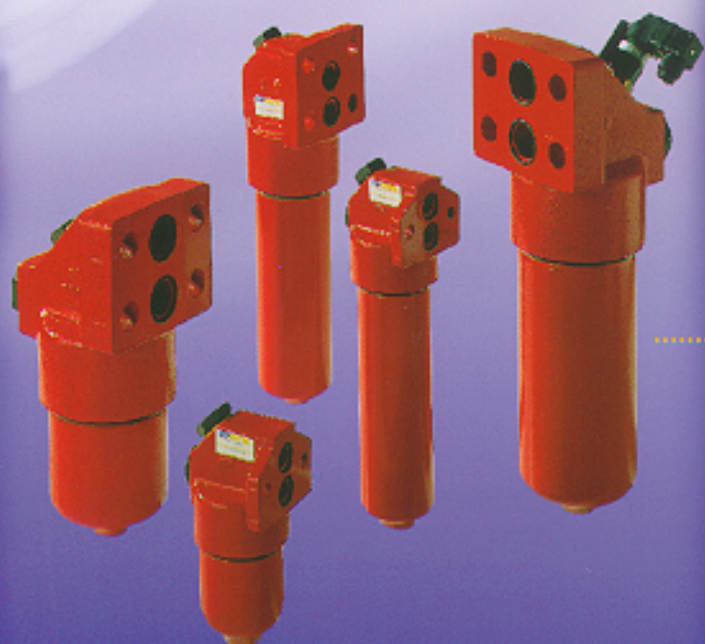


FHB SERIES

IN-LINE FILTER



LEHENGOTAK, S.A.



MPFILTRI
filtri per oleodinamica



Maximum working pressure 320 bar

Flow rates to 400 l/min

FHB

FHB series filters are designed for pressure line applications where manifold mounting is a specific requirement.

The manifold type filters are designed to integrate onto manifold valve systems to provide a compact low pressure loss and leak free installation.

Continued research and development on both the filter bodies and the filter elements has resulted in a product line with excellent pressure drop characteristics combined with a high filtration efficiency.

A complete line of pressure differential visual and electrical indicators are available with this series of filters.

FHB series filters are available with Reverse Flow Valve.

FHB series filters within this range are suitable for flow rates to 400 l/min. See page 12.

FHB series are suitable for industrial machinery steel and process application.

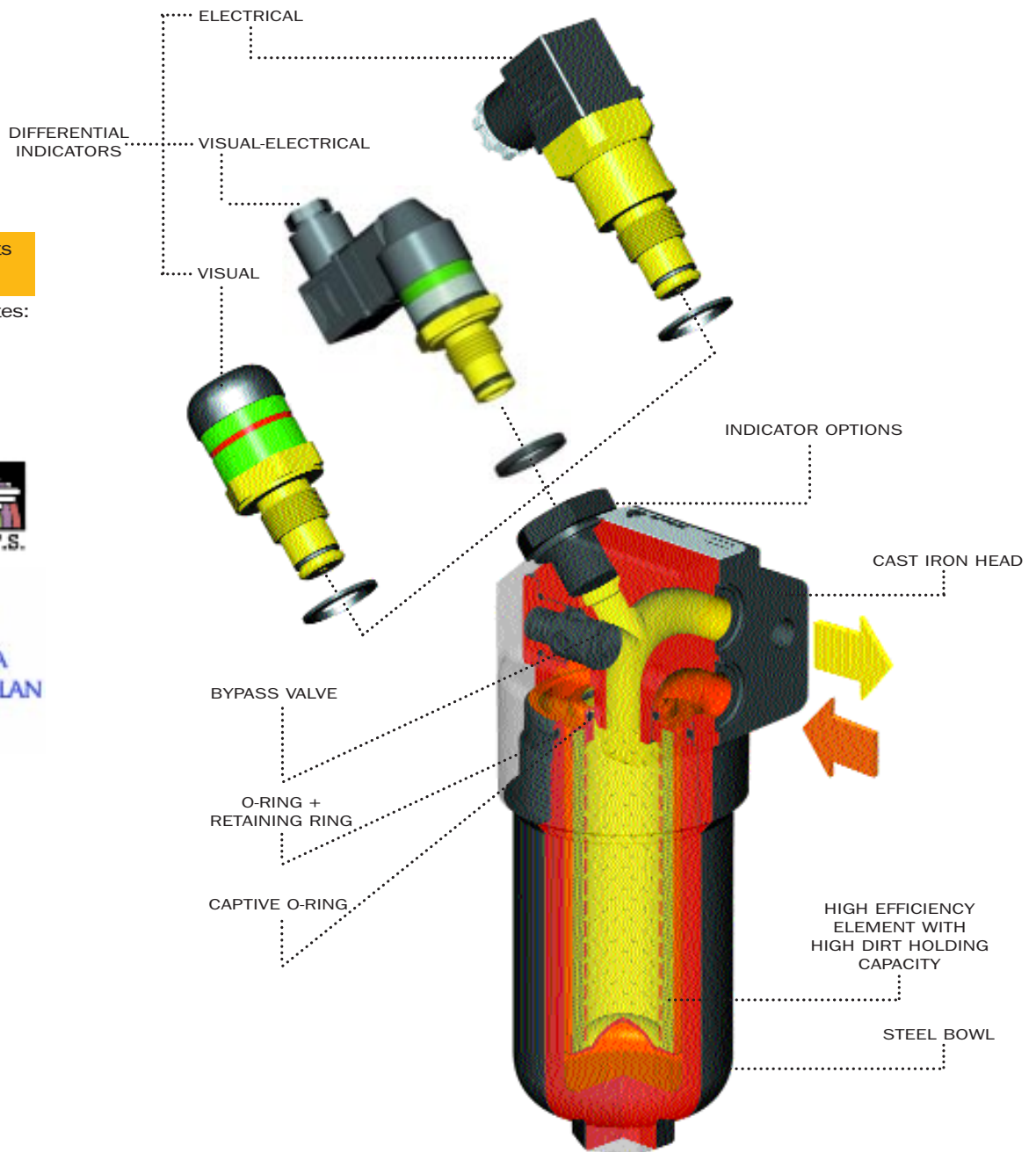
New

absolute filter elements independently tested in the following Institutes:

Institute of Filtration (France)



Royal Institute of Technology



Filter element:

Filter element material

End caps:

Steel (Thermal treatment)

Support tube:

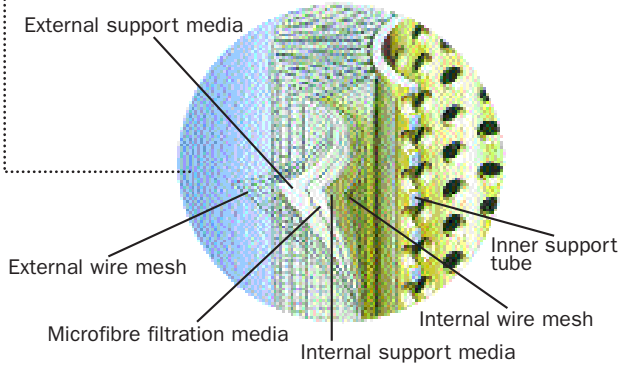
Steel (Thermal treatment)

Support frames:

Coated wire cloth

A Series

Inorganic microfibre



MP Filter elements - Conform to the following ISO standards

- ISO 2941 - Verification of collapse/burst resistance.
- ISO 2942 - Verification of fabrication integrity and determination of the first bubble point.
- ISO 2943 - Verification of material compatibility with fluids.
- ISO 3723 - Method for end load test.
- ISO 3724 - Verification of flow fatigue characteristics.
- ISO 3968 - Evaluation of pressure drop versus flow characteristics.
- ISO 4572 - Multi-pass method for evaluating filtration performance.

Element material Absolute filtration

A Series

New material:

Inorganic microfibre with acrylic support

Contamination retention
as per ISO 4572: Multi-pass test.

New improved $\beta \geq 200$ filter elements with greater efficiency and increased dirt holding capacity

Filter elements	Dimensions for $\beta(\mu\text{m})$ values				Filtration ratios			ΔP (bar)
	$\beta \geq 2$ (50%)	$\beta \geq 20$ (95%)	$\beta \geq 75$ (98,7%)	$\beta \geq 200$ (99,5%)	β_2	β_{10}	β_{20}	
A03	-	2	2,4	3	20	>10.000	>10.000	7
A06	-	3	4,6	6	8	> 2.000	>10.000	7
A10	3	6	7,8	10	1,5	≥ 200	>10.000	7
A25	13	19	22	25	-	> 1,5	> 35	7

N.B. Other materials giving different degrees of filtration are available on request.

Type HP	065-1	065-2	065-3	135-1	135-2	320-1	320-2	320-3	320-4
A03/A06	386	546	1098	895	1879	1512	3326	5428	7544
A10/A25	386	546	1098	895	1879	1512	3326	5428	7544

Values in cm^2

Type HP	065-1	065-2	065-3	135-1	135-2	320-1	320-2	320-3	320-4
A03/A06	386	544	1094	777	1655	1475	3258	5341	7425
A10/A25	386	544	1094	777	1655	1475	3258	5341	7425

Values in cm^2

Filtering area Filter elements N - ΔP 20 bar

Filtering area Filter elements H - ΔP 210 bar

Element material Nominal filtration

M Series

Square wire mesh (filtration degree is defined in microns by the maximum diameter of a sphere corresponding to the mesh size)

T Series

Triangular stainless steel wire mesh

Filtering area Filter elements N - ΔP 20 bar

Type HP	065-1	065-2	065-3	135-1	135-2	320-1	320-2	320-3	320-4
M10	374	530	1064	950	2020	1650	3645	5970	8280
M25	374	530	1064	950	2020	1650	3645	5970	8280
M60	374	530	1064	950	2020	1650	3645	5970	8280

Values in cm^2

Filtering area Filter elements T - ΔP 80 bar

Type HP	065-1	065-2	065-3	135-1	135-2	320-1	320-2	320-3	320-4
T10/T25	385	545	1090	710	1500	1670	3690	6040	8380

Values in cm^2

Filter body:

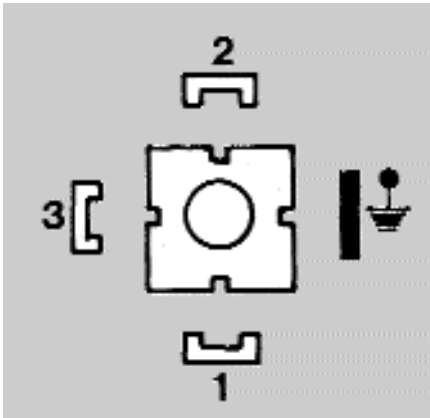
Materials	Head Cast iron (Thermal treatment)	Bypass valve Brass	
	Bowl Steel (Thermal treatment)	Reverse flow (Only for 135/320 series) Steel	
	Seals A Series: Nitrile (Buna-N) V Series: Viton	Indicator Brass (with viton seals)	
Working temperature	From -25 to +110°C For temperatures outside this range, please consult our Sales Network Organization		
Pressure filter body	Maximum working pressure up to 320 bar Test pressure: 420 bar Minimum burst pressure: 840 bar	Fatigue test: a filter body subjected to pressure impulses from 0 to 320 bar will withstand 1.000.000 cycles	
Collapse pressure filter elements		N Series: 20 bar H Series: 80 bar H Series: 210 bar	
Bypass valve Calibration pressure	Bypass valve, differential opening pressure:	B: 6 bar ± 10%	
Compatibility with fluids	Filter head and bowls compatible for use with: <ul style="list-style-type: none"> • mineral oils (types HH-HL-HM-HR-HV-HG as per ISO 6743/4) • water-based emulsions (types HFAE-HFAS as per ISO 6743/4) • synthetic fluids (types HS-HFDR-HFDS-HFDU as per ISO 6743/4) • water-glycol (types HFC as per ISO 6743/4) 	Filter elements As per ISO 2943; suitable for mineral oils (types HH-HL-HM-HR-HV-HG as per ISO 6743/4) and synthetic fluids (A and M series only) (types HS-HFDR-HFDS-HFDU as per ISO 6743/4) For water-based emulsions (types HFAE-HFAS as per ISO 6743/4) and fluids other than those mentioned, please consult our Sales Network Organization.	
	Seals A Series Nitrile (Buna-N) compatible with mineral oils (types HH-HL-HM-HR-HV-HG as per ISO 6743/4)	water-based emulsions (types HFAE-HFAS as per ISO 6743/a) water - glycol (types HFC as per ISO 6743/4) V Series Viton compatible with synthetic fluids (types HS-HFDR-HFDS-HFDU as per ISO 6743/4)	
Types of indicators	(Complete with Viton seals) Description: FHB series filters are fitted with indicators switching at a pressure of 5 bar ± 10% (for N elements series) 7 bar ± 10% (for H and T elements series) 10 bar ± 10% (for H and T elements series)		
Visual indicator	With bypass 5 bar setting: V7 Series	Without bypass 7 bar setting: V8 Series	Without bypass 10 bar setting: V9 Series
Electrical indicator	With bypass 5 bar setting: N7 Series	Without bypass 7 bar setting: N8 Series	Without bypass 10 bar setting: N9 Series
Visual-electrical indicator	With bypass 5 bar setting: E7-K7* Series	Without bypass 7 bar setting: E8-K8* Series	Without bypass 10 bar setting: E9-K9* Series
	*For K visual-electrical indicator, specify the voltage (f.i. K71 = LED 24 volt)		
			$\left. \begin{array}{l} 1 - 24 \text{ Volt} \\ 2 - 115 \text{ Volt} \\ 3 - 230 \text{ Volt} \end{array} \right\}$

MP Filtri - Specification

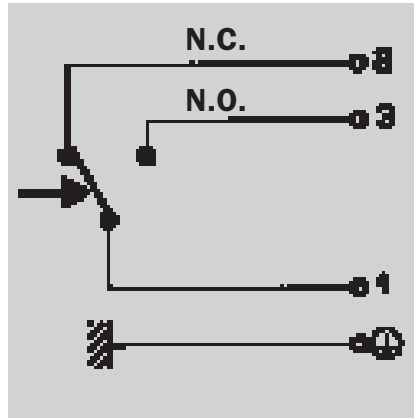
K - E - N Series

Supply voltage (50/60 Hz)	Resistive load	Inductive load
(V)	(A)	(A)
Vca 125	5	2
Vca 250	5	2
Vcc 30	5	3
Vcc 125	0,5	0,03
Vcc 250	0,25	0,03

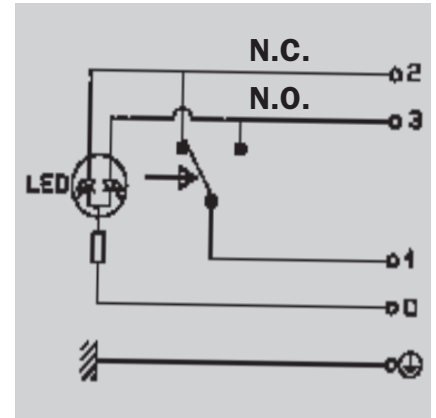
CONNECTOR DIN 43650



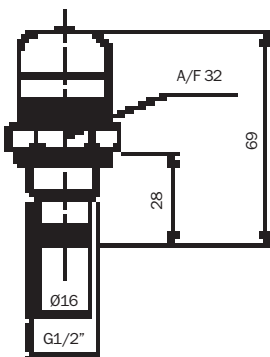
ELECTRICAL CONNECTION E - N SERIES



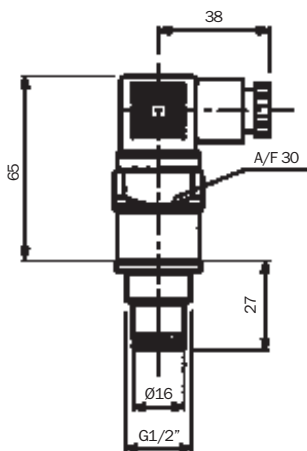
ELECTRICAL CONNECTION K SERIES



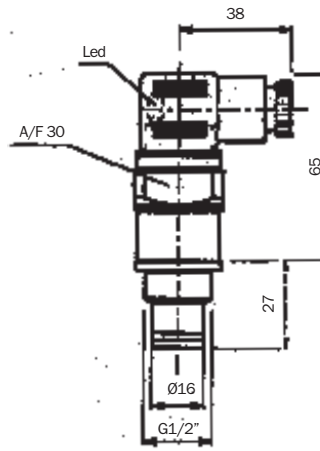
Visual V series



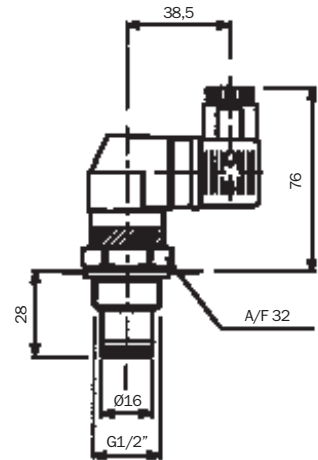
Electrical N series



Visual - Electrical K series



Visual - Electrical E series



Selection & installation information

Filter Elements types

A Series

Absolute inorganic microfibre filtration media, available in 3, 6, 10 and 25 micron
Example - **A03, A06, A10** or **A25**

M Series

Metal mesh media, available in 10, 25 and 60 micron
Example - **M10, M25** or **M60**

T Series

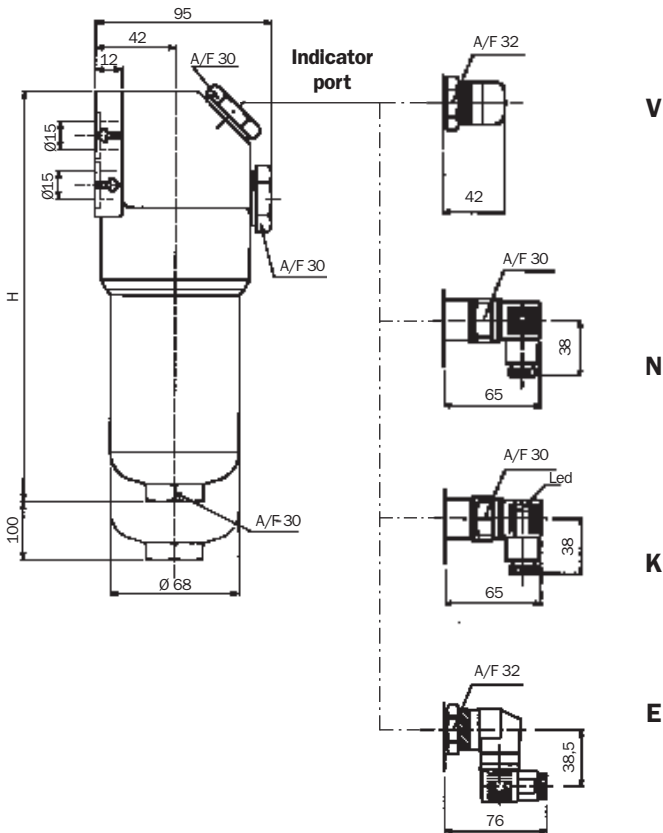
Triangular stainless steel mesh media, available in 10, 25 micron
Example - **T10, T25**

Please refer to individual pressure drop curves to obtain filter assembly pressure drop information

The following filter sizing recommendations are based using a mineral oil fluid at 30 mm²/s (cSt), with a maximum filter assembly (housing and filter element) pressure drop of 25% of the filter condition indicator (1.25 bar)

FHB 065

FHB 065 SERIES



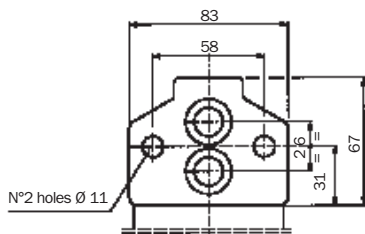
Filter assembly	Flow rate l/min N series *	Flow rate l/min H-T series *	Bowl length	Port size BSP/NPT/SAE	Weight kg **
A03	18	15	1	-	3,0
A06	20	18			
A10	35	32			
A25	50	48			
T10	-	75	2	-	3,6
A03	22	18			
A06	35	25			
A10	50	45			
A25	75	65	3	-	4,0
T10	-	90			
A03	35	30			
A06	60	50			
A10	75	65	3	-	4,0
A25	90	80			
T10	-	110			

* Flow rates with 30 mm²/s fluid viscosity
** Weight including filter element

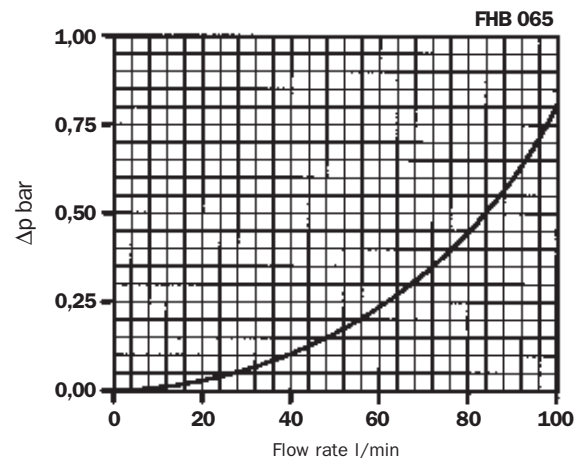
Lengths

Type	H
1	188
2	210
3	315

FRONT VIEW



Housing pressure drop curve



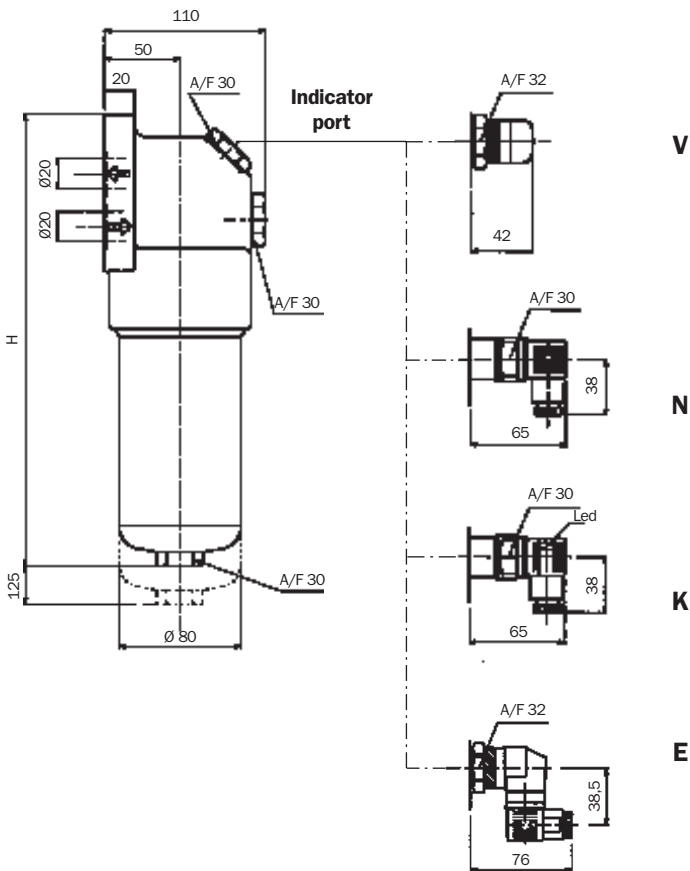
Selection & installation information

Please refer to individual pressure drop curves to obtain filter assembly pressure drop information

The following filter sizing recommendations are based using a mineral oil fluid at 30 mm²/s (cSt), with a maximum filter assembly (housing and filter element) pressure drop of 25% of the filter condition indicator (1.25 bar)

FHB 135

FHB 135 SERIES

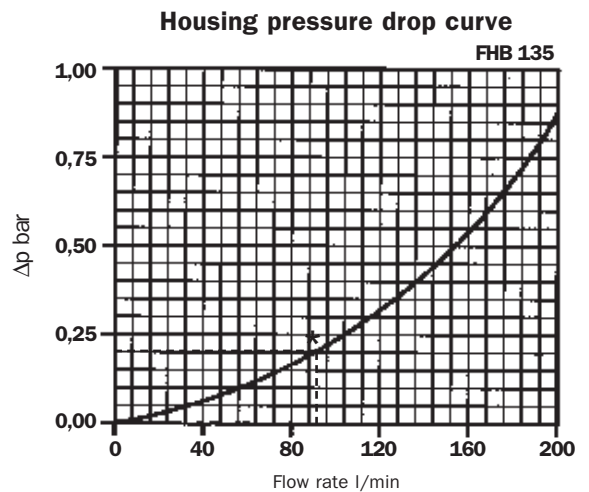
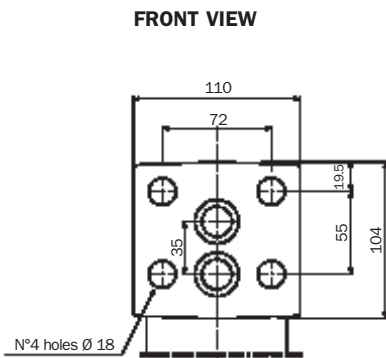


Filter assembly	Flow rate l/min N series *	Flow rate l/min H-T series *	Bowl length	Port size BSP/NPT/SAE	Weight kg **
A03	50	35	1	-	6,7
A06	60	50			
A10	80	60			
A25	100	75			
T10	-	150	2	-	8,1
A03	100	80			
A06	110	90			
A10	140	120			
A25	180	150			
T10	-	180			

* Flow rates with 30 mm²/s fluid viscosity
 ** Weight including filter element

Lengths

Type	H
1	271
2	385

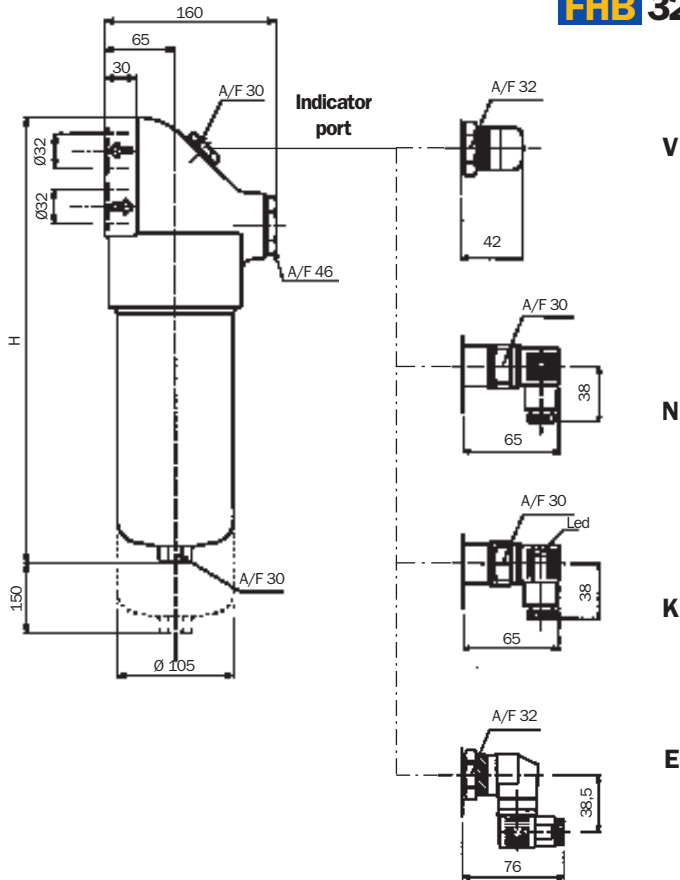


Selection & installation information

Please refer to individual pressure drop curves to obtain filter assembly pressure drop information

The following filter sizing recommendations are based using a mineral oil fluid at 30 mm²/s (cSt), with a maximum filter assembly (housing and filter element) pressure drop of 25% of the filter condition indicator (1.25 bar)

FHB 320

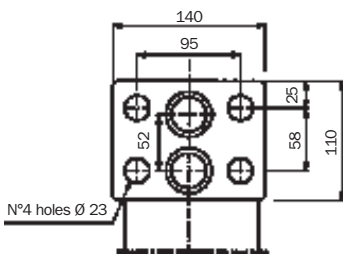


FHB 320 SERIES

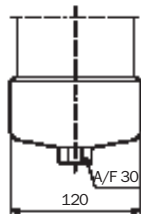
Filter assembly	Flow rate l/min N series *	Flow rate l/min H-T series *	Bowl length	Port size BSP/NPT/SAE	Weight kg **
A03	100	65	1	-	13,0
A06	120	80			
A10	140	100			
A25	180	150			
T10	-	200			
A03	210	150	2	-	15,0
A06	250	180			
A10	300	220			
A25	350	250			
T10	-	275			
A03	250	225	3	-	21,0
A06	280	250			
A10	320	280			
A25	350	340			
T10	-	360			
A03	300	250	4	-	24,0
A06	340	275			
A10	375	320			
A25	400	380			
T10	-	400			

* Flow rates with 30 mm²/s fluid viscosity
** Weight including filter element

FRONT VIEW



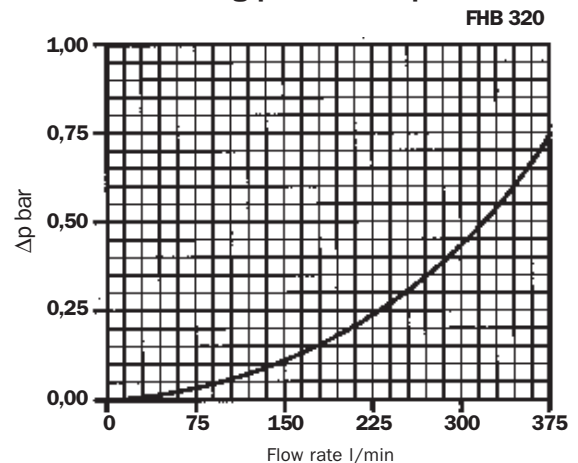
Only for FHB 320-4



Lengths

Type	H
1	315
2	425
3	562
4	692

Housing pressure drop curve



Pressure drop information

General

Pressure drop versus flow rate curve information for both housing and filter elements is in accordance with ISO 3968

Filter assembly pressure drop - $\Delta p_{\text{Total}} = \Delta p_{\text{Housing}} + \Delta p_{\text{Filter element}}$

Housing pressure drop - The housing pressure drop is proportional to the fluid density

Filter element pressure drop - Filter element pressure drop is proportional to kinematic viscosity therefore always check the fluid operating temperature and fluid type to obtain the working viscosity according to the following formula:

$$\Delta p_1 \text{ Filter element} = (\text{working viscosity} / \text{brochure viscosity}) \times \Delta p \text{ filter element}$$

Brochure viscosity 30 mm²/s (cSt)

Filter assembly sizing example

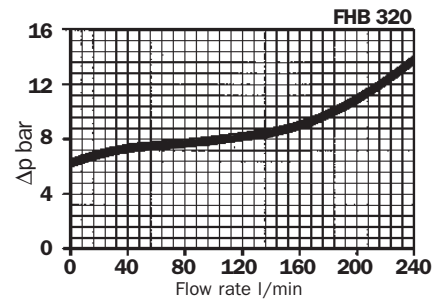
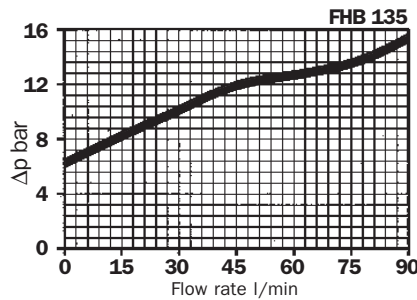
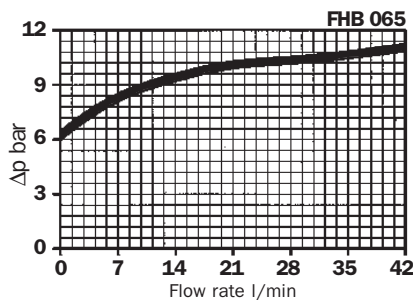
- Customer requires a 90 l/min filter assembly
- Mineral oil fluid: ISO VG 46 (46 mm²/s (cSt) at 40°C)
- A10 - 10 micron absolute filtration

Selection :

- **Housing pressure drop** - FHB 135-2 with 90 l/min $\Delta p = 0.2$ bar (see curve on page 7)
- **Filter element pressure drop** (brochure viscosity) - HP 135-2A10AN with 90 l/min $\Delta p = 0.55$ bar (see curve on page 10)
- **Filter element pressure drop** (working viscosity) - With 46 mm²/s (cSt) $\Delta p_1 = 0.55 \times (46/30) = 0.85$ bar
- **Filter assembly pressure drop** $\Delta p_{\text{Total}} = \Delta p_{\text{Housing}} + \Delta p_1 \text{ Filter element} = 0.2 + 0.85 = 1.05 \text{ bar}^*$ { *Acceptable pressure drop value as per our recommendations

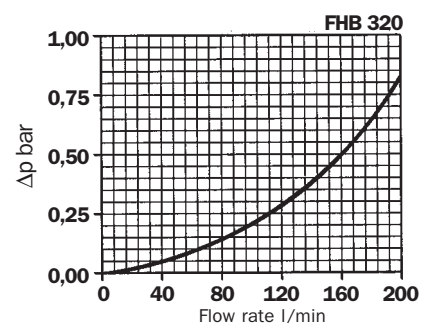
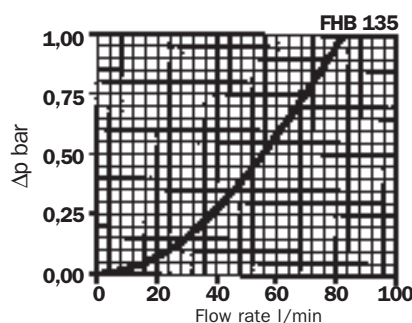
Bypass valves pressure drop

The curves were obtained using a mineral oil with a density of 0,86 kg/dm³.
The Δp varies proportionally to the density.



Reverse flow valves pressure drop

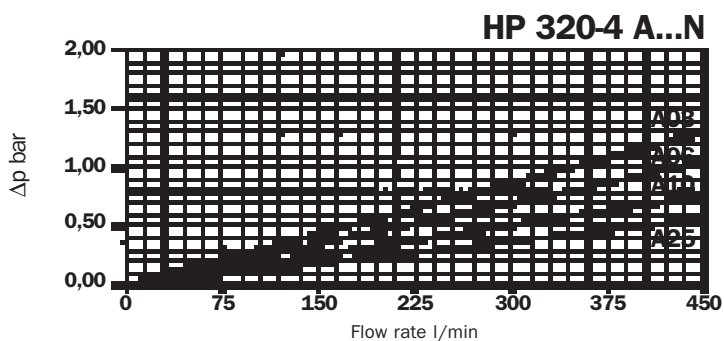
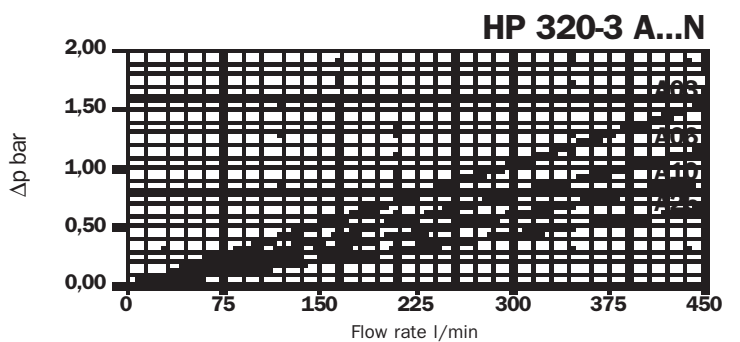
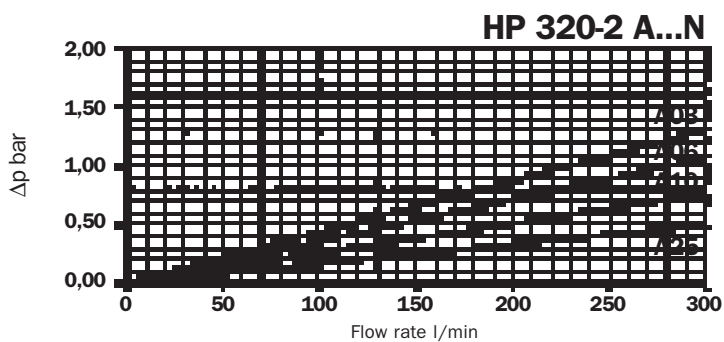
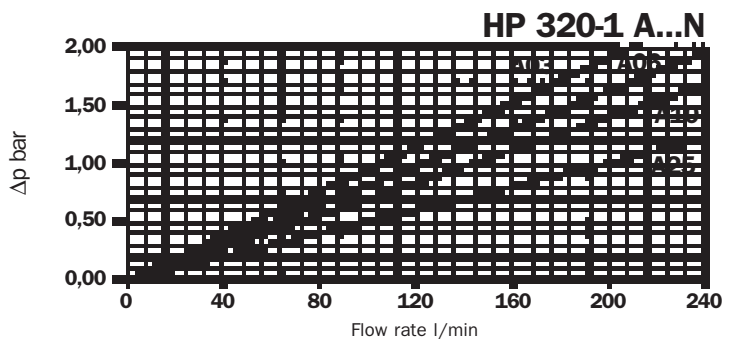
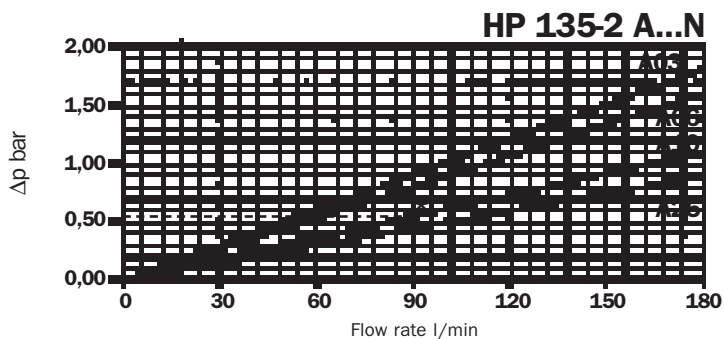
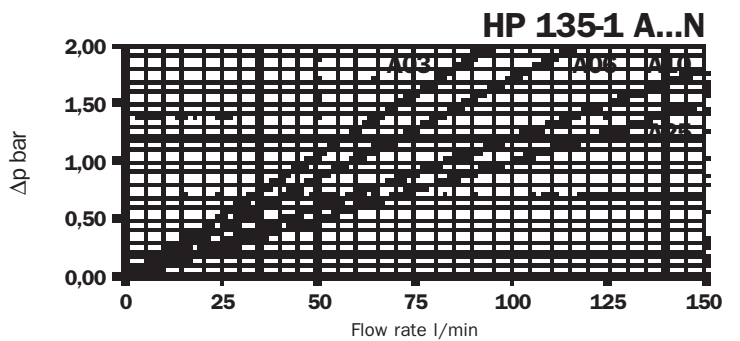
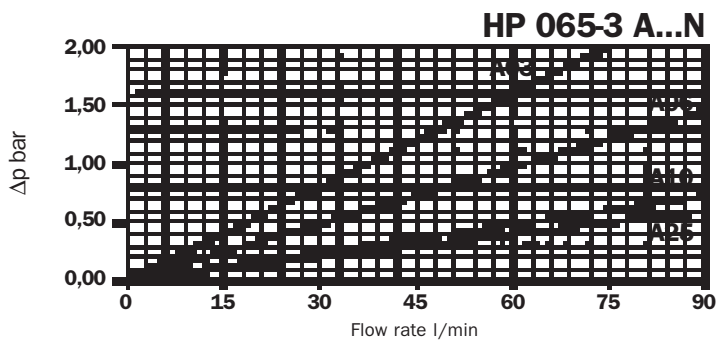
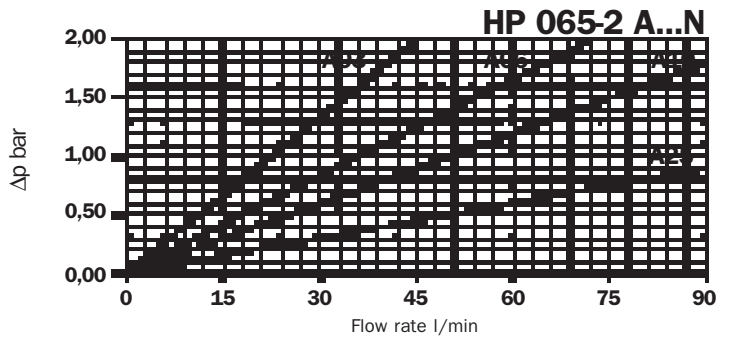
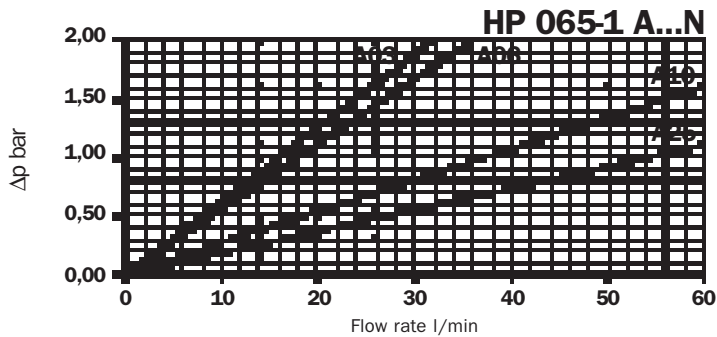
The curves were obtained using a mineral oil with a density of 0,86 kg/dm³.
The Δp varies proportionally to the density.



Filter elements - N - ΔP 20bar

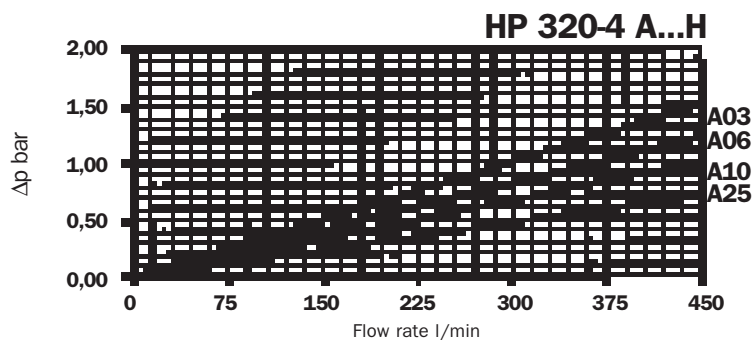
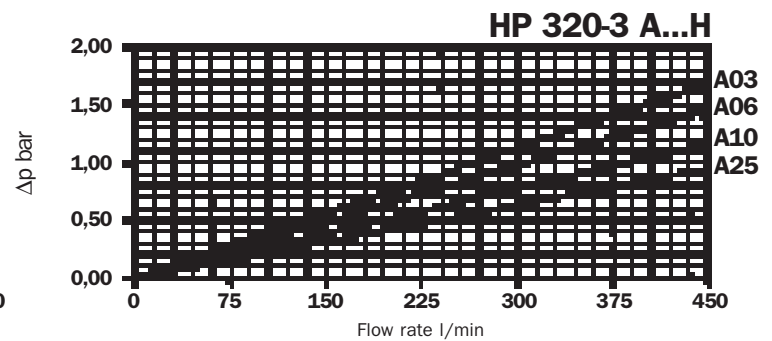
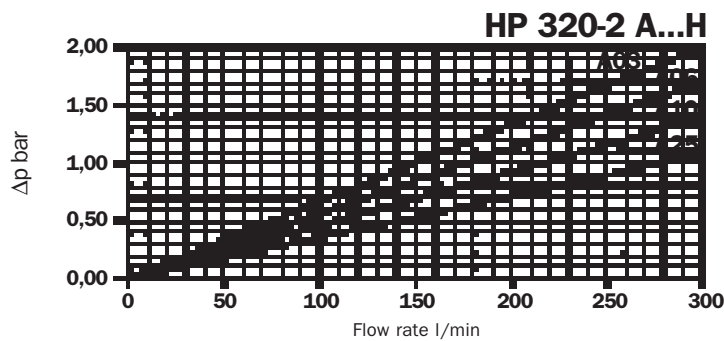
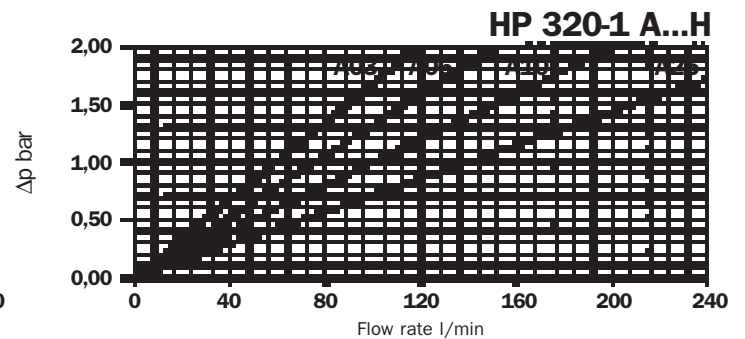
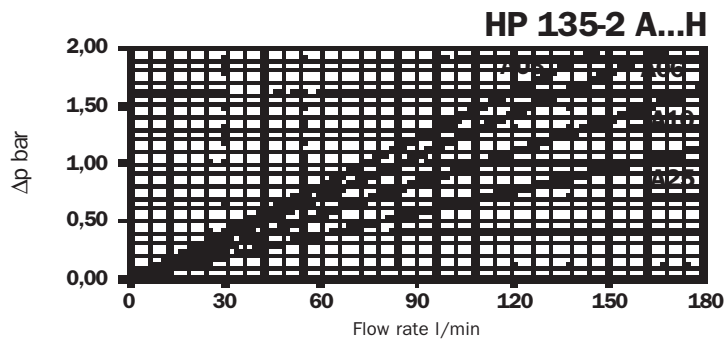
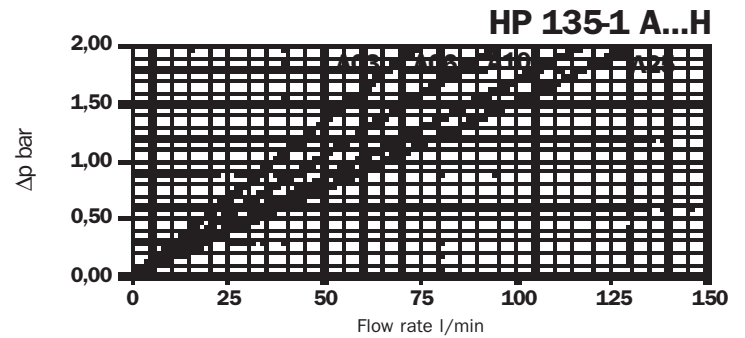
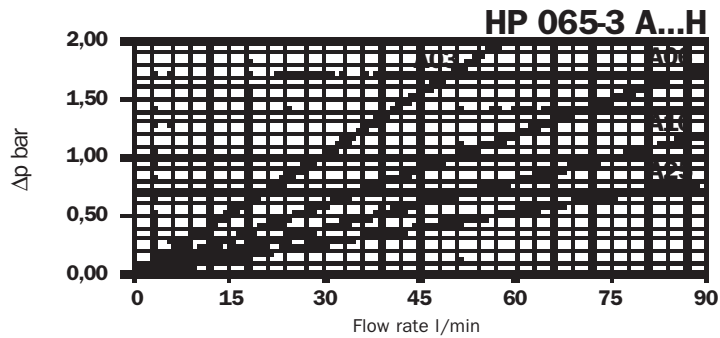
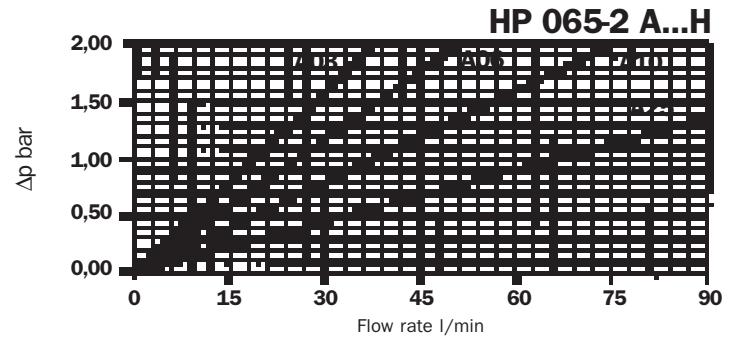
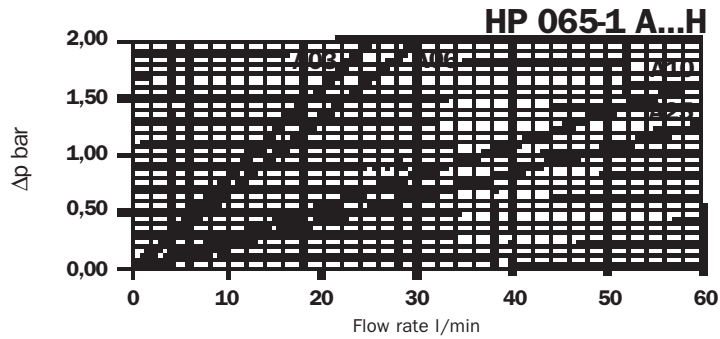
The curves were obtained using a mineral oil with a kinematic viscosity of 30 mm²/s (cSt).
The Δp varies proportionally to the fluid kinematic viscosity.

For the metal filter elements curves (M series), please consult our Sales and Network Organization



Filter elements - H - ΔP 210bar

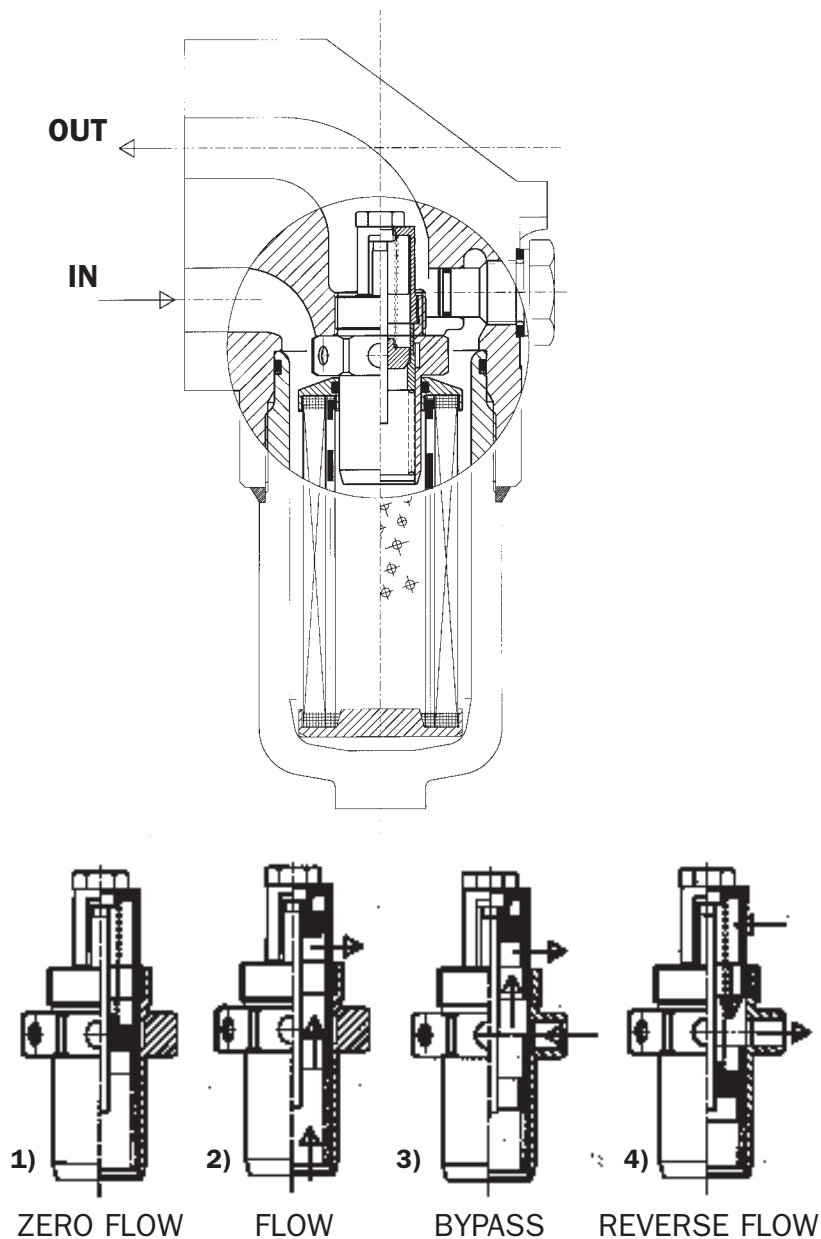
The curves were obtained using a mineral oil with a kinematic viscosity of 30 mm²/s (cSt).
 The Δp varies proportionally to the fluid kinematic viscosity.



CONTAMINATION CODES ISO 4406		CORRESPONDENT CODES NAS 1638	RECOMMENDED FILTRATION DEGREE	TYPICAL APPLICATIONS
5 μm	15 μm		$\beta_x \geq 200$	
12	9	3	3	High precision and laboratory servo-systems
15	11	6	3-6	Robotic and servo-systems
16	13	7	10-12	Very sensitive systems where a high degree of reliability is required
18	14	9	12-15	General equipment of limited reliability
19	16	10	15-25	General equipment of limited reliability
21	18	12	25-40	Low - pressure equipment not in continuous service

Reverse flow valve - Drawing

FHB 135 - FHB 320 SERIES



FHB

F1

Nominal sizes

065
135
320

Bowl lengths

FHB 065 = 1, 2, 3
FHB 135 = 1, 2
FHB 320 = 1, 2, 3, 4

Integral bypass valve

S	Without bypass
B	With bypass
W	With reverse flow
R	With reverse flow + bypass (Not available for FHB 065)

Seals

A	Nitrile (Buna-N)
V	Viton

Filter condition indicator

S	With threaded hole only
T2	With plug
V7	Visual 5 bar
V8	Visual 7 bar
V9	Visual 10 bar
N7	Electrical 5 bar
N8	Electrical 7 bar
N9	Electrical 10 bar
E7	Visual - electrical 5 bar
E8	Visual - electrical 7 bar
E9	Visual - electrical 10 bar
K7*	Visual - electrical 5 bar
K8*	Visual - electrical 7 bar
K9*	Visual - electrical 10 bar

{ 1 - 24 Volt
 { 2 - 115 Volt
 { 3 - 230 Volt

*For K visual-electrical indicator, specify the voltage (f.i. K71 = LED 24 volt)

Collapse pressure series

N	20 bar
T	80 bar
H	210 bar

Filter elements

A03	Inorganic microfibre Bx ≥200
A06	
A10	
A25	
M10	Square wire mesh
M25	
M60	
T10	Stainless steel wire mesh
T25	

HP

Replacement element

MP Filtri - Filtration products will only be guaranteed if original MP Filtri replacement elements and spares are used

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