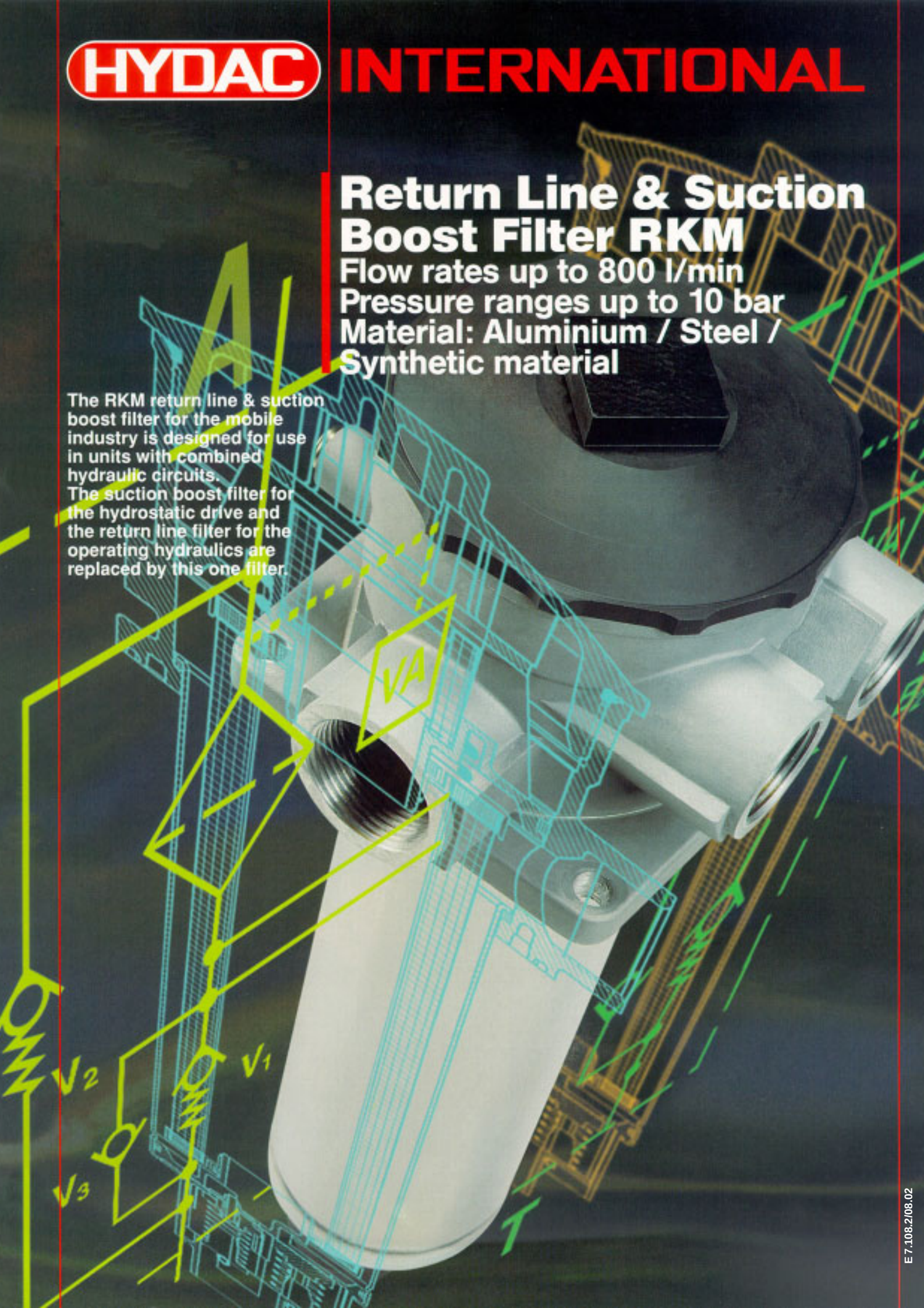
HYDAC INTERNATIONAL

Return Line & Suction Boost Filter RKM

Flow rates up to 800 l/min
Pressure ranges up to 10 bar
Material: Aluminium / Steel / Synthetic material

The RKM return line & suction boost filter for the mobile industry is designed for use in units with combined hydraulic circuits.
The suction boost filter for the hydrostatic drive and the return line filter for the operating hydraulics are replaced by this one filter.



E 7.108.2/08.02

Application

RKM return line & suction boost filters for the mobile industry are used in units with both open-loop hydraulic circuits (e.g. operating hydraulics) and closed-loop hydrostatic drives (e.g. transmissions).

RKM filters therefore combine the function of the return line filter of the open-loop circuit and the suction boost filter of the closed-loop drive in one filter. The return flow must always be greater than the flow rate of the hydrostatic feed pump on these applications.

Function

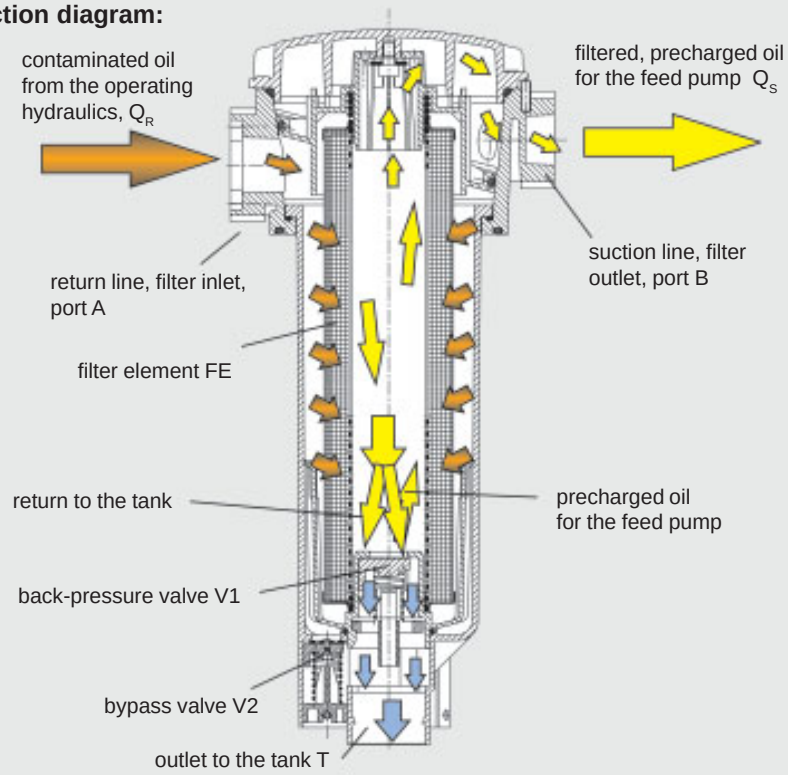
The return line flow of the operating hydraulics is fed to the filter via port A and is cleaned by the filter element (full flow return line filtration). A pressure (standard = 0.5 bar) is applied by the back-pressure valve V1. This ensures that the filtered return line flow is available to the hydrostatic feed pump via port B (full flow suction boost filtration). Excess quantities are drained via the back-pressure valve to the tank (port T).

A bypass valve V2 (standard = 2.5 bar) is fitted to relieve excessive back-pressures in the element (important on cold starts). Flow from the tank can be fed via the anti-cavitation valve to the suction side for a short time (emergency function).

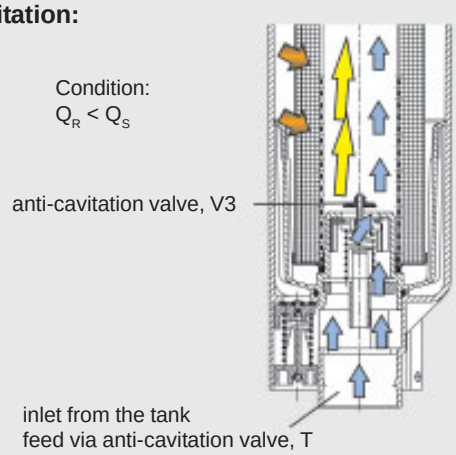
Advantages

- Full flow finest filtration (10 µm, 15 µm absolute) of return line and hydrostatic feed pump which extends the service life of your components.
- Outstanding cold start characteristics due to precharge via back pressure valve (standard = 0.5 bar).
- Due to the advanced RK element technology and specially developed bypass valves, the lowest back-pressures can be achieved across the filter even at very low temperatures.

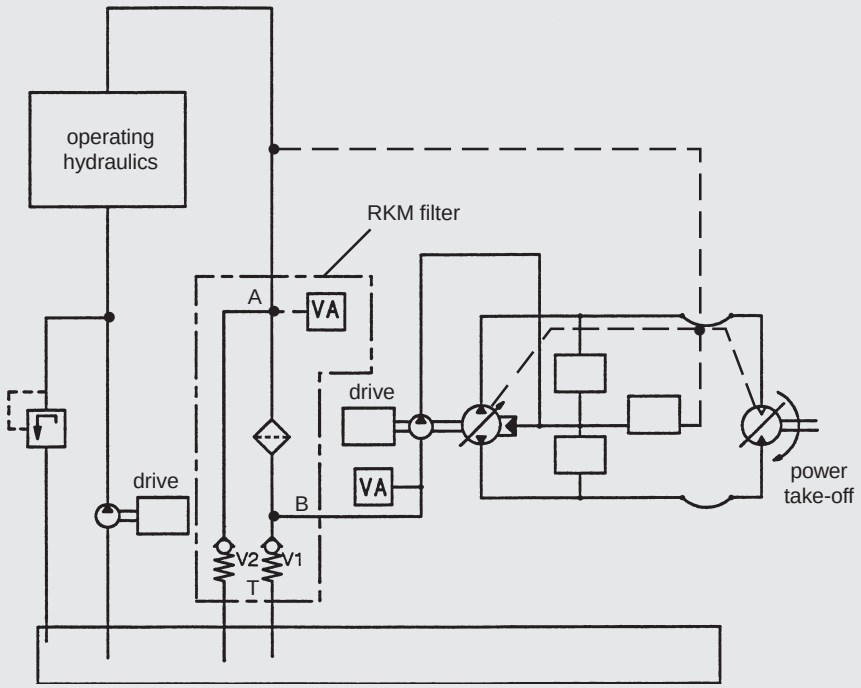
Function diagram:



Anti-cavitation:



Circuit example:



1. TECHNICAL DESCRIPTION

1.1. FILTER HOUSING

Construction

The RKM filter essentially consists of a filter head, a filter bowl, a cover plate and a filter element. It also has a bypass valve, a back-pressure valve and optionally an anti-cavitation valve.

1.2. FILTER ELEMENTS

Hydac filter elements are tested according to the following ISO standards:

- ISO 3724 Verification of flow fatigue characteristics
- ISO 4572 Contamination retention capacity
- ISO 4572 Multi-pass method for evaluating filtration performance
- ISO 3968 Evaluation of pressure drop versus flow characteristics
- ISO 2942 Bubble point test
- ISO 2941 Verification of collapse / burst resistance

Reliable filter operation is only guaranteed for Hydac original filter elements.

The filter elements are also suitable for dynamic conditions due to their high pressure stability: max permissible Δp across the element:

Betamicron® (BN3HC): 10 bar

The flow through the elements is from out to in. With regard to filtration rating, pressure drop and contamination retention, excellent values are achieved.

Fluid compatibility
Suitable for mineral oils, lubrication oils, non-flam fluids, synthetic and rapidly biodegradable fluids.

1.3. CLOGGING INDICATORS

VMF 2 F . 0

Type of indicator
VMF return line indicator or vacuum indicator

Pressure setting
-0.2 0.2 bar (vacuum)
2 2.0 bar (back-pressure)

Indicator type code
E. = pressure gauge
F. = pressure switch
K. = return line vacuum pressure gauge
UF. = vacuum pressure switch

Modification number
0 latest version is always supplied

The return line indicator monitors the contaminated element.
The vacuum indicator monitors the suction boost side of the feed pump.

For further details, please see Clogging Indicators brochure, **no. E 7.050../..**

1.4. SEALS

Perbunan (= NBR) or Viton (= FPM for HFD oils)

1.5. SPECIAL MODELS AND ACCESSORIES

- Extension in the filter outlet
- Breather valve
- Size 400, 800 port size suction boost line SAE DN 50

1.6. SPARE PARTS

Please see Spare Parts List and Maintenance Instructions – brochure no.: E 7.108.E../..

2. GENERAL

Mounting

Tank top mounted filter

Temperature range
-30 °C to +100 °C
(short-term -40 °C)

Pressure setting of the return line clogging indicator
Δp_a = 2 bar -10%

Other pressure settings on request

Cracking pressure of the bypass valve
Δp_o = 2.5 bar +0.3 bar

Setting back pressure valve
Δp_v = 0.5 bar

Other cracking or back pressure pressures on request

3. MODEL CODE

(also order example)

3.1. COMPLETE FILTER

RKM BN/HC 300 B T F 10 W 0 . X /-B6-CV3

Filter type

Filter material of element

BN/HC Betamicron® (BN3HC)

Size / Housing material

Al/St/PA: 100, 201, 251, 400, 800

Al/PA: 300

Operating pressure

B = 10 bar

Type of port / Size of suction line port

Type	Port	Filter size					
		100	201	251	300	400	800
P	1x G 1"/1x G 1 1/4"					●	●
Q	4x G 1 1/2"					●	●
R	4x G 1 1/4"					●	●
T	2x CS 1 1/4"				●		
U	2x G 1 1/4"					●	●
V	2x G 1"		●	●		●	●
W	1x G 1 1/4"					●	●
X	1x G 1"	●					
Y	1x G 3/4"	●					
Z	According to customer specification						

Type of port / Size of return line port

Type	Port	Filter size					
		100	201	251	300	400	800
C	G 3/4"	●					
D	G 1"	●					
E	G 1 1/4"		●	●			
F	CS 1 1/2"				●		
L	SAE DN 50 (2")					●	●
M	SAE DN 65 (2 1/2")					●	●
Z	According to customer specification						

Other port sizes on request.

Filtration rating in µm

BN3HC: 10, 15

Type of clogging indicator

W no port for clogging indicator
Y port for clogging indicator
A with blanking plug
E with pressure gauge
F with pressure switch
K return line and vacuum pressure gauge
UF vacuum switch

for other clogging indicators see brochure no. E 7.050../..

Type code

0 no indicator
1-8 see point 3.1.1

Modification number

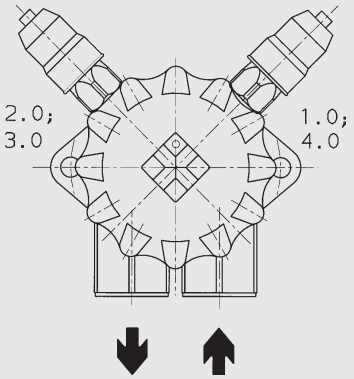
X the latest version is always supplied

Supplementary details

no details = standard (without anti-cavitation valve; seals in NBR, bypass valve 2.5 bar, back-pressure valve 0.5 bar)
V FPM (Viton) seals, filter suitable for rapidly biodegradable hydraulic fluids
B2 bypass valve with 2 bar cracking pressure
B6-CV3 bypass valve with 6 bar cracking pressure and back-pressure valve with 3 bar cracking pressure
NR with anti-cavitation valve
NRF125 with anti-cavitation valve and coarse filter strainer 125 µm
ND with pressure release valve
NB with anti-cavitation valve via the main bypass valve
GRxx with threaded adaptor for the return line port, only for size 300
GSxx with threaded adaptor for the suction boost port, only for size 300
EV air bleed valve
UT suitable for use when immersed in oil

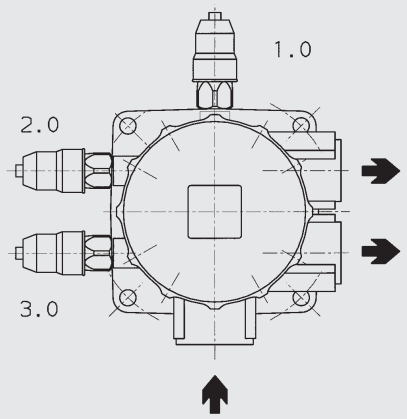
3.1.1 **Type code**

Size 100



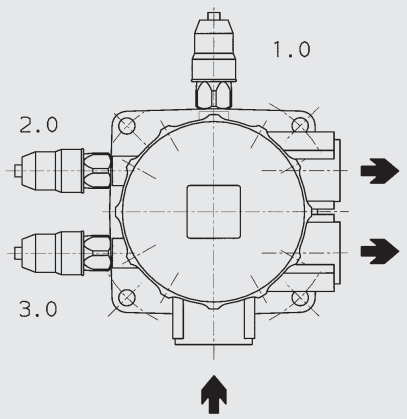
Type Code	Mounting position of the clogging indicator	Type of clogging indicator	Measuring
1.0	on the filter inlet – right-hand side, bottom	return line	before the filter element
2.0	on the filter inlet – left-hand side, bottom	return line	before the filter element
3.0	on the filter outlet – right-hand side, top	vacuum	after the filter element
4.0	on the filter outlet – left-hand side, top	vacuum	after the filter element
5.0	type code 1.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
6.0	type code 2.0 and 4.0	2 indicators: return line & vacuum	before & after the filter element

Size 201



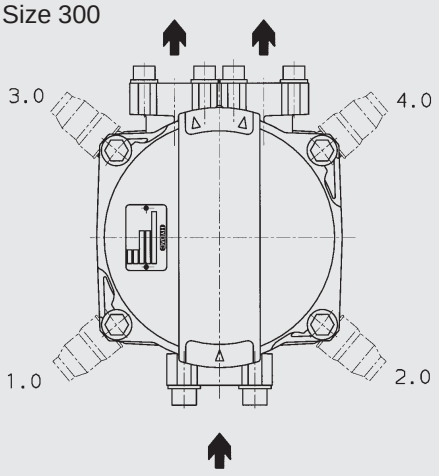
Type Code	Mounting position of the clogging indicator	Type of clogging indicator	Measuring
1.0	on the filter inlet – opposite side	return line	before the filter element
2.0	on the filter inlet – left-hand side	return line	before the filter element
3.0	on the filter outlet – right-hand side	vacuum	after the filter element
5.0	type code 1.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
6.0	type code 2.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
7.0	type code 1.0 and 2.0	2 indicators: return line	before the filter element

Size 251



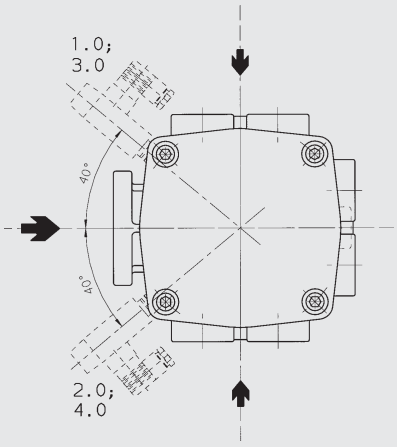
Type Code	Mounting position of the clogging indicator	Type of clogging indicator	Measuring
1.0	on the filter inlet – opposite side	return line	before the filter element
2.0	on the filter inlet – left-hand side	return line	before the filter element
3.0	on the filter outlet – right-hand side	vacuum	after the filter element
5.0	type code 1.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
6.0	type code 2.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
7.0	type code 1.0 and 2.0	2 indicators: return line	before the filter element

Size 300



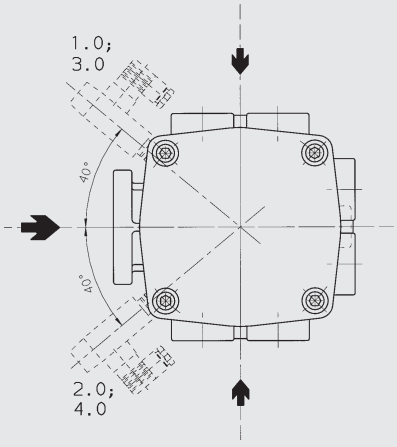
Type Code	Mounting position of the clogging indicator	Type of clogging indicator	Measuring
1.0	on the filter inlet – left-hand side	return line	before the filter element
2.0	on the filter inlet – right-hand side	return line	before the filter element
3.0	on the filter outlet – left-hand side	vacuum	after the filter element
4.0	on the filter outlet – right-hand side	vacuum	after the filter element
5.0	type code 1.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
6.0	type code 2.0 and 4.0	2 indicators: return line & vacuum	before & after the filter element
7.0	type code 1.0 and 2.0	2 indicators: return line	before the filter element
8.0	type code 3.0 and 4.0	2 indicators: vacuum	after the filter element

Size 400



Type Code	Mounting position of the clogging indicator	Type of clogging indicator	Measuring
1.0	on the filter inlet – left-hand side, bottom	return line	before the filter element
2.0	on the filter inlet – right-hand side, bottom	return line	before the filter element
3.0	on the filter inlet – left-hand side, top	vacuum	after the filter element
4.0	on the filter inlet – right-hand side, top	vacuum	after the filter element
5.0	type code 1.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
6.0	type code 2.0 and 4.0	2 indicators: return line & vacuum	before & after the filter element
7.0	type code 1.0 and 2.0	2 indicators: return line	before the filter element
8.0	type code 3.0 and 4.0	2 indicators: vacuum	after the filter element

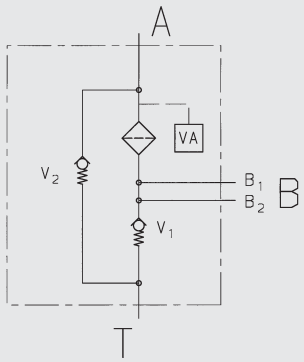
Size 800



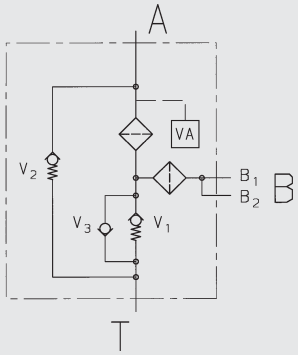
Type Code	Mounting position of the clogging indicator	Type of clogging indicator	Measuring
1.0	on the filter inlet – left-hand side, bottom	return line	before the filter element
2.0	on the filter inlet – right-hand side, bottom	return line	before the filter element
3.0	on the filter inlet – left-hand side, top	vacuum	after the filter element
4.0	on the filter inlet – right-hand side, top	vacuum	after the filter element
5.0	type code 1.0 and 3.0	2 indicators: return line & vacuum	before & after the filter element
6.0	type code 2.0 and 4.0	2 indicators: return line & vacuum	before & after the filter element
7.0	type code 1.0 and 2.0	2 indicators: return line	before the filter element
8.0	type code 3.0 and 4.0	2 indicators: vacuum	after the filter element

3.1.2 **Symbols**

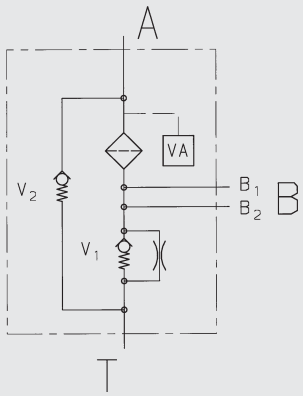
Standard



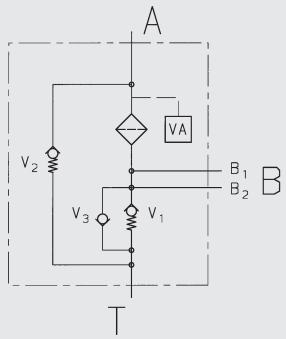
/-NRF125 (with anti-cavitation valve and a coarse filter with 125 µm)



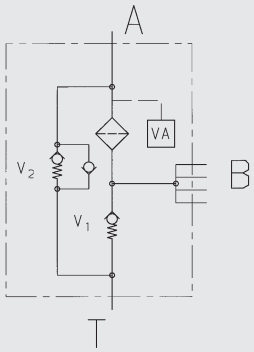
/-ND (with pressure release valve)



/-NR (with anti-cavitation)



/-NB (with anti-cavitation via the main bypass valve)



3.2. REPLACEMENT ELEMENT
(also order example)

0300 RK 010 BN3HC /-V

Size
0100, 0201, 0251, 0300, 0400, 0800

Type
RK

Filtration rating in µm
BN3HC: 10, 15

Filter material
BN3HC

Supplementary details
V = FPM seals,
filter suitable for rapidly biodegradable oils

4. FILTER SPECIFICATIONS

Filter type/ Nominal flow rate (l/min)	Suction boost port*	Return line port*	Element size	Contam-ination retention 10 µm (g)	Contam-ination retention 15 µm (g)	β values	Weight (kg) with element
100	G 3/4 G 1	G 3/4 G 1	0100 RK...	16.3	19.6	$\beta_{10,15} > 100$	1.7
201	G 1	G 1 1/4	0201 RK...	50.9	61.4	$\beta_{10,15} > 100$	3.7
251	G 1	G 1 1/4	0251 RK...	61.9	74.7	$\beta_{10,15} > 100$	4.0
300	CS 1 1/4	CS 1 1/2	0300 RK...	55.6	67.1	$\beta_{10,15} > 100$	4.6
400	G 1 G 1 1/4 G 1 1/2	G 1 G 1 1/4 G 1 1/2 SAE DN 50 SAE DN 65	0400 RK...	67.4	81.3	$\beta_{10,15} > 100$	6.5
800	G 1 G 1 1/4 G 1 1/2	G 1 G 1 1/4 G 1 1/2 SAE DN 50 SAE DN 65	0800 RK...	86.3	104.2	$\beta_{10,15} > 100$	7.5

***** = for number, size of ports etc.: see point 3.1.

Model code for complete filter:
Type of port / Port size

5. FILTER CALCULATION / SIZING

5.1. RECOMMENDED FILTRATION RATING

The elements are available in the filtration ratings 10 and 15 µm absolute ($\beta_x > 100$). In our experience the required cleanliness classes are always reached without problem even with the 15 µm material. Due to the outstanding cold start characteristics (low Δp at high oil viscosity) we recommend that the 15 µm material should be used for normal operating conditions.

5.2. RECOMMENDATION – INITIAL PRESSURE DROP

We recommend a maximum permissible initial pressure drop with clean element of 1 bar at the given flow rate and at a viscosity of 30 mm²/s (= 0.5 bar across the element and housing + 0.5 bar back pressure).

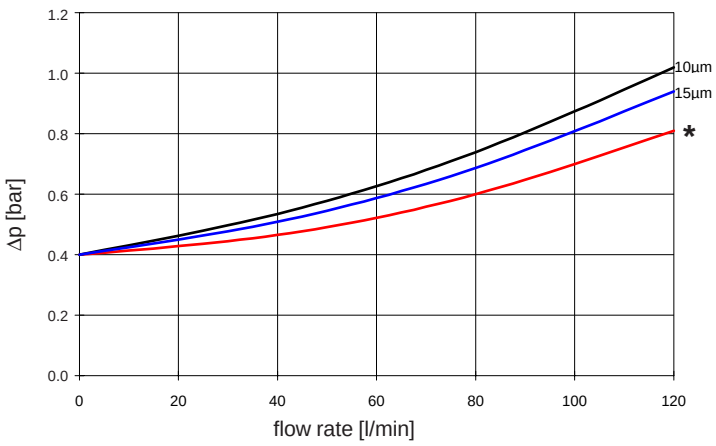
5.3. ΔP-Q-DIAGRAMS FOR COMPLETE FILTER (INCL. ELEMENT)

The flow rate / pressure drop curves for the RKM filter are shown in the following graphs.

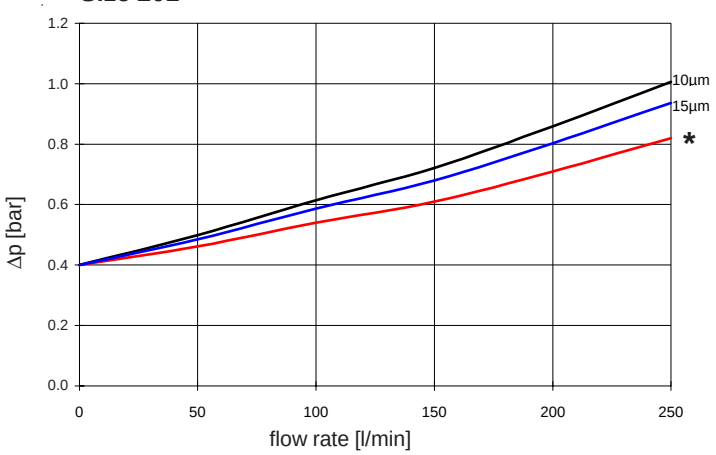
These curves apply to mineral oil with a density of 0.86 kg/dm³ and a viscosity of 30 mm²/s.

FLOW RATE / PRESSURE DROP GRAPHS
(HOUSING WITH ELEMENT)

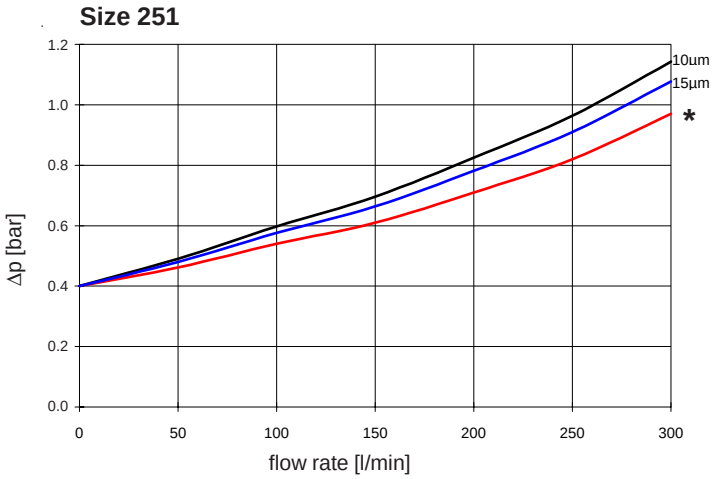
Size 100



Size 201

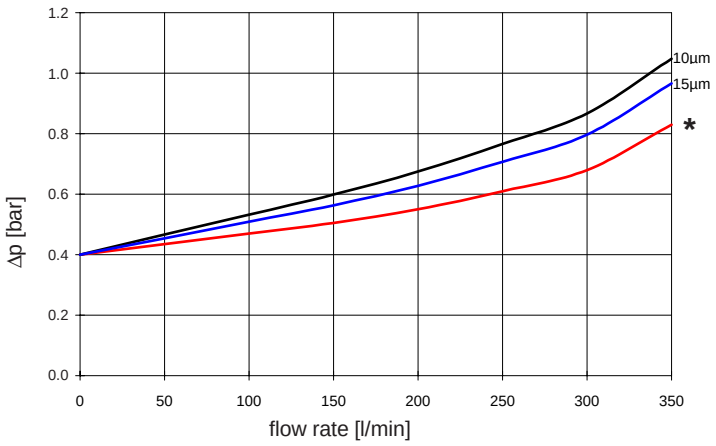


Size 251

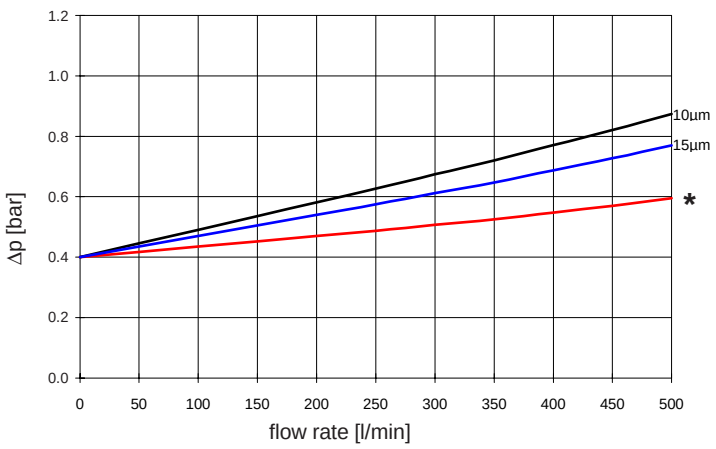


* = housing only

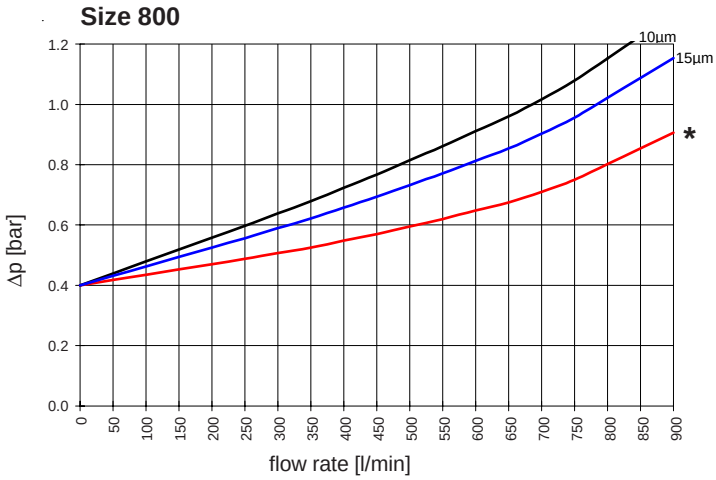
Size 300



Size 400



Size 800



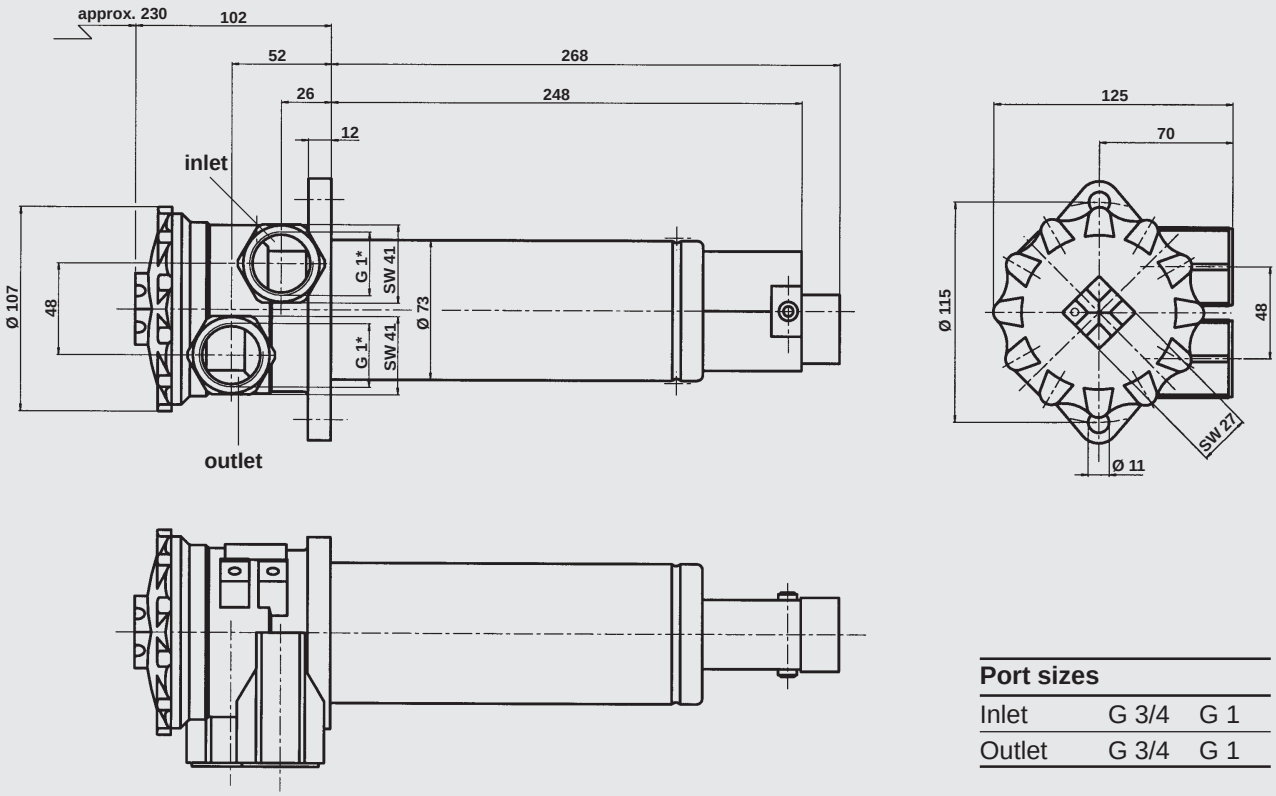
* = housing only

5.4. EXAMPLE

System parameters:
Return line flow: Q = 80 l/min;
BN3HC element
Filtration rating: 15 µm absolute
Δp = found in the graphs under point 5.3.
⇒ RKM 100

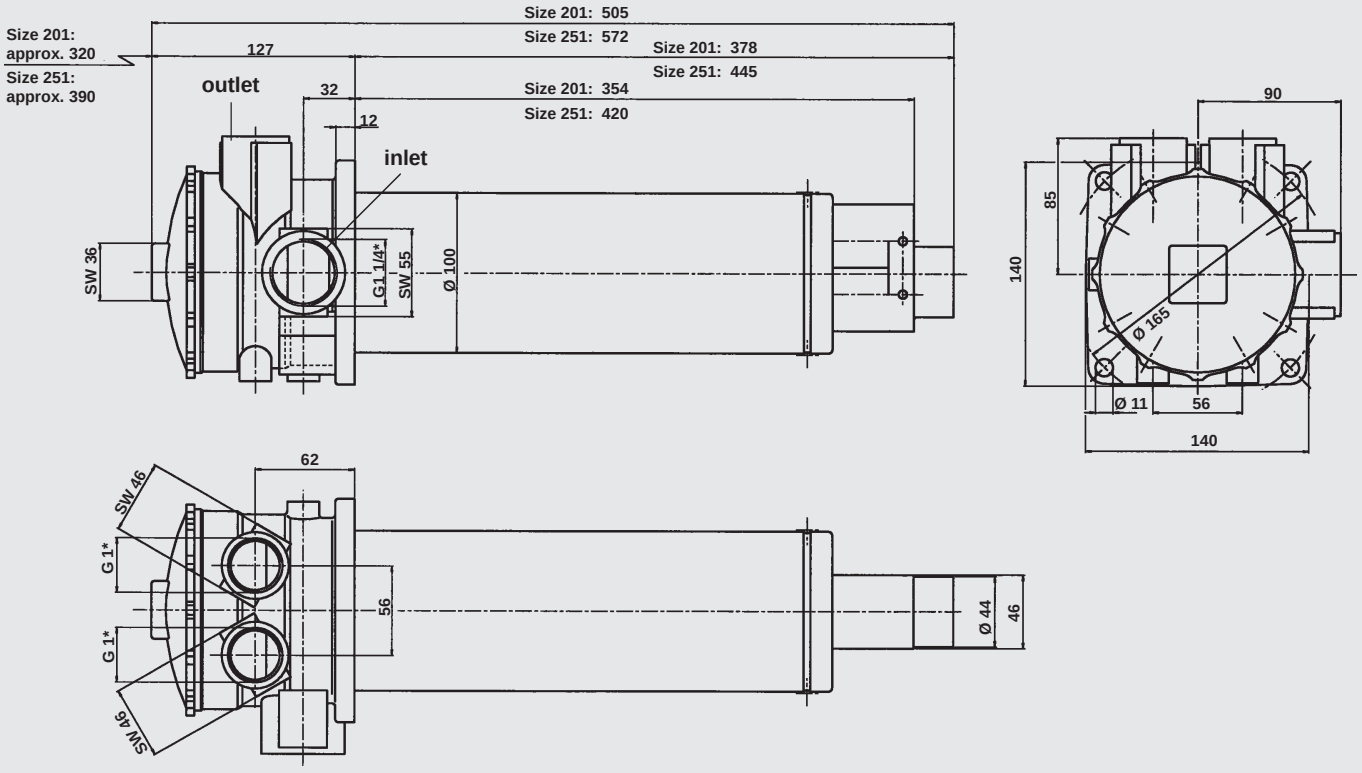
6. DIMENSIONS

6.1. RKM 100



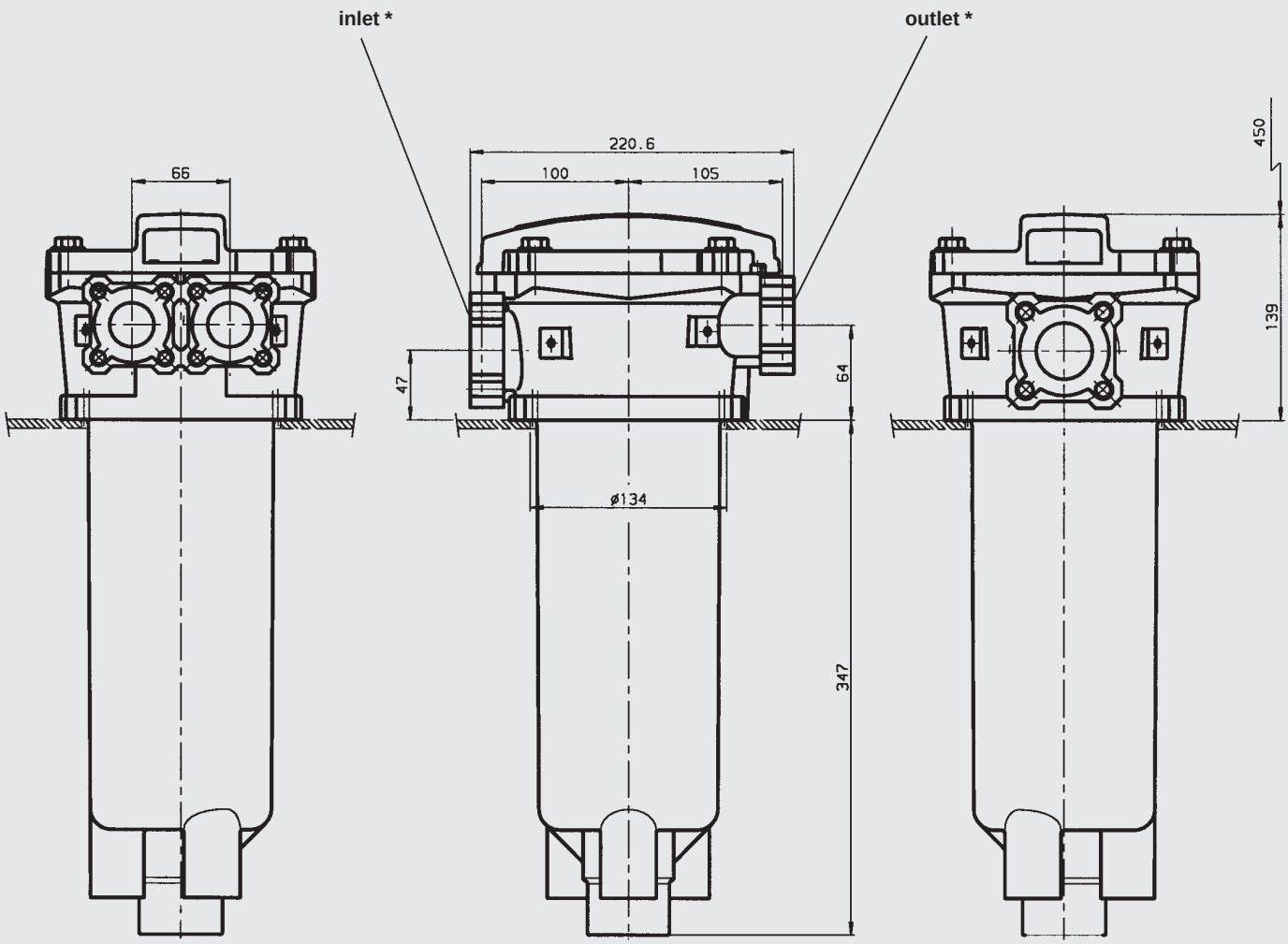
Port sizes		
Inlet	G 3/4	G 1
Outlet	G 3/4	G 1

6.2. RKM 201, 251

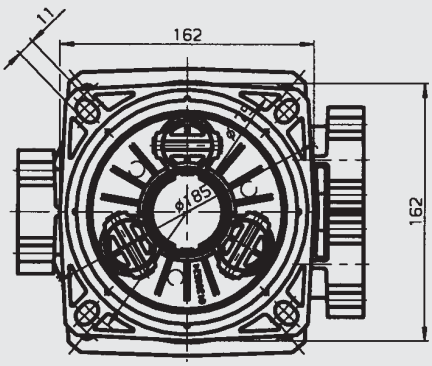


* = for number, size of ports etc.: please see point 3.1.
Model code for complete filter: Type of port / Port size

6.3. RKM 300

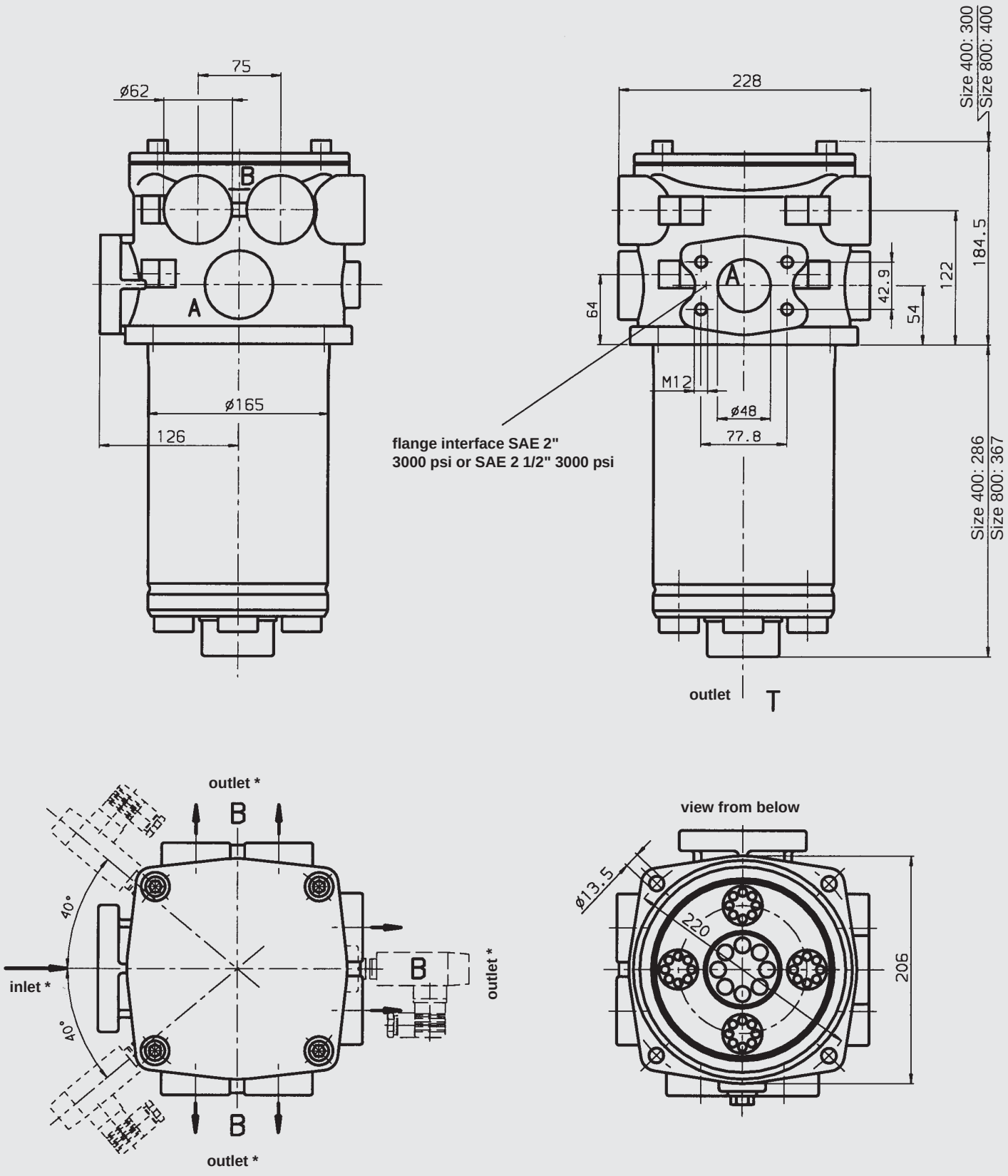


view from below



* = for number, size of ports etc.: please see point 3.1.
Model code for complete filter: Type of port / Port size

6.4. RKM 400, 800



* = for number, size of ports etc.: please see point 3.1.
Model code for complete filter: Type of port / Port size

7. 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.