

In line medium pressure Spin-On filters

HF 650 series



 **IKRON[®]**
Fluid Filtration

THE IMPORTANCE OF AN EFFICIENT FILTRATION

The main cause of anomalies in hydraulic systems has to be attributed to the presence of contaminants in the fluid. The nature of the contaminant may be: gaseous, namely air mixed with the fluid; fluid, it depends on water penetrating the fluid; solid, therefore particles of various origins and dimensions.

Customers who operate equipments are always focused on obtaining the best possible performance, lower energy consumptions and greater respect for the environment.

These characteristics can be attained by using top quality components in the hydraulic system, which are more sensitive to the presence of contaminants in the fluid.

Starting from these requirements, we understand how important and fundamental it is to prevent the presence of air and water from mixing in the fluid tank by using dedicated solutions.

It is also crucial to limit the presence of solid particles in the hydraulic circuit through a suitable filtering system, which is indispensable to maintain the project requirements of the system over time and to keep running costs low.

The correct choice of a filter and its optimum position in the hydraulic system requires the same care and experience needed to choose all the other components.

The use of filters with larger filtering surfaces reduces, at equal flow rates, the superficial contaminant load and therefore the filter's life is extended proportionally.

To maintain the maximum efficiency of the system, the filters must have a clogging indicator showing the differential pressure on the filtering cartridge and to immediately point out when the cartridge needs replacing in order to prevent the by-pass valve from opening.

The following factors should be analysed when choosing the ideal filter:

- The filtration degree required to protect the most sensitive component from contamination
- The points of the circuit in which the filters have to be installed
- The working pressure of the system
- The maximum flow rate and the type of fluid to be filtered
- The duty cycle
- The retention efficiency of the filtering cartridge
- The contaminant accumulation capacity of the filtering cartridge
- The working ambient temperature

Each filter used generates a pressure drop that increases continuously as time goes by. This pressure drop represents an efficiency index of the filter itself.

When the hydraulic system is about to be assembled, all the components must be perfectly clean and the fluid has to be added through a device complete with a filter.

During the test phase, it is advisable to run some work cycles at low pressure in order to create the best possible conditions for all the components.

TECHNICAL CHARACTERISTICS

HF 650 series can be used on hydraulic circuits with working pressure up to 35 bar and are particularly specified for hydrostatic charge pumps, cooling circuits along with the traditional fluid filtration on the tank return line. The standard filters are supplied with by-pass valve set at 25 psi (1,7 bar) or at 51 psi (3,5 bar).

- Max working pressure 508 psi (35 bar)
- Flow up to 52.8 US gpm (200 l/min)
- Secondary outlets

MATERIALS

Head	Aluminum
Bowl	Steel - Aluminum
Seals	Buna - Viton
End cap	Zinc plated steel
Inner tube	Zinc plated steel
Fiber media	Inorganic micro-fibre glass Reinforced cellulose

FLUID COMPATIBILITY

Conforming to ISO 2943 (Norm ISO 6743/4)

Mineral oil (1)	HH - HL - HM - HR - HV - HG
Water emulsion (1)	HFAE - HFAS
Synthetic fluid (2)	HS - HFDR - HFDU - HFDS

(1) With buna seals

(2) With viton seals

FLOW

Flow max.	52.8 US gpm (200 l/min)
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PRESSURE

Working pressure	508 psi (35 bar)
Testing pressure	870 psi (60 bar)
Burst pressure	1378 psi (95 bar)
Element collapse pressure rating (secondo ISO 2941)	290 psi (20 bar)

BY-PASS VALVE

By-pass setting	25 psi (1.7 bar) 51 psi (3.5 bar)
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OPERATING TEMPERATURE

With buna seals	-22 ÷ 195 °F (-30 ÷ 90 °C)
With viton seals	-4 ÷ 230 °F (-20 ÷ 110 °C)

ENDURANCE STRENGTH

> 1.000.000 cycle
0 ÷ 508 psi (0 ÷ 35 bar)

DEGREE OF FILTRATION

Absolute Filtration

Multi-pass test conforming to ISO 16889 (regulation in force)
Contaminant ISO MTD

Code	Degree of filtration	Ratio $\beta_{x(c)}$	Percentage of efficiency
FG003	5 μm	$\beta_{5(c)} \geq 200$	99,5 %
FG006	7 μm	$\beta_{7(c)} \geq 200$	99,5 %
FG010	10 μm	$\beta_{10(c)} \geq 200$	99,5 %
FG016	14 μm	$\beta_{14(c)} \geq 200$	99,5 %
FG025	21 μm	$\beta_{21(c)} \geq 200$	99,5 %

Multi-pass test conforming to ISO 4572 (previous regulation)
Contaminant ACFTD

Code	Degree of filtration	Ratio β_x	Percentage of efficiency
FG003	3 μm	$\beta_3 \geq 200$	99,5 %
FG006	6 μm	$\beta_6 \geq 200$	99,5 %
FG010	10 μm	$\beta_{10} \geq 200$	99,5 %
FG016	16 μm	$\beta_{16} \geq 200$	99,5 %
FG025	25 μm	$\beta_{25} \geq 200$	99,5 %

Nominal Filtration

Code	Degree of filtration
RP010	10 μm
RP025	25 μm

INDICATORS (3)

Visual differential indicator

Visual electrical differential indicator

(3) Characteristics and dimensions at page 13

SIZING – PRESSURE DROP

The total pressure drop of the filter is calculated by summing the pressure drop value in the housing to the one in the filtering element.

$$\text{Total } \Delta p = \Delta p \text{ in housing} + \Delta p \text{ in element}$$

In filters of HF 650 series in normal working conditions, the total Δp must not be more than 5.8 psi (0,4 bar). To establish the values of pressure drop involved, the following pages provide some diagrams with curves referred to the use of mineral oils ISO VG46 with kinematic viscosity of 120 SSU (30 cSt) and density of 7.29 lb/gal (0,856 kg/dm³).

Calculation example

Filter HF650-20.180-AS-FG010-B17-GE-B-XA-F-Y

Flow rate= 22.5 US gpm (85 l/min)

Kinematic viscosity: 120 SSU (30 cSt)

Oil density : 7.29 lb/gal (0,856 kg/dm³)

Filtration degree: 10 μ m

Data obtained from the diagrams:

Δp in housing = 3.62 psi (0,25 bar) (page 4)

Δp in element = 1.60 psi (0,11 bar) (page 5)

Total Δp = 3.62 + 1.60 = 5.22 psi (0,36 bar) (Δp is lower than maximum value admitted – therefore sizing is correct).

If oil with different kinematic viscosity and different density is used, the values obtained from the diagrams will be re-calculated considering the following indications:

1) The pressure drop of the housing is proportional with the oil density, therefore for oil with density different to 7.29 lb/gal (0,856 kg/dm³) the value of the Δp in the head-bowl will be:

$$\Delta p \text{ in housing} = \frac{\Delta p \text{ of diagram (psi)} \cdot \text{Oil density (lb/gal)}}{7.29 \text{ (lb/gal)}} \quad [\text{psi}]$$

Or

$$\Delta p \text{ in housing} = \frac{\Delta p \text{ of diagram (bar)} \cdot \text{Oil density (kg/dm}^3\text{)}}{0,856 \text{ (kg/dm}^3\text{)}} \quad [\text{bar}]$$

2) The pressure drop of the element is proportional with the oil density and kinematic viscosity, therefore for oil with density different to 7.29 lb/gal (0,856 kg/dm³) and kinematic viscosity different to 120 SSU (30 cSt) the value of Δp in the element will be:

$$\Delta p \text{ in element} = \Delta p \text{ of diagram (psi)} \cdot \frac{\text{Oil density (lb/gal)}}{7.29 \text{ (lb/gal)}} \cdot \frac{\text{Oil viscosity (SSU)}}{120 \text{ (SSU)}} \quad [\text{psi}]$$

Or

$$\Delta p \text{ in element} = \Delta p \text{ of diagram (bar)} \cdot \frac{\text{Oil density (kg/dm}^3\text{)}}{0,856 \text{ (kg/dm}^3\text{)}} \cdot \frac{\text{Oil viscosity (cSt)}}{30 \text{ (cSt)}} \quad [\text{bar}]$$

Now you sum the values of the pressure drop of the housing to the value of the pressure drop of the filtering element, always making sure the total Δp does not exceed the pressure indicated above.

02/01.2016

PRESSURE DROP CURVES THROUGH THE BY-PASS VALVES B17/B35

The pressure drop values are directly proportional with the specific weight of the fluid and do not affect the establishment of the total pressure drop of the complete filter.

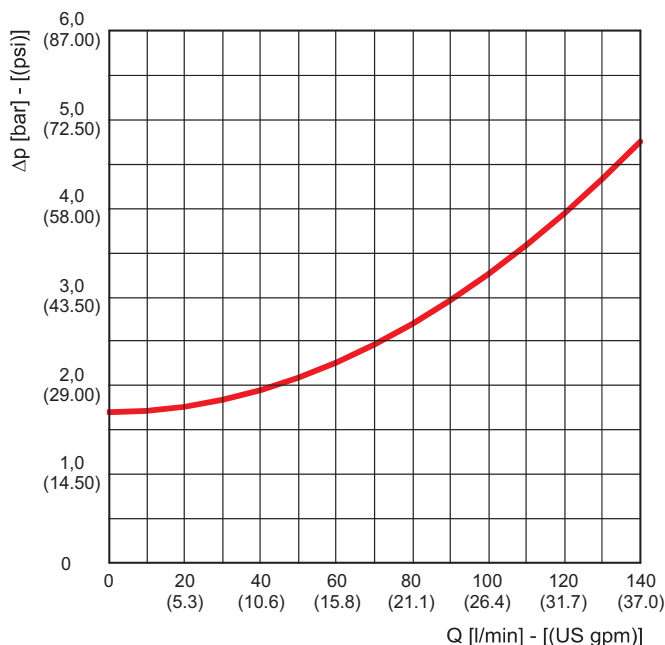
The curves are obtained in the following conditions:

Mineral oil type ISO VG46

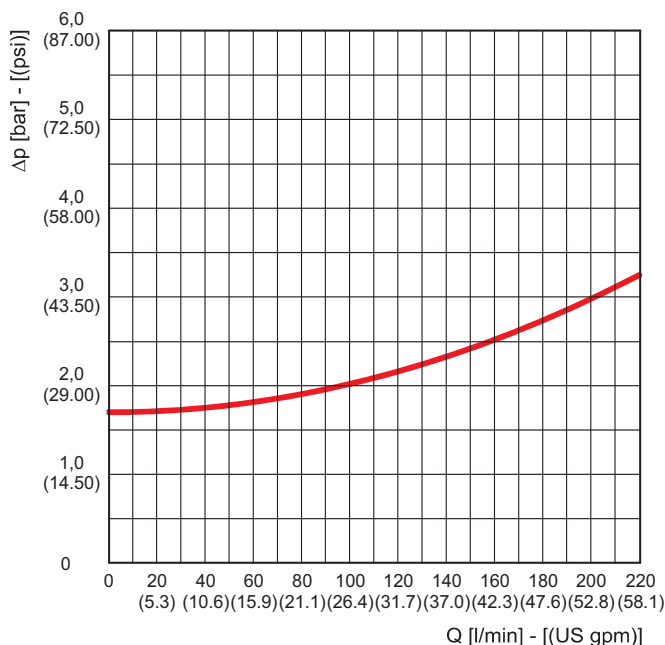
Kinematic viscosity 120 SSU (30 cSt)

Density 7.29 lb/gal (0,856 kg/dm³).

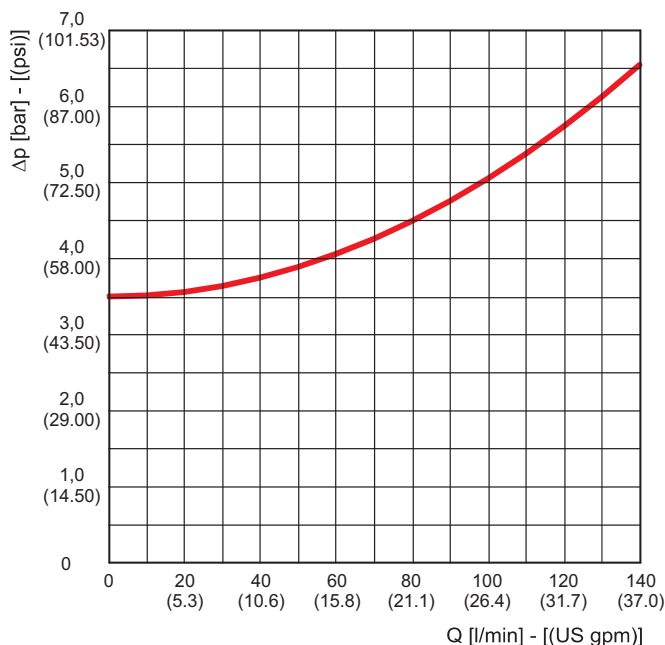
HF 650-20 (B17)



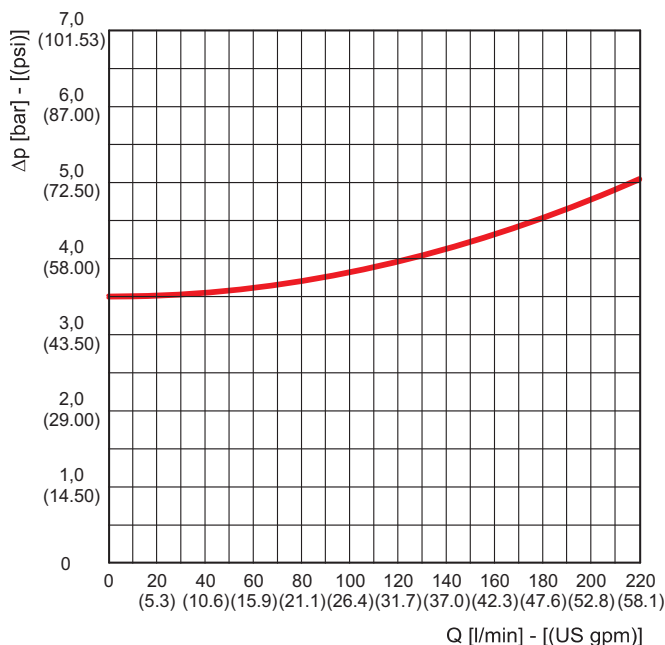
HF 650-30 (B17)



HF 650-20 (B35)



HF 650-30 (B35)



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PRESSURE DROP CURVES THROUGH THE HOUSING

The curves are obtained in the following conditions:

Mineral oil type ISO VG46

Kinematic viscosity 120 SSU (30 cSt)

Density 7.29 lb/gal (0,856 kg/dm³).

Series 20

G 3/4

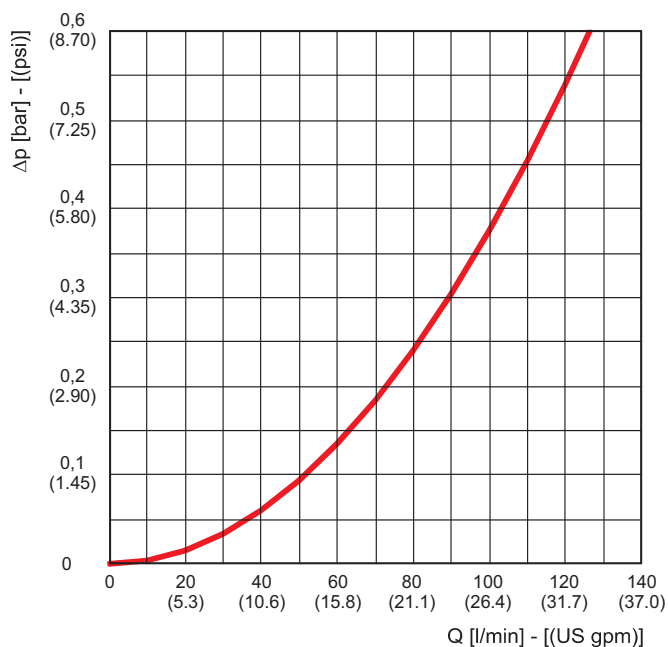
Series 20

G 1

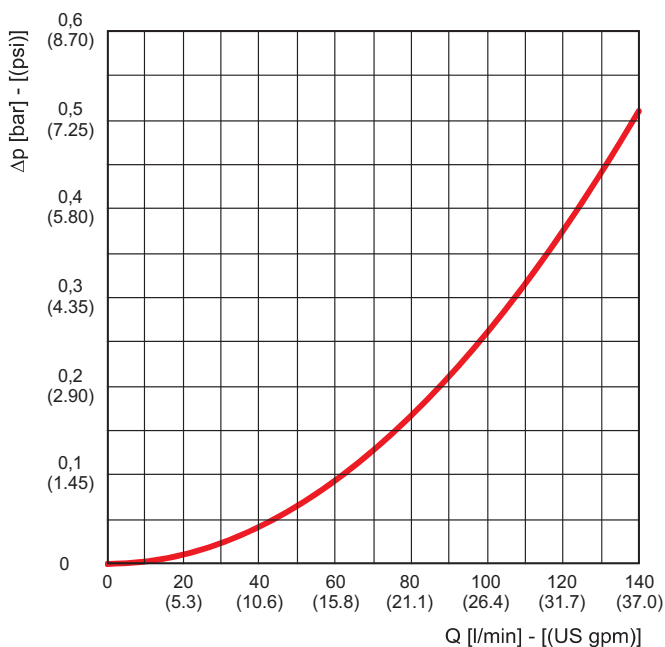
Series 30

G 1 1/4

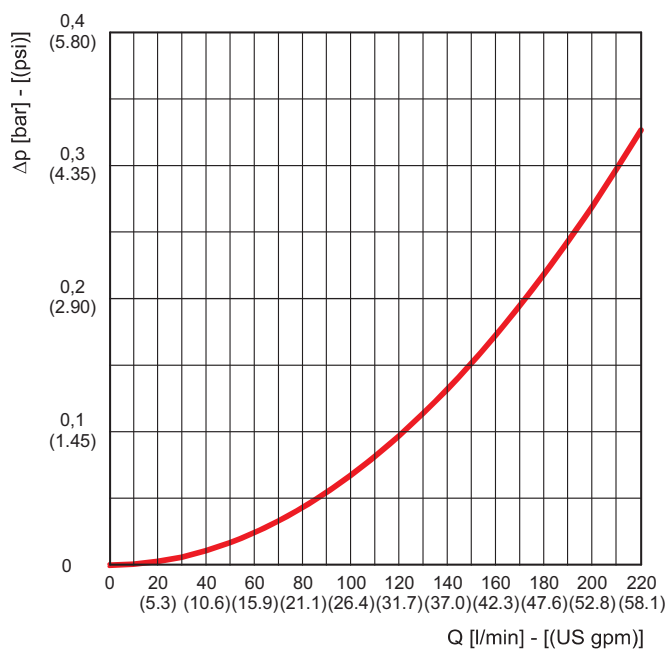
HF 650-20 (G3/4)



HF 650-30 (G 1)



HF 650-30 (G 1 1/4)



02/01.2016

PRESSURE DROP CURVES THROUGH THE ELEMENT HEK50-20

The curves are obtained in the following conditions:

Mineral oil type ISO VG46

Kinematic viscosity 120 SSU (30 cSt)

Density 7.29 lb/gal (0,856 kg/dm³).

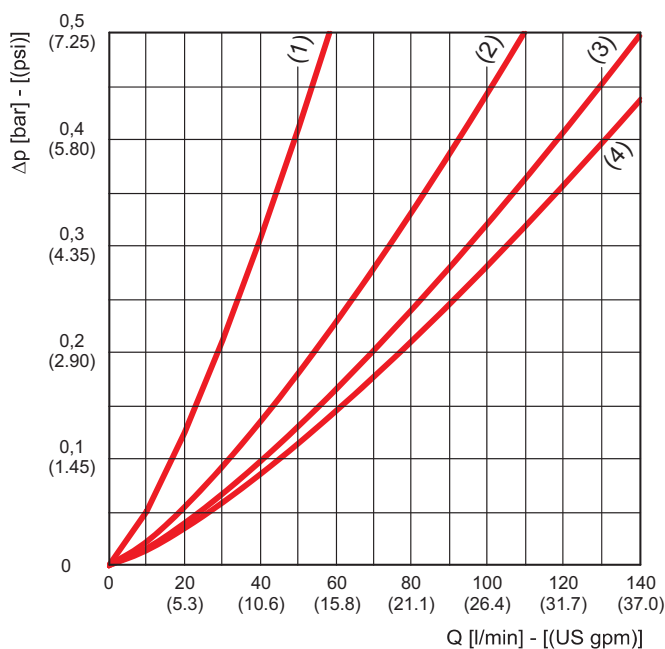
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(2) HEK50-20.150

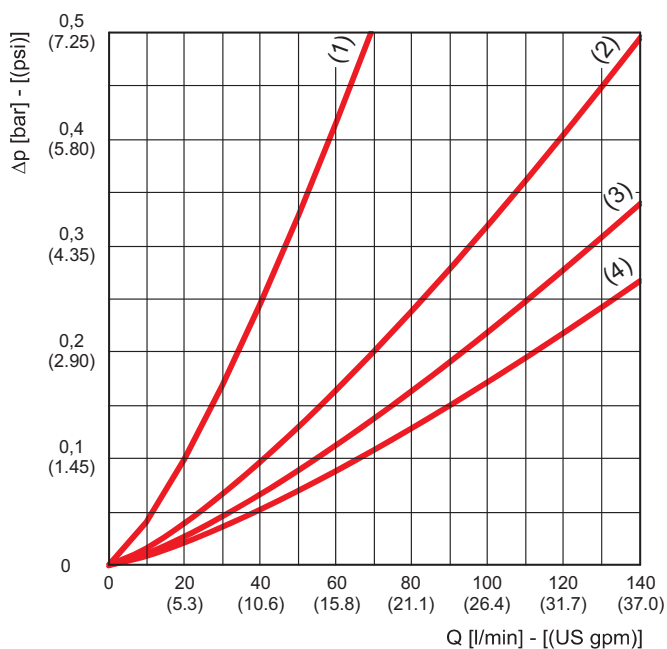
(3) HEK50-20.180

(4) HEK50-20.230

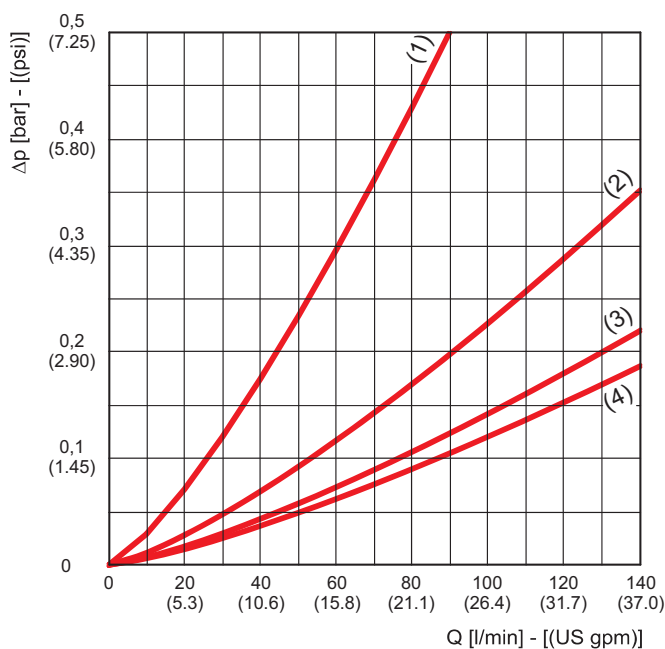
FG003



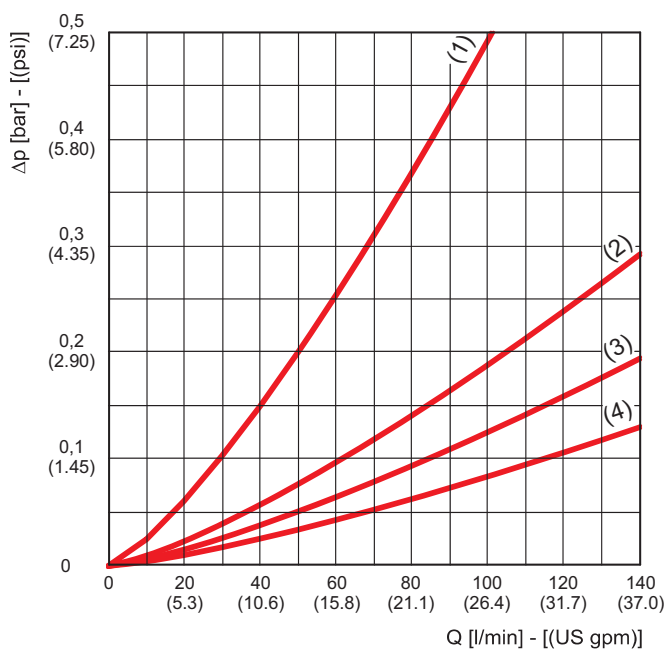
FG006



FG010



FG016



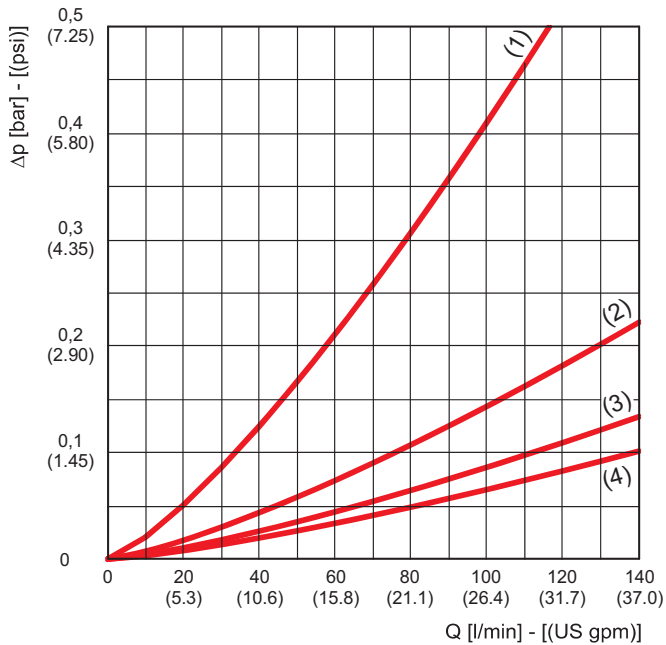
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PRESSURE DROP CURVES THROUGH THE ELEMENT HEK50-20

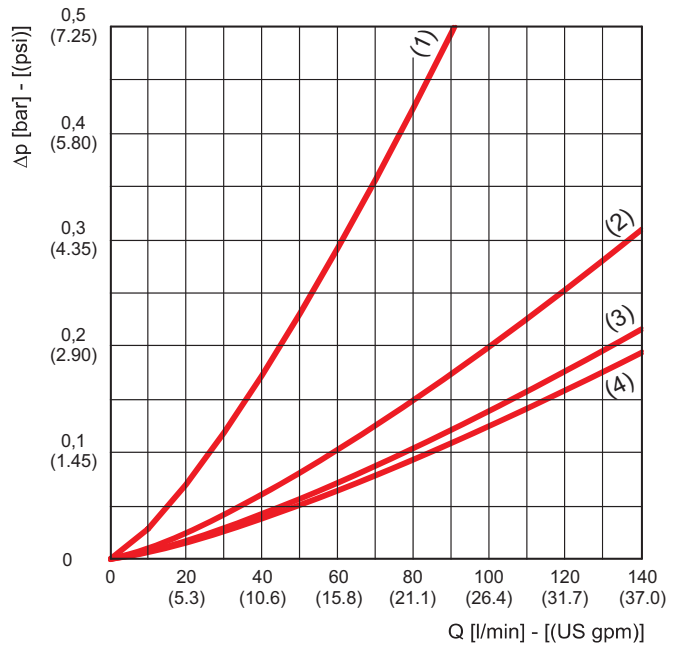
The curves are obtained in the following conditions:
Mineral oil type ISO VG46
Kinematic viscosity 120 SSU (30 cSt)
Density 7.29 lb/gal (0,856 kg/dm³).

- (1) HEK50-20.100
- (2) HEK50-20.150
- (3) HEK50-20.180
- (4) HEK50-20.230

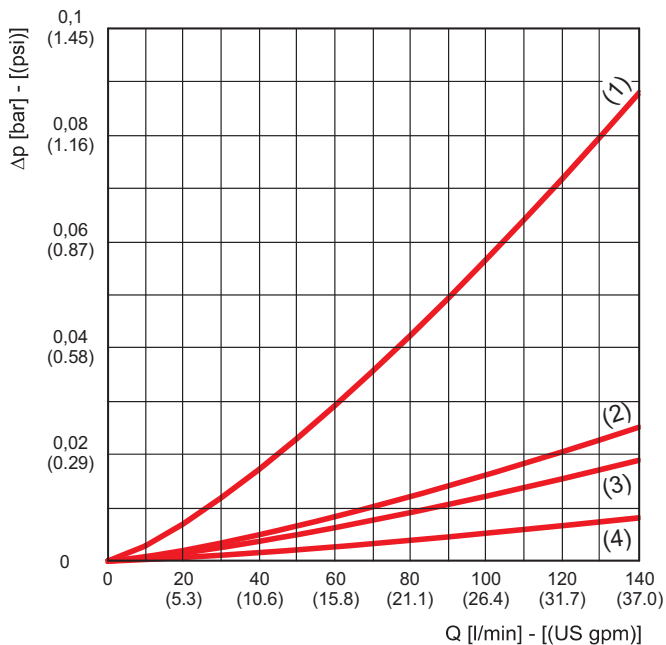
FG025



RP010



RP025



02/01.2016

PRESSURE DROP CURVES THROUGH THE ELEMENT HEK50-30

The curves are obtained in the following conditions:

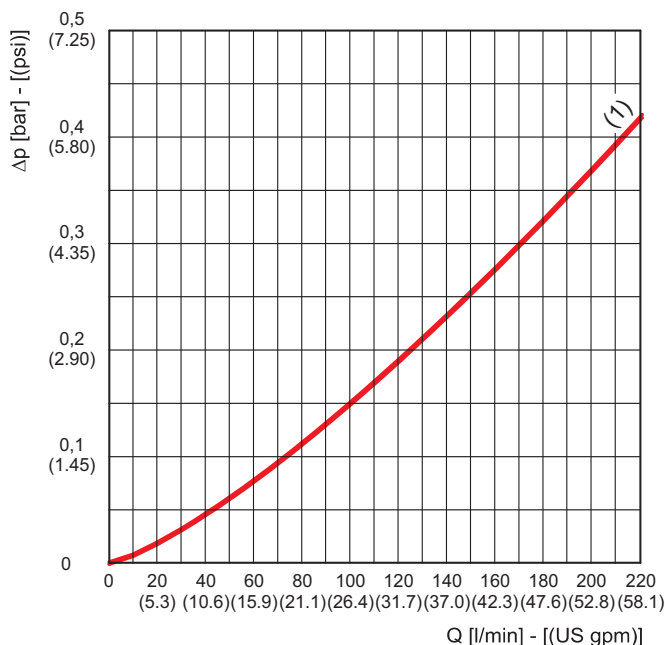
Mineral oil type ISO VG46

Kinematic viscosity 120 SSU (30 cSt)

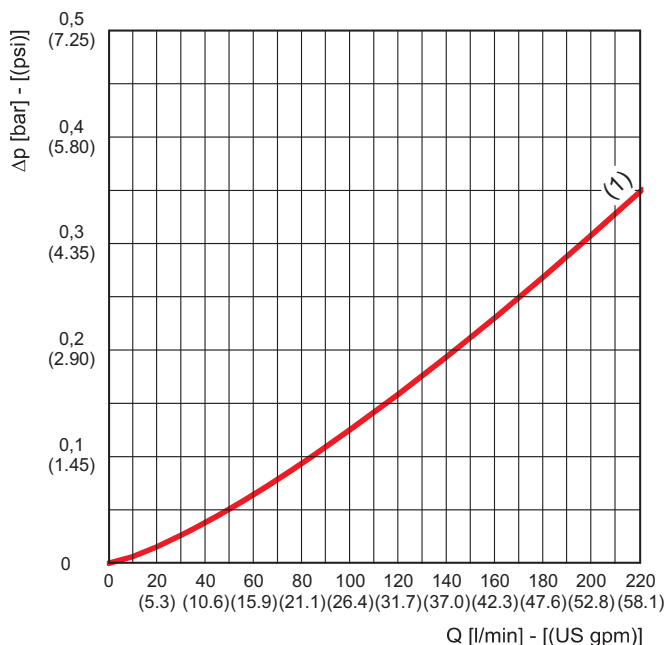
Density 7.29 lb/gal (0,856 kg/dm³).

(1) HEK50-30.295

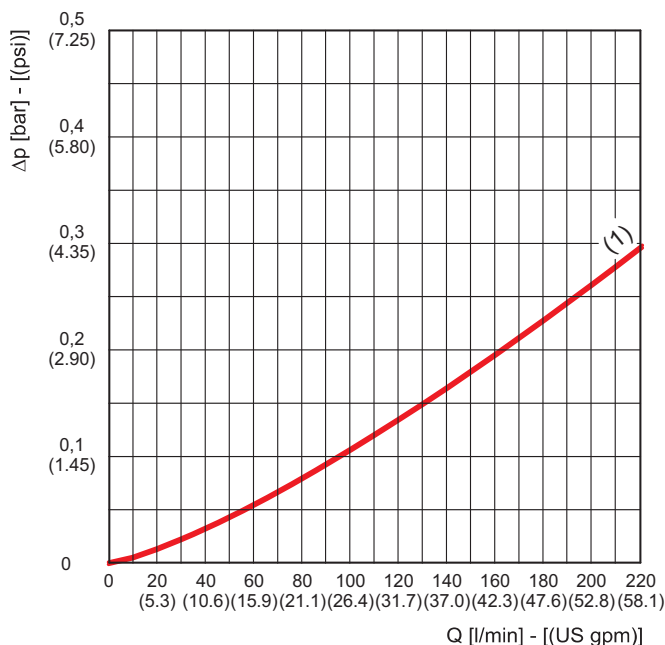
FG003



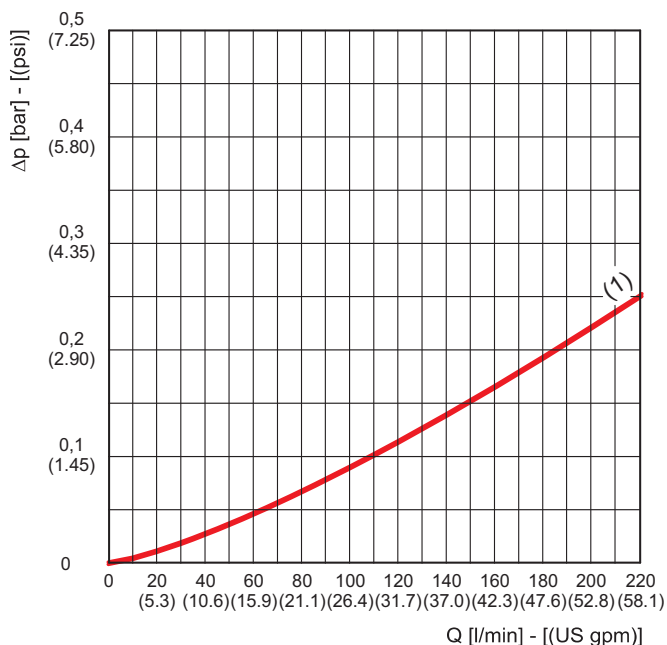
FG006



FG010



FG016



02/01.2016

PRESSURE DROP CURVES THROUGH THE ELEMENT HEK50-30

The curves are obtained in the following conditions:

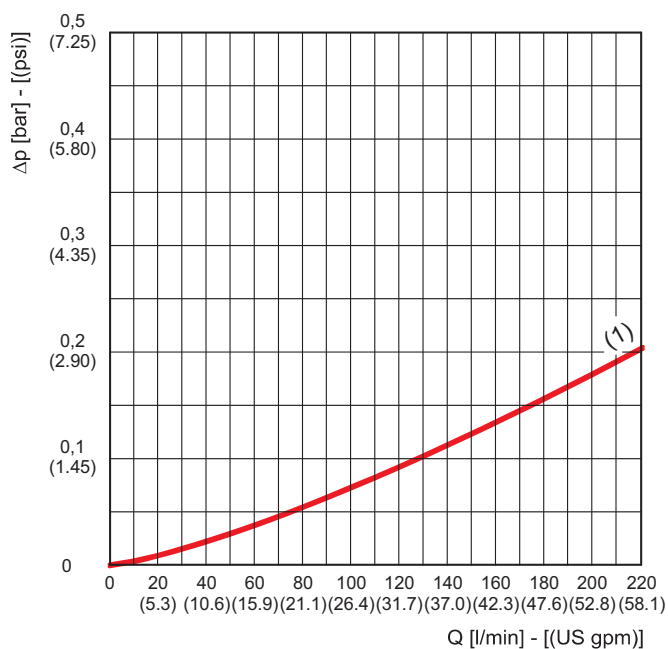
Mineral oil type ISO VG46

Kinematic viscosity 120 SSU (30 cSt)

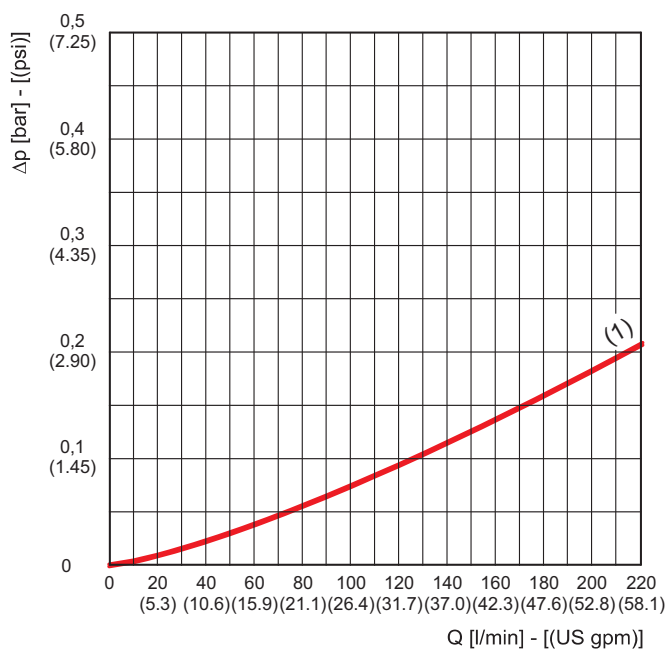
Density 7.29 lb/gal (0,856 kg/dm³).

(1) HEK50-30.295

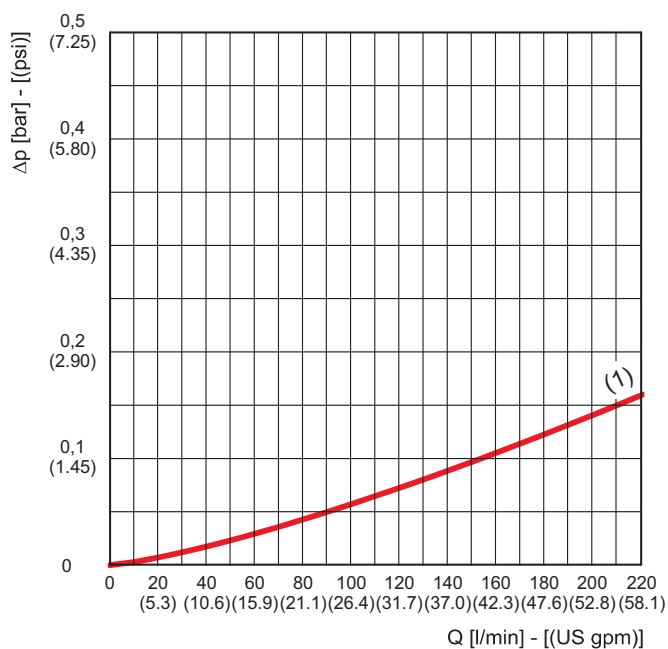
FG025



RP010



RP025



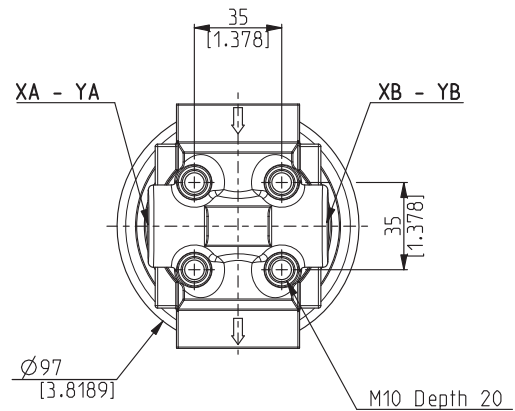
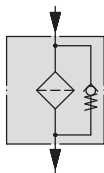
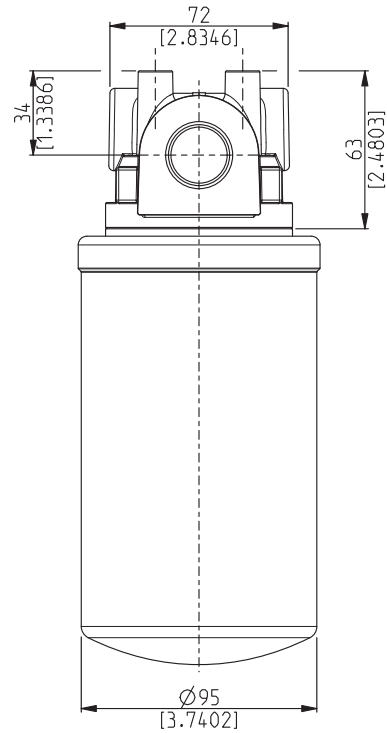
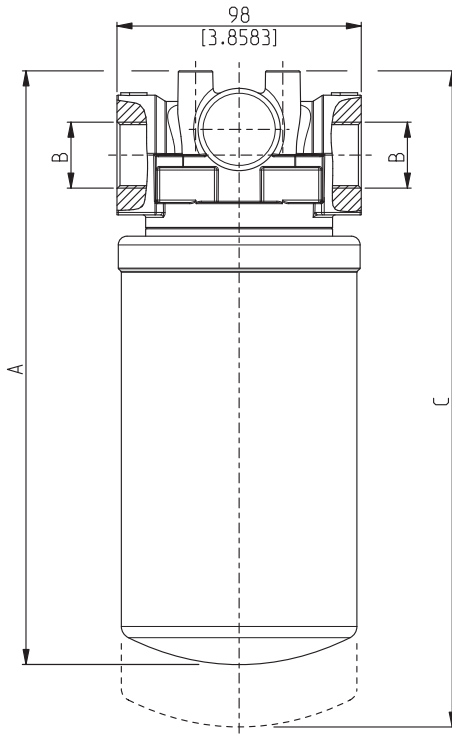
02/01.2016

FLOWS

Filter type	Ports IN / OUT	Degree of filtration						
		FG003	FG006	FG010	FG016	FG025	RP010	RP025
		Flow $\Delta p = 5.8 \text{ psi}$ ($\Delta p = 0.4 \text{ bar}$)						
		US gpm (l/min)						
HF650-20.100	G 3/4	10.6 (40)	13.2 (50)	14.5 (55)	15.9 (60)	17.2 (65)	14.5 (55)	19.8 (75)
	G 1	11.9 (45)	14.5 (55)	15.9 (60)	17.2 (65)	18.5 (70)	15.9 (60)	21.1 (80)
HF650-20.150	G 3/4	17.2 (65)	19.8 (75)	21.1 (80)	22.5 (85)	23.8 (90)	22.5 (85)	23.8 (90)
	G 1	18.5 (70)	21.1 (80)	23.8 (90)	25.1 (95)	26.4 (100)	25.1 (95)	29.1 (110)
HF650-20.180	G 3/4	18.5 (70)	21.1 (80)	22.5 (85)	23.8 (90)	25.1 (95)	22.5 (85)	25.1 (95)
	G 1	21.1 (80)	23.8 (90)	26.4 (100)	27.7 (105)	29.1 (110)	26.4 (100)	30.4 (115)
HF650-20.230	G 3/4	19.8 (75)	21.1 (80)	23.8 (90)	25.1 (95)	26.4 (100)	23.8 (90)	26.4 (100)
	G 1	22.5 (85)	25.1 (95)	27.7 (105)	29.1 (110)	30.4 (115)	27.7 (105)	31.7 (120)
HF650-30.295	G 1 1/4	39.6 (150)	42.3 (160)	44.9 (170)	47.6 (180)	50.2 (190)	50.2 (190)	52.8 (200)

01/03.2011

HF650-20 DIMENSIONS



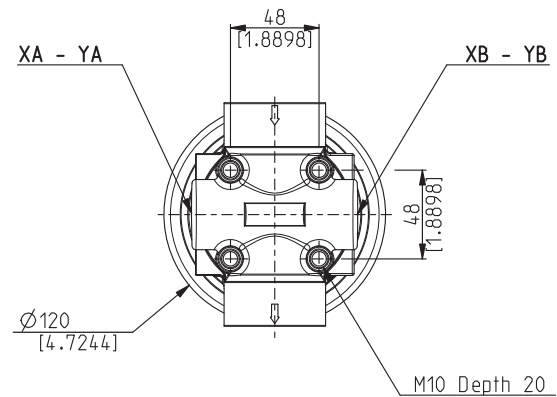
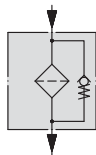
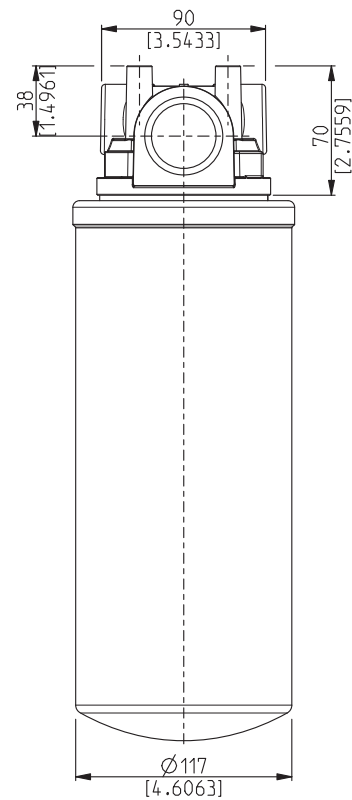
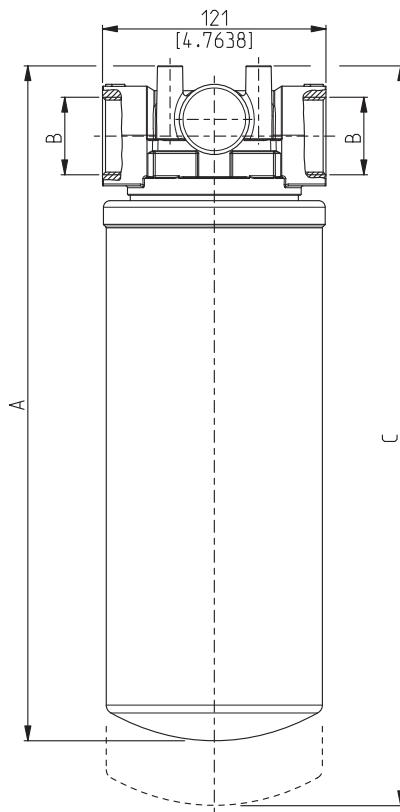
ICAT_019_001_HF650

02/01.2016

Filter type	A	B (GAS-BSPP)		C
	mm (in)	Standard	On request	mm (in)
HF650-20.100	163 (6.4173)	G 3/4	G 1	188 (7.4016)
HF650-20.150	213 (8.3858)			238 (9.3700)
HF650-20.180	243 (9.5669)	G 1	G 3/4	268 (10.5511)
HF650-20.230	293 (11.5354)			318 (12.5196)

NPT and SAE UN-UNF threads are available (consult our technical department).

HF650-30 DIMENSIONS



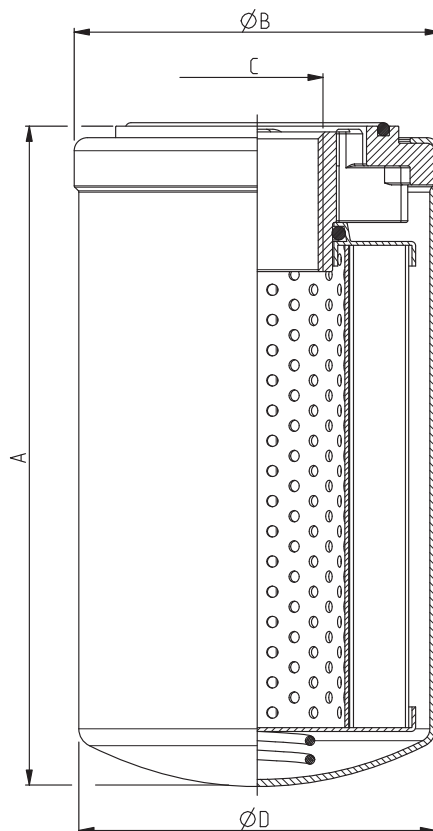
ICAT_019_002_HF650

02/01.2016

Filter type	A	B (GAS-BSPP)	C
	mm (in)	Standard	mm (in)
HF 650-30.295	365 (14.3700)	G 1 1/4	395 (15.5511)

NPT and SAE UN-UNF threads are available (consult our technical department).

ELEMENTS DIMENSIONS FOR HF650



ICAT_019_003_HF650

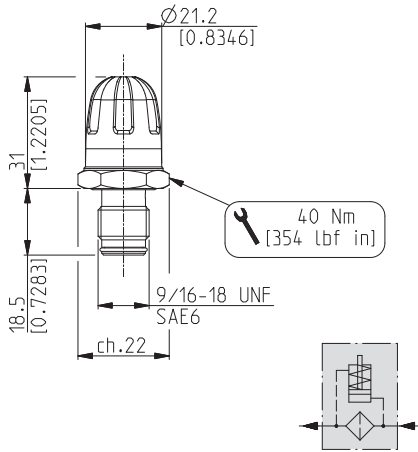
Element type	A	Ø B	C	Ø D	Filtering surface	
					FG	RP
	mm (in)	mm (in)	mm (in)	mm (in)	cm ² (in ²)	cm ² (in ²)
HEK50-20.100	100 (3.9370)				905 (140.2753)	1040 (161.2003)
HEK50-20.150	150 (5.9055)	97 (3.8189)	1 3/8-12 UNF-2B	95 (3.7401)	1910 (296.0506)	2185 (338.6757)
HEK50-20.180	180 (7.0866)				2380 (368.9007)	2720 (421.6008)
HEK50-20.230	230 (9.0551)				3270 (506.8510)	3740 (579.7012)
HEK50-30.295	295 (11.6141)	120 (4.7244)	1 3/4-12 UNF-2B	117 (4.6063)	5035 (780.4266)	8730 (1353.1530)

02/01.2016

INDICATORS

DIFFERENTIAL VISUAL INDICATOR

Code: **F**

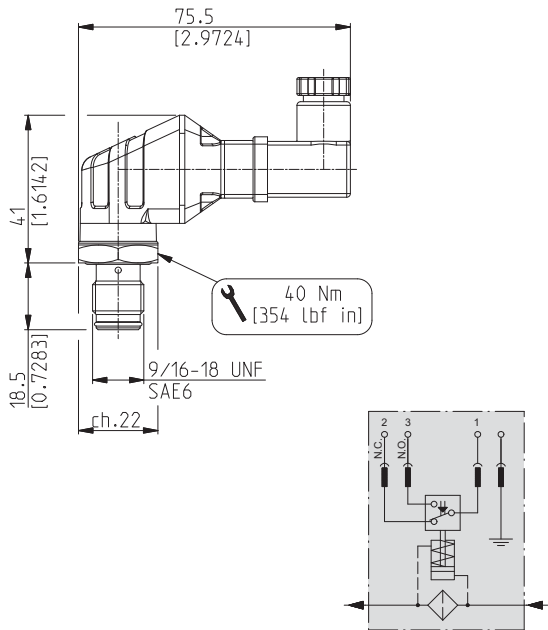


ICAT_023_003_HF725

Differential pressure setting	21.8 psi (1,5 bar) for By-pass B17 43.5 psi (3 bar) for By-pass B35
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DIFFERENTIAL ELECTRICAL-VISUAL INDICATOR

Code: **Q**



ICAT_023_004_HF725

Differential pressure setting	21.8 psi (1,5 bar) for by-pass B17 43.5 psi (3 bar) for by-pass B35
Max. working voltage	250 VAC 30 VDC
Max. working current	3 A (resistivity) 3 A (inductive)
Protection class	IP 66 - Cable clamp PG 7

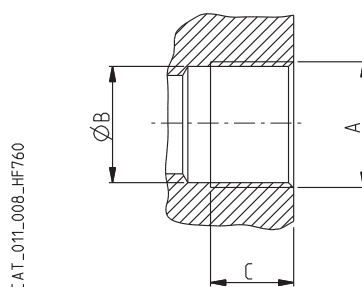
IN / OUT PORTS

Filter type	Nominal size	PORTS TYPE		
		Gas BSPP	NPT	SAE ODT
HF 620-20	3/4"	GE	NE	OD
HF 620-20	1"	GF	NF	OF
HF 620-30	1" 1/4	GG	NG	OG

GAS THREAD

BSPP

Cylindrical GAS thread (55°) in accordance with UNI - ISO 228



CODE	Nominal size	A	Ø B	C	
			mm (in)	mm (in)	Nm (lbf in)
GE	3/4"	G 3/4	24,5 (0.9645)	20 (0.7873)	30 ^{+2,5} (266 ÷ 288)
GF	1"	G 1	30,5 (1.2008)	22 (0.8661)	50 ^{+2,5} (442 ÷ 464)
GG	1" 1/4	G 1 1/4	39 (1.5354)	24 (0.9448)	60 ⁺⁵ (531 ÷ 575)

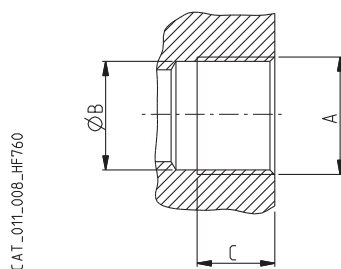
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IN / OUT PORTS

NPT THREAD

NPT

NPT thread (60°) in accordance with ANSI - ASME B1-20

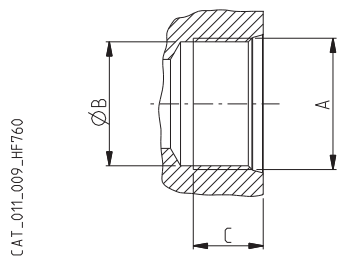


CODE	Nominal size	A	Ø B	C	
			mm (in)	mm (in)	Nm (lbf in)
NE	3/4"	3/4 NPT	23,5 (0.9251)	14 (0.5511)	25 ⁺¹ (221 ÷ 230)
NF	1"	1 NPT	29,5 (1.1614)	17,5 (0.6890)	30 ^{+2,5} (266 ÷ 288)
NG	1" 1/4	1 1/4 NPT	38,5 (1.5157)	18 (0.7086)	50 ^{+2,5} (442 ÷ 464)

SAE J514 THREAD

ODT

American thread UNC-UNF 60° in accordance with ANSI B 1.1



CODE	Nominal size	A	Ø B	C	
			mm (in)	mm (in)	Nm (lbf in)
OD	3/4"	1 1/16" - 12 UNF - 2B	24,7 (0.9724)	20 (0.7873)	40 ^{+2,5} (354 ÷ 376)
OF	1"	1 5/16" - 12 UNF - 2B	30,5 (1.2008)	20 (0.7873)	60 ⁺⁵ (531 ÷ 575)
OG	1" 1/4	1 5/8" - 12 UNF - 2B	39,1 (1.5393)	20 (0.7873)	70 ⁺⁵ (620 ÷ 664)

02/01.2016

ASSEMBLY AND REPLACING ELEMENT INSTRUCTIONS

MOUNTING

Once you have checked the integrity of the filter inside its package, proceed as follow:

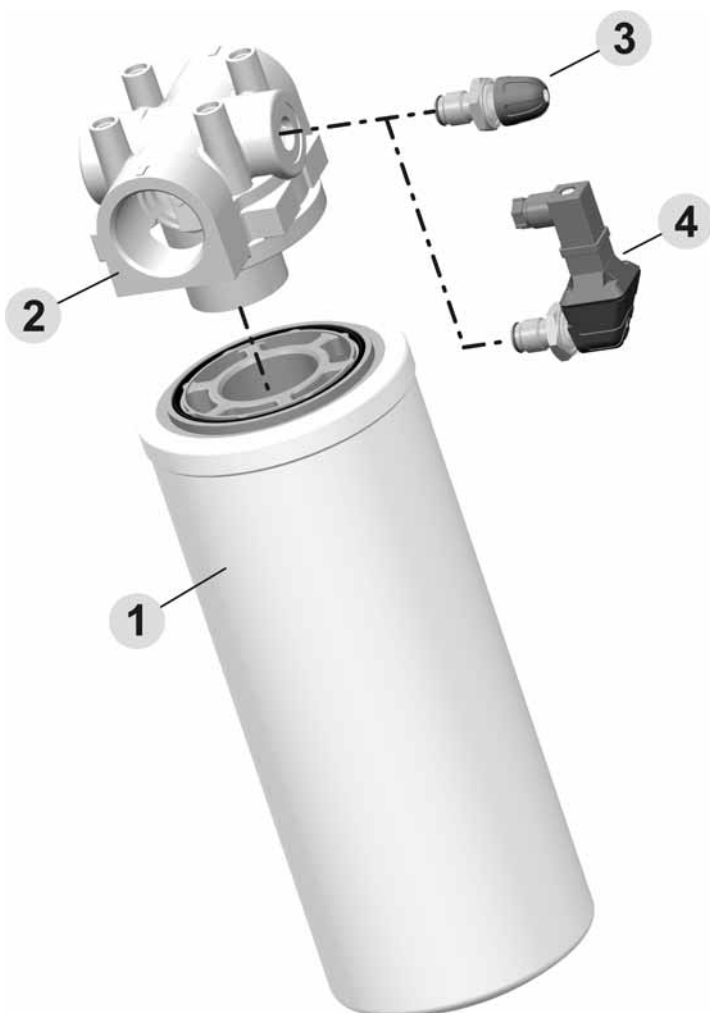
- A Take off the protection cap from the in/out ports.
- B Secure the filter in the head through the holes of the upper side (pos.2) tightening them as follows:
HF 650-20 and HF 650-30 = 44 lbf in (5 Nm)
- C Connect circuit's pipes to inlet and outlet ports using the tightening torque indicated on pages 14 and 15.
- D If the filter has a clogging indicator (pos.3 - 4), take the protection cap off and screw the indicator in the dedicated seat, then tighten to a tightening torque of 354 lbf in (40 Nm). If the indicator is electric, complete the required connections.
- E Start the circuit for a few minutes.
- F Make sure there are no leaks.

REPLACING ELEMENT

Once the working hour limit indicated in the maintenance instructions of the system is reached or when the clogging indicators point out the limit pressure drop created inside the filter, the element must be replaced. Pay attention to the drainage of hydraulic oil, therefore prepare suitable containers to collect it.

Proceed as follows:

- A Stop the system in "machine stopped" status.
- B Secure any shut-off valves on the hydraulic circuit.
- C Remove the clogged element (pos.1) by hands-crewing it from the filter head (pos.2) or if needed by using a strap wrench.
It is advisable not to recover the oil in the element since it is full of clogging particles.
- D Grease the sealing O-ring on the replacement element (pos.1).
- E Screw the new element until reaching the ledge with the filter head (pos.2).
- F After reaching the ledge, hand-screw the element (pos.1) for 1/2 more.
- G Re-open the eventual valves closed before.
- H Start the machine for a few minutes.
- I Make sure there are no leaks.



Pos. Description

- | | |
|---|--|
| 1 | Filtering element |
| 2 | Filter's head |
| 3 | Differential visual indicator |
| 4 | Differential electrical-visual indicator |

When ordering spare parts, always specify the reference number, the filter code and quantity.

Example: Spare parts pos. 4 - HHE70303 - Q.ty 1

02/01.2016

HOW TO ORDER A COMPLETE FILTER HF 650

1	2	3	4	5	6	7						
HF650-...	-	AS	-	FG010	-	B17	-	GE	-	B	-	XA
8	9	10										
F	-	YB	-	GD								

1	Filter type	CODE
	See table from pag. 10 to pag. 11	HF650..
2	Filtering surface	CODE
	Standard	AS
3	Degree of filtration	CODE
	3 [µm] Micro-fibre glass	FG003
	6 [µm] Micro-fibre glass	FG006
	10 [µm] Micro-fibre glass	FG010
	16 [µm] Micro-fibre glass	FG016
	25 [µm] Micro-fibre glass	FG025
	10 [µm] Reinforced cellulose	RP010
	25 [µm] Reinforced cellulose	RP025
4	By-pass setting valve	CODE
	Without	B00
	With By-pass setting valve 25 [psi] (1,7 [bar])	B17
	With By-pass setting valve 51 [psi] (3,5 [bar])	B35
5	Inlet port	CODE
	GAS threads (BSPP)	
	G 3/4	GE
	G 1	GF
	G 1 1/4	GG
	NPT threads	
	3/4	NE
	1	NF
	1 1/4	NG
	SAE threads ODT	
	3/4	OD
	1	OF
	1 1/4	OG

6	Seals	CODE
	Buna	B
	Viton	V
7	Indicators arranged	CODE
	Without	XN
	Right side arranged	XA
	Left side arranged	XB
8	Indicators	CODE
	Without	G
	Differential visual indicator	F
	Differential electrical-visual indicator	Q
9	Secondary outlets	CODE
	Without	YN
	Right side arranged	YA
	Left side arranged	YB
10	Secondary outlets dimensions	CODE
	G 1/4	GB
	G 3/8	GC
	G 1/2	GD

☒ Standard
☐ On request

02/01.2016

HOW TO ORDER A REPLACEMENT ELEMENT

1	2	3	4
HEK50-...	AS	FG010	B

1	Element type	CODE
	See table pag. 12	HEK50..
2	Filtering surface	CODE
	Standard	AS

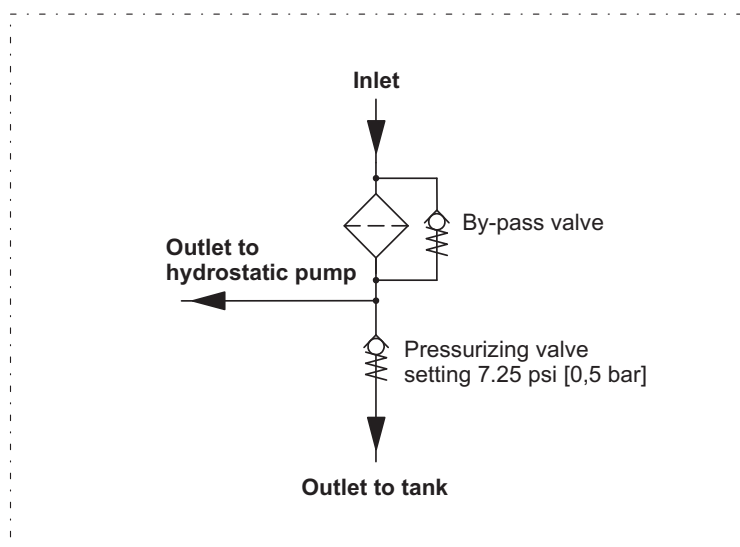
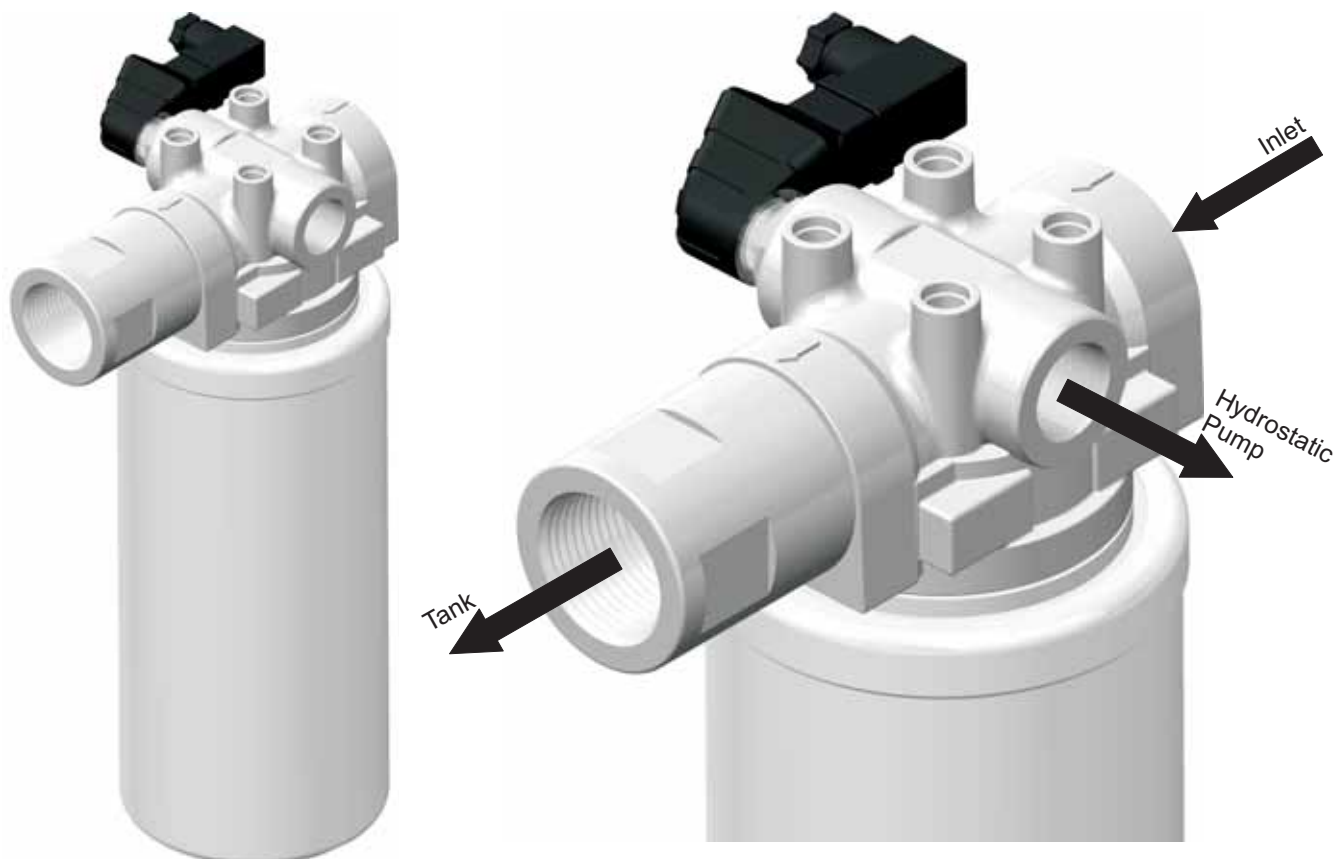
3	Degree of filtration	CODE
3	[μm] Micro-fibre glass	FG003
6	[μm] Micro-fibre glass	FG006
10	[μm] Micro-fibre glass	FG010
16	[μm] Micro-fibre glass	FG016
25	[μm] Micro-fibre glass	FG025
10	[μm] Reinforced cellulose	RP010
25	[μm] Reinforced cellulose	RP025

4	Seals	CODE
	Buna	B
	Viton	V

☐ Standard
☐ On request

SPECIAL VERSION FOR HYDROSTATIC TRANSMISSIONS

The in line HF650 filters can be applied to hydrostatic transmission circuits by using a special pressurization valve. The oil flow coming from the open circuit is pressurized at 7.25 psi (0,5 bar) and sent to the hydrostatic circuit depending on the charge pump need, while the excess flow is normally discharged into the tank. For a correct filter choice, please contact our technical department.



02/01.2016

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02/01.2016

Building &
construction

Agriculture

Truck
Market

Material
Handling

Industrial



Full range of filters
for all hydraulic circuits

Suction filters

HF 410
HF 431
HF 434
HF 437

Tank mounted return line filters

HF 502
HF 508
HF 547
HF 554
HF 570
HF 575
HF 578

Tank mounted return and suction line filters

HF 525

In line filters Spin-On

HF 620
HF 625
HF 650

In line medium and high pressure filters

HF 690
HF 705
HF 710
HF 725
HF 735
HF 745
HF 748
HF 760
HF 761

Accessories

Filler breathers
Air filters
Level and temperature gauges
Pressure gauges
Pressure/vacuum gauges
Clogging indicators



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Replaces: HF 650 01 T A

HF 650 02 T A Edition: 02/01.2016

