Fluid Level Gauge
Fluid Level Sensor
Temperature Switch

FSA / FSK / TS

up to size 381, up to PN 0.5 bar, up to T = 80 °C

1. DESCRIPTION

1.1. GENERAL

FSA fluid level gauges, FSK fluid level sensors and TS temperature switches are designed to monitor and control the level of operating fluid.

The flexible product range means that many combinations are possible:

– FSA: Range of five sizes.

  Visual thermometer with °C and °F scale.

  Temperature gauge which records the temperature of the operating fluid in the tank. Scale in °C. Dual scale in °C und °F available on request.

  Simple, standardised mounting (FSA/K).

– FSK: Range of four sizes.

  Switching contact can be either type O (opens when fluid is at low level), type C (closes when fluid is at low level) or type W (dual switching unit).

  Temperature gauge which records the temperature of the operating fluid in the tank. Scale in °C. Dual scale in °C und °F available on request.

– FSK-2SP: Monitoring of the minimum or maximum fluid level.

  Two additional alternative switching points for size 254 and above.

  Option: line marking on sight tube and float.

  Better visual fluid level monitoring possible with red float.

  Simple, standardised mounting (FSA/K).

– TS: three nominal temperatures possible: 60 °C, 70 °C and 80 °C.

  Can be easily fitted into the FSA and FSK.

  Simple, standardised mounting (FSA/K).

  Non-corroding surfaces.

1.2. FUNCTION

FSA

By using the FSA, the fluid level can be easily seen on the outside of the tank. The fluid enters the unit via the lower connection bore and is clearly visible in the tube. By selecting the right size, the particular fluid level can be monitored.

FSK

By using the FSK, the fluid level is monitored via an electrical switching signal. This switching signal can be used as an alarm or to adjust the fluid level. The fluid enters the unit via the lower connection bore and pushes the float up the tube. The float now shows the level of the fluid in the tank. If the level of the fluid drops again, the float activates a switching contact. On type C the circuit is then closed, on type O the circuit is then open.

The special dual switching model (type W) offers two possibilities. It can be used either to close on contact or to open on contact.

TS

The TS is a very useful additional option to the FSA and FSK products. However, it also has a useful application as a separate accessory for systems.

Once fitted, the temperature sensor of the TS is surrounded by operating fluid. When the nominal temperature is reached, a contact opens and the circuit is broken.

This switching process can be used either as an alarm or to monitor the temperature.

When the temperature of the fluid drops by approx. 15 K, the circuit closes again.

1.3. APPLICATION

Fluid level gauges FSA, fluid level sensors FSK and temperature switches TS are used to monitor and control levels of operating fluid.

Areas of application are for example: Machine tools, system engineering, tanks for hydraulic, lubricating and cutting oils, and gearboxes.

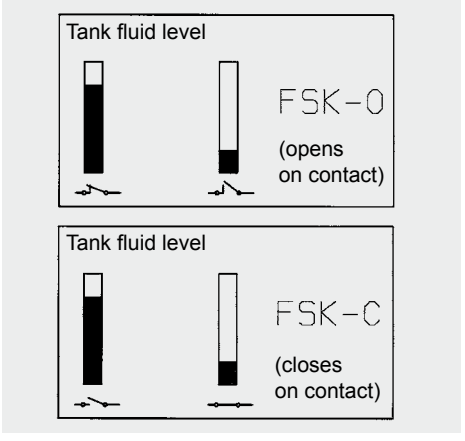
1.4. NOTES

The upper viscosity limit is 2,000 mm²/s. It is not possible to combine a temperature switch TS with an FT temperature gauge.

To ensure correct functioning, pressure, viscosity and temperature specifications must be observed.

FSA/FSK
Not suitable for use with glycol or fluids containing glycol.

FSK
Depending on the fluid level of the tank, the following switching logic applies.



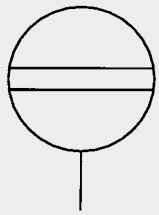
In the FSK type O the switching contact opens when the fluid level drops below the switching level. Correspondingly, in the FSK type C, the switching contact closes when the fluid level drops below the switching level.

2. TECHNICAL SPECIFICATIONS

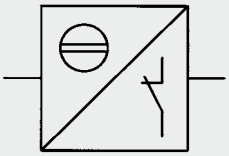
2.1. GENERAL

2.1.1 Designation and symbol

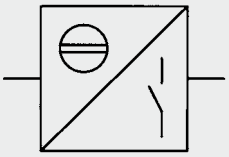
Fluid level gauge FSA



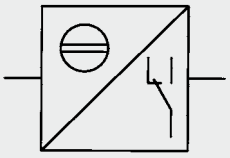
Fluid level sensor FSK



O - N/C contact

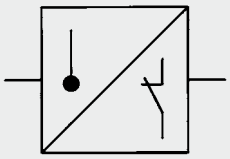


C - N/O contact



W - N/O or N/C contact

Temperature switch TS



2.1.2 Model codes

Model code for FSA
(also order example)

FSA – 076 – 2 . X / FT200 / 12 ...

Fluid level gauge

Size
≅ centre distance of bolts
076
127
176
254
381

Material of seals
1 = NBR (Perbunan)
2 = FKM (Viton)

Series
(determined by manufacturer)

Additional thermometer function
– = no additional function
T = temperature gauge in display tube
FF = prepared for temperature gauge
FT 200 = temperature gauge 200 mm
FT 300 = temperature gauge 300 mm
TS 60 = temperature switch nominal temperature 60 °C
TS 70 = temperature switch nominal temperature 70 °C
TS 80 = temperature switch nominal temperature 80 °C

Mounting
Banjo bolt thread
M 12 (standard)
M 10 (not on TS)

Special models
SO2 = with glass tube, end caps in aluminium and round shape
SO7 = housing, mounting bolts and nuts in stainless steel (1.4571)
SO8 = mounting bolts and nuts in stainless steel (1.4571)
SO14 = with glass tube, end caps in plastic (PA)
SO19 = with green banjo bolt, without label
SO65 = FSA - standard, but without mounting nuts and washers
SO67 = FSA - standard, but without mounting nuts

Model code TS
(also order example)

TS – 70 / X / 12

Temperature switch
TS - temperature switch (for FSA)
TS-L - temperature switch long (for FSK)

Nominal temperature
60 °C
70 °C
80 °C

Series
(determined by manufacturer)

Banjo bolt thread
M 12

Model code FSK
(also order example)

FSK - 127 - 2 . X / O / FT200 / 12 / ...

Fluid level sensor

Size
≅ centre distance of bolts
127
176
254
381

Material of seals
2 = FKM (Viton)

Series
(determined by manufacturer)

Switching function
O = opens at the switching level
C = closes at the switching level
W = opens or closes at the switching level
(connector Z4 = standard)

Additional thermometer function
– = no additional function
FT 200 = temperature gauge 200 mm
FT 300 = temperature gauge 300 mm
TSL 60 = temperature switch nominal temperature 60 °C
TSL 70 = temperature switch nominal temperature 70 °C
TSL 80 = temperature switch nominal temperature 80 °C

Mounting
Banjo bolt thread
M 12 (standard)
M 10 (not on TS)

Connection
No details = 3 pole MPM (standard)
Z4 = 4 pole Hirschmann
SEW = 4 pole M12x1 (sensor connection horizontal)
SES = 4 pole M12x1 (sensor connection vertical)
Form B = special connection

Model code FSK-2SP
(also order example)

FSK – 127 – 1 . O / W / – / 12 / 2SP

Fluid level sensor
FSK = Fluid level sensor

Size
≅ centre distance of bolts
127
176
254
381

Material of seals
1 = NBR (Perbunan)
2 = FKM (Viton)

Series
(determined by manufacturer)

Switching function
W = opens or closes at the switching level

Additional thermometer function
– = no additional function (standard)

Mounting
12 = M12 (banjo bolt thread)

Switching points
2SP = 2 switching points (1 x minimum, 1 x maximum)

Connector (standard)
5 pole M12x1 (sensor)

2.1.3 **Type of construction**
The units are designed to be mounted directly on to the operating fluid tank.

2.1.4 **Type of connection**
FSA / FSK
The unit is mounted using two banjo bolts. The connection bores can either be threaded holes or clearance holes (Ø 13, Ø 11).

TS
The temperature switch can be fitted to the FSA/FSK in place of the lower banjo bolt.

2.1.5 **Mounting position**
FSA – vertically on the tank wall
FSK – vertically on the tank wall (connection plug at the bottom of the tank)
TS – instead of lower banjo bolt M12 (FSA)
TS-L – instead of lower banjo bolt M12 (FSK)

2.1.6 **Weight**
FSK 127 – 0.21 kg
FSK 176 – 0.23 kg
FSK 254 – 0.26 kg
FSK 381 – 0.30 kg
FSA 076 – 0.17 kg
FSA 127 – 0.19 kg
FSA 176 – 0.21 kg
FSA 254 – 0.24 kg
FSA 381 – 0.29 kg
TS-... – 0.11 kg
TS-L-... – 0.13 kg
FT 200 – 0.03 kg
FT 300 – 0.04 kg

2.1.7 **Flow direction**
Optional

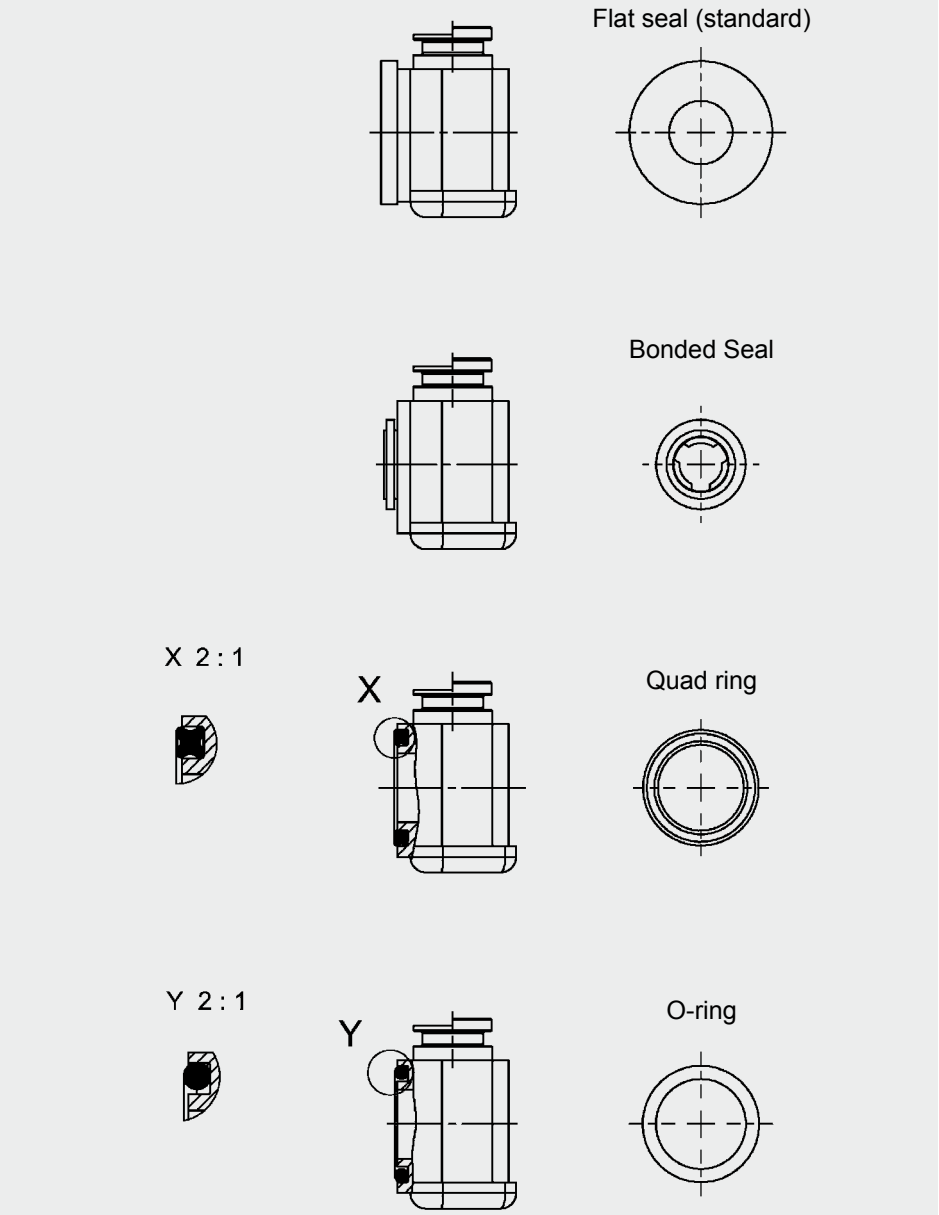
2.1.8 **Ambient temperature**
- 20 °C to + 80 °C

2.1.9 **Materials**
FSA / FSK
- End caps and tube in high quality synthetic material
- Housing in aluminium
- Soft seals in Viton (FKM) or Perbunan (NBR)
- Bolts, nuts and washers in steel (zinc-plated)
- Plug connections in high quality synthetic material (FSK)

FSK – 2SP
- End caps and housing in aluminium
- Tube in glass

TS / TS-L
- Housing with temperature sensor, washer and nut in steel (zinc-plated)
- Plug connections in high quality synthetic material

2.1.10 **FSA seal types**



2.2. HYDRAULIC DATA

2.2.1 **Nominal pressure**
max. 0.5 bar

2.2.2 **Operating fluids**
Mineral oil to DIN 51524 Part 1 and 2, water-oil emulsions and synthetic fluids, such as hydraulic fluids based on phosphate ester.

(other fluids on request)

2.2.3 **Temperature of operating fluid**
- 20 °C to + 80 °C

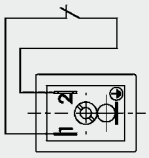
2.2.4 **Scale range of thermometer FSA / FSK**
Thermometer T for FSA:
+ 20 °C to + 80 °C

Thermometer FT for FSA / FSK:
0 °C to + 100 °C

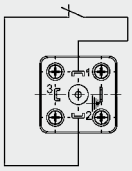
2.3. ELECTRICAL DATA FSK

2.3.1 **Electrical functions**

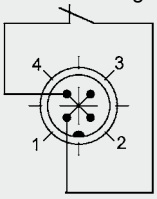
Type O / Opens on contact
opens when fluid at switching level



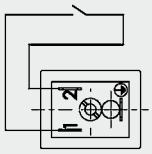
Type O / Opens on contact
(Hirschmann plug Z4 and Form B)
opens when fluid at switching level



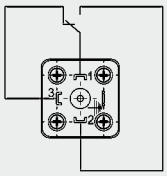
Type O / Opens on contact
(Sensor plug - SEW)
opens when fluid at switching level



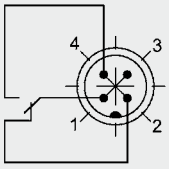
Type C / Closes on contact
closes when fluid at switching level



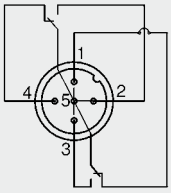
Type W / Dual switching unit
(Hirschmann plug Z4 and Form B)
opens or closes when fluid at switching level



Type W / Dual switching unit
(Sensor plug - SEW)
opens or closes when fluid at switching level



FSK–2SP



Type W / Dual switching unit
When delivered, switching point at bottom is activated by magnetic field. For the closed circuits, see table below:

Contact assignment / Float setting	bottom switch	top switch
Minimum	5 - 3	5 - 4
Maximum	5 - 1	5 - 2

2.3.2 **Contact load**
Max. 8 W

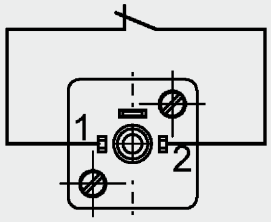
2.3.3 **Switching voltage**
50 V AC / DC

2.3.4 **Switching current**
0.2 A

2.4. ELECTRICAL DATA TS / TS-L

2.4.1 **Electrical function**

opens on contact



2.4.2 **Switching power**
2.5 A/50 V - 10,000 switch operations
0.5 A/50 V -100,000 switch operations

2.4.3 **Minimum switching current**
50 mA

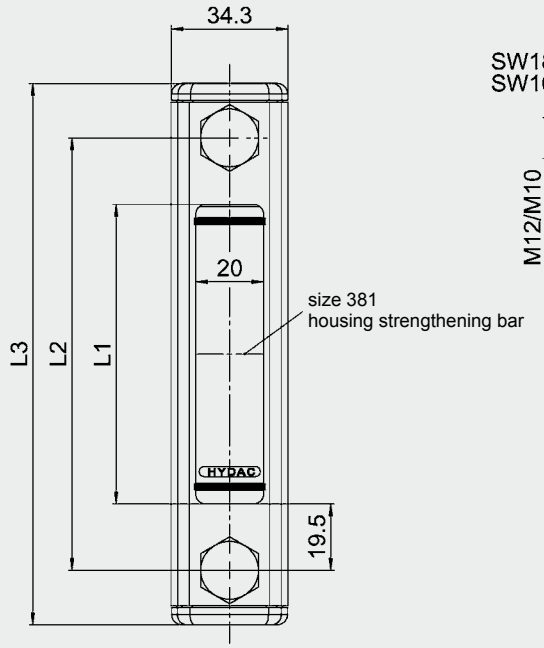
2.4.4 **Switching tolerance**
± 5 K

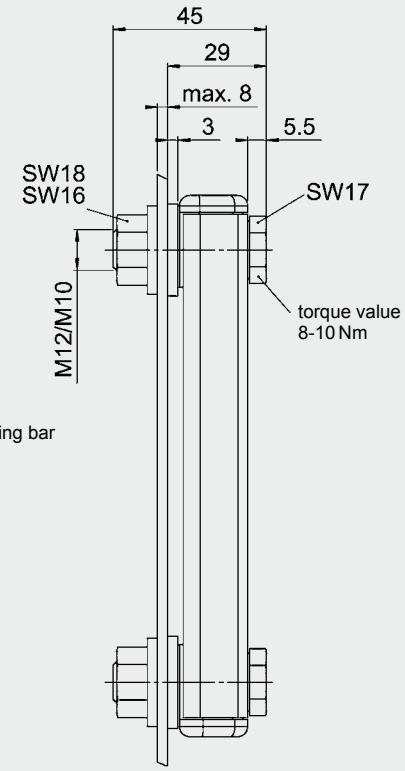
2.4.5 **Switching hysteresis**
Opens on contact
60 °C – 10-15 K
70 °C – 10-15 K
80 °C – 15-20 K

3. DIMENSIONS

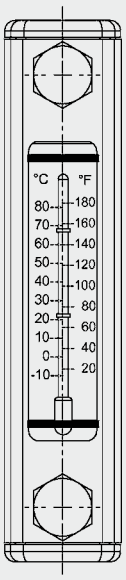
3.1. FLUID LEVEL GAUGE FSA

FSA Standard

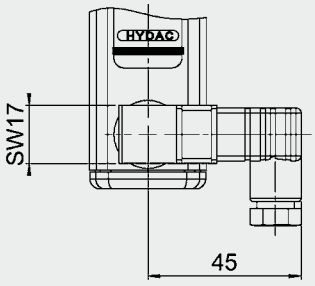


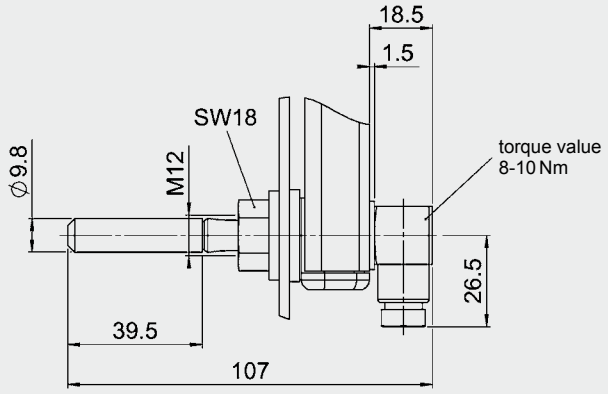


FSA with temperature gauge

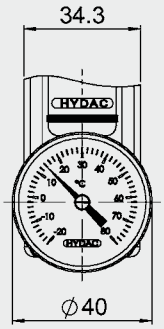


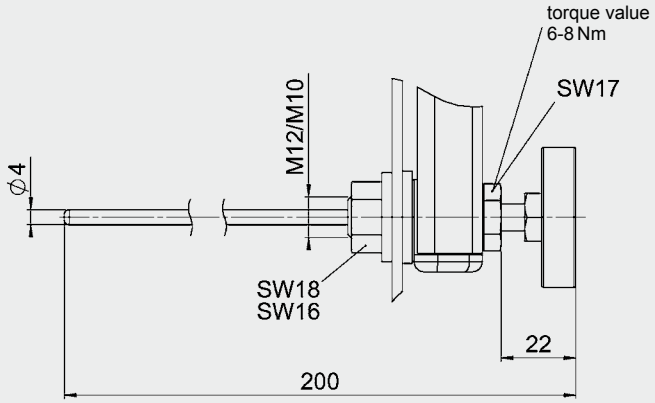
FSA with temperature switch TS





FSA / FSK with temperature gauge

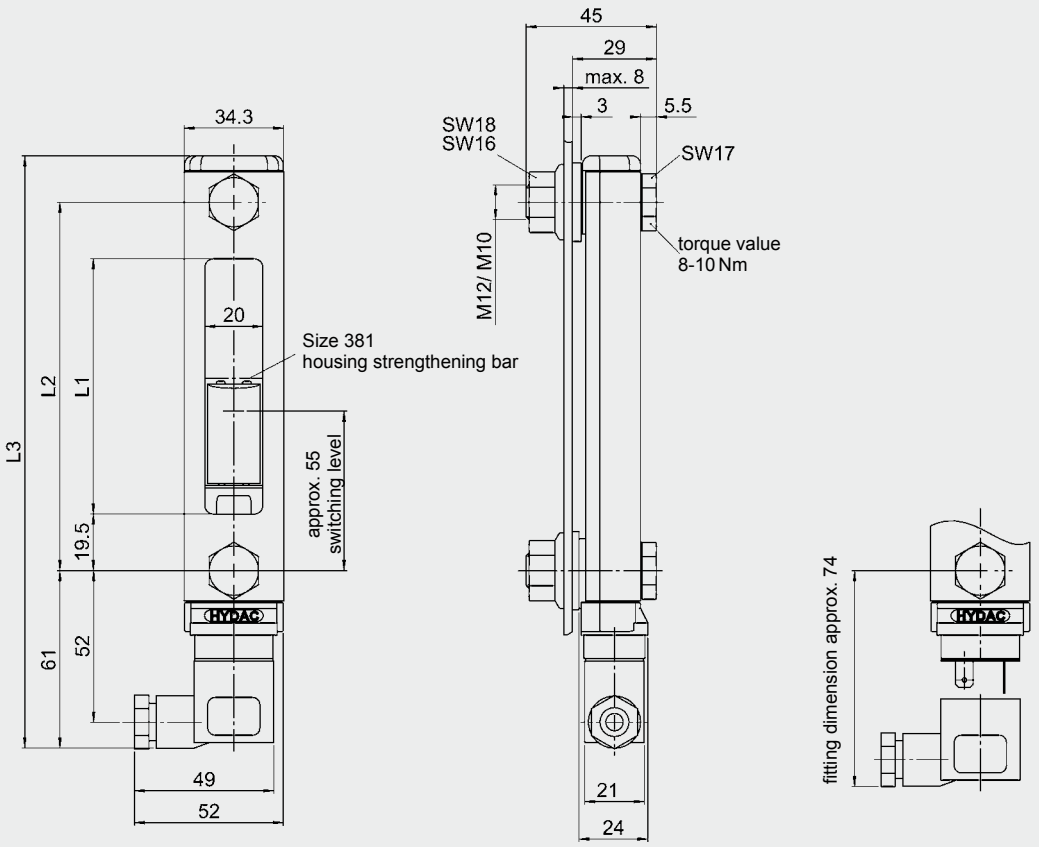




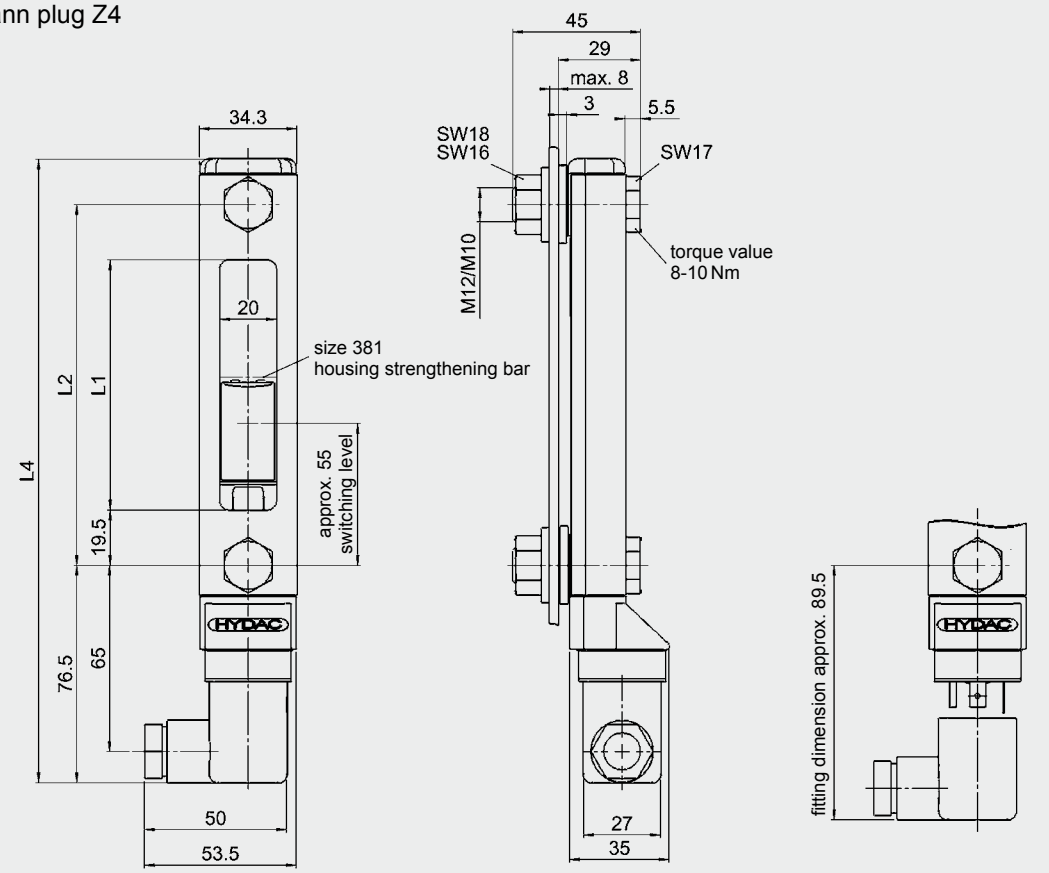
Size = centre distance of bolts	L3	L1	L2
76	107	37	76
127	158	88	127
176	207	137	176
254	285	215	254
381	412	342	381

3.2. FLUID LEVEL SENSOR FSK

FSK Standard

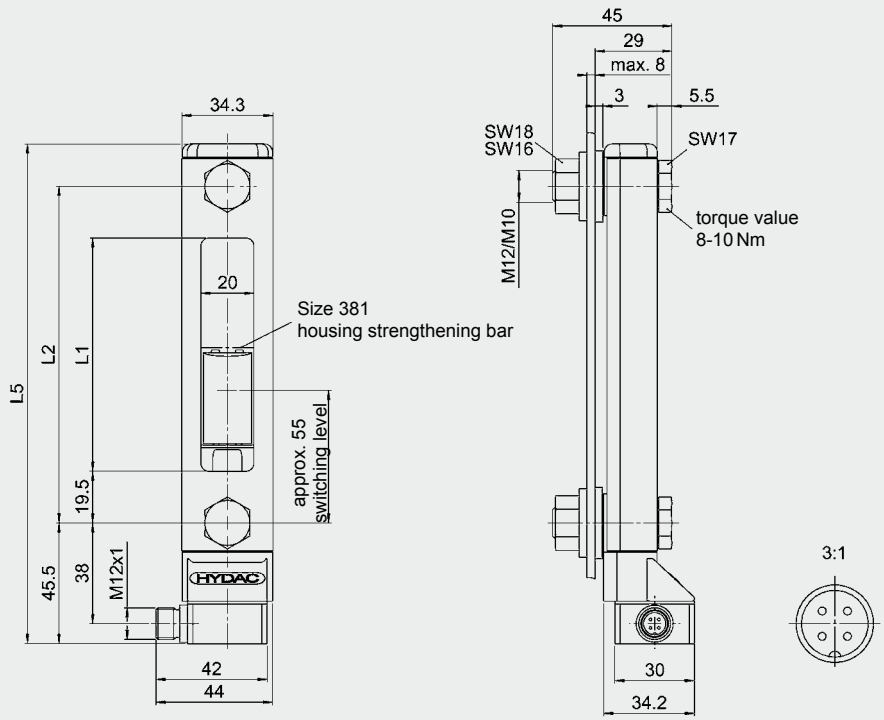


FSK Hirschmann plug Z4

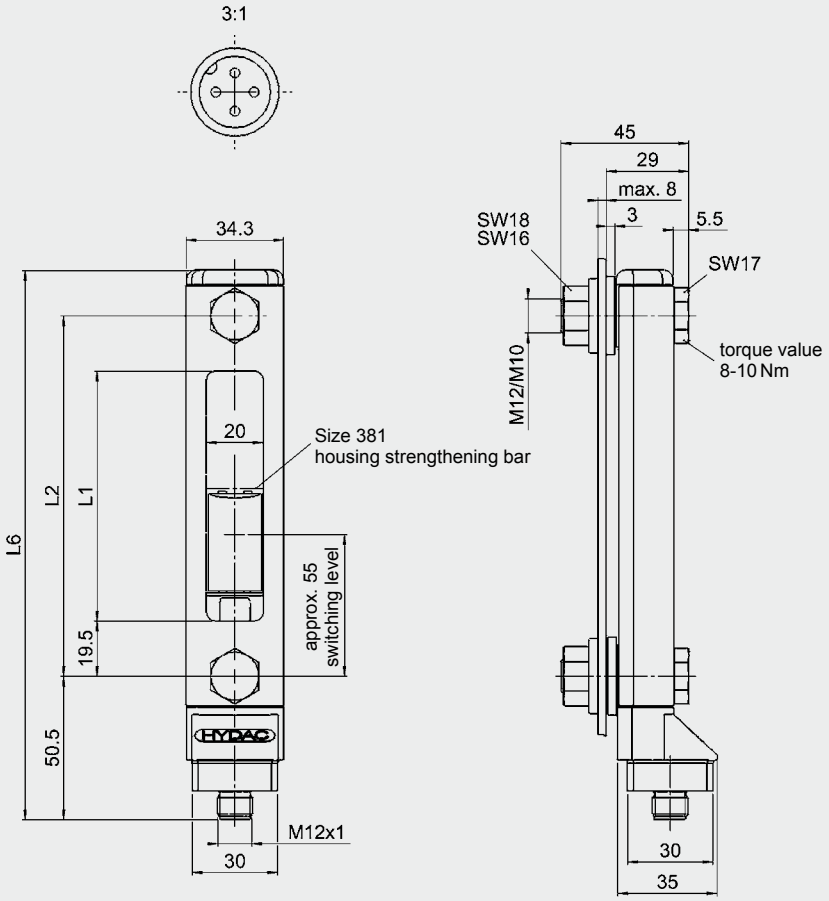


Size = centre distance of bolts	L1	L2	L3	L4
127	88	127	215	219
176	137	176	264	268
254	215	254	347	351
381	342	381	474	478

FSK sensor connection SEW-M12x1 horizontal

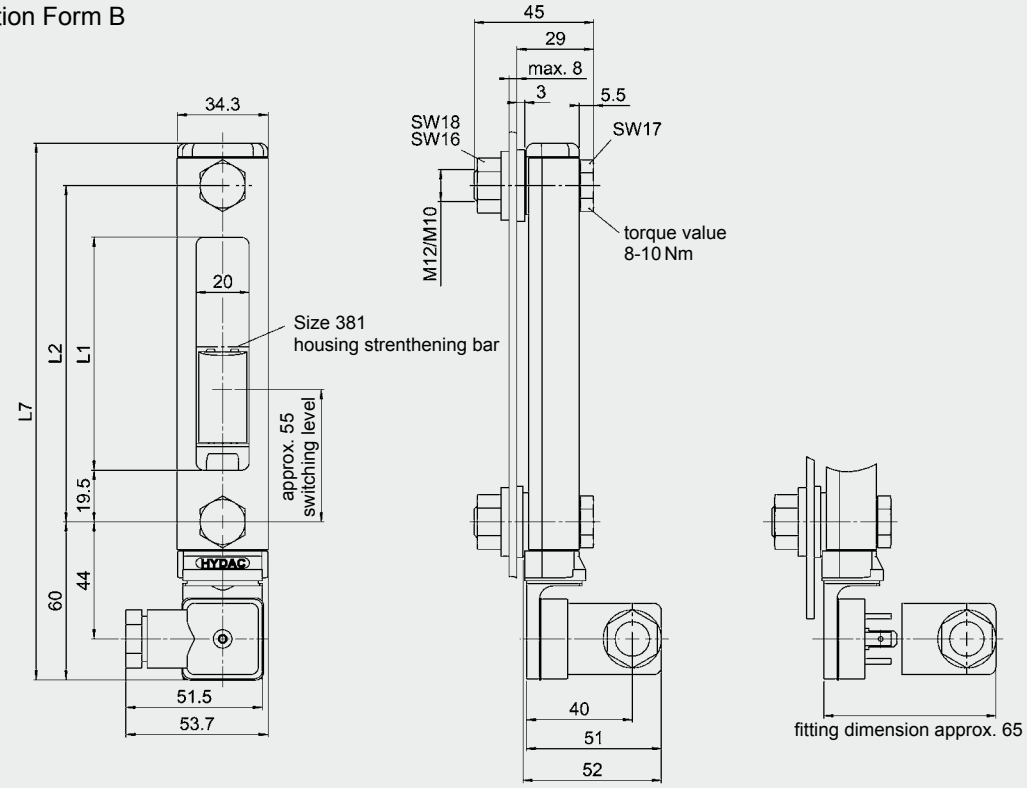


FSK sensor connection SES-M12x1 vertical



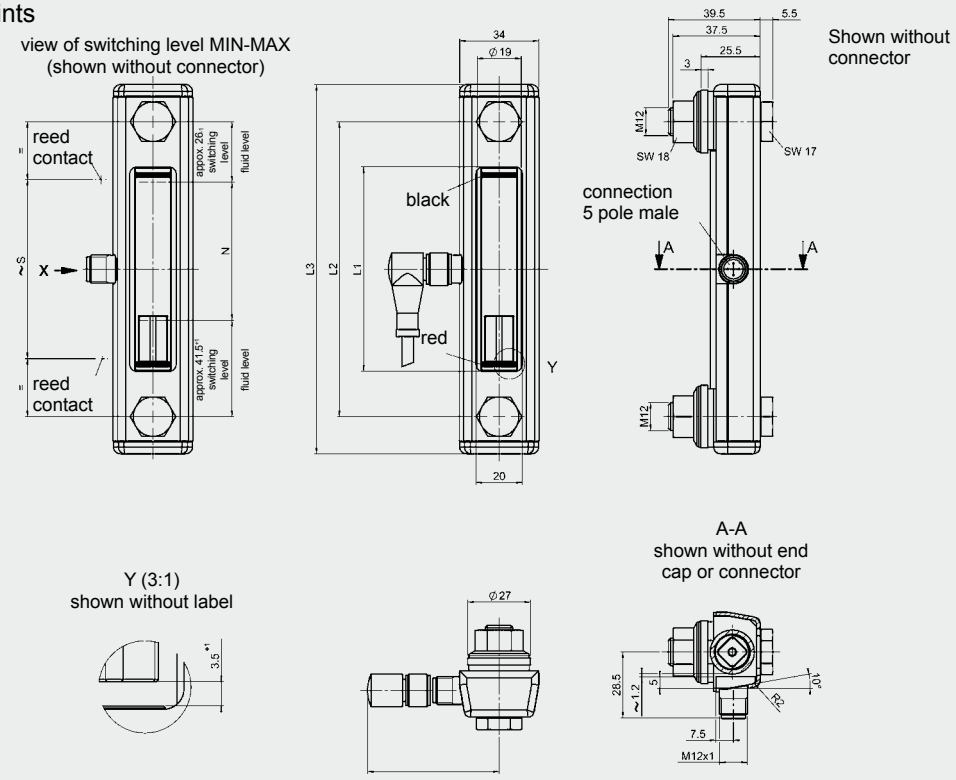
Size = centre distance of bolts	L1	L2	L5	L6
127	88	127	188	194
176	137	176	237	243
254	215	254	315	321
381	342	381	442	448

FSK male connection Form B



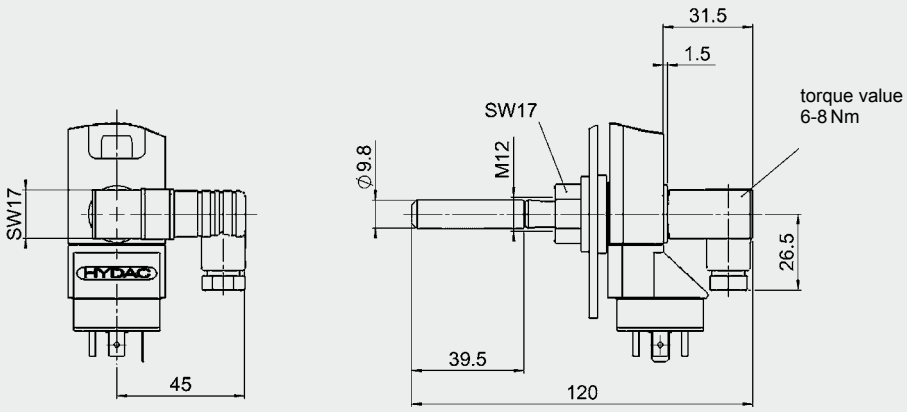
Size = centre distance of bolts	L1	L2	L7
127	88	127	203
176	137	176	352
254	215	254	330
381	342	381	457

FSK with two switching points



Type	Size	L1	L2	L3	N	approx. S
FSK-127-2.O/W/-/12/2SP	127	88	127	159	59.5	77
FSK-176-1.O/W/-/12/2SP	176	137	176	208	108.5	126
FSK-254-1.O/W/-/12/2SP	254	215	254	286	186.5	204
FSK-381-1.O/W/-/12/2SP	381	342	318	413	313.5	331

FSK with temperature switch TS-L

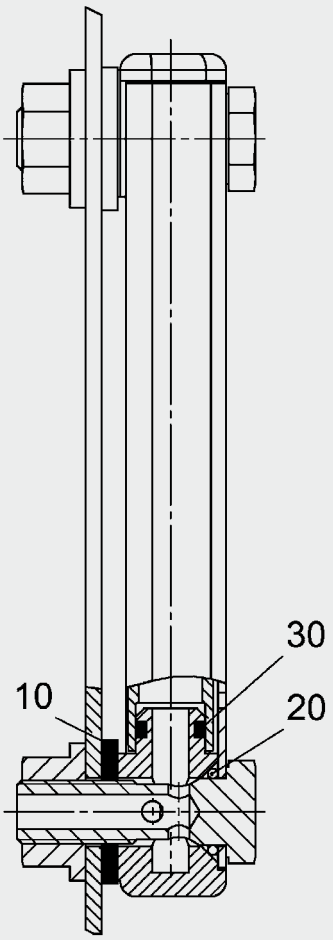


3.3. TEMPERATURE SWITCH TS / TS-L

See FSA with TS fitted
See FSK with TS-L fitted

4. SPARE PARTS

4.1. SEAL KIT



Seal kit	Order no. = Part number
FSA - 76 - 381 - 1.X /- /12 NBR	704 616
FSA - 76 - 381 - 2.X /- /12 FKM	704 627
FSA - 76 - 381 - 1.X /- /10 NBR	3248767
FSA - 76 - 381 - 2.X /- /10 FKM	3395614

5. 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 Accessories GmbH
Hirschbachstr. 2
66280 Sulzbach/Saar
Tel.: +49 (0)6897 - 509-1001
Fax: +49 (0)6897 - 509-1009
Internet: www.hydac.com
E-Mail: info@hydac.com