

# In line high pressure filters

## HF 760 - HF 761 series



## 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 HF760 and HF761 series are connected to the pressure line of the circuit and protect the system's components against contaminant particles.

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

HF761 serie differs from the HF760 one because adopts HE K-86 elements.

For applications which need maximum protection of the system, 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 120 US gpm (450 l/min)
- Maximum working pressure 6090 psi (420 bar)
- High efficiency multilayer system
- Flanged ports SAE 3000 e SAE 6000

### 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.	120 US gpm (450 l/min)
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### PRESSURE

Working pressure	6090 psi (420 bar)
Testing pressure	8700 psi (600 bar)
Burst pressure	18275 psi (1260 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

Size 20 and 30	1.000.000 cycle 0 ÷ 6090 psi (0 ÷ 420 bar)
Size 40(3)	1.000.000 cycle 0 ÷ 4060 psi (0 ÷ 280 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 (4)

Visual differential indicator

Visual electrical differential indicator

Visual electrical differential indicator with thermostat

(3) Special version with endurance strength 1.000.000 cycles from 0 to 420 bar available on request.

(4) Characteristics and dimension pag. 14

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## SIZING – PRESSURE DROP

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

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

In filters of series HF760 and HF761 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>).

### Calculation example

Filter HF760-20.106-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 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/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).

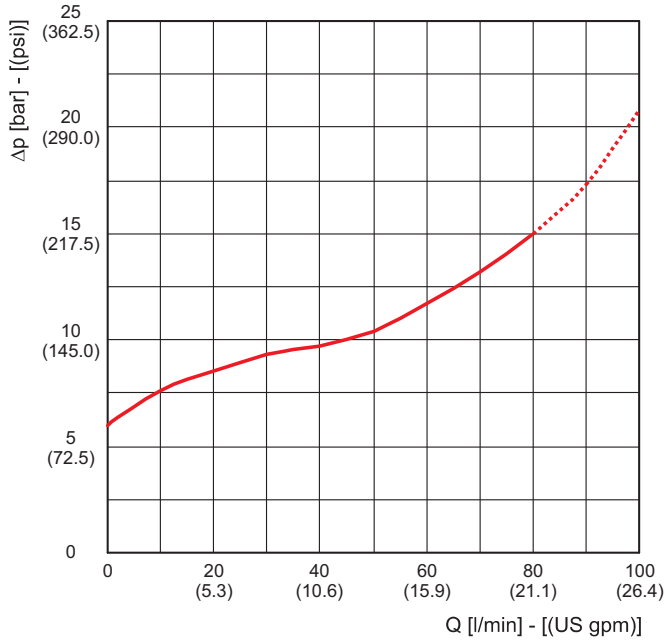
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## PRESSURE DROP CURVES THROUGH THE BY-PASS VALVES

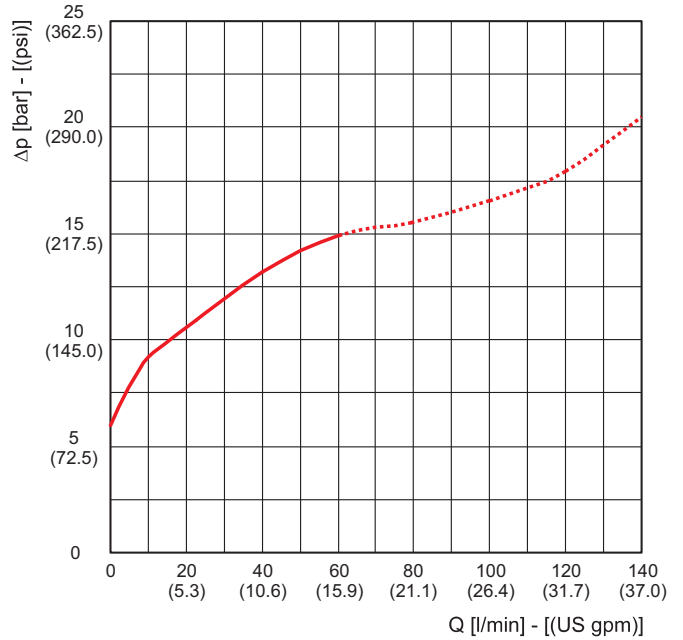
The pressure drop values are directly proportional with the specific weight of the fluid and do not affect the establishment of the total pressure drop of the complete filter.

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>).

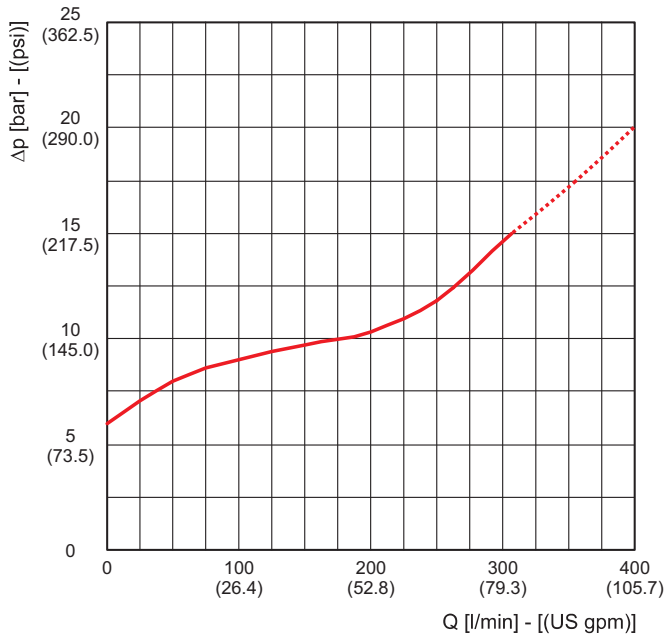
**HF760-20**



**HF760-30 / HF761-30**



**HF760-40 / HF761-40**



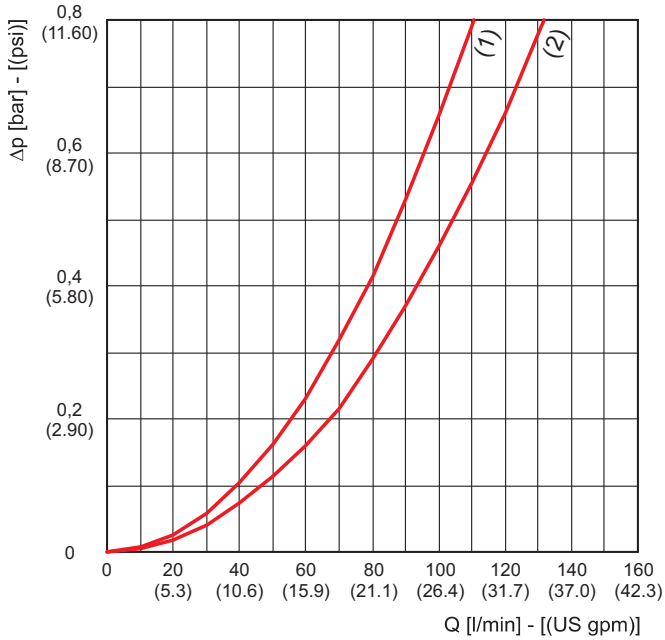
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**PRESSURE DROP CURVES THROUGH THE HOUSING**

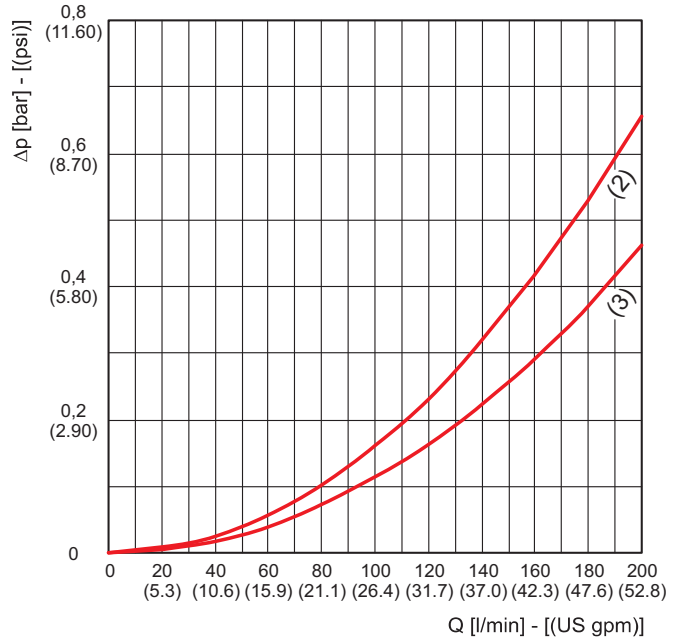
The curves are obtained in the following conditions:  
 Mineral oil type ISO VG46  
 Kinematic viscosity 120 SSU (30 cSt)  
 Density 7.29 lb/gal (0,856 kg/dm<sup>3</sup>).

- (1) G 1/2
- (2) G 3/4
- (3) G 1
- (4) G 1 1/4
- (5) G 1 1/2

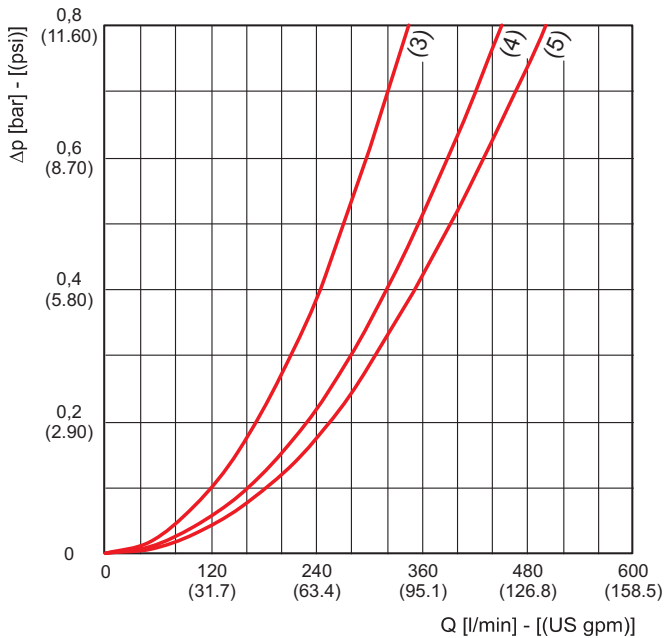
**HF760-20**



**HF760-30 / HF761-30**



**HF760-40 / HF761-40**



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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)

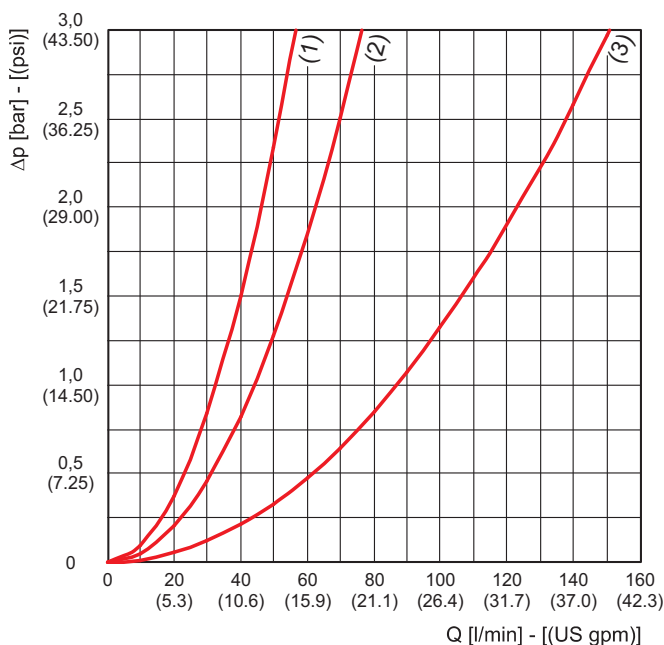
Density 7.29 lb/gal (0,856 kg/dm<sup>3</sup>).

(1) HEK85-20.080

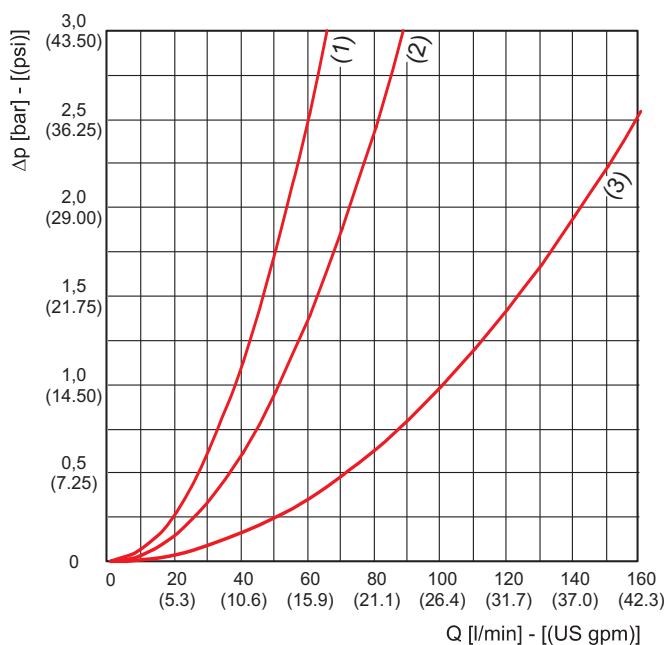
(2) HEK85-20.106

(3) HEK85-20.203

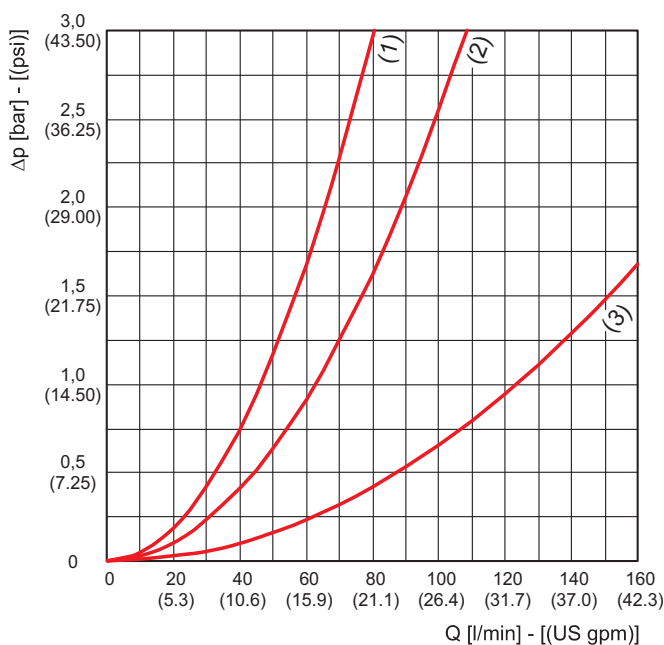
**FG003**



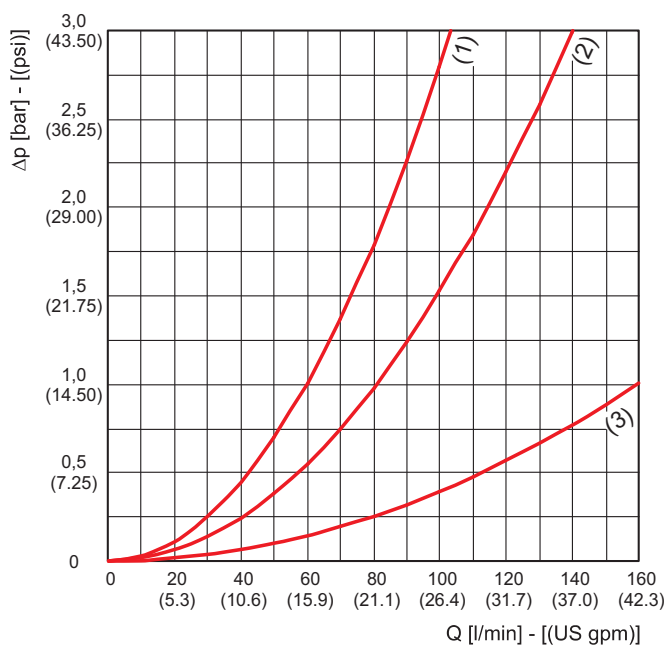
**FG006**



**FG010**



**FG025**



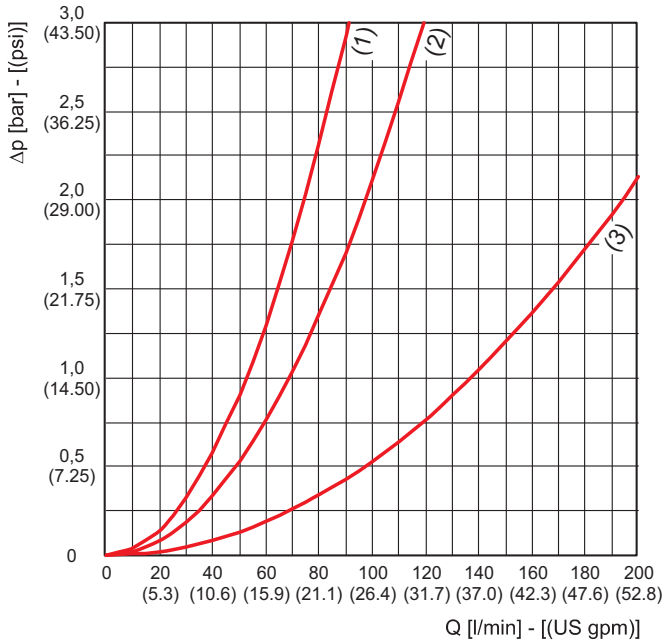
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**PRESSURE DROP CURVES THROUGH THE ELEMENT HEK85-30 / HEK86-30**

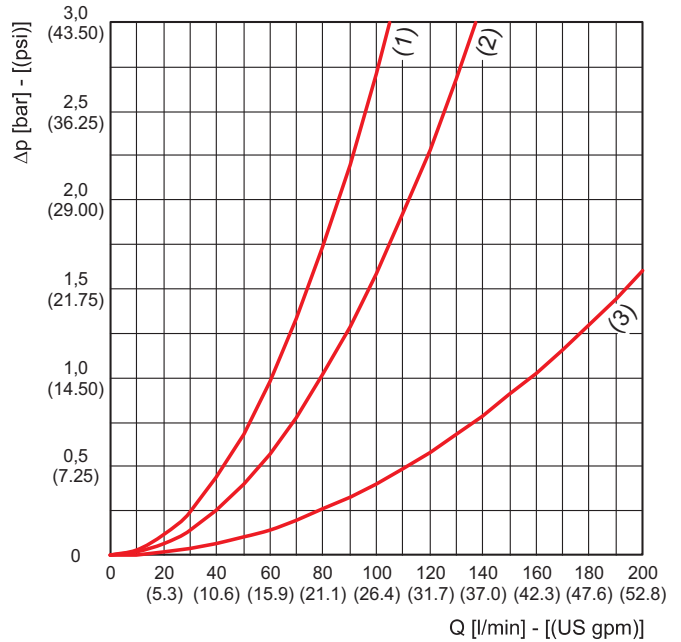
The curves are obtained in the following conditions:  
 Mineral oil type ISO VG46  
 Kinematic viscosity 120 SSU (30 cSt)  
 Density 7.29 lb/gal (0,856 kg/dm<sup>3</sup>).

- (1) HEK86-30.087
- (2) HEK85-30.115 / HEK86-30.116
- (3) HEK85-30.223 / HEK86-30.209

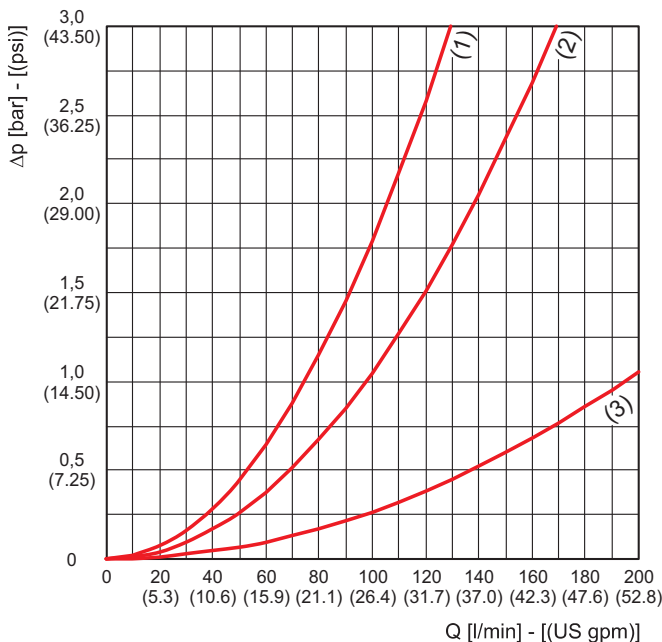
**FG003**



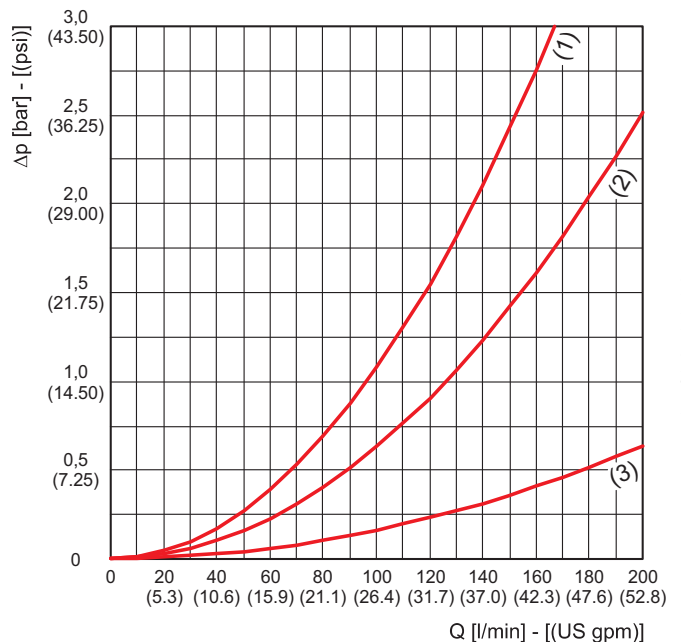
**FG006**



**FG010**



**FG025**



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## PRESSURE DROP CURVES THROUGH THE ELEMENT HEK85-40 / HEK86-40

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) HEK85-40.102 / HEK86-40.115

(2) HEK85-40.132

(3) HEK86-40.210

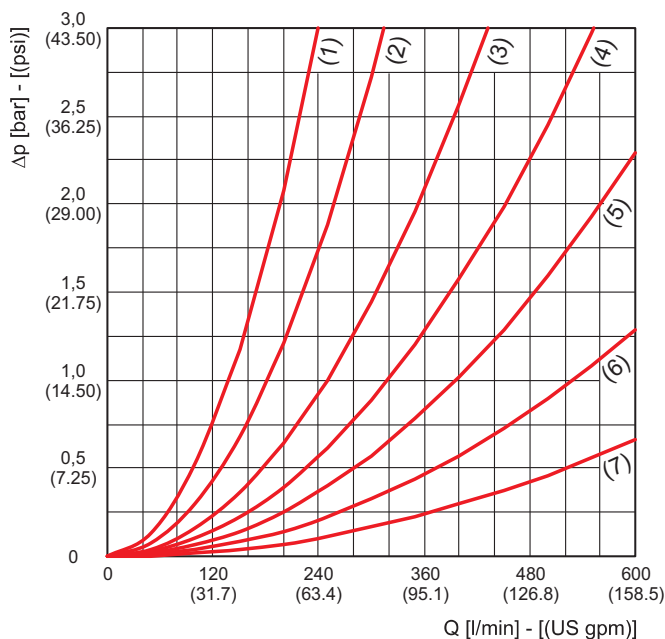
(4) HEK85-40.227

(5) HEK86-40.329

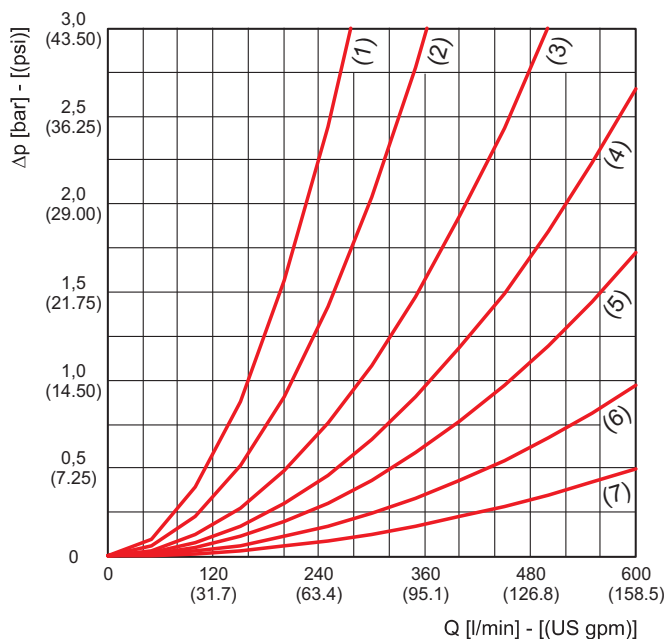
(6) HEK85-40.372 / HEK86-40.428

(7) HEK85-40.517

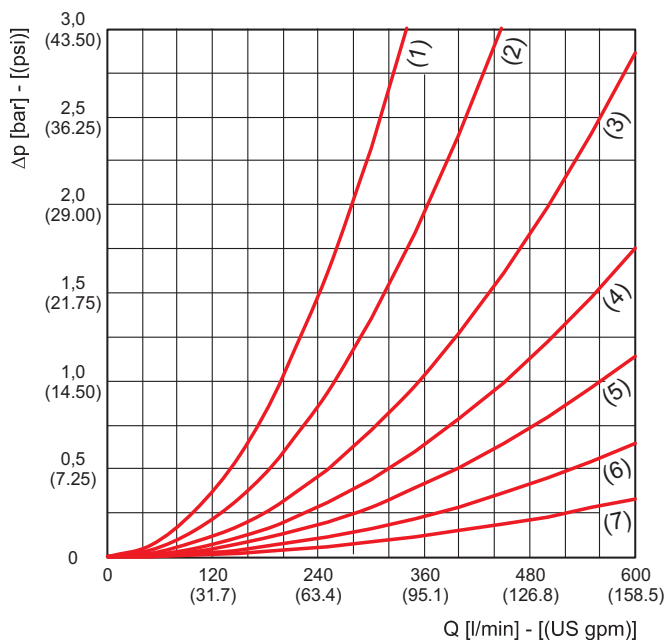
### FG003



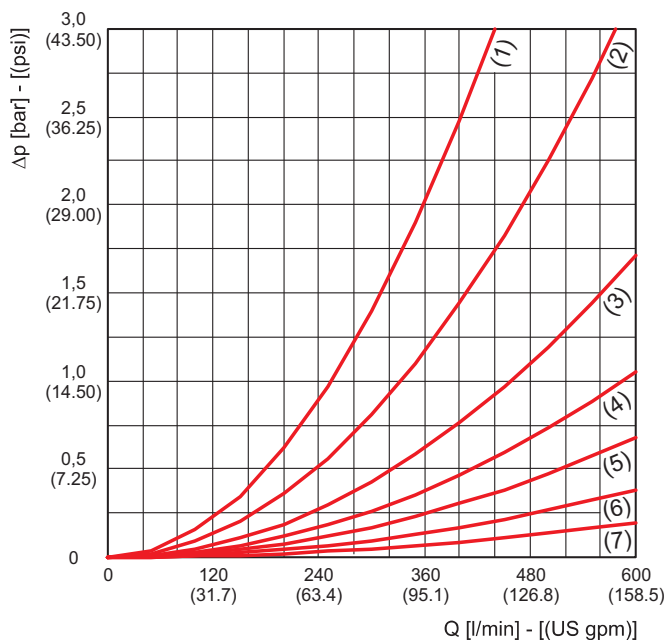
### FG006



### FG010



### FG025



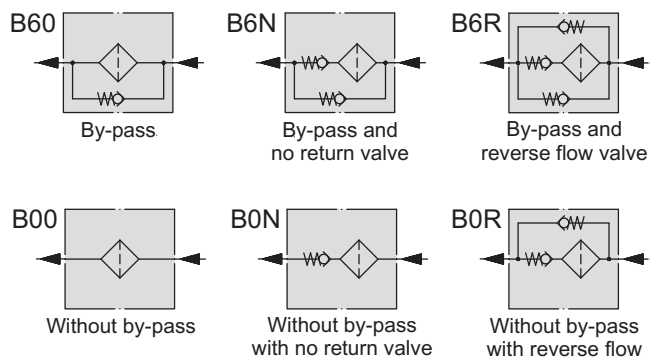
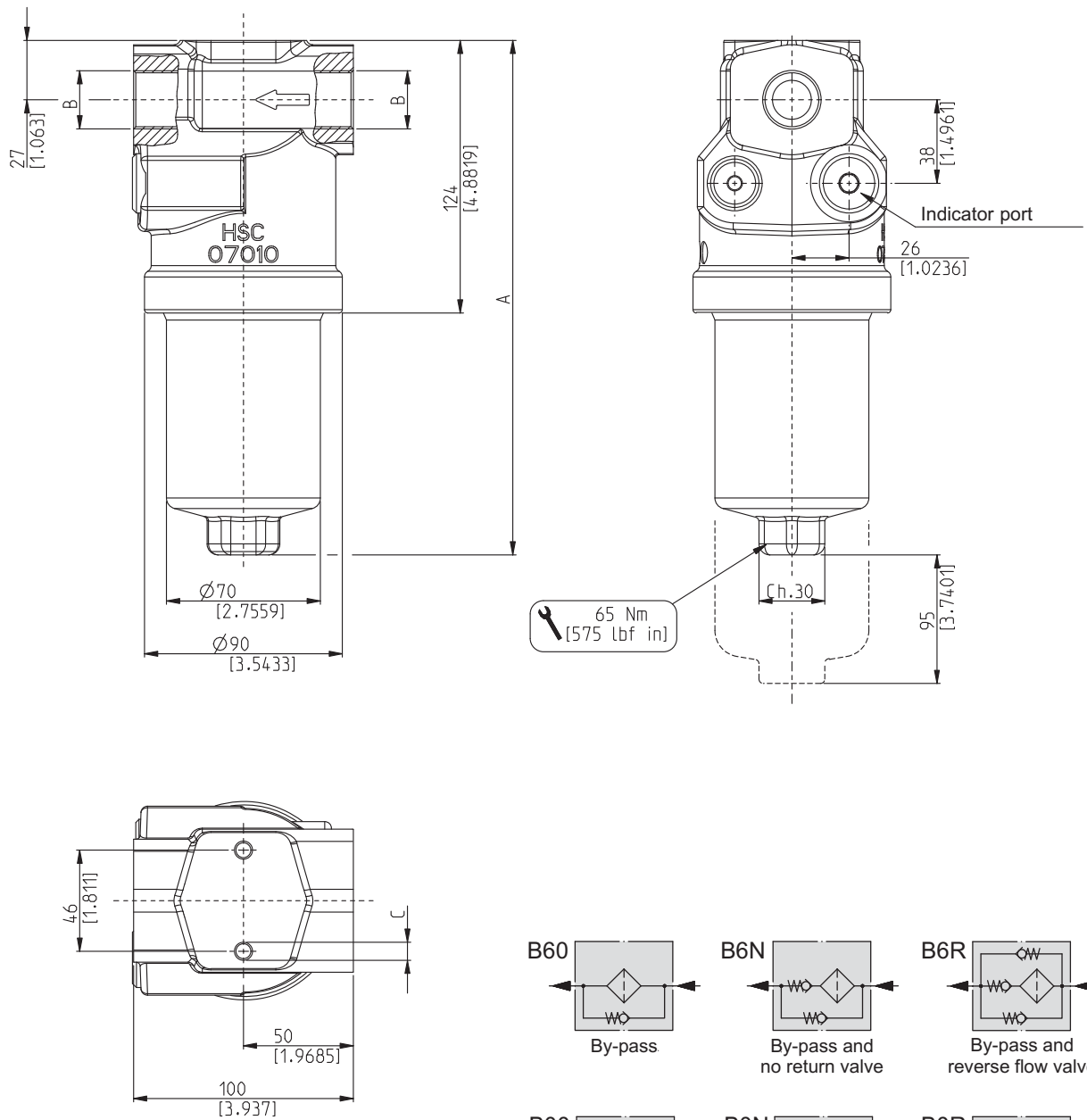
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## FLOW

Filter type	Ports IN/OUT				Degree of filtration			
					FG003	FG006	FG010	FG025
					Flow Δp= 11 psi (0.75 bar)			
GAS (BSPP)	NPT	SAE J514b	SAE J518b Nom. size	US gpm (l/min)				
HF760-20.080	G 1/2	1/2 NPT	3/4-16 UNF-2B		6.6 (25)	7.9 (30)	9.2 (35)	11.9 (45)
	G 3/4	3/4 NPT	1 1/16-12 UN-2B		6.6 (25)	7.9 (30)	9.2 (35)	11.9 (45)
HF760-20.106	G 1/2	1/2 NPT	3/4-16 UNF-2B		9.2 (35)	10.6 (40)	13.2 (50)	15.9 (60)
	G 3/4	3/4 NPT	1 1/16-12 UN-2B		9.2 (35)	10.6 (40)	13.2 (50)	15.9 (60)
HF760-20.203	G 1/2	1/2 NPT	3/4-16 UNF-2B		15.9 (60)	17.2 (65)	19.8 (75)	22.5 (85)
	G 3/4	3/4 NPT	1 1/16-12 UN-2B		17.2 (65)	18.5 (70)	21.1 (80)	25.1 (95)
HF761-30.087	G 3/4	3/4 NPT	1 1/16-12 UN-2B	3/4	11.9 (45)	13.2 (50)	15.9 (60)	19.8 (75)
	G 1	1 NPT	1 5/16-12 UN-2B	1	11.9 (45)	13.2 (50)	15.9 (60)	21.1 (80)
HF760-30.115 HF761-30.116	G 3/4	3/4 NPT	1 1/16-12 UN-2B	3/4	15.9 (60)	17.2 (65)	21.1 (80)	26.4 (100)
	G 1	1 NPT	1 5/16-12 UN-2B	1	15.9 (60)	18.5 (70)	22.5 (85)	27.7 (105)
HF760-30.223 HF761-30.209	G 3/4	3/4 NPT	1 1/16-12 UN-2B	3/4	27.7 (105)	31.7 (120)	35.7 (135)	40.9 (155)
	G 1	1 NPT	1 5/16-12 UN-2B	1	29.1 (110)	33.0 (125)	38.3 (145)	44.9 (170)
HF760-40.102 HF 761-40.115	G 1	1 NPT	1 5/16-12 UN-2B		29.1 (110)	33.0 (125)	39.6 (150)	48.9 (185)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	30.4 (115)	34.3 (130)	42.3 (160)	51.5 (195)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	31.7 (120)	35.7 (135)	43.6 (165)	52.8 (200)
HF760-40.132	G 1	1 NPT	1 5/16-12 UN-2B		37.0 (140)	42.3 (160)	48.9 (185)	56.8 (215)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	38.3 (145)	43.6 (165)	52.8 (200)	63.4 (240)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	39.6 (150)	44.9 (170)	54.2 (205)	64.7 (245)
HF761-40.210	G 1	1 NPT	1 5/16-12 UN-2B		47.6 (180)	52.8 (200)	59.4 (225)	67.4 (255)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	51.5 (195)	56.8 (215)	66.0 (250)	77.9 (295)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	52.8 (200)	58.1 (220)	68.7 (260)	80.6 (305)
HF760-40.227	G 1	1 NPT	1 5/16-12 UN-2B		55.5 (210)	60.8 (230)	67.4 (255)	74.0 (280)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	62.1 (235)	67.4 (255)	76.6 (290)	87.2 (330)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	63.4 (240)	70.0 (265)	80.6 (305)	92.5 (350)
HF761-40.329	G 1	1 NPT	1 5/16-12 UN-2B		63.4 (240)	67.4 (255)	72.6 (275)	77.9 (295)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	71.3 (270)	76.6 (290)	85.9 (325)	95.1 (360)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	74.0 (280)	80.6 (305)	89.8 (340)	100.4 (380)
HF760-40.372 HF761-40.428	G 1	1 NPT	1 5/16-12 UN-2B		71.3 (270)	74.0 (280)	77.9 (295)	81.9 (310)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	83.2 (315)	88.5 (335)	95.1 (360)	101.7 (385)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	87.2 (330)	93.8 (355)	101.7 (385)	111.0 (420)
HF760-40.517	G 1	1 NPT	1 5/16-12 UN-2B		77.9 (295)	79.3 (300)	81.9 (310)	84.5 (320)
	G 1 1/4	1 1/4 NPT	1 5/8-12 UN-2B	1 1/4	95.1 (360)	99.1 (375)	103.0 (390)	108.3 (410)
	G 1 1/2	1 1/2 NPT	1 7/8-12 UN-2B	1 1/2	101.7 (385)	105.7 (400)	112.3 (425)	118.9 (450)

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**HF760-20 DIMENSIONS**

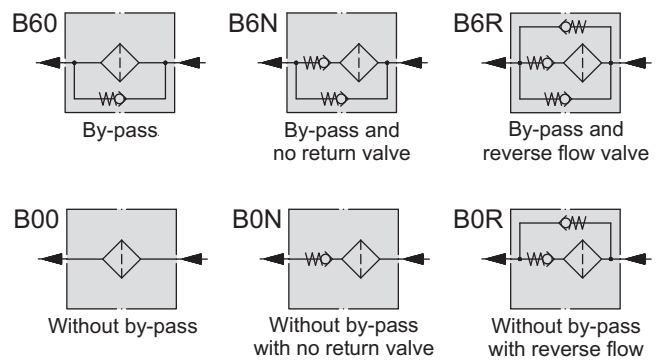
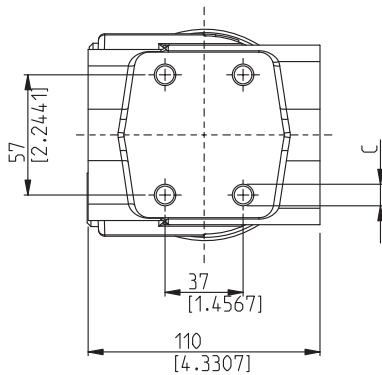
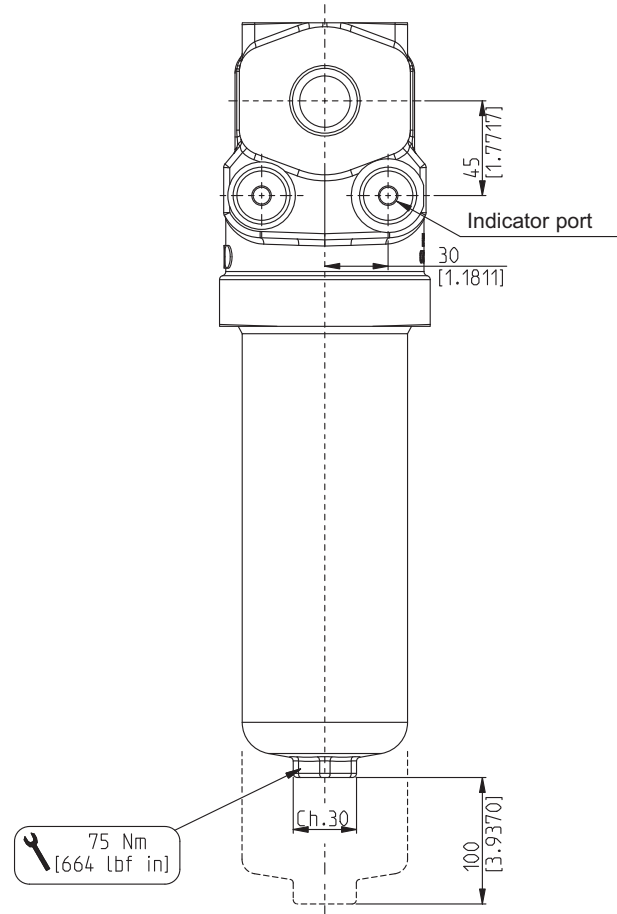
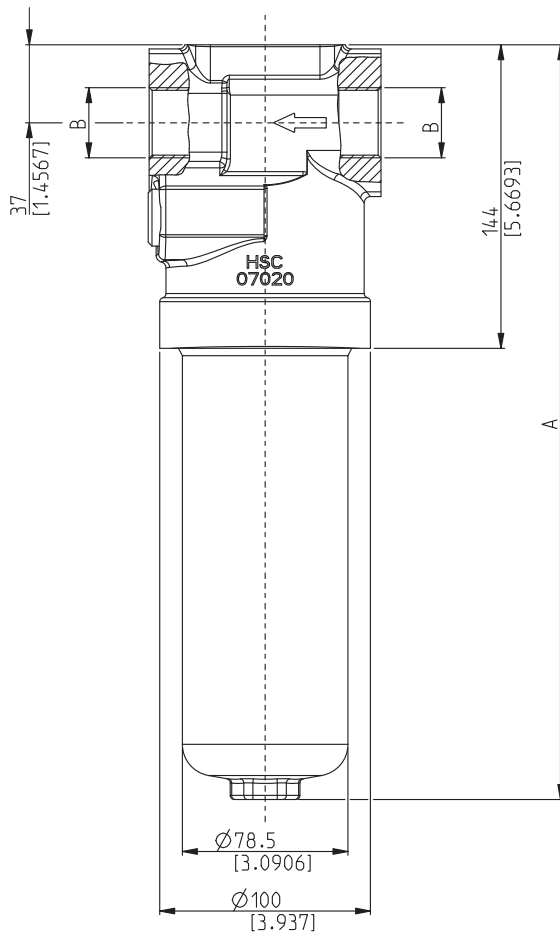


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Filter type	Weight	A	B (Ports) (1)	C (2)
	kg (lbs)	mm (in)	Availability	
<b>HF760-20.080</b>	5,3 (11.69)	208 (8.1889)	GAS (BSPP)	
<b>HF760-20.106</b>	5,7 (12.57)	234 (9.2126)	NPT	M 8
<b>HF760-20.203</b>	7,2 (15.87)	331 (13.0315)	SAE J514b	

(1) Ports dimensions: see pages 15 ÷ 18  
 (2) The respective threads 5/16-18 UNC-2B are available.  
**On request, mounting holes can have special threads and different locations between center lines.**

**HF760-30 - HF761-30 DIMENSIONS**



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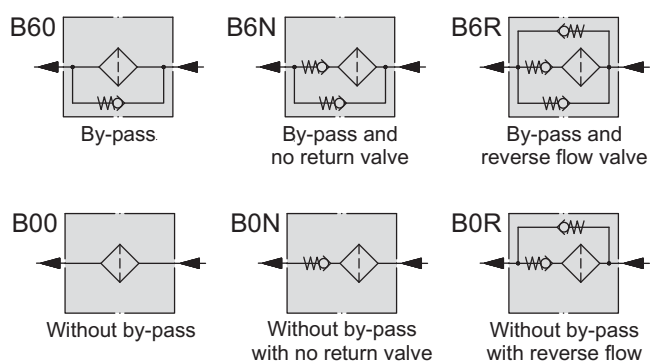
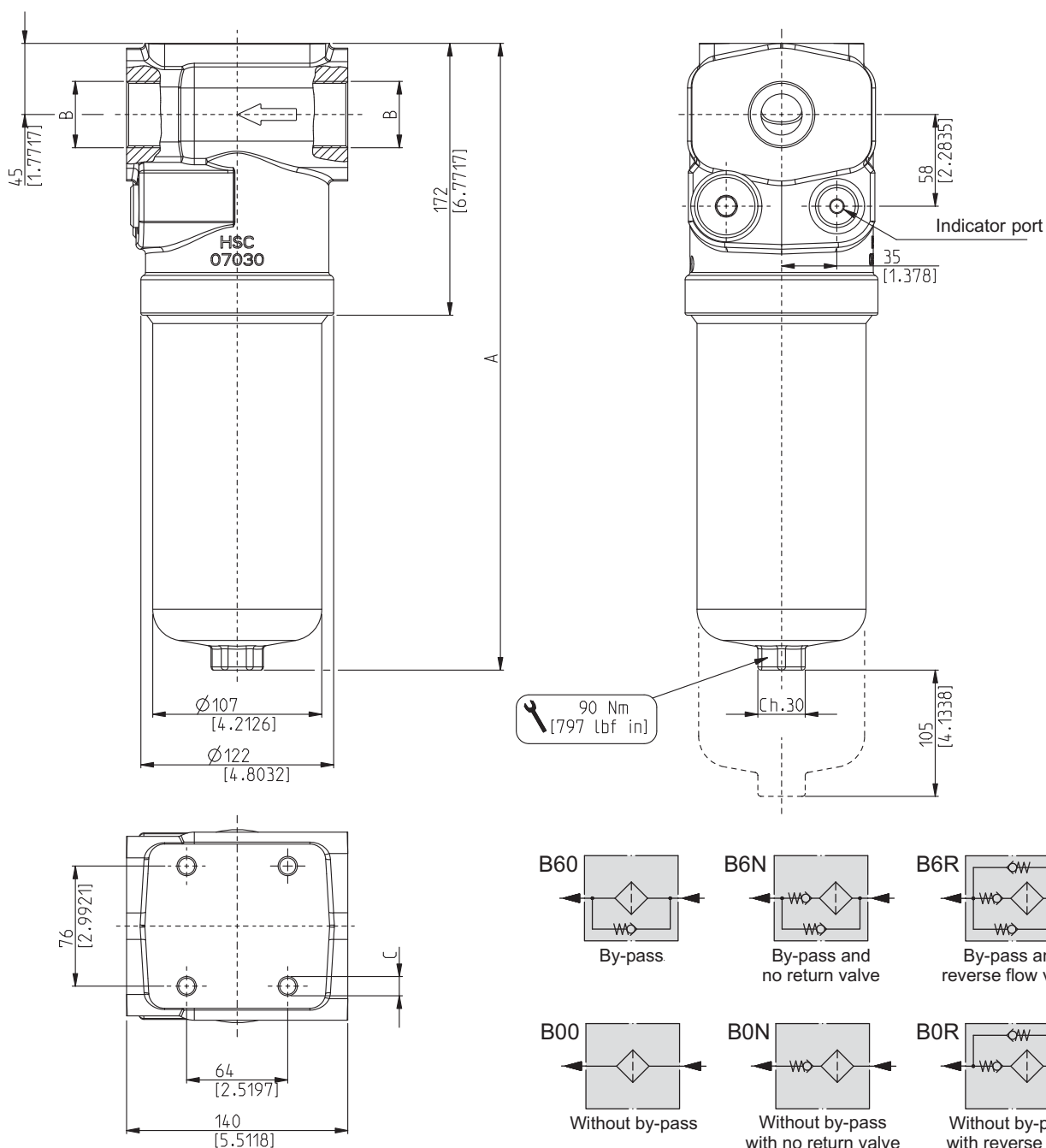
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Filter type	Weight		A	B (ports) (1)	C (2)
	kg (lbs)		mm (in)	Availability	
<b>HF761-30.087</b>	7,6 (16.75)		215 (8.4646)	GAS (BSPP)	
<b>HF760-30.115</b> <b>HF761-30.116</b>	8,2 (18.08)		250 (9.8425)	NPT	M 10 (2)
<b>HF760-30.223</b> <b>HF761-30.209</b>	10 (22.05)		358 (14.0945)	SAE J514b SAE J518	

(1) Ports dimensions: see pages 15 ÷ 18

(2) The respective threads 3/8-16 UNC-2B are available.

**On request, mounting holes can have special threads and different locations between center lines.**

**HF760-40 - HF761-40 DIMENSIONS**


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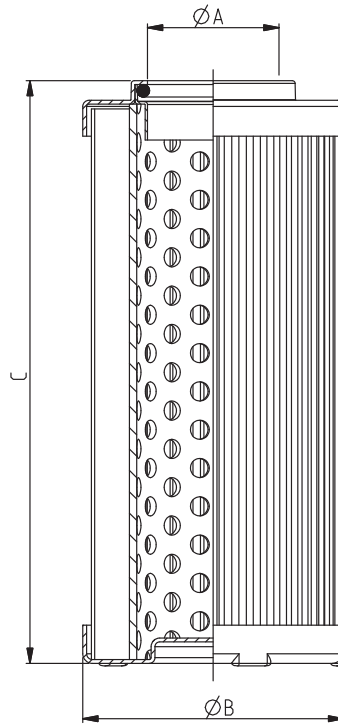
Filter type	Weight	A	B ((ports) (1) C (2))	
			Availability	
<b>HF760-40.102</b> <b>HF761-40.115</b>	14,3 (31.53)	274 (10.7874)		
<b>HF760-40.132</b>	15,2 (33.51)	304 (11.9685)	GAS (BSPP)	
<b>HF760-40.227</b> <b>HF761-40.210</b>	18 (39.68)	399 (15.7087)	NPT	M 12 (2)
<b>HF760-40.372</b> <b>HF761-40.329</b>	22 (48.50)	544 (21.4173)	SAE J514b	
<b>HF760-40.517</b> <b>HF761-40.428</b>	28,5 (62.83)	689 (27.1260)	SAE J518	

(1) Ports dimensions: see pages 15 ÷ 18

(2) The respective threads 1/2-13 UNC-2B are available.

**On request, mounting holes can have special threads and different locations between center lines.**

## ELEMENTS DIMENSIONS FOR HF760



ICAT\_011\_004\_HF760

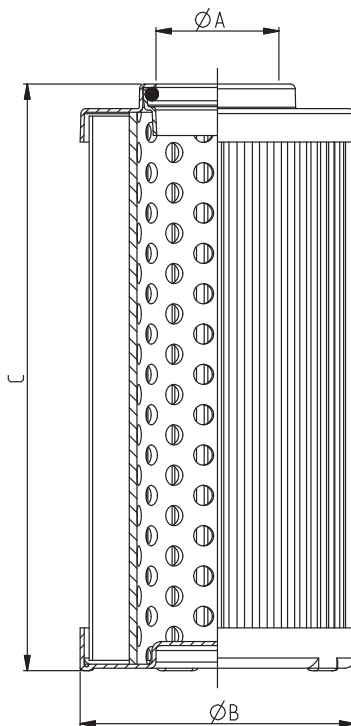
Filtering elements with  $\Delta p$  - collapse pressure of 3046 psi (210 bar) are also available (please consult our technical department).

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)
<b>HEK85-40.102</b>			110 (4.3307)	1757 (272.3355)	9,8 (0.0217)	12,7 (0.0279)	14,1 (0.0310)	20,4 (0.0449)
<b>HEK85-40.132</b>			140 (5.5118)	2306 (357.4307)	12,9 (0.0285)	16,6 (0.0366)	18,4 (0.0407)	26,7 (0.0590)
<b>HEK85-40.227</b>	40,5 (1.5945)	78 (3.0709)	235 (9.2520)	4045 (626.9762)	22,7 (0.0499)	29,1 (0.0642)	32,4 (0.0713)	46,9 (0.1034)
<b>HEK85-40.372</b>			380 (14.9606)	6700 (1038.5020)	37,5 (0.0827)	48,2 (0.1064)	53,6 (0.1182)	77,7 (0.1713)
<b>HEK85-40.517</b>			525 (20.6693)	9350 (1449.2528)	52,4 (0.1154)	67,3 (0.1484)	74,8 (0.1649)	108,5 (0.2391)

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## ELEMENTS DIMENSIONS FOR HF761



ICAT\_011\_005\_HF760

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

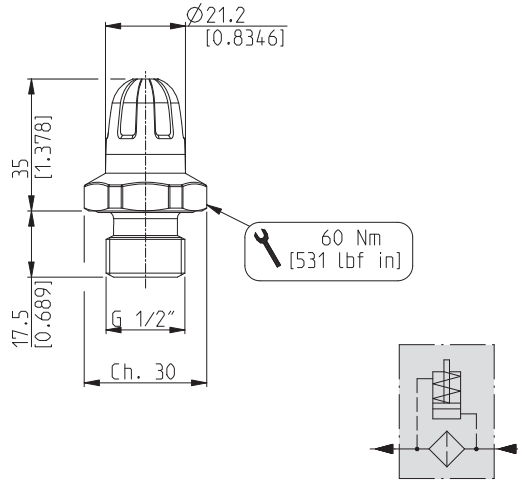
Technical data for (MS) version elements are available on request.

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>HEK86-30.087</b>			87 (3.4252)	667 (103.3852)	3,7 (0.0082)	4,8 (0.0106)	5,3 (0.0118)	7,7 (0.0171)
<b>HEK86-30.116</b>	24,5 (0.9645)	53 (2.0866)	116 (4.5669)	923 (143.0653)	5,2 (0.0114)	6,6 (0.0147)	7,4 (0.0163)	10,7 (0.0236)
<b>HEK86-30.209</b>			209 (8.2283)	1719 (266.4455)	9,6 (0.0212)	12,4 (0.0273)	13,8 (0.0303)	19,9 (0.0440)
<b>HEK86-40.115</b>			115 (4.5276)	1685 (261.1755)	9,4 (0.0208)	12,1 (0.0267)	13,5 (0.0297)	19,5 (0.0431)
<b>HEK86-40.210</b>	43,2 (1.7008)	78 (3.0709)	210 (8.2677)	3167 (490.8860)	17,7 (0.0391)	22,8 (0.0503)	25,3 (0.0559)	36,7 (0.0810)
<b>HEK86-40.329</b>			329 (12.9528)	5023 (778.5665)	28,1 (0.0620)	36,2 (0.0797)	40,2 (0.0886)	58,3 (0.1285)
<b>HEK86-40.428</b>			428 (16.8504)	6568 (1018.0420)	36,8 (0.0811)	47,3 (0.1043)	52,5 (0.1158)	76,2 (0.1680)

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## INDICATORS

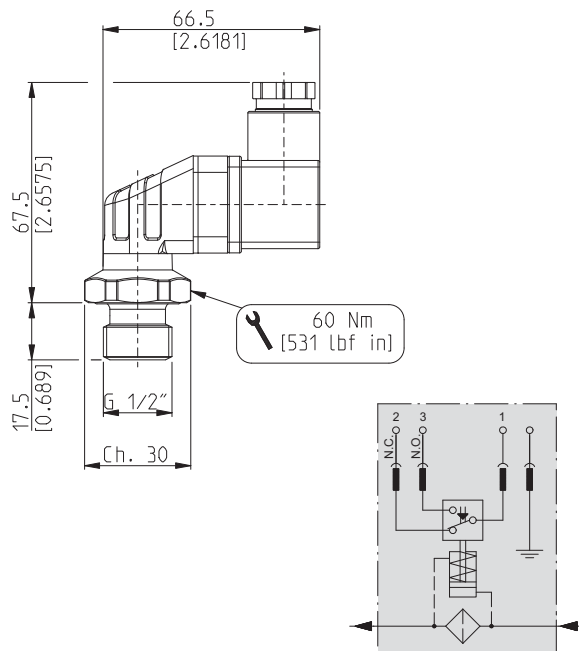
**VISUAL DIFFERENTIAL**

 Code: **H**


ICAT\_011\_006\_HF760

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

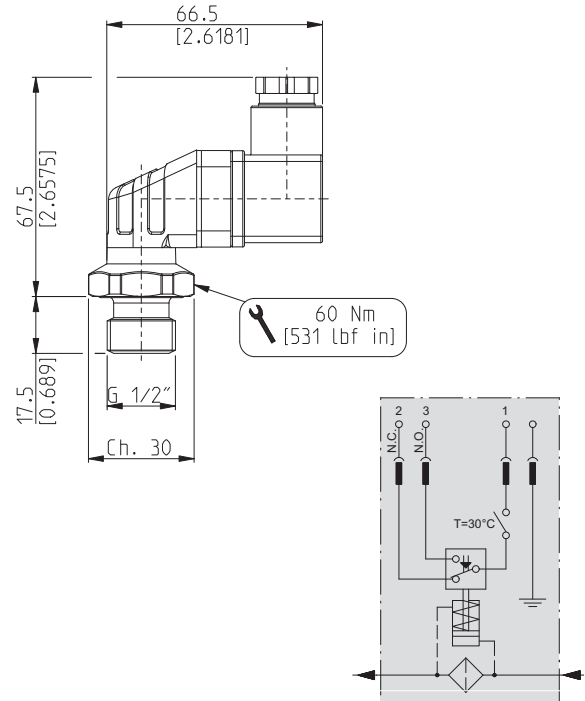
**VISUAL ELECTRICAL DIFFERENTIAL**

 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 - Cable clamp PG 11

**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 - Cable clamp PG 11
Min. function temperature	86 °F (30 °C)

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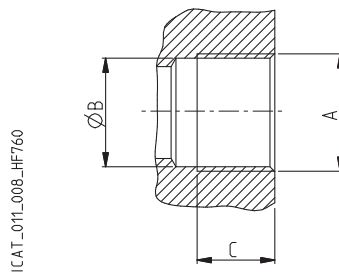
## PORTS IN/OUT

Filter type	PORTS TYPE							
	Nominal size	Gas BSP	NPT	SAE ODT	Split SSM (3000 PSI) (6000 PSI)		Split SSS (3000 PSI) (6000 PSI)	
<b>HF760-20</b>	1/2"	GD	ND	OB	—	—	—	—
	3/4"	GE	NE	OD	—	—	—	—
<b>HF760-30</b>	3/4"	GE	NE	OD	MB	QB	SB	VB
<b>HF761-30</b>	1"	GF	NF	OF	MC	QC	SC	VC
<b>HF760-40</b>	1"	GF	NF	OF	MC	QC	SC	VC
	1" 1/4	GG	NG	OG	MD	QD	SD	VD
<b>HF761-40</b>	1" 1/2	GH	NH	OH	ME	QE	SE	VE

## GAS STRAIGHT THREAD PORTS

## BSP

British standard pipe parallel (55°) conforms to UNI - ISO 228



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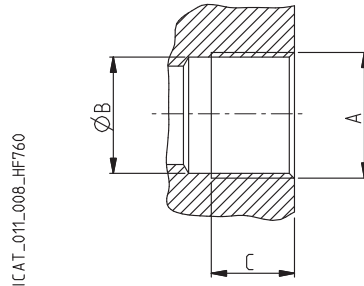
CODE	Nominal size	A	Ø B	C	Nm (lbf in)
			mm (in)	mm (in)	
<b>GD</b>	1/2"	G 1/2	19,0 (0.7480)	16,0 (0.6299)	50 <sup>+2,5</sup> (443 ÷ 465)
<b>GE</b>	3/4"	G 3/4	24,5 (0.9646)	18,0 (0.7087)	90 <sup>+5</sup> (797 ÷ 841)
<b>GF</b>	1"	G 1	30,5 (1.2008)	20,0 (0.7874)	130 <sup>+10</sup> (1151 ÷ 1239)
<b>GG</b>	1" 1/4	G 1 1/4	39,5 (1.5551)	22,0 (0.8661)	170 <sup>+10</sup> (1505 ÷ 1593)
<b>GH</b>	1" 1/2	G 1 1/2	45,5 (1.7913)	24,0 (0.9449)	210 <sup>+15</sup> (1859 ÷ 1991)

## PORTS IN/OUT

### NPT STRAIGHT THREAD PORTS

**NPT**

NPT thread (60°) conforms to ANSI - ASME B1-20

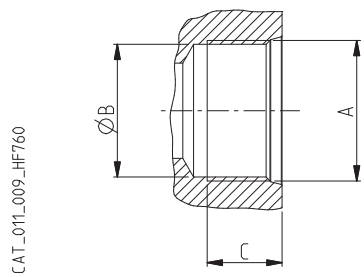


CODE	Nominal size	A	Ø B	C	Nm (lbf in)
			mm (in)	mm (in)	
<b>ND</b>	1/2"	1/2 NPT	18,0 (0.7087)	13,5 (0.5315)	45 <sup>+2,5</sup> (398 ÷ 420)
<b>NE</b>	3/4"	3/4 NPT	23,5 (0.9252)	14,0 (0.5512)	75 <sup>+5</sup> (664 ÷ 708)
<b>NF</b>	1"	1 NPT	29,5 (1.1614)	17,5 (0.6890)	120 <sup>+10</sup> (1062 ÷ 1151)
<b>NG</b>	1" 1/4	1 1/4 NPT	38,5 (1.5157)	18,0 (0.7087)	250 <sup>+20</sup> (2213 ÷ 2390)
<b>NH</b>	1" 1/2	1 1/2 NPT	44,0 (1.7323)	18,5 (0.7283)	350 <sup>+20</sup> (3098 ÷ 3275)

### SAE STRAIGHT THREAD PORTS J514

**ODT**

American straight thread UNC-UNF 60° conforms to ANSI B 1.1



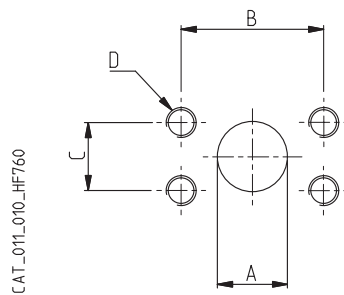
CODE	Nominal size	A	Ø B	C	Nm (lbf in)
			mm (in)	mm (in)	
<b>OB</b>	1/2"	3/4" - 16 UNF - 2B	17,3 (0.6811)	15,0 (0.5906)	45 <sup>+2,5</sup> (398 ÷ 420)
<b>OD</b>	3/4"	1 1/16" - 12 UN - 2B	24,7 (0.9724)	20,0 (0.7874)	120 <sup>+10</sup> (1062 ÷ 1151)
<b>OF</b>	1"	1 5/16" - 12 UN - 2B	31,0 (1.2205)	20,0 (0.7874)	170 <sup>+10</sup> (1505 ÷ 1593)
<b>OG</b>	1" 1/4	1 5/8" - 12 UN - 2B	39,0 (1.5354)	20,0 (0.7874)	200 <sup>+10</sup> (1770 ÷ 1859)
<b>OH</b>	1" 1/2	1 7/8" - 12 UN - 2B	45,3 (1.7835)	20,0 (0.7874)	270 <sup>+15</sup> (2390 ÷ 2522)

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## PORTS IN/OUT

**SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI**
**SSM**

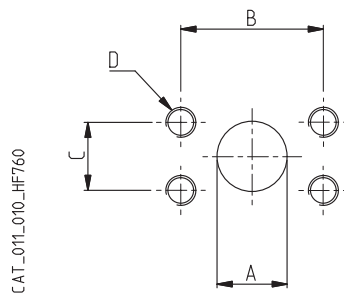
Metric thread ISO 60° conforms to ISO/R 262



CODE	Nominal size	Ø A	B	C	D	Nm (lbf in)
		mm (in)	mm (in)	mm (in)	Thread Depth mm (in)	
<b>MB</b>	3/4	19,1 (0.7520)	47,6 (1.8740)	22,2 (0.8740)	M 10 15,0 (0.5906)	30 <sup>+2,5</sup> (266 ÷ 288)
<b>MC</b>	1	25,4 (1.0000)	52,4 (2.0630)	26,2 (1.0315)	M 10 15,0 (0.5906)	40 <sup>+2,5</sup> (354 ÷ 376)
<b>MD</b>	1 1/4	31,8 (1.2520)	58,7 (2.3110)	30,2 (1.1890)	M 10 15,0 (0.5906)	50 <sup>+2,5</sup> (443 ÷ 465)
<b>ME</b>	1 1/2	38,1 (1.5000)	69,8 (2.7480)	35,7 (1.4055)	M 12 18,0 (0.7087)	65 <sup>+5</sup> (575 ÷ 620)

**SAE FLANGED PORTS J518 - Standard pressure series 6000 PSI**
**SSM**

Metric thread ISO 60° conforms to ISO/R 262



CODE	Nominal size	Ø A	B	C	D	Nm (lbf in)
		mm (in)	mm (in)	mm (in)	Thread Depth mm (in)	
<b>QB</b>	3/4	19,1 (0.7520)	50,8 (2.0000)	23,8 (0.9370)	M 10 15,0 (0.5906)	40 <sup>+2,5</sup> (354 ÷ 376)
<b>QC</b>	1	25,4 (1.0000)	57,2 (2.2520)	27,8 (1.0945)	M 12 16,0 (0.6299)	60 <sup>+5</sup> (531 ÷ 575)
<b>QD</b>	1 1/4	31,8 (1.2520)	66,7 (2.6260)	31,7 (1.2480)	M 14 18,0 (0.7087)	90 <sup>+5</sup> (797 ÷ 841)
<b>QE</b>	1 1/2	38,1 (1.5000)	79,4 (3.1260)	36,5 (1.4370)	M 16 22,0 (0.8661)	160 <sup>+10</sup> (1416 ÷ 1505)

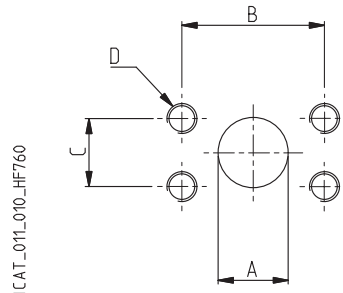
05/03.2016

## PORTS IN/OUT

### SAE FLANGED PORTS J518 - Standard pressure series 3000 PSI

**SSS**

American straight threads UNC-UNF 60° conforms to ANSI B 1.1

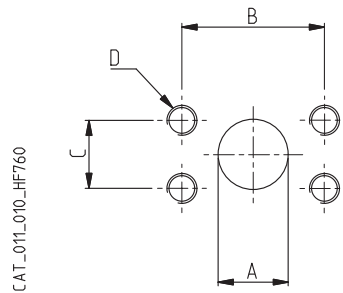


CODE	Nominal size	∅ A	B	C	D	Nm (lbf in)
		mm (in)	mm (in)	mm (in)	Thread Depth mm (in)	
<b>SB</b>	3/4	19,1 (0.7520)	47,6 (1.8740)	22,2 (0.8740)	3/8-16 UNC-2B 15,0 (0.5906)	30 <sup>+2,5</sup> (266 ÷ 288)
<b>SC</b>	1	25,4 (1.0000)	52,4 (2.0630)	26,2 (1.0315)	3/8-16 UNC-2B 15,0 (0.5906)	40 <sup>+2,5</sup> (354 ÷ 376)
<b>SD</b>	1 1/4	31,8 (1.2520)	58,7 (2.3110)	30,2 (1.1890)	7/16-14 UNC-2B 15,0 (0.5906)	50 <sup>+2,5</sup> (443 ÷ 465)
<b>SE</b>	1 1/2	38,1 (1.5000)	69,8 (2.7480)	35,7 (1.4055)	1/2-13 UNC-2B 18,0 (0.7087)	65 <sup>+5</sup> (575 ÷ 620)

### SAE FLANGED PORTS J518 - Standard pressure series 6000 PSI

**SSS**

American straight threads UNC-UNF 60° conforms to ANSI B 1.1



CODE	Nominal size	∅ A	B	C	D	Nm (lbf in)
		mm (in)	mm (in)	mm (in)	Thread Depth mm (in)	
<b>VB</b>	3/4	19,1 (0.7520)	50,8 (2.0000)	23,8 (0.9370)	3/8-16 UNC-2B 15,0 (0.5906)	40 <sup>+2,5</sup> (354 ÷ 376)
<b>VC</b>	1	25,4 (1.0000)	57,2 (2.2520)	27,8 (1.0945)	7/16-14 UNC-2B 16,0 (0.6299)	60 <sup>+5</sup> (531 ÷ 575)
<b>VD</b>	1 1/4	31,8 (1.2520)	66,7 (2.6260)	31,7 (1.2480)	1/2-13 UNC-2B 18,0 (0.7087)	90 <sup>+5</sup> (797 ÷ 841)
<b>VE</b>	1 1/2	38,1 (1.5000)	79,4 (3.1260)	36,5 (1.4370)	5/8-11 UNC-2B 22,0 (0.8661)	160 <sup>+10</sup> (1416 ÷ 1505)

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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:

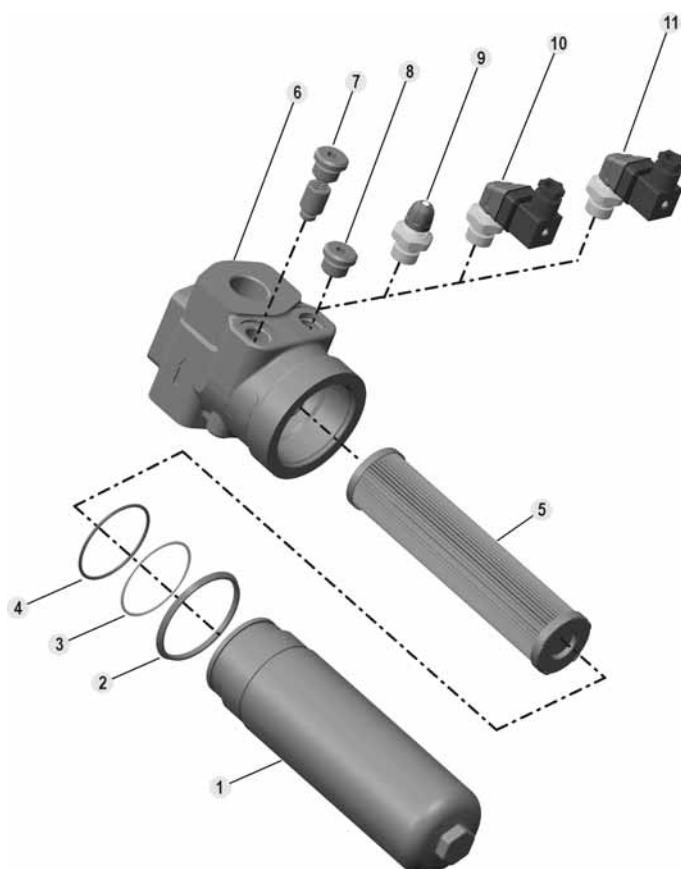
- A Secure the filter to the attachment device via the threaded holes in the head (pos.6).
- B Take the protection caps off the oil inlet and outlet.
- C Connect the circuit pipes to the filter, checking the flow direction, which is pointed out by the arrow on the head (pos.6).
- D If the clogging indicator (pos.9 - 10 - 11) is immediately mounted in the filter, take the protection cap off and screw the indicator in the dedicated seat and tighten to a tightening torque of 531 lbf in (60 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 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 bowl bottom (pos.1).
- E Make sure the O-ring (pos.4), seal (pos.2) 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 9,10,11.
- 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

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

Example: Spare part pos. 4 - HHP02050 - Qty 2

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## HOW TO ORDER A COMPLETE FILTER

1

2

3

4

5

6

7

8

9

**HF760**  
**HF761**

- 20.080 - AS - FG010 - LC - B60 - GD - B - DD - G

1	Filter type	CODE
	See table from pag. 9 to pag. 11	<b>HF76...</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>
	3046 [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	Ports IN/OUT	CODE
	<b>Threads GAS (BSPP)</b>	
	G 1/2	<b>GD</b>
	G 3/4	<b>GE</b>
	G 1	<b>GF</b>
	G 1 1/4	<b>GG</b>
	G 1 1/2	<b>GH</b>
	<b>Threads NPT</b>	
	1/2	<b>ND</b>
	3/4	<b>NE</b>
	1	<b>NF</b>
	1 1/4	<b>NG</b>
	1 1/2	<b>NH</b>
	<b>Threads SAE ODT</b>	
	1/2	<b>OB</b>
	3/4	<b>OD</b>
	1	<b>OF</b>
	1 1/4	<b>OG</b>
	1 1/2	<b>OH</b>

6	Ports IN/OUT	CODE
	<b>Flanged SAE (SSM) - 3000 PSI</b>	
	3/4"	<b>MB</b>
	1"	<b>MC</b>
	1" 1/4	<b>MD</b>
	1" 1/2	<b>ME</b>
	<b>Flanged SAE (SSM) - 6000 PSI</b>	
	3/4"	<b>QB</b>
	1"	<b>QC</b>
	1" 1/4	<b>QD</b>
	1" 1/2	<b>QE</b>
	<b>Flanged SAE (SSS) - 3000 PSI</b>	
	3/4"	<b>SB</b>
	1"	<b>SC</b>
	1" 1/4	<b>SD</b>
	1" 1/2	<b>SE</b>
	<b>Flanged SAE (SSS) - 6000 PSI</b>	
	3/4"	<b>VB</b>
	1"	<b>VC</b>
	1" 1/4	<b>VD</b>
	1" 1/2	<b>VE</b>
7	Seals	CODE
	Buna	<b>B</b>
	Viton	<b>V</b>
8	Indicator ports	CODE
	Arranged	<b>XA</b>
	Arranged with plug	<b>DD</b>
9	Indicators	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>

Standard  
 On request

05/03.2016

## HOW TO ORDER A REPLACEMENT ELEMENT

	1	2	3	4	5					
<b>HEK85</b>	-	<b>20.080</b>	-	<b>AS</b>	-	<b>FG010</b>	-	<b>LC</b>	-	<b>B</b>
<b>HEK86</b>										

1	Element type	CODE
	See table pag. 12	<b>HEK85-..</b>
	See table pag. 13	<b>HEK86-..</b>

4	$\Delta p$ collapse pressure	CODE
	290 [psi] (20 [bar])	<b>LC</b>
	3046 [psi] (210 [bar])	<b>HC</b>

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

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

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

- Standard
- On request









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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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