

**HYDAC**

**INTERNATIONAL**

**Change-Over**

**Inline Filter FMND**

**With elements to DIN 24 550**

**Flow rates up to 400 l/min**

**Pressure range: 210 bar**

**Material: Cast Iron / Steel**

FMND change-over inline filters are designed for inline mounting to filter solid contamination from the fluids used.



# 1. TECHNICAL SPECIFICATIONS

## 1.1. FILTER HOUSING

### Construction

The FMND filter consists of a filter head and screw-in filter bowls.

The standard model is supplied without bypass valve, but with drain screws, and also a connection for differential clogging indicator. The pressure compensation requirement is achieved by raising the change-over lever prior to switching it to the relevant filter side.

## 1.2. FILTER ELEMENTS

Original Hydac filter elements guarantee reliable function and protect hydraulic components and systems which are sensitive to contamination from wear and tear. Performance and quality tests according to international standards guarantee reliable operation of the filter.

HYDAC filters are validated and their quality is continuously monitored according to the following standards:

- DIN ISO 2941: Verification of collapse / burst resistance
- DIN ISO 2942: Verification of fabrication integrity and determination of first bubble point
- DIN ISO 2943: Verification of material compatibility with fluids
- ISO 3724: Verification of flow fatigue characteristics
- ISO 3968: Evaluation of differential pressure versus flow characteristics
- ISO 16889: Multi-pass method for evaluating filtration performance of a filter element

In addition to guaranteeing retention and flow rate characteristics, the filter elements have excellent structural stability.

The careful construction and mechanically stable support of the filter media guarantee above-average beta value stability and flow fatigue characteristics of the filter elements.

The filter elements are available with the following collapse/burst stability values:

Betamicron®(BN/HC) : 30 bar  
Betamicron®(BH/HC) :160 bar

For further information on filter elements:

**Brochure no.: E 7.200../..**

## 1.3. CLOGGING INDICATORS

(also order example)

**VM 5 D . 0 /-V-L24**

### Type of indicator

VM differential pressure indicator

VD differential pressure indicator

### Pressure setting

5 = 5 bar

### Indicator type

B = visual

C = electrical

D = visual/electrical

### Modification number

0 the latest version is always supplied

### Supplementary details

V Viton

L... light with corresponding voltage (24V, 48V, 110V, 220V)

W.. filter suitable for oil-water emulsions (HFA, HFC), NBR seals (VD indicators only)

For other types of clogging indicator and further details on indicators,

**please see brochure, no. E 7.050../..**

## 1.4. SEALS

Choice of NBR (Perbunan) or FPM (Viton).

## 1.5. SPECIAL MODELS AND ACCESSORIES

- with bypass valve

## 1.6. SPARE PARTS

See Original Spare Parts List and Maintenance Instructions.

## 1.7. COMPATIBILITY WITH OPERATING FLUIDS

DIN ISO 2943:

- Hydraulic oils H to HLPD to DIN 51524
- Lubrication oils to DIN 51517, APJ, ACEA, DIN 51515, ISO 6743
- Compressor oils to DIN 51506
- Rapidly biodegradable operating fluids to VDMA 24568 HETG, HEES, HEPG
- Non-flam operating fluids HFC and HFD
- Operating fluids with high water content (>50 % water content) on request

For further details on filter elements:

**Brochure no.: E 7.200../..**

# 2. GENERAL

## Mounting

As inline filter

## Temperature range

-10 °C to +100 °C

## Pressure setting of the differential pressure clogging indicator

$\Delta p_a = 5 \text{ bar} -10\%$

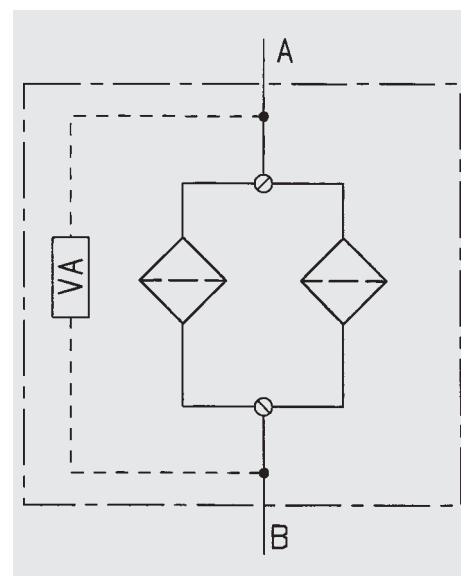
Other pressure settings on request

## Cracking pressure of the bypass valve

$\Delta p_o = 7 \text{ bar} \pm 10\%$

Other cracking pressures on request

## Hydraulic symbol



### 3. MODEL CODE (also order example)

#### 3.1 COMPLETE FILTER

**FMND BN/HC 250 L D F 10 A 1 . X /-V-B7**

**Filter type** \_\_\_\_\_

FMND

**Filter material of element** \_\_\_\_\_

BN/HC Betamicon®  
 BH/HC Betamicon®  
 W/HC Stainless steel wire mesh

**Size** \_\_\_\_\_

160, 250, 400

**Operating pressure** \_\_\_\_\_

L 210 bar

**Type of change-over** \_\_\_\_\_

D segment valve

**Type and size of port** \_\_\_\_\_

standard (●), special FMND (X)

Type	Port	Filter size		
		160	250	400
E	G 1 ¼	●	X	X
F	G 1 ½	X	●	X
K	DN 38*	X	X	●
Z	according to customer specification			

\* Flange SAE 1 1/2"; 3000 psi

**Filtration rating in µm** \_\_\_\_\_

BN/HC, BH/HC : 3, 6, 10, 25  
 W/HC: 25, 50, 100, 200 (on request)

**Type of clogging indicator** \_\_\_\_\_

Y plastic blanking plug in indicator port  
 A steel blanking plug in indicator port  
 B with visual clogging indicator  
 C with electrical clogging indicator  
 D with visual/electrical clogging indicator  
 LE visual-mechanical/electrical indicator  
 LZ visual-mechanical/electrical indicator with  
 75% and 100% switching contact

for other clogging indicators  
 see brochure no. E 7.050../..

**Type code** \_\_\_\_\_

1

**Modification number** \_\_\_\_\_

X the latest version is always supplied

**Supplementary details** \_\_\_\_\_

No details = standard (NBR seals)  
 V FPM (Viton) seals, filter suitable for rapidly biodegradable hydraulic oils and phosphate esters (HFD-R)  
 L.. light with appropriate voltage (24V, 48V, 110V, 220V)  
 LED 2 light emitting diodes up to 24 volt  
 DB LZ indicator with plug to DIN 43651 with 3 LEDs  
 CN LZ indicator with plug to DIN 43651 with 3 LEDs (CNOMO standard)  
 BO LZ indicator with plug and pin connection to BMW specification (M12x1)  
 AV LZ indicator with plug to AUDI specification  
 B7 with bypass valve (cracking pressure 7 bar)  
 W suitable for oil-water emulsions (HFA, HFC), NBR seals, refers exclusively to the type of clogging indicator

3.2 REPLACEMENT ELEMENT  
(also order example)

**0250 DN 010 BN/HC /-V**

**Size** \_\_\_\_\_  
0160, 0250, 0400

**Type** \_\_\_\_\_  
DN

**Filtration rating in  $\mu\text{m}$**  \_\_\_\_\_  
BN/HC, BH/HC: 3, 6, 10, 25  
W/HC: 25, 50, 100, 200 (on request)

**Filter material** \_\_\_\_\_  
BN/HC  
BH/HC  
W/HC

**Supplementary details** \_\_\_\_\_  
V = FPM seals, filter suitable for rapidly biodegradable oils  
and phosphate esters (HFD-R)

**3.2.1 Element specifications**

Filter type	ISOMTD contamination retention capacity in g at $\Delta p = 5\text{bar}$ for BN/HC elements			
	3 $\mu\text{m}$	6 $\mu\text{m}$	10 $\mu\text{m}$	25 $\mu\text{m}$
160	27.5	29.3	33.1	36.7
250	46.0	49.0	55.2	61.3
400	76.2	81.3	91.4	101.5

Filter type	ISOMTD contamination retention capacity in g at $\Delta p = 5\text{bar}$ for BH/HC elements			
	3 $\mu\text{m}$	6 $\mu\text{m}$	10 $\mu\text{m}$	25 $\mu\text{m}$
160	21.8	23.9	27.8	33.8
250	38.1	41.7	48.6	59.0
400	63.6	69.5	81.0	98.3

**3.2.2 Filtration areas for W/HC elements**

Filter type	Filtration area
160	2750 $\text{cm}^2$
250	4400 $\text{cm}^2$
400	6730 $\text{cm}^2$

**4. FILTER SPECIFICATIONS**

Filter type	Port	Element size	Weight [kg] including element
160	G 1 $\frac{1}{4}$	0160 DN...	42.9
250	G 1 $\frac{1}{2}$	0250 DN...	44.2
400	DN 38*	0400 DN...	45.6

\* Flange SAE 1 1/2"; 3000 psi

## 5. FILTER CALCULATION / SIZING

The total pressure drop of a filter at a certain flow rate is the sum of the housing  $\Delta p$  and element  $\Delta p$ .

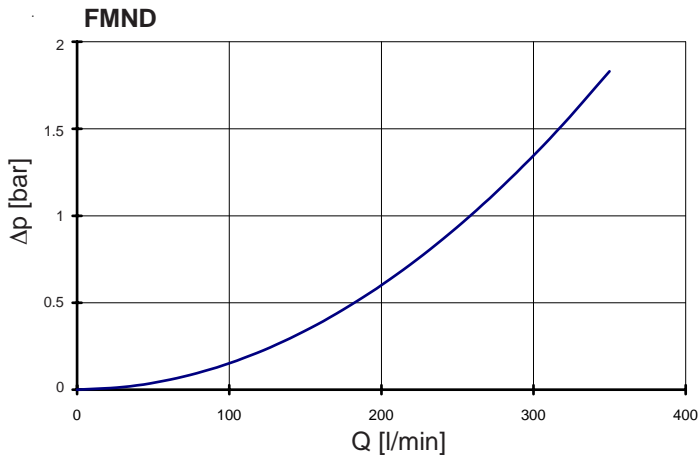
The pressure drop can be determined either with the aid of our Filter Sizing Program, which is available free of charge, or by using the following graphs.

It must be stressed that all of the technical documentation from HYDAC Filtrertechnik always states the pressure drop of the complete filter, i.e. including the change-over valve.

### 5.1 $\Delta P$ -Q HOUSING GRAPHS TO ISO 3968

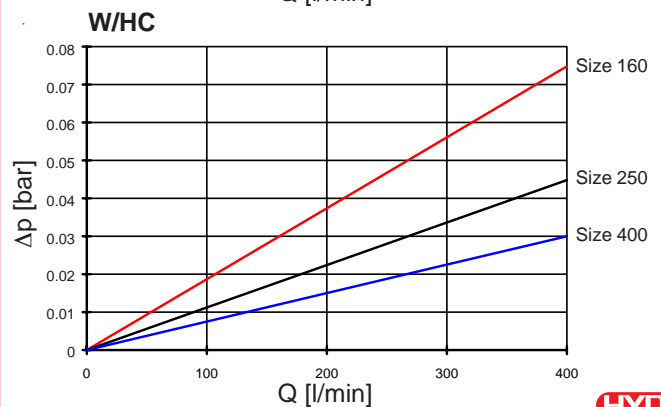
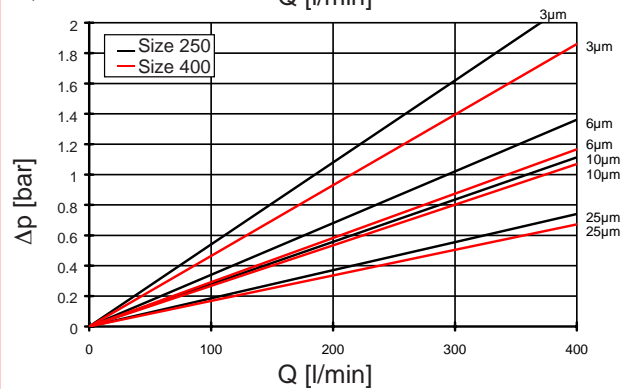
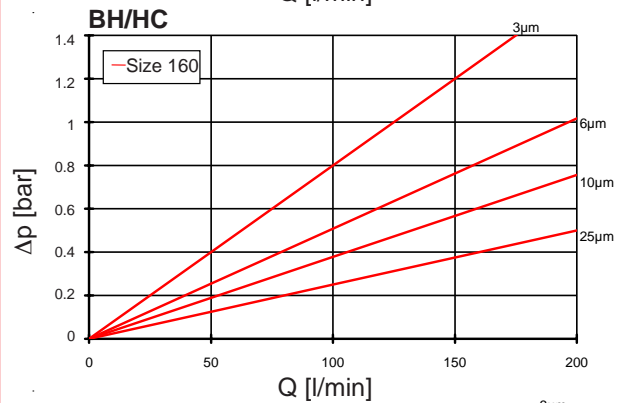
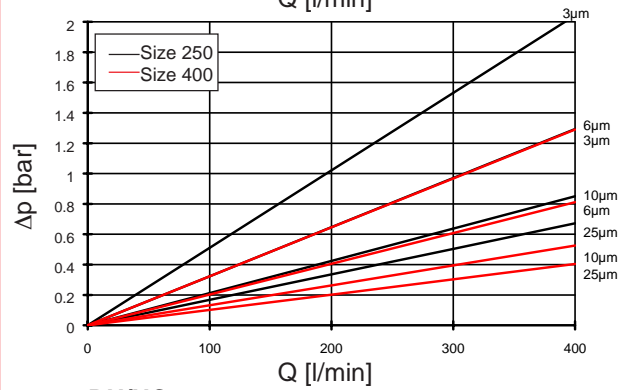
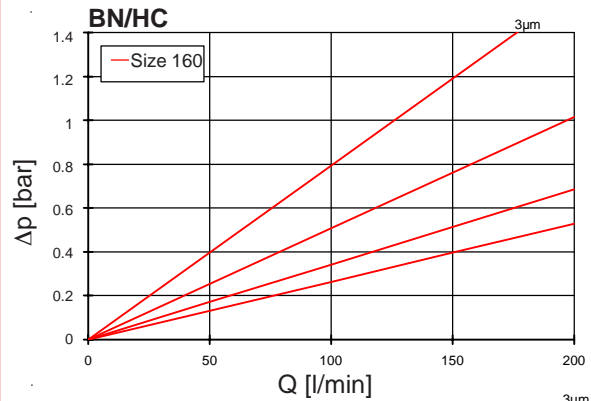
The housing graphs apply to mineral oil with a density of  $0.86 \text{ kg/dm}^3$  and a viscosity of  $30 \text{ mm}^2/\text{s}$ .

In this case, the differential pressure changes proportionally to the density.



### 5.2 $\Delta P$ -Q GRAPHS - FILTER ELEMENTS

The element graphs apply to mineral oil with a kinematic viscosity of  $30 \text{ mm}^2/\text{s}$ . The pressure drop changes proportionally to the change in viscosity (see Example 5.3.).



### 5.3 EXAMPLE

#### General

$$\Delta p_{\text{total}} = \Delta p_{\text{housing}} + \Delta p_{\text{Element}} \cdot \frac{\text{viscosity (mm}^2/\text{s)}}{30\text{mm}^2/\text{s}}$$

$\Delta p_{\text{housing}}$  = to be determined in accordance with Point 5.1.

$\Delta p_{\text{element}}$  = element pressure drop at flow rate Q and viscosity = 30 mm<sup>2</sup>/s determined according to Point 5.2.

### 5.4 EXAMPLE

System parameters:

Q = 150 l/min; FMND 250 with BN/HC element (10 μm); Viscosity = 46 mm<sup>2</sup>/s (ISO VG 46 at 40 °C);

$$\Rightarrow \Delta p_{\text{housing}} = 0.33 \text{ bar (FMND 250)}$$

$$\Delta p_{\text{element}} = 0.3 \text{ bar} \cdot \frac{46 \text{ mm}^2/\text{s}}{30 \text{ mm}^2/\text{s}} = 0.46 \text{ bar}$$

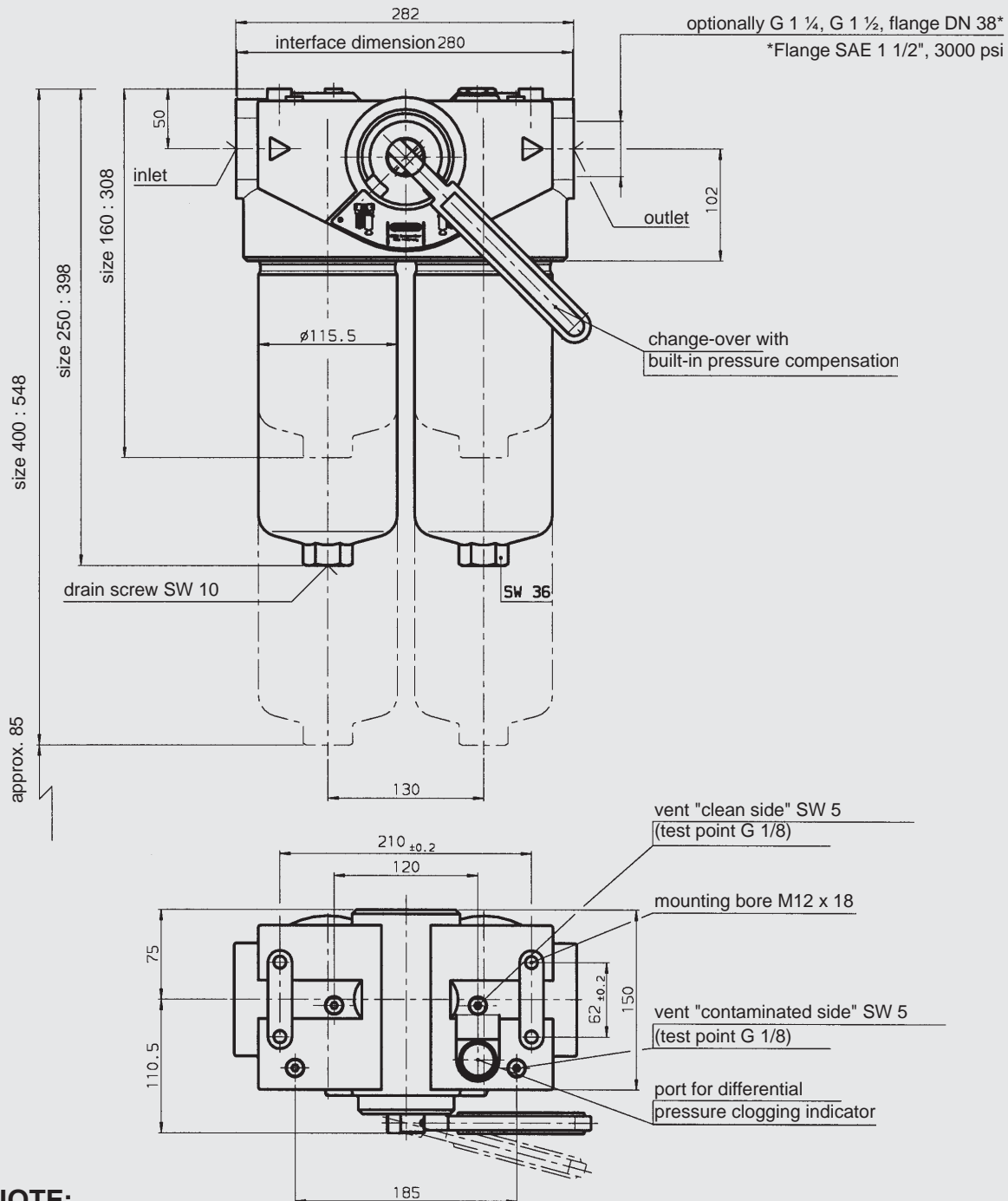
$$\Delta p_{\text{total}} = \Delta p_{\text{housing}} + \Delta p_{\text{element}} = 0.79 \text{ bar}$$

For ease of calculation, our Filter Sizing Program is available.

**NEW:** Filter selection online at [www.hydac.com](http://www.hydac.com) (please click on the following buttons: Products-Filters-Electronic catalogue-Filter Selection HFS)

## 6. DIMENSIONS

### 6.1 FMND 160, 250, 400



### 7. NOTE:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

**NOTES:**