

# Hydraulic Filtration



## MATERIALS

Head: Aluminium alloy  
 Spin-on cartridge: Steel  
 Bypass valve: Polyamide  
 Seals: NBR Nitrile (FKM - on request fluoroelastomer)  
 Indicator housing: Brass

## PRESSURE (ISO 10771-1:2002)

Max working: 1,2 MPa (12 bar)  
 Test: 1,5 MPa (15 bar)  
 Bursting: 2,5 MPa (25 bar)  
 Collapse, differential for the filter element (ISO 2941): 400 kPa (4 bar)

## BYPASS VALVE

Setting: 170 kPa (1,7 bar)  $\pm$  10%

## WORKING TEMPERATURE

From -25° to +110° C

## COMPATIBILITY (ISO 2943:1999)

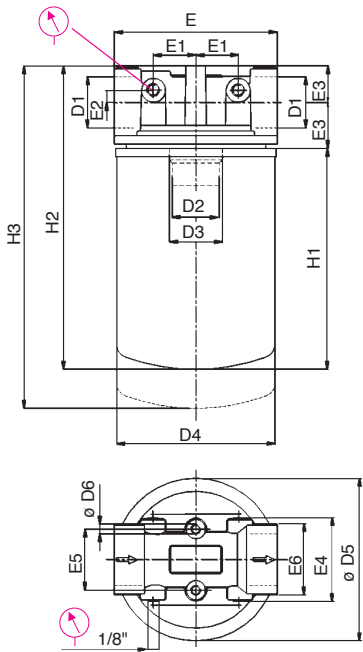
Full with fluids: HH-HL-HM-HR-HV-HG (according to ISO 6743/4)  
 For fluids different than the above mentioned, please contact our Sales Department.



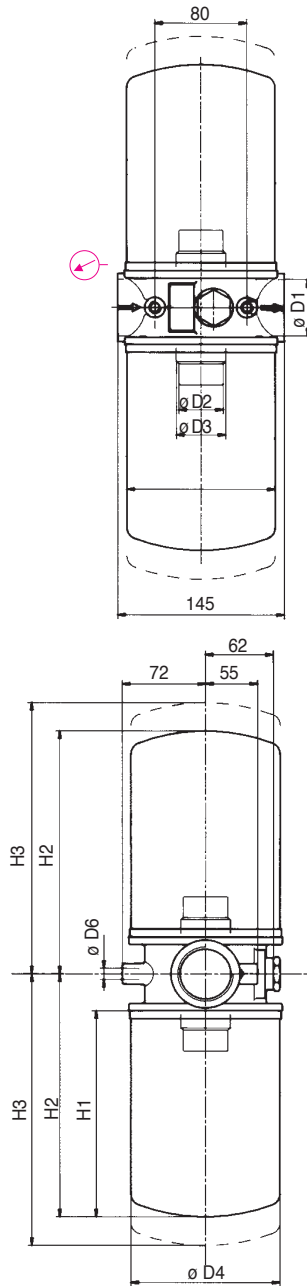
# Pressure Filters

## Installation Drawing

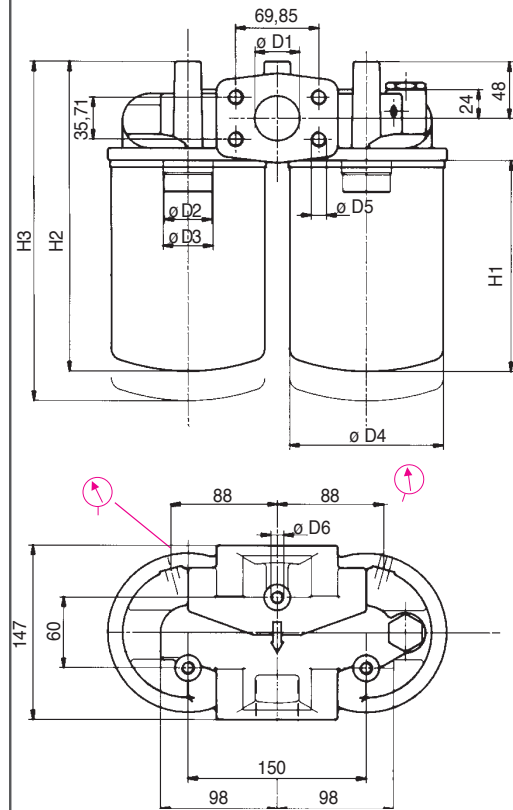
FPE 1+ & FPE 2+



FPE 3+



FPE 4+



### FILTER HOUSING

|       | D1     | D2           | D3         | D4  | D5  | D6  | E   | E1   | E2 | E3 | E4 | E5 | E6 | H1  | H2  | H3  | kg  |
|-------|--------|--------------|------------|-----|-----|-----|-----|------|----|----|----|----|----|-----|-----|-----|-----|
| FPE11 | 3/4"   | 3/4" BSP     | -          | 96  | 96  | M8  | 95  | 20,5 | 7  | 20 | 49 | 38 | 37 | 145 | 188 | 208 | 1,2 |
| FPE12 | 3/4"   | 3/4" BSP     | -          | 96  | 96  | M8  | 95  | 20,5 | 7  | 20 | 49 | 38 | 37 | 191 | 234 | 254 | 1,5 |
| FPE21 | 1" 1/4 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | 134 | M8  | 133 | 35   | 10 | 30 | 64 | 50 | 57 | 181 | 248 | 278 | 1,9 |
| FPE31 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | -   | M10 | -   | -    | -  | -  | -  | -  | -  | 181 | 216 | 246 | 3,6 |
| FPE41 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | M12 | M10 | -   | -    | -  | -  | -  | -  | -  | 181 | 269 | 299 | 4,8 |
| FPE22 | 1" 1/4 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | 134 | M8  | 133 | 35   | 10 | 30 | 64 | 50 | 57 | 226 | 293 | 323 | 2,0 |
| FPE32 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | -   | M10 | -   | -    | -  | -  | -  | -  | -  | 226 | 261 | 291 | 3,8 |
| FPE42 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | M12 | M10 | -   | -    | -  | -  | -  | -  | -  | 226 | 314 | 344 | 5,0 |

# Pressure Filters

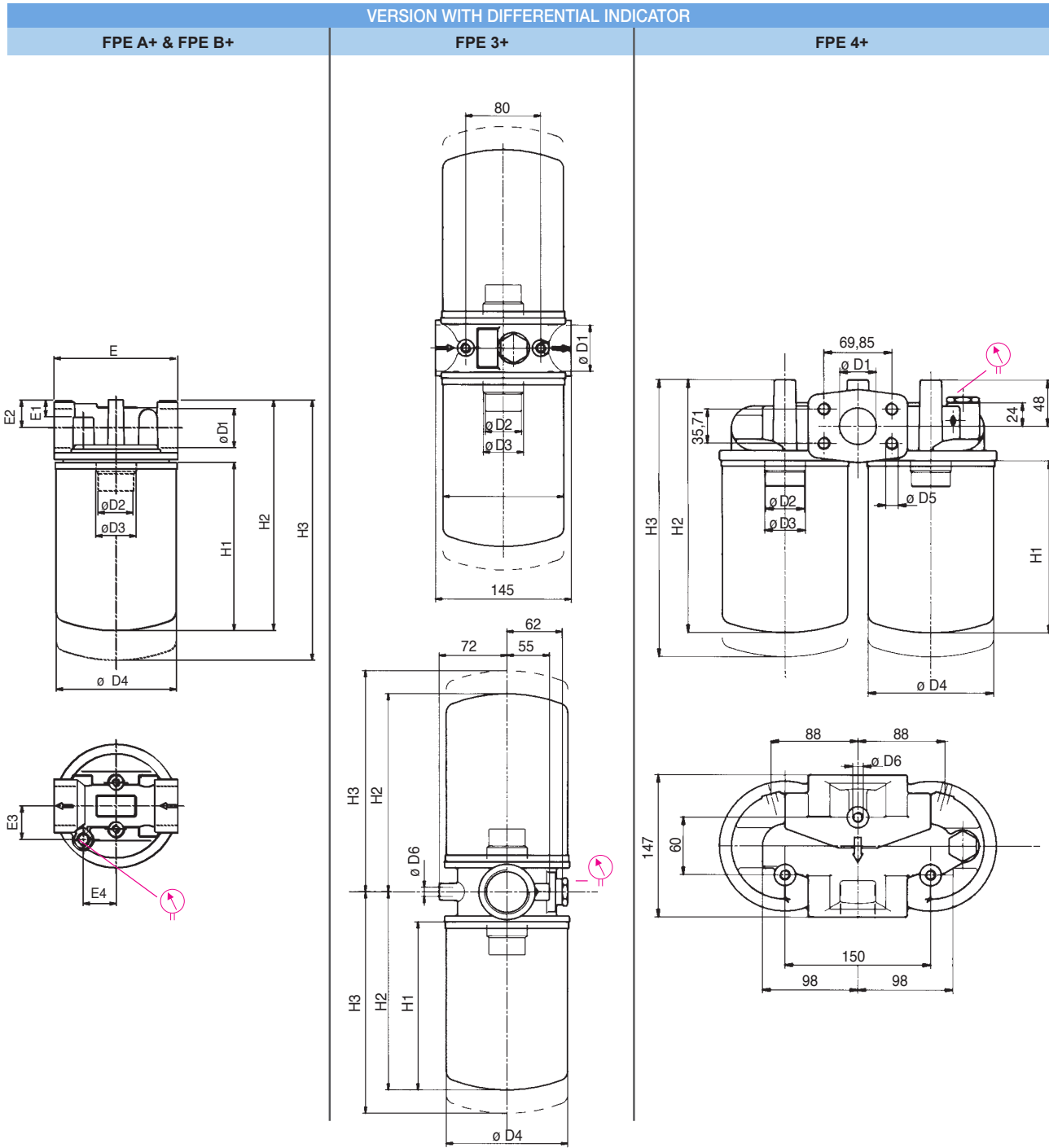
## Ordering and Option Chart

|   |          |                    |    |    |    |    |    |    |    |   |  |
|---|----------|--------------------|----|----|----|----|----|----|----|---|--|
| <b>TYPE</b>                             |          |                    |    |    |    |    |    |    |    |   |  |
| F = FILTER COMPLETE                     |          | F                  | F  | F  | F  | F  | F  | F  | F  |   |  |
| B = FILTER HOUSING                      |          | B                  | B  | B  | B  | B  | B  | B  | B  | <b>ELEMENT</b> E  |  |
| <b>P</b>                                | <b>E</b> |                    |    |    |    |    |    |    |    | <b>FAMILY SIZE &amp; LENGTH</b> S E   |  |
| <b>FAMILY NOMINAL SIZE &amp; LENGTH</b> |          |                    |    |    |    |    |    |    |    |   |  |
| 11                                      |          | 12                 | 21 | 22 | 31 | 32 | 41 | 42 |    |   |  |
| <b>PORT TYPE</b>                        |          |                    |    |    |    |    |    |    |    |   |  |
| B = BSP thread                          |          | B                  | B  | B  | B  | B  | B  | B  | B  | NOTE:<br>ESE31+++ = nr. 2 x ESE21+++<br>ESE32+++ = nr. 2 x ESE22+++<br>ESE41+++ = nr. 2 x ESE21+++<br>ESE42+++ = nr. 2 x ESE22+++ |  |
| F = SAE flange 3000 psi                 |          | -                  | -  | -  | -  | -  | -  | F  | F  |   |  |
| <b>PORT SIZE</b>                        |          |                    |    |    |    |    |    |    |    |   |  |
| 06 = 3/4"                               |          | 06                 | 06 | -  | -  | -  | -  | -  | -  |   |  |
| 10 = 1" 1/4"                            |          | -                  | -  | 10 | 10 | -  | -  | -  | -  |   |  |
| 12 = 1" 1/2"                            |          | -                  | -  | -  | -  | 12 | 12 | 12 | 12 |   |  |
| <b>BYPASS VALVE</b>                     |          |                    |    |    |    |    |    |    |    |   |  |
| W = without                             |          | W                  | W  | W  | W  | W  | W  | W  | W  |   |  |
| B = 170 kPa (1,7 bar)                   |          | B                  | B  | B  | B  | B  | B  | B  | B  |   |  |
| <b>SEALS</b>                            |          |                    |    |    |    |    |    |    |    | <b>SEALS</b>  |  |
| N = NBR Nitrile                         |          | N                  | N  | N  | N  | N  | N  | N  | N  | N = NBR   |  |
| F = FKM Fluoroelastomer                 |          | F                  | F  | F  | F  | F  | F  | F  | F  | F = FKM   |  |
| <b>FILTER MEDIA</b>                     |          |                    |    |    |    |    |    |    |    | <b>FILTER MEDIA</b>   |  |
| FA = fiber 5 μm <sub>(e)</sub> β>1.000  |          | FA                 | FA | FA | FA | FA | FA | FA | FA | FA = fiber 5 μm <sub>(e)</sub>  |  |
| FB = fiber 7 μm <sub>(e)</sub> β>1.000  |          | FB                 | FB | FB | FB | FB | FB | FB | FB | FB = fiber 7 μm <sub>(e)</sub>  |  |
| FC = fiber 12 μm <sub>(e)</sub> β>1.000 |          | FC                 | FC | FC | FC | FC | FC | FC | FC | FC = fiber 12 μm <sub>(e)</sub>   |  |
| FD = fiber 21 μm <sub>(e)</sub> β>1.000 |          | FD                 | FD | FD | FD | FD | FD | FD | FD | FD = fiber 21 μm <sub>(e)</sub>   |  |
| CC = cellulose 10 μm β>2                |          | CC                 | CC | CC | CC | CC | CC | CC | CC | CC = cellulose 10 μm  |  |
| CD = cellulose 25 μm β>2                |          | CD                 | CD | CD | CD | CD | CD | CD | CD | CD = cellulose 25 μm  |  |
| <b>CLOGGING INDICATOR</b>               |          |                    |    |    |    |    |    |    |    |   |  |
| 06 = 1/8" ports, plugged                |          | 06                 | 06 | 06 | 06 | 06 | 06 | 06 | 06 |   |  |
| 31 = pressure gauge, rear connection    |          | 31                 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |   |  |
| P1 = SPDT, pressure switch              |          | P1                 | P1 | P1 | P1 | P1 | P1 | P1 | P1 |   |  |
| <b>X</b>                                | <b>X</b> | <b>ACCESSORIES</b> |    |    |    |    |    |    |    |   |  |
| XX = no accessory available             |          | XX                 | XX | XX | XX | XX | XX | XX | XX |   |  |

| FILTER ELEMENT |      |            |     |      |                         |          |
|----------------|------|------------|-----|------|-------------------------|----------|
|                | A    | B          | C   | kg   | Area (cm <sup>2</sup> ) |          |
|                |      |            |     |      | Media F+                | Media C+ |
| ESE11          | 96,5 | 3/4" BSP   | 146 | 0,70 | 2.140                   | 3.305    |
| ESE12          | 96,5 | 3/4" BSP   | 191 | 0,80 | 3.630                   | 4.745    |
| ESE21          | 129  | 1" 1/4 BSP | 181 | 1,20 | 4.450                   | 5.560    |
| ESE22          | 129  | 1" 1/4 BSP | 226 | 1,40 | 5.890                   | 7.360    |

# Pressure Filters

## Installation Drawing



### FILTER HOUSING

|       | D1     | D2           | D3         | D4  | D5  | D6  | E   | E1 | E2 | E3   | E4   | E5 | E6 | H1  | H2  | H3  | kg  |
|-------|--------|--------------|------------|-----|-----|-----|-----|----|----|------|------|----|----|-----|-----|-----|-----|
| FPEA1 | 3/4"   | 3/4" BSP     | -          | 96  | 96  | M8  | 95  | -  | 23 | 24,5 | 21,5 | 38 | 32 | 145 | 188 | 208 | 1,2 |
| FPEA2 | 3/4"   | 3/4" BSP     | -          | 96  | 96  | M8  | 95  | -  | 23 | 24,5 | 21,5 | 38 | 32 | 191 | 234 | 254 | 1,5 |
| FPEB1 | 1" 1/4 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | 134 | M8  | 133 | 19 | 30 | 36   | 35   | 50 | 54 | 181 | 248 | 278 | 1,9 |
| FPE31 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | -   | M10 | -   | -  | -  | -    | -    | -  | -  | 181 | 216 | 246 | 3,6 |
| FPE41 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | M12 | M10 | -   | -  | -  | -    | -    | -  | -  | 181 | 269 | 299 | 4,8 |
| FPEB2 | 1" 1/4 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | 134 | M8  | 133 | 19 | 30 | 36   | 35   | 50 | 54 | 226 | 293 | 323 | 2,0 |
| FPE32 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | -   | M10 | -   | -  | -  | -    | -    | -  | -  | 226 | 261 | 291 | 3,8 |
| FPE42 | 1" 1/2 | 1" 1/2 16-UN | 1" 1/4 BSP | 129 | M12 | M10 | -   | -  | -  | -    | -    | -  | -  | 226 | 314 | 344 | 5,0 |

# Pressure Filters

## Ordering and Option Chart

|  |          |                    |    |    |    |    |    |    |    |                                 |  |   |          |  |
|--|----------|--------------------|----|----|----|----|----|----|----|---------------------------------|--|---|----------|--|
| <b>TYPE</b>  |          |                    |    |    |    |    |    |    |    | <b>ELEMENT</b>                  |  | <b>E</b>  |          |  |
| F = FILTER COMPLETE                                      |          | F                  | F  | F  | F  | F  | F  | F  | F  |                                 |  |   |          |  |
| B = FILTER HOUSING                                       |          | B                  | B  | B  | B  | B  | B  | B  | B  |                                 |  |   |          |  |
| <b>P</b>   | <b>E</b> |                    |    |    |    |    |    |    |    | <b>FAMILY SIZE &amp; LENGTH</b> |  | <b>S</b>  | <b>E</b> |  |
| <b>FAMILY NOMINAL SIZE &amp; LENGTH</b>                  |          | A1                 | A2 | B1 | B2 | 31 | 32 | 41 | 42 |                                 |  |   |          |  |
| <b>PORT TYPE</b>   |          |                    |    |    |    |    |    |    |    |                                 |  |   |          |  |
| B = BSP thread   |          | B                  | B  | B  | B  | B  | B  | B  | B  |                                 |  |   |          |  |
| F = SAE flange 3000 psi                                  |          | -                  | -  | -  | -  | -  | -  | F  | F  |                                 |  |   |          |  |
| <b>PORT SIZE</b>   |          |                    |    |    |    |    |    |    |    |                                 |  |   |          |  |
| 06 = 3/4"  |          | 06                 | 06 | -  | -  | -  | -  | -  | -  |                                 |  |   |          |  |
| 10 = 1" 1/4"   |          | -                  | -  | 10 | 10 | -  | -  | -  | -  |                                 |  |   |          |  |
| 12 = 1" 1/2"   |          | -                  | -  | -  | -  | 12 | 12 | 12 | 12 |                                 |  |   |          |  |
| <b>BYPASS VALVE</b>                                      |          |                    |    |    |    |    |    |    |    |                                 |  |   |          |  |
| W = without  |          | W                  | W  | W  | W  | W  | W  | W  | W  |                                 |  |   |          |  |
| B = 170 kPa (1,7 bar)                                    |          | B                  | B  | B  | B  | B  | B  | B  | B  |                                 |  |   |          |  |
| <b>SEALS</b>   |          |                    |    |    |    |    |    |    |    | <b>SEALS</b>                    |  |   |          |  |
| N = NBR Nitrile  |          | N                  | N  | N  | N  | N  | N  | N  | N  |                                 |  | <b>N = NBR</b>  |          |  |
| F = FKM Fluoroelastomer                                  |          | F                  | F  | F  | F  | F  | F  | F  | F  |                                 |  | <b>F = FKM</b>  |          |  |
| <b>FILTER MEDIA</b>                                      |          |                    |    |    |    |    |    |    |    | <b>FILTER MEDIA</b>             |  |   |          |  |
| FA = fiber 5 μm <sub>(e)</sub> β>1.000                   |          | FA                 | FA | FA | FA | FA | FA | FA | FA |                                 |  | <b>FA = fiber 5 μm<sub>(e)</sub></b>  |          |  |
| FB = fiber 7 μm <sub>(e)</sub> β>1.000                   |          | FB                 | FB | FB | FB | FB | FB | FB | FB |                                 |  | <b>FB = fiber 7 μm<sub>(e)</sub></b>  |          |  |
| FC = fiber 12 μm <sub>(e)</sub> β>1.000                  |          | FC                 | FC | FC | FC | FC | FC | FC | FC |                                 |  | <b>FC = fiber 12 μm<sub>(e)</sub></b>   |          |  |
| FD = fiber 21 μm <sub>(e)</sub> β>1.000                  |          | FD                 | FD | FD | FD | FD | FD | FD | FD |                                 |  | <b>FD = fiber 21 μm<sub>(e)</sub></b>   |          |  |
| CC = cellulose 10 μm β>2                                 |          | CC                 | CC | CC | CC | CC | CC | CC | CC |                                 |  | <b>CC = cellulose 10 μm</b>   |          |  |
| CD = cellulose 25 μm β>2                                 |          | CD                 | CD | CD | CD | CD | CD | CD | CD |                                 |  | <b>CD = cellulose 25 μm</b>   |          |  |
| <b>CLOGGING INDICATOR</b>                                |          |                    |    |    |    |    |    |    |    |                                 |  |   |          |  |
| 03 = ports, plugged                                      |          | -                  | -  | -  | -  | 03 | 03 | 03 | 03 |                                 |  |   |          |  |
| 5B = visual differential 130 kPa (1,3 bar)               |          | -                  | -  | -  | -  | 5B | 5B | 5B | 5B |                                 |  |   |          |  |
| 6B = electrical differential 130 kPa (1,3 bar)           |          | -                  | -  | -  | -  | 6B | 6B | 6B | 6B |                                 |  |   |          |  |
| 7B = indicator 6B with LED                               |          | -                  | -  | -  | -  | 7B | 7B | 7B | 7B |                                 |  |   |          |  |
| T0 = elect. diff. 130 kPa (1,3 bar) with thermostat 30°C |          | -                  | -  | -  | -  | T0 | T0 | T0 | T0 |                                 |  |   |          |  |
| 0U = ports, plugged                                      |          | 0U                 | 0U | 0U | 0U | -  | -  | -  | -  |                                 |  |   |          |  |
| U0 = differential, visual, 130 kPa (1,3 bar)             |          | U0                 | U0 | U0 | U0 | -  | -  | -  | -  |                                 |  |   |          |  |
| N0 = differ. vis-electrical, 130 kPa (1,3 bar)           |          | N0                 | N0 | N0 | N0 | -  | -  | -  | -  |                                 |  |   |          |  |
|  |          |                    |    |    |    |    |    |    |    |                                 |  | When the filter is ordered with FKM seals, the first digit of the indicator code is a letter (please see page 182 - 183). |          |  |
|  |          |                    |    |    |    |    |    |    |    |                                 |  | N.B. Indicator series 70 only on request  |          |  |
| <b>X</b>   | <b>X</b> | <b>ACCESSORIES</b> |    |    |    |    |    |    |    |                                 |  |   |          |  |
| XX = no accessory available                              |          | XX                 | XX | XX | XX | XX | XX | XX | XX |                                 |  |   |          |  |

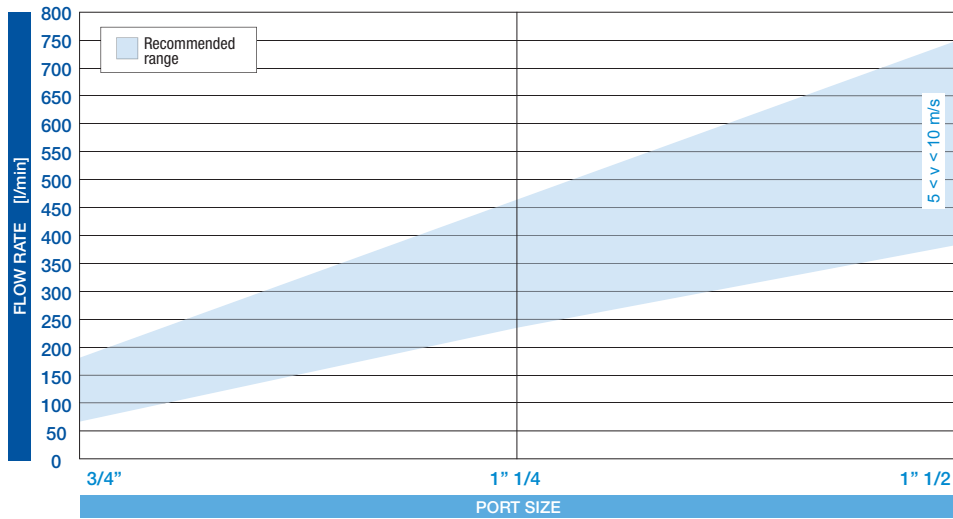
| FILTER ELEMENT |      |            |     |      |                         |          |
|----------------|------|------------|-----|------|-------------------------|----------|
|                | A    | B          | C   | kg   | Area (cm <sup>2</sup> ) |          |
|                |      |            |     |      | Media F+                | Media C+ |
| ESE11          | 96,5 | 3/4" BSP   | 146 | 0,70 | 2.140                   | 3.305    |
| ESE12          | 96,5 | 3/4" BSP   | 191 | 0,80 | 3.630                   | 4.745    |
| ESE21          | 129  | 1" 1/4 BSP | 181 | 1,20 | 4.450                   | 5.560    |
| ESE22          | 129  | 1" 1/4 BSP | 226 | 1,40 | 5.890                   | 7.360    |

The diagram shows a cross-section of a cylindrical filter element. Dimension A is the diameter of the element. Dimension B is the height of the element. Dimension C is the total height, including the top and bottom housing. The element itself is shown with a yellow mesh and a blue seal at the bottom.

# Pressure Filters

## FLUID SPEED

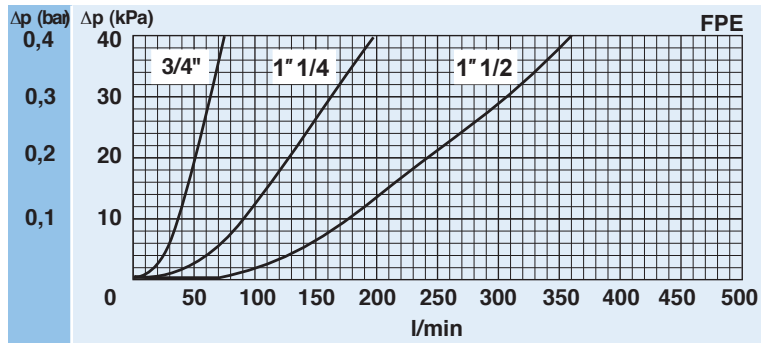
(when selecting the filter size, we suggest to consider also the max recommended fluid speed (in pressure lines normally  $5 < v < 10$  m/s).



## PRESSURE DROP CURVES ( $\Delta p$ )

The "Assembly Pressure Drop ( $\Delta p$ )" is obtained by adding the pressure drop values of the Filter Housing and of the Clean Filter Element corresponding to the considered Flow Rate and it must be lower than 50 kPa (0,5 bar).

## FILTER HOUSING PRESSURE DROP (mainly depending on the port size)



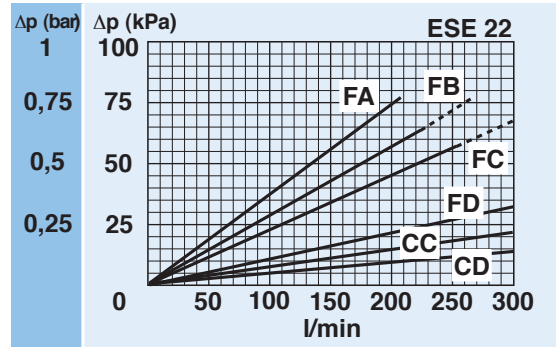
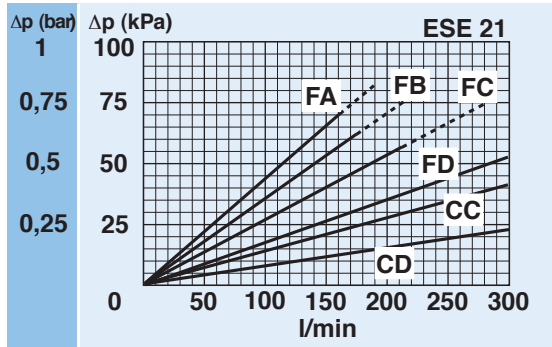
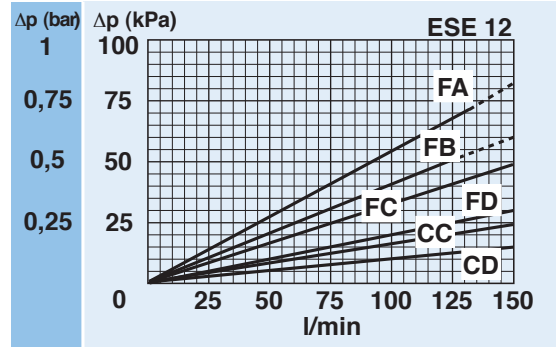
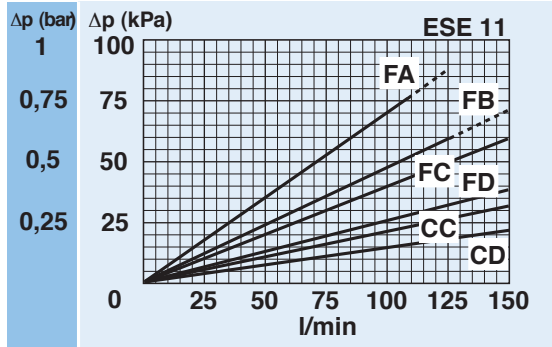
# Pressure Filters

## PRESSURE DROP CURVES ( $\Delta p$ )

The "Assembly Pressure Drop ( $\Delta p$ )" is obtained by adding the pressure drop values of the Filter Housing and of the Clean Filter Element corresponding to the considered Flow Rate and it must be lower than 50 kPa (0,5 bar).

### CLEAN FILTER ELEMENT PRESSURE DROP WITH F+ AND C+ MEDIA

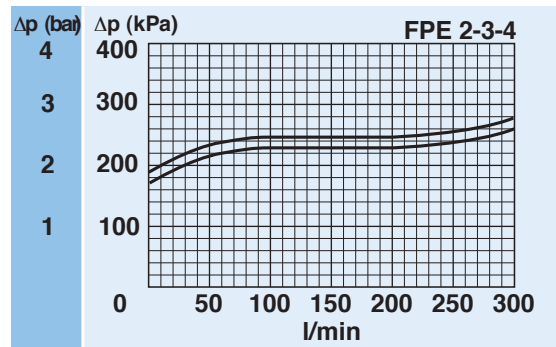
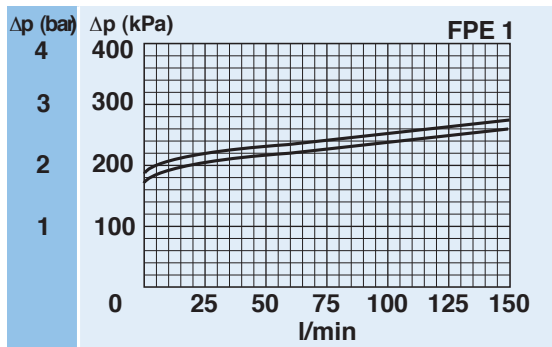
(depending both on the internal diameter of the element and on the filter media)



FPE3+ and FPE4+ filters use double element canisters. The Assembly Pressure Drop is therefore determined by adding the Housing Pressure Drop at the real flow rate and half the pressure drop of the ESE2+ element. E.g. The pressure drop of a complete FPE31----FC--- filter at a 60 l/min flow rate is obtained by adding the Housing Pressure Drop and half the ESE21NFC element pressure drop at 60 l/min.

### BYPASS VALVE PRESSURE DROP

When selecting the filter size, these curves must be taken into account if it is foreseen that any flow peak is to be absorbed by the bypass valve, it also must be of proper configuration to avoid pressure peaks. The valve pressure drop is directly proportional to fluid specific gravity.



N.B. All the curves have been obtained with mineral oil having a kinematic viscosity 30 cSt and specific gravity 0,9 kg/dm<sup>3</sup>; for fluids with different features, please consider the factors described in the first part of this catalogue. All the curves are obtained from test done at the UFI HYDRAULIC DIVISION Laboratory, according to the specification ISO 3968:2005. In case of discrepancy, please check the contamination level, viscosity and features of the fluid in use.





