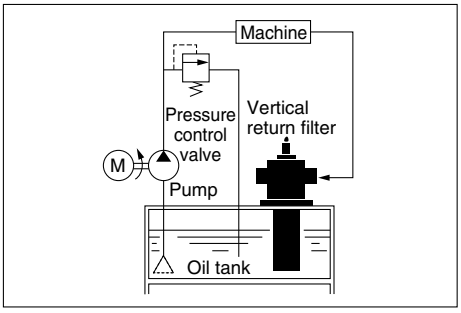
Vertical Return Filter
Series FHBA

The vertical return filters are designed for mounting directly on top of oil tanks for hydraulic systems. They prevent dust generated within the circuit from entering the tank and help keep the oil clean. This efficient configuration reduces the total number of filters required.



Compact design that does not clutter the top of the oil tank
Since most of the filter case is inside the oil tank, very little space is occupied on the top of the tank.

No need for an OUTLET pipe
The filter case also functions as a fluid return pipe, so there is no need to attach a separate OUTLET pipe.

Easy maintenance
Simply open the cover and extract the element from the top of the filter. Replacement is quick and easy.

Designed to prevent collected dust from falling into the oil tank
The collected dust remains inside the element, so it cannot flow out when the relief valve is opened and all collected dust is removed from the case.

Two INLET ports
The filter has two INLET ports, oriented 180° from each other to provide more flexibility when routing pipes.

Specifications

Operating pressure		Max. 1.6 MPa
Operating temperature		Max. 80°C
Main material	**Cover**	Aluminum die-cast
	Body	Aluminum die-cast
	Case	Steel plate
	O-ring/Seal	NBR or FKM Note 2)
Element	**Material**	Paper and micromesh
	Nominal filtration Note)	5, 10, 20 μm
	Differential pressure resistance	0.6 MPa
Differential pressure indicator operating pressure		0.18 MPa
Relief valve open pressure		0.25 MPa

∗ Micromesh elements with other than the standard filtration are available.
∗ The paper elements for water-glycol is 10 μm only.
Note) The material of the O-rings differs depending on the hydraulic fluid used.
Petroleum, Water-glycol, Emulsion: NBR; Phosphoric ester: FKM

Model/Rated Flow Rate

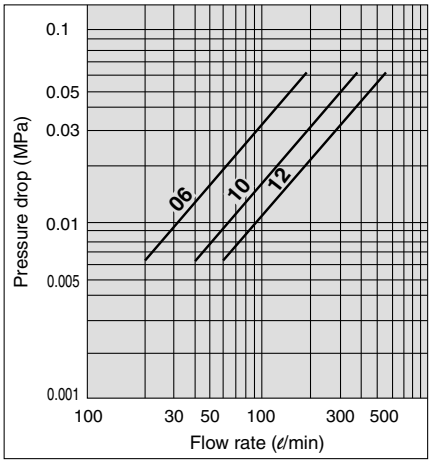
Model	Port size (Rc)	Max. flow rate (ℓ/min)	Weight (kg)	Applicable hydraulic fluid
FHBA□-06	3/4	150	1.7	N: Petroleum W: Water-glycol Emulsion V: Phosphoric ester
FHBA□-10	1 1/4	300	3.7	
FHBA□-12	1 1/2	400	5	

The symbol represented by □ indicates the type of applicable hydraulic fluid (N, W, V).

Accessory/Option

Description	Part no.	Note
Differential pressure indicator	CB-58H	Petroleum, Water-glycol, Emulsion
	CB-58H-V	Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-59H	Petroleum, Water-glycol, Emulsion
	CB-59H-V	Phosphoric ester
Blanking cap (for differential pressure indication part)	AG-12H	Petroleum
	AG-12H-W	Water-glycol, Emulsion
	AG-12H-V	Phosphoric ester

Flow Characteristics



Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 1.6 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

How to Order

FH B A N – 06 – P 010 M R

Hydraulic filter

Operating pressure

B	Max. 1.6 MPa

Type

A	Vertical

Hydraulic fluid

N	Petroleum
W	Water-glycol, Emulsion
V	Phosphoric ester

Port size (Rc)

06	3/4
10	1 1/4
12	1 1/2

Element

P	Paper
M	Micromesh

Nominal filtration

005	5 µm
010	10 µm
020	20 µm

Relief valve

R	With relief valve
D	None

Differential pressure indication

D	None (Blanking cap)
M	Differential pressure indicator
E	Differential pressure indication switch

Made to Order

Nil	None
X0	Non-standard filtration

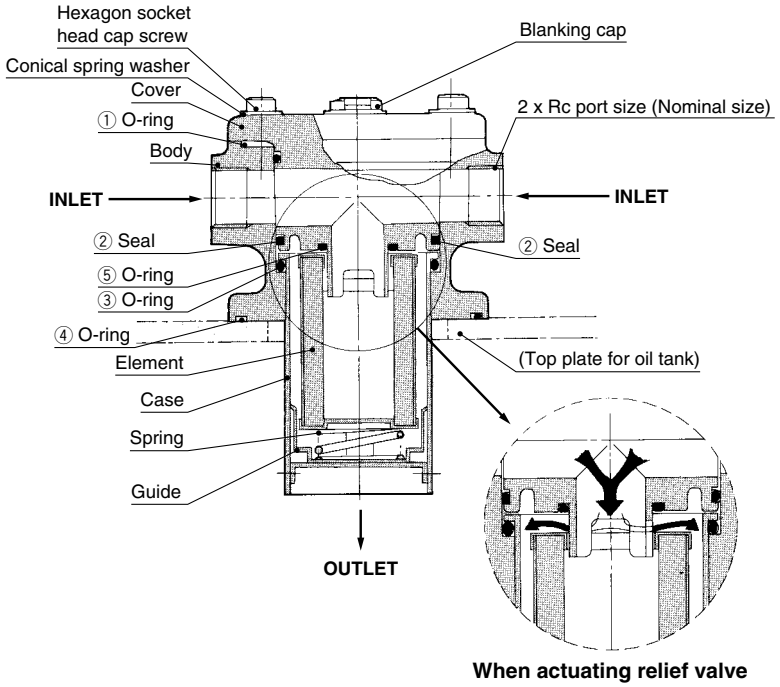
Note) The non-standard filtration is for micromesh elements only. Refer to page 32 for details.

Replacement Element Part No.

Port size (Nominal size)	Paper			Micromesh			Element size
	5 µm	10 µm	20 µm	5 µm	10 µm	20 µm	
06 (3/4B)	EP001H-005N	EP001H-010N	EP001H-020N	EM601H-005N	EM601H-010N	EM601H-020N	ø56 x 180
10 (1 1/4B)	EP101H-005N	EP101H-010N	EP101H-020N	EM701H-005N	EM701H-010N	EM701H-020N	ø76 x 190
12 (1 1/2B)	EP201H-005N	EP201H-010N	EP201H-020N	EM801H-005N	EM801H-010N	EM801H-020N	ø76 x 290

Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type. N: Petroleum, Phosphoric ester, W: Water-glycol, Emulsion.
Note 2) Refer to page 32 for non-standard filtration.
Note 3) Above elements require one element per filter.

Construction/Seal List



When actuating relief valve

Replacement Seal List
(One each of the seal and O-ring types listed below are required per filter.)

No.	Description	Petroleum, Water-glycol, Emulsion			Phosphoric ester		
		FHBA$^{N}_{W}$-06	FHBA$^{N}_{W}$-10	FHBA$^{N}_{W}$-12	FHBAV-06	FHBAV-10	FHBAV-12
①	O-ring for cover	JIS B2401 -1A-G80	JIS B2401-1A-G105		JIS B2401 -4D-G80	JIS B2401-4D-G105	
②	Seal for cover	AL-206H	AL-207H		AL-206H-V	AL-207H-V	
③	O-ring for case	JIS B2401 -1A-G65	JIS B2401-1A-G85		JIS B2401 -4D-G65	JIS B2401-4D-G85	
④	O-ring for body	JIS B2401 -1A-G80	JIS B2401-1A-G105		JIS B2401 -4D-G80	JIS B2401-4D-G105	
⑤	O-ring for element	JIS B2401 -1A-P26	JIS B2401-1A-P40		JIS B2401 -4D-P26	JIS B2401-4D-P40	

Handling Precautions

① Mounting

- Confirm the INLET orientation before mounting. Then connect so that the case is oriented downward. For maintenance, make sure to provide sufficient space above the filter for removing the element.
- The filter has two INLET ports. If one is not used, it must be covered with a plug or the like.
- Before mounting the filter on the oil tank, confirm that ④ the O-ring (see "Construction") is installed on the body.
- Ensure that the opening in the case (OUTLET) is always below the fluid surface. Air could leak into the system if the fluid level drops below the outlet opening.

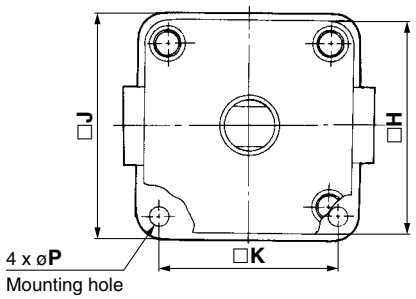
② Operation

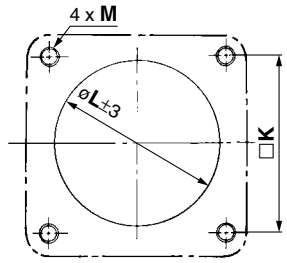
- Operation of the differential pressure indicator in cold weather, such as during winter, mostly occurs due to high viscosity, so check whether it is from clogging or not after normal operation starts.
- Once the differential pressure indicator is triggered, the indication continues to be displayed until the indicator is reset (by depressing the reset button), even if the pump stops operating. Reset after replacing the element and restarting operation, or after normal operation starts in cold weather such as during winter.
- When using a differential pressure indication switch and if a filter clogged signal is incorporated into the sequence circuit of the machine, make sure to design the system so the filter clogged signal does not operate until normal operation starts.

③ Element replacement

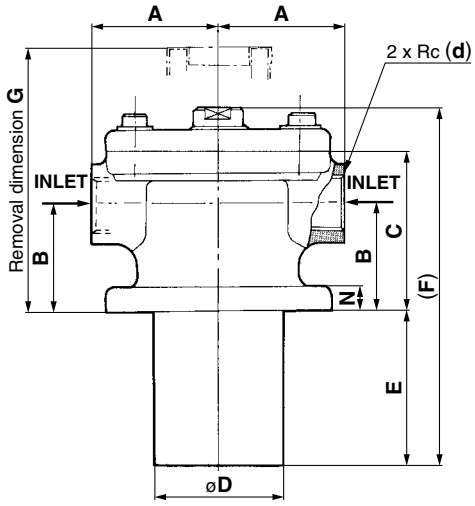
- When the pressure difference reaches 0.18 MPa during filter operation (actuating the differential pressure indicator), stop operation, and replace the paper element or wash the micromesh element. If the micromesh element has reached the end of its service life, replace it.
- When replacing the element, check the O-rings and replace them if they are damaged.
- When washing the micromesh element, do not wipe it using a stiff brush or rag.

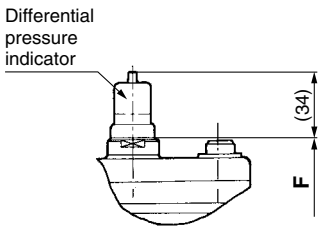
Dimensions



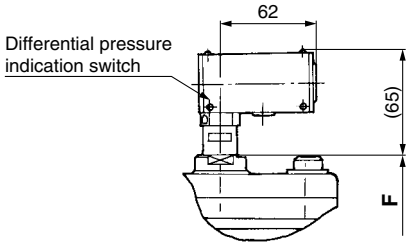


Mounting base dimensions





Differential pressure indicator



Differential pressure indication switch

(mm)

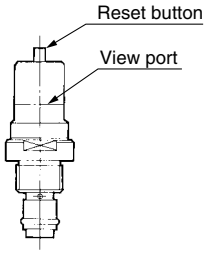
Port size Rc (d)	A	B	C	D	E	F	G	H	J	K	L	M	N	P
3/4	55	54	76	65	200	299	270	95	100	75	70	M8	12	10
1 1/4	75	76	112	89.1	210	342	320	120	128	100	95	M10	14	12
1 1/2					310	442	420							

Differential Pressure Indication

Two indication methods are available: differential pressure indicator and differential pressure indication switch. These can be mounted on all filter models.

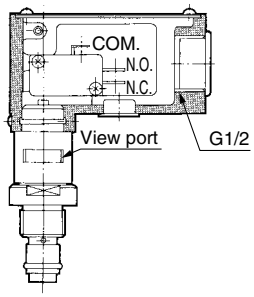
■ Differential pressure indicator

- Operating pressure—0.18 MPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (2-stage display reset type)
- Perform element replacement when the red ring floats up and covers the entire view port.



■ Differential pressure indication switch

- Operating pressure—0.18 MPa
- When a value has been displayed, it will be automatically reset when the pump is stopped. (Non-reset type)
- This is a visual dual-purpose 2-stage display. Perform element replacement when the switch has actuated (when the red ring floats up and covers the entire view port).
- N.C. and N.O. common



Microswitch Rating

Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
	Resistance load		Light load		Inductive load		Motor load	
	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open
AC125	5		1.5	0.7	4		2.5	1.3
AC250	5		1	0.5	4		1.5	0.8
DC8	5		3		5	4	3	
DC14	5		3		4		3	
DC30	5		3		4		3	
DC125	0.4		0.1		0.4		0.1	
DC250	0.3		0.05		0.3		0.05	

Precautions

1. The figures in the above table indicate stationary current.
2. An inductive load has a power factor (AC) of 0.75 or more, and a time constant (DC) of 7 msec or less.
3. A light load has an inrush current 10 times greater.
4. Lead wires are connected using a screw tightening terminal.
5. The electrical entry is equipped with a conduit (G1/2) and grommet.
6. Please wire freely to the microswitch indication symbol 1(COM.), 2(N.C.) and 3(N.O.).
7. If a holding mechanism is necessary for the non-reset type, provide it using electric circuits.

Series FH
Made to Order (Non-Standard Filtration)

Please contact SMC for detailed specifications, lead times and prices.

How to Order

Filter symbol (Refer to "How to Order" for each series) **X0**

Note) Made-to-order specifications (non-standard filtration rating) are available only for micromesh elements (element symbol: M).

Made to Order (Non-standard filtration)

Hydraulic Filter Non-Standard Filtration Replacement Element Part No.

Description	Model	Port size	Replacement element part no.		Element size
			Micromesh element	Micromesh element (With relief valve)	
Vertical suction filter	**FHIA** (Refer to P. 3.)	1/2	EM001H-*1*2	—	ø65 x ℓ90
		3/4, 1	EM101H-*1*2	—	ø85 x ℓ110
		1 1/4, 1 1/2	EM201H-*1*2	—	ø100 x ℓ160
		2	EM301H-*1*2	—	ø120 x ℓ180
		2 1/2, 3	EM401H-*1*2	—	ø140 x ℓ200
		3 1/2, 4	EM501H-*1*2	—	ø180 x ℓ260
Suction filter with case	**FH99** (Refer to P. 7.)	1/2, 3/4	EM230-*1*2	EM520-*1*2	ø65 x ℓ90
		1,1 1/4	EM330-*1*2	EM620-*1*2	ø82 x ℓ133
		1 1/2	EM430-*1*2	EM720-*1*2	ø104 x ℓ177
		2	EM530-*1*2	EM820-*1*2	ø104 x ℓ177
		2 1/2	EM630-*1*2	EM920-*1*2	ø132 x ℓ212
		3	EM730-*1*2	EM030-*1*2	ø132 x ℓ212
		3 1/2, 4	EM830-*1*2	EM130-*1*2	ø155 x ℓ193
Suction guard	**FHG** (Refer to P. 11.)	1/2, 3/4, 1	EM220-*1*2	—	ø69 x ℓ88
		1 1/4, 1 1/2, 2	EM320-*1*2	—	ø89 x ℓ123
		2 1/2, 3	EM420-*1*2	—	ø109 x ℓ188
Line filter	**FH34 FH44 FH54 FH64** (Refer to P. 15.)	3/8, 1/2	EM040-*1*2	—	ø53.1 x ℓ90
		3/4, 1	EM910-*1*2	—	ø73.5 x ℓ117
		1 1/4, 1 1/2	EM140-*1*2	—	ø73.5 x ℓ195
		2	EM930-*1*2	—	ø87.6 x ℓ282
		2 1/2, 3	EM240-*1*2	—	ø118.7 x ℓ280
Vertical return filter	**FHBA** (Refer to P. 19.)	3/4	EM601H-*1*2	—	ø56 x ℓ180
		1 1/4	EM701H-*1*2	—	ø76 x ℓ190
		1 1/2	EM801H-*1*2	—	ø76 x ℓ290
Return filter	**FH100** (Refer to P. 22.)	3/4, 1	EM810-*1*2	—	ø65 x ℓ95
		1 1/4, 1 1/2	EM910-*1*2	—	ø73.5 x ℓ117
		2	EM020-*1*2	—	ø87.6 x ℓ157
		2 1/2, 3	EM120-*1*2	—	ø118.7 x ℓ207
Oil filter	**FH150** (Refer to P. 26.)	1/4, 3/8, 1/2	EM040-*1*2	—	ø53 x ℓ90

Note) In the table above ∗1 indicates nominal filtration and ∗2 indicates hydraulic fluid type.

Nominal Filtration

Symbol (∗1)	µm
003	3
005	5
010	10
020	20
040	40
074	74
105	105
149	149
270	270

Hydraulic Fluid

Symbol (∗2)	Type
N	Petroleum
W	Water-glycol, Emulsion
V	Phosphoric ester