

In line high pressure filters

HF 735 series



**IKRON**<sup>®</sup>  
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 for generating and regulating the fluid power, which are also 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

The filters of the HF735 series are connected to the pressure line of the circuit and they protect the system's components against contaminant particles.

The standard filters are supplied with by-pass valve calibrated at 87 psi (6 bar).

For applications where the maximum protection of the system is requested, such as servo drives or proportional controls, the filters are equipped with highly resistant filtering elements (versions "HC") and do not have a by-pass valve.

- Flow up to 40 US gpm (150 l/min)
- Maximum working pressure 4640 psi (320 bar)
- High efficiency multilayer system
- Direct mounting on manifold

### MATERIALS

Head	Spheroidal cast iron GS 450-10 UNI ISO 1083
Bowl	Extruded steel
Seals	Buna - Viton
End cap	Zinc plated steel
Inner tube	Zinc plated steel
Filter media	Inorganic micro-fibre glass

### FLUID COMPATIBILITY

Conforming to ISO 2943 (Norm ISO 6743/4)

Oil mineral (1)	HH - HL - HM - HR - HV - HG
Water emulsion (1)	HFAE - HFAS
Water glycol (1)	HFC
Syntetic fluid (2)	HS - HFDR - HFDU - HFDS
(1) With Buna seals	
(2) With Viton seals	

### FLOW

Flow max.	40 US gpm (150 l/min)
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### PRESSURE

Working pressure	4640 psi (320 bar)
Testing pressure	6960 psi (480 bar)
Burst pressure	9280 psi (640 bar)
Element collapse pressure	290 psi (20 bar) (version LC)
rating (conforming to ISO 2941)	3045 psi (210 bar) (version HC)

### BY-PASS VALVE

By-pass setting	87 psi (6 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 ÷ 4640 psi (0 ÷ 320 bar)

### DEGREE OF FILTRATION

Multi-pass test conforming to ISO 16889 (regulation in force)  
Contaminant ISO MTD - final  $\Delta p$  87 psi (6 bar)

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

Multi-pass test conforming to ISO 4572. (previous regulation)  
Contaminant ACFTD - final  $\Delta p$  87 psi (6 bar)

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

### INDICATORS (3)

Visual differential indicator  
Visual electrical differential indicator  
Visual electrical differential indicator with thermostat

(3) Characteristics and dimensions pag. 11

## SIZING – PRESSURE DROP

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

**Total  $\Delta p = \Delta p$  in housing +  $\Delta p$  in element**

In the filters of series HF735 in normal working conditions, the total  $\Delta p$  must not be more than 11 psi (0,75 bar) whereas, for use in harsh conditions, it must be within 14.5 ÷ 22 psi (1 ÷ 1,5 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/dm<sup>3</sup>).

**Example calculation**

Filter HF735-20.106-AS-FG010-LC-B60-GD-B-DD-G  
 Flow rate= 12 US gpm (45 l/min)  
 Kinematic viscosity: 120 SSU (30 cSt)  
 Oil density : 7.29 lb/gal (0,856 kg/dm<sup>3</sup>)  
 Filtering degree: 10  $\mu$ m

Data obtained from the diagrams:

$\Delta p$  in housing = 2.00 psi (0,14 bar) (page 4)

$\Delta p$  in element = 7.25 psi (0,50 bar) (page 5)

Total  $\Delta p = 2.00 + 7.25 = 9.25$  psi (0,64 bar) ( $\Delta p$  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 shall 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/dm<sup>3</sup>) the value of the  $\Delta p$  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/dm<sup>3</sup>) and kinematic viscosity different to 120 SSU (30 cSt) the value of  $\Delta p$  in the element will be:

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

Or

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

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  $\Delta p$  does not exceed the pressure limit of 11 psi (0,75 bar).

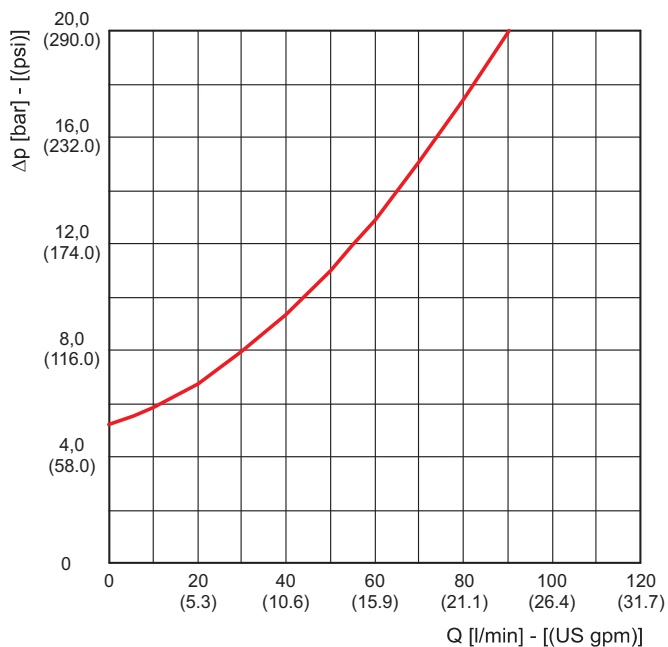
03/10.2015

## PRESSURE DROP CURVES THROUGH THE BY-PASS VALVES

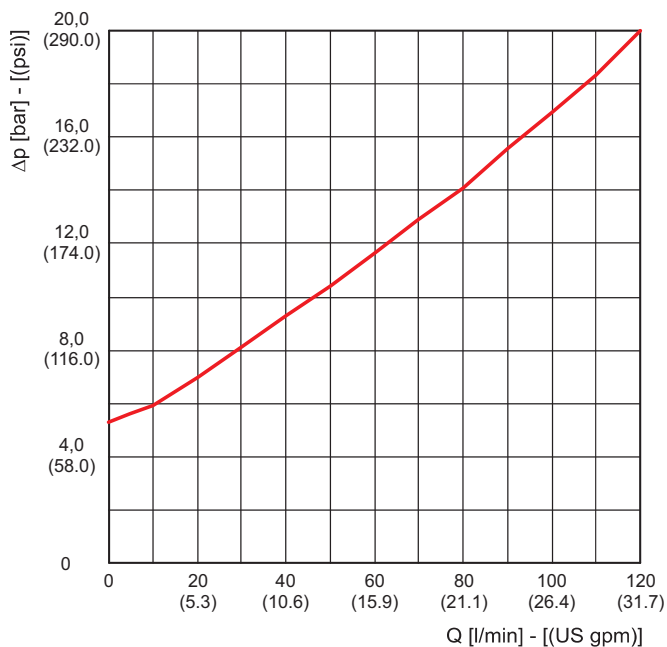
The pressure drop values are directly proportional with the specific weight of the fluid and do not affect the establishment of the total pressure drop of the complete filter.

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/dm<sup>3</sup>).

**HF735-20**



**HF735-30**

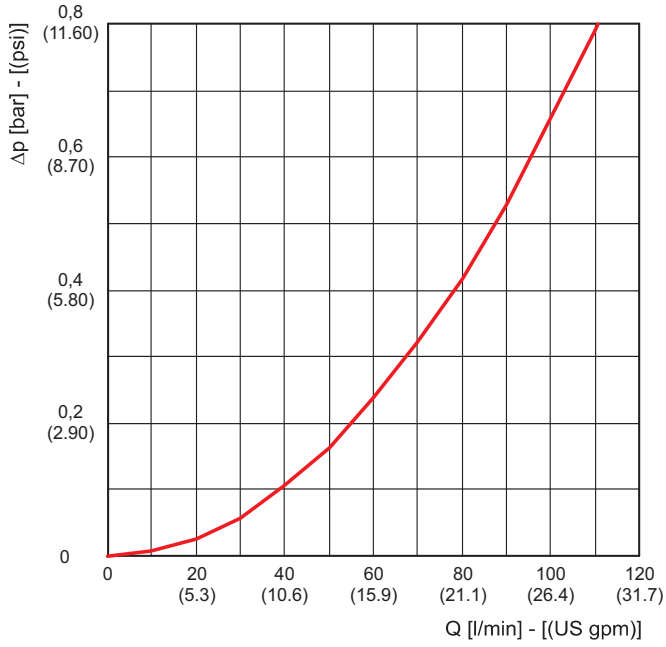


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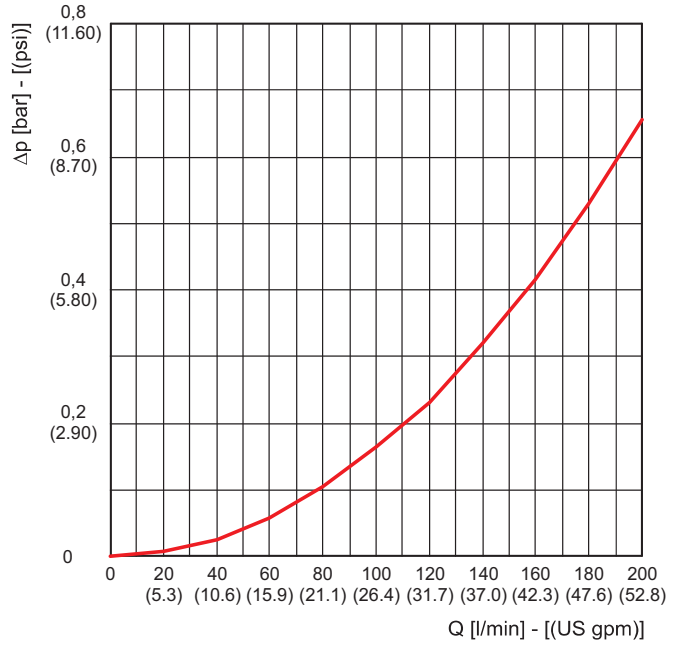
**PRESSURE DROP CURVES THROUGH THE HOUSING**

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/dm<sup>3</sup>).

**HF 735-20**



**735-30**



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## PRESSURE DROP CURVES THROUGH THE ELEMENT HEK85-20

The curves are obtained in the following conditions:

Mineral oil type ISO VG46

Kinematic viscosity 120 SSU (30 cSt)

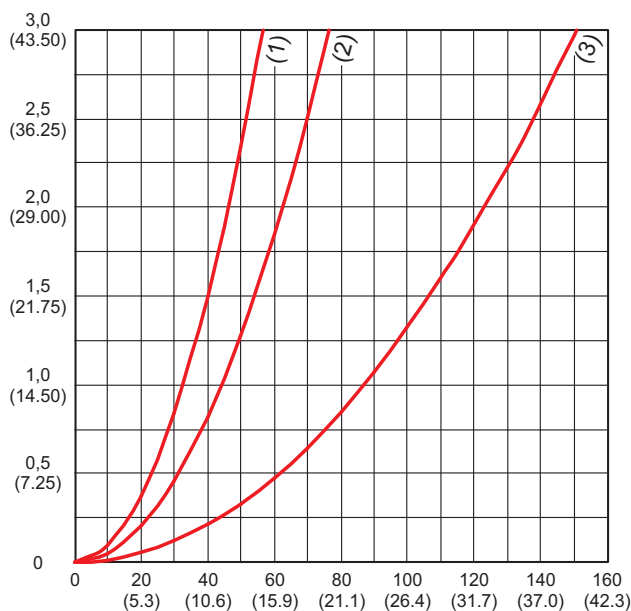
Density 7.29 lb/gal (0,856 kg/dm<sup>3</sup>).

(1) HEK85-20.080

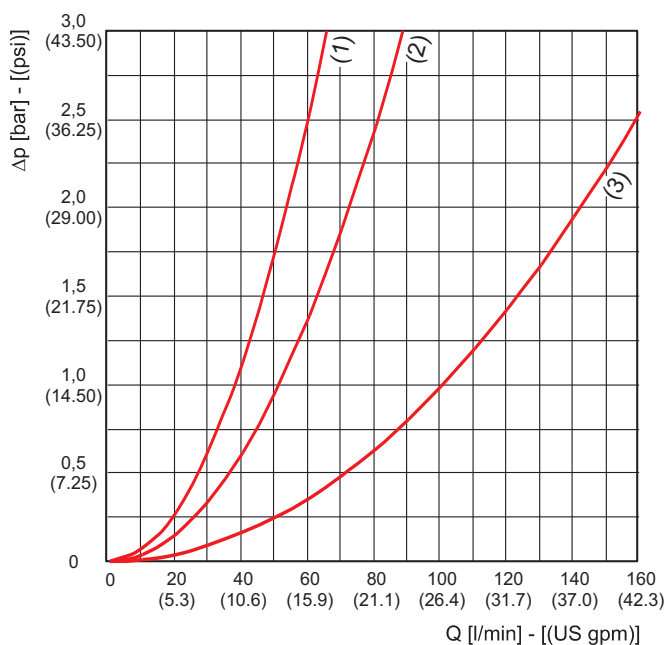
(2) HEK85-20.106

(3) HEK85-20.203

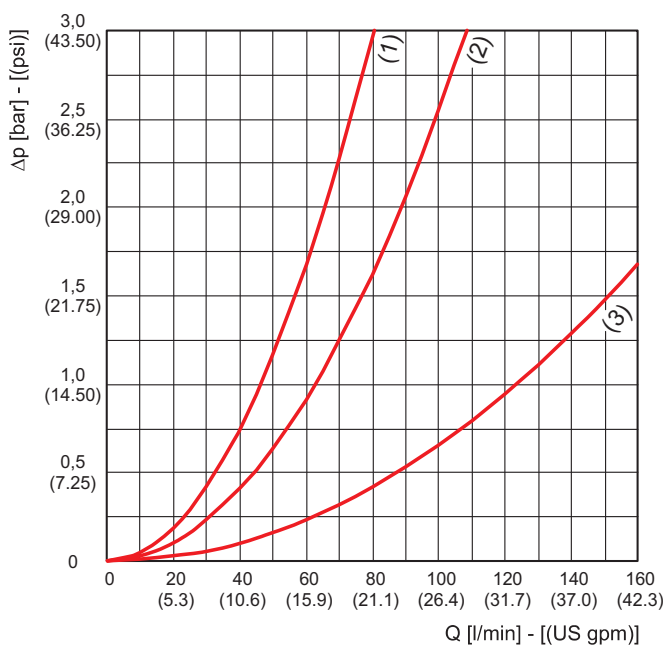
**FG003**



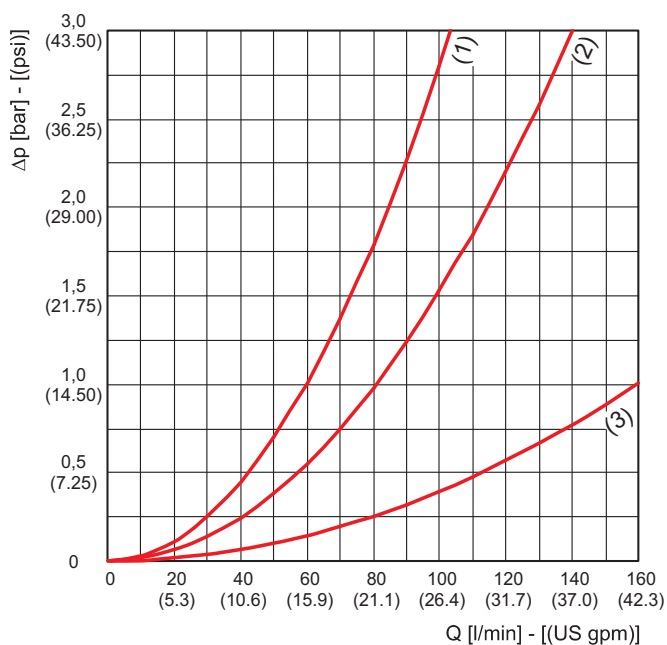
**FG006**



**FG010**



**FG025**



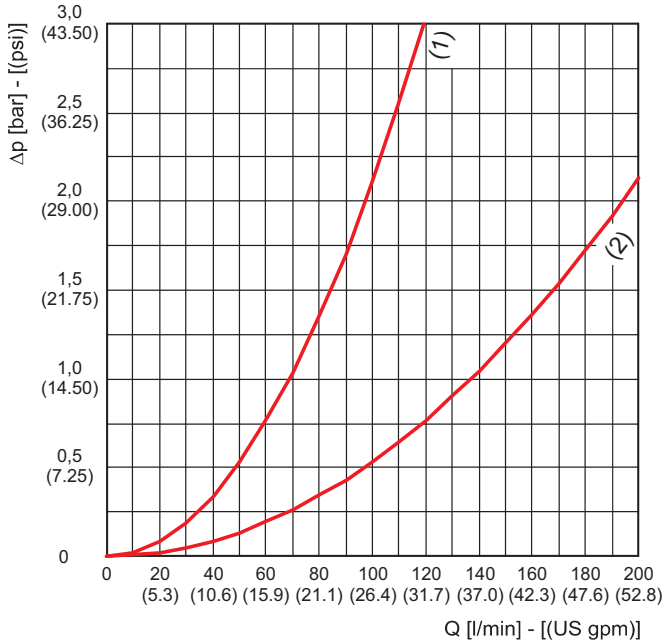
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**PRESSURE DROP CURVES THROUGH THE ELEMENT HEK85-30**

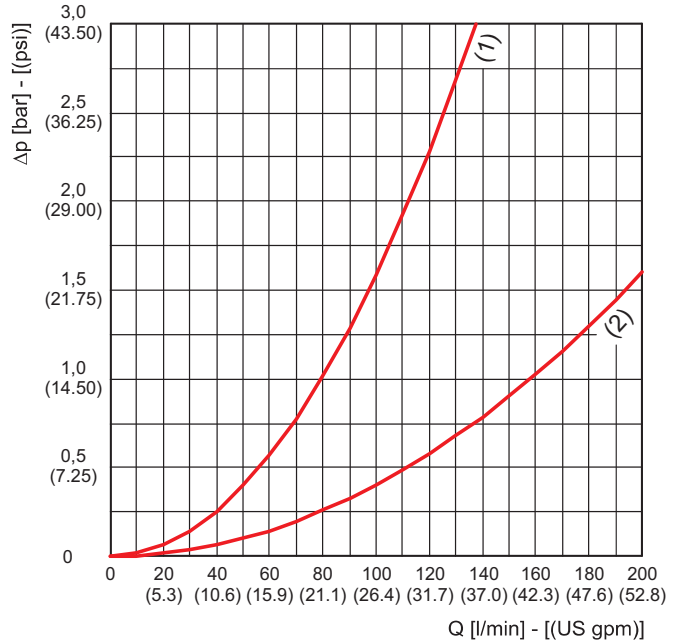
The curves are obtained in the following conditions:  
 Mineral oil type ISO VG46  
 Kinematic viscosity 120 SSU (30 cSt)  
 Density 7.29 lb/gal (0,856 kg/dm<sup>3</sup>).

- (1) HEK85-30.115
- (2) HEK85-30.223

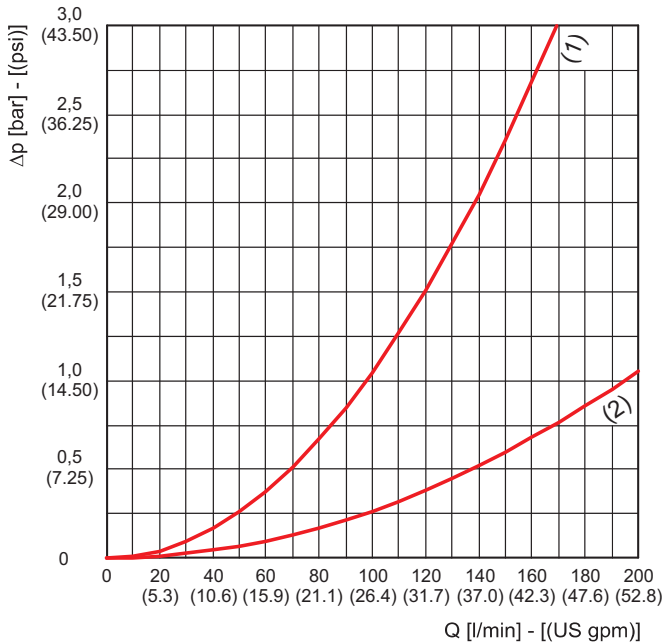
**FG003**



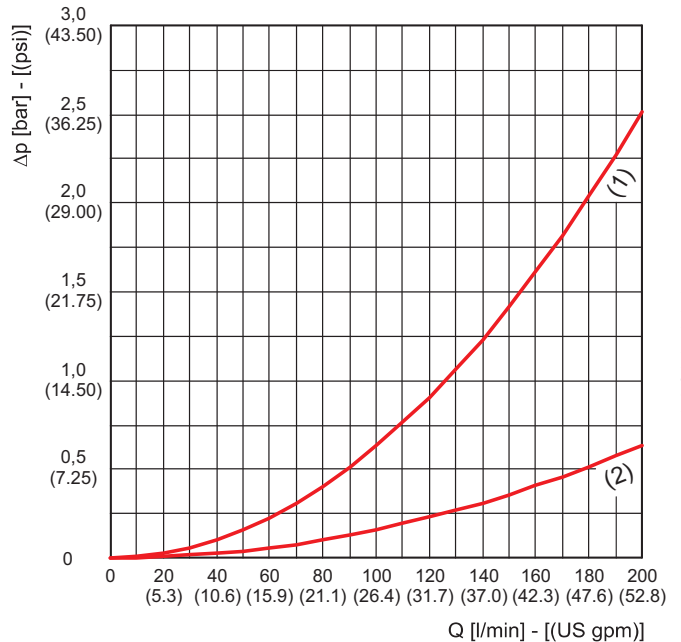
**FG006**



**FG010**



**FG025**



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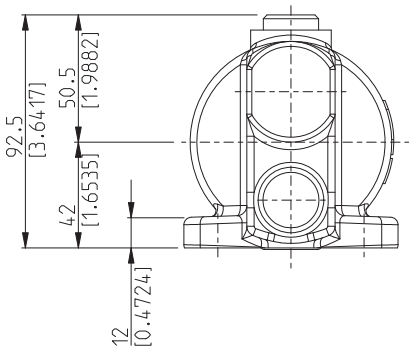
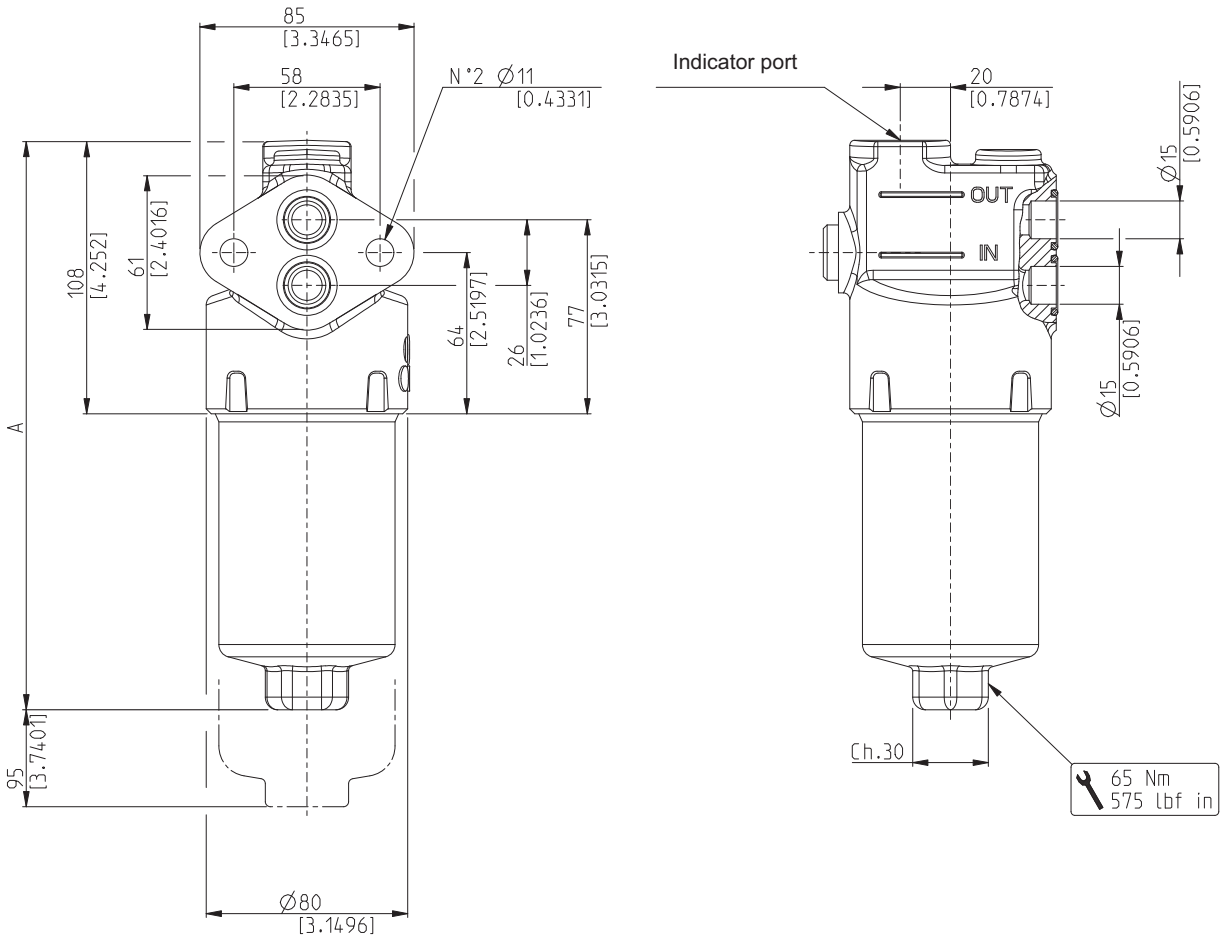


**FLOW**

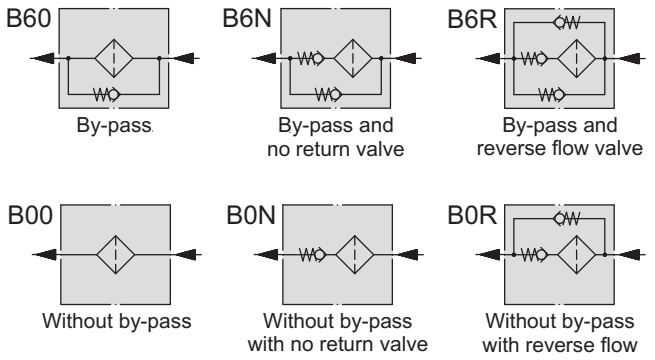
Filter type	Degree of filtration			
	FG003	FG006	FG010	FG025
	Flow Δp= 11 psi (0,75 bar) US gpm (l/min)			
<b>HF735-20.080</b>	6.6 (25)	7.9 (30)	9.2 (35)	11.9 (45)
<b>HF735-20.106</b>	7.9 (30)	10.6 (40)	11.9 (45)	15.9 (60)
<b>HF735-20.203</b>	13.2 (50)	14.5 (55)	15.9 (60)	21.1 (80)
<b>HF735-30.115</b>	15.9 (60)	18.4 (70)	22.4 (85)	29.1 (110)
<b>HF735-30.223</b>	27.7 (105)	31.7 (120)	35.7 (135)	39.6 (150)

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**HF735-20 DIMENSIONS**



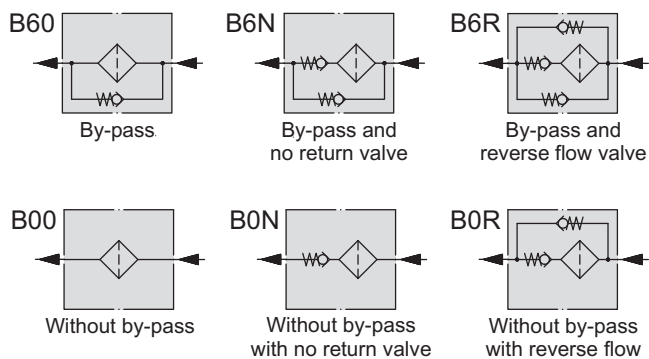
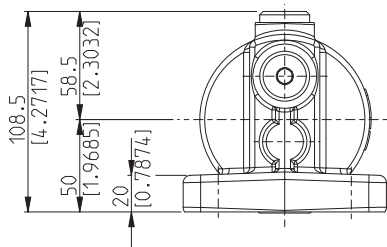
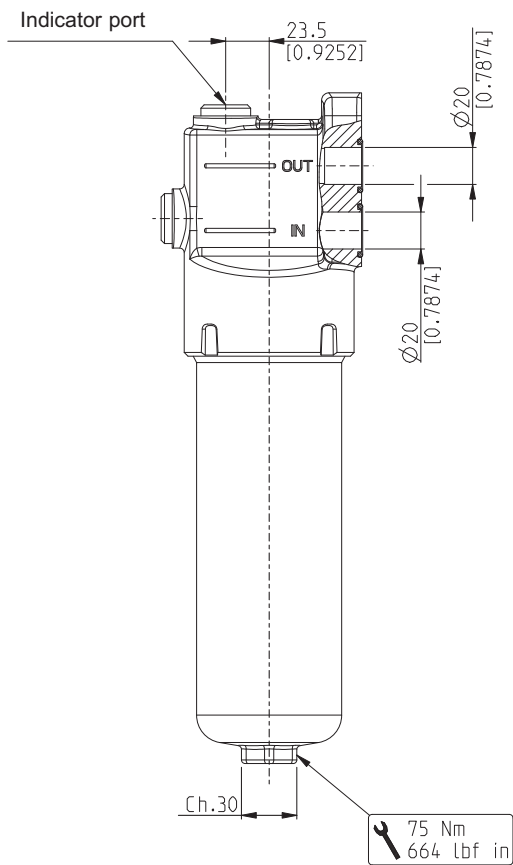
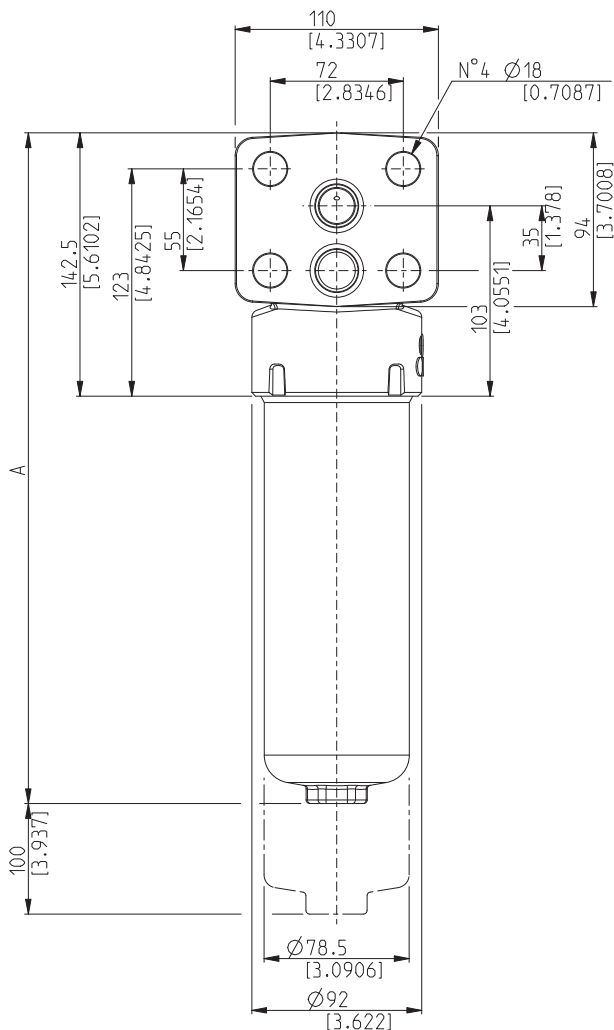
ICAT\_022\_001\_HF735



Filter type	Weight		A
	kg (lbs)		mm (in)
<b>HF735-20.080</b>	3,7 (8.15)		200 (7.8740)
<b>HF735-20.106</b>	4,1 (9.03)		226 (8.8976)
<b>HF735-20.203</b>	5,6 (12.34)		323 (12.7165)

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**HF 735-30 DIMENSIONS**

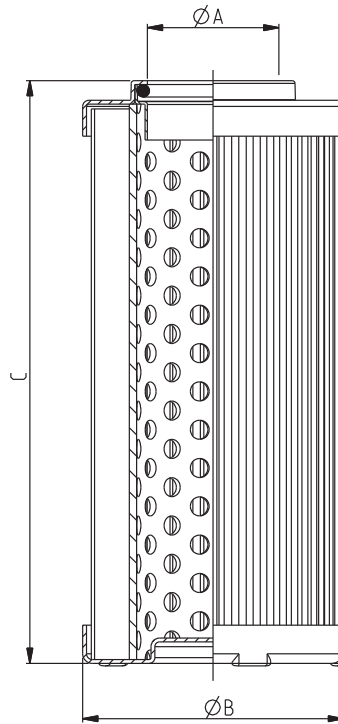


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ICAT\_022\_002\_HF735

Filter type	Weight		A
	kg (lbs)		mm (in)
<b>HF735-30.115</b>	6,0 (13.22)		255 (10.0393)
<b>HF735-30.223</b>	7,8 (17.20)		363 (14.2913)

## ELEMENTS DIMENSIONS FOR HF735



ICAT\_011\_004\_HF760

Filtering elements with  $\Delta p$  - collapse pressure of 3046 psi (210 bar) are also available (please consult our technical department).

Technical data for (MS) version elements are available on request.

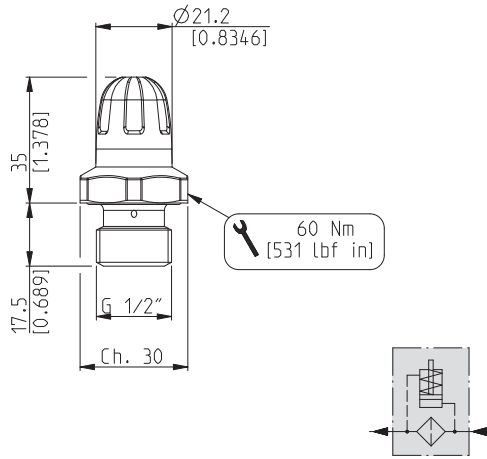
Element type	Ø A	Ø B	C	Filtering surface (AS)	Dirt holding capacity (ISO MTD)			
					$\Delta p = 72.5 \text{ psi (5 bar)}$			
					FG003	FG006	FG010	FG025
mm (in)	mm (in)	mm (in)	cm <sup>2</sup> (in <sup>2</sup> )	gr (lbs)	gr (lbs)	gr (lbs)	gr (lbs)	
<b>HEK85-20.080</b>			87 (3.4252)	415 (64.3251)	2,3 (0.0051)	3,0 (0.0066)	3,3 (0.0073)	4,8 (0.0106)
<b>HEK85-20.106</b>	25,5 (1.0039)	46,5 (1.8307)	113 (4.4488)	560 (86.8002)	3,1 (0.0069)	4,0 (0.0089)	4,5 (0.0099)	6,5 (0.0143)
<b>HEK85-20.203</b>			210 (8.2677)	1103 (170.9653)	6,2 (0.0136)	7,9 (0.0175)	8,8 (0.0195)	12,8 (0.0282)
<b>HEK85-30.115</b>	27,5 (1.0827)	54,5 (2.1457)	122 (4.8031)	908 (140.7403)	5,1 (0.0112)	6,5 (0.0144)	7,3 (0.0160)	10,5 (0.0232)
<b>HEK85-30.223</b>			230 (9.0551)	1808 (280.2405)	10,1 (0.0223)	13,0 (0.0287)	14,5 (0.0319)	21,0 (0.0462)

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**INDICATORS**

**VISUAL DIFFERENTIAL**

Code: **H**

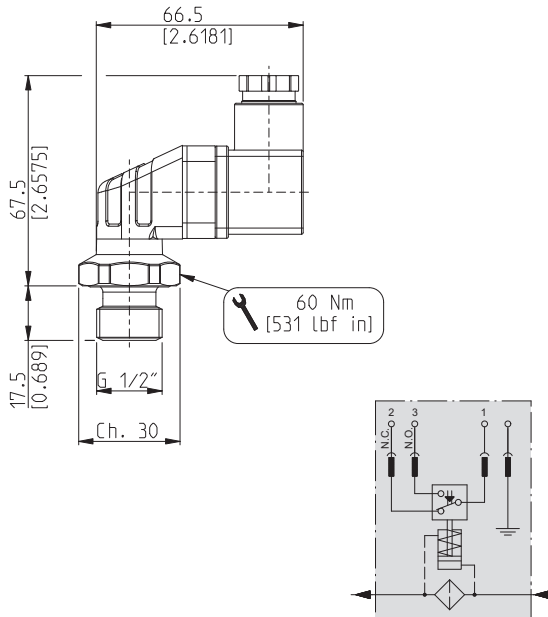


ICAT\_011\_006\_HF760

Differential pressure setting	116 psi (8 bar) without by-pass
	72.5 psi (5 bar) with by-pass

**VISUAL ELECTRICAL DIFFERENTIAL**

Code: **U**

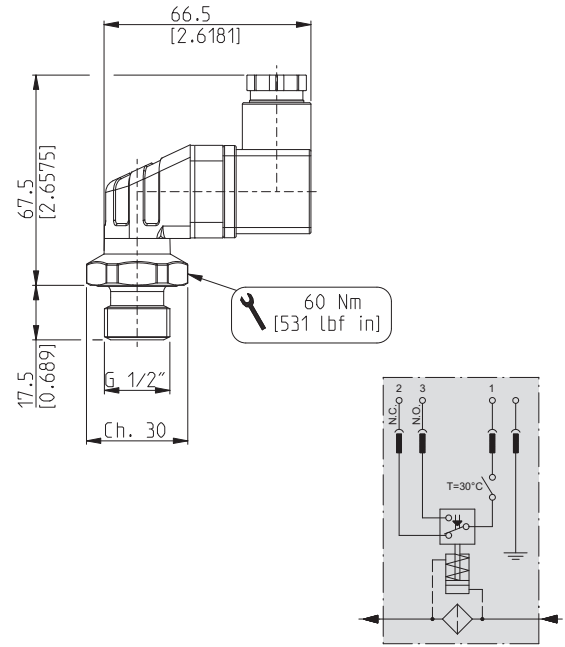


ICAT\_011\_007\_HF760

Differential pressure setting	116 psi (8 bar) without by-pass
	72.5 psi (5 bar) with by-pass
Max. working voltage	250 VAC
	30 VCC
Max. working current	3 A (resistivity)
	3 A (inductive)
Protection class	IP 66

**VISUAL ELECTRICAL DIFFERENTIAL WITH THERMOSTAT**

Code: **W**



ICAT\_011\_011\_HF760

Differential pressure setting	116 psi (8 bar) without by-pass
	72.5 psi (5 bar) with by-pass
Max. working voltage	250 VAC
	30 VCC
Max. working current	3 A (resistivity)
	3 A (inductive)
Protection class	IP 66
Min. function temperature	86 °F (30 °C)

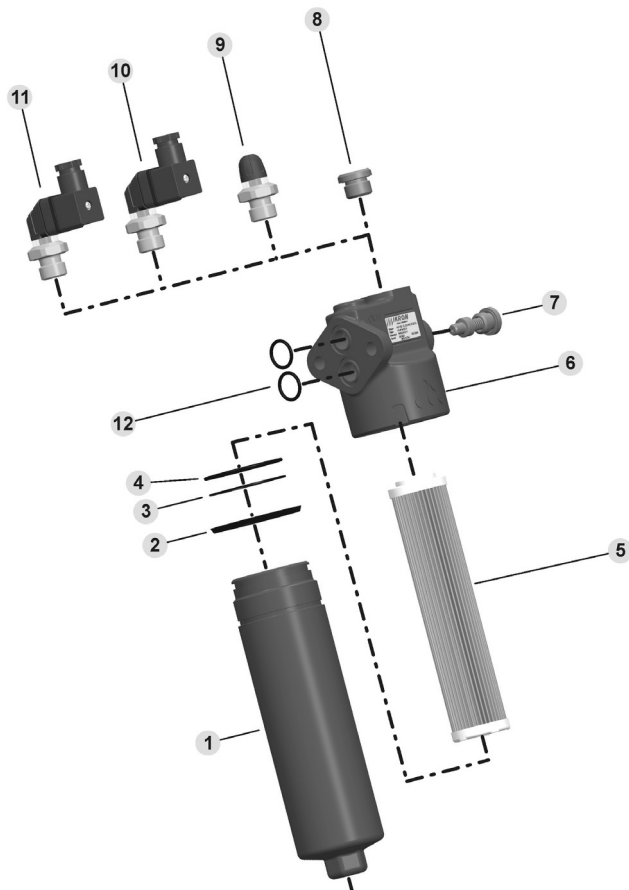
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## ASSEMBLY AND REPLACING ELEMENT INSTRUCTIONS

### ASSEMBLY

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

- A Take the protection caps off the oil inlet and outlet.
- B Secure the filter to the attachment device via the flange's holes of the head (pos.6), checking the flow direction, which is determined by the IN and OUT incisions.
- C If the clogging indicator (pos.9 - 10 - 11) is immediately mounted in the filter, take the protection cap off and screw the indicator in the dedicated seat, then tighten to a tightening torque of 531 lbf in (60 Nm). If the indicator is electric, complete the required connections.
- D Start the circuit for a few minutes.
- E Make sure there are no leaks.



### REPLACING ELEMENT

Once the working hours 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 cartridge must be replaced, remembering that this procedure involves the drainage of hydraulic oil and therefore you need to prepare suitable containers to collect the oil.

Proceed as follows:

- A Stop the system in "Machine stopped" status.
- B Secure any shut-off valves on the hydraulic circuit.
- C Unscrew the filter container (pos.1).
- D Remove the clogged filtering cartridge (pos.5), making sure no residual particles have settled on the bottom (pos.1).
- E Make sure the seal, the O-ring (pos.2 - 4) and the anti-extrusion ring (pos.3) are not damaged, otherwise replace them and consequently position the new ones correctly.
- F Insert the new filtering cartridge, lubricating the sealing O-ring beforehand.
- G Screw the container tight (pos.1) making sure the threading is screwed correctly. Tighten to a tightening torque as indicated on pages 8, 9.
- H Start the machine for a few minutes.
- I Make sure there are no leaks.

Pos.	Description
1	Filter bowl
2	Seal
3	Anti-extrusion ring
4	Sealing O-Ring
5	Filtering element
6	Filter head
7	By-pass valve
8	Sealing cap
9	Visual differential indicator
10	Visual electrical differential indicator
11	Visual electrical differential indicator with thermostat
12	Inlet and outlet ports' O-rings.

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

Example: Spare part pos. 4 - HHP41879 - Qty 2

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## HOW TO ORDER A COMPLETE FILTER

1

2

3

4

5

6

7

8

**HF735 - 20.080 - AS - FG010 - LC - B6 - B - DD - G**

1	Filter type	CODE
	See table page 8 and page 9	<b>HF735-..</b>

2	Filtering surface	CODE
	Standard	<b>AS</b>
	Multilayer	<b>MS</b>

3	Degree of filtration	CODE
	3 [µm] Micro-fibre glass	<b>FG003</b>
	6 [µm] Micro-fibre glass	<b>FG006</b>
	10 [µm] Micro-fibre glass	<b>FG010</b>
	25 [µm] Micro-fibre glass	<b>FG025</b>

4	Δp - Collapse pressure	CODE
	290 [psi]; (20 [bar])	<b>LC</b>
	3045 [psi]; (210 [bar])	<b>HC</b>

5	Valves	CODE
	By-pass setting 87 [psi] (6 [bar])	<b>B60</b>
	By-pass setting 87 [psi] (6 [bar]) and no return valve	<b>B6N</b>
	By-pass setting 87 [psi] (6 [bar]) and reverse flow valve	<b>B6R</b>
	Without	<b>B00</b>
	Without by-pass, with no return valve	<b>B0N</b>
	Without by-pass, with reverse flow	<b>B0R</b>

6	Seals	CODE
	Buna	<b>B</b>
	Viton	<b>V</b>

7	Indicator ports	CODE
	Without	<b>XN</b>
	Arranged	<b>XA</b>
	Arranged with plug	<b>DD</b>

8	Indicator	CODE
	Without	<b>G</b>
	Visual differential indicator	<b>H</b>
	Visual electrical differential indicator	<b>U</b>
	Visual electrical differential indicator with thermostat	<b>W</b>

03/10.2015

Standard  
 On request

## HOW TO ORDER A REPLACEMENT ELEMENT

1	2	3	4	5
HEK85	- 20.080	- AS	- FG010	- LC - B

1	Element type	CODE
	See table pag. 10	HEK85-..

2	Filtering surface	CODE
	Standard	AS
	Multilayer	MS

3	Degree of filtration	CODE
	3 [µm] Micro-fibre glass	FG003
	6 [µm] Micro-fibre glass	FG006
	10 [µm] Micro-fibre glass	FG010
	25 [µm] Micro-fibre glass	FG025

4	Δp collapse pressure	CODE
	290 [psi] (20 [bar])	LC
	3045 [psi] (210 [bar])	HC

5	Seals	CODE
	Buna	B
	Viton	V

Standard  
 On request







Building & construction

Agriculture

Truck Market

Material Handling

Industrial



Full range of filters  
for all hydraulic circuits

## Suction filters

HF 410  
HF 412  
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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