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
SENSORS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES

Sensors for Potentially Explosive Locations:

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDA 4700</td>
<td>ATEX, CSA, IECEx Flameproof enclosure</td>
</tr>
<tr>
<td>EDS 4400</td>
<td>ATEX, CSA, IECEx Flameproof enclosure, programmable</td>
</tr>
<tr>
<td>ETS 4500</td>
<td>ATEX, CSA, IECEx Flameproof enclosure</td>
</tr>
<tr>
<td>HDA 4700 Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4400 Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4300 Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4100 Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>EDS 4400 Intrinsic safe, programmable</td>
<td></td>
</tr>
<tr>
<td>EDS 4300 Intrinsic safe, programmable</td>
<td></td>
</tr>
<tr>
<td>EDS 4100 Intrinsic safe, programmable</td>
<td></td>
</tr>
<tr>
<td>HDA 4700 CSA Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4400 CSA Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4300 CSA Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4100 CSA Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4700 IECEx Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4400 IECEx Intrinsic safe</td>
<td></td>
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<tr>
<td>HDA 4300 IECEx Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4700 Flush membrane ATEX Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4400 Flush membrane ATEX Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4300 Flush membrane ATEX Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4700 Flush membrane IECEx Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4400 Flush membrane IECEx Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4300 Flush membrane IECEx Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HDA 4700 Flush membrane ATEX, CSA, IECEx flameproof enclosure</td>
<td></td>
</tr>
<tr>
<td>HFS 2100 ATEX Intrinsic safe</td>
<td></td>
</tr>
<tr>
<td>HFS 2500 ATEX Intrinsic safe</td>
<td></td>
</tr>
</tbody>
</table>

For several years HYDAC ELECTRONIC has been systematically stepping up the expansion of its range of sensors for potentially explosive locations. The sensors for potentially explosive locations can be supplied with a variety of output signals, connectors and fluid port connection options. This versatility, combined with certification to ATEX, CSA and IECEx, ensures worldwide acceptance of our products.

Further sensors for potentially explosive locations can be found in the section "OEM Products for Large Volume Production".

<table>
<thead>
<tr>
<th>Sensors for potentially explosive atmospheres</th>
<th>HDA 4700</th>
<th>HDA 4400</th>
<th>HDA 4300</th>
<th>HDA 4100</th>
<th>EDS 4400</th>
<th>EDS 4300</th>
<th>EDS 4100</th>
<th>ETS 4500</th>
<th>HFS 2500</th>
<th>HFS 2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
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<td>✓</td>
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<td>✓</td>
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<tr>
<td>Temperature</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
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</tr>
<tr>
<td>Flow rate</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Available as individual units</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>OEM product for large volume production</td>
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<td></td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Flush membrane</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>ATEX-Intrinsically safe</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Flush membrane ATEX-Intrinsically safe</td>
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<td>✓</td>
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<tr>
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<td>✓</td>
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<tr>
<td>Flush membrane IECEx Intrinsically safe</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ATEX, IECEx, CSA, flameproof enclosure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Note: Not all feature combinations are possible. For precise information, please consult the relevant data sheet.
**Electronic Pressure Transmitter**

**HDA 4700**

**ATEX, CSA, IECEx**

**Flameproof Enclosure**

**Description:**

The HDA 4700 electronic pressure transmitter series with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures the instrument is universally suitable for use in potentially explosive environments around the world.

Each instrument is certified by the three approvals organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

As with the industrial version of the HDA 4700, those with triple approval have a proven, fully-welded stainless steel measurement cell with thin film strain gauge without internal seals.

The main areas of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high levels of dust contamination.

**Protection types and applications:**

- **cCSAus** Explosion Proof - Seal Not Required
  - **CSAus** Group A, B, C, D, T6, T5
  - **CSAus** Group E, F, G
  - **Type 4**

- **ATEX** Flame Proof
  - I M2 Ex d I Mb
  - II 2G Ex d IIIC T6, T5 Gb
  - II 2D Ex tb IIIC T6, T110 °C

- **IECEx** Flame Proof
  - Ex d I Mb
  - Ex d IIC T6, T5 Gb
  - Ex tb IIIC T110 .. 130 °C

**Special features:**

- Accuracy ≤ ± 0.25 % FS typ.
- Certificates:
  - ATEX KEMA 10ATEX0100 X
  - CSA MC 224264
  - IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

**Input data**

- Measuring ranges\(^1\): 6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
- Overload pressures: 15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
- Burst pressures: 100; 200; 300; 500; 1000; 2000; 3000 bar
- Mechanical connection\(^2\) (torque value):
  - G1/2 A DIN 3852 (40 Nm)
  - G1/4 A DIN 3852 (20 Nm)

**Parts in contact with medium**

- Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
- Seal:
  - FPM

**Conduit and housing material**

- 1.4404; 1.4435 (316L)

**Output data**

- Output signal, permitted load resistance\(^3\)
  - 4 .. 20 mA, 2 conductor
  - \(R_{\text{max}} = (U_S - 8 \text{ V}) / 20 \text{ mA} [\text{k}]\)
- Accuracy to DIN 16086,
  - ≤ ± 0.25 % FS typ.
  - ≤ ± 0.15 % FS max.
- Temperature compensation
  - ≤ ± 0.008 % FS / °C typ.
  - ≤ ± 0.015 % FS / °C max.
- Hysteresis
  - ≤ ± 0.1 % FS max.
- Repeatability
  - ≤ ± 0.05 % FS
- Rise time
  - ≤ 1.5 ms
- Long-term drift
  - ≤ ± 0.1 % FS typ. / year

**Environmental conditions**

- Compensated temperature range:
  - T5, T130 °C: -25 .. +80 °C
  - T6, T110 °C: -25 .. +60 °C
- Operating temperature range\(^4\)
  - T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C
  - T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
- Storage temperature range
  - -40 .. +100 °C
- Fluid temperature range\(^5\)
  - T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C
  - T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C

**Mark**

- EN 61000-6-1 / 2 / 3 / 4
- EN 60079-0 / 1 / 31

**Vibration resistance**

- ≤ 20 g

**Protection class to IEC 60529**

- IP 65 (Vented Gauge)
- IP 69K (Sealed Gauge)

**Other data**

- Voltage supply
  - 8 .. 30 V DC
- Residual ripple of supply voltage
  - ≤ 5 %
- Life expectancy
  - ≥ 10 million cycles
  - 0 .. 100 % FS
  - ≤ 300 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

- FS (Full Scale) = relative to the full measuring range
- B.F.S.L. = Best Fit Straight Line
- \(^1\) 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa
- \(^2\) Other mechanical connections on request
- \(^3\) Other output signals on request
- \(^4\) -20 °C with FPM seal, -40 °C on request

E 18.385.1/11.13
Pin connections:

Conduit (single cores)

Core | HDA 47X9-A
--- | ---
red | Signal +
black | Signal -
green-yellow | Housing

Conduit (flying leads)

Core | HDA 47XG-A
--- | ---
white | Signal +
brrown | Signal -
green | n.c.
yellow | n.c.

Areas of application:

### Approvals
- cCSAus: Explosion Proof - Seal not required
- ATEX: Flame Proof
- IECEx: Flame Proof

### Certificate
- ATEX KEMA 10ATEX100X
- CSA MC 224264
- IECEx KEM 10.0053X

### Applications / Protection types
- **cCSAus:**
  - Class I: Group A, B, C, D, T6; T5
  - Class II: Group E, F, G
  - Class III: Type 4
- **ATEX:**
  - I  M2: Ex d I Mb
  - II 2G: Ex d IIC T6, T5 Gb
  - II 2D: Ex tb IIIC T110 .. 130 °C Db
- **IECEx:**
  - Ex d I Mb
  - Ex d IIC T6, T5 Gb
  - Ex tb IIIC T110 .. 130 °C Db

### Model code:

**HDA 4 7 X X – A – XXXX – D X – 000 (2m)**

- **Mechanical connection**
  - 2 = G1/2 DIN 3852
  - (only for "1000 bar" press. range)
  - 4 = G1/4 A DIN 3852

- **Electrical connection**
  - 9 = 1/2-14 NPT Conduit (male thread), single cores
  - G = 1/2-14 NPT Conduit (male thread), flying leads

- **Signal**
  - A = 4 .. 20 mA, 2 conductor

- **Pressure ranges in bar**
  - 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600
  - (only in conjunction with mechanical connection type "4")
  - 1000
  - (only in conjunction with mechanical connection type "2")

- **Approval**
  - D = CSA Explosion Proof - Seal not required
  - ATEX Flame Proof
  - IECEx Flame Proof

- **Type of measurement cell**
  - S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar
  - V = Vented Gauge (vented to atmosphere) ≤ 16 bar

- **Modification number**
  - 000 = Standard

- **Cable length in m**
  - Standard = 2 m

Notes:

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
**Note:**
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

*) optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"
**Description:**
The programmable electronic pressure switch EDS 4400 with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures the instrument is universally suitable for use in potentially explosive environments around the world.

Each instrument is certified by the three approval organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

As with the industrial version of the EDS 4400, those with triple approval have a proven, fully-welded stainless steel measurement cell with thin film strain gauge without internal seals.

The instrument is programmed conveniently and simply using the HPG 3000 HYDAC programming unit.

The main areas of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high dust loads.

**Protection types and applications:**
cCSAUS Explosion Proof - Seal Not Required
Class I Group A, B, C, D, T6, T5
Class II Group E, F, G
Class III Type 4

ATEX Flame Proof
I II2 Ex d I Mb
II 2G Ex d IIC T6, T5 Gb
II 2D Ex tb IIC T110 .. 130 °C Db

IECEx Flame Proof
Ex d I Mb
Ex d IIC T6, T5 Gb
Ex tb IIC T110 .. 130 °C Db

**Special features:**
- Accuracy ≤ ± 1.0 % FS
- Certificates: ATEX KEMA 10ATEX100 X
  CSA MC 224264
  IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
</tr>
<tr>
<td>Overload pressures</td>
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<tr>
<td>Burst pressure</td>
</tr>
<tr>
<td>Mechanical connection (torque value)</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
</tr>
</tbody>
</table>

| Conduit and housing material | 1.4404; 1.4435 (316L) |

<table>
<thead>
<tr>
<th>Output data</th>
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<tbody>
<tr>
<td>Accuracy to DIN 16086, Max. setting</td>
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<td>Repeatability</td>
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<tr>
<td>Temperature drift</td>
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<td>Switch output 2)</td>
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<td>Output load</td>
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<tr>
<td>Switch points / hysteresis / N/C or N/O function</td>
</tr>
<tr>
<td>Rising switch point and falling switch point delay</td>
</tr>
<tr>
<td>Long-term drift</td>
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</tbody>
</table>

**Environmental conditions:**

<table>
<thead>
<tr>
<th>Compensated temperature range</th>
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</thead>
<tbody>
<tr>
<td>T5, T100 °C; -25 .. +80 °C</td>
</tr>
<tr>
<td>T6, T110 °C; -25 .. +60 °C</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Operating temperature range 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T5, T100 °C; -40 .. +80 °C /-20 .. +80 °C</td>
</tr>
<tr>
<td>T6, T110 °C; -40 .. +60 °C /-20 .. +60 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 .. +100 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluid temperature range 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T5, T100 °C; -40 .. +80 °C /-20 .. +80 °C</td>
</tr>
<tr>
<td>T6, T110 °C; -40 .. +60 °C /-20 .. +60 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>mark</th>
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<tbody>
<tr>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>EN 60079-0 / 1 / 31</td>
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</table>

<table>
<thead>
<tr>
<th>Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz</th>
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</thead>
<tbody>
<tr>
<td>≤ 20 g</td>
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</table>

<table>
<thead>
<tr>
<th>Protection class to IEC 60529</th>
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<tbody>
<tr>
<td>IP 65 (Vented Gauge)</td>
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<tr>
<td>IP 69K (Sealed Gauge)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
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<tr>
<td>Voltage supply</td>
</tr>
<tr>
<td>Current consumption</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
</tr>
<tr>
<td>Life expectancy</td>
</tr>
<tr>
<td>Weight</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other mechanical connection options available on request

2) NPN switching outputs upon request

3) -20 °C with FPM seal, -40 °C on request
Setting ranges for the switch outputs:
- Switch point or upper switch value: 5% .. 100% of the measurement range
- Hysteresis or lower switch value: 1% .. 96% of the measurement range

Pin connections:

Conduit (single cores)

Conduit (flying leads)

Programming Unit:
(must be ordered separately)
HPG 3000 – 000
Portable Programming Unit
Part. No. 909 422

Areas of application:

Model code:

The pressure switch can be connected to the HPG 3000 very simply by using the UVM 3000 Connection Adapter (see Accessories Brochure).

CAUTION!
The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

Model code:

EDS 4 4 X X – XXXX – X P – D X – 000 (2m)

Mechanical connection
2 = G1/2 DIN 3852
(only for “1000 bar” press. range)
4 = G1/4 A DIN 3852

Electrical connection
9 = 1/2-14 NPT Conduit (male thread),
single cores
G = 1/2-14 NPT Conduit (male thread),
    flying leads

Pressure ranges in bar
0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600
(only in conjunction with mech. connection type “4”)
1000
(only in conjunction with mech. connection type “2”)

Number of switch outputs
1 = 1 switch output
2 = 2 switch outputs

Output type
P = Programmable

Approval
D = CSA Explosion Proof - Seal not required
ATEX: Flame Proof
IECEx: Flame Proof

Type of measurement cell
S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar
V = Vented Gauge (vented to atmosphere) ≤ 16 bar

Modification number
000 = Standard

Cable length in m
Standard = 2 m

Notes:
Special models on request.
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

*) optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"
**Electronic Temperature Transmitter**

**ETS 4500**

**ATEX, CSA, IECEx Flameproof Enclosure**

**Description:**
The electronic temperature transmitter series ETS 4500 with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures that the device is universally suitable for use in potentially explosive environments around the world.

Each device is certified by the three approval organizations and is labelled accordingly. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 to +100 °C.

Its main applications are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high dust loads.

**Protection types and applications:**
cCSAus Explosion Proof - Seal Not Required
- Class I Group A, B, C, D, T6, T5
- Class II Group E, F, G
- Class III Type 4

ATEX Flame Proof
- I M2 Ex d I Mb
- II 2G Ex d IIIC T6, T5 Gb
- II 2D Ex tb IIIC T110 ... 130 °C Db

IECEx Flame Proof
- Ex d I Mb
- Ex d IIC T6, T5 Gb
- Ex tb IIIC T110 ... 130 °C Db

**Special features:**
- Accuracy ± 1.5 % FS typ.
- Robust design
- Pressure resistant to 600 bar (depending on model)
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

**Input data**

- Measuring principle: Silicon semiconductor device
- Measuring range: -25 ... +100 °C
- Probe length: 10.7; 100; 250; 350 mm
- Pressure resistance: 600 bar (probe length 10.7 mm)
- 125 bar (probe length 100 mm)
- 125 bar (probe length 250 mm)
- 125 bar (probe length 350 mm)

- Mechanical connection (torque value): G1/4 A DIN 3852 (20 Nm)
- Parts in contact with medium: Stainless steel: 1.4571; 1.4301 (316Ti; 304)
- Seal: FPM

**Output data**

- Output signal: 4 ... 20 mA, 2 conductor
- \( R_{\text{max}} = \frac{(U_b - 8 \text{ V})}{20 \text{ mA}} \times \text{[k} \Omega \text{]} \)
- Accuracy: \( \leq \pm 1.5 \% \text{ FS typ.} \)
- \( \leq \pm 3.0 \% \text{ FS max.} \)
- Rise time to DIN EN 60751: \( t_{50} = 10 \text{ s} \)
- \( t_{90} = 15 \text{ s} \)

**Environmental conditions**

- Operating temperature range: T5, T130 °C: -40 ... +80 °C/-20 ... +80 °C
- T6, T110 °C: -40 ... +60 °C/-20 ... +60 °C

- Storage temperature range: -40 ... +100 °C
- Fluid temperature range: T5, T130 °C: -40 ... +80 °C/-20 ... +80 °C
- T6, T110 °C: -40 ... +60 °C/-20 ... +60 °C

- Vibration resistance to DIN EN 60668-2-6 at 10 ... 500 Hz: \( \leq 20 \text{ g} \)

- Protection class to ISO 20653: IP 69K

- Voltage supply: 8 ... 30 V DC
- Residual ripple of supply voltage: \( \leq 5 \% \)
- Life expectancy: > 10 million cycles
- 0 ... 100 % FS

- Weight: ~ 280 g (probe length 10.7 mm)
- ~ 315 g (probe length 100 mm)
- ~ 350 g (probe length 250 mm)
- ~ 385 g (probe length 350 mm)

**Note:** Reverse polarity protection of the supply voltage, excess voltage and override short circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range

1) Other output signals on request

2) -20 °C with FPM seal, -40 °C on request
Pin connections:

Conduit (single cores)

Core | ETS 4549-A
red | Signal +
black | Signal -
green-yellow | Housing

Conduit (flying leads)

Areas of application:

<table>
<thead>
<tr>
<th>Approvals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>cCSAus:</td>
<td>Explosion Proof - Seal not required</td>
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<tr>
<td>ATEX:</td>
<td>Flame Proof</td>
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<tr>
<td>IECEx:</td>
<td>Flame Proof</td>
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<table>
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<th>Certificate</th>
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<tr>
<td>ATEX KEMA 10ATEX100X</td>
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<tr>
<td>CSA MC 224264</td>
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<tr>
<td>IECEx KEM 10.0053X</td>
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<tr>
<th>Applications / Protection types</th>
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<tbody>
<tr>
<td>cCSAus:</td>
<td>Class I Group A, B, C, D, T6; T5</td>
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<td></td>
<td>Class II Group E, F, G</td>
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<td></td>
<td>Type 4</td>
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<td>ATEX:</td>
<td>I M2 Ex d I Mb</td>
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<td></td>
<td>II 2G Ex d IIC T6, T5 Gb</td>
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<tr>
<td></td>
<td>II 2D Ex tb IIIC T110 .. 130 °C Db</td>
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<tr>
<td>IECEx:</td>
<td>Ex d I Mb</td>
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<td>Ex d IIC T6, T5 Gb</td>
</tr>
<tr>
<td></td>
<td>Ex tb IIIC T110 .. 130 °C Db</td>
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</table>

Model code:

ETS 4 5 4 X – A– D – XXX – 000 (2m)

<table>
<thead>
<tr>
<th>Core</th>
<th>ETS 454G-A</th>
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<tbody>
<tr>
<td>white</td>
<td>Signal +</td>
</tr>
<tr>
<td>brown</td>
<td>Signal -</td>
</tr>
<tr>
<td>green</td>
<td>n.c.</td>
</tr>
<tr>
<td>yellow</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

Mechanical connection

4 = G1/4 A DIN 3852

Electrical connection

9 = 1/2-14 NPT Conduit (male thread), single cores
G = 1/2-14 NPT Conduit (male thread), flying leads

Signal

A = 4 .. 20 mA, 2 conductor

Approval

D = CSA Explosion Proof - Seal not required
ATEX Flame Proof
IECEx Flame Proof

Probe length

010 = 10.7 mm
100 = 100 mm
250 = 250 mm
350 = 350 mm

Modification number

000 = Standard

Cable length in m

Standard = 2 m

Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The pressure transmitter HDA 4700 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4700 in ATEX version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications:
I M1 Ex ia I Ma
II 1G Ex ia IIIC T6 Ga
II 1/2G Ex ia IIIC T6 Ga/Gb
II 2G Ex ia IIIC T6 Gb
II 3G Ex na IIIC T6,T5,T4 Gc
II 3G Ex ic IIIC T6,T5,T4 Gc
II 1D Ex ia IIIC T85°C Da
II 1D Ex ta IIIC T80/90/100°C Da
II 2D Ex tb IIIC T80/90/100°C Db
II 3D Ex tc IIIC T80/T90/T100°C Dc
II 3D Ex ic IIIC T80/T90/T100°C Dc

Special features:
• Accuracy ≤ ± 0.25 % FS typ.
• Certificates: KEMA 05ATEX1016 X KEMA 05ATEX1021
• Output signal 4 .. 20 mA
• Very small temperature error
• Excellent EMC characteristics
• Excellent durability

Technical data:
Input data
Measuring ranges 1) -1 .. 9; 6; 16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures 20; 15; 32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures 100; 100; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection 1) G1/4 A DIN 3852
G1/2 DIN 3852
Torque value 20 Nm
Parts in contact with medium Stainless steel: 1.4542; 1.4571; 1.4435;
1.4404; 1.4301
Seal: FPM

Output data
Output signal permitted load resistance 4 .. 20 mA, 2 conductor
R_{Lmax} = (U_B - 12 V) / 20 mA [\Omega]
Accuracy to DIN 16086, ≤ ± 0.25 % FS typ.
Max. setting ≤ ± 0.5 % FS max.
Accuracy at min. setting ≤ ± 0.15 % FS typ.
Accuracy at min. setting ≤ ± 0.3 % FS max.
Temperature compensation ≤ ± 0.008 % FS / °C typ.
Zero point ≤ ± 0.015 % FS / °C max.
Temperature compensation ≤ ± 0.008 % FS / °C typ.
Over range ≤ ± 0.015 % FS / °C max.
Non-linearity at max. setting to DIN 16086 ≤ ± 0.3 % FS max.
Hysteresis ≤ ± 0.1 % FS max.
Repeatability ≤ ± 0.05 % FS
Rise time ≤ 1.5 ms
Long-term drift ≤ ± 0.1 % FS typ. / year

Environmental conditions
Compensated temperature range -20 .. +85 °C
Operating temperature range 2) -40 .. +60°C / -20 .. +60 °C
Storage temperature range -40 .. +100°C
Fluid temperature range 2) -40 .. +80°C / -20 .. +60 °C

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz ≤ 20 g
Protection class to IEC 60529 IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18)
IP 67 (for M12x1 male when an IP 67 connector is used)

Relevant data for Ex applications
Supply voltage U_B = 12 .. 28 V
Max. input current I _i = 100 mA
Max. input power P_i = 1 W
max. power consumption ≤ 1 W
Connection capacitance of the sensor C_s ≤ 22 nF
Inductance of the sensor L_s = 0 mH
Insulation voltage 3) 50 V AC, with integrated overvoltage protection EN 61000-6-2

Other data
Residual ripple of supply voltage ≤ 5 %
Life expectancy > 10 million cycles 0 .. 100 % FS
Weight ~ 150 g

Note:
1) Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to the full measuring range. B.F.S.L. = Best Fit Straight Line
2) -20 °C with FPM seal, -40 °C on request
3) 500 V AC on request
Pin connections:

Binder series 714 M18

Pin HDA 47X4-A
1 n.c.
2 Signal +
3 Signal -
4 n.c.

EN175301-803 (DIN 43650)

Pin HDA 47X5-A
1 Signal +
2 Signal -
3 n.c.
▌ Housing

M12x1

Pin HDA 47X6-A
1 Signal +
2 n.c.
3 Signal -
4 n.c.

Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>1</th>
<th>9</th>
<th>A</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>Protection type</td>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 1D Ex ia IIC T80°C T90°C Da</td>
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<tr>
<td></td>
<td>II 1/2G Ex ia IIC T6 Ga/Gb</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 3G Ex nA IIC T6 Gc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II 1D Ex ia IIC T80°C T90°C Da</td>
<td>II 2D Ex lb IIC T80°C Db</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II 3G Ex ic IIC T6 Gc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate</td>
<td>KEMA 05ATEX1016 X / KEMA 05ATEX1021</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ia IIC T80/90/100°C Da T90/T100/T110° C Da, II 2D Ex lb IIC T80/90/100°C Db and II 3D Ex tc IIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

Model code:

HDA 4 7 X X – A – XXXX – A N X – 000

Mechanical connection

2 = G1/2 DIN 3852
(only for "1000 bar" press. range)
4 = G1/4 A DIN 3852 (male)

Electrical connection

4 = Male, 4 pole Binder series 714 M18
(connector not supplied)
5 = Male, 3 pole + PE, EN175301-803
(DIN 43650)
(connector supplied)
6 = Male, M12x1, 4 pole
(connector not supplied)

Signal

A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar

0009 (-1..9); 0006; 0016; 0060; 0100; 0250; 0400; 0600
1000 (only in conjunction with mechanical connection code "2")

Approval

A = ATEX

Insulation voltage

N = 50 V AC

Protection types and applications (code)

1 = I M1 Ex ia I Ma
Il 1G Ex ia IIC T6 Ga
Il 1/2G Ex ia IIC T6 Ga/Gb
Il 2G Ex ia IIC T6 Gb
Il 1D Ex ia IIC T85 °C Da

9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")*
A = II 1D Ex ia IIC T80 °C T90 °C Da (only in conjunction with electr. connection "6")*
Il 2D Ex lb IIC T80 °C Db
C = II 3G Ex ic IIC T6 Gc
Il 3D Ex ic IIC T80 °C Dc

Modification number

000 = Standard

Notes:

* For design and electrical connection see device dimensions

Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
Dimensions:
Protection types and applications (code): 1, C

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

Protection ratings and areas of application (code): 9, A

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
**Description:**
The pressure transmitter HDA 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

**Protection types and applications:**
- I M1 Ex ia I Ma
- II 1G Ex ia IIC T6 Ga
- II 1/2G Ex ia IIC T6 Ga/Gb
- II 3G Ex ia IIC T6, T5, T4 Gc
- II 1D Ex ia IIIC T85 °C Da
- II 1D Ex ta IIIC T80/90/100 °C Da
- II 2D Ex tb IIIC T80/90/100 °C Db
- II 3D Ex tc IIIC T80/90/100 °C Dc
- II 3D Ex ic IIIC T80/90/100 °C Dc

**Special features:**
- Accuracy \( \leq \pm 0.5 \% \) FS typ.
- Certificates:
  - KEMA 05ATEX1016 X
  - KEMA 05ATEX1021
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th>16; 60; 100; 250; 400; 600; 1000 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
<td>32; 120; 200; 500; 800; 1000; 1600 bar</td>
</tr>
<tr>
<td>Overload pressures</td>
<td>200; 300; 500; 1000; 2000; 3000 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/2 DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301</td>
</tr>
<tr>
<td></td>
<td>Seal: FPM</td>
</tr>
</tbody>
</table>

**Output data**:

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>4 .. 20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086</td>
<td>( \leq \pm 0.5 % ) FS typ.</td>
</tr>
<tr>
<td>Max. setting</td>
<td>( \leq \pm 1 % ) FS max.</td>
</tr>
<tr>
<td>Accuracy at min. setting</td>
<td>( \leq \pm 0.25 % ) FS typ.</td>
</tr>
<tr>
<td>(B.F.S.L)</td>
<td>( \leq \pm 0.5 % ) FS max.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>( \leq \pm 0.015 % ) FS / °C typ.</td>
</tr>
<tr>
<td>Zero point</td>
<td>( \leq \pm 0.025 % ) FS / °C max.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>( \leq \pm 0.015 % ) FS / °C typ.</td>
</tr>
<tr>
<td>Over range</td>
<td>( \leq \pm 0.025 % ) FS / °C max.</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>( \leq \pm 0.3 % ) FS max.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>( \leq \pm 0.4 % ) FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>( \leq \pm 0.1 % ) FS</td>
</tr>
<tr>
<td>Rise time</td>
<td>( \leq 1.5 ) ms</td>
</tr>
<tr>
<td>Long-term drift</td>
<td>( \leq \pm 0.3 % ) FS typ. / year</td>
</tr>
</tbody>
</table>

**Environmental conditions**

| Compensated temperature range                  | \(-20 \ldots +85^\circ\) C |
| Operating temperature range                    | \(-20 \ldots +60^\circ\) C |
| Storage temperature range                      | \(-40 \ldots +100^\circ\) C |
| Fluid temperature range1)                      | \(-40 \ldots +60^\circ\) C - \(-20 \ldots +60^\circ\) C |

**Special data for Ex applications**

| Supply voltage                                 | 12 .. 28 V |
| Max. input current                             | 100 mA     |
| Max. input power                               | 1 W        |
| Connection capacitance of the sensor           | \( \leq 22 \) nF |
| Inductance of the sensor                       | \( L = 0 \) mH |
| Insulation voltage                             | 50 V AC, with integrated overvoltage protection |

**Other data**

| Residual ripple of supply voltage              | \( \leq 5 \% \) |
| Life expectancy                                | > 10 million cycles |
| Weight                                         | 100 % FS |

Note: Reverse polarity protection of the supply voltage, excess voltage, overide and short circuit protection are provided.

- FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line
- 1) 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa
- 2) -20 °C with FPM seal, -40 °C on request
- 3) 500 V AC on request
### Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>1</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection type</td>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 3G Ex nA IIC T6 Gc</td>
</tr>
<tr>
<td></td>
<td>II 1/2G Ex ia IIC T6 Ga/Gb</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 1D Ex ia IIC T85 °C Da</td>
<td>II 3G Ex ic IIC T80 °C Db</td>
</tr>
<tr>
<td>Certificate</td>
<td>KEMA 05ATEX1016 X / KEMA 05ATEX1021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zones / Categories</td>
<td>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier</td>
<td>Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier</td>
<td>Group II Category 3G Gases Protection class: Non-sparking nA</td>
<td>Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure</td>
</tr>
<tr>
<td>(see model code)</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td></td>
</tr>
</tbody>
</table>

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIC T80/90/100° C Da T_{ex} T80/T90/T100/T110°C Da, II 2D Ex tb IIC T80/90/100°C Db and II 3D Ex tc IIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

### Pin connections:

**Binder series 714 M18**

- **Pin** HDA 44X4-A
  1. n.c.
  2. Signal +
  3. Signal -
  4. n.c.

- **Pin** HDA 44X5-A
  1. Signal +
  2. Signal -
  3. n.c.
  4. Housing

- **Pin** HDA 44X6-A
  1. Signal +
  2. n.c.
  3. Signal -
  4. n.c.

**EN175301-803 (DIN 43650)**

**Model code:**

HDA 4 4 X X – A – XXXX – A N X – 000

**Mechanical connection**

2 = G1/2 DIN 3852 (only for "1000 bar" press. range)
4 = G1/4 A DIN 3852 (male)

**Electrical connection**

4 = Male 4 pole Binder series 714 M18 (connector not supplied)
5 = Male 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
6 = Male M12x1, 4 pole (connector not supplied)

**Signal**

A = 4 .. 20 mA, 2 conductor

**Pressure ranges in bar**

0016; 0060; 0100; 0250; 0400; 0600 (only in conjunction with mechanical connection code "2")

**Approval**

A = ATEX

**Insulation voltage**

N = 50 V AC

**Protection type and applications (code)**

1 = I M1 Ex ia I Ma
   II 1G Ex ia IIC T6 Ga
   II 1/2G Ex ia IIC T6 Ga/Gb
   II 2G Ex ia IIC T6 Gb
   II 1D Ex ia IIC T85 °C Da

9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. conn. "6")

A = II 1D Ex ta IIC T80 °C T_{ex} T80/T90 °C Da (only in conjunction with electr. conn. "6")
   II 2D Ex tb IIC T80 °C Db

C = II 3G Ex ic IIC T6 Gc
   II 3D Ex ic IIC T80 °C Dc

**Modification number**

000 = Standard

**Notes:**

* For design and electrical connection see device dimensions

**Accessories:**

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
Dimensions:
Protection types and applications (code): 1, C

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
**Electronic Pressure Transmitter**

**HDA 4300**  
**ATEX Intrinsically Safe**  
**ATEX Dustproof Enclosure**  
**ATEX Non-sparking**

**Description:**
The pressure transmitter HDA 4300 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series. As with the industry model, the ATEX version HDA 4300 has a ceramic measurement cell with thick-film strain gauge. Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

**Protection types and applications:**  
I M1 Ex ia I Ma  
II 1G Ex ia IIIC T6 Ga  
II 1/2G Ex ia IIIC T6 Ga/Gb  
II 2G Ex ia IIIC T6 Gb  
II 3G Ex na IIIC T6,T5,T4 Gc  
II 3G Ex ic IIIC T6,T5,T4 Gc  
II 1D Ex ia IIIC T85 °C Da  
II 1D Ex ta IIIC T80/90/100 °C Da  
II 2D Ex tb IIIC T80/90/100 °C Db  
II 3D Ex tc IIIC T80/T90/T100 °C Dc  
II 3D Ex ic IIIC T80/T90/T100 °C Dc

**Special features:**  
- Accuracy ≤ ± 0.5 % FS typ.  
- Certificates: KEMA 05ATEX1016 X  
  KEMA 05ATEX1021  
- Output signal 4 .. 20 mA  
- Very small temperature error  
- Excellent EMC characteristics  
- Excellent durability

**Technical data:**

**Input data:**  
- Measuring ranges: -1 .. 1; 1; 2.5; 4; 6; 10; 16; 25; 40 bar  
- Overload pressures: 3; 3; 8; 12; 20; 32; 50; 80; 120 bar  
- Burst pressures: 5; 5; 12; 18; 30; 48; 75; 120; 180 bar  
- Mechanical connection: G1/4 A DIN 3852  
- Torque value: 20 Nm  
- Parts in contact with medium: Sensor: Ceramic  
  Mech. connection: 1.4301  
  Seal: FPM / EPDM

**Output data:**  
- Output signal, permitted load resistance: 4 .. 20 mA, 2 conductor  
  $R_{\text{max}} = \frac{(U_{\text{B}} - 12 \text{ V})}{20 \text{ mA}} \text{ [kΩ]}$  
- Accuracy to DIN 16086: ≤ ± 0.5 % FS typ.  
- Max. setting: ≤ ± 1 % FS max.  
- Accuracy at min. setting: ≤ ± 0.25 % FS typ.  
- Temperature compensation: ≤ ± 0.5 % FS max.  
- Zero point: ≤ ± 0.02 % FS / °C typ.  
- Temperature compensation: ≤ ± 0.03 % FS / °C max.  
- Over range: ≤ ± 0.03 % FS / °C max.  
- Non-linearity at max. setting to DIN 16086: ≤ ± 0.5 % FS max.  
- Hysteresis: ≤ ± 0.4 % FS max.  
- Repeatability: ≤ ± 0.1 % FS  
- Rise time: ≤ 1.5 ms  
- Long-term drift: ≤ ± 0.3 % FS typ. / year

**Environmental conditions:**  
- Compensated temperature range: -20 .. +85 °C  
- Operating temperature range: -20 .. +60 °C  
- Storage temperature range: -40 .. +100 °C  
- Fluid temperature range: -40 °C .. +60 °C / -20 °C .. +60 °C

**CE mark:**  
EN 61000-6-1 / 2 / 3 / 4  
EN 60079-0 / 1  
EN 50303

**Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:** ≤ 20 g

**Protection class to IEC 60529:**  
- IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18)  
- IP 67 (for M12x1, when an IP 67 connector is used)

**Relevant data for Ex applications:**  
- Ex ia, ic  
- Ex na, ta, tb, tc

**Supply voltage:**  
- U1 = 12 .. 28 V  
- T2 = 28 V

**Max. input current:**  
- I1 = 100 mA

**Max. input power:**  
- P1 = 1 W max. power consumption ≤ 1 W

**Connection capacitance of the sensor:**  
- Cc = ≤ 22 nF

**Inductance of the sensor:**  
- L1 = 0 mH

**Insulation voltage:**  
50 V AC, with integrated overvoltage protection EN 61000-6-2

**Other data:**  
- Residual ripple of supply voltage: ≤ 5 %  
- Life expectancy: > 10 million cycles  
- 0 .. 100 % FS

**Weight:**  
~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overide and short circuit protection are provided.  
FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

1) -20 °C with FPM or EPDM seal, -40 °C on request  
2) 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>Protection type</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>KEMA 05ATEX1016 X / KEMA 05ATEX1021</td>
</tr>
<tr>
<td>II 1/2G Ex ia IIC T6 Ga/Gb</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td></td>
</tr>
<tr>
<td>II 1D Ex ia IIC T85°C Da</td>
<td>II 3G Ex na IIC T6 Gc</td>
<td></td>
</tr>
<tr>
<td>II 1D Ex ia IIC T80°C T25°C Da</td>
<td>II 3G Ex ic IIC T6 Gc</td>
<td></td>
</tr>
<tr>
<td>II 2D Ex lb IIC T80°C Db</td>
<td>II 3D Ex ic IIC T80°C Dc</td>
<td></td>
</tr>
</tbody>
</table>

Zones / Categories

<table>
<thead>
<tr>
<th>Group I</th>
<th>Category M1 Mining Protection class: intrinsically safe ia with barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group II, III</td>
<td>Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier</td>
</tr>
</tbody>
</table>

Electrical Connection (see model code)

<table>
<thead>
<tr>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
</tr>
</tbody>
</table>

Mechanical connection

- 4 = G1/4 A DIN 3852 (male)

Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male, M12x1, 4 pole (connector not supplied)

Signal

- A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar

- 0001(-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

Approval

- A = ATEX

Insulation voltage

- N = 50 V AC

Protection types and applications (code)

<table>
<thead>
<tr>
<th>1</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>II 1D Ex ia IIC T80°C T25°C Da</td>
<td>II 3G Ex ic IIC T6 Gc</td>
</tr>
<tr>
<td>II 1/2G Ex ia IIC T6 Ga/Gb</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 3G Ex na IIC T6 Gc</td>
<td></td>
</tr>
<tr>
<td>II 1D Ex ia IIC T85°C Da</td>
<td>II 3G Ex ic IIC T6 Gc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II 2D Ex lb IIC T80°C Db</td>
<td>II 3D Ex ic IIC T80°C Dc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Modification number

- 000 = Standard

Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for refrigerants)

Material of connection (in contact with fluid)

- 1 = Stainless steel

Notes:

* For design and electrical connection see device dimensions

Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
Dimensions:
Protection types and applications (code): 1, C

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Protection types and applications (code): 9, A

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
Description:
The pressure transmitter HDA 4100 in ATEX version has been specially developed for use in potentially explosive atmospheres for absolute measurement in the low pressure range and is based on the HDA 4000 series.

As with the industry model, the ATEX version HDA 4100 has a ceramic measurement cell with thick-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications:
I M1 Ex ia I Ma
II 1G Ex ia IIC T6 Ga
II 1/2G Ex ia IIC T6 Ga/Gb
II 2G Ex ia IIC T6 Gb
II 3G Ex na IIC T6, T5, T4 Gc
II 3G Ex ic IIC T6, T5, T4 Gc
II 1D Ex ia IIIc T85 °C Da
II 1D Ex ta IIIc T80/90/100 °C Da
T90/T100/T110 °C Da
II 2D Ex tb IIIc T80/90/100 °C Db
II 3D Ex tc IIIc T80/T90/T100 °C Dc
II 3D Ex ic IIIc T80/T90/T100 °C Dc

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Certificates: KEMA 05ATEX1016 X
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:
- Measuring ranges: 1, 2.5 bar
- Overload pressures: 3, 8 bar
- Burst pressures: 5, 12 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Sensor: Ceramic
- Mech. connection: 1.4301
- Seal: FPM / EPDM

Output data:
- Output signal, permitted load resistance: 4 .. 20 mA, 2 conductor
- Accuracy to DIN 16086, ≤ ± 0.5 % FS typ.
- Max. setting, ≤ ± 1 % FS max.
- Temperature compensation at min. setting (B.F.S.L.), ≤ ± 0.02 % FS typ.
- Temperature compensation, ≤ ± 0.05 % FS max.
- Max. setting, ≤ ± 0.5 % FS max.
- Over range, ≤ ± 0.02 % FS / °C typ.
- Non-linearity at max. setting, ≤ ± 0.03 % FS / °C max.
- Temperature compensation, ≤ ± 0.02 % FS / °C typ.
- Max. setting, ≤ ± 0.03 % FS / °C max.
- Temperature compensation, ≤ ± 0.02 % FS / °C typ.
- Max. setting, ≤ ± 0.5 % FS max.
- Hysteresis, ≤ ± 0.4 % FS max.
- Repeatability, ≤ ± 0.1 % FS
- Rise time, ≤ 1.5 ms
- Long-term drift, ≤ ± 0.3 % FS typ. / year

Environmental conditions:
- Compensated temperature range: -20 .. +85 °C
- Operating temperature range: -20 .. +60 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 °C .. +60 °C / -20 °C .. +60 °C

Marking:
- EN 61000-6-1 / 2 / 3 / 4
- EN 60079-0 / 1
- EN 50303

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
- ≤ 20 g

Protection class to IEC 60529:
- IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18)
- IP 67 (for M12x1, when an IP 67 connector is used)

Supply voltage:
- Uᵢ = 12 .. 28 V
- Max. input current: II ≤ 100 mA
- Max. input power: Pᵢ ≤ 1 W

Connection capacitance of the sensor:
- Cᵣ ≤ 22 nF

Inductance of the sensor:
- Lᵣ ≤ 0 mH

Insulation voltage:
- 50 V AC, with integrated overvoltage protection EN 61000-6-2

Relevant data for Ex applications:

<table>
<thead>
<tr>
<th>Ex ia, ic</th>
<th>Ex na, ta, tb, tc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage: Uᵢ = 12 .. 28 V</td>
<td>T2, 28 V</td>
</tr>
<tr>
<td>Max. input current: II ≤ 100 mA</td>
<td></td>
</tr>
<tr>
<td>Max. input power: Pᵢ ≤ 1 W</td>
<td>max. power consumption ≤ 1 W</td>
</tr>
</tbody>
</table>

Connection capacitance of the sensor:
- Cᵣ ≤ 22 nF

Inductance of the sensor:
- Lᵣ ≤ 0 mH

Insulation voltage:
- 50 V AC, with integrated overvoltage protection EN 61000-6-2

Other data:
- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: ~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overide and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line
1) -20 °C with FPM or EPDM seal, -40 °C on request
2) 500 V AC on request
### Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>1</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection type</td>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>II 3G Ex na IIC T6 Gc</td>
<td>II 3G Ex ic IIC T6 Gc</td>
</tr>
<tr>
<td></td>
<td>II 1/2G Ex ia IIC T6 Ga/Gb</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 1D Ex ia IIC T85°C Da</td>
<td>II 3D Ex ic IIC T80°C Da</td>
</tr>
<tr>
<td>Certificate</td>
<td>KEMA 05ATEX1016 X / KEMA 05ATEX1021</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zones / Categories</th>
<th>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier</th>
<th>Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier</th>
<th>Group II Category 2G Gases Protection class: intrinsically safe ia with barrier</th>
<th>Group III Category 3G Conductive dust Protection class: Dustproof enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
</tr>
</tbody>
</table>

Pin connections:

**Binder series 714 M18**

- **Pin HDA 4144-A**
  - 1 n.c.
  - 2 Signal +
  - 3 Signal -
  - 4 n.c.

- **EN175301-803 (DIN 43650)**
  - Pin HDA 4144-A
  - 1 n.c.
  - 2 Signal +
  - 3 Signal -
  - 4 n.c.

**Pin HDA 4145-A**

- 1 Signal +
- 2 Signal -
- 3 n.c.
- Housing

**M12x1**

- **Pin HDA 4146-A**
  - 1 Signal +
  - 2 n.c.
  - 3 Signal -
  - 4 n.c.

### Model code:

- **HDA 4 1 4 X – A – XXXX – A N X – 000 – X 1**

#### Mechanical connection

4 = G1/4 A DIN 3852 (male)

#### Electrical connection

4 = Male, 4 pole Binder series 714 M18 (connector not supplied)

5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)

6 = Male, M12x1, 4 pole (connector not supplied)

#### Signal

A = 4 .. 20 mA, 2 conductor

#### Pressure ranges in bar

01.0; 02.5

#### Approval

A = ATEX

#### Insulation voltage

N = 50 V AC

#### Protection types and applications (code)

1 = I M1 Ex ia I Ma

II 1G Ex ia IIC T6 Ga

II 1/2G Ex ia IIC T6 Ga/Gb

II 2G Ex ia IIC T6 Gb

II 1D Ex ia IIC T85 °C Da

II 3G Ex na IIC T6 Gc (only in conjunction with electr. connection "6") *

A = II 1D Ex ia IIC T80 °C T70/90 °C Da (only in conjunction with electr. connection "6")

II 1D Ex ia IIC T80 °C Da

II 2D Ex ib IIC T80 °C Db

C = II 3G Ex ic IIC T6 Gc

II 3D Ex ic IIC T80 °C Dc

#### Modification number

000 = Standard

#### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

#### Material of connection (in contact with fluid)

1 = Stainless steel

#### Notes:

* For design and electrical connection see device dimensions

#### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

**Dimensions:**

Protection types and applications (code): 1, C

![Diagram of dimensions and applications](image)

Protection types and applications (code): 9, A

![Diagram of dimensions and applications](image)

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243
Description:
The programmable pressure switch EDS 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series. The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge for measuring relative pressure in the high pressure range.

With approval for the following Protection types and applications:

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>Equipment Class</th>
<th>Max. Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>I M1 Ex ia I</td>
<td></td>
<td>T100°C</td>
</tr>
<tr>
<td>II 1G Ex ia IIC T4, T5, T6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II 1/2G Ex ia IIC T4, T5, T6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II 1 D Ex iaD 20 T100°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available upon request.

Special features:

- Switching point and switch-back point are user-programmable
- Accuracy ≤ ± 1 % FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:

- Measuring ranges: 60; 100; 250; 400; 600 bar
- Overload pressures: 120; 200; 500; 800; 1000 bar
- Burst pressure: 300; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
- Seal: FPM

Output data:

- Switch output: 1 x PNP N/C or N/O
- Output load: during operation: I_{max} ≤ 34 mA
- Switching points: user-programmable with HYDAC Programming Unit HPG 3000
- Accuracy to DIN 16086:
  - ≤ ± 0.5 % FS typ.
  - ≤ ± 1 % FS max.
- Repeatability (at 25 °C):
  - ≤ ± 0.1 % FS max.
- Temperature drift:
  - ≤ ± 0.03 % FS / °C max. zero point
  - ≤ ± 0.03 % FS / °C max. range
- Rising switch point and falling switch point delay: 8 ms to 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000
- Long-term drift:
  - ≤ ± 0.3 % FS typ./year

Environmental conditions:

- Storage temperature range: -40 ... +100 °C
- Fluid temperature range: -20 ... +60 °C / +70 °C / +85 °C
- Vibration resistance to DIN EN 60068-2-6: ≤ 20 g
- Protection class to IEC 60529: IP 67 (M12x1, when an IP 67 connector is used)

Relevant data for Ex applications:

- Supply voltage: I M1: 14 ... 28 V DC
  - II 1G: 14 ... 28 V DC
  - II 2G: 14 ... 28 V DC
  - II 1 D: 14 ... 28 V DC
- Compensated temperature range:
  - T6: -20 ... +60 °C
  - T5, T4: -20 ... +70 °C
  - T100: -20 ... +70 °C
- Operating temperature range:
  - T6: -20 ... +60 °C
  - T5, T4: -20 ... +70 °C
  - T100: -20 ... +70 °C
- Max. ambient temperature T_a:
  - T6: +60 °C
  - T5, T4: +70 °C
  - T100: +70 °C
- Max. input current: 100 mA
- Max. input power: 0.7 W
- Max. internal capacitance: 33 nF
- Max. internal inductance: 0 mH
- Insulation voltage: 50 V AC, with integrated overvoltage protection EN 61000-6-2
- Approved intrinsic safety barriers: Peppel & Fuchs: Z 787 Telematic Ex STOCK: MTL 7087

Other data:

- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: ~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. FS (Full Scale) = relative to the complete measuring range

1) 500 V AC on request
Setting options:
In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switch outputs:
Measuring range in bar | Increment in bar
---|---
0 .. 60 | 0.1
0 .. 100 | 0.2
0 .. 250 | 0.5
0 .. 400 | 1
0 .. 600 | 1

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

Pin connections:
M12x1, 5 pole

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Process connection</th>
<th>HPG connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_B</td>
<td>+U_A</td>
</tr>
<tr>
<td>2</td>
<td>0 V</td>
<td>Comport 1 *</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>Out 1</td>
<td>n.c.</td>
</tr>
<tr>
<td>5</td>
<td>0 V</td>
<td>Comport 2 *</td>
</tr>
</tbody>
</table>

* Comport = programming connection

Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection Type</td>
<td>I M1 Ex ia I</td>
<td>II 1G Ex ia IIC T4, T5, T6</td>
<td>II 2G Ex ia IIC T4, T5, T6</td>
<td>II 1D Ex iaD 20 T100 °C</td>
</tr>
<tr>
<td>Zones / Categories</td>
<td>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier For use in Zone 0</td>
<td>Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2</td>
<td>Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0, 1/2G For mounting to Zone 0</td>
<td>Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zones 20, 21, 22 For mounting to Zone 20 T100: T_a = 70 °C</td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

Model code:

EDS 4 4 4 8 – XXXX – P – A N X – 000

Mechanical connection
4 = G1/4 A DIN 3852 (male)

Electrical connection
8 = Male M12x1, 5 pole (connector not supplied)

Pressure ranges in bar
0060; 0100; 0250; 0400; 0600

Switching output
P = Programmable

Approval
A = ATEX

Insulation voltage
N = 50 V AC

Protection types and applications (sede)
1 = I M1 Ex ia I
2 = II 1G Ex ia IIC T4, T5, T6
3 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6
8 = II 1D Ex iaD 20 T100 °C

Modification number
000 = Standard

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
Safety instructions:

- These units must only be programmed outside the potentially explosive location.
- When operating in potentially explosive locations, the programming cables may only be connected to the 0 V outside of the potentially explosive area.
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- The dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:

Programming Unit:
(must be ordered separately)

HPG 3000 – 000
Portable Programming Unit
Part. No. 909 422

Caution:
The HPG 3000 Programming Unit may only be used outside the potentially explosive area.
Electronic Pressure Switch
EDS 4300 Programmable
ATEX Intrinsically Safe

Description:
The programmable pressure switch EDS 4300 in ATEX version was specially developed for use in potentially explosive atmospheres and is based on the EDS 4000 series. The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4300 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

With approval for the following Protection types and applications:
- I M1 Ex ia I
- II 1G Ex ia IIC T4, T5, T6
- II 1/2G Ex ia IIC T4, T5, T6
- II 2G Ex ia IIC T4, T5, T6
- II 1 D Ex iaD 20 T100 °C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available on request.

Special features:
- Switching point and switch-back point user-programmable
- Accuracy ≤ ±1 % FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:
Measuring ranges: 1: 2; 5; 4; 6; 10; 16; 25; 40 bar
Overload pressures: 3: 8; 12; 20; 32; 50; 80; 120 bar
Burst pressures: 5; 12; 18; 30; 48; 75; 120; 180 bar
Mechanical connection: G1/4 A DIN 3852
Torque value: 20 Nm

Parts in contact with medium:
Sensor: Ceramic
Mech. connection: FPM / EPDM

Output data:
Switch output: 1 x PNP N/C or N/O
Output load: during operation: I_{max} ≤ 34 mA
Switching outputs: user-programmable with HYDAC Programming Unit HPG 3000
Accuracy to DIN 16086: ≤ ± 0.5 % FS typ.
Max. setting: ≤ ± 1 % FS max.
Repeatability (at 25 °C): ≤ ± 0.1 % FS max.
Temperature drift: ≤ ± 0.03 % FS / °C max. zero point
≤ ± 0.03 % FS / °C max. range
Rising switch point and falling switch point delay: 8 ms to 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000

Long-term drift: ≤ ± 0.3 % FS typ. / year

Environmental conditions:
Storage temperature range: -40 .. +100 °C
Fluid temperature range: -20 .. +60 °C / +70 °C / +85 °C

Mark:
- EN 61000-6-1 / 2 / 3 / 4
- EN 60079-0 / 1 1 / 26
- EN 61241-0 / 1
- EN 50303

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
Protection class to IEC 60529: IP 67
(M12x1, when an IP 67 connector is used)

Relevant data for Ex applications:

Supply voltage:
- I M1 14 .. 28 V DC
- II 1G, 1/2G 10 .. 28 V DC
- II 2G 10 .. 28 V DC
- II 1 D 10 .. 28 V DC
- 93 mA

Compensated temperature range:
- T5: -20 .. +60 °C
- T6: -20 .. +60 °C

Operating temperature range:
- T5: -20 .. +70 °C
- T6: -20 .. +70 °C
- T100: -20 .. +70 °C

Max. ambient temperature T_{a}:
- T6: +60 °C
- T5: +70 °C
- T100: +70 °C

Max. input current:
- T5, T4: 200 mA
- T6: 300 mA

Max. input power:
- T5, T4: 0.7 W
- T6: 0.9 W

Max. internal capacitance:
- T5, T4: 33 nF
- T6: 33 nF

Max. internal inductance:
- T5, T4: 0 mH
- T6: 0 mH

Insulation voltage:
- 50 V AC, with integrated overvoltage protection EN 61000-6-2

Approved intrinsic safety barriers:
- Pepperl & Fuchs: Z 787
- Telematic Ex STOCK: MTL 7087

Other data:
Residual ripple of supply voltage: ≤ 5 %
Life expectancy: > 10 million cycles
0 .. 100 % FS

Weight: ~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. FS (Full Scale) = relative to the full measuring range

1) 500 V AC on request
### Setting options:
In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

### Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Increment in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 .. 1</td>
<td>0.002</td>
</tr>
<tr>
<td>0 .. 2.5</td>
<td>0.005</td>
</tr>
<tr>
<td>0 .. 4</td>
<td>0.01</td>
</tr>
<tr>
<td>0 .. 6</td>
<td>0.01</td>
</tr>
<tr>
<td>0 .. 10</td>
<td>0.02</td>
</tr>
<tr>
<td>0 .. 16</td>
<td>0.05</td>
</tr>
<tr>
<td>0 .. 25</td>
<td>0.1</td>
</tr>
<tr>
<td>0 .. 40</td>
<td>0.1</td>
</tr>
</tbody>
</table>

The switch point (upper switch value) on all instruments is between 5% and 100% of the measuring range and the switch-back point (lower switch value) is between 1% and 96% of the measuring range.

<table>
<thead>
<tr>
<th>Minimum value in ms</th>
<th>Maximum value in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch-on delay</td>
<td>8</td>
</tr>
<tr>
<td>Ton1/Ton2</td>
<td>2040</td>
</tr>
<tr>
<td>Switch-off delay</td>
<td>8</td>
</tr>
<tr>
<td>ToF1/ToF2</td>
<td>2040</td>
</tr>
</tbody>
</table>

The increment for all instruments is 8 ms.

### Pin connections:

- **M12x1, 5 pole**

### Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection Type</strong></td>
<td>I M1 Ex ia I</td>
<td>II 1G Ex ia IIC T4, T5, T6</td>
<td>II 2G Ex ia IIC T4, T5, T6</td>
<td>II 1D Ex iaD 20 T100 °C</td>
</tr>
<tr>
<td><strong>Certificate</strong></td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
</tr>
<tr>
<td><strong>Zones / Categories</strong></td>
<td>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier For use in Zone 0 T4, T5: T = 70 °C T6: T = 60 °C</td>
<td>Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0 T4, T5: T = 70 °C T6: T = 60 °C</td>
<td>Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1 T4, T5: T = 70 °C</td>
<td>Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20 T100: T = 70 °C</td>
</tr>
<tr>
<td><strong>Electrical Connection</strong></td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

### Model code:

**EDS 4 3 4 8 – XXXX – P – A N X – 000 – X 1**

- **Mechanical connection**
  - 4 = G1/4 A DIN 3852 (male)
- **Electrical connection**
  - 8 = Male M12x1; 5 pole (connector not supplied)
- **Pressure ranges in bar**
  - 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040
- **Switching output**
  - P = Programmable
- **Approval**
  - A = ATEX
- **Insulation voltage**
  - N = 50 V AC
- **Protection types and applications**
  - 1 = I M1 Ex ia I
  - 2 = II 1G Ex ia IIC T4, T5, T6
  - 3 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6
  - 8 = II 1D Ex iaD 20 T100 °C
- **Modification number**
  - 000 = Standard
- **Seal material** (in contact with fluid)
  - F = FPM seal (e.g.: for hydraulic oils)
  - E = EPDM seal (e.g.: for refrigerants)
- **Material of connection** (in contact with fluid)
  - 1 = Stainless steel

### Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
**Safety instructions:**

- These units must only be programmed outside the potentially explosive location.
- When operating in potentially explosive locations, the programming cables may only be connected to the 0 V outside of the potentially explosive area.
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

**Dimensions:**

**Programming Unit:**
(must be ordered separately)

HPG 3000 – 000
Portable Programming Unit
Part. No. 909 422

**Caution:**
The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Pressure Switch
EDS 4100 Programmable
ATEX Intrinsically Safe

Description:
The programmable pressure switch EDS 4100 in ATEX version has
been specially developed for use in potentially explosive atmospheres and
is based on the EDS 4000 series.
The switching point and switch-back point, the function of the switching outputs as N/C or N/O
and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.
As with the industry model, the programmable EDS 4100 in ATEX
version has a ceramic measurement cell with thick-film strain gauge for
measuring absolute pressure in the low pressure range.

With approval for the following
Protection types and applications:

- I M1
- II 1G
- II 1/2G
- II 2G
- II 1 D

almost all requirements are covered regarding ignition group, error class
and temperature class.

Versions for other Protection types
and applications are available on
request.

Special features:
- Switching point and switch-back point user-programmable
- Accuracy ≤ ± 1 % FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:
- Measuring ranges: 1; 2.5 bar
- Overload pressures: 3; 8 bar
- Burst pressures: 5; 12 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm

Output data:
- Switch output: 1 x PNP N/C or N/O
- Output load during operation: I ≤ 34 mA
- Switching points: user-programmable with HYDAC Programming Unit HPG 3000
- Accuracy to DIN 16086, ≤ ± 0.5 % FS typ.
- Max. setting ≤ ± 2 % FS max.
- Repeatability (at 25 °C) ≤ ± 0.1 % FS max.
- Temperature drift ≤ ± 0.03 % FS / °C max. zero point
- Rising switch point and falling switch point delay: 8 ms to 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000
- Long-term drift ≤ ± 0.3 % FS typ. / year

Environmental conditions:
- Storage temperature range: -40 ... +100 °C
- Fluid temperature range:
  - -20 ... +60 °C / +70 °C / +85 °C
  - EN 60068-2-26 at 10 ... 500 Hz
- Protection class to IEC 60529:
  - IP 67 (M12x1, when an IP 67 connector is used)

Relevant data for Ex applications:
- Supply voltage: 14 ... 28 V DC
- Compensated temperature range:
  - T6: -20 ... +60 °C
  - T5, T4: -20 ... +70 °C
  - T100: -20 ... +70 °C
- Operating temperature range:
  - T6: -20 ... +60 °C
  - T5, T4: -20 ... +70 °C
  - T100: -20 ... +70 °C
- Max. ambient temperature Ta:
  - T6: +60 °C
  - T5, T4: +70 °C
  - T100: +70 °C
- Max. input current: 100 mA
- Max. input power: 0.7 W
- Max. internal capacitance:
  - 33 nF
- Max. internal inductance:
  - 0 mH
- Insulation voltage 1)
  - 50 V AC, with integrated overvoltage protection EN 61000-6-2
- Approved intrinsic safety barriers:
  - Pepperl & Fuchs: Z 787
  - Telematic Ex STOCK: MTL 7087

Other data:
- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: ~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override
and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range
1) 500 V AC on request
Setting options:
In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switch outputs:
Measuring range in bar | Increment in bar
--- | ---
0 .. 1 | 0.002
0 .. 2.5 | 0.005

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

<table>
<thead>
<tr>
<th>Switch-on delay</th>
<th>Switch-off delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ton1/Ton2</td>
<td>8</td>
</tr>
<tr>
<td>ToF1/ToF2</td>
<td>8</td>
</tr>
</tbody>
</table>

The increment for all instruments is 8 ms.

Pin connections:
- **M12x1, 5 pole**
- **Pin** | **Process connection** | **HPG connection**
--- | --- | ---
1 | +Ua | +Ua
2 | 0 V | Comport 1 *
3 | 0 V | 0 V
4 | Out 1 | n.c.
5 | 0 V | Comport 2 *

* Comport = programming connection

Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>Protection Type</th>
<th>Certificate</th>
<th>Zones / Categories</th>
<th>Electrical Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I M1 Ex ia I</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>Group I, Category M1 Mining Protection class: intrinsically safe ia with barrier</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>II 1G Ex ia IIC T4, T5, T6</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>Group II, Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0 T4, T5: T_α = 70 °C T6: T_α = 60 °C</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>II 2G Ex ia IIC T4, T5, T6</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>Group II, Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0 T4, T5: T_α = 70 °C T6: T_α = 60 °C</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>II 1D Ex iaD 20 T100 °C</td>
<td>DEKRA EXAM BVS 07 ATEX E 041 X</td>
<td>Group II, Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20 T100: T_α = 70 °C</td>
<td>8</td>
</tr>
</tbody>
</table>

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

Model code:
- **EDS 4 1 4 8 – XXXX – P – A N X – 000 – X 1**

- **Mechanical connection**
  - 4 = G1/4 A DIN 3852 (male)

- **Electrical connection**
  - 8 = Male M12x1, 5 pole (connector not supplied)

- **Pressure ranges in bar**
  - 01.0; 02.5

- **Switching output**
  - P = Programmable

- **Approval**
  - A = ATEX

- **Insulation voltage**
  - N = 50 V AC

- **Protection types and applications (code)**
  - 1 = I M1 Ex ia I
  - 2 = II 1G Ex ia IIC T4, T5, T6
  - 3 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6
  - 8 = II 1D Ex iaD 20 T100 °C

- **Modification number**
  - 000 = Standard

- **Seal material** (in contact with fluid)
  - F = FPM seal (e.g.: for hydraulic oils)
  - E = EPDM seal (e.g.: for refrigerants)

- **Material of connection** (in contact with fluid)
  - 1 = Stainless steel

**Accessories:**
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
**Safety instructions:**
- These units must only be programmed outside the potentially explosive location.
- When operating in potentially explosive locations, the programming cables may only be connected to the 0 V outside of the potentially explosive area.
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

**Dimensions:**

![Diagram of Dimensions]

**Programming Unit:**
(must be ordered separately)

**HPG 3000 – 000**
Portable Programming Unit
Part. No. 909 422

**Caution:**
The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The pressure transmitter HDA 4700 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series. As with the industry model, the HDA 4700 in CSA version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
Intrinsically safe:
- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Class I, II, III Div. 1 Group A, B, C, D, E, F, G T6 [C, US]

Non incendive:
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 AEx nL IIC T4 [C]
- Class I Zone 2 AEx nA II T4 [US]
- Class I Zone 2 AEx nA II T4 [C]

Special features:
- Accuracy \( \leq 0.25 \% \) FS typ.
- Certificate: CSA 1760344
- Output signal 4 . . 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:
- Measuring ranges: -0.1 .. 9; 16; 60; 100; 250; 400; 600; 1000 bar
- Overload pressures: 20; 32; 120; 200; 500; 800; 1000; 1600 bar
- Burst pressures: 200; 200; 300; 500; 1000; 2000; 3000 bar
- Mechanical connection: G1/4 A DIN 3852, G1/2 DIN 3852
- Torque value: 20 Nm; 40 Nm
- Parts in contact with medium: Stainless steel
- Seal: FPM

Output data:
- Output signal, permitted load resistance 4 . . 20 mA, 2 conductor
- Accuracy to DIN 16086 \( \leq 0.25 \% \) FS typ.
- Max. setting \( \leq \pm 0.5 \% \) FS max.
- Non-linearity at max. setting \( \leq 0.3 \% \) FS max.
- Non-linearity at min. setting \( \leq \pm 0.15 \% \) FS typ.
- Accuracy at min. setting \( \leq \pm 0.008 \% \) FS / °C typ.
- Temperature compensation \( \leq \pm 0.008 \% \) FS / °C max.
- Zero point \( \leq \pm 0.015 \% \) FS / °C max.
- Over range \( \leq \pm 0.015 \% \) FS / °C max.
- Hysteresis \( \leq \pm 0.1 \% \) FS max.
- Repeatability \( \leq \pm 0.05 \% \) FS
- Rise time \( \leq 1.5 \) ms
- Long-term drift \( \leq \pm 0.1 \% \) FS typ. / year

Environmental conditions:
- Compensated temperature range Intrinsically safe: \(-20 \ldots +60 \) °C
- Non incendive: \(-20 \ldots +85 \) °C
- Operating temperature range Intrinsically safe: \(-40 \ldots +60 \) °C / \(-20 \ldots +85 \) °C
- Storage temperature range \(-40 \ldots +100 \) °C
- Fluid temperature range Intrinsically safe: \(-40 \ldots +60 \) °C / \(-20 \ldots +85 \) °C
- Fluid temperature range Non incendive: \(-40 \ldots +85 \) °C / \(-20 \ldots +85 \) °C

Certification:
- Certificate No.: CSA 1760344

Relevant data for Ex applications:
- Supply voltage 12 . . 28 V DC
- Max. input current 100 mA
- Max. input power up to 28 V ; 1 W
- Connection capacitance of the sensor \( \leq 22 \) nF
- Inductance of the sensor 0 mH
- Insulation voltage \( 50 \) V AC, with integrated overvoltage protection EN 61000-6-2

Other data:
- Residual ripple of supply voltage \( \leq 5 \% \)
- Life expectancy > 10 million cycles 0 . . 100 \% FS
- Weight ~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line
1) psi pressure ranges on request
2) 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa.
3) \(-20 \) °C with FPM seal, \(-40 \) °C on request
4) 500 V AC on request
Pin connections:

Conduit (single cores)

Core HDA 47X9-A
green Signal +
white Signal -
green-yellow Housing

EN175301-803 (DIN 43650)

Control

Pin HDA 47X5-A HDA 47XA-A
1 Signal + Signal +
2 Signal - Signal -
3 n.c. n.c.
↓ Housing Housing

Areas of application:

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<tr>
<th>Group</th>
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<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection Type</td>
<td>Intrinsically safe Gases and dusts</td>
<td>Intrinsically safe Gases</td>
<td>Non incendive (with field cabling) Gases</td>
<td>Non incendive Gases and dusts</td>
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<tr>
<td>Certificate</td>
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<td>CSA 1760344</td>
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</tr>
<tr>
<td>Electrical Connection</td>
<td>9, A</td>
<td>5, 9, A</td>
<td>5, 9, A</td>
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<tr>
<td>Code for Model Code</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Model code:

HDA 4 7 X X – A – XXXX – C N X – 000 (2m)

Mechanical connection
2 = G1/2 DIN 3852
(only for pressure range *1000 bar*)
4 = G1/4 A DIN 3852 (male)

Electrical connection
5 = Male, 3 pole + PE EN175301-803 (DIN 43650)
(connector supplied)
9 = Conduit connection thread
(1/2-14 NPT, male)
A = Male, EN175301-803
(DIN 43650), 3 pole + PE
(1/2" conduit female thread)

Signal
A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar
0000 (-1..9); 0016; 0060; 0100; 0250; 0400; 0600
1000 (only in conjunction with mechanical connection code "2")

Approval
C = CSA

Insulation voltage
N = 50 V AC

Protection types and applications (code)
A = Group 1
B = Group 2 and 3
C = Group 4

Modification number
000 = Standard

Cable length in m (only for electr. connection type 9)
Standard = 2 m

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The pressure transmitter HDA 4400 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4400 in CSA version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

**Protection types and applications:**

**Intrinsically safe:**
- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]

**Non incendive:**
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 Ex nL IIC T4 [C]
- Class I Zone 2 AEx nA II T4 [US]
- Class I Zone 2 Ex nA II T4 [C]

**Technical data:**

**Input data**

- Measuring ranges 1)
  - 16; 60; 100; 250; 400; 600; 1000 bar
- Overload pressures
  - 32; 120; 200; 500; 800; 900; 1000 bar
- Burst pressures
  - 200; 300; 500; 1000; 2000; 3000 bar
- Mechanical connection 1)
  - G1/2 A DIN 3852
  - G1/4 A DIN 3852
- Torque value
  - 45 Nm; 20 Nm
- Parts in contact with medium 2)
  - Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
  - Seal: FPM

**Output data**

- Output signal, permitted load resistance
  - 4 .. 20 mA, 2 conductor
  - R_Lmax = (U_B - 12 V) / 20 mA [kΩ]
- Accuracy to DIN 16086,
  - ≤ ± 0.5 % FS typ.
- Max. setting
  - ≤ ± 1 % FS max.
- Temperature compensation
  - ≤ ± 0.015 % FS / °C typ.
- Non-linearity at max. setting
  - ≤ ± 0.3 % FS max.
- Hysteresis
  - ≤ ± 0.4 % FS max.
- Repeatability
  - ≤ ± 0.1 % FS
- Rise time
  - ≤ 1.5 ms

**Environmental conditions**

- Compensated temperature range
  - Intrinsically safe: -20 .. +60 °C
  - Non incendive: -20 .. +85 °C
- Operating temperature range
  - Intrinsically safe: -20 .. +60 °C
  - Non incendive: -20 .. +85 °C
- Storage temperature range
  - -40 .. +100 °C
- Fluid temperature range 3)
  - Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C
  - Non incendive: -40 .. +85 °C / -20 .. +85 °C

**Other data**

- Residual ripple of supply voltage
  - ≤ 5 %
- Life expectancy
  - > 10 million cycles
- Weight
  - ~ 150 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

1) 1000 bar only with mechanical connection G ½” DIN 3852 and vice versa
2) Other seal materials available on request
3) -20 °C with FPM seal, -40 °C on request
4) 500 V AC on request
### Pin connections:
- Conduit (single cores)

### Core
- Green: Signal +
- White: Signal -
- Green-yellow: Housing

### EN175301-803 (DIN 43650)

### Areas of application:

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<tr>
<td>Protection Type</td>
<td>Intrinsically safe Gases and dusts</td>
<td>Intrinsically safe Gases</td>
<td>Non incendive (with field cabling) Gases</td>
<td>Non incendive Gases and dusts</td>
</tr>
<tr>
<td>Certificate</td>
<td></td>
<td></td>
<td>CSA 1760344</td>
<td></td>
</tr>
<tr>
<td>Zones / Categories</td>
<td>Intrinsically safe</td>
<td>Intrinsically safe Ex ia IIC T6</td>
<td>Non incendive</td>
<td>Non incendive</td>
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<tr>
<td></td>
<td>- Class I, II, III - Group A, B, C, D, E, F, G T6</td>
<td>- Class I - Zone 0 - AEx ia IIC T6</td>
<td>- Class I - Division 2 - Group A, B, C, D T4A</td>
<td>- Class I - Zone 2 - AEx nL IIC T4</td>
</tr>
<tr>
<td></td>
<td>- Class I - Division I - Group A, B, C, D T6</td>
<td>- Class I - Zone 2 - AEx nL IIC T4</td>
<td>- Class I - Zone 2 - Ex nL IIC T4</td>
<td>- Class I - Zone 2 - AEx nA II T4</td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>9, A</td>
<td>5, 9, A</td>
<td>5, 9, A</td>
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</tr>
<tr>
<td>Code for Model Code</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

### Model code:

**HDA 4 4 X X – A – XXXX – C N X – 000 (2m)**

**Mechanical connection**
- 2 = G1/2 DIN 3852
  - (only for pressure range "1000 bar")
- 4 = G1/4 A DIN 3852 (male)

**Electrical connection**
- 5 = Male, 3 pole + PE, EN175301-803 (DIN 43650)
  - (connector supplied)
- 9 = Conduit connection thread
  - (1/2-14 NPT, male)
- A = Male, EN175301-803 (DIN 43650), 3 pole + PE
  - (1/2" conduit female thread)

**Signal**
- A = 4.. 20 mA, 2 conductor

**Pressure ranges in bar**
- 0016; 0060; 0100; 0250; 0400; 0600
- 1000 (only in conjunction with mechanical connection code "2")

**Approval**
- C = CSA

**Insulation voltage**
- N = 50 V AC

**Protection types and applications (code)**
- A = Group 1
- B = Group 2 and 3
- C = Group 4

**Modification number**
- 000 = Standard

**Cable length in m**
- (only for electr. connection code 9) Standard = 2 m

**Accessories:**
- Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Pressure Transmitter
HDA 4300
CSA Intrinsically safe
CSA Non Incendive

Description:
The pressure transmitter HDA 4300 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4300 in CSA version has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
Intrinsically safe:
- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Class I, II, III Div. 2 Group A, B, C, D, E, F, G T6 [C, US]

Non incendive:
- Class I Zone 2 AEx nL IIC T4 [US]

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Certificate: CSA 1760344
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:
- Measuring ranges:\[1)\] -1 .. 1; 1; 2.5; 4; 6; 10; 16; 25; 40 bar
- Overload pressures: 3; 3; 8; 12; 20; 32; 50; 80; 120 bar
- Burst pressures: 5; 5; 12; 18; 30; 48; 75; 120; 180 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium:
  - Sensor: Ceramic Al203
  - Mechan. conn.: 1.4301
  - Seal: FPM / EPDM

Output data:
- Output signal, permitted load resistance:
  \[ R_{L\text{max}} = \frac{(U_B - 12 \text{ V})}{20 \text{ mA}} \text{ [k}\Omega\text{] } \]
- Accuracy to DIN 16086, ≤ ± 0.5 % FS typ.
- Max. setting, ≤ ± 1.0 % FS max.
- Accuracy at min. setting, ≤ ± 0.25 % FS typ.
- Temperature compensation, ≤ ± 0.02 % FS / °C typ.
- Zero point, ≤ ± 0.03 % FS / °C max.
- Temperature compensation, ≤ ± 0.02 % FS / °C max.
- Over range, ≤ ± 0.03 % FS / °C max.
- Non-linearity at max. setting, ≤ ± 0.5 % FS max.
- Hysteresis, ≤ ± 0.4 % FS max.
- Repeatability, ≤ ± 0.1 % FS
- Rise time, ≤ 1.5 ms
- Long-term drift, ≤ ± 0.3 % FS typ. / year

Environmental conditions:
- Compensated temperature range:
  - Intrinsically safe: -20 .. +60 °C
  - Non incendive: -20 .. +85 °C

- Operating temperature range:
  - Intrinsically safe: -20 .. +60 °C
  - Non incendive: -20 .. +85 °C

- Storage temperature range:
  - -40 .. +100 °C

- Fluid temperature range:\[2)\]
  - Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C
  - Non incendive: -40 .. +85 °C / -20 .. +85 °C

Other data:
- Residual ripple of supply voltage, ≤ 5 %
- Life expectancy, > 10 million cycles
- Weight, ~ 180 g

Note:
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

1) psi pressure ranges on request
2) -20 °C with FPM or EPDM seal, -40° on request
3) 500 V AC on request
Pin connections:
Conduit (single cores)

Core: HDA 43X9-A
  green: Signal +
  white: Signal -
  green-yellow: Housing

EN175301-803 (DIN 43650)

Areas of application:

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<th>3</th>
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<tbody>
<tr>
<td>Protection Type</td>
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<td>Gases and dusts</td>
<td>Gases</td>
<td>(with field cabling)</td>
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<td>- Division 2</td>
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<td>A, B, C, D</td>
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<tr>
<td>Electrical Connection</td>
<td>9, A</td>
<td>5, 9, A</td>
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</tr>
<tr>
<td>Code for Model Code</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Model code:

HDA 4 3 X – A – XXXX – C N X – 000 – X1 (2m)

Mechanical connection
4 = G1/4 A DIN 3852 (male)
Electrical connection
5 = Male, 3 pole+ PE, EN175301-803 (DIN 43650) (connector supplied)
9 = Conduit connection thread (1/2”-14 NPT, male)
A = Male, EN175301-803 (DIN 43650), 3 pole + PE (1/2” conduit female thread)

Signal
A = 4..20 mA, 2 conductor
Pressure ranges in bar
0001(-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

Approval
C = CSA
Insulation voltage
N = 50 V AC

Protection types and applications (code)
A = Group 1
B = Group 2 and 3
C = Group 4

Modification number
000 = Standard

Seal material (in contact with fluid)
F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for refrigerants)

Material of connection (in contact with fluid)
1 = Stainless steel

Cable length in m (only for electr. connection type 9)
Standard = 2 m

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The pressure transmitter HDA 4100 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4100 in CSA version has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

Protection types and applications:

Intrinsically safe:
- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Class I Zone 1 AEx ia IIC T6 [C]
- Class I, II, III
  - Div. 1 Group A, B, C, D, E, F, G T6
  - Class I Zone 2 AEx nL IIC T4 [US]
  - Class I Zone 2 Ex nL IIC T4 [C]
- Class I, II, III
  - Class I Zone 2 AEx nA II T4 [US]
  - Class I Zone 2 Ex nA II T4 [C]

Non incendive:
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 Ex nL IIC T4 [C]
- Class I, II, III
  - Div. 1 Group A, B, C, D, E, F, G T6
  - Class I Zone 0 AEx ia IIC T6 [US]
- Class I Zone 1 AEx ia IIC T6 [C]

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Certificate: CSA 1760344
- Output signal 4..20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

Input data:
- Measuring ranges 1) 1; 2.5 bar
- Overload pressures 3; 8 bar
- Burst pressures 5; 12 bar
- Mechanical connection G1/4 A DIN 3852
- Torque value 20 Nm
- Parts in contact with medium
  - Sensor: Ceramic Al203
  - Mech. conn.: 1.4301
  - Seal: FPM / EPDM
- Output signal, permitted load resistance
  - 4..20 mA, 2 conductor
  - R_Lmax. = (U_B - 12 V) / 20 mA [kΩ]
- Accuracy to DIN 16086 ≤ ± 0.5 % FS typ.
- Max. setting ≤ ± 1.0 % FS max.
- Accuracy at min. setting (B.F.S.L.) ≤ ± 0.25 % FS typ.
- Zero point ≤ ± 0.02 % FS / °C typ.
- Temperature compensation ≤ ± 0.02 % FS / °C max.
- Temperature compensation ≤ ± 0.03 % FS / °C typ.
- Non-linearity at max. setting to DIN 16086 ≤ ± 0.5 % FS max.
- Hysteresis ≤ ± 0.4 % FS max.
- Repeatability ≤ ± 0.1 % FS
- Rise time ≤ 1.5 ms
- Long-term drift ≤ ± 0.3 % FS typ. / year

Environmental conditions:
- Compensated temperature range
  - Intrinsically safe: -20 .. +60 °C
  - Non incendive: -20 .. +85 °C
- Operating temperature range
  - Intrinsically safe: -20 .. +60 °C
  - Non incendive: -20 .. +85 °C
- Storage temperature range
  - -40 .. +100 °C
- Fluid temperature range 2)
  - Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C
  - Non incendive: -40 .. +85 °C / -20 .. +85 °C

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- 1) psi pressure ranges on request
- 2) -20° C with FPM or EPDM seal, -40° on request
- 3) 800 V AC on request

Relevant data for Ex applications:
- Supply voltage 12 .. 28 V DC
- Max. input current 100 mA
- Max. input power up to 28 V: 1 W
- Connection capacitance of the sensor ≤ 22 nF
- Inductance of the sensor 0 mH
- Insulation voltage 3) 50 V AC, with integrated overvoltage protection EN 61000-6-2

Other data:
- Residual ripple of supply voltage ≤ 5 %
- Life expectancy > 10 million cycles
- Weight ~ 180 g

Note:
- Protection class to IEC 60529 / NEMA (depending on the electr. connection) Min. IP65 Min. NEMA 4
**Pin connections:**

Conduit (single cores)

Core | HDA 41X9-A
--- | ---
green | Signal +
white | Signal -
green-yellow | Housing

EN175301-803 (DIN 43650)

**Areas of application:**

<table>
<thead>
<tr>
<th>Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</thead>
<tbody>
<tr>
<td>Protection Type</td>
<td>Intrinsically safe</td>
<td>Intrinsically safe</td>
<td>Non incendive (with field cabling)</td>
<td>Non incendive</td>
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<tr>
<td></td>
<td>Gases and dusts</td>
<td>Gases</td>
<td>Gases</td>
<td>Gases and dusts</td>
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<tr>
<td>Certificate</td>
<td></td>
<td></td>
<td>CSA 1760344</td>
<td></td>
</tr>
</tbody>
</table>

**Zones / Categories**

- Intrinsically safe
- Ex ia IIC T6
- Class I
- Division 2
- Group A, B, C, D, F, G T4A
- Zone 2
- AEx nL IIC T4
- Class I
- Zone 2
- Ex nL IIC T4
- AEx nA II T4

<table>
<thead>
<tr>
<th>Electrical Connection</th>
<th>9, A</th>
<th>5, 9, A</th>
<th>5, 9, A</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Code for Model Code</td>
<td>A</td>
<td>B</td>
<td></td>
<td>C</td>
</tr>
</tbody>
</table>

**Model code:**

```
HDA 4 1 4 X – A – XXXX – C N X – 000 – X 1 (2m)
```

- **Mechanical connection**
  
  4 = G1/4 A DIN 3852 (male)

- **Electrical connection**
  
  5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)

  9 = Conduit connection thread (1/2-14 NPT, male)

  A = Male EN175301-803 (DIN 43650), 3 pole + PE (1/2" conduit female thread)

- **Signal**
  
  A = 4 .. 20 mA, 2 conductor

- **Pressure ranges in bar**
  
  01.0; 02.5

- **Approval**
  
  C = CSA

- **Insulation voltage**
  
  N = 50 V AC

- **Protection types and applications (code)**
  
  A = Group 1
  
  B = Group 2 and 3
  
  C = Group 4

- **Modification number**
  
  000 = Standard

- **Seal material (in contact with fluid)**
  
  F = FPM seal (e.g.: for hydraulic oils)
  
  E = EPDM seal (e.g.: for refrigerants)

- **Material of connection (in contact with fluid)**
  
  1 = Stainless steel

- **Cable length in m (only for electr. connection type 9)**
  
  Standard = 2 m

**Accessories:**

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The pressure transmitter HDA 4700 IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series. As with the industrial version of the HDA 4700, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seal. Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust loads, e.g. in mills.

Protection types and applications:
Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex na IIC T6, T5, T4 Gc
Ex ic IIC T6, T5, T4 Gc
Ex ta IIIC T80/90/100 °C Da
T<sub>sep</sub> 90/100/110 °C Da
Ex tb IIIC T80/90/100 °C Db
Ex tc IIIC T80/90/100 °C Dc
Ex ic IIIC T80/90/100 °C Dc
Ex ia IIIC T85 °C Da

Special features:
- Accuracy ≤ ± 0.25 % FS typ.
- Certificate: IECEx TSE 09.0041X / IECEx KEM 08.0014X
- Output signal 4 ... 20 mA
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

Technical data:

### Input data
- Measuring ranges<sup>1)</sup> -1...9; 6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
- Overload pressures 20; 15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
- Burst pressure 100; 100; 200; 200; 300; 500; 1000; 2000; 2000; 3000 bar
- Mechanical connection<sup>1)</sup> (torque value) G1/4 A DIN 3852 (20 Nm)
- Parts in contact with medium Stainl. steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301

### Output data
- Output signal, permitted load resistance 4 .. 20 mA, 2 conductor
- Accuracy to DIN 16086, ≤ ± 0.25 % FS typ.
- Max. setting ≤ ± 0.5 % FS max.
- Temperature compensation ≤ ± 0.008 % FS / °C typ.
- Zero point ≤ ± 0.008 % FS / °C max.
- Temperature compensation ≤ ± 0.015 % FS / °C max.
- Over range ≤ ± 0.015 % FS / °C max.
- Non-linearity at max. setting to DIN 16086 ≤ ± 0.3 % FS max.
- Hysteresis ≤ ± 0.1 % FS max.
- Repeatability ≤ ± 0.05 % FS
- Rise time ≤ 1.5 ms
- Long-term drift ≤ ± 0.1 % FS typ. / year

### Environmental conditions
- Compensated temperature range -20 .. +85 °C
- Operating temperature range<sup>2)</sup> -20 .. +65 °C
- Storage temperature range -40 .. +100 °C
- Fluid temperature range<sup>2)</sup> -40 .. +60 °C / -20 .. +60 °C

### Other data
- Residual ripple of supply voltage ≤ 5 %
- Life expectancy > 10 million cycles 0 .. 100 % FS
- Weight ~ 150 g

### Notes:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line
- 1) 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa
- 2) -20 °C with FPM seal, -40 °C on request
- 3) 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Protection types and applications</th>
<th>Ex ia I Ma</th>
<th>Ex ia IIC T6 Ga</th>
<th>Ex ia IIC T6 Ga/Gb</th>
<th>Ex ia IIC T6 Gb</th>
<th>Ex na IIC T6 Gc</th>
<th>Ex ta IIC T80 °C T500 °C Da T90 °C Da</th>
<th>Ex ic IIC T6 Gc</th>
<th>Ex ic IIC T80 °C Da</th>
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</thead>
<tbody>
<tr>
<td>Zones / Categories</td>
<td>Equipment protection level Ma</td>
<td>Equipment protection level Ga, Ga/Gb</td>
<td>Gases</td>
<td>Equipment protection level Gb</td>
<td>Gases</td>
<td>Equipment protection level Ga</td>
<td>Gc</td>
<td>Gases</td>
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<tr>
<td>Mining</td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td></td>
<td>Protection class: non-sparking nA</td>
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<td>Protection class: Dustproof enclosure</td>
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</tbody>
</table>

Electrical connection

<table>
<thead>
<tr>
<th>Code for use in Model code</th>
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<th>IECEx Australia</th>
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<td>A</td>
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<tr>
<td>D</td>
<td>✓</td>
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</tr>
</tbody>
</table>

Certificate numbers: IECEx TSA 09.0041X, IECEx KEM 08.0014X

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIC T80/90/100 °C Da T500T90/T100/T110°C Da, Ex tb IIC T80/90/100 °C Db and Ex tc IIC T80/90/100 °C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex na IIC T6, T5, T4 Gc are available with flying leads on request.

Model code:

- **Mechanical connection**
  - 2 = G1/2 DIN 3852 (only for “1000 bar” pressure range)
  - 4 = G1/4 A DIN 3852 (male)

- **Electrical connection**
  - 4 = Male 4 pole Binder series 714 M18 (connector not supplied)
  - 5 = Male 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
  - 6 = Male M12x1, 4 pole (connector not supplied)

- **Signal**
  - A = 4 .. 20 mA, 2 conductor

- **Pressure ranges in bar**
  - 0009 (-1..9); 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600; 1000 (only in conjunction with mechanical connection type "2")

- **Approval**
  - I = IECEx

- **Insulation voltage**
  - N = 50 V AC

- **Protection types and applications (code)**
  - 1 = Ex ia I Ma
  - Ex ia IIC T6 Ga
  - Ex ia IIC T6 Ga/Gb
  - Ex ia IIC T6 Gb
  - 6 = Ex na IIC T6 Gc (only in conjunction with electr. connection "6")
  - 9 = Ex ta IIC T80 °C T500 °C Da (only in conjunction with electr. connection "6")
  - Ex tb IIC T80 °C Db
  - Ex tc IIC T80 °C Dc
  - C = Ex ic IIC T6 Gc
  - Ex ic IIC T80 °C Dc
  - D = Ex ia I Ma
  - Ex ia IIC T6 Ga
  - Ex ia IIC T6 Ga/Gb
  - Ex ia IIC T6 Gb
  - Ex ia IIC T85 °C Da

- **Modification number**
  - 000 = Standard

Notes:
- * For design and electrical connection see Dimensions

Accessories:
- Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Pressure Transmitter
HDA 4400
IECEx Intrinsically Safe
IECEx Dustproof Enclosure
IECEx Non-sparking

Description:
The pressure transmitter HDA 4400 IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series. As with the industrial version of the HDA 4400, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seal. Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust loads, e.g. in mills.

Protection types and applications:
Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb
Ex nA IIC T6,T5,T4 Gc
Ex ic IIC T6,T5,T4 Gc
Ex ta IIC T80/90/100 °C Da
T50k/90/100/110 °C Da
Ex tb IIC T80/90/100 °C Db
Ex tc IIC T80/90/100 °C Dc
Ex ic IIC T80/90/100 °C Dc
Ex ia IIC T85 °C Da

Special features:
- Accuracy: ≤ ± 0.5 % FS typ.
- Certificate:
  IECEx TSA 09.0041X / IECEx KEM 08.0014X
- Output signal 4 .. 20 mA
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

Technical data:

### Input data
Measuring ranges 1)
- 16; 60; 100; 250; 400; 600; 1000 bar
Overload ranges
- 32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressure
- 200; 300; 500; 1000; 2000; 3000 bar
Mechanical connection 1)
- G1/2 DIN 3852 (45 Nm)
- G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium
- Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
- Seal: FPM

### Output data
Output signal, permitted load resistance
- 4 .. 20 mA, 2 conductor
- R_{max} = (U_B – 12 V) / 20 mA [kΩ]
Accuracy to DIN 16086,
- Max. setting ≤ ± 0.5 % FS typ.
- ≤ ± 1.0 % FS max.
- Accuracy at minimum setting (B.F.S.L.)
  - ≤ ± 0.25 % FS typ.
  - ≤ ± 0.5 % FS max.
- Non-linearity at max. setting
to DIN 16086
  - ≤ ± 0.3 % FS max.
- Hysteresis ≤ ± 0.015 % FS / °C typ.
- ≤ ± 0.025 % FS / °C max.
- Temperature compensation
  - ≤ ± 0.015 % FS / °C typ.
  - ≤ ± 0.025 % FS / °C max.
- Temperature compensation Over range
  - ≤ ± 0.015 % FS / °C typ.
  - ≤ ± 0.025 % FS / °C max.
- Non-linearity at max. setting
to DIN 16086
  - ≤ ± 0.3 % FS max.
- Rise time ≤ 1.5 ms
- Repeatability ≤ ± 0.025 % FS
- Long term drift ≤ ± 0.3 % FS typ. / year

### Environmental conditions
Compensated temperature range
- -20 .. +85 °C
- Operating temperature range
  - -20 .. +60 °C
- Storage temperature range
  - -40 .. +100 °C
- Fluid temperature range
  - -20 °C with FPM seal, -40 °C on request

### Protection class to IEC 60529
- Ex ia I Ma
- Ex ia IIc T80/90/100 °C Da
- Ex tb IIc T80/90/100 °C Db
- Ex tc IIc T80/90/100 °C Dc
- Ex ic IIc T80/90/100 °C Dc
- Ex ia IIc T85 °C Da

### Relevant data for Ex applications
Supply voltage
- U_i = 12 .. 28 V
- Max. input current
  - I_i = 100 mA
- Max. input power
  - P_i = 1 W
- max. power consumption ≤ 1 W
Connection capacitance of the sensor
- C_s = ≤ 22 nF
Inductance of the sensor
- L_s = 0 nH
Insulation voltage 2)
- 50 V AC, with integrated overvoltage protection
- EN 61000-6-2
Residual ripple of supply voltage
- ≤ 5 %
Life expectancy
- > 10 million cycles
- 0 .. 100 % FS
Weight
- ~ 150 g

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line
- 1) 1000 bar only with mechanical connection G1/2 DIN 3852 and vice versa
- 2) -20 °C with FPM seal, -40 °C on request

1) 1000 bar only with mechanical connection G1/2 DIN 3852 and vice versa
2) -20 °C with FPM seal, -40 °C on request
Areas of application:

<table>
<thead>
<tr>
<th>Protection types and applications</th>
<th>Ex ia I Ma</th>
<th>Ex ia IIC T6 Ga</th>
<th>Ex ia IIC T6 Ga/Gb</th>
<th>Ex ia IIC T6 Gb</th>
<th>Ex nA IIC T6 Gc</th>
<th>Ex ia IIC T80 °C T_2 &lt; 90 °C Da</th>
<th>Ex tb IIC T80 °C Db</th>
<th>Ex ic IIC T6 Gc</th>
<th>Ex ic IIC T80 °C Dc</th>
<th>Ex ia IIC T85 °C Da</th>
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</thead>
<tbody>
<tr>
<td>Zones / Categories</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Mining</td>
<td>Equipment protection level Ga, Ga/Gb Gases Gases Protection class: intrinsically safe ia with barrier</td>
<td>Equipment protection level Gb Gases</td>
<td>Equipment protection level Gc Gases Protection class: non-sparking nA with barrier</td>
<td>Equipment protection level Da, Db Conductive dust Gases/conductive dust Protection class: Dustproof enclosure</td>
<td>Equipment protection level Da, Db Conductive dust Gases/conductive dust Protection class: non-sparking nA with barrier</td>
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<td>Mining</td>
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<td>Ex nA IIC T6 Gc</td>
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</tbody>
</table>

Certificate numbers: IECEx TSA 09.0041X, IECEx KEM 08.0014X

Devices in the ignition protection class “Dustproof enclosure” for the protection types Ex ta IIC T80/90/100 °C Da, T500 T90 °C Da, Ex tb IIC T80/90/100 °C Db and Ex tc IIC T80/90/100 °C Dc are available with flying leads on request. Devices in the ignition protection class “non-sparking” for protection types Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

Model code:

- **Mechanical connection**
  2 = G1/2 DIN 3852 (only for “1000 bar” pressure range)
  4 = G1/4 A DIN 3852

- **Electrical connection**
  4 = Male 4 pole Binder series 714 M18 (connector not supplied)
  5 = Male 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)
  6 = Male M12x1, 4 pole (connector not supplied)

- **Signal**
  A = 4 .. 20 mA, 2 conductor

- **Pressure ranges in bar**
  0016; 0060; 0100; 0250; 0400; 0600; 1000 (only in conjunction with mechanical connection type “2”)

- **Approval**
  I = IECEx

- **Insulation voltage**
  N = 50 V AC

- **Protection types and applications (code)**
  1 = Ex ia I Ma
  Ex ia IIC T6 Ga
  Ex ia IIC T6 Ga/Gb
  Ex ia IIC T6 Gb
  9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")*
  A = Ex ta IIC T80 °C T_2 < 90 °C Da (only in conjunction with electr. connection "6")*
  Ex tb IIC T80 °C Db
  C = Ex ic IIC T6 Gc
  Ex ic IIC T80 °C Dc
  D = Ex ia I Ma
  Ex ia IIC T6 Ga
  Ex ia IIC T6 Ga/Gb
  Ex ia IIC T6 Gb
  Ex ia IIC T85 °C Da

- **Modification number**
  000 = Standard

**Notes:**

*For design and electrical connection see Dimensions

**Accessories:**

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
**Dimensions:**
Protection types and applications: (code): 1, C, D

![Diagram of dimensions]

Protection types and applications: (code): 9, A

![Diagram of protection types and applications]

Pin connections:
Binder series 714 M18

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44x4-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n.c.</td>
</tr>
<tr>
<td>2</td>
<td>Signal +</td>
</tr>
<tr>
<td>3</td>
<td>Signal -</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

EN 175301-803 (DIN 43650)

Pin HDA 44x5-A

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44x5-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal +</td>
</tr>
<tr>
<td>2</td>
<td>Signal -</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
</tr>
<tr>
<td>4</td>
<td>Housing</td>
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</table>

Binder series 714, -4p

Pin HDA 44x6-A

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44x6-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal +</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal -</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

![Diagram of pin connections]

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The pressure transmitter HDA 4300 in IECEx Intrinsically Safe version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series. As with the industrial version, the HDA 4300 with IECEx Intrinsically Safe approval has the field-proven ceramic measuring cell with thick-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications:
Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb
Ex na IIC T6,T5,T4 Gc
Ex ic IIC T6,T5,T4 Gc
Ex ta IIC T80/90/100°C Da
T 150°C 90/100/110°C Da
Ex tb IIC T80/90/100°C Db
Ex tc IIC T80/90/100°C Dc
Ex ic IIC T80/90/100°C Dc
Ex ia IIC T85°C Da

Special features:
- Accuracy: ≤ ± 0.5 % FS typ.
- Certificate: IECEx TSA 09.0041X / IECEx KEM 08.0014X
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
</tr>
<tr>
<td>Overload pressures</td>
</tr>
<tr>
<td>Burst pressures</td>
</tr>
<tr>
<td>Mechanical connection</td>
</tr>
<tr>
<td>Torque value</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal, permitted load resistance</td>
</tr>
<tr>
<td>Accuracy to DIN 16086, max. setting</td>
</tr>
<tr>
<td>Accuracy at minimum setting (B.F.S.L.)</td>
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<tr>
<td>Temperature compensation</td>
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<td>Zero point</td>
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<td>Temperature compensation</td>
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<td>Over range</td>
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<td>Non-linearity at max. setting to DIN 16086</td>
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<tr>
<td>Hysteresis</td>
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<tr>
<td>Repeatability</td>
</tr>
<tr>
<td>Rise time</td>
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<tr>
<td>Long term drift</td>
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</tbody>
</table>

Environmental conditions
- Compensated temperature range: -20 .. +85 °C
- Operating temperature range: -20 .. +60 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 .. +60 °C / -20 .. +60 °C

C - mark
- EN 61000-6-1 / 2 / 3 / 4
- EN 60079-0 / 11 / 26 / 36

Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
≤ 20 g

Protection class to IEC 60529
- IP 65 (for male EN 175301-803 (DIN 43650) and Binder 714 M18)
- IP 67 (for M12x1 male, when an EN 175301-803 (DIN 43650) and Binder 714 M18 female connector is used)

Relevant data for Ex applications
- Ex ia, ic Ex ia ta, tb, tc |
- Ex na, ta, tb, tc |
- Ex na, ta, tb, tc |

Supply voltage
- U = 12 .. 28 V |
- Max. input current Ii = 100 mA |
- Max. input power Pi = 1 W |
- max. power consumption ≤ 1 W |

Connection capacitance of the sensor Cc = ≤ 22 nF |
Inductance of the sensor L = 0 nH |
Insulation voltage
- 50 V AC, with integrated overvoltage protection EN 61000-6-2 |

Other data
- Residual ripple of supply voltage ≤ 5 % |
- Life expectancy > 10 million cycles |
- 0 .. 100 % FS |
- ~ 180 g |

Weight

Note: Reverse polarity protection of the supply voltage, excess voltage, overdrive and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

1) -20 °C with FPM or EPDM seal, -40 °C on request
2) 500 V AC on request
### Areas of application:

<table>
<thead>
<tr>
<th>Protection types and applications</th>
<th>Ex ia I Ma</th>
<th>Ex ia IIC T6 Ga</th>
<th>Ex ia IIC T6 Ga/Gb</th>
<th>Ex ia IIC T6 Gb</th>
<th>Ex nA IIC T6 Gc</th>
<th>Ex ta IIC T80°C T_\text{gpd} T90°C Da</th>
<th>Ex tc IIC T80°C Db</th>
<th>Ex ic IIC T6 Gc</th>
<th>Ex ic IIC T80°C Dc</th>
<th>Ex ia IIC T85°C Da</th>
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<tr>
<td>Zones / Categories</td>
<td>Equipment level standard</td>
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<td>Equipment level standard</td>
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<td>Ga, Ga/Gb</td>
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<td>Certificate numbers:</td>
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</table>

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIC T80/90/100°C Da T500T90/T100/T110°C Da, Ex tb IIC T80/90/100°C Db and Ex tc IIC T80/90/100°C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

### Model code:

#### Mechanical connection

4 = G1/4 A DIN 3852

#### Electrical connection

4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)
6 = Male, M12x1, 4 pole (connector not supplied)

#### Signal

A = 4 .. 20 mA, 2 conductor

#### Pressure ranges in bar

0001 (-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

#### Approval

I = IECEx

#### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb

9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")*
A = Ex ta IIC T80°C T_\text{gpd} T90°C Da (only in conjunction with electr. connection "6")*  
Ex tb IIC T80°C Db

C = Ex ic IIC T6 Gc
Ex ic IIC T80°C Dc

D = Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb
Ex ia IIC T85°C Da

#### Modification number

000 = Standard

#### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)
E = EPDM seal (e.g.: for refrigerants)

#### Material of connection (in contact with fluid)

1 = Stainless steel

#### Notes:

* For design and electrical connection see device dimensions

#### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
Pin connections:

**Binder series 714 M18**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 43x4-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n.c.</td>
</tr>
<tr>
<td>2</td>
<td>Signal +</td>
</tr>
<tr>
<td>3</td>
<td>Signal -</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

**Pin HDA 43x5-A**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 43x5-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal +</td>
</tr>
<tr>
<td>2</td>
<td>Signal -</td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
</tr>
<tr>
<td>4</td>
<td>Housing</td>
</tr>
</tbody>
</table>

**Pin HDA 43x6-A**

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 43x6-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal +</td>
</tr>
<tr>
<td>2</td>
<td>n.c.</td>
</tr>
<tr>
<td>3</td>
<td>Signal -</td>
</tr>
<tr>
<td>4</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

**Dimensions:**

**Protection types and applications (code): 1, C, D**

**Protection types and applications (code): 9, A**

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
# Electronic Pressure Transmitter

**HDA 4100**  
**IECEx Intrinsically Safe**  
**IECEx Dustproof Enclosure**  
**IECEx Non-sparking**

## Description:

The pressure transmitter HDA 4100 in IECEx Intrinsically Safe version has been specially developed for use in potentially explosive atmospheres for absolute measurement in the low pressure range and is based on the HDA 4000 series. As with the industrial version, the HDA 4100 with IECEx Intrinsically Safe approval has the field-proven ceramic measuring cell with thick-film strain gauge without interior seals. Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

## Protection types and applications:

- Ex ia I Ma
- Ex ia IIC T6 Ga
- Ex ia IIC T6 Ga/Gb
- Ex ic IIC T6, T5, T4 Gc
- Ex ia IIC T80/90/100°C Da
- Ex ta IIC T80/90/100°C Da
- T_{90°C} = 90/100/110°C Da
- Ex tb II2c T80/90/100°C Db
- Ex ic II2c T80/90/100°C Dc
- Ex ia IIIC T85°C Da

## Special features:

- Accuracy: ≤ ± 0.5 % FS typ.
- Certificate: IECEx TSA 09.0041X / IECEx KEM 08.0014X
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

## Technical data:

### Input data

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>1; 2.5 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload pressures</td>
<td>3; 8 bar</td>
</tr>
<tr>
<td>Burst pressures</td>
<td>5; 12 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/4 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
</tbody>
</table>
| Parts in contact with medium | Sensor: Ceramic  
Mech. connection: 1.4301  
Seal: FPM / EPDM |

### Output data

- Output signal, permitted load resistance: 4 .. 20 mA, 2 conductor  
  \[ R_{\text{max}} = \frac{(U_s - 12 \, \text{V})}{20 \, \text{mA} [\kappa\Omega]} \]
- Accuracy to DIN 16086, max. setting: ≤ ± 0.5 % FS typ.  
  ≤ ± 1.0 % FS max.  
- Temperature compensation: ≤ ± 0.02 % FS / °C typ.  
- Temperature compensation zero point: ≤ ± 0.03 % FS / °C max.  
- Temperature compensation over range: ≤ ± 0.02 % FS / °C typ.  
  ≤ ± 0.03 % FS / °C max.  
- Non-linearity at max. setting: ≤ ± 0.5 % FS max.  
- Hysteresis: ≤ ± 0.4 % FS max.
- Repeatability: ≤ ± 0.1 % FS
- Rise time: ≤ 1.5 ms
- Long term drift: ≤ ± 0.3 % FS typ. / year

### Environmental conditions

- Compensated temperature range: -20 .. +85 °C
- Operating temperature range: -20 .. +60 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 .. +60 °C
  -20 °C with FPM or EPDM seal,  -40 °C on request
- Temperature compensation zero point: ≤ ± 0.02 % FS / °C typ.  
- Temperature compensation over range: ≤ ± 0.03 % FS / °C max.  
- Non-linearity at max. setting: ≤ ± 0.5 % FS max.  
- Hysteresis: ≤ ± 0.4 % FS max.
- Repeatability: ≤ ± 0.1 % FS
- Rise time: ≤ 1.5 ms
- Long term drift: ≤ ± 0.3 % FS typ. / year

### Relevant data for Ex applications

<table>
<thead>
<tr>
<th>Ex ia, ic</th>
<th>Ex nA, ta, tb, tc</th>
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</thead>
<tbody>
<tr>
<td>Ul = 12 .. 28 V</td>
<td>Ex nA, ta, tb, tc</td>
</tr>
<tr>
<td>Max. input current</td>
<td>100 mA</td>
</tr>
<tr>
<td>Max. input power</td>
<td>≤ 1 W</td>
</tr>
<tr>
<td>max. power consumption</td>
<td>1 W</td>
</tr>
<tr>
<td>Connection capacitance of the sensor</td>
<td>≤ 22 nF</td>
</tr>
<tr>
<td>Inductance of the sensor</td>
<td>L = 0 nH</td>
</tr>
<tr>
<td>Insulation voltage</td>
<td>50 V AC, with integrated overvoltage protection EN 61000-6-2</td>
</tr>
</tbody>
</table>

### Other data

- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- 0 .. 100 % FS
- 0 .. 180 g

### Weight

- 14301

### Note:

- Reverse polarity protection of the supply voltage, excess voltage, overide and short circuit protection are provided.
- FS (Full Scale) = relative to the full measuring range, B.F.S.L = Best Fit Straight Line
- 1) -20 °C with FPM or EPDM seal, -40 °C on request
- 2) 500 V AC on request

---

**Source:** HYDAC International
Areas of application:

<table>
<thead>
<tr>
<th>Protection types and applications</th>
<th>Ex ia I Ma</th>
<th>Ex ia IIC T6 Ga</th>
<th>Ex ia IIC T6 Ga/Gb</th>
<th>Ex ia IIC T6 Gb</th>
<th>Ex na IIC T6 Gc</th>
<th>Ex ta IIC T80°C T_90°C Da</th>
<th>Ex tb IIC T80°C Db</th>
<th>Ex ic IIC T6 Gc</th>
<th>Ex ic IIC T80°C Dc</th>
<th>Ex ia IIC T85°C Da</th>
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<tbody>
<tr>
<td>Zones / Categories</td>
<td>Equipment level standard Ma Ga, Ga/Gb Gases</td>
<td>Equipment level standard Gb Gases</td>
<td>Equipment level standard Gc Gases</td>
<td>Equipment level standard Da, Db Conductive dust</td>
<td>Equipment level standard Gc, Gd Gases/Conductive dust</td>
<td>Equipment level standard Dg, Dd Conductive dust</td>
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<tr>
<td>Protection class: intrinsic safety with barrier</td>
<td>Protection class: intrinsic safety with barrier</td>
<td>Protection class: intrinsic safety with barrier</td>
<td>Protection class: intrinsic safety with barrier</td>
<td>Protection class: Dustproof enclosure</td>
<td>Protection class: Intrinsically safe ic with barrier</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Certificate numbers: IECEx TSA 09.0041X, IECEx KEM 08.0014X

Devices in the ignition protection class “Dustproof enclosure” for the protection types Ex IIC T80/90/100°C Da T500/100/100°C Da and Ex IIC T80/90/100°C Db and Ex IIC T80/90/100°C Dc are available with flying leads on request. Devices in the ignition protection class “non-sparking” for protection type Ex na IIC T6, T5, T4 Gc are available with flying leads on request.

Model code:

- **Mechanical connection**
  4 = G1/4 A DIN 3852

- **Electrical connection**
  4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
  5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)
  6 = Male, M12x1, 4 pole (connector not supplied)

- **Signal**
  A = 4 .. 20 mA, 2 conductor

- **Pressure ranges in bar**
  0.1; 0.2; 5

- **Approval**
  I = IECEx

- **Insulation voltage**
  N = 50 V AC

- **Protection types and applications (code)**
  1 = Ex ia I Ma
  Ex ia IIC T6 Ga
  Ex ia IIC T6 Ga/Gb
  Ex ia IIC T6 Gb
  9 = Ex na IIC T6 Gc (only in conjunction with electr. connection “6”)*
  A = Ex ta IIC T80°C T_90°C Da (only in conjunction with electr. connection “6”)*
  Ex tb IIC T80°C Db
  C = Ex ic IIC T6 Gc
  Ex ic IIC T80°C Dc
  D = Ex ia I Ma
  Ex ia IIC T6 Ga
  Ex ia IIC T6 Ga/Gb
  Ex ia IIC T6 Gb
  Ex ia IIC T85°C Da

- **Modification number**
  000 = Standard

- **Seal material (in contact with fluid)**
  F = FPM seal (e.g.: for hydraulic oils)
  E = EPDM seal (e.g.: for refrigerants)

- **Material of connection (in contact with fluid)**
  1 = Stainless steel

- **Notes:**
  * For design and electrical connection see device dimensions

**Accessories:**
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.
Pin connections:

Binder series 714 M18

Pin HDA 41x4-A
1 n.c.
2 Signal +
3 Signal -
4 n.c.

EN 175301-803 (DIN 43650)

Pin HDA 41x5-A
1 Signal +
2 Signal -
3 n.c.
4 Housing

Pin HDA 41x6-A
1 Signal +
2 n.c.
3 Signal -
4 n.c.

Dimensions:
Protection types and applications: (code): 1, C, D

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Pressure Transmitter
HDA 4700
with Flush Membrane
ATEX Intrinsically Safe
ATEX Dustproof Enclosure
ATEX Non-sparking

Description:
The pressure transmitter HDA 4700 in ATEX version with flush membrane has been specially developed for use in potentially explosive atmospheres. Like the standard model, the HDA 4700 with flush membrane has a stainless steel measurement cell with a thin film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media. Intended areas of application are, for example, the oil and gas industry, in mines or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
I M1 Ex ia I Ma
II 1G Ex ia IIC T6 Ga
II 2G Ex ia IIC T6 Gb
II 3G Ex na IIC T6, T5, T4 Gc
II 3G Ex ic IIC T6, T5, T4 Gc
II 1D Ex ia IIC T65 °C Da
II 1D Ex ta IIC T80/90/100 °C Da
II 2D Ex tb IIC T80/90/100 °C Db
II 3D Ex tc IIC T80/T90/100 °C Dc
II 3D Ex ic IIC T80/T90/100 °C Dc

Special features:
● Pressure connection has a flush membrane
● Accuracy ≤ 0.25 % typ.
● Certificates:
  KEMA 05ATEX1016 X
  KEMA 05ATEX1021
● Robust design
● Very small temperature error
● Excellent EMC characteristics
● Excellent long-term properties

Technical data:

Input data

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>40; 60; 100; 250; 400; 600 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload ranges</td>
<td>80; 120; 200; 500; 800; 900 bar</td>
</tr>
<tr>
<td>Burst pressure</td>
<td>200; 300; 500; 1000; 2000; 2000 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G1/2 A DIN 3852</td>
</tr>
<tr>
<td></td>
<td>G1/2 with additional front O-ring seal</td>
</tr>
<tr>
<td>Pressure transfer fluid</td>
<td>Silicon-free oil</td>
</tr>
<tr>
<td>Torque value</td>
<td>45 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Stainless steel: 1.4435; 1.4301</td>
</tr>
<tr>
<td></td>
<td>Seal: FPM</td>
</tr>
<tr>
<td></td>
<td>O-ring: FPM</td>
</tr>
</tbody>
</table>

Output data

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>4...20 mA, 2 conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy to DIN 16086, max. setting</td>
<td>± 0.25 % FS typ.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>± 0.008 % FS / °C typ.</td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>± 0.015 % FS / °C max.</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
<td>± 0.3 % FS max.</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>± 0.1 % FS max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>± 0.05 % FS</td>
</tr>
<tr>
<td>Rise time</td>
<td>≤ 1.5 ms</td>
</tr>
<tr>
<td>Long term drift</td>
<td>≤ 0.1 % FS typ. / year</td>
</tr>
</tbody>
</table>

Environmental conditions

Compensated temperature range: -20...+85 °C
Operating temperature range: -40...+60 °C / -20...+60 °C
Storage temperature range: -40...+100 °C
Fluid temperature range: -40...+60 °C / -20...+60 °C

Vibration resistance to DIN EN 60068-2-6 at 10...500 Hz ≤ 20 g

Protection class to IEC 60529
IP 65 (for male EN 175301-803 (DIN 43650))
IP 67 (for M12x1 male, when an IP 67 female connector is used)

Insulation voltage 4) 500 V AC on request

Relevant data for Ex applications

| Supply voltage | 12...28 V |
| Max. input current | 100 mA |
| Max. input power | 1 W |
| Inductance of the sensor | 0 mH |
| Connection capacitance of the sensor | ≤ 22 nF |
| Insulation voltage | 50 V AC, with integrated overvoltage protection |

Other data

Residual ripple of supply voltage ≤ 5 %
Life expectancy > 10 million cycles
Weight ~ 180 g

Note:
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line
1) G1/2 with additional front O-ring seal max. 1500 bar
2) Other seal materials on request
3) -20 °C with FPM seal, -40 °C on request
4) 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Code used in Model code</th>
<th>1</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection type</td>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>II 3G Ex nA IIC T6 Gc</td>
<td>II 3G Ex ic IIC T6 Gc</td>
</tr>
<tr>
<td></td>
<td>II 1/2G Ex ia IIC T6 Ga/Gb</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 1D Ex ia IIC T85°C Da</td>
<td>II 3D Ex ic IIC T80°C Db</td>
</tr>
<tr>
<td>Certificate</td>
<td>KEMA 05ATEX1016 X / KEMA 05ATEX1021</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Zones / Categories

| Protection class         | Group I | II 1G Ex ia IIC T6 Ga |
|                         | Mining | II 1/2G Ex ia IIC T6 Ga/Gb |
|                         | Gases/Conductive dust | II 1D Ex ia IIC T85°C Da |
|                         | Protection class: intrinsically safe ia with barrier | II 2D Ex tb IIC T80°C Db |

Zones / Categories

| Protection class         | Group II | II 1D Ex ia IIC T80°C T90°C Db |
|                         | Category 2G | II 3G Ex ic IIC T6 Gc |
|                         | Gases | II 3D Ex ic IIC T80°C Dc |
|                         | Protection class: Non-sparking nA |

Electrical Connection (see model code)

<table>
<thead>
<tr>
<th>Pin HDA 47Z5-A</th>
<th>Signal +</th>
<th>Signal -</th>
<th>n.c.</th>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pin connections:

EN175301-803 (DIN 43650)

Housing

M12x1, 4 pole

Model code:

HDA 4 7 Z X – A – XXXX – XXX – A N X – 000

Mechanical process connection

Z = Flush membrane

Electrical connection

5 = Male 3 pole + PE, EN 175301-803 (DIN 43650) (female connector supplied)
6 = Male M12x1, 4 pole (female connector not supplied)

Signal

A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

Mechanical connection

G01 = G1/2 A, DIN 3852
G02 = G1/2 with additional front O-ring seal

Approval

A = ATEX

Insulation voltage

N = 50 V AC

Protection types and applications (code)

1 = I M1 Ex ia I Ma
2 = II 1/2G Ex ia IIC T6 Ga/Gb
3 = II 2G Ex ia IIC T6 Gb
4 = II 1D Ex ia IIC T85 °C Da
9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")*
A = II 1D Ex ia IIC T80 °C T90 °C Da (only in conjunction with electr. connection "6")*
B = II 2D Ex tb IIC T80 °C Db
C = II 3G Ex ic IIC T6 Gc
D = II 3D Ex ic IIC T80 °C Dc

Modification number

000 = Standard

Notes:

* For design and electrical connection see Dimensions

Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
**Dimensions:**

Protection types and applications (code): 1, C

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Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

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HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The pressure transmitter HDA 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version, the HDA 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media. Intended areas of application are, for example, the oil and gas industry, in mines, or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
I M1 Ex ia I Ma
II 1G Ex ia IIIC T6 Ga
II 1/2G Ex ia IIIC T6 Ga/Gb
II 2G Ex ia IIIC T6 Gb
II 3G Ex na IIIC T6, T5, T4 Gc
II 3G Ex ic IIIC T6, T5, T4 Gc
II 1D Ex ia IIIC T85 °C Da
II 1D Ex ta IIIC T80/90/100 °C Da
T 50,T90/T100/T110 °C Da
II 2D Ex tb IIIC T80/90/100 °C Db
II 3D Ex tc IIIC T80/90/T100 °C Dc
II 3D Ex ic IIIC T80/90/T100 °C Dc

Special features:
- Pressure connection has a flush membrane
- Accuracy ≤ 0.5 % typ.
- Certificates: KEMA 05ATEX1016 X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

Technical data:

Input data

<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>Overload ranges</th>
<th>Burst pressure</th>
<th>Mechanical connection</th>
<th>Pressure transfer fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>40; 60; 100; 250; 400; 600 bar</td>
<td>80; 120; 200; 500; 800; 900 bar</td>
<td>200; 300; 500; 1000; 2000; 2000 bar</td>
<td>G1/2A DIN 3852</td>
<td>Silicone-free oil</td>
</tr>
<tr>
<td>G1/2 with add. front O-ring seal</td>
<td>G1/4 with add. front O-ring seal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Output data

<table>
<thead>
<tr>
<th>Output signal, permitted load resistance</th>
<th>Accuracy to DIN 16086</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ... 20 mA, 2 conductor</td>
<td>± 0.5 % FS typ.</td>
</tr>
<tr>
<td>R Lmax = (UB - 12 V) / 20 mA [kΩ]</td>
<td>± 0.5 % FS max.</td>
</tr>
</tbody>
</table>

Accuracy at minimum setting (B.F.S.L.)

| ± 0.25 % FS typ. | ± 0.5 % FS max. |

Temperature compensation

| ± 0.015 % FS / °C typ. | ± 0.025 % FS / °C max. |

Temperature compensation

| ± 0.015 % FS / °C typ. | ± 0.025 % FS / °C max. |

Over range

| ± 0.015 % FS / °C typ. | ± 0.025 % FS / °C max. |

Non-linearity at max. setting to DIN 16086

| ± 0.3 % FS max. |

Hysteresis

| ± 0.4 % FS max. |

Repeatability

| ± 0.1 % FS |

Rise time

| ≤ 1.5 ms |

Long term drift

| ± 0.3 % FS typ. / year |

Environmental conditions

- Compensated temperature range
- Operating temperature range
- Storage temperature range
- Fluid temperature range

| -20 ... +85 °C | -20 ... +60 °C |

| -40 ... +100 °C | -20 ... +60 °C |

| -40 ... +100 °C | -20 ... +60 °C |

Environmental data

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Max. input current</th>
<th>Max. input power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ui = 12 ... 28 V</td>
<td>li = 100 mA</td>
<td>Pi = 1 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection capacitance of the sensor</th>
<th>Insulation of the sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>C = ≤ 22 nF</td>
<td>L = 0 mH</td>
</tr>
</tbody>
</table>

Insulation voltage

| 50 V AC, with integrated overvoltage protection |
| EN 61000-6-2 |

Other data

<table>
<thead>
<tr>
<th>Residual ripple of supply voltage</th>
<th>Life expectancy</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 5 %</td>
<td>≥ 10 million cycles</td>
<td>~ 180 g</td>
</tr>
</tbody>
</table>

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- G1/2 with additional front O-ring seal max. 1500 bar
- Other seal materials on request
- 20 °C with FPM seal, -40 °C on request
- 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Code used in Model code</th>
<th>1</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection type</td>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIC T6 Ga</td>
<td>II 2G Ex ia IIC T6 Gb</td>
<td>II 3G Ex nA IIC T6 Gc</td>
</tr>
<tr>
<td>Certificate</td>
<td>KEMA 05ATEX1016 X / KEMA 05ATEX1021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zones / Categories</td>
<td>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier</td>
<td>Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier</td>
<td>Group II Category 2G Gases Protection class: intrinsically safe ia with barrier</td>
<td>Group III Category 3G Gases Protection class: Non-sparking nA</td>
</tr>
<tr>
<td>Electrical Connection (see model code)</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ia IIC T80/90/100°C Da T85°C Da T90/T100/T110°C Da, II 2D Ex tb IIC T80/90/100°C Db and II 3D Ex ic IIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

Pin connections:

**EN 175301-803 (DIN 43650)**

**Pin HDA 44Z5-A**

- 1 Signal +
- 2 Signal -
- 3 n.c.
- H Housing

**M12x1, 4 pole**

**Pin HDA 44Z6-A**

- 1 Signal +
- 2 n.c.
- 3 Signal -
- 4 n.c.

Model code:

**HDA 4 4 Z X – A – XXXX – XXX – A N X – 000**

**Mechanical process connection**

- Z = Flush membrane

**Electrical connection**

- 5 = Male 3 pole + PE
- EN 175301-803 (DIN 43650) (female connector supplied)
- 6 = Male M12x1, 4 pole (female connector not supplied)

**Signal**

- A = 4 .. 20 mA, 2 conductor

**Pressure ranges in bar**

- 0040; 0060; 0100; 0250; 0400; 0600

**Mechanical connection**

- G01 = G1/2 A, DIN 3852
- G02 = G1/2 with additional front O-ring seal
- G04 = G1/4 with additional front O-ring seal

**Approval**

- A = ATEX

**Insulation voltage**

- N = 50 V AC

**Protection types and applications (code)**

- 1 = I M1 Ex ia I Ma
- II 1G Ex ia IIC T6 Ga
- II 1/2G Ex ia IIC T6 Ga/Gb
- II 2G Ex ia IIC T6 Gb
- II 1D Ex ia IIC T85 °C Da
- 9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")
- A = II 1D Ex ia IIC T80 °C T90°C Da (only in conjunction with electr. connection "6")
- II 2D Ex tb IIC T80 °C Db
- C = II 3G Ex ic IIC T6 Gc
- II 3D Ex ic IIC T80 °C Dc

**Modification number**

- 000 = Standard

**Notes:**

- * For design and electrical connection see Dimensions

**Accessories:**

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:
Protection types and applications (code): 1, C

Protection types and applications (code): 9, A

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
The pressure transmitter HDA 4300 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version, the HDA 4300 in ATEX version has the field-proven ceramic measurement cell with thick-film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used.

Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media. Intended areas of application are, for example, the oil and gas industry, in mines, or in locations with high levels of dust, e.g. in mills.

**Protection types and applications:**
- I M1 Ex ia I Ma
- II 1G Ex ia IIC T6 Ga
- II 1/2G Ex ia IIC T6 Ga/Gb
- II 2G Ex ia IIC T6 Gb
- II 3G Ex Na IIC T6, T5, T4 Gc
- II 3G Ex ic IIC T6, T5, T4 Gc

**Special features:**
- Pressure connection has a flush membrane
- Accuracy: ≤ ± 0.5% FS typ.
- Certificates: KEMA 05ATEX1016 X, KEMA 05ATEX1021
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

**Input data**
- Measuring ranges: -1..1; -1..9; 1; 2.5; 4; 6; 10; 16; 25 bar
- Overload range: 3; 32; 3; 8; 20; 32; 50; 80 bar
- Burst pressure: 5; 48; 5; 12; 18; 30; 48; 75; 120 bar
- Mechanical connection: G1/2A DIN 3852
- Pressure transfer fluid: Silicon-free oil
- Torque value: 45 Nm for G1/2, G1/2 A
- Parts in contact with medium: Stainless steel: 1.4435; 1.4301

**Output data**
- Output signal, permitted load resistance: R_{L_{max}} = (U_B – 12 V) / 20 mA [kΩ]
- Accuracy to DIN 16086, max. setting: ≤ ± 0.5% FS typ., ≤ ± 1.0% FS max.
- Non-linearity at max. setting to DIN 16086: ≤ ± 0.5% FS max.
- Accuracy at minimum setting: ≤ ± 0.4% FS max., ≤ ± 0.5% FS max.
- Temperature compensation: ≤ ± 0.25% FS typ., ≤ ± 0.5% FS max.

**Environmental conditions**
- Temperature compensation: ≤ ± 0.02% FS / °C typ., ≤ ± 0.03% FS / °C max.
- Non-linearity at max. setting to DIN 16086: ≤ ± 0.02% FS / °C typ.
- Temperature compensation: ≤ ± 0.02% FS / °C typ., ≤ ± 0.03% FS / °C max.
- Zero point: ≤ ± 0.02% FS / °C typ.
- Over range: ≤ ± 0.02% FS / °C typ.

**Output data**
- Output signal, permitted load resistance: 4 .. 20 mA, 2 conductor
- Accuracy to DIN 16086, max. setting: ≤ ± 0.5% FS typ., ≤ ± 1.0% FS max.
- Temperature compensation: ≤ ± 0.2% FS / °C typ., ≤ ± 0.5% FS max.
- Zero point: ≤ ± 0.02% FS / °C typ.
- Temperature compensation: ≤ ± 0.2% FS / °C typ.
- Over range: ≤ ± 0.2% FS / °C typ.

**Other data**
- Connection capacitance of the sensor: ≤ 22 nF
- Inductance of the sensor: ≤ 0 mH
- Insulation voltage: 50 V AC, with integrated overvoltage protection

**Supply voltage**
- E = 12 .. 28 V
- Maximum input current: I_i = 100 mA
- Maximum input power: P_i = 1 W

**Electrical connection**
- Connection capacitance of the sensor: C_s = ≤ 22 nF
- Inductance of the sensor: L_s = 0 mH

**Output data**
- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: ~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
Areas of application:

<table>
<thead>
<tr>
<th>Code</th>
<th>Model code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection type</td>
<td>1</td>
</tr>
<tr>
<td>I M1 Ex ia I Ma</td>
<td>II 1G Ex ia IIIC T6 Ga</td>
</tr>
<tr>
<td>II 1G Ex ia IIIC T6 Ga</td>
<td>II 2G Ex ia IIIC T6 Gb</td>
</tr>
<tr>
<td>II 1D Ex ia IIIC T85°C Da</td>
<td>II 1G Ex ia IIIC T6 Ga</td>
</tr>
<tr>
<td>II 1G Ex ia IIIC T80°C Da</td>
<td>II 1D Ex ia IIIC T6 Ga</td>
</tr>
<tr>
<td>II 1G Ex ia IIIC T6 Ga</td>
<td>II 1G Ex ia IIIC T6 Ga</td>
</tr>
<tr>
<td>II 1D Ex ia IIIC T70°C T90°C Da</td>
<td>II 1D Ex ia IIIC T80°C Da</td>
</tr>
<tr>
<td>II 1G Ex ia IIIC T6 Ga</td>
<td>II 1G Ex ia IIIC T6 Ga</td>
</tr>
<tr>
<td>II 1D Ex ia IIIC T70°C T90°C Da</td>
<td>II 1D Ex ia IIIC T80°C Da</td>
</tr>
</tbody>
</table>

Certificate: KEMA 05ATEX1016 X / KEMA 05ATEX1021

Zones / Categories

<table>
<thead>
<tr>
<th>Electrical Connection (see model code)</th>
<th>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier</th>
<th>Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier</th>
<th>Group II Category 2G Gases Protection class: intrinsically safe ia with barrier</th>
<th>Group II Category 3G Gases Protection class: Non-sparking nA</th>
<th>Group II Category 1D, 2D Conductive dust Protection class: Dustproof enclosure</th>
<th>Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>6</td>
<td>6</td>
<td>4,5,6</td>
<td></td>
</tr>
</tbody>
</table>

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ia IIIC T80/90/100°C Da T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex ic IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIIC T6, T5, T4 Gc are available with flying leads on request.

**Pin connections:**

EN 175301-803 (DIN 43650)

**Model code:**

HDA 4 3 Z X – A – XXXX – XXX – A N X – XXX

**Mechanical process connection**

Z = Flush membrane

**Electrical connection**

5 = Male 3 pole + PE, EN 175301-803 (DIN 43650) (female connector supplied)

6 = Male M12x1, 4 pole (female connector not supplied)

**Signal**

A = 4 .. 20 mA, 2 conductor

**Pressure ranges in bar**

0001(-1..1); 0009(-1..9); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

**Mechanical connection**

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

**Approval**

A = ATEX

**Insulation voltage**

N = 50 V AC

**Protection types and applications (code)**

1 = I M1 Ex ia I Ma

II 1G Ex ia IIIC T6 Ga

II 1/2G Ex ia IIIC T6 Ga/Gb

II 2G Ex ia IIIC T6 Gb

II 1D Ex ia IIIC T85 °C Da

9 = II 3G Ex nA IIIC T6 Gc (only in conjunction with electr. connection "6")

A = II 1D Ex ta IIIC T80 °C T90 °C Da (only in conjunction with electr. connection "6")

II 2D Ex tb IIIC T80 °C Db

C = II 3G Ex ic IIIC T6 Gc

II 3D Ex ic IIIC T80 °C Dc

**Modification number**

000 = Standard

**Notes:**

* For design and electrical connection see Dimensions

**Accessories:**

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:
Protection types and applications (code): 1, C

Protection types and applications (code): 9, A

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243
Electronic Pressure Transmitter
HDA 4700
with Flush Membrane
IECEx Intrinsically Safe
IECEx Dustproof Enclosure
IECEx Non-sparking

Description:
The pressure transmitter HDA 4700 in IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version of the HDA 4700, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin-film strain gauge without internal seal.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media. Intended areas of application are, for example, the oil and gas industry, in mines or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb
Ex na IIC T6, T5, T4 Gc
Ex ic IIC T6, T5 Gc
Ex ta IIIC T80/90/100°C Da
Ex tb IIIC T80/90/100°C Db
Ex tc IIC T80/90/100°C Dc
Ex ic IIC T80/90/100°C Dc
Ex ia IIIC T85°C Da

Special features:
● Pressure connection has a flush membrane
● Accuracy ≤ 0.25 % FS typ.
● Certificate: IECEx KEM 08.0014X
● Robust design
● Very small temperature error
● Excellent EMC characteristics
● Excellent long-term properties

Technical data:

Input data
Measuring ranges 40; 60; 100; 250; 400; 600 bar
Overload ranges 80; 120; 200; 500; 800; 900 bar
Burst pressure 1) 200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection G1/2 A DIN 3852
G1/2 with additional front O-ring seal
Pressure transfer fluid Silicon-free oil
Torsion value 45 Nm
Parts in contact with medium 2) Stainless steel: 1.4435; 1.4301
Seal: FPM
O-ring: FPM

Output data
Output signal, permitted load resistance 4 . . 20 mA, 2 conductor
R_{L_{max}} = (U_{B} – 12 V) / 20 mA [kΩ]
Accuracy to DIN 16086,
max. setting ± 0.25 % FS typ.
± 0.5 % FS max.
Accuracy at minimum setting ± 0.15 % FS typ.
± 0.25 % FS max.
Temperature compensation zero point ± 0.008 % FS / °C typ.
± 0.015 % FS / °C max.
Temperature compensation over range ± 0.008 % FS / °C typ.
± 0.015 % FS / °C max.
Non-linearity at max. setting to DIN 16086 ± 0.3 % FS max.
Hysteresis ≤ ± 0.1 % FS max.
Repeatability ≤ ± 0.05 % FS
Rise time ≤ 1.5 ms
Long term drift ≤ ± 0.1 % FS typ. / year

Environmental conditions
Compensated temperature range -20 .. +85 °C
Operating temperature range -40 .. +60 °C / -20 .. +60 °C
Storage temperature range -40 .. +100 °C
Fluid temperature range -40 .. +60 °C / -20 .. +60 °C

mark
EN 61000-6-1 / 2 / 3 / 4
EN 60079-0 / 11 / 26 / 36
Vibration resistance to DIN EN 60068-2-6 at 10 ..500 Hz ≤ 20 g
Protection class to IECEx 60079
IP 65
IP 67
IP 67 female connector is used

Relevant data for Ex applications
Ex ia, ic
Ex na, tb, tc

Supply voltage U_{I} = 12 .. 28 V
Max. input current I_{I} = 100 mA
Max. input power P_{I} = 1 W max. power consumption ≤ 1 W
Connection capacitance of the sensor C_{S} = ≤ 22 nF
Inductance of the sensor L_{S} = 0 mH
Insulation voltage 4) 50 V AC, with integrated overvoltage protection EN 61000-6-2

Other data
Residual ripple of supply voltage ≤ 5 %
Life expectancy > 10 million cycles
Weight ~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line
1) G1/2 with additional front O-ring seal max. 1500 bar
2) Other seal materials on request
3) ± 20 °C with FPM seal, -40 °C on request
4) 500 V AC on request
### Areas of application:

<table>
<thead>
<tr>
<th>Code used in Model code</th>
<th>D</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection types and applications</td>
<td>Ex ia I Ma</td>
<td>Ex ia IIC T6 Ga</td>
<td>Ex ia IIC T6 Gb</td>
<td>Ex nA IIC T6 Gc</td>
</tr>
<tr>
<td>Certificate</td>
<td>IECEx KEM 08.0014X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zones / Categories</td>
<td>Equipment protection level Ma Mining Protection class: intrinsically safe ia with barrier</td>
<td>Equipment protection level Gb Ga, Ga/Gb, Da Gases/conductive dust Protection class: intrinsically safe ia with barrier</td>
<td>Equipment protection level Gc Gases Protection class: intrinsically safe ia with barrier</td>
<td>Equipment protection level Da, Db Conduit: intrinsically safe ia with barrier</td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>6</td>
</tr>
</tbody>
</table>

Devices in ignition protection class "Dustproof enclosure" for the protection types Ex ia IIC T80/90/100 °C Da T<sub>b</sub> T90/T100/T110 °C Da, Ex tb IIC T80/90/100 °C Db and Ex tc IIC T80/90/100 °C Db are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

### Pin connections:

#### EN 175301-803 (DIN 43650)

- **Pin HDA 47Z5-A**
  - 1: Signal +
  - 2: Signal -
  - 3: n.c.
  - 4: Housing

- **Pin HDA 47Z6-A**
  - 1: Signal +
  - 2: n.c.
  - 3: Signal -
  - 4: n.c.

#### Model code:

- **Mechanical process connection**
  - Z = Flush membrane
- **Electrical connection**
  - 5 = Male 3 pole+ PE, EN 175301-803 (DIN 43650) (female connector supplied)
  - 6 = Male M12x1, 4 pole (female connector not supplied)
- **Signal**
  - A = 4 .. 20 mA, 2 conductor
- **Pressure ranges in bar**
  - 0040; 0060; 0100; 0250; 0400; 0600
- **Mechanical connection**
  - D = Ex ia I Ma
  - Ex ia IIC T6 Ga
  - Ex ia IIC T6 Ga/Gb
  - Ex ia IIC T6 Gb
  - Ex ia IIC T85 °C Da
  - 9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6") *
  - A = Ex ta IIC T80 °C T<sub>b</sub> T90 °C Da (only in conjunction with electr. conn. "6") *
  - Ex tb IIC T80 °C Db
  - C = Ex ic IIC T6 Gc
  - Ex ic IIC T80 °C Dc
- **Modification number**
  - 000 = Standard
- **Notes:**
  - * For design and electrical connection see Dimensions

### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:
Protection types and applications (code): D, C

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243
**Electronic Pressure Transmitter**

**HDA 4400**

with Flush Membrane

IECEx Intrinsically Safe

IECEx Dustproof Enclosure

IECEx Non-sparking

**Description:**

The pressure transmitter HDA 4400 in IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version of the HDA 4400, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seal.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing and any residues could cause mixing or contamination of the media, or in highly viscous media. Intended areas of application are, for example, the oil and gas industry, in mines or in locations with high levels of dust, e.g. in mills.

**Protection types and applications:**

Ex ia I Ma

Ex ia IIC T6 Ga

Ex ia IIC T6 Ga/Gb

Ex ia IIC T6 Gb

Ex nA IIC T6,T5,T4 Gc

Ex ic IIC T6,T5,T4 Gc

Ex ia IIC T80/90/100 °C Da

Ex ib IIC T80/90/100 °C Db

Ex tc IIC T80/90/100 °C Dc

Ex ic IIC T80/90/100 °C Dc

Ex ia IIC T85 °C Da

**Special features:**

- Pressure connection has a flush membrane
- Accuracy: ≤ ± 0.5 % FS typ.
- Certificate: IECEx KEM 08.0014X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

**Input data**

| Measuring ranges | 40; 60; 100; 250; 400; 600 bar |
| Burst pressure | 200; 300; 500; 1000; 2000; 2000 bar |

**Mechanical connection**

- G1/2 A DIN 3852
- G1/2 with additional front O-ring seal
- G1/4 with additional front O-ring seal

**Pressure transfer fluid**

Silicon-free oil

**Torque value**

45 Nm for G1/2, G1/2 A
20 Nm for G1/4

**Parts in contact with medium**

- Stainless steel: 1.4435, 1.4301
- Seal: FPM, O-ring: FPM

**Output data**

- Output signal, permitted load resistance: 4 ... 20 mA, 2 conductor
- Accuracy to DIN 16086:
  - ≤ ± 0.5 % FS typ.
  - ≤ ± 1 % FS max.
- Accuracy at minimum setting (B.F.S.L.):
  - ≤ ± 0.25 % FS typ.
  - ≤ ± 0.5 % FS max.
- Temperature compensation:
  - ≤ ± 0.015 % FS / °C typ.
  - ≤ ± 0.025 % FS / °C max.
- Zero point:
  - ≤ ± 0.015 % FS / °C typ.
  - ≤ ± 0.025 % FS / °C max.
- Non-linearity at max. setting to DIN 16086:
  - ≤ ± 0.3 % FS max.
- Hysteresis:
  - ≤ ± 0.4 % FS max.
- Repeatability:
  - ≤ ± 0.1 % FS
- Rise time:
  - ≤ 1.5 ms
- Long term drift:
  - ≤ ± 0.3 % FS typ. / year

**Environmental conditions**

- Compensated temperature range:
  - -20 ... +85 °C
- Operating temperature range:
  - -20 ... +60 °C
- Storage temperature range:
  - -20 ... +60 °C
- Fluid temperature range:
  - -40 ... +60 °C / -20 ... +60 °C
- Temperature compensation:
  - ≤ ± 0.5 % FS / °C typ.
  - ≤ ± 0.25 % FS / °C type
  - ≤ ± 0.025 % FS / °C max.
  - ≤ ± 0.015 % FS / °C typ.
  - ≤ ± 0.025 % FS / °C max.

**Certification:**

- IECEx KEM 08.0014X
- IP 67 (for male EN 175301-803(DIN 43650))
- IP65 (for M12x1 male, when an 67 female connector is used)

**Technical data for Ex applications**

| Ex ia, ic | Ex nA, ia, tb, tc |
| Supply voltage | Ui = 12 ... 28 V |
| Max. input current | Ii = 100 mA |
| Max. input power | Pi = 1 W |
| Connection capacitance of the sensor | Cc = ≤ 22 nF |
| Inductance of the sensor | Lc = 0 mH |
| Insulation voltage | 50 V AC, with integrated overvoltage protection |

**Other data**

- Residual ripple of supply voltage:
  - ≤ 5 %
- Life expectancy:
  - > 10 million cycles
- Other data:
  - 0 ... 100 % FS
- Weight:
  - ~ 180 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- G1/2 with additional front O-ring seal max. 1500 bar
- Other seal materials on request
- ≤ 20 °C with FPM seal, -40 °C on request
- 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Code No. for use in Model code</th>
<th>D</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection types and applications</td>
<td>Ex ia I Ma</td>
<td>Ex ia IIC T6 Ga</td>
<td>Ex ia IIC T6 Gb</td>
<td>Ex ia IIC T6 Gc</td>
</tr>
<tr>
<td></td>
<td>Ex ia IIC T6 Ga/Gb</td>
<td>Ex iIC T85 °C</td>
<td>Ex ia IIC T80 °C T90 °C Da</td>
<td>Ex ic IIC T6 Gc</td>
</tr>
<tr>
<td></td>
<td>Ex ia IIC T85 °C Da</td>
<td>EX lb IIC T80 °C Db</td>
<td>Ex ic IIC T80 °C Dc</td>
<td></td>
</tr>
</tbody>
</table>

Certificate: IECEx KEM 08.0014X

Zones / Categories

| Electrical connection | 4, 5, 6 | 4, 5, 6 | 4, 5, 6 | 6 | 6 | 4, 5, 6 |

Devices in ignition protection class "Dustproof enclosure" for the protection types Ex ia IIC T80/90/100 °C Da T90/T100/T110 °C Da, Ex lb IIC T80/90/100 °C Db and Ex lc IIC T80/90/100 °C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type Ex na IIC T6, T5, T4 Gc are available with flying leads on request.

Pin connections:

EN 175301-803 (DIN 43650)

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44Z5-A</th>
<th>1</th>
<th>Signal +</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Signal -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Housing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M12x1, 4 pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>HDA 44Z6-A</th>
<th>1</th>
<th>Signal +</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Signal -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n.c.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mechanical process connection

Z = Flush membrane

Electrical connection

5 = Male 3 pole+ PE, EN 175301-803 (DIN 43650) (female connector supplied)

6 = Male M12x1, 4 pole (female connector not supplied)

Signal

A = 4 .. 20 mA, 2 conductor

Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

Approval

I = IECEx

Insulation voltage

N = 50 V AC

Protection types and applications (code)

D = Ex ia I Ma

Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb
Ex ia IIC T85 °C Da

9 = Ex na IIC T6 Gc (only in conjunction with electr. connection "6")*

A = Ex ia IIC T80 °C T90 °C Da (only in conjunction with electr. connection "6")*

Ex lb IIC T80 °C Db

C = Ex ic IIC T6 Gc

Ex ic IIC T80 °C Dc

Modification number

000 = Standard

Notes:

* For design and electrical connection see Dimensions

Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:
Protection types and applications (code): D, C

Protection types and applications (code): 9, A

The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243
Electronic Pressure Transmitter
HDA 4300
with Flush Membrane
IECEx Intrinsically Safe
IECEx Dustproof Enclosure
IECEx Non-sparking

Description:
The pressure transmitter HDA 4300 in IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version HDA 4300, the devices with IECEx Intrinsically Safe approval have the field-proven ceramic measuring cell with thick-film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media. Intended areas of application are, for example, the oil and gas industry, in mines, or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
Ex ia I Ma
Ex ia IIC T6 Ga
Ex ia IIC T6 Ga/Gb
Ex ia IIC T6 Gb
Ex nA IIC T6,T5,T4 Gc
Ex ic IIC T6,T5,T4 Gc
Ex ta IIC T80/90/100 °C Da
Ex tb IIC T80/90/100 °C Db
Ex tc IIC T80/90/100 °C Dc
Ex ic IIC T80/90/100 °C Dc
Ex ia IIC T85 °C Da

Special features:
- Pressure connection has a flush membrane
- Accuracy: ≤ ± 0.5 % FS typ.
- Certificate: IECEx KEM 08.0014X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

Technical data:

Input data:
- Measuring ranges: -1; 1; 2; 4; 5; 6; 10; 16; 25 bar
- Overload pressures: 3; 32; 3; 12; 20; 3; 50; 80 bar
- Burst pressure: 5; 48; 5; 12; 18; 30; 48; 75; 120 bar
- Mechanical connection: G1/2 A DIN 3852
- Pressure transfer fluid: Silicone-free oil
- Torque value: 45 Nm for G1/2, G1/2 A

Output data:
- Output signal, permitted load resistance: 4 ... 20 mA, 2 conductor
- R_Lmax = (U_B – 12 V) / 20 mA [kΩ]
- Accuracy to DIN 16086:
  - max. setting: ± 0.5 % FS typ.
  - ± 1.0 % FS max.
- Temperature compensation:
  - zero point: ± 0.02 % FS / °C typ.
  - ± 0.03 % FS / °C max.
- Temperature compensation over range:
  - ± 0.02 % FS / °C typ.
  - ± 0.03 % FS / °C max.
- Non-linearity at max. setting to DIN 16086:
  - ± 0.5 % FS max.
- Hysteresis:
  - ± 0.4 % FS max.
- Repeatability:
  - ± 0.1 % FS
t
- Rise time:
  - ≤ 1.5 ms
- Long term drift:
  - ± 0.3 % FS typ. / year

Environmental conditions:
- Compensated temperature range: -20 ... +85 °C
- Operating temperature range: -20 ... +60 °C
- Storage temperature range: -40 ... +100 °C
- Fluid temperature range:
  - -40 ... +60 °C
  - -20 ... +60 °C
- Vibration resistance acc. to DIN EN 60068-2-6 at 10 ... 500 Hz:
  - ≤ 20 g
- Protection class to IEC 60529:
  - IP 65 (for male EN 175301-803 (DIN 43650))
  - IP 67 (for M12x1 male, when an IP 67 female connector is used)

Other data:
- Residual ripple of supply voltage:
  - ± 5 %
- Life expectancy:
  - > 10 million cycles
- Weight:
  - ~ 180 g

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- Other seal materials on request
- -20 °C with FPM seal, -40 °C on request
- 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Code for use in Model code</th>
<th>D</th>
<th>9</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection types and applications</td>
<td>Ex ia I Ma</td>
<td>Ex ia IIC T6 Ga</td>
<td>Ex ia IIC T6 Gb</td>
<td>Ex ia IIC T80°C T90°C Da Ex ic IIC T80°C Db</td>
</tr>
<tr>
<td>Certificate</td>
<td>IECEx KEM 08.0014X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zones / Categories</td>
<td>Equipment protection level Ma Mining</td>
<td>Equipment protection level Ga, Ga/Gb, Da Gases/conductive dust</td>
<td>Equipment protection level Gb Gases</td>
<td>Equipment protection level Da, Db Conductive dust</td>
</tr>
<tr>
<td></td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td>Protection class: Non-sparking nA</td>
<td>Protection class: Dustproof enclosure</td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>4, 5, 6</td>
<td>6</td>
</tr>
</tbody>
</table>

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ia IIC T80/90/100° C Da T90/T100/T110° C Da, Ex tb IIC T80/90/100° C Db and Ex tc IIC T80/90/100° C Db are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

Pin connections:

EN 175301-803 (DIN 43650)

**Model code:**

HDA 4 3 Z X – A – XXXX – XXX – IN X – 000

- **Mechanical process connection**
  - Z = Flush membrane

- **Electrical connection**
  - 5 = Male 3 pole + PE, EN 175301-803 (DIN 43650) (female connector supplied)
  - 6 = Male M12x1, 4 pole (female connector not supplied)

- **Signal**
  - A = 4 ... 20 mA, 2 conductor

- **Pressure ranges in bar**
  - 0001 (+1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

- **Mechanical connection**
  - G01 = G1/2 A, DIN 3852
  - G02 = G1/2 with additional front O-ring seal
  - G04 = G1/4 with additional front O-ring seal

- **Approval**
  - I = IECEx

- **Insulation voltage**
  - N = 50 V AC

- **Protection types and applications (code)**
  - D = Ex ia I Ma
  - Ex ia IIC T6 Ga
  - Ex ia IIC T6 Ga/Gb
  - Ex ia IIC T6 Gb
  - Ex ia IIC T85 °C Da
  - 9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")
  - A = Ex tb IIC T80 °C T90 °C Da (only in conjunction with electr. connection "6")
  - Ex tb IIC T80 °C Db
  - C = Ex ic IIC T6 Gc
  - Ex ic IIC T80 °C Dc

- **Modification number**
  - 000 = Standard

**Notes:**

- * For design and electrical connection see device dimensions

**Accessories:**

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:
Protection types and applications (code): D, C

The Impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. E.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

Protection types and applications (code): 9, A
**Electronic Pressure Transmitter**

**HDA 4700 with Flush Membrane**

**ATEX, IECEx, CSA Flameproof Enclosure**

**Description:**
The electronic pressure transmitter HDA 4700 with flush membrane is certified in the ignition protection class Flameproof Enclosure to ATEX, IECEx and CSA. The devices have triple approval, ensuring that they are universally suitable for use in potentially explosive environments around the world. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media.

Its main applications are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic power units (HPU), blow-out preventers (BOPs), drill drives or in lubrication systems.

**Protection types and applications:**

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA</td>
<td>Explosion Proof – Seal Not Required</td>
</tr>
<tr>
<td>ATEX Flame Proof</td>
<td>Class I: Group A, B, C, D, T6, T5&lt;br&gt;Class II: Group E, F, G&lt;br&gt;Class III: Type 4</td>
</tr>
<tr>
<td>IECEx Flame Proof</td>
<td>Ex d I Mb&lt;br&gt;Ex d IIC T6, T5 Gb&lt;br&gt;Ex tb IIIC T110...130 °C Db</td>
</tr>
</tbody>
</table>

**Special features:**
- Accuracy ≤ 0.25 % FS typ.
- Certificates: ATEX KEMA 10ATEX0100 X<br>CSA MC 224264<br>IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

### Input data

- Measuring ranges: 40; 60; 100; 250; 400; 600 bar
- Overload ranges: 80; 120; 200; 500; 800; 1000 bar
- Burst pressure: 300; 300; 500; 1000; 2000; 2000 bar

### Mechanical connection

- G1/2 A DIN 3852
- G1/2 with add. front O-ring seal

### Pressure transfer fluid

Silicon-free oil

### Torque value

45 Nm

### Parts in contact with medium

- Stainless steel: 1.4435, 1.4301
- O-ring: FPM

### Conduit, housing material

1.4404; 1.4435 (316L)

### Output data

- Output signal, permitted load resistance: 4 ... 20 mA, 2 conductor
  
  \[ R_{\text{L}} = \frac{(U_B - 8 \text{ V})}{20 \text{ mA}} \times [\Omega] \]

- Accuracy to DIN 16086:
  - ± 0.25 % FS typ.
  - ± 0.5 % FS max.

- Temperature compensation:
  - ± 0.008 % FS / °C typ.
  - ± 0.015 % FS / °C max.

- Zero point:
  - ± 0.008 % FS / °C typ.
  - ± 0.015 % FS / °C max.

- Non-linearity at max. setting:
  - ± 0.3 % FS max.

- Environmental conditions:

  **Compensated temperature range**
  - T5, T130 °C: -25 ... +80 °C
  - T6, T110 °C: -25 ... +60 °C

  **Operating temperature range**
  - T5, T130 °C: -40 ... +80 °C / -20 ... +80 °C
  - T6, T110 °C: -40 ... +60 °C / -20 ... +60 °C

  **Storage temperature range**
  - -40 ... 100 °C

  **Fluid temperature range**
  - T5, T130 °C: -40 ... +80 °C / -20 ... +80 °C
  - T6, T110 °C: -40 ... +60 °C / -20 ... +60 °C

**Other data:**

- Supply voltage: 8 ... 30 V DC
- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million load cycles, 0 ... 100 % FS
- Weight: ~ 300 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) Other mechanical connections on request

2) Other output signals on request

3) -20 °C with FPM seal; -40 °C on request
Pin connections:

Conduit (single cores)

Core: HDA 47Z9-A
- red: Signal +
- black: Signal -
- green-yellow: Housing

Conduit (flying leads)

Core: HDA 47ZG-A
- white: Signal -
- brown: Signal +
- green: n.c.
- yellow: n.c.

Areas of application:

<table>
<thead>
<tr>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>c-CSAus: Explosion Proof - Seal not required</td>
</tr>
<tr>
<td>ATEX: Flame Proof</td>
</tr>
<tr>
<td>IECEx: Flame Proof</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX KEMA 10ATEX100X</td>
</tr>
<tr>
<td>CSA MC 224264</td>
</tr>
<tr>
<td>IECEx KEM 10.0053X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applications / Protection types</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA: Group A, B, C, D, T6; T5</td>
</tr>
<tr>
<td>IECEx: Flame Proof</td>
</tr>
<tr>
<td>Approvals: CSA US, CSA US</td>
</tr>
<tr>
<td>ATEX: I M2 Ex d I Mb</td>
</tr>
<tr>
<td>II 2G Ex d IIC T6, T5 Gb</td>
</tr>
<tr>
<td>II 2D Ex tb IIC T110 .. 130 °C Db</td>
</tr>
<tr>
<td>IECEx: Ex d I Mb</td>
</tr>
<tr>
<td>Ex d IIC T6, T5 Gb</td>
</tr>
<tr>
<td>Ex tb IIC T110 .. 130 °C Db</td>
</tr>
</tbody>
</table>

Model code:

HDA 4 7 Z X – A – XXXX – XXX – D X – 000 (2m)

<table>
<thead>
<tr>
<th>Mechanical process connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z = Flush membrane</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 = 1/2-14 NPT Conduit (male thread), single cores</td>
</tr>
<tr>
<td>G = 1/2-14 NPT Conduit (male thread), flying leads</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 4 .. 20 mA, 2 conductor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure ranges in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0040; 0060; 0100; 0250; 0400; 0600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>G01 = G1/2 A, DIN 3852</td>
</tr>
<tr>
<td>G02 = G1/2 with additional front O-ring seal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>D = CSA Explosion Proof – Seal not required</td>
</tr>
<tr>
<td>ATEX Flame Proof</td>
</tr>
<tr>
<td>IECEx Flame Proof</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of measurement cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar</td>
</tr>
<tr>
<td>V = Vented Gauge (vented to atmosphere) ≤ 16 bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>000 = Standard</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cable length in m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard = 2 m</td>
</tr>
</tbody>
</table>

Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

* optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"
**Description:**
The HYDAC HFS 2100 flow switch in ATEX version has been specially developed for use in potentially explosive atmospheres. Like the standard version it is based on the variable area float principle, and can be mounted in any position.

The test medium moves a spring-loaded float in the direction of flow, depending on the flow rate. A fully encapsulated reed contact is fitted to the outside of the instrument and is therefore separate from the flow circuit. When the magnet inside the float reaches the preset position, the reed contact switches.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

**Protection types and applications:**
- II 2G Ex mb IIC T6 / T5
- II 2D Ex tD A21 IP67 T80 °C / T100 °C

**Medium:**
- Oils / viscous fluids

**Special features:**
- Accuracy ≤ ± 10 % FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- Certificate: PTB 03 ATEX 2159 X
- PTB 03 ATEX N056-3

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th>Size 1</th>
<th>Size 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching ranges [l/min]</td>
<td>0.5 .. 1.6</td>
<td>0.5 .. 1.5</td>
</tr>
<tr>
<td></td>
<td>0.8 .. 3.0</td>
<td>1 .. 4</td>
</tr>
<tr>
<td></td>
<td>2.0 .. 7.0</td>
<td>2 .. 8</td>
</tr>
<tr>
<td></td>
<td>3 .. 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 .. 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 .. 24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 .. 30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 .. 45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 .. 60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 .. 90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 .. 110</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass version 300 bar</td>
</tr>
<tr>
<td>Stainless steel version 350 bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02 .. 0.2 bar</td>
</tr>
<tr>
<td>0.02 .. 0.4 bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>See dimensions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parts in contact with medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass version St. steel 1.4571; FPM 1); brass nickel-pl.; brass; hard ferrite</td>
</tr>
<tr>
<td>Stainless steel version Stainless steel 1.4571; FPM 1); hard ferrite</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching outputs 1 or 2 Reed contacts</td>
</tr>
<tr>
<td>Change-over or normally open type 2)</td>
</tr>
<tr>
<td>Accuracy 3) ≤ ± 10 % FS</td>
</tr>
<tr>
<td>Repeatability 2 % FS max.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switching capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change-over contact max. 250 V / 1 A / 30 W</td>
</tr>
<tr>
<td>Back-up fuse 1 A (outside the hazardous area)</td>
</tr>
<tr>
<td>N/O contact max. 250 V / 2 A / 60 W</td>
</tr>
<tr>
<td>Back-up fuse 2 A (outside the hazardous area)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range T6 / T80 °C: -20 .. +75 °C</td>
</tr>
<tr>
<td>T5 / T100 °C: -20 .. +90 °C</td>
</tr>
<tr>
<td>Fluid temperature range T6 / T80 °C: -20 .. +75 °C</td>
</tr>
<tr>
<td>T5 / T100 °C: -20 .. +90 °C</td>
</tr>
<tr>
<td>Max. surface temperature T6 / T80 °C: +75 °C</td>
</tr>
<tr>
<td>T5 / T100 °C: +90 °C</td>
</tr>
<tr>
<td>Viscosity range 30 .. 600 cSt</td>
</tr>
</tbody>
</table>

**- mark**
- Directive 2006 / 95 / EC
- Directive 2004 / 108 / EC
- Directive 94 / 9 / EC
- EN 60079-0:2006 / EN 60079-18:2004
- EN 61241-0:2006 / EN 61241-1:2004

Protection class to IEC 60529 IP 67

**Other data**
- Housing material Brass (nickel-plated) or stainless steel 1.4571
- Electrical connection Flying leads (2 m cable length)

Note:
1) Other seal materials available on request
2) The contact opens / switches when the flow falls below the pre-set switching point.
3) 3% possible with calibration to a certain viscosity
**Pin assignment:**

**Flying leads**

<table>
<thead>
<tr>
<th>Core</th>
<th>HFS 21X1-XS</th>
<th>HFS 21X1-XW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/O contact</td>
<td>Centre</td>
</tr>
<tr>
<td>2</td>
<td>N/C contact</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>N/O contact</td>
<td></td>
</tr>
</tbody>
</table>

**Notes on installation:**

- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

**Safety instructions:**

- The circuits must not incorporate any effective inductance or capacitance.
- The maximum ratings stipulated in the technical data must never be exceeded, not even for a short time.
- To protect the switching contact, a fuse for the circuit must be provided outside the hazardous area, unless the switching unit is connected to an intrinsically safe circuit.
- Unless the device is connected to an intrinsic safe circuit, special safety precautions have to be implemented.
- The device may be used in hazardous areas designated as category 2.
- The device must not be used in areas where there is a possibility that an electrostatic charge can be caused in the plastic housing.
- The device must not be used in machinery, systems or medical apparatus where, in the event of a malfunction, persons, animals or equipment could be harmed or damaged.

**Model code:**

HFS 2 1 X 1 – XX – XXXX–XXXX – 7 – X – X – A00

**Measuring principle**

2 = Variable area float

**Test medium**

1 = Oils / viscous fluids

**Mechanical connection**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>3/8&quot;</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

**Electrical connection**

1 = Flying leads (2m in length)

**Switching contacts**

1S = 1 N/O contact
2S = 2 N/O contacts
1W = 1 Change-over contact
2W = 2 Change-over contacts

**Switching ranges in l/min**

- **Oil 10 % -Size 1-**
  00.5-01.6; 00.8-03.0; 02.0-07.0
- **Oil 10 % - Size 2-**
  00.5-01.5; 0001-0004; 0002-0008; 0003-0010; 0005-0015; 0008-0024; 0010-0030; 0015-0045; 0020-0060; 0030-0090; 0035-0110

**Accuracy**

7 = ≤ 10.0 % FS

**Housing material**

B = Brass (nickel-plated)
S = Stainless steel

**Mechanical indicator**

0 = Without indicator
1 = With indicator

**Modification number**

A00 = ATEX version for potentially explosive areas

- Mechanical connection options depend on housing type (see Dimensions).
- If the model with 2 switching contacts is selected, the second contact is mounted on the side of the instrument, at 90° to the first contact.
- Other models available on request.

**Note:**

Special models on request.
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.
## Dimensions without indicator:

**OIL - Size 1 - without indicator**

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.6</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>27</td>
</tr>
<tr>
<td>0.8 .. 3.0</td>
<td>15</td>
<td>27</td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td>15</td>
<td>27</td>
</tr>
</tbody>
</table>

*) Standard

**OIL - Size 2 - without indicator**

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.5</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>1 .. 4</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>2 .. 8</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>3 .. 10</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>8 .. 24</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>10 .. 30</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>15 .. 45</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>20 .. 60</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>30 .. 90</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>35 .. 110</td>
<td>25</td>
<td>40</td>
</tr>
</tbody>
</table>

*) Standard
Dimensions with indicator:

### OIL -Size 1- with indicator

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.6</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>0.8 .. 3.0</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td>25</td>
<td>40</td>
</tr>
</tbody>
</table>

### OIL -Size 2- with indicator

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>SW</td>
</tr>
<tr>
<td>0.5 .. 1.5</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>1 .. 4</td>
<td>15</td>
<td>34</td>
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<td>20</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td>1 .. 8</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>3 .. 10</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>5 .. 15</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>10 .. 24</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>15 .. 30</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>20 .. 45</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>30 .. 60</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>35 .. 110</td>
<td>15</td>
<td>34</td>
</tr>
</tbody>
</table>

*) Standard

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The HYDAC HFS 2500 flow switch in ATEX version has been specially developed for use in potentially explosive atmospheres. Like the standard version it is based on the variable area float principle, and can be mounted in any position. The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A fully encapsulated reed contact is fitted to the outside of the device and is therefore separate from the flow circuit. When the magnet inside the float reaches the preset position, the reed contact switches.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

Protection types and applications:
II 2G Ex mb II T6 / T5
II 2D Ex tD A21 IP67 T80 °C / T100 °C

Medium:
- Water / water-based media

Special features:
- Accuracy ≤ ± 5 % or ≤ ± 10 % FS
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- Certificate:
  - PTB 03 ATEX 2159 X
  - PTB 03 ATEX N056-3

Technical data:

### Input data

<table>
<thead>
<tr>
<th>Switching ranges [l/min]</th>
<th>5 % accuracy</th>
<th>10 % accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Size 2</td>
<td>Size 3</td>
</tr>
<tr>
<td>0.2 .. 4.0</td>
<td>8 .. 90</td>
<td>0.02 .. 0.2</td>
</tr>
<tr>
<td>0.6 .. 5.0</td>
<td>5 .. 110</td>
<td>0.2 .. 0.6</td>
</tr>
<tr>
<td>0.5 .. 8.0</td>
<td>10 .. 150</td>
<td>0.4 .. 1.8</td>
</tr>
<tr>
<td>1 .. 14</td>
<td>35 .. 220</td>
<td>0.8 .. 3.2</td>
</tr>
<tr>
<td>1 .. 28</td>
<td>35 .. 250</td>
<td>2 .. 7</td>
</tr>
<tr>
<td>2 .. 40</td>
<td>3 .. 13</td>
<td></td>
</tr>
<tr>
<td>4 .. 55</td>
<td>4 .. 20</td>
<td></td>
</tr>
<tr>
<td>1 .. 70</td>
<td>8 .. 30</td>
<td></td>
</tr>
</tbody>
</table>

### Operating pressure

| Brass version | 200 bar | 300 bar | 250 bar |
| Stainless steel version | 300 bar | 350 bar | 300 bar |

| Pressure drop [bar] | 0.02 .. 0.8 | 0.02 .. 0.3 | 0.02 .. 0.4 |

### Mechanical connection

See dimensions

### Parts in contact with medium

Brass version
- Stainless steel 1.4571;
- NBR 1)
- Brass; nickel-plated
- Brass

Stainless steel version
- Stainless steel 1.4571;
- FPM 1)
- Hard ferrite

### Output data

<table>
<thead>
<tr>
<th>Switching outputs</th>
<th>1 or 2 reed contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change-over or normally open type</td>
<td>2)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>≤ ± 5 % or ≤ ± 10 % FS</td>
</tr>
<tr>
<td>Repeatability</td>
<td>2 % FS max.</td>
</tr>
</tbody>
</table>

### Switching capacity

| Change-over contact | max. 250 V / 1 A / 30 W |
| N/O contact         | max. 250 V / 2 A / 60 W |

| Back-up fuse 1 A (outside the hazardous area) | 0.02 .. 0.8 |
| Back-up fuse 2 A (outside the hazardous area) | 0.02 .. 0.3 |

### Environmental conditions

| Operating temperature range | T6 / T80 °C: -20 .. +75 °C |
| Fluid temperature range     | T5 / T100 °C: -20 .. +90 °C |

| Max. surface temperature   | T6 / T80 °C: +75 °C |
|                            | T5 / T100 °C: +90 °C |

### Mark

- Directive 2006 / 95 / EC
- Directive 2004 / 108 / EC
- Directive 94 / 9 / EC
- EN 60079-0:2006 / EN 60079-18:2004
- EN 61241-0:2006 / EN 61241-1:2004

| Protection class to IEC 60529 | IP 67 |

### Other data

| Housing material | Brass (nickel-plated) or stainless steel 1.4571 |
| Electrical connection | Flying leads (2 m cable length) |

Note.: FS (Full Scale) = relative to the complete measuring range
1) Other seal materials available on request
2) The contact opens / switches when the flow falls below the pre-set switching point.
Model code: HFS 2 5 X 1 – XX – XXXX–XXXX – X – X – X – A00

Measuring principle
2 = Variable area float

Test medium
5 = Water or water-based

Mechanical connection
1 = 1/4 "
2 = 3/8 "
3 = 1/2 "
4 = 3/4 "
5 = 1 "
6 = 1 1/4 "
7 = 1 1/2 "

Electrical connection
1 = Flying leads (2m in length)

Switching contacts
1S = 1 N/O contact
2S = 2 N/O contacts
1W = 1 Change-over contact
2W = 2 Change-over contacts

Switching ranges in l/min
Water 5 %
0.02-0.2; 0.04-0.4; 0.08-0.8; 0.12-1.2; 0.16-1.6; 0.20-2.0; 0.25-2.5; 0.30-3.0

Water 10 % -Size 2-
0.02-0.2; 0.04-0.4; 0.08-0.8; 0.12-1.2; 0.16-1.6; 0.20-2.0; 0.25-2.5; 0.30-3.0

Water 10 % - Size 3 -
0.01-0.1; 0.02-0.2; 0.04-0.4; 0.08-0.8; 0.12-1.2; 0.16-1.6; 0.20-2.0; 0.25-2.5; 0.30-3.0

Accuracy
6 = ≤ 5.0 % FS
7 = ≤ 10.0 % FS

Housing material
B = Brass, nickel-plated
S = Stainless steel

Mechanical indicator
0 = Without indicator
1 = With indicator

Modification number
A00 = ATEX version for potentially explosive areas

Notes on installation:
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors).

Safety instructions:
- The circuits must not incorporate any effective inductance or capacities.
- The maximum ratings stipulated in the technical data must never be exceeded, even for a short time.
- To protect the switching contact, a fuse for the circuit must be provided outside the hazardous area, unless the switching unit is connected to an intrinsically safe circuit.
- Unless the device is connected to an intrinsic safe circuit, special safety precautions have to be implemented.
- The device may be used in hazardous areas designated as category 2.
- The device must not be used in areas where an electrical charge in the plastic housing is likely.
- The device must not be used in machinery, systems or medical apparatus where, in the event of a malfunction, persons, animals or equipment could be harmed or damaged.
Dimensions without indicator:

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
</tr>
<tr>
<td>Water 5% accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2 .. 4.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.6 .. 5.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.5 .. 8.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>1 .. 14</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>1 .. 28</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>2 .. 40</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>4 .. 55</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>1 .. 70</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>8 .. 90</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>5 .. 110</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>10 .. 150</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>35 .. 220</td>
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<td>30</td>
</tr>
<tr>
<td>35 .. 250</td>
<td>27</td>
<td>30</td>
</tr>
</tbody>
</table>

Water 10% Accuracy - Size 2 -

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
</tr>
<tr>
<td>0.02 .. 0.2</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>0.2 .. 0.6</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>0.4 .. 1.8</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>0.8 .. 3.2</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>2.0 .. 7.0</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>3.0 .. 13.0</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>4.0 .. 20.0</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>8.0 .. 30.0</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>

Water 10% Accuracy - Size 3 -

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
</tr>
<tr>
<td>10 .. 30</td>
<td>34</td>
<td>47</td>
</tr>
<tr>
<td>15 .. 45</td>
<td>34</td>
<td>47</td>
</tr>
<tr>
<td>20 .. 60</td>
<td>34</td>
<td>47</td>
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<tr>
<td>30 .. 90</td>
<td>34</td>
<td>47</td>
</tr>
<tr>
<td>60 .. 150</td>
<td>34</td>
<td>47</td>
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</tbody>
</table>

\* Standard
**Dimensions with indicator:**

<table>
<thead>
<tr>
<th>Type [l/min]</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SW</td>
<td>D</td>
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<tr>
<td>Water 5 % accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2 .. 4.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.6 .. 5.0</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>0.5 .. 8.0</td>
<td>32</td>
<td>35</td>
</tr>
<tr>
<td>1 .. 14</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>1 .. 28</td>
<td>40</td>
<td>40</td>
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<td>2 .. 40</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>4 .. 55</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

**Water 10 % Accuracy - Size 2-**

<table>
<thead>
<tr>
<th>Type</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02 .. 0.2</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>0.2 .. 0.6</td>
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<tr>
<td>0.4 .. 1.8</td>
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<td>30</td>
</tr>
<tr>
<td>0.8 .. 3.2</td>
<td>30</td>
<td>30</td>
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<tr>
<td>2.0 .. 7.0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>3.0 .. 13.0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>4.0 .. 20.0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>8.0 .. 30.0</td>
<td>30</td>
<td>30</td>
</tr>
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</table>

**Water 10 % Accuracy - Size 3-**

<table>
<thead>
<tr>
<th>Type</th>
<th>Installation dimensions [mm]</th>
<th>Weight (approx.) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 .. 30</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>15 .. 45</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>20 .. 60</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>30 .. 90</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>60 .. 150</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Note: The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
DISPLAY AND MONITORING UNITS

The universal display unit HDA 5500 provides the means of visualising and further processing the signals from our sensors. The unit is designed for front panel mounting with a standard 92 x 45 mm cut-out.

Universal display unit for general applications:

| HDA 5500 | 313 |
Description:
The digital display units in the HDA 5500 series are microprocessor-controlled display and monitoring instruments designed for control panel installation.
Different versions are available with a maximum of 3 analogue inputs, an analogue output (4 .. 20 mA or 0 .. 10V) and up to 4 relay outputs.
The analogue input signals are displayed according to the settings selected by the user.
Each of the relay outputs can be allocated to each of the sensor inputs or to the differential between input 1 and 2.
A PT 100 temperature probe can be connected directly to the instrument. There is also an option for frequency measurement using the HDS 1000 (HYDAC rpm probe), for example to measure the speed of rotating components.
Depending on the model, it is also possible to connect SMART sensors (condition monitoring sensors). SMART sensors are a generation of sensors from HYDAC which can transmit several different measured values.

Special features:
- Digital display of analogue signals
- Clear 4-digit 7-segment LED display
- Up to 3 analogue inputs (4 .. 20 mA, 0 .. 10 V or 0 .. 5 V)
- Accuracy ≤ ± 0.5 %
- Differential measurement possible
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Up to 4 relay switching outputs
- RS 232 interface
- Voltage supply
  12 .. 32 V DC or
  85 .. 265 V AC 50 / 60 Hz
- Option for PT100 sensor input or frequency input
**Input models:**

<table>
<thead>
<tr>
<th>Analogue transm.</th>
<th>HDA 5500-0-...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue seq.</td>
<td></td>
</tr>
</tbody>
</table>

**Display range**

- 4-digit 7-segment LED display, red, height of digits 14.2 mm
- 3 LEDs for active sensor, 4 LEDs for switch points

**Display range**

- -999 .. 9999 (user-adjustable)

**Display units with background lighting**

- bar, kg/cm², MPa, psi, °C, °F, mA, V, Hz, kN, m, mm, inch, l, l/min, gal, gal/min, 1/min, %, t

**Input data**

**Analogue signal input(s)**

- Measuring range(s): select: 4 .. 20 mA, 0 .. 5 V, 0 .. 10 V or (up to 3 analogue inputs) 4 .. 20 mA sequential (Modification 006)

**Accuracy**

- ≤ ± 0.5 % at 25 °C

**PT 100 input**

- Measuring range: - 25 .. 100 °C

**Accuracy**

- ≤ ± 0.5 % at 25 °C

**Frequency/counter input**

- Signal threshold: 0 .. 0.6 V = LOW, 3 .. 24 V = HIGH
- Frequency range: 15 Hz to 24 kHz

**Output data**

**Analogue output**

- 4 .. 20 mA, load resistance ≤ 400 Ω or 0 .. 10 V, load resistance ≥ 2 kΩ

**Accuracy**

- ≤ ± 0.5 % at 25 °C

**Rise time**

- 70 ms

**Switching outputs**

- Type: 2 or 4 relays each with separate common supply
- Switching voltage: 0.1 .. 250 V AC
- Switching current: 9 mA .. 2 A
- Switching capacity: 400 VA, 50 W (for inductive load, use varistors)

**Life expectancy of switch contacts**

- ≥ 20 million cycles at minimum load
- ≥ 1 million cycles at maximum load

**Reaction time**

- (with switching delay = 0 ms) approx. 20 ms

**Setting range of switch points**

- 1.5 .. 100 % of the pre-set display range

**Setting range of the switching hystereses (switch-back points)**

- 0.5 .. 99 % of the pre-set display range

**Interface**

- Serial interface: RS 232, Baud rate 19200 Bauds; 8 data bits; 2 stop bits; no parity; no handshake

**Environmental conditions**

- Nominal temperature range: 0 .. +50 °C
- Operating temperature range: 0 .. +50 °C
- Storage temperature range: - 40 .. +80 °C
- mark: EN 61000-6-1 / 2 / 3 / 4

**Other data**

- Housing: control panel housing 96 x 48 x 109 mm; control panel cut-out (92 +0.8) x 45 +0.6 mm; front panel thickness 1.25 .. 15 mm; maximum installation depth 121 mm
- Supply voltage: 12 .. 32 V DC or 85 .. 265 V AC, 50 / 60 Hz
- Power consumption: 15 VA at 85 .. 230 V AC – fuse protection 1 AT
- Supply of the meas. transmitter: 12 V DC ± 1 %; max. 20 mA / analogue input
- Residual ripple of supply voltage: ≤ 5 %
- Weight: approx. 320 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
### Model code:

**HDA 5 5 0 0 – X – X – XX – 00X**

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>One analogue input</td>
</tr>
<tr>
<td>1</td>
<td>Three analogue inputs</td>
</tr>
<tr>
<td>2</td>
<td>One analogue input + frequency input / counter function</td>
</tr>
<tr>
<td>3</td>
<td>One analogue input + PT 100 input</td>
</tr>
</tbody>
</table>

### Inputs

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 analogue output</td>
</tr>
<tr>
<td>1</td>
<td>1 analogue output + 2 relay outputs</td>
</tr>
<tr>
<td>2</td>
<td>1 analogue output + 4 relay outputs</td>
</tr>
</tbody>
</table>

### Outputs

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 analogue output</td>
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<td>1</td>
<td>1 analogue output + 2 relay outputs</td>
</tr>
<tr>
<td>2</td>
<td>1 analogue output + 4 relay outputs</td>
</tr>
</tbody>
</table>

### Supply voltage

- **AC**: 85 .. 265 V AC
- **DC**: 12 .. 32 V DC

### Modification

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>Standard</td>
</tr>
<tr>
<td>006</td>
<td>Model with sequential analogue input for HLB 1300 and CS 1000 (only possible on input model &quot;0&quot; and output model &quot;2&quot;)</td>
</tr>
</tbody>
</table>

### Dimensions:

[Diagram showing dimensions]

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### Notes:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
SERVICE INSTRUMENTS

Our service instruments have been specially developed for use in servicing, maintenance and the laboratory, as well as for commissioning. All commonly available sensors (e.g. pressure, temperature, flow rate, condition monitoring, ...) with a very wide range of output signals can be connected to these instruments.

Service instruments for general applications:

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMG 500</td>
<td>317</td>
</tr>
<tr>
<td>HMG 510</td>
<td>319</td>
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<tr>
<td>HMG 3010</td>
<td>321</td>
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<tr>
<td>HDA 4748-H (Accessories)</td>
<td>325</td>
</tr>
<tr>
<td>ETS 4148-H (Accessories)</td>
<td>327</td>
</tr>
<tr>
<td>EVS 3100-H (Accessories)</td>
<td>329</td>
</tr>
</tbody>
</table>
Description:
The HMG 500 is a portable measuring instrument for simple measuring tasks in fluid technology such as hydraulics, pneumatics, lubrication, process, refrigeration and air conditioning.

Up to two sensors with the HYDAC Sensor Interface (HSI) can be connected to the HMG 500 to measure pressure, temperature or flow rate (except for SMART sensors). The HMG 500 automatically recognises these sensors and takes all of the necessary basic settings from each sensor. The measurement values and the corresponding physical unit are displayed on an easy-to-read LCD display.

In addition, the HMG 500 offers a wealth of other advantages over mechanical pressure gauges, for example, for measuring pressure on machines and systems. The user benefits from a technologically high level of measuring accuracy and dynamics.

The HMG 500 measures values at a very high sampling rate. It can therefore record and display pressure peaks in the maximum value memory or rapid pressure discharges in the minimum value memory, for example.

Furthermore, differential measurements can be carried out using two sensors of a similar type, to calculate pressure drops or temperature differentials.

To further extend the application range, HMG 500 has a function for setting mechanical pressure and temperature switches precisely and reliably.

Compact, simple and versatile - the HMG 500 is an invaluable tool for all those involved in maintenance, commissioning and service.

Special features:
- Portable 2-channel data recorder
- Simple and user-friendly key operation
- Large LCD display including battery status indication
- 2 sensor inputs, automatic sensor recognition
- Measuring range and unit of measurement of the sensors connected to it are recognised automatically
- Zeroing (taring) of the individual measurement channels
- Display of the actual measured values
- Display of the differential (channel A minus channel B)
- Minimum or maximum value indication, with reset function
- Setting device for mechanical pressure and temperature switches
Technical data:

Measurement inputs: 2 analogue inputs for HYDAC measurement transmitters with HSI interface (except for SMART sensors**)

Accuracy*: ≤ ± 0.1 % FS max.

Functions:
- Automatic recognition of measuring range and unit of measurement
- Taring of the measuring channels
- Display of the actual meas. value
- Min./max. indication
- Reset of the min./max. values
- Measured values differential channel A - channel B
- Display of units, selectable
- Setting device for mechanical pressure and temperature switches

Display: 4-digit 7 segment LCD display with battery status indication; 2 measurement values incl. unit displayed simultaneously

Measurement unit: Selectable (depending on the sensors connected to HMG)
- Pressure: bar, psi, MPa
- Temperature: °C, K, °F
- Flow rate: l/min, gallon/min (1 US gallon = 3.7853 l)

Sampling rate: 0.1 ms

Resolution: 12 bit

CE mark: EN 61000-6-1 / 2 / 3 / 4

Safety: EN 61010

Protection class: IP 54

Voltage supply:
- 9 V battery
- Oper. time: approx. 10 h (with 2 sensors)
- Euro plug power supply (230 V AC) (available as an accessory)

Environmental conditions:
- Operating temp.: +5 .. +60 °C
- Storage temp.: -40 .. +70 °C
- Rel. humidity: 0 .. 70 %

Weight: 410 g

Ordering details:

HMG 500 - 000
Items supplied:
- HMG 500
- Operating manual D/E/F
- 9 V battery

HMG 500-Set 01
Items supplied:
- HMG 500
- Operating manual D/E/F
- 9 V battery
- HDA 4748-H-0600-000
- ZBE 30-02, sensor cable M12x1, 2 m
- Connection adapter G1/4 female to Minimess 16X2
- Case for HMG 500 / 510

HMG 500-Set 02
Items supplied:
- HMG 500
- Operating manual D/E/F
- 9 V battery
- 2 off HDA 4748-H-0600-000
- 2 off ZBE 30-02, sensor cable M12x1, 2 m
- 2 off connection adapter G1/4 female to Minimess 16X2
- Case for HMG 500 / 510

Accessories:
Appropriate accessories, such as electrical and mechanical connection adapters, power supply, etc. can be found in the Accessories brochure.

Examples of main accessories:
- Pressure transmitter
  HDA 4000 with HSI interface
  Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar, 0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar

- Temperature transmitter
  ETS 4000 with HSI interface
  Measuring range: -25 .. 100 °C

- Flow rate transmitter
  EVS 3000 with HSI interface
  Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min, 15 .. 300 l/min, 40 .. 600 l/min

- Sensor simulator
  SSH 1000, ideal for training purposes

- Electrical connection adapter
  UVM 3000, for mechanical pressure and temperature switches

- Hydraulic adapters

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Ordering details:

HMG 500 - 000
Items supplied:
- HMG 500
- Operating manual D/E/F
- 9 V battery

HMG 500-Set 01
Items supplied:
- HMG 500
- Operating manual D/E/F
- 9 V battery
- HDA 4748-H-0600-000
- ZBE 30-02, sensor cable M12x1, 2 m
- Connection adapter G1/4 female to Minimess 16X2
- Case for HMG 500 / 510

HMG 500-Set 02
Items supplied:
- HMG 500
- Operating manual D/E/F
- 9 V battery
- 2 off HDA 4748-H-0600-000
- 2 off ZBE 30-02, sensor cable M12x1, 2 m
- 2 off connection adapter G1/4 female to Minimess 16X2
- Case for HMG 500 / 510

Accessories:
Appropriate accessories, such as electrical and mechanical connection adapters, power supply, etc. can be found in the Accessories brochure.

Examples of main accessories:
- Pressure transmitter
  HDA 4000 with HSI interface
  Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar, 0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar

- Temperature transmitter
  ETS 4000 with HSI interface
  Measuring range: -25 .. 100 °C

- Flow rate transmitter
  EVS 3000 with HSI interface
  Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min, 15 .. 300 l/min, 40 .. 600 l/min

- Sensor simulator
  SSH 1000, ideal for training purposes

- Electrical connection adapter
  UVM 3000, for mechanical pressure and temperature switches

- Hydraulic adapters

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Description:
The HMG 510 is a hand-held instrument for simple measurement tasks on hydraulic and pneumatic systems in mobile and industrial applications. Compact and simple to use, the HMG 510 is an ideal tool for all those involved in maintenance, commissioning and service.

Up to two sensors with the HYDAC Sensor Interface (HSI) can be connected to the HMG 510. Sensors are available to measure pressure, temperature and flow rate as well as sensors for condition monitoring (also known as SMART sensors). Some examples of SMART sensors are the HYDACLAB® Oil Condition Sensor, the AS 1000 AquaSensor and the CS 1000 Contamination Sensor.
The HMG 510 automatically recognises these sensors and takes all the necessary basic settings from each sensor.
The measurement values and the corresponding physical unit are displayed on an easy-to-read LCD display.

In addition to this, the HMG 510 enables measured values which have been saved in the SMART sensors to be uploaded to a PC. With the aid of the HYDAC PC software "CMWIN", the measurement data stored in the SMART sensors can be displayed on a PC screen in the form of a graph, then analysed, edited and saved.
The HMG has a standard integrated USB port to enable this data transfer.

To further extend the application range, the HMG 510 has a function for setting mechanical pressure and temperature switches precisely and reliably.

Special features:
- Portable 2-channel data recorder
- Simple and user-friendly key operation
- Large LCD display including battery status indication
- 2 sensor inputs, automatic sensor recognition
- Specially designed to display measured values from condition monitoring sensors (SMART sensors)
- Measuring range and unit of measurement of the sensors connected to it are recognised automatically
- Zeroing (taring) of the individual measurement channels
- Display of the actual measured values
- Display of the differential (channel A minus channel B)
- Min. or max. value indication, with reset function
- Setting device for mechanical pressure and temperature switches
- USB port
**Technical data:**

| Measurement inputs | 2 analogue inputs for HYDAC measurement transmitters with HSI interface and SMART sensors |
| Accuracy* | ≤ ± 0.1 % FS max. |
| Functions | ● Automatic recognition of measuring range and unit of measurement   |
|            | ● Taring of the measuring channels  |
|            | ● Display of the actual measured value  |
|            | ● Min./max. indication  |
|            | ● Reset of the min./max. values  |
|            | ● Measured values differential channel A - channel B  |
|            | ● Display of units, selectable  |
|            | ● Setting device for mechanical pressure and temperature switches  |
|            | ● Communication bridge to a connected PC  |

| Display | 4-digit 7 segment LCD display with battery status indication, 2 measured values incl. unit displayed simultaneously |

| Measurement unit (depending on the sensors connected) | Selectable for  |
| Pressure: | bar, psi, MPa  |
| Temperature: | °C, K, °F  |
| Flow rate: | l/min, gallon/min  |
| (1 US gallon = 3.7853 l) |  |
| Permanent pre-set on SMART sensors |  |

| Sampling rate | 0.1 ms |
| Resolution | 12 bit |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 |
| Safety | EN 61010 |
| Protection class | IP 54 |

| Voltage supply | 9 V battery  |
| Operating time: | approx. 10 h (with 2 sensors)**  |
| Euro plug power supply (230 V AC) available as an accessory |  |

| Environmental conditions | Operating temperature: +5 .. +60 °C  |
| Storage temperature: | -40 .. +70 °C  |
| Rel. humidity: | 0 .. 70 %  |

| Weight | 410 g |

* FS (Full Scale) = relative to complete measuring range  
**Not applicable to SMART sensors, as they require an external voltage.

**Ordering details:**

**HMG 510 - 000**

**Items supplied**

- Case for HMG 500 / 510  
- HMG 510  
- Operating manual D/E/F  
- 9 V battery  
- USB cable  
- Y adapter blue (for HLB 1300)  
- Y adapter yellow (for CS 1000)  
- ZBE 30-02, sensor cable M12x1, 2m  
- Software CD with "CMWIN"

**Accessories:**

Appropriate accessories, such as electrical and mechanical connection adapters, power supply, etc. can be found in the Accessories brochure.  
Examples of main accessories:

- **Pressure transmitter**  
  HDA 4000 with HSI interface  
  Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar, 0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar

- **Temperature transmitter**  
  ETS 4000 with HSI interface  
  Measuring range: -25 .. 100 °C

- **Flow rate transmitter**  
  EVS 3000 with HSI interface  
  Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min, 15 .. 300 l/min, 40 .. 600 l/min

- **Sensor simulator**  
  SSH 1000, ideal for training purposes

- **Electrical connection adapter**  
  UVM 3000, for mechanical pressure or temperature switches

- **Hydraulic adapters**

**Note:**

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For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

HYDAC ELECTRONIC GMBH  
Hauptstraße 27, D-66128 Saarbrücken  
Telephone +49 (0)6897 509-01, Fax +49 (0)6897 509-1726  
E-mail: electronic@hydac.com, Internet: www.hydac.com
Description:
The HMG 3010 is an impressive, top performance portable measuring and data recording device. Automated setting procedures, a simple, self-explanatory operator guide and many comprehensive functions ensure the operator is able to carry out a wide range of measuring tasks within a very short time and to work in a way which is both time-saving and cost-effective. The HMG 3010 thus quickly becomes a reliable and helpful tool in the working environment of service, maintenance, development, test rig technology, quality assurance or commissioning of systems and machines.

The HMG 3010 is designed primarily to record pressure, temperature and flow rate values which are the standard variables in hydraulics and pneumatics. For this purpose, special sensors are available, with which the variable, the measurement range and unit are automatically detected by the HMG 3010. The device also offers measurement inputs for standard sensors with current and voltage signals. In addition to the analogue inputs, the HMG 3010 also has two digital inputs (e.g. for frequency or rpm measurements).

The ability to connect the HMG 3010 to a CAN bus and thus to display messages from the CAN bus completes the range of applications. Due to the wide range of functions and its simple handling, the HMG 3010 is just as appropriate for users who take measurements only occasionally as it is for professionals for whom measuring and documentation are routine. The update capability of the HMG 3010 via the integral USB port ensures that the user can benefit from future upgrades of the device software.

Special features:
- Simple, user-friendly operation
- Practical, robust design
- Large, full-graphics colour display
- Quick and independent basic setting of the device through the use of automatic sensor recognition
- Up to 10 sensors can be connected simultaneously
- Up to 32 measurement channels can be displayed at a time
- Measuring rates up to 0.1 ms
- Extended voltage measurement -10 .. +10 V and 0 .. 50 V
- Can be connected to a CAN bus
- Very large data memory for archiving measurement curves
- Various measurement modes:
  - Normal measuring
  - Fast curve recording
  - Long term measuring
- 4 independent triggers, can be logically linked
- PC connection
  - USB
  - RS 232
- Convenient visualisation, archiving and data processing using the HMGWIN 3000 and CMWIN software supplied
Function:
- Clear and graphical selection menus guide the operator very simply to all the device functions available. A navigation pad on the keypad ensures rapid operation.
- The HMG 3010 can monitor signals from up to ten sensors simultaneously. For this there are 5 robust standard input sockets. By using Y adapters, the number of inputs can be doubled individually to make a total of between 6 and 10.
- Up to 8 sensors can be connected to 4 of these input sockets:
  - 8 sensors (e.g., for pressure, temperature, and flow rate) with the special digital HSI interface (HYDAC Sensor Interface); this means the basic device settings (measured variable, range, and unit of measurement) are undertaken automatically
  - 8 standard analogue sensors with current and voltage signals
  - 4 Condition Monitoring sensors*) (SMART sensors); again, the basic device settings are carried out automatically
- Frequency measurements, counter functions, or triggers for data logging can be implemented via the fifth input socket with 2 digital inputs.
- For extended voltage measurement, the HMG 3010 offers the possibility of recording signals of 0 .. 50 V on two inputs and a signal of -10 .. +10 V on one input (e.g., proportional valve control).
- The connection to a CAN bus in conjunction with the CAN adapter ZBE 3010 makes it possible to record CAN messages (e.g., motor speed, motor oil pressure) in combination with measured data from the hydraulic system.
- HYDAC CAN bus sensors connected directly to the CAN adapter can be parameterized using the HMG 3010 (node ID and baud rate)
- All input channels can operate simultaneously at a measurement rate of 0.5 ms (1.0 ms for SMART sensors). To record highly dynamic processes, 2 analogue inputs are capable of recording measured values of 0.1 ms.
- The most impressive function of the HMG 3010 is its ability to record dynamic processes “online”, i.e., in real-time, as a measurement curve and to render them as graphs in the field.

- The data memory for recording curves or logs can hold up to 500,000 measured values. At least 100 such full-length data records can be stored in an additional archive memory.
- For specific, event-driven curves or logs, the HMG 3010 has four independent triggers, which can be linked together logically.
- It is also possible to determine differential values between different input signals from sensors. Particularly when measuring flow rate by means of differential pressure measurement across a measuring orifice, the accuracy can be significantly improved by using a stored calibration curve. To generate such calibration curves, the HMG 3010 has an easy-to-use handheld recording function.
- User-specific device settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings.

- Measured values, curves or texts are visualized on a full-graphics colour display in different selectable formats and display forms.
- Numerous useful and easy-to-use auxiliary functions are available, e.g., zoom, ruler tool, differential value graph creation and individual scaling, which are particularly for use when analysing the recorded measurement curves.

- The HMG 3010 communicates with a PC via the built-in USB port or RS 232 port.
HMGWIN 3000:
The PC software HMGWIN 3000 is also supplied with the device. This software is a convenient and simple package for analysing and archiving curves and logs which have been recorded using the HMG 3010, or for exporting the data for integration into other PC programs if required. It is also possible to operate the HMG 3010 directly from the computer, to undertake basic settings, and to start measurements online and display them directly on the PC screen as measurement curve progressions.

CMWIN:
The HYDAC software CMWIN is also supplied with the device. This software enables you to communicate directly with SMART sensors *) connected to the HMG 3010 from your PC.

Both programs can be run on PCs with Windows Vista / XP / 2000 and Windows 7 operating systems.

Some examples of the numerous useful additional functions:
- **Transfer and archiving** of measurements recorded using the HMG 3010
- **Display of the measurements in graph form or as a table**

![Fig.: Zoomed section of measurement curve](image1)

- **Zoom function:** Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed.

- **Accurate measurement** of the curves using the ruler tool (time values, amplitude values, and differentials)

- **Individual comments** and measurement information can be inserted into the graph

- **Overlay** of curves, for example to document the wear of a machine (new condition/current condition)

- **Using mathematical operations** (calculation functions, filter functions) new curves can be added.

- **Snap-shot function:** comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a jpg file.

- **A professional measurement report** can be produced at the click of a mouse: HMGWIN 3000 has an automatic layout function. Starting with a table of contents, all recorded data, descriptions, and graphics and/or tables are combined into a professional report and saved as a pdf file.

- **Online function:** Starting, recording, and online display of measurements (similar to the function of an oscilloscope)

- **Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph )**

*) SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC which can provide a variety of different measured values.
Technical data:

**Meas. inputs**
- 4 input sockets (channels A-H) for connecting up to 8 analogue sensors or up to 4 SMART sensors.
- 1 input socket with 2 digital inputs (channels I-J) and one voltage input of -10 V to +10 V (shown on channel H).

Sensors are connected using standard M12x1 male connectors (5 pole).

<table>
<thead>
<tr>
<th>Channels A, B, E, F, G</th>
<th>Accuracy</th>
<th>Measuring range</th>
<th>FS (± % FS max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSI</td>
<td></td>
<td>4 .. 20 mA</td>
<td>± 0.1 % FS max.</td>
</tr>
<tr>
<td>0 .. 20 mA</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 4.5 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 5 V</td>
<td></td>
<td>± 0.2 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 10 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0.5 .. 4.5 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0.5 .. 5.5 V</td>
<td></td>
<td>± 0.2 % FS max.</td>
<td></td>
</tr>
<tr>
<td>1 .. 5 V</td>
<td></td>
<td>± 0.2 % FS max.</td>
<td></td>
</tr>
<tr>
<td>1 .. 6 V</td>
<td></td>
<td>± 0.2 % FS max.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channels C and D</th>
<th>Accuracy</th>
<th>Measuring range</th>
<th>FS (± % FS max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSI</td>
<td></td>
<td>4 .. 20 mA</td>
<td>± 0.1 % FS max.</td>
</tr>
<tr>
<td>0 .. 20 mA</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 4.5 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 5 V</td>
<td></td>
<td>± 0.2 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 10 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0.5 .. 4.5 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0.5 .. 5.5 V</td>
<td></td>
<td>± 1.0 % FS max.</td>
<td></td>
</tr>
<tr>
<td>1 .. 5 V</td>
<td></td>
<td>± 1.0 % FS max.</td>
<td></td>
</tr>
<tr>
<td>1 .. 6 V</td>
<td></td>
<td>± 1.0 % FS max.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channel H</th>
<th>Accuracy</th>
<th>Measuring range</th>
<th>FS (± % FS max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSI</td>
<td></td>
<td>4 .. 20 mA</td>
<td>± 0.1 % FS max.</td>
</tr>
<tr>
<td>0 .. 20 mA</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 4.5 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 5 V</td>
<td></td>
<td>± 0.2 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0 .. 10 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0.5 .. 4.5 V</td>
<td></td>
<td>± 0.1 % FS max.</td>
<td></td>
</tr>
<tr>
<td>0.5 .. 5.5 V</td>
<td></td>
<td>± 2.0 % FS max.</td>
<td></td>
</tr>
<tr>
<td>1 .. 5 V</td>
<td></td>
<td>± 2.0 % FS max.</td>
<td></td>
</tr>
<tr>
<td>1 .. 6 V</td>
<td></td>
<td>± 2.0 % FS max.</td>
<td></td>
</tr>
<tr>
<td>-10 .. +10 V</td>
<td></td>
<td>± 0.5 % FS max.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channels I and J</th>
<th>Frequency range: 1 .. 30 000 Hz</th>
<th>Switching / switch-back threshold: 2 V / 1 V</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Differential channels</th>
<th>A - B</th>
<th>C - D</th>
</tr>
</thead>
</table>

Difference channel for flow rate-measurement orifice (shown on channel B).

**Measuring rate**
- 0.1 ms, max. 2 analogue input channels
- 0.2 ms, max. 4 analogue input channels
- 0.5 ms, all 10 input channels
- 1.0 ms, for SMART sensors

**Resolution**
- 12 bit

**Memory**
- At least 100 measurement curves, each with up to 500,000 measured values

**Display**
- 3.5" colour display

**Interfaces**
- 1 USB, 1 serial port

**Č Emark**
- EN 61000-1/2/3/4

**Safety**
- EN 61010

**Protection class**
- IP 40

**Ambient conditions**
- Operating temp.: 0 .. +50 °C
- Storage temp.: -20 .. +60 °C
- Rel. humidity: 0 .. 70 %

**Weight**
- 1100 g

**Note:**
FS (Full Scale) = relative to the full measuring range.

Order details:

**HMG 3010 - 000 - X**

**Operating manual and documentation**
- D = German
- E = English
- F = French

**Items supplied**
- HMG 3010
- Power supply for 90 .. 230 V AC
- Operating manual
- CD-ROM containing USB drivers, HMGWIN 3000 and CMWIN software
- USB connection cable

**Accessories:**
- CAN adapter, required for CAN bus operation (to be ordered separately)
  - ZBE 3010 CAN adapter for HMG 3010
  - Material No. 921238
- Additional accessories, such as electrical and mechanical connection adapters, power adapters, etc. can be found in the "Accessories - Service devices" catalogue section

**Dimensions:**
- Shown with protective cover open

**Note:**
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HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01, Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com, Internet: www.hydac.com
**Electronic Pressure Transmitter with HSI Sensor Recognition**

**HDA 4748-H**

### Description:
The pressure transmitter HDA 4748-H with HSI sensor recognition has been specially developed for use in conjunction with HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000. For data transmission, the HDA 4748-H has an HSI interface (HYDAC Sensor Interface). The HSI sensors are automatically recognised via the HSI interface by the above-mentioned HYDAC measuring instruments and all necessary basic device settings are taken from each sensor.

Like all pressure transmitters of the HDA 4700 series, the HDA 4748-H also has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. It combines excellent technical specifications with a very compact design.

### Special features:
- Fully automatic recognition by, and voltage supply from, HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000
- Automatic transfer of measuring range, measured value and measurement unit
- Accuracy $\leq 0.25$ % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent long term stability
- Very compact design

### Technical data:

#### Input data
- **Measuring ranges**$^1$  
  -1 .. 9; 16; 60; 100; 250; 400; 600; 1000 bar
- **Overload pressures**  
  20; 32; 120; 200; 500; 800; 1000; 1600 bar
- **Burst pressures**  
  100; 200; 300; 500; 1000; 2000; 3000 bar
- **Mechanical connection**$^1$  
  G1/4 A DIN 3852 (20 Nm)
  G1/2 DIN 3852 (40 Nm)
- **Parts in contact with medium**  
  Mech. connection: Stainless steel
  Seal: FPM

#### Output data
- **Output signal**  
  HSI (HYDAC Sensor Interface)
  Automatic sensor recognition
- **Accuracy to DIN 16086**  
  Max. setting  
  $\leq \pm 0.25$ % FS typ.
  $\leq \pm 0.5$ % FS max.
  Acc. at min. setting  
  (B.F.S.L.)  
  $\leq \pm 0.15$ % FS typ.
  $\leq \pm 0.25$ % FS max.
- **Temperature compensation**  
  $\leq \pm 0.008$ % FS / °C typ.
  Zero point  
  $\leq \pm 0.015$ % FS / °C max.
- **Temperature compensation**  
  $\leq \pm 0.008$ % FS / °C typ.
  Over range  
  $\leq \pm 0.015$ % FS / °C max.
- **Non-linearity at max. setting**  
  $\leq \pm 0.3$ % FS max.
- **Hysteresis**  
  $\leq 0.1$ % FS max.
- **Repeatability**  
  $\leq 0.05$ % FS
- **Rise time**  
  $\leq 0.5$ ms
- **Long-term drift**  
  $\leq 0.1$ % FS typ. / year

#### Environmental conditions
- **Compensated temperature range**  
  -25 .. +85 °C
- **Operating temperature range**$^2$  
  -40 .. +85 °C / -25 .. +85 °C
- **Storage temperature range**  
  -40 .. +100 °C
- **Fluid temperature range**$^2$  
  -40 .. +100 °C / -25 .. +100 °C
- **C mark**  
  EN 61000-6-1 / 2 / 3 / 4
- **Vibration resistance to**  
  DIN EN 60068-2-6 at 10 .. 500 Hz  
  $\leq 20$ g
- **Protection class to IEC 60529**  
  IP 67 (when an IP 67 connector is used)

#### Other data
- **Voltage supply**  
  via HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000
- **Life expectancy**  
  $> 10$ million cycles
  0 .. 100 % FS
- **Weight**  
  $\approx 150$ g

**Note:** Read polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range,
B.F.S.L. = Best Fit Straight Line

$^1$ 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

$^2$ -25 °C with FPM seal, -40 °C on request
### Model code:

<table>
<thead>
<tr>
<th>Mechanical connection</th>
<th>Electrical connection</th>
<th>Signal</th>
<th>Pressure ranges in bar</th>
<th>Modification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 = G1/2 DIN 3852 (male) (only for &quot;1000 bar&quot; press. range)</td>
<td>8 = Male, M12x1, 5 pole (connector not supplied)</td>
<td>= HSI (automatic sensor recognition)</td>
<td>0009; 0016; 0060; 0100; 0250; 0400; 0600 (only in conjunction with mech. conn. &quot;4&quot;) 1000 (only in conjunction with mech. connection &quot;2&quot;)</td>
<td>000 = Standard</td>
</tr>
</tbody>
</table>

**Note:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

### Dimensions:

![Diagram of the sensor with dimensions](image)

- **Mechanical connection**
  - G1/2 DIN 3852 (male)
  - G1/4 A DIN 3852 (male)

- **Electrical connection**
  - Male, M12x1, 5 pole (connector not supplied)

- **Signal**
  - HSI (automatic sensor recognition)

- **Pressure ranges in bar**
  - 0009; 0016; 0060; 0100; 0250; 0400; 0600 (only in conjunction with mech. conn. "4")
  - 1000 (only in conjunction with mech. connection "2")

- **Modification number**
  - 000 = Standard

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The electronic temperature transmitter ETS 4148-H with HSI sensor recognition has been specially developed for use in conjunction with HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000.

For data transmission, the ETS 4148-H has an HSI interface (HYDAC Sensor Interface).
The HSI sensors are automatically recognised by the above-mentioned HYDAC measuring instruments and all necessary basic settings are taken from each sensor.

Like all temperature transmitters of the ETS 4000 series, the ETS 4148-H features a robust design and excellent EMC properties. Based on corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 °C to +100 °C.

**Special features:**
- Fully automatic sensor recognition by, and voltage supply from, HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000
- Automatic transfer of measuring range, measured value and measurement unit
- Accuracy ≤ ± 0.8 % FS
- Robust design
- Excellent EMC characteristics
- Excellent long term stability
- Standard protection class IP 67

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring principle</td>
<td>PT 1000</td>
</tr>
<tr>
<td>Measuring range</td>
<td>-25 .. +100 °C</td>
</tr>
<tr>
<td>Probe length</td>
<td>6 mm</td>
</tr>
<tr>
<td>Probe diameter</td>
<td>4.5 mm</td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>600 bar</td>
</tr>
<tr>
<td>Overload pressure</td>
<td>900 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G ¼ A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>20 Nm</td>
</tr>
<tr>
<td>Parts in contact with medium</td>
<td>Mech. conn.: Stainless steel Seal: FPM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
<td>HSI (HYDAC Sensor Interface)</td>
</tr>
<tr>
<td>Automatic sensor recognition through HMG</td>
<td></td>
</tr>
<tr>
<td>Accuracy (at room temperature)</td>
<td>≤ ± 0.4 % FS typ.</td>
</tr>
<tr>
<td></td>
<td>≤ ± 0.8 % FS max.</td>
</tr>
<tr>
<td>Temperature drift (environment)</td>
<td>≤ ± 0.01 % FS / °C</td>
</tr>
<tr>
<td>Rise time to DIN EN 60751</td>
<td>t50: ~4 s</td>
</tr>
<tr>
<td></td>
<td>t90: ~8 s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-40 .. +85°C / -25 .. +85 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +100 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. 125°C / -25 .. +125 °C</td>
</tr>
<tr>
<td>CE mark</td>
<td>EN 61000-6-1 / 2 / 3 / 4</td>
</tr>
<tr>
<td>Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz</td>
<td>≤ 25 g</td>
</tr>
<tr>
<td>Protection class to IEC 60529</td>
<td>IP 67 (when an IP 67 connector is used)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical connection</td>
<td>M12x1, 5 pole</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>via HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 200 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
1) Other seal materials available on request
2) -25 °C with FPM seal, -40 °C on request
Model code:

<table>
<thead>
<tr>
<th>Mechanical connection</th>
<th>ETS 4 1 4 8 – H – 006 – 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>G1/4 A DIN 3852 (male)</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>8 = Male, M12x1, 5 pole</td>
</tr>
<tr>
<td></td>
<td>(connector not supplied)</td>
</tr>
<tr>
<td>Signal</td>
<td>H = HSI (automatic sensor recognition)</td>
</tr>
<tr>
<td>Probe length</td>
<td>006 = 6 mm</td>
</tr>
<tr>
<td>Modification number</td>
<td>000 = Standard</td>
</tr>
</tbody>
</table>

**Note:**
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Dimensions:**

[Diagram of mechanical and electrical connections with dimensions shown]

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Flow Rate Transmitter with HSI-Sensor Recognition
EVS 3100-H
EVS 3110-H

Description:
The flow rate transmitters in the series EVS 3100-H and EVS 3110-H with HSI sensor recognition have been specially developed for use in conjunction with HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000.

For data transmission, the EVS 31x0-H has an HSI interface (HYDAC Sensor Interface).

The HSI sensors are recognised automatically via the HSI interface by the above-mentioned HYDAC measuring instruments, and all the necessary basic settings are taken from each instrument.

As with all flow rate transmitters in the series EVS 3100 and EVS 3110, the EVS 31x0-H also operates according to the turbine principle. The speed of an impeller turning in the fluid flow is measured and converted into an electronic signal.

Special features:
- Fully automatic recognition by, and voltage supply from, HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000
- Automatic transfer of measuring range, measured value and measurement unit
- Viscosities of 1 .. 100 cSt
- Additional connection of temperature and / or pressure transmitters possible

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges and operating pressure</td>
</tr>
<tr>
<td>EVS 3108-H-0020 1.2 .. 20.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 3118-H-0020 1.2 .. 20.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 3108-H-0060 6.0 .. 60.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 3118-H-0060 6.0 .. 60.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 3108-H-0300 15.0 .. 300.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 3118-H-0300 15.0 .. 300.0 l/min 400 bar</td>
</tr>
<tr>
<td>EVS 3108-H-0600 40.0 .. 600.0 l/min 315 bar</td>
</tr>
<tr>
<td>EVS 3118-H-0600 40.0 .. 600.0 l/min 400 bar</td>
</tr>
</tbody>
</table>

| Additional connection options |
| 2 x G1/4 female threads for pressure and/or temperature sensors |

Output data

| Output signal |
| HSI (HYDAC Sensor Interface) |
| Automatic sensor recognition |

Accuracy

≤ 2 % of the actual value

Environmental conditions

- Compensated temperature range: -20 .. +70 °C
- Operating temperature range: -20 .. +70 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -20 .. +90 °C

Protection class to IEC 60529

IP 67 (when an IP 67 connector is used)

Other data

| Measuring medium |
| EVS 3100-H: Hydraulic oils |
| EVS 3110-H: Water-based media |

Viscosity range

1 .. 100 cSt

Calibration viscosity

EVS 3100-H: 30 cSt
EVS 3110-H: 5 cSt

Voltage supply

via HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000

Note:

1) Other measuring ranges on request
2) Other fluids on request
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Model code:

EVS 3 1 X 8 – H – XXXX – 000

Housing material
0 = Aluminium
1 = Stainless steel

Electrical connection
8 = Male M12x1, 5 pole
Connector not supplied

Signal
H = HSI (Automatic Sensor Recognition)

Measuring range
0020 = 1.2..20 l/min
0060 = 6.0..60 l/min
0300 = 15.0..300 l/min
0600 = 40.0..600 l/min

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Dimensions:

<table>
<thead>
<tr>
<th>Model</th>
<th>Meas. range [l/min]</th>
<th>L</th>
<th>H</th>
<th>D / SW</th>
<th>G</th>
<th>Torque value [Nm]</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVS 3108-H-0020</td>
<td>1.2..20</td>
<td>117</td>
<td>135</td>
<td>47/46</td>
<td>G½&quot;</td>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>EVS 3108-H-0060</td>
<td>6..60</td>
<td>144</td>
<td>135</td>
<td>48.5/46</td>
<td>G½&quot;</td>
<td>130</td>
<td>11</td>
</tr>
<tr>
<td>EVS 3108-H-0300</td>
<td>15..300</td>
<td>155</td>
<td>150</td>
<td>63.5/60</td>
<td>G1¼&quot;</td>
<td>500</td>
<td>22</td>
</tr>
<tr>
<td>EVS 3108-H-0600</td>
<td>40..600</td>
<td>181</td>
<td>150</td>
<td>63.5/60</td>
<td>G1½&quot;</td>
<td>600</td>
<td>30</td>
</tr>
<tr>
<td>EVS 3118-H-0020</td>
<td>1.2..20</td>
<td>117</td>
<td>135</td>
<td>47/46</td>
<td>G½&quot;</td>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>EVS 3118-H-0060</td>
<td>6..60</td>
<td>144</td>
<td>135</td>
<td>48.5/46</td>
<td>G½&quot;</td>
<td>130</td>
<td>11</td>
</tr>
<tr>
<td>EVS 3118-H-0300</td>
<td>15..300</td>
<td>155</td>
<td>150</td>
<td>63.5/60</td>
<td>G1¼&quot;</td>
<td>500</td>
<td>22</td>
</tr>
<tr>
<td>EVS 3118-H-0600</td>
<td>40..600</td>
<td>181</td>
<td>150</td>
<td>63.5/60</td>
<td>G1½&quot;</td>
<td>600</td>
<td>30</td>
</tr>
</tbody>
</table>
CONDITION MONITORING PRODUCTS

Condition monitoring is the process of logging and interpreting condition information from machines, systems and their components, with the aim of implementing predictive maintenance programs based on the condition of the system. The operating data of the machine or system is recorded continuously using the HYDAC sensor system. The recorded data is then analysed and interpreted. Finally this compressed condition information can be transmitted to the operator, enabling him to monitor and control the machine or system using a variety of communication channels.

Condition monitoring products from HYDAC ELECTRONIC GMBH:

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU 1000, Condition Monitoring Unit</td>
<td>333</td>
</tr>
<tr>
<td>CSI-B-2, Interface Module</td>
<td>337</td>
</tr>
<tr>
<td>HLB 1300, Oil condition sensor</td>
<td>339</td>
</tr>
<tr>
<td>AS 1000, AquaSensor</td>
<td>341</td>
</tr>
<tr>
<td>AS 3000, AquaSensor</td>
<td>343</td>
</tr>
<tr>
<td>AS 3000 IO-Link, AquaSensor</td>
<td>345</td>
</tr>
<tr>
<td>EY 1356, Contamination switch</td>
<td>347</td>
</tr>
</tbody>
</table>
Description:
The CMU1000 is an electronic evaluation unit designed for permanent online condition monitoring of machines and systems. In order to achieve this, the device must be supplied with relevant data which is recorded by the sensors connected to it. This recorded data (processed or unprocessed) can be transferred by the CMU 1000 via different ports or as an analogue value to other devices and/or monitoring levels. The CMU 1000 processes the application program stored in it continuously and cyclically like a PLC. The user creates this program simply and conveniently on a PC using the CM Editor developed for this purpose and then uploads it to the CMU 1000. The CM Editor is part of the HYDAC PC software CMWIN Version V03 or higher (supplied) and it provides the various tools and functions in accordance with IEC 61131 for designing, integrating and testing the user program using "drag and drop" operations. For status indication and for displaying messages and values on the device itself, there is a back-lit LCD display and three different coloured LEDs. The CMU 1000 is operated and data is input on site using a built-in keypad within the menu structure of the device. The CMU 1000 is designed for use in machines in both the stationary and mobile sectors. It is possible to connect easily to higher-level control, monitoring and bus systems using the built-in interfaces or in combination with an additional coupling module.

Special features:
- 8 input channels for HSI or SMART sensors
- 8 input channels for analogue sensors
- 4 input channels for digital signals
- 2 output channels for analogue signals
- 4 relay switching outputs with change-over contacts
- USB slave port for PC connection
- USB master port for storing measured data on a standard USB memory stick
- Ethernet interface
- RS 232 interface
- 2-line LCD display (2 x 16 characters) to display measured data and status and/or error messages
- 3 user-programmable LEDs in different colours, for status indication (red, yellow, green)
- Simple operation using navigation pad
- Creation of customised application program using the PC software CMWIN supplied
CM Editor:
The CM Editor is part of the HYDAC PC software CMWIN, Version 03 or higher, and provides a wide variety of tools and functions for designing, integrating and testing the application program. An application program consists of many individual functions which can be linked together. During subsequent operation, this user program is processed as for a PLC, cyclically. The program is created according to the IEC 61131 (the standard for PLC programming).
Technical data:

Supply
- Input voltage: 18.0 .. 35.0 V DC
- Current consumption: max. 1.5 A (3.5 A when CSI-F-10 connected)
- Reverse pol. protect.: -30 V
- Isolation voltage: +40 V

Connection of sensors
- Up to 8 sensors with HSI functionality or up to 8 SMART sensors and in addition up to 8 analogue sensors and up to 4 digital sensors
  - 4 x digital / 2 x digital + 2 x frequency / 3 x digital + 1 x frequency

Analogue inputs
- Channel I and J
  - Accuracy: 4 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0.5 .. 4.5 V (≤ ± 0.1 % FS max.)
  - 0 .. 10 V (≤ ± 0.1 % FS max.)
- Channel K and L
  - Accuracy: 4 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0.5 .. 4.5 V (≤ ± 0.1 % FS max.)
  - 0 .. 50 V (≤ ± 0.1 % FS max.)
  - -10 .. +10 V (≤ ± 0.2 % FS max.) L only!
- Channel M and N
  - Accuracy: 4 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0.5 .. 4.5 V (≤ ± 0.1 % FS max.)
- Channel O and P
  - Accuracy: 4 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0 .. 20 mA (≤ ± 0.1 % FS max.)
  - 0.5 .. 4.5 V (≤ ± 0.1 % FS max.)
  - -10 .. +10 V (≤ ± 0.2 % FS max.) P only!

Digital inputs
- Quantity: 4, of which 2 are for frequency measurement (Channel Q and R)
- Trigger threshold: approx. 2 V
- Dynamics: 30 kHz

Measurement channels
- Quantity: 32 - A measurement channel can be a value of a connected sensor (also a subchannel of a SMART sensor) or a value derived (calculated) from sensor data.

Analogue outputs
- Quantity: 2
- Type: individually selectable, current (4 .. 20 mA) or voltage (0 .. 10 V)

Digital outputs
- Quantity: 4
- Type: Relay output, change-over contact
- Switching capacity: 30V DC / 1 A

Calculation unit
- Analogue value recording: 12 bit A/D converter

Interfaces
- Keypad: - 4 arrow keys (up, down, right, left)
  - OK key
  - ESC key
- Display (back-lit): - Two-line LCD display (2 x 16 characters)
  - Additional indication of status information via 3 different coloured LEDs is possible
- USB Mass Storage Device: - USB 1.1 / USB 2.0 full speed port for connecting a mass storage device (memory stick)
  - Female connection type "A."
- Ethernet, supported protocols: - RJ 45 8/8 Ethernet interface
  - HTTP Server
  - TCP/IP
- Serial Interface 0 (UART 0): - Implementing an RS 232 or an HSI master interface
  - Change-over user-programmable
  - Connection via plug-in terminals
  - No handshake lines
- HSI Master: Cascading the CMU
- USB Device: - USB 1.1 / USB 2.0 full speed port for connecting a PC / Notebook to configure the CMU
  - Female connection type "B."
- CAN Bus Interface: Can be integrated as an option

Cycle time
- Independently determined at start of program
- Display of actual cycle time is possible in the CM Editor

Operating and environmental conditions
- Operating temperature: -20 .. +70 °C
- Storage temperature: -30 .. +80 °C
- Relative humidity: 0 .. 70 %, non-condensing

Dimensions and weight
- Dimensions: approx. 212 x 106 x 36 mm
- Weight: approx. 600 g

Technical standards
- EMC: EN 61000-6-1 / 2 / 3 / 4
- Safety: EN 61010
- Protection class: IP 40

Note:
1) SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC, which can provide a variety of different measured values.
2) Recorded data from the CMU can be transferred to a memory stick via this interface.
   The USB Host supports mass storage devices exclusively.
Block circuit diagram:

- SRAM
- Flash
- CF-Card
- Processor 16 Bit
- CAN transceiver (optional)
- Real-time clock
- USB master (Memory Stick)
- USB slave (PC slave)
- Ethernet (HTTP server / TCP/IP)
- RS-232 / HSI-Master (selectable)
- LCD display (2 x 16 characters)
- Keypad (4 x arrows / OK / ESC)
- 3 x LED (user-programmable)
- 8 x HSI-IN
- 8 x Analogue-IN
- 4 x Digital-IN
- 2 x Analogue-OUT
- 4 x Digital-OUT

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Model code:

CMU 1000 – 000 – X

- Modification number 
  000 = Standard

- Operating manual and documentation 
  D = German 
  E = English 
  F = French

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as sensor lines for the electrical connection can be found in the Accessories brochure.

Dimensions:

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01,
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The condition monitoring interface module CSI-B-2 is another element in the HYDAC condition monitoring concept which connects the sensor level with the interpretation level. It is an all-purpose electronic instrument for converting the HSI signal from HYDAC SMART sensors into a standardised PC signal. Using the HYDAC "CMWIN" PC software, it is therefore possible to read the data and measured values of the connected SMART sensor directly.

The long-term memory can also be read as well as adjustments made and parameters set on the connected sensor (the setting options depend on the particular sensor).

The HSI signal can be converted either into an RS 232 or an RS 485 signal. The CSI-B-2 can be connected to any PC via the RS 232 interface (and possibly an additional standard RS 232/USB adapter). The RS 485 interface and appropriate additional coupling modules can also be used to connect to higher-level control and/or bus systems.

Special features:
- 1 input channel for HYDAC SMART sensors
- Direct connection of the sensor via screw-type terminals
- Indication of the active interface via LED (RS 232 / RS 485)
- Very compact design
- Suitable for mounting on standard DIN rails
- Protection class IP 40

Technical data:

Input data

| HSI interface | HYDAC Sensor Interface for digital linking of SMART sensors (1) - Male X2 |

Output data

| Signal output | switchable: RS 485 half-duplex or RS 232 - Male X1 (RS 485) - SUB-D 9 pole female (RS 232) |

Environmental Conditions

- Operating temperature range: -25 .. +85 °C
- Storage temperature range: -30 .. +85 °C
- Relative humidity: 0 .. 70 %, non-condensing
- CE mark: EN 61000-6-1 / 2 / 3 / 4
- Protection class to IEC 60529: IP 40

Other data

| Supply voltage of the module | 18 .. 35 V DC (male X1) |
| Current consumption (module + sensor) | 30 mA to 300 mA max. (depending on the supply voltage and the connected sensor) |
| Sensor supply | 15 V DC ± 5 % / 300 mA max. at 23 °C (male X2) |

Electrical connection

- Cross-section of connection: Max. 1.5 mm²
- X1: Module supply + RS 232 / RS 485 Male terminal block, 8 pole RM 3.5
- X2: Sensor supply + HSI Male terminal block, 5 pole RM 3.5
- SUB-D: RS 232 9 pole female with thumbscrews

Conversion mode options


Indication of active conversion mode


Dimensions and weight

| Housing | approx. 55 x 106 x 34 mm |
| Housing to be mounted on rails (35 mm) to DIN EN 60715 TH 35 (formerly DIN EN 50022) |
| Weight | ~ 140 g |

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

1) SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC, which can provide a variety of different measured values.
Model code: CSI – B – 2 – 000

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as sensor lines for the electrical connection can be found in the Accessories brochure.

Dimensions:

Terminal assignment:

Terminal strip –X1

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS 485 (-)</td>
</tr>
<tr>
<td>2</td>
<td>RS 485 (+)</td>
</tr>
<tr>
<td>3</td>
<td>3 – 4 open: HSI to RS 232</td>
</tr>
<tr>
<td>4</td>
<td>3 – 4 closed: HSI to RS 485</td>
</tr>
<tr>
<td>5</td>
<td>RxD RS 232 (connected to Pin 3 SUB-D 9 pole)</td>
</tr>
<tr>
<td>6</td>
<td>TxD RS 232 (connected to Pin 2 SUB-D 9 pole)</td>
</tr>
<tr>
<td>7</td>
<td>0 V (connected to Pin 5 SUB-D 9 pole)</td>
</tr>
<tr>
<td>8</td>
<td>+U (18 .. 35 V DC) Module supply</td>
</tr>
</tbody>
</table>

Terminal strip –X2

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U (15 V DC) Sensor supply</td>
</tr>
<tr>
<td>2</td>
<td>0 V</td>
</tr>
<tr>
<td>3</td>
<td>HSI signal</td>
</tr>
<tr>
<td>4</td>
<td>0 V</td>
</tr>
<tr>
<td>5</td>
<td>0 V</td>
</tr>
</tbody>
</table>

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Oil Condition Sensor HYDACLAB®
HLB 1300

**Description:**
The HYDACLab® HLB 1300 is a multifunctional sensor for online condition monitoring of standard and bio oils in stationary and mobile applications. The user is thus informed in real time of changes in the fluids and can take immediate action in the case of deteriorating operating conditions. Assertions can be made about the condition of an oil, e.g. ageing or mixing with other fluids, on the basis of the measured values for the relative change in dielectric constant, the saturation level and the temperature.

These measurements are available as sequential analogue signals and switching signals at the electrical output of the HYDACLab® (e.g. for activating warning devices or alarms). The measured values can be displayed on various HYDAC display and measurement devices.

**Technical data:**

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rel. humidity</td>
<td>0 .. 100 % saturation</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>-25 .. +100 °C</td>
<td></td>
</tr>
<tr>
<td>Dielectric constant</td>
<td>1 .. 10</td>
<td></td>
</tr>
<tr>
<td>Operating pressure</td>
<td>&lt; 50 bar</td>
<td></td>
</tr>
<tr>
<td>Pressure resistance</td>
<td>&lt; 600 bar</td>
<td></td>
</tr>
<tr>
<td>Flow velocity</td>
<td>&lt; 5 m/s</td>
<td></td>
</tr>
</tbody>
</table>

**Output data - Saturation level**
- Output signal: 4 .. 20 mA (0 .. 100 %)
- Calibration accuracy: ≤ ± 2 % FS max.
- Accuracy¹: ≤ ± 3 % FS typ.

**Output data - Temperature measurement**
- Output signal: 4 .. 20 mA (-25 .. +100 °C)
- Accuracy: ≤ ± 3 % FS max.

**Output data - Relative change in dielectric constant (ε_R)**
- Output signal: 12 mA ± 8 mA (± 30 % of IV)
- Accuracy²: see below

**Switch output**
- Signal 1 (N/C) PNP switching output 0.5 A max. switching level ≥ U_S - 4 V
- Default warning level SP1
  - Humidity ≥ 85 %
  - Temperature ≥ 80 °C
- Default warning level SP1
  - Dielectric constant ± 15 % (temperature compensated)

**Environmental conditions**
- Nominal temperature range: 20 .. 80 °C
- Storage temperature: -40 .. +90 °C
- Fluid compatibility: Mineral oils HLP (HLP-D on request), Esters: HEES, HETG
- Seal material: FPM

**Mark**
- EN 61000 - 6 - 1 / 2 / 3 / 4
- Protection class according to IEC 60529: IP 67

**Other data**
- Supply voltage U_s: 10 .. 36 V DC
- Residual ripple of supply voltage ≤ 5 %
- Mechanical connection: G ¾ DIN 3852 E
- Torque value: 30 Nm
- Electrical connection: M12x1, 5 pole
- Housing: Stainless Steel
- Weight: ~ 205 g

**Note:** Reverse polarity protection, short circuit protection provided.

¹ The max. accuracy achievable when measuring relative humidity is heavily dependent on the type of fluid or fluid additive. More precise information on this is available on request.

² The accuracy achievable when measuring the relative change in dielectric constant is dependent on the application, the type of oil and the individual calibration of the sensor. Detailed information on this is available on request.
Model code: HLB 1 3 0 8 – 1 C – 000 – F 1

Variables:
- 3 variables
  - Relative change in dielectric constant (DK)
  - Saturation level
  - Temperature

Mechanical connection
0 = G3/4 A DIN 3852

Electrical connection
8 = Male M12x1, 5-pole (connector not supplied)

Type of signal, output 1
1 = Switching output / N/C

Type of signal, output 2
C = 4 .. 20 mA, 3 conductor

Modification number
000 = Standard (cannot be adjusted)

Seal material (parts in contact with the fluid)
F = FPM seal

Connection material (in contact with fluid)
1 = Stainless steel

Pin connections:

M12x1

Pin
1 +U H
2 Signal 1
3 Signal 2
4 HSI* Reset (PLC)

* HSI = HYDAC Sensor Interface
(HYDAC’s own communication interface)

Signal 1: PNP switching output
Signal 2: Sequential analogue output (4 .. 20 mA)

Display and read-out options:

HDA 5500-0-2-Zc-006
Digital Display Unit; the HDA 5500 displays the sequential analogue output of the HYDACLAB™ and provides the user with 4 programmable switching outputs.

HDA 5500-0-2-AC-006(CM1k)
Order no.: 909925

HDA 5500-0-2-DC-006(CM1k)
Order no.: 909926

HMG 510
Portable 2-channel data recorder, specially designed for use with HSI and SMART sensors
Order no.: 909889

HMG 3010
Portable data recorder with full graphics colour display for indicating, displaying and editing measured values
Order no.: 920930

Information on other read-out options can be found on our website at www.hydac.com or please contact your HYDAC representative.

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The AquaSensor AS 1000 is the culmination of continued development of the successful AS 2000 series for online detection of water in oils, in particular as an OEM sensor for fluid conditioning monitoring. It measures the degree of saturation and the temperature of the fluid.

In the analogue output version, the AS 1000 transmits the values for the degree of saturation and the temperature as a 4 .. 20 mA signal.

In the version with 2 switch outputs, the AS 1000 can be configured individually using the HYDAC service instrument HMG 3010, the Condition Monitoring Unit CMU 1000 and the interface module CSI-B-2.

The following parameters can be adjusted:
- Saturation level / temperature
- Switch points
- Switch mode of the switch outputs
- Switching direction
- Switch delay times

The AS 1000 therefore enables hydraulic and lubrication oils to be monitored accurately, continuously and online.

Special features:
- Reliable due to its compact and robust design
- Cost-effective sensor, also for use in OEM applications
- Not necessary to calibrate to different types of oil
- Pressure-resistant also during pulsations
- Wide fluid temperature range
- Individual configuration
- Early detection of water problems thereby preventing breakdowns and unnecessary interruption to operations.

Technical data:

Input data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturation level</td>
<td>0 ... 100 %</td>
</tr>
<tr>
<td>Temperature</td>
<td>-25 .. 100 °C</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>-0.5 .. 50 bar</td>
</tr>
<tr>
<td>Burst pressure</td>
<td>≤ 630 bar</td>
</tr>
<tr>
<td>Mechanical connection</td>
<td>G3/8 A DIN 3852</td>
</tr>
<tr>
<td>Torque value</td>
<td>25 Nm</td>
</tr>
</tbody>
</table>

Parts in contact with medium
- Mech. connection: Stainless steel / Vacuum-metallized ceramic
- Seal: FPM or EPDM

Output data

Pin 2: Saturation level

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
<td>4 .. 20 mA (corresponds to 0 .. 100 %)</td>
</tr>
<tr>
<td>R_{max} = (U_b - 10 V) / 20 mA [kΩ]</td>
<td></td>
</tr>
<tr>
<td>or switch output (configurable)</td>
<td></td>
</tr>
<tr>
<td>Calibration accuracy</td>
<td>≤ ± 2 % FS max.</td>
</tr>
<tr>
<td>Accuracy in media measurements</td>
<td>≤ ± 3 % FS typ.</td>
</tr>
<tr>
<td>Pressure dependency</td>
<td>± 0.2 % FS / bar</td>
</tr>
</tbody>
</table>

Pin 4: Temperature

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
<td>4 .. 20 mA (corresponds to -25 .. 100 %)</td>
</tr>
<tr>
<td>R_{max} = (U_b - 10 V) / 20 mA [kΩ]</td>
<td></td>
</tr>
<tr>
<td>or switch output (configurable)</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>≤ ± 2 % FS max.</td>
</tr>
</tbody>
</table>

Pin 5: HSI (HYDAC Sensor Interface)
- Automatic sensor recognition

Switch outputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP transistor outputs</td>
<td>(configurable as N/O or N/C)</td>
</tr>
<tr>
<td>Switching current</td>
<td>max. 1 A per switch output</td>
</tr>
</tbody>
</table>

Environmental conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensated temperature range</td>
<td>0 .. +90 °C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 .. +100 °C / -25 .. +100 °C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-40 .. +100 °C</td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>-40 .. +125 °C / -25 .. +125 °C</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>1 .. 6000 cSt</td>
</tr>
<tr>
<td>Flow velocity</td>
<td>&lt; 5 m/s</td>
</tr>
<tr>
<td>Fluid compatibility</td>
<td>mineral oil based fluids, synthetic and natural esters</td>
</tr>
</tbody>
</table>

CE mark
- EN 61000-6-1 / 2 / 3 / 4

Protection class to IEC 60529
- IP 67

Other data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>12 .. 32 V DC</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>≤ 5 %</td>
</tr>
<tr>
<td>Weight</td>
<td>~ 145 g</td>
</tr>
</tbody>
</table>

Note: Reverse polarity protection, short circuit protection are provided. FS (Full Scale) = relative to complete measuring range
-1) -25 °C with FPM or EPDM seal, -40 °C on request
**Model code:**

AS 1 X 0 8 – X – 000

**Medium**

0 = Mineral oils
1 = Phosphate ester, e.g. Skydrol

**Mechanical connection**

0 = G3/8 A DIN 3852

**Electrical connection**

8 = Male M12x1, 5 pole (connector not supplied)

**Signal technology**

C = Output 1 Pin 2 saturation level (4 .. 20 mA)
Output 2 Pin 4 temperature (4 .. 20 mA)

2 = 2 switching outputs

**Modification number**

000 = Standard

**Notice:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instruments.

**Accessories:**

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Dimensions:**

![Dimensions Diagram]

**Pin connections:**

M12x1

<table>
<thead>
<tr>
<th>Pin</th>
<th>AS 1X08-C</th>
<th>AS 1X08-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+U_B</td>
<td>+U_B</td>
</tr>
<tr>
<td>2</td>
<td>Saturation level 4 .. 20 mA</td>
<td>SP 1</td>
</tr>
<tr>
<td>3</td>
<td>0 V</td>
<td>0 V</td>
</tr>
<tr>
<td>4</td>
<td>Temperature 4 .. 20 mA</td>
<td>SP 2</td>
</tr>
<tr>
<td>5</td>
<td>HSI*</td>
<td>HSI*</td>
</tr>
</tbody>
</table>

* HSI = HYDAC Sensor Interface (HYDAC's own communication interface)

**Display, read-out and configuration options:**

**HDA 5500-1-1-xC-000**

Digital Display Unit with 2 programmable switch outputs, which have been specifically designed for use with the AS 1000

HDA 5500-1-1-AC-000

Order no.: 908869

HDA 5500-1-1-DC-000

Order no.: 908870

**HMG 510**

Portable 2-channel data recorder, specially designed for displaying measured values with HSI and SMART sensors

Order no.: 909889

**HMG 3010**

Portable data recorder with full graphics colour display for indicating, displaying and editing measured values as well as for configuration of HSI and SMART sensors

Order no.: 920930

**CMU 1000**

Electronic evaluation unit for online measured value monitoring as well as for the configuration of HSI and SMART sensors

Order no. 920716

**CSI-B-2**

Interface module, enables configuration of HSI and SMART sensors using HYDAC PC software CMWIN

Order no. 920134

Information on other read-out options can be found on our website at www.hydac.com or please contact your HYDAC representative.

**Note:**

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.
**AquaSensor AS 3000**

**Description:**
The AquaSensor AS 3000 with an integrated digital display is based on the proven AS 1000 series for the online detection of water in oils, particularly as a sensor for Condition Monitoring. The device has 2 switch outputs and one switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

The AS 3000 detects the water saturation level and temperature of the fluid and transmits the values in the form of an analogue or switching signal. The display shows the actual measured values.

All settings offered by the AS 3000 are grouped in 2 clearly-arranged menus. The following parameters can be adjusted:
- Saturation level / temperature
- Switch points
- Switch mode of the switch outputs
- Switching direction
- Switch delay times

The AS 3000 thus enables hydraulic and lubricating oils to be monitored accurately, continuously and online.

**Special features:**
- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Reliable due to its robust design
- Not necessary to calibrate to different types of oil
- Pressure-resistant, also during pulsations
- Wide fluid temperature range
- Individual configuration
- User-friendly due to key programming
- Early detection of water problems thus preventing faults and unnecessary interruptions to operations.

**Technical data:**

**Input data**
- Saturation level: 0 .. 100 %
- Temperature: -25 .. 100 °C
- Operating pressure: -0.5 .. 50 bar
- Burst pressure: ≤ 630 bar
- Mechanical connection: G3/8 A DIN 3852
- Torque value: 25 Nm

**Parts in contact with medium**
- Connector: Stainless steel / Vacuum-metallized ceramic
- Seal: FPM or EPDM

**Output data**
- Calibration accuracy: ≤ ± 2 % FS max.
- Accuracy in media measurements: ≤ ± 3 % FS typ.
- Pressure dependency: ≤ 0.2 % FS / bar

**Analogue output**
- Selectable: 4 .. 20 mA ohmic resist. max. 500 Ω

**Switch outputs**
- Type: PNP transistor outputs (programmable as N/O / N/C)
- Assignment: Selectable: Saturation level or temperature
- Switching current: max. 1.2 A per switch output
- Switching cycles: > 100 million

**Environmental conditions**
- Compensated temperature range: 0 .. +80 °C
- Operating temperature range: -25 .. +80 °C
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range: -40 .. +100 °C / -25 .. +100 °C
- Viscosity range: 1 .. 5000 cSt
- Flow velocity: < 5 m/s
- Fluid compatibility: mineral oil based fluids, synthetic and natural esters

**Protection class to IEC 60529**
- IP 67

**Other data**
- Supply voltage: 18 .. 35 V DC
- Residual ripple of supply voltage: ≤ 5 %
- Weight: ~ 145 g

**Note:** Reverse polarity protection, short circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range

1) -25 °C with FPM or EPDM seal, -40 °C on request
Model code:

AS 3 X 0 8 – 5 – 000

Medium
0 = Mineral oils
1 = Phosphate ester, e.g. Skydrol

Mechanical connection
0 = G3/8 A DIN 3852

Electrical connection
8 = Male M12x1, 5 pole
   (connector not supplied)

Signal technology
5 = 2 switch outputs and 1 analogue output

Modification number
000 = Standard

Note:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical connection adaptors, etc. can be found in the Accessories brochure.

Pin connections:

Pin AS 3X08-5
1 +Ua
2 Analogue
3 0 V
4 SP 1
5 SP 2

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
AquaSensor
AS 3000
with IO-Link Interface

Description:
The AS 3000 with its IO Link communication interface and integrated digital display is used for the online detection of water in oils, particularly as a sensor for condition monitoring. In addition, the AS 3000 measures the temperature of the operating fluid.

The instrument has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The AquaSensor AS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or packaging industry.

Special features:
- IO Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Not necessary to calibrate to different types of oil
- Wide fluid temperature range
- 4-digit display
- Display rotates in two planes for optimal alignment

Technical data:

**Input data**
- Saturation level: 0 ... 100 %
- Temperature: -25 ... +100 °C
- Operating pressure: -0.5 ... 50 bar
- Burst pressure: ≤ 630 bar
- Mechanical connection: G3/8 A DIN 3852
- Torque value: 25 Nm
- Parts in contact with medium: Mach., connection:
  - Stainless steel / Vacuum-metallized ceramic
  - Seal: FPM or EPDM

**Output data**
- Output signals:
  - Output 1: PNP transistor switching output
  - Output 2: can be configured as PNP transistor switching output or analogue output
- Calibration accuracy: ≤ ± 2 % FS max.
- Accuracy in media measurements: ≤ ± 3 % FS typ.
- Pressure dependence: ± 0.2 % FS / bar

**Analogue output**
- Signal: selectable:
  - 4 .. 20 mA load resistance max. 500 Ω
  - 0 .. 10 V load resist. min. 1 kΩ
  - corresponds to measuring range selected

**Switch outputs**
- Type: PNP transistor switching outputs
- Assignment: Selectable:
  - Saturation level or temperature
- Switching current: max. 250 A per switching output
- Switching cycles: > 100 million

**Parameterisation**
- Via IO-Link interface, with HYDAC programming device HPG 3000 or push-buttons on the AS 3000

**Environmental conditions**
- Compensated temperature range: 0 .. +80 °C
- Operating temperature range: -25 .. +80 °C
- Storage temperature range: -40 .. +80 °C
- Fluid temperature range:
  - -40 .. +100 °C / -25 .. +100 °C
- Viscosity range: 1 .. 5000 cSt
- Flow velocity: < 5 m/s
- Fluid compatibility: mineral oil based fluids, synthetic and natural esters
- **CE** mark: EN 61000-6-1 / 2 / 3 / 4
- Protection class to IEC 60529: IP 67

**Other data**
- Supply voltage: 18 .. 35 V DC
- Current consumption:
  - ≤ 0.590 A with active switching outputs
  - ≤ 90 mA with inactive switching outputs
  - ≤ 110 mA with inactive switching output and analogue output
- Residual ripple of supply voltage: ≤ 5 %
- Weight: ~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
- -25 °C with FPM or EPDM seal, -40 °C on request

1) -25 °C with FPM or EPDM seal, -40 °C on request
Setting options:
All terms and symbols used for setting the AS 3000 as well as the menu structure comply with the specifications in the VDMA Standard.

Setting ranges for the switch outputs:

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Lower limit of RP</th>
<th>Upper limit of SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...100 %</td>
<td>1 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Minimum difference between RP and SP</th>
<th>Increment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...100 %</td>
<td>1 %</td>
<td>0.2 %</td>
</tr>
<tr>
<td>-25...100 °C</td>
<td>0.1 °C</td>
<td></td>
</tr>
</tbody>
</table>

* All ranges given in the table are adjustable by the increments shown.
SP = switching point
RP = switch-back point

Additional functions:
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V

Pin connections:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L+</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>2</td>
<td>I/Q</td>
<td>Switching output (SP2) / analogue output</td>
</tr>
<tr>
<td>3</td>
<td>L-</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>C/Q</td>
<td>IO-Link communication / switching output (SP1)</td>
</tr>
</tbody>
</table>

IO-Link-specific data:

- Baud rate: 38.4 kBaud *
- Cycle time: 2.5 ms
- Process data width: 16 Bit
- Frame type: 2.2
- Specification: V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:
http://www.hydac.com/de-en/service/downloads-software-on-request/

Model code:

- **AS 3 X 0 6 – L – 000**

Medium:
- 0 = Mineral oils
- 1 = Phosphate ester, e.g. Skydrol

Mechanical connection:
- 0 = G3/8 A DIN 3852

Electrical connection:
- 6 = Male M12x1, 4-pole (connector not supplied)

Output:
- L = IO Link interface

Modification number:
- 000 = Standard

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical connection adaptors, etc. can be found in the Accessories brochure.

Dimensions:

**Note:**
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Electronic Contamination Switch
EY-1356

Description:
The contamination switch series EY-1356 works as a warning element in hydraulic systems and gearboxes and has been developed by HYDAC ELECTRONIC to meet the special requirements of our customers.
The sensor detects and attracts metal ferromagnetic particles in oil or in other hydraulic fluids. The accumulation of particles generates a switching signal (change in the ohmic resistance). The contamination sensor thus provides an early warning of possible wear. Substantial damage on bearings and gear wheels, for instance, can therefore be avoided.
The sensor is available with different mechanical and electrical connections and can be integrated into almost any application.

Special features:
- Simple design
- Robust design
- Standard connection types

Technical data:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum switching voltage</td>
<td>30 VDC</td>
</tr>
<tr>
<td>Maximum switching current</td>
<td>200 mA</td>
</tr>
<tr>
<td>Maximum oil pressure abs.</td>
<td>6 bar (16 bar)</td>
</tr>
<tr>
<td>Holding power of the permanent solenoid</td>
<td>~ 1.5 N</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25 °C .. +90 °C</td>
</tr>
</tbody>
</table>

Protection class to IEC 60529

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Protection Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEUTSCH male connector DT04 2 pole</td>
<td>IP67</td>
</tr>
<tr>
<td>Integrated male connector</td>
<td>IP65</td>
</tr>
</tbody>
</table>

Mating connector supplied

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Supplied Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEUTSCH male connector DT04 2 pole</td>
<td>no</td>
</tr>
<tr>
<td>Integrated male connector</td>
<td>yes</td>
</tr>
</tbody>
</table>

Max. torque value

<table>
<thead>
<tr>
<th>Thread Size</th>
<th>Torque Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M14x1.5</td>
<td>15 Nm</td>
</tr>
<tr>
<td>M18x1.5</td>
<td>25 Nm</td>
</tr>
<tr>
<td>M22x1.5</td>
<td>60 Nm</td>
</tr>
<tr>
<td>M26x1.5</td>
<td>70 Nm</td>
</tr>
<tr>
<td>M33x2</td>
<td>140 Nm</td>
</tr>
</tbody>
</table>

Installation position

We recommend an “upside-down” mounting position, i.e. connector or cable outlet pointing downwards.

The contamination switch is supplied with seal ring DIN 3896 NBR.

Functional principle / diagram:
The permanent solenoid at the measuring surface of the contamination switch attracts the ferromagnetic particles from the passing oil. The increased accumulation of particles forms an electrical bridge between the permanent solenoid and the adjacent metal contact. The resulting switching signal can, for instance, activate a warning function or switch off the system.
**Order details:**

<table>
<thead>
<tr>
<th>Electrical connection</th>
<th>Mechanical connection</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated male connector according to EN175301-803/ ISO4400</td>
<td>M14x1.5</td>
<td>3252533</td>
</tr>
<tr>
<td></td>
<td>M18x1.5</td>
<td>3305023</td>
</tr>
<tr>
<td></td>
<td>M22x1.5</td>
<td>3731848</td>
</tr>
<tr>
<td></td>
<td>M26x1.5</td>
<td>3731849</td>
</tr>
<tr>
<td></td>
<td>M33x2</td>
<td>3252555</td>
</tr>
<tr>
<td>Strand DEUTSCH male connector DT04 2 pole</td>
<td>M14x1.5</td>
<td>3731852</td>
</tr>
<tr>
<td></td>
<td>M18x1.5</td>
<td>3731853</td>
</tr>
<tr>
<td></td>
<td>M22x1.5</td>
<td>3731854</td>
</tr>
<tr>
<td></td>
<td>M26x1.5</td>
<td>3731855</td>
</tr>
<tr>
<td></td>
<td>M33x2</td>
<td>3731856</td>
</tr>
</tbody>
</table>

**Pin connections:**

in accordance with EN 175301-803

Reverse polarity permitted

**Pin connections:**

1 \(-U_B\)
2 \(-U_B\)

**Dimensions:**

<table>
<thead>
<tr>
<th>Dim.</th>
<th>14</th>
<th>18</th>
<th>22</th>
<th>26</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>M14x1.5</td>
<td>M18x1.5</td>
<td>M22x1.5</td>
<td>M26x1.5</td>
<td>M33x2</td>
</tr>
<tr>
<td>B</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>ØE</td>
<td>19</td>
<td>23.9</td>
<td>27</td>
<td>31.4</td>
<td>39.2</td>
</tr>
</tbody>
</table>

Other types of connection are available on request

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
OEM PRODUCTS FOR LARGE VOLUME PRODUCTION

Areas of application for our OEM products for large volume production range from mobile and stationary industrial hydraulics, to pneumatics, machine building, automotive and mobile technology through to mining, oil depots, marine and the off-shore industry.

Our sensors are available in a variety of electrical output signals, connector and fluid port connection options. This versatility, combined with certification to ATEX, CSA and IECEx or , ensures an almost limitless range of applications for our products.

OEM Products for Large Volume Production:

Pressure transmitters

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDA 8700 (minimum order 500 pieces)</td>
<td>351</td>
</tr>
<tr>
<td>HDA 8400 (minimum order 500 pieces)</td>
<td>353</td>
</tr>
<tr>
<td>HDA 8700 for appl. with increased functional safety (minimum order 500 pieces)</td>
<td>355</td>
</tr>
<tr>
<td>HDA 7400 (minimum order 100 pieces)</td>
<td>357</td>
</tr>
<tr>
<td>HDA 9300 (minimum order 1000 pieces)</td>
<td>359</td>
</tr>
</tbody>
</table>

Electronic pressure switches

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS 810 (minimum order 500 pieces)</td>
<td>361</td>
</tr>
<tr>
<td>EDS 710 (minimum order 100 pieces)</td>
<td>363</td>
</tr>
<tr>
<td>EDS 410 (minimum order 50 pieces)</td>
<td>365</td>
</tr>
<tr>
<td>EDS 4400 ATEX, CSA, IECEx Flameproof encl. (min. order 50 pieces)</td>
<td>367</td>
</tr>
<tr>
<td>EDS 4400 ATEX Intrinsically safe (minimum order 50 pieces)</td>
<td>369</td>
</tr>
<tr>
<td>EDS 4300 ATEX Intrinsically safe (minimum order 50 pieces)</td>
<td>371</td>
</tr>
<tr>
<td>EDS 4100 ATEX Intrinsically safe (minimum order 50 pieces)</td>
<td>373</td>
</tr>
</tbody>
</table>

Temperature transmitters

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTT 8000 (minimum order 500 pieces)</td>
<td>375</td>
</tr>
</tbody>
</table>

Electronic temperature switch

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTS 8000 (minimum order 500 pieces)</td>
<td>377</td>
</tr>
</tbody>
</table>

Electronic position switch

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLS 100 for appl. with increased functional safety (minimum order 100 pieces)</td>
<td>379</td>
</tr>
</tbody>
</table>

Special products

- Position switches IES 2010 / 2015 / 2020
- Position sensor IWE 40
- Position switch HLS 200 for applications with increased functional safety
**Description:**
The pressure transmitter series HDA 8700 has been specifically developed for the OEM market, e.g. in mobile applications. Like most of our pressure transmitter series, the HDA 8700 is based on a robust, long-life thin-film sensor.

All parts (sensor and pressure connection) which are in contact with the fluid are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor and the possibility of leakage is excluded.

The pressure transmitters are available in various pressure ranges from 0 .. 40 bar to 0 .. 600 bar.

For the electrical connection, various integrated connections are available.

A basic accuracy of max. ≤ ± 0.5 % FS, combined with a small temperature drift, ensures a broad range of applications for the HDA 8700.

**Special features:**
- Accuracy ≤ ± 0.25 % FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design
- ECE type approval (approved for road vehicles)

**Technical data:**

### Input data
- **Measuring ranges**
  - 40, 50, 100, 160, 250, 400, 600 bar
- **Overload pressures**
  - 80, 120, 200, 320, 500, 800, 1000 bar
- ** Burst pressures**
  - 400, 600, 800, 1000, 1200, 2000 bar
- **Mechanical connection**
  - G1/4” DIN 3852 (20 Nm)
  - 9/16-20 UNF 2A (15 Nm)
  - 7/16-20 UNF 2A (20 Nm)
- **Parts in contact with medium**
  - Mech. conn.: Stainless steel
  - Seal: FPM

### Output data
- **Output signal**
  - e.g.: 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V, 0 .. 10 V, ratiometric: 0.5 .. 4.5 V for U_B = 5 V DC
- **Accuracy**
  - to DIN 16086 ≤ ± 0.25 % FS typ.
  - Max. setting ≤ ± 0.5 % FS max.
  - Temperature compensation ≤ ± 0.01 % FS / °C typ.
  - Temperature compensation ≤ ± 0.02 % FS / °C max.
  - Ratiometric output signals are also available.

### Environmental conditions
- **Compensated temperature range**
  - -25 .. +85 °C
- **Operating temperature range**
  - -40 .. +100 °C / -25 .. +125 °C
- **Storage temperature range**
  - -40 .. +100 °C
- **Fluid temperature range**
  - -40 .. +125 °C / -25 .. +125 °C

### Other data
- **Electrical connection**
  - M12x1, 4 pole
  - AMP DIN 72585 code 1, 3 pole
  - Packard Melti Pack Series 150, 3 pole
  - Deutsch DT 04, 3 pole
  - AMP Superscale, 3 pole
  - AMP Junior Power Timer, 3 pole
  - Flying leads, 1 m cable length

- **Supply voltage**
  - 8 .. 30 V DC
  - 12 .. 30 V DC for output signal 0 .. 10 V
  - 5 V ± 5 % for ratiometric output signal

- **Current consumption**
  - max. 22 mA total

- **Life expectancy**
  - > 10 million cycles

- **Weight**
  - ~ 55 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided. The pressure transmitter HDA 8700 is designed for use acc. to UL specification. For use acc. to UL specification, the supply voltage must be limited to 5 V ± 5 % for ratiometric output signal. Approval of the complete measuring range is dependent on the electrical connection.
Dimensions:

Male connection DIN 72585
- 3 pole

Male connection Metri-Pack series 150
- 3 pole

Male connection Deutsch DT04
- 3 pole

Male connection Junior Power Timer
- 3 pole

Male connection Superseal series 1.5
- 3 pole

Flying leads

Male connection EN175301-803 (DIN 43650)
- 3 pole

Order details:
The electronic pressure switch HDA 8700 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Pressure Transmitter  
HDA 8400

(Minimum order quantity 500 units)

Description:
The pressure transmitter series HDA 8400 has been specifically developed for the OEM market, e.g. in mobile applications. Like most of our pressure transmitter series, the HDA 8400 is based on a robust and long-life, thin-film sensor. All parts (sensor and pressure connection) which are in contact with the fluid are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor. The possibility of leakage is excluded.

The pressure transmitters are available in various pressure ranges from 0 .. 40 bar to 0 .. 600 bar. For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available. For the electrical connection, different types of integrated connections are available.

A basic accuracy of max. ± 1 % FS, combined with a small temperature drift, ensures a broad range of applications for the HDA 8400.

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design
- ECE type approval (approved for road vehicles)

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring ranges</td>
</tr>
<tr>
<td>Overload pressures</td>
</tr>
<tr>
<td>Burst pressures</td>
</tr>
<tr>
<td>Mechanical connection (Torque value)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signal</td>
</tr>
<tr>
<td>Accuracy to DIN 16086</td>
</tr>
<tr>
<td>Max. setting</td>
</tr>
<tr>
<td>Accuracy at min. setting (B.F.S.L.)</td>
</tr>
<tr>
<td>Temperature compensation</td>
</tr>
<tr>
<td>Over range</td>
</tr>
<tr>
<td>Non-linearity at max. setting to DIN 16086</td>
</tr>
<tr>
<td>Hysteresis</td>
</tr>
<tr>
<td>Repeatability</td>
</tr>
<tr>
<td>Rise time</td>
</tr>
<tr>
<td>Long-term drift</td>
</tr>
</tbody>
</table>

Environmental conditions:

Compensated temperature range | -25 .. +85 °C |
Operating temperature range | -40 .. +125 °C |
Storage temperature range | -40 .. +100 °C |
Fluid temperature range | -40 .. +125 °C |

Certificate No. | E318391 |
Vibration resistance to DIN EN 60068-2-6 at 5 .. 2000 Hz | ≥ 25 g |
Shock resistance to DIN EN 60068-2-27 | 100 g / 6 ms / half sine |
Protection class to IEC 60529 to ISO 20653 | IP 66, IP 67 (depending on the electrical connection) |
IP 69 K (depending on the electrical connection) |

Other data:

Electrical connection | M12x1, 4 pole |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP DIN 72585 code 1, 3 pole</td>
<td></td>
</tr>
<tr>
<td>Packard Melt Pack Series 150, 3 pole</td>
<td></td>
</tr>
<tr>
<td>Deutsch DT 04, 3 pole</td>
<td></td>
</tr>
<tr>
<td>AMP Superseal, 3 pole</td>
<td></td>
</tr>
<tr>
<td>AMP Junior Power Timer, 3 pole</td>
<td></td>
</tr>
<tr>
<td>Flying leads, 1 m cable length</td>
<td></td>
</tr>
<tr>
<td>EN175301-803 (DIN 43650), 3 pole</td>
<td></td>
</tr>
</tbody>
</table>

Supply voltage | 8 .. 30 V DC |
12 .. 30 V DC for output signal 0 .. 10 V |
5 V ± 5 % for ratiometric output signal - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950 |

Residual ripple of supply voltage | ≤ 5 % |

Life expectancy | > 10 million cycles |
| 0 .. 100 % FS |

Weight | ~ 55 g |

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range  
B.F.S.L. = Best Fit Straight Line

1) -25 °C with FPM seal, -40 °C on request  
2) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Order details:
The electronic pressure switch HDA 8400 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Dimensions:

Male connection DIN 72585
3 pole

Male connection Metr-Pack series 150
3 pole

Male connection Deutsch DT04
3 pole

Male connection Junior Power Timer
3 pole

Male connection Superseal series 1.5
3 pole

Flying leads

Male connection EN175301-803 (DIN 43650)
3 pole

Dimensions:

Male connection DIN 72585
3 pole

Male connection Metr-Pack series 150
3 pole

Male connection Deutsch DT04
3 pole

Male connection Junior Power Timer
3 pole

Male connection Superseal series 1.5
3 pole

Flying leads

Male connection EN175301-803 (DIN 43650)
3 pole

Dimensions:
Electronic Pressure Transmitter
HDA 8700
for Applications with Increased Functional Safety

(Minimum order quantity 500 units)

Description:
This version of the pressure transmitter series HDA 8700 has been developed specifically for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849). During normal operation, the pressure transmitter HDA 8700 generates a pressure-proportional output signal. In the background, the pressure transmitter performs cyclical diagnostic tests to detect internal errors.

If an instrument error is detected, the pressure transmitter HDA 8700 supplies an output signal < 3 mA which is recognised by the user as an unacceptable discrepancy. This means that the pressure transducer HDA 8700 achieves Performance Level d in the Safety category (based on a Category 2 of the architecture) and SIL 2. As a result, the pressure transducer can be recommended for use in applications where safety is critical.

The main areas of application are in mobile and stationary safety-oriented systems such as load torque displays or load torque limitation in loading cranes or working platforms.

Special features:
- SIL 2 / PL d certification
- Accuracy ≤ ± 0.25 % FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design

Technical data:

### Input data
- Measuring ranges: 40; 60; 100; 160; 250; 400; 600 bar
- Overload pressures: 80; 120; 200; 320; 500; 800; 1000 bar
- Burst pressures: 200; 300; 500; 800; 1200; 2000; 2000 bar
- Mechanical connection (Torque value):
  - G1/4 A DIN 3852 (20 Nm)
  - 7/16-20 UNF 2A (15 Nm)
  - 9/16-18 UNF 2A (20 Nm)
- Parts in contact with medium:
  - Mech. conn.: Stainless steel
  - Seal: FPM

### Output data
- Output signal, permitted load resistance: 4 .. 20 mA
- Output signal with error recognition: 
  \[ R_{\text{max}} = \frac{(U_{\text{s}} - 8 \text{ V})}{20 \text{ mA}} \text{(kΩ)} \] ≤ 3 mA
- Accuracy to DIN 16086:
  - Max. setting: ≤ ± 0.25 % FS typ.
  - ≤ ± 0.5 % FS max.
- Accuracy at minimum setting (B.F.S.L.):
  - ≤ ± 0.15 % FS typ.
  - ≤ ± 0.25 % FS max.

### Environmental conditions
- Compensated temperature range: -25 .. 85 °C
- Operating temperature range:
  - -40 .. 100 °C / -25 .. 100 °C
- Storage temperature range: -40 .. 100 °C
- Fluid temperature range:
  - -40 .. 125 °C / -25 .. 125 °C
- Vibration resistance according to DIN EN 60068-2-6 at 0 .. 500 Hz:
  - ≤ 25 g
- Shock resistance according to DIN EN 60068-2-29 (11 ms):
  - 100 g / 6 ms / half-sine
  - 500 g / 1 ms / half-sine
- Protection class to IEC 60529:
  - IP 67

### Other data
- Electrical connection: AMP Junior Power Timer, 2 pole
- Supply voltage: 8 .. 32 V DC
- Service life: > 10 million cycles (0 .. 100 %)
- Weight: ~ 75 g

### Safety-related data
- Performance level:
  - Based on DIN EN ISO 13849-1:2008
  - PL d
- Architecture: Category 2
- Safety Integrity Level:
  - Based on DIN EN 61508:2001
  - SIL 2

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
- FS (Full Scale) = relative to complete measuring range
- B.F.S.L. = Best Fit Straight Line
- °C with FPM seal, °C on request

1) Other seal materials on request
Order details:
This version of the electronic pressure transducer HDA 8700 has been specially developed for OEM customers and is available for minimum order quantities of 500 pieces per type.
For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.
Description:
The pressure transmitter series HDA 7400 combines excellent technical specifications with a highly compact design. The HDA 7400 was specifically developed for OEM applications e.g. in mobile applications. A stainless steel sensor cell with thin-film strain gauge is the basis for a robust, long-life pressure transmitter. Various pressure ranges between 0 .. 40 bar and 0 .. 600 bar provide versatility when adapting to particular applications.

For integration into modern controls (e.g. with PLC), standard analogue output signals are available.

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Highly robust sensor cell
- Highly compact design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

### Input data

- Measuring ranges: 40; 60; 100; 160; 250; 400; 600 bar
- Overload pressures: 80; 120; 200; 320; 500; 600; 1000 bar
- Burst pressures: 200; 300; 500; 800; 1250; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel Seal: FPM

### Output data

- Output signal:
  - e.g.: 4 .. 20 mA, 0 .. 5 V, 0.5 .. 4.5 V, 1 .. 6 V, 0 .. 10 V etc.
- Accuracy to DIN 16086
  - Max. setting: ≤ ± 0.5 % FS typ.
  - ≤ 1 % FS max.
- Accuracy at min. setting (B.F.S.L.):
  - ≤ ± 0.25 % FS typ.
  - ≤ 0.5 % FS max.
- Temperature compensation:
  - ≤ ± 0.015 % FS / °C typ.
  - ≤ ± 0.025 % FS / °C max.
- Non-linearity at max. setting to DIN 16086:
  - ≤ ± 0.3 % FS max.
- Hysteresis:
  - ≤ ± 0.4 % FS max.
- Repeatability:
  - ≤ ± 0.1 % FS
- Rise time:
  - ≤ 2 ms
- Long-term drift:
  - ≤ ± 0.3 % FS typ. / year

### Environmental conditions

- Compensated temperature range:
  - -25 .. +85 °C
- Operating temperature range:
  - -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range:
  - -40 .. +100 °C
- Fluid temperature range:
  - -40 .. +100 °C / -25 .. +100 °C

### Other data

- Electrical connection:
  - e.g.: M12x1 (4 pole)
- Supply voltage:
  - 10 .. 30 V DC 2 conductor
  - 12 .. 30 V DC 3 conductor
- for use acc. to UL specification:
  - - limited energy - according to 9.3 UL 61010; Class 2; UL 1510/1585; LPS UL 60950
- Residual ripple of supply voltage:
  - ≤ 5 %
- Current consumption:
  - max. 34 mA total
- Life expectancy:
  - > 10 million cycles
  - 0 .. 100 % FS
- Weight:
  - ~ 60 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L = Best Fit Straight Line

1) Other models on request
2) -25 °C with FPM seal, -40 °C on request
3) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Dimensions (examples):

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Order details:
The electronic pressure switch HDA 7400 has been specially developed for OEM customers and is available for minimum order quantities of 100 units per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.
Description:
The pressure transmitter series HDA 9000 has been specially developed for low pressure applications in the industrial and mobile sectors. The transmitters are available in various pressure ranges from 0 .. 1 bar to 0 .. 100 bar. For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiodermal output signals are also available. For the electrical connection, different types of integrated connections are available.

A basic accuracy of ≤ ± 0.5 % FS typ., combined with a small temperature drift, ensures a broad range of applications for the HDA 9300, e.g. in pump and compressor controls, refrigerating plants and air conditioning, or for pilot controls in the mobile sector.

Special features:
- Accuracy ≤ ± 0.5 % FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design

Technical data:

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<td>1/4-18 NPT, external thread</td>
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<td>7/16-20 UNF 2A</td>
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<td>Connector: Stainless steel</td>
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<td>Seal: FPM, EPDM</td>
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<th>Output data</th>
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<td>≤ ± 0.25 % FS max.</td>
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<td>Rise time</td>
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<td>≤ 4 ms</td>
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<td>Long term drift</td>
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<td>≤ ± 0.3 % FS / year typ.</td>
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Environmental conditions
- Compensated temperature range: - 25 .. 85 °C
- Operating temperature range: - 40 .. 100 °C / - 25 .. 100 °C
- Storage temperature range: - 40 .. +100 °C
- Fluid temperature range: - 40 .. 125 °C / - 25 .. 125 °C

Certificate No.: E318391
Vibration resistance according to DIN EN 60068-2-3 at 5 .. 2000 Hz ≤ 25 g
Shock resistance to DIN EN 60068-2-27 100 g / 6 ms / half-sine
500 g / 1 ms / half-sinus
Protection class to IEC 60529 to ISO 20653 1) IP 65, IP 67 (depending on electrical connection) IP 69K (depending on electrical connection)

Other data
- Electrical connection: M12x1, 4 pol.
  Packard Metri Pack Series 150, 3 pole.
  Deutsch DT 04, 3 pole
  EN 175301-803 (DIN 43650), 3 pole + PE
- Supply voltage: 8 .. 36 V DC
  12 .. 36 V DC for 0 .. 10 V, 5 V DC ≤ ± 5 % (ratiometric)
- Residual ripple of supply voltage ≤ 5 %
- Service life: > 10 million cycles, 0 .. 100 % FS
- Weight: ~ 100 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overide and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L = Best Fit Straight Line
1) Other mechanical connections on request
2) -25 °C with FPM or EPDM seal, -40 °C on request
3) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1 (Minimum order quantity 1000 units)
Order details:
The electronic temperature switch HDA 9300 has been specially developed for OEM customers and is available for minimum order quantities of 1000 units per type.
For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The electronic pressure switch EDS 810 has been specially developed for use in volume production machines.
The highly compact instrument is equipped with a very robust pressure sensor with thin-film strain gauge on a stainless steel membrane.
The transistor switching output is available with either N/C or N/O function.
The switching and switch-back point of the EDS 810 is factory-set according to customer specification (not field-adjustable).
Various pressure ranges between 0..40 bar and 0 .. 600 bar are available.

Technical data:

Input data:
- Measuring ranges: 40; 60; 100; 160; 250; 400; 600 bar
- Overload pressures: 80; 120; 200; 320; 500; 800; 1000 bar
- Burst pressures: 2000; 3000; 5000; 12500; 20000; 20000 bar
- Mechanical connection: G1/4" DIN 3852 (20 Nm)
  7/16-20 UNF 2A (15 Nm)
  9/16-18 UNF 2A (20 Nm)
each with orifice 0.5 mm
- Parts in contact with medium: Mech. conn.: Stainless steel
  Seal: FPM

Output data:
- Switch output: Either:
  - 1 PNP or 1 NPN transistor switching output
  - 2 PNP transistor switching outputs
    (only in conjunction with electrical connection M12x1, 4 pole)
- Switching and switch-back points: according to customer specification
- Output load: ≤ 500 mA per switching output
- Switching points: according to customer specification
- Switching direction: N/C / N/O function
  (according to customer specification)
- Output load:
  ≤ 500 mA per switching output
- Switching direction: N/C / N/O function
  (according to customer specification)
- Temperature drift:
  ≤ ± 0.03 % FS / °C max. zero point
  ≤ ± 0.03 % FS / °C max. range
- Rising switch point and falling switch point delay: 8 ms to 2000 ms (standard 32 ms);
  factory-set according to customer spec.
- Switching points:
  ≤ ± 0.1 % FS typ.
- Switching points:
  ≤ ± 0.5 % FS typ.
- Max. setting:
  ≤ ± 1 % FS max.
- Rising switch point and falling switch point delay:
  ≤ ± 1 % FS typ. / year
- Environmental conditions:
  -25 °C with FPM seal, -40 °C on request

Special features:
- Accuracy ≤ ± 1 % FS
- Outstanding performance in terms of temperature effect and EMC
- Very compact design
- ECE type approval (approved for road vehicles)

Electrical connection:
- M12x1, 4 pole
- AMP DIN 72585 code 1, 3 pole
- Packard Metri Pack series 150, 3 pole
- Deutsch DT 04, 3 pole
- AMP Superseal, 3 pole
- AMP Junior Power Timer, 3 pole
- Flying leads, 1 m cable length
- EN175301-803 (DIN 43650), 3 pole

Supply voltage:
- 8 .. 32 V DC
- for use acc. to UL spec.:
  - limited energy - according to 9.3 UL 61010: Class 2
  - UL 1310/1585; LPS UL 60950

Current consumption:
- 1 PNP max. 0.52 A total/max. 20 mA
- with inactive switch output
  2 PNP max. 1.02 A total/max. 20 mA
- with inactive switch outputs
- NPN max. 20 mA total

Residual ripple of supply voltage:
- ≤ 5 %

Life expectancy:
- > 10 million cycles
  0 .. 100 % FS

Weight:
- ≤ 55 g

Note:
- Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.
- FS (Full Scale) = relative to the complete measurement range

Environmental conditions:
- Complied temperature range: -25 °C .. +85 °C
- Operating temperature range: -40 °C .. +125 °C
- Storage temperature range: -40 °C .. +125 °C
- Protection class to IEC 60529:
  IP 65, IP 67 (depending on the electrical connection)
  IP 69 K (depending on the electrical connection)
- Protection class to ISO 20653
- EN 61000-6-1 / 2 / 3 / 4
- Certificate No. EN 61000-6-1 / 2 / 3 / 4
- mark 2)
- Vibration resistance to ≤ 25 g
- DIN EN 60068-2-6 at 5 .. 2000 Hz
- Shock resistance to 100 g / 6 ms / half sine
  500 g / 1 ms / half sine
- Protection class to IEC 60529
  to ISO 20653
- Other data
  0 .. 100 % FS
- Weight: ~ 55 g

*(Minimum order quantity 500 units)*
**Dimensions:**

- **Male connection**
  - DIN 72585
  - 3 pole

- **Male connection**
  - Metri-Pack series 150
  - 3 pole

- **Male connection**
  - Deutsch DT 04
  - 3 pole

- **Male connection**
  - Junior Power Timer
  - 3 pole

- **Male connection**
  - Superseal series 1.5
  - 3 pole

- **Flying leads**
  - Male M12x1, 4 pole
  - Seal ring DIN 38602-14, FPM
  - Hex-SW27 orifice
  - Ø25.9 ±0.5
  - Ø23.5 ±0.1
  - Ø29.4 ±0.1

- **Male connection**
  - DIN EN175301-803 (DIN 43650)
  - 3 pole

- **Flying leads**
  - Male M12x1, 4 pole
  - Seal ring DIN 38602-14, FPM
  - Hex-SW27 orifice
  - Ø25.9 ±0.5
  - Ø23.5 ±0.1
  - Ø29.4 ±0.1

- **Flying leads**
  - Male M12x1, 4 pole
  - Seal ring DIN 38602-14, FPM
  - Hex-SW27 orifice
  - Ø25.9 ±0.5
  - Ø23.5 ±0.1
  - Ø29.4 ±0.1

**Order details:**
The electronic pressure switch EDS 810 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For precise specifications, please contact our Sales Department of HYDAC ELECTRONIC.

**Note:**
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The electronic pressure switch EDS 710 has been specially developed for use in large volume production machines.
The highly compact unit has a very robust pressure sensor with thin-film strain gauge on a stainless steel membrane.
The EDS 710 is available with 1 transistor switching output (PNP) which can be defined either as N/C or N/O.
Switching and switch-back points of the EDS 710 are factory-set according to customer specification (not field-adjustable).
Various pressure ranges between 0 .. 16 bar and 0 .. 600 bar are available.

**Special features:**
- 1 transistor switch output (PNP), either as N/C or N/O
- Factory-set according to customer specification (not field-adjustable)
- Accuracy ± 1 % FS
- Highly robust sensor cell
- Highly compact design
- Very small temperature error

**Technical data:**

**Input data:**
- Measuring ranges: 16; 60; 100; 250; 400; 600 bar
- Overload pressures: 32; 200; 200; 500; 800; 1000 bar
- Burst pressures: 200; 500; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. conn.: Stainless steel
  Seal: FPM

**Output data:**
- Switch output: 1 transistor switching output (N/C or N/O)
- Output load: 400 mA
- Switching points: according to customer specification
- Switch-back points: according to customer specification
- Accuracy to DIN 16086:
  - Max. setting: ≤ ± 1 % FS max.
  - Repeatability: ≤ ± 0.1 % FS max.
- Temperature drift:
  - Relative to complete measuring range
  - ≤ ± 0.03 % FS / °C max. zero point
  - ≤ ± 0.03 % FS / °C max. range
- Rising switch point and falling switch point delay:
  - ≤ 8 ms to 2000 ms (standard 32 ms); factory-set according to customer spec.
- Long-term drift:
  - ≤ ± 0.3 % FS typ. / year

**Environmental conditions:**
- Compensated temperature range: -25 .. +85 °C
- Operating temperature range:
  - -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range:
  - -40 .. +100 °C / -25 .. +100 °C
- Vibration resistance:
  - ≤ 20 g
- Shock resistance to DIN EN 60068-2-6 at 10 .. 500 Hz:
  - ≤ 100 g
- Protection class to IEC 60529:
  - IP 67

**Other data:**
- Electrical connection:
  - e.g. M12x1 (4 pole)
  - Flying leads
- Supply voltage:
  - 10 .. 30 V DC
- Residual ripple of supply voltage:
  - ≤ 5 %
- Life expectancy:
  - > 10 million cycles
  - 0 .. 100 % FS
- Weight:
  - ~ 60 g

**Note:**
Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
-25 °C with FPM seal, -40 °C on request
Other electrical connection options, e.g. cables with different types of connector, available on request.
Order details:
The electronic pressure switch EDS 710 has been specially developed for OEM customers and is available for minimum order quantities of 100 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.
Electronic Pressure Switch
EDS 410

(Minimum order quantity 50 pieces)

Description:
The electronic pressure switch EDS 410 has been specially developed for use in volume production machines, and is based on the EDS 4000 pressure switch series. The EDS 410 is available with 1 or 2 transistor switching outputs (PNP), which can be defined as either N/C or N/O.
The switching and reset points of the EDS 410 are factory-set according to customer specification (not field-adjustable).

As with the EDS 4000 standard model, the EDS 410 has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range, and a stainless steel measurement cell with thin-film strain gauge for measuring in the high pressure range.

Various pressure ranges between 0 .. 1 bar and 0 .. 600 bar as well as different electrical and mechanical connection types are available.

Special features:
- 1 or 2 transistor switching outputs (PNP), either as N/C or N/O
- Factory-set according to customer specification (not field-adjustable)
- Accuracy ≤ ± 1 % FS
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

**Input data**

- Measuring ranges: 1; 2.5; 6; 10; 16; 40; 60; 100; 250; 400; 600 bar
- Overload pressures: 3; 8; 15; 20; 32; 80; 120; 200; 500; 800; 1000 bar
- Burst pressures: 5; 12; 30; 48; 75; 180; 300; 500; 1000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Mech. connection: Stainless steel Sensor cell: Ceramic or stainless steel Seal: FPM or EPDM

**Output data**

- Switch output: 1 or 2 PNP transistor switching outputs (N/C or N/O)
- Output load: 1.2 A per switching output
- Switching points: according to customer specification
- Switch-back points: according to customer specification
- Accuracy to DIN 16086, Max. setting: ≤ ± 0.5 % FS typ.
- ≤ ± 1 % FS max.
- Repeatability (at 25 °C): ≤ ± 0.1 % FS max.
- Temperature drift: ≤ ± 0.03 % FS / °C max. zero point
- ≤ ± 0.03 % FS / °C max. range
- Rising switch point and falling switch point delay: 8 ms to 2000 ms (standard 32 ms); factory-set according to customer spec.
- Long-term drift: ≤ ± 0.3 % FS typ. / year

**Environmental conditions**

- Compensated temperature range: -25 .. +85 °C
- Operating temperature range: -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 .. +100 °C / -25 .. +100 °C
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz: ≤ 20 g
- Shock resistance to DIN EN 60068-2-29 (1 ms): ≤ 100 g
- Protection class to IEC 60529: IP 65
- IP 67 (M12x1, when an IP 67 connector is used)

**Other data**

- Electrical connection: e.g. EN175301-803 (DIN 43650) M12x1 (4 pole) Flying lead
- Supply voltage: 8 .. 32 V DC
- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: ~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

1) -25 °C with FPM or EPDM seal, -40 °C on request

2) Other connection options available on request.
Order details:
The electronic pressure switch EDS 410 has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.
Description:

The electronic pressure switch EDS 4400 with flameproof enclosure and triple approval according to ATEX, CSA, and IECEx ensures the instrument is universally suitable for use in potentially explosive environments around the world.

Each device is certified by the three approval organizations and is labelled accordingly. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

As with the industrial version of the EDS 4400, those with triple approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seals.

Main applications are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high dust loads.

Protection types and applications:

- ATEX Flame Proof
  - Class I Group A, B, C, D, T6, T5
  - Class II Group E, F, G
  - Class III Type 4
- CSA Flame Proof
  - Ex d I Mb
  - Ex d IIIC T6, T5 Gb
  - Ex tb IIIC T110 .. 130 °C Db
- IECEx Flame Proof
  - Ex d I Mb
  - Ex d IIIC T6, T5 Gb
  - Ex tb IIIC T110 .. 130 °C Db

Special features:

- Accuracy ± 1.0 % FS typ.
- Certificates: ATEX KEMA 10ATEX100 X CSA MC 224264 IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

### Input data

- **Measuring ranges**: 6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
- **Overload pressures**: 15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
- **Burst pressure**: 100; 200; 300; 500; 1000; 2000; 3000 bar
- **Mechanical connection**: (Torque value) G1/2 A DIN 3852 (40 Nm) G1/4 A DIN 3852 (20 Nm)
- **Parts in contact with medium**: Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
- **Seal**: FPM

### Output data

- **Conduit and housing material**: 1.4404; 1.4435 (316L)

#### Environmental conditions

- **Temperature drift**: ≤ ± 0.3 % FS / °C max. zero point ≤ ± 0.3 % FS / °C max. range
- **Switch points / hysteresis / N/C or N/O function**: permanently pre-set acc. to customer spec.
- **Rising switch point and falling switch point delay**: 32 ms standard (8 .. 2000 ms pre-set to customer spec.)
- **Long-term drift**: ≤ ± 0.3 % FS typ. / year

#### Vibration resistance to DIN EN 6068-2-6 at 10 .. 500 Hz

- ** ≤ 20 g**

### Other data

- **Voltage supply**: 12 .. 30 V DC
- **Current consumption**: ~ 25 mA (plus switching current)
- **Residual ripple of supply voltage**: ≤ 5 %
- **Life expectancy**: > 10 million cycles
- **Weight**: ~ 300 g

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

**FS** (Full Scale) = relative to complete measuring range

1) Other mechanical connection options available on request

2) Other output signals available on request

3) -20 °C with FPM seal, -40 °C on request
**Areas of application:**

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</table>

**Order details:**

The electronic pressure switch EDS 4400 with triple approval has been specially developed for OEM customers and is available for minimum order quantities of 50 units per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

**Dimensions:**

*optional, depending on gauge type “Sealed Gauge” / “Vented Gauge”

**Note:**

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
**Description:**
The pressure switch EDS 4400 in ATEX version, has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series.
The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set according to customer requirement (not field-adjustable).
As with the industry model, the EDS 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge for measuring relative pressure in the high pressure range.

With approval for the following Protection types and applications:

- **I M1**
- **II 1G, 1/2G, 2G**
- **II 1 D**

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available upon request.

**Special features:**
- Switching point and switch-back point factory-set according to customer specification (not field-adjustable)
- Accuracy ≤ ±1% FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Various types of electrical connection
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

**Technical data:**

### Input data
- Measuring ranges: 60; 100; 250; 400; 600 bar
- Overload pressures: 120; 200; 500; 800; 1000 bar
- Burst pressures: 300; 500; 1000; 2000; 2000 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm
- Parts in contact with medium: Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
- Seal: FPM

### Output data
- Switch output: 1 x PNP N/C or N/O
- Output load during operation: I_max ≤ 34 mA
- Switching point: Factory-set acc. to customer specification
- Switch-back point: Factory-set acc. to customer specification
- Accuracy to DIN 16086, ≤ ± 0.5% FS typ.
- Repeatability: ≤ ± 0.1% FS at 25 °C
- Temperature drift: ≤ ± 0.03% FS / °C max. zero point
- Rising switch point and falling switch point delay: 32 ms standard (8 .. 2000 ms factory-set to customer spec.)

### Environmental conditions
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -20 .. +60 °C / +70 °C / +85 °C
- Vibration resistance to EN 60068-2-6 at 10 .. 500 Hz
- Protection class to IEC 60529: IP 65 (male to EN175301-803 (DIN 43650))
- IP 67 (M12x1 male, when an IP 67 connector is used)

### Relevant data for IEC applications

<table>
<thead>
<tr>
<th>I M1</th>
<th>II 1G, 1/2G, 2G</th>
<th>II 1 D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage:</td>
<td>14 .. 28 V DC</td>
<td>14 .. 28 V DC</td>
</tr>
<tr>
<td>Compensated temperature range:</td>
<td>T6: -20 .. +60 °C T5: -20 .. +70 °C T100: -20 .. +70 °C</td>
<td>T6: -20 .. +60 °C T5: -20 .. +70 °C T100: -20 .. +70 °C</td>
</tr>
<tr>
<td>Max. ambient temperature T_a:</td>
<td>T6: +60 °C T5: +70 °C T100: +70 °C</td>
<td>T6: +60 °C T5: +70 °C</td>
</tr>
<tr>
<td>Max. input current:</td>
<td>100 mA</td>
<td>100 mA</td>
</tr>
<tr>
<td>Max. input power:</td>
<td>0.7 W</td>
<td>0.7 W</td>
</tr>
<tr>
<td>Max. internal capacitance:</td>
<td>33 nF</td>
<td>33 nF</td>
</tr>
<tr>
<td>Max. internal inductance:</td>
<td>0 mH</td>
<td>0 mH</td>
</tr>
<tr>
<td>Insulation voltage 1)</td>
<td>50 V AC, with integrated overvoltage protection EN 61000-6-2</td>
<td>50 V AC, with integrated overvoltage protection EN 61000-6-2</td>
</tr>
<tr>
<td>Approved intrinsic safety barriers</td>
<td>Pepperl &amp; Fuchs: Z 787</td>
<td>Pepperl &amp; Fuchs: Z 787</td>
</tr>
<tr>
<td>Telematic Ex STOCK: MTL 7087</td>
<td>Telematic Ex STOCK: MTL 7087</td>
<td></td>
</tr>
</tbody>
</table>

### Other data
- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: ~ 150 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

1) 500 V AC on request
Areas of application:

<table>
<thead>
<tr>
<th>Zones / Categories</th>
<th>Group I</th>
<th>Group II</th>
<th>Group II</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Category M1</td>
<td>Category 1G</td>
<td>Category 2G, 1/2G</td>
<td>Category iD</td>
</tr>
<tr>
<td></td>
<td>Mining</td>
<td>Gases</td>
<td>Gases</td>
<td>Dusts</td>
</tr>
<tr>
<td></td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td>Protection class: intrinsically safe ia with barrier</td>
<td>Protection class: intrinsically safe ia with barrier</td>
</tr>
<tr>
<td></td>
<td>For use in Zone 0</td>
<td>For use in Zone 1, 2</td>
<td>For mounting to Zone 0</td>
<td>For use in Zone 20, 21, 22</td>
</tr>
<tr>
<td></td>
<td>T4, T5: $T_a = 70 , ^\circ!!, C$</td>
<td>T4, T5: $T_a = 70 , ^\circ!!, C$</td>
<td>T4, T5: $T_a = 70 , ^\circ!!, C$</td>
<td>T100: $T_a = 70 , ^\circ!!, C$</td>
</tr>
<tr>
<td></td>
<td>T6: $T_a = 60 , ^\circ!!, C$</td>
<td>For mounting to Zone 0</td>
<td>T6: $T_a = 60 , ^\circ!!, C$</td>
<td>For mounting to Zone 20</td>
</tr>
</tbody>
</table>

Instruments for other Protection types and applications are available upon request. Please contact our technical sales department for more information.

Order details:
The electronic pressure switch EDS 4400 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Description:
The pressure switch EDS 4300 in ATEX version, has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series. The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set according to customer requirement (not field-adjustable). As with the industry model, the EDS 4300 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

With approval for the following Protection types and applications:

- I M1
- II 1D
- II 1G, II 1/2G, II 2G

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available upon request.

Special features:
- Switching output factory-set (not field-adjustable)
- Accuracy ≤ ± 1% FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Various types of electrical connection
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

### Input data
- Measuring ranges: 1; 2.5; 4; 6; 10; 16; 25; 40 bar
- Overload pressures: 3; 6; 12; 20; 32; 50; 80; 120 bar
- Burst pressures: 5; 12; 18; 30; 48; 75; 120; 180 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm

### Output data
- Switch output: 1 x PNP N/C or N/O
- Output load during operation: \( I_{\text{max}} \leq 34 \text{ mA} \)
- Switching point: factory-set to customer specification
- Switch-back point: factory-set to customer specification
- Accuracy to DIN 16086: ≤ ± 0.5 % FS typ.
- Repeatability: ≤ ± 0.1 % FS at 25 °C
- Temperature drift: ≤ ± 0.03 % FS / °C max.
- Rising switch point and falling switch point delay: 32 ms standard; (8 .. 2000 ms factory-set to customer spec.)

### Environmental conditions
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -20 .. +60 °C / +70 °C / +85 °C
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz: ≤ 20 g
- Protection class to IEC 60529: IP 65 (male to EN175301-803 (DIN 43650)), IP 67 (M12x1 male, when an IP 67 connector is used)

### Relevant data for Ex applications

<table>
<thead>
<tr>
<th>I M1</th>
<th>II 1G, 1/2G, 2G</th>
<th>II 1 D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>14 .. 28 V DC</td>
<td></td>
</tr>
<tr>
<td>Compensated temperature range</td>
<td>T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C</td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C</td>
<td></td>
</tr>
<tr>
<td>Max. ambient temperature Tₘ</td>
<td>T6: +60 °C T5, T4: +70 °C T100: +70 °C</td>
<td></td>
</tr>
<tr>
<td>Max. input current</td>
<td>100 mA</td>
<td>93 mA</td>
</tr>
<tr>
<td>Max. input power</td>
<td>0.7 W</td>
<td>0.65 W</td>
</tr>
<tr>
<td>Max. internal capacitance</td>
<td>33 nF</td>
<td>33 nF</td>
</tr>
<tr>
<td>Max. internal inductance</td>
<td>0 mH</td>
<td>0 mH</td>
</tr>
<tr>
<td>Insulation voltage</td>
<td>50 V AC, with integrated overvoltage protection EN 61000-6-2</td>
<td></td>
</tr>
<tr>
<td>Approved intrinsic safety barriers</td>
<td>Peppel &amp; Fuchs: Z 787</td>
<td>MTL 7087</td>
</tr>
</tbody>
</table>

Other data

- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- Weight: "~ 150 g"

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

1) 500 V AC on request
Pin connections:
Pin connections are configured according to customer specification.

EN175301-803 (DIN 43650)

Safety instructions:
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit from the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

Order details:
The electronic pressure switch EDS 4300 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Areas of application:

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>I M1 Ex ia I</th>
<th>II 1G Ex ia IIC T4, T5, T6</th>
<th>II 2G Ex ia IIC T4, T5, T6</th>
<th>II 1D Ex iaD 20 T100 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zones / Categories</td>
<td>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier For use in Zone 0 T4, T5: T_a = 70 °C T6: T_a = 60 °C</td>
<td>Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0 T4, T5: T_a = 70 °C T6: T_a = 60 °C</td>
<td>Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0 T4, T5: T_a = 70 °C T6: T_a = 60 °C</td>
<td>Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20 T100: T_a = 70 °C</td>
</tr>
</tbody>
</table>

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

Dimensions:

Note:
The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.
Description:
The pressure switch EDS 4100 in ATEX version, has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series. The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set according to customer requirement (not field-adjustable).

As with the industry model, the EDS 4100 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range.

With approval for the following Protection types and applications:

- I M1
- II 1G, 1/2G, 2G
- II 1 D

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available on request.

Special features:
- Switching output factory-set (not field-adjustable)
- Accuracy ≤ ± 1% FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Various types of electrical connection
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

Technical data:

**Input data**

- Measuring ranges: 1; 2.5 bar
- Overload pressures: 3; 8 bar
- Burst pressures: 5; 12 bar
- Mechanical connection: G1/4 A DIN 3852
- Torque value: 20 Nm

**Output data**

- Switch output: 1 x PNP N/C or N/O
- Output load during operation: I<sub>max</sub> ≤ 34 mA
- Switching point: factory-set to customer specification
- Switch-back point: factory-set to customer specification
- Accuracy to DIN 16086, ≤ ± 0.5 % FS typ.
- Max. setting: ≤ ± 1 % FS max.
- Repeatability: ≤ ± 0.03 % FS at 25 °C
- Temperature drift: ≤ ± 0.03 % FS / °C max. zero point
- ≤ ± 0.03 % FS / °C max. range

**Environmental conditions**

- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -20 .. +60 °C / +70 °C / +85 °C
- Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz
- ≤ 20 g
- Protection class to IEC 60529
- IP 65 (male to EN175301-803 (DIN 43650))
- IP 67 (M12x1 male, when an IP 67 connector is used)

**Relevant data for Ex applications**

- Supply voltage: 14 ... 28 V DC
- Compensated temperature range:
  - T6: -20 .. +60 °C
  - T5: -20 .. +70 °C
  - T100: -20 .. +70 °C
- Operating temperature range:
  - T6: -20 .. +60 °C
  - T5: -20 .. +70 °C
  - T100: -20 .. +70 °C
- Max. ambient temperature T<sub>a</sub>:
  - T6: +60 °C
  - T5: +70 °C
  - T100: +70 °C
- Max. input current: 100 mA
- Max. input power: 0.7 W
- Max. internal capacitance: 33 nF
- Max. internal inductance: 0 mH
- Insulation voltage: 50 V AC, with integrated overvoltage protection EN 61000-6-2
- Approved intrinsic safety barriers:
  - Peppel & Fuchs: Z 787
  - Telematic Ex STOCK: MTL 7087

Other data:

- Residual ripple of supply voltage: ≤ 5 %
- Life expectancy: > 10 million cycles
- 0 .. 100 % FS
- Weight: ~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

1) 500 V AC on request
Pin connections:
Pin connections are configured according to customer specification.

EN175301-803 (DIN 43650)

M12x1

Areas of application:

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>I M1 Ex ia I</th>
<th>II 1G Ex ia IIC T4, T5, T6</th>
<th>II 2G Ex ia IIC T4, T5, T6</th>
<th>II 1D Ex iaD 20 T100 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zones / Categories</td>
<td>Group I Category M1 Mining Protection class: intrinsically safe ia with barrier</td>
<td>Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0 T4, T5: ( T_a = 70 ) °C T6: ( T_a = 60 ) °C</td>
<td>Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0 T4, T5: ( T_a = 70 ) °C T6: ( T_a = 60 ) °C</td>
<td>Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20 T100: ( T_a = 70 ) °C</td>
</tr>
</tbody>
</table>

Instruments for other protection types and applications are available on request. Please contact our technical sales department for more information.

Order details:
The electronic pressure switch EDS 4100 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Accessories:
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

Dimensions:

Safety instructions:
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that the measured fluids in contact with the pressure switch are compatible with the materials used.

Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
**Description:**
The HTT 8000 series of temperature transmitters was specifically developed for OEM applications e.g. in mobile applications. It is based on a silicon semiconductor device with corresponding evaluation electronics. All parts in contact with the medium are in stainless steel, and are welded together.

For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available.

For the electrical connection, various built-in connections are available.

The pressure resistance up to 600 bar and excellent EMC characteristics make the HTT 8000 ideal for use in harsh conditions.

**Special features:**
- Accuracy ≤ ± 1.5 % FS typ.
- Small, compact design
- Excellent EMC characteristics
- Long-term stability

**Technical data:**

### Input data:
- Measuring principle: Silicon semiconductor device
- Measuring range: -25 .. +125 °C
- Probe length: 16 mm
- Pressure resistance: 600 bar
- Mechanical connection: G1/4 A DIN 3852 (20 Nm)
- Parts in contact with medium: Mech. conn.: Stainless steel; Seal: FPM

### Output data:
- Output signal: e.g.: 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V, 0 .. 10 V, ratiometric: 0.5 .. 4.5 V for $U_B = 5$ V DC (10 .. 90 % $U_B$ ± 5 %), etc.
- Accuracy (at room temperature): ≤ ± 1.0 % FS typ.
- ≤ ± 2.0 % FS max.
- Temperature drift (environment): ≤ ± 0.02 % FS / °C
- Rise time to DIN EN 60751:
  - $t_{50}$: ~ 4 s
  - $t_{90}$: ~ 8 s

### Environmental conditions:
- Ambient temperature range: -40 .. +85 °C / -25 .. +85 °C
- Storage temperature range: -40 .. +100 °C
- Fluid temperature range: -40 .. +125 °C / -25 .. +125 °C

**Marking:**
- Certificate No. E318391

### Vibration resistance:
- ≤ 25 g DIN EN 60068-2-6 at 10 .. 500 Hz

### Shock resistance:
- 100 g / 6 ms / half sine DIN EN 60068-2-27
- 500 g / 1 ms / half sine

### Protection class to IEC 60529:
- IP 67

### Other data:
- **Electrical connection:**
  - M12x1, 4 pole
  - AMP DIN 72685 code 1, 3 pole
  - Packard Metri Pack Series 150, 3 pole
  - Deutsch DT 04, 3 pole
  - AMP Superseal, 3 pole
  - AMP Junior Power Timer, 3 pole
  - Flying leads, 1 m cable length
  - EN175301-803 (DIN 43650), 3 pole. + PE

- **Supply voltage:**
  - 8 .. 30 V DC
  - 12 .. 30 V DC for 0 .. 10 V,
  - 5 V DC ± 5 % (ratiometric)
- **for use acc. to UL spec.:**
  - Limited energy - according to
    - 9.3 UL 61010; Class 2;
    - UL 1310/1585; LPS UL 60950

- **Current consumption:** ≤ 25 mA
- **Residual ripple of supply voltage:** ≤ 5 %
- **Weight:** ~ 145 g

**Note:** Reverse polarity protection of the supply voltage, excess voltage, override, short circuit protection are provided.

**FS (Full Scale) = relative to the complete measuring range**

1) Other measuring ranges on request
2) Other mechanical connections on request
3) -25 °C with FPM seal, -40 °C on request
4) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Dimensions:

- Male connection DIN 72585 3 pole
- Male connection Metri-Pack series 150 3 pole
- Male connection DT04 3 pole
- Male connection Junior Power Timer 3 pole
- Male connection Superseal series 1.5 3 pole
- Male connection EN175301-803 (DIN 43650) 3 pole + PE
- Male connection M12x1 - 4 pole

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

Order details:
The electronic temperature transmitter HTT 8000 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.
Description:
The temperature switch series HTS 8000 has been specifically developed for the OEM market, e.g. in mobile applications. It is based on a silicon semiconductor device with corresponding evaluation electronics. All parts in contact with the medium are in stainless steel, and are welded together.
The transistor switching output is available with either a N/C or a N/O function.
The switching and switch-back point of the HTS 8000 is factory-set according to customer specification.
For the electrical connection, various built-in connections are available.
With a pressure resistance of 600 bar and excellent EMC characteristics, the HTS 8000 is ideal for use in harsh conditions.

Special features:
- Accuracy \( \leq 1.5 \% \) FS typ.
- Small, compact design
- Excellent EMC characteristics
- Long-term stability

Technical data:

### Input data
- Measuring principle: Silicon semiconductor device
- Measuring range\(^{1}\): -25 \(^{\circ}\)C to +125 \(^{\circ}\)C
- Probe length: 16 mm
- Pressure resistance: 600 bar
- Mechanical connection\(^{2}\): G1/4 A DIN 3852 (20 Nm)
- Parts in contact with medium: Mech. conn.: Stainless steel Seal: FPM

### Output data
- Output signal: Either:
  - 1 PNP transistor switching output
  - 2 PNP transistor switching outputs (only in conjunction with electr. conn. M12x1, 4 pole)
- Switching points / switch-back points: according to customer specification
- Accuracy (at room temperature): \( \leq 1.0 \% \) FS typ. \( \leq 2.0 \% \) FS max.
- Temperature drift (environment): \( \leq 0.02 \% \) FS / \(^{\circ}\)C
- Accuracy to DIN 16086:
  - Max. setting: \( \leq 1.5 \% \) FS typ.
- Repeatability (at 25 \(^{\circ}\)C): \( \leq 1 \% \) FS max.
- Rising switch point and falling switch point delay: 32 ms standard (8 to 2000 ms pre-set to customer spec.)

### Environmental conditions
- Ambient temperature range\(^{3}\): -40..+85 \(^{\circ}\)C / -25..+85 \(^{\circ}\)C
- Storage temperature range: -40..+100 \(^{\circ}\)C
- Fluid temperature range\(^{3}\): -40..+125 \(^{\circ}\)C / -25..+125 \(^{\circ}\)C
- \(E_h, E_m\) mark\(^{4}\): Certificate No. E319381
- Vibration resistance to DIN EN 60068-2-6 at 10..500 Hz: \( \leq 25 \) g
- Shock resistance to DIN EN 60068-2-27: 100 g / 6 ms / half sine
- Protection class to IEC 60529: IP 67

### Other data
- Electrical connection: M12x1, 4 pole
- AMP DIN 72585 code 1, 3 pole
- Packard Metri Pack Series 150, 3 pole
- Deutsch DT 04, 3 pole
- AMP Superseal, 3 pole
- AMP Junior Power Timer, 3 pole
- Flying lead, 1 m cable length
- EN175301-803 (DIN 43650), 3 pole + PE

### Supply voltage
- for use acc. to UL spec.: 8..32 V DC
- limited energy - according to 9.3 UL 61010: Class 2;
- UL 1310/1585; LPS UL 60950

### Current consumption
- \( \leq 20 \) mA with inactive switching outputs
- \( \leq 0.52 \) A with 1 switching output
- \( \leq 1.02 \) A with 2 switching outputs

### Residual ripple of supply voltage
- \( \leq 5 \% \)

### Weight
- \( \sim 145 \) g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range
\(^{1}\) Other measuring ranges on request
\(^{2}\) Other mechanical connections on request
\(^{3}\) -25 \(^{\circ}\)C with FPM seal, -40 \(^{\circ}\)C on request
\(^{4}\) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1
Dimensions:

Order details:
The electronic temperature switch HTS 8000 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For a precise specification, please contact the Sales Department of HYDAC ELECTRONIC.

Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Electronic Position Switch
HLS 100
for Applications with Increased Functional Safety

(Minimum order quantity 100 units)

Description:
The position switch series HLS 100 has been specifically developed to detect the end position of safety-related devices on mobile machinery. The position switches are designed for continuous use in safety circuits/safety functions as part of the functional safety of machines up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The HLS 100 consists of two parts, the encoder magnet and the sensor unit. Using two Hall sensors integrated into the sensor unit, the sensor detects the defined position (end position) of the magnet and transmits the switching condition "ON" if this position is detected, or otherwise the switching condition "OFF". Switching conditions are output as permanent PWM signals.

During stable normal operation, the position switch cyclically performs internal diagnostic steps, which identify systematic and random errors. Errors which occur are therefore detected immediately. The output signal is then deactivated completely and the sensor is restarted.

Special features:
- Compact design
- Robust housing suitable for mobile applications
- High operating temperature range
- PWM output
- IP 67 male connector
- SIL 2 / PL d certification

Technical data:

<table>
<thead>
<tr>
<th>Input data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching range 1)</td>
<td>± 3 .. ± 9 mm</td>
<td></td>
</tr>
<tr>
<td>Switching distance magnet – sensor 1)</td>
<td>0 .. 11 mm</td>
<td></td>
</tr>
<tr>
<td>Lateral offset magnet – sensor 1)</td>
<td>± 6 mm</td>
<td></td>
</tr>
<tr>
<td>Steel plate thickness</td>
<td>Magnet: min. 5 mm</td>
<td>Sensor: 6 .. 8 mm</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>PWM 50 Hz ± 3 % (Push-Pull)</td>
<td></td>
</tr>
<tr>
<td>Duty cycle of the output signal OFF (magnet outside the switching range)</td>
<td>26 ± 1 %</td>
<td></td>
</tr>
<tr>
<td>Duty cycle of the output signal ON (magnet within the switching range)</td>
<td>74 ± 1 %</td>
<td></td>
</tr>
<tr>
<td>Output current consumption</td>
<td>High level: 60 mA min. / 150 mA max.</td>
<td>Low level: 30 mA min. / 110 mA max.</td>
</tr>
<tr>
<td>Output voltage</td>
<td>&gt; +Uu – 1.2 V at I = 10 mA</td>
<td>&lt; GND + 0.2 V at I = 10 mA</td>
</tr>
<tr>
<td>Response times after activation</td>
<td>0.5 .. 1.5 s</td>
<td></td>
</tr>
<tr>
<td>Output signal response time</td>
<td>&lt; 100 ms</td>
<td></td>
</tr>
<tr>
<td>Internal diagnostic interval</td>
<td>≤ 500 ms typ. (hardware)</td>
<td>≤ 1 s (memory modules)</td>
</tr>
</tbody>
</table>

Environmental conditions

Nominal temperature range -30 .. +85 °C
Operating temperature range (failsafe) -40 .. +100 °C
Storage temperature range -60 .. +110 °C

C mark EN 61000-6-1 / 2 / 3 / 4
Functional safety SIL 2 to EN 61508 PL d to ISO 13849
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz 25 g
Shock resistance to DIN EN 60068-2-29 (6 ms) 50 g (half sine)
Protection class to IEC 60529 IP 67

Other data

Electrical connection 2) Male ITT Canon Sure Seal, 3 pole
Supply voltage 8 .. 32 V DC
Current consumption < 10 mA (inactive output)
Residual ripple of supply voltage ≤ 5 %
Life expectancy 10 years
Weight Sensor ~ 75 g Magnet ~ 25 g

Safety-related data

Performance level
Based on DIN EN ISO 13849-1: 2008 PL d
Architecture Category 2

Safety Integrity Level
Based on DIN EN 61508: 2001 1oo1 - B
SIL 2

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range
1) All values apply to installation in magnetic steel plate of the required material thickness.
If installed in thicker steel plate or other materials, the entire system must be tested thoroughly.
2) Other connectors available on request
Dimensions:

Order details:
The electronic positioning switch HLS 100 has been especially developed for OEM customers and is available for minimum order quantities of 100 units per type.
For a precise specification, please contact the Sales Department of HYDAC ELECTRONIC.

Switching ranges:
Switching range:

Switching distance:

Lateral offset:

Note:
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Subject to technical modifications.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com
Special Products
Position Sensors and Position Switches

The position sensors and switches have been developed for short distance monitoring and can be used on the one hand for monitoring valve settings and on the other as part of a control. Based on different measuring techniques, HYDAC provides different variants for a diverse range of applications.

Position switch IES 2010 / 2015 / 2020
The position switch for monitoring valve settings (end or centre position) is primarily used in stationary applications such as:
- Hydraulic presses
- Plastics machines
- Machine tools

Special features:
- Pressure resistant to 400 bar
- Inductive measurement (LVDT)
- Various stroke sizes
- Output: 2 switching outputs with change-over function
- Electrical connection: M12x1 (4 pole)

Position sensor IWE 40
The IWE 40 position sensors for short distance detection are primarily used in stationary applications such as:
- Hydraulic presses
- Plastics machines
- Machine tools

Special features:
- Pressure resistant to 400 bar
- Inductive measurement (LVDT)
- Different measuring ranges (up to max. ±7 mm)
- Output: Analogue 4 .. 20 mA
- Electrical connection: M12x1 (4 pole)

Position switch HLS 200 with increased functional safety
The position switch HLS 200 is used for reliable detection of valve centre positions. They are used both in mobile and in stationary applications.

Special features:
- PL d certification
- Measuring technique: IR light barriers
- Output: 2 switching outputs with change-over function
- Electrical connection: M12x1 (4 pole); Deutsch DT 04 (4 pole)

Order details:
The position sensors and position switches are OEM products which have been especially developed for volume production customers. For a precise specification, please contact the Sales Department of HYDAC ELECTRONIC.

Note:
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ACCESSORIES

Accessories to suit every sensor!
Whether it’s electrical connectors, mechanical adapters or the instrument mounting clamps, the wide range of products from HYDAC offers solutions for all applications.
Saving time on installation and commissioning.

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Electrical Accessories
Female Connectors for Sensors

ZBE 02
Female connector
Binder Series 714 M18
4 pole, straight
Cable diameter: 6.5 .. 8 mm
Part No.: 609479

ZBE 03
Female connector
Binder Series 714 M18
4 pole, right-angle
Cable diameter: 6.5 .. 8 mm
Part No.: 609480

ZBE 01
Female connector
EN175301-803 (DIN 43650) / ISO 4400
3 pole + PE, right-angle
Cable diameter: 4.5 .. 7 mm
Part No.: 905701

With electrical connection type "4":
(Male Binder series 714 M18)

With electrical connection type "5":
(Male EN175301-803 (DIN 43650) / ISO 4400)
**ZBE 06**
Female connector M12x1
4 pole, right-angle
Cable diameter: 2.5 .. 6.5 mm
Part No.: 6006788

**ZBE 06-02**
Female connector M12x1
4 pole, right-angle
with 2 m cable
Part No.: 6006790

**ZBE 06-05**
Female connector M12x1
4 pole, right-angle
with 5 m cable
Part No.: 6006789

Colour code:
Pin 1: brown
Pin 2: white
Pin 3: blue
Pin 4: black

**ZBE 06S-03**
Female connector M12x1
4-pole, straight
with 3 m cable, shielded
Part No.: 6098243

**ZBE 06S-05**
Female connector M12x1
4-pole, straight
with 5 m cable, shielded
Part No.: 6143284

**ZBE 06S-05**
Female connector M12x1
4 pole, right-angle
with 5 m cable, shielded
Part No.: 6044891

Colour code:
Pin 1: brown
Pin 2: white
Pin 3: blue
Pin 4: black

---

**With electrical connection type "6":**
(Male M12x1, 4 pole)
ZBE 10
Female connector DIN 43651
6 pole + PE, right-angle
Cable diameter: 7 .. 9 mm
Part No.: 654527

ZBE 08
Female connector M12x1
5 pole, right-angle
Cable diameter: 2.5 .. 6.5 mm
Part No.: 6006786

With electrical connection type "7":
(Male DIN 43651)

With electrical connection type "8":
(Male M12x1, 5 pole)

ZBE 08-02
Female connector M12x1
5 pole, right-angle
with 2 m cable
Part No.: 6006792

ZBE 08-05
Female connector M12x1
5 pole, right-angle
with 5 m cable
Part No.: 6006791

Colour code:
Pin 1: brown
Pin 2: white
Pin 3: blue
Pin 4: black
Pin 5: grey
**ZBE 08S-02**
Female connector M12x1  
5 pole, right-angle  
with 2 m cable, shielded  
Part No.: 6019455

**ZBE 08S-05**
Female connector M12x1  
5 pole, right-angle  
with 5 m cable, shielded  
Part No.: 6019456

**ZBE 08S-10**
Female connector M12x1  
5 pole, right-angle  
with 10 m cable, shielded  
Part No.: 6023102

Colour code:  
Pin 1: brown  
Pin 2: white  
Pin 3: blue  
Pin 4: black  
Pin 5: grey

**ZBE 30-02**
Connection cable M12x1 plug/socket  
5 pole, 2 m  
Part No.: 6040851

**ZBE 30-05**
Connection cable M12x1 plug/socket  
5 pole, 5 m  
Part No.: 6040852
**ZBE 0P**
Female connector M12x1
8 pole, right-angle
Cable diameter: 4 .. 8 mm
Part No.: 6055444

**ZBE 0P-02**
Female connector M12x1
8 pole, right-angle with 2 m cable
Part No.: 6052697

**ZBE 0P-05**
Female connector M12x1
8 pole, right-angle with 5 m cable
Part No.: 6052698

Colour code:
- Pin 1: white
- Pin 2: brown
- Pin 3: green
- Pin 4: yellow
- Pin 5: grey
- Pin 6: pink
- Pin 7: blue
- Pin 8: red

*With electrical connection type "P": (Male M12x1, 8 pole)*
Note:
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Mechanical Accessories

Connection accessories for pressure sensors

**ZBM 01**
Adapter female thread G1/4 – male thread G1/2 B, DIN EN 837-1
Part No.: 257276

**ZBM 02**
Adapter female thread G1/4 – male thread G1/2 A, DIN 3852
Part No.: 257277

**ZBM 13**
Adapter female thread G1/4 - male thread G1/4 A, with orifice 0.5 mm
Part No.: 906968

**ZBM 14**
Adapter female thread G1/4 - male thread G1/4 (rotating)
Part No.: 907818
ZBM 8000
Clamp for wall-mounting
- screw-type fitting -
(Material of lower section: TPE Santoprene 10187;
Material of top section: Steel strip DIN 95381-1.4571)
Part No.: 3546755

ZBM 8100
Clamp for wall-mounting
- weld-type fitting -
(Material of welding bridge: QSTE340TM, zinc coating EN 12329 FE/ZN8/B;
Material of lower section: TPE Santoprene 10187;
Material of top section: Steel strip DIN 95381-1.4571)
Part No.: 3546757
**ZBM 3000**
Clamp for wall-mounting
- screw-type fitting -
(Material of lower section: TPE Santoprene 10187;
Material of top section: Steel strip DIN 95381-1.4571)
Part No.: 3184630

**ZBM 3100**
Clamp for wall-mounting
- weld-type fitting -
(Material of welding bridge: QSTE340TM, zinc coating
EN 12329 FE/ZN8/B;
Material of lower section: TPE Santoprene 10187;
Material of top section: Steel strip DIN 95381-1.4571)
Part No.: 3184632

**ZBM 3200**
Splash guard
(Material: Elastollan S60 A15 SPF 000)
Part No.: 3201919

---

**Mounting accessories, device-specific**
EDS 3000, ETS 3000, AS 3000, ENS 3000 and HNS 3000
ZBM 300
Clamp for wall-mounting
- screw-type fitting -
(Material polypropylene)
Part No.: 906385

ZBM 310
Clamp for wall-mounting
- weld-type fitting -
(Material polypropylene, aluminium AlSi12, steel)
Part No.: 6011511

Mounting accessories, device-specific
EDS 300, ETS 300

[Diagram of ZBM 300]

[Diagram of ZBM 310]
Vibration mounts
Part No.: 257492

Mounting kit EDS 601
- for front panel mounting-
(S4K32 DIN 1544)
Part No.: 905404

Mounting accessories, device-specific
EDS 1700, ETS 1700

Mounting accessories, device-specific
EDS 601
Protective sleeve for tank-mounting
(Material CuZn39Pb3 - DIN 1763, electro-nickel-plated)
Part No.: 909640

Tank mounting sleeve, device-specific
ETS 3000 (100 mm)

Connection accessories, device-specific
ENS 3000

ZBM 19
Straight bulkhead union ISO 8434
Part No.: 908738
Note: Not suitable for ENS with 250 mm probe length

ZBM 20
Straight male stud coupling to ISO 8434
Part No.: 908739
Mounting block, device-specific
HLB 1300

ZBM 21 (Flow)
Mounting block for HLB 1300
for flow rates > 2 l/min
Part No.: 3244260

ZBM 23 (Low Flow)
Mounting block for HLB 1300
for flow rates from 0.5 .. 10 l/min
Part No.: 3299331

ZBM 22
Mounting block for AquaSensor
AS 1000 and AS 3000
Part No.: 3248511

Connection accessories, device-specific
AS 1000, AS 3000
Note:
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Accessories
Sensors for Distance and Position

Magnets for HLT 1000, HLT 2000, HNT 1000

**ZBL MR17**
Position magnet for HLT 1000 and HLT 2100
Part No.: 6119372

**ZBL MR22**
Position magnet for HLT 1000 and HLT 2100
Part No.: 6084453

**ZBL MR33**
Position magnet for HLT 1000 and HLT 2100
Part No.: 6084207
ZBL MV63
Position magnet for
HLT 1000, HLT 2100 and
HLT 2500-L2
Part No.: 6084454

ZBL MS35-39
Measuring slide for
HLT 2500-L2
Part No.: 6105654

ZBL MU38-20
Position magnet for
HLT 1000, HLT 2100 and
HLT 2500-L2
Part No.: 6084455
ZBL MF38-18
Position magnet for HLT 2500-F1
Part No.:  6084456

ZBL MF55-20
Position magnet for HLT 2500-F1
Part No.:  6084457

ZBL Mounting set
Mounting set for HLT 2500
Part No.:  6105653

---

Electrical accessories HLT 2000

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<th>Signal output</th>
<th>HYDAC description</th>
<th>Part number</th>
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<td>Analogue</td>
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<td>654653</td>
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<tr>
<td>M08</td>
<td>Analogue</td>
<td>Cable connector C091, 8 pole, straight</td>
<td>6123255</td>
</tr>
<tr>
<td>C61</td>
<td>CAN / DVN</td>
<td>ZBE 08 cable connector M12x1, 5 pole, right-angle</td>
<td>6006786</td>
</tr>
<tr>
<td>S01</td>
<td>SSI</td>
<td>Cable connector M23, 12 pole, straight</td>
<td>6120462</td>
</tr>
<tr>
<td>S01</td>
<td>SSI</td>
<td>Cable connector M23, 12 pole, right-angle</td>
<td>6120463</td>
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Note:
The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.
Accessories for Service Instruments

Aluminium case
for HMG 30X0 and accessories
Part No.: 6042959

Bag with carrying strap
for HMG 30X0
Part No.: 909795

Power supply unit
for HMG 30X0, Spare Part
Part No.: 6054296

ZBE 31
Car charger for HMG 30X0
Part No.: 909739

ZBE 34
Adapter for HMG 30X0 for connecting HYDAC transmitters
(4 .. 20 mA, 2 conductor)
Male M12x1 to
Binder series 714 M18
(electrical connection type "4")
Part No.: 3236597

ZBE 35
Adapter for HMG 30X0 for connecting HYDAC transmitters
(4 .. 20 mA, 2 conductor)
Male M12x1 to
Male EN175301-803
(DIN 43650)
(electrical connection type "5")
Part No.: 3236601
ZBE 36
Adapter for HMG 30X0 for connecting an AquaSensor AS 1000
Part No.: 909737

ZBE 38
Y adapter (black) for HMG 30X0 to double the number of input sockets
Part No.: 322436

ZBE 41
Y adapter (yellow) for HMG 30X0 to connect a ContaminationSensor CS 1000
Part No.: 910000

ZBE 3010
CAN adapter for HMG 3010 for connecting a CAN-Bus
Part No.: 921238

Connection cable
for HMG 30X0 - PC (USB), Spare Part
Part No.: 6040585

Hydraulic adapter kit
for HMG
2 pieces each
- Adapter hose DN 2 - 1620 / 1620 (400 mm and 1000 mm)
- Pressure gauge conn. 1620 / G1/4
- Adapter 1650 / 1620
- Bulkhead union 1620 / 1620
Part No.: 903083

HDS 1000 RPM probe
for HMG 30X0 including reflective foil set
Part No.: 909436

HDS 1000 reflective foil set
Spare Part, Quantity: 25
Part No.: 904812
**UVM 30X0**
Module for HMG 30X0 for connecting different input signals
Part No.: 909752

**Plastic case**
for HMG 500/510 and accessories
Part No.: 6043006

**Power supply (230 V AC)**
for HMG 500/510
Part No.: 6043562

**Connection cable**
for HMG 510 - PC (USB), Spare Part
Part No.: 6049553

**ZBE 30-02 (5 pole)**
Connection cable M12x1, 2 m male/female
Part No.: 6040851

**ZBE 30-05 (5 pole)**
Connection cable M12x1, 5 m male/female
Part No.: 6040852

**SSH 1000**
Sensor simulator to simulate 2 HSI sensors, ideal for training purposes
Part No.: 909414

---

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**HYDAC ELECTRONIC GMBH**
Hauptstraße 27, D-66128 Saarbrücken
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com