Hydraulic Filters

Series	Operating pressure	Port size	Element (μm) nominal filtration	Accessory (Option)	Page
Vertical Suction Filter FHIA series	Negative pressure	1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	Micromesh 74, 105, 149	Differential pressure indicator Differential pressure indication switch Blanking cap	**2**
Suction Filter with Case FH99 series	Negative pressure	1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4	Micromesh 74, 105, 149	Differential pressure indicator Differential pressure indication switch Blanking cap	**6**
Suction Guard FHG series	Negative pressure	1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3	Micromesh 74, 105, 149	Differential pressure indicator Differential pressure indication switch Air breezer Cap	**10**
Line Filter FH34/44/54/64 series	Max. 3.5, 7, 14, 21 MPa	3/8, 1/2, 3/4, 1, 1 1/4 1 1/2, 2, 2 1/2, 3	Paper 5, 10, 20 (Micromesh)	Differential pressure indicator Differential pressure indication switch Blanking cap	**14**
Vertical Return Filter FHBA series	Max. 1.6 MPa	3/4, 1 1/4, 1 1/2	Paper 5, 10, 20 Micromesh 5, 10, 20	Differential pressure indicator Differential pressure indication switch Blanking cap	**18**
Return Filter FH100 series	Max. 1 MPa	3/4, 1, 1 1/4, 1 1/2, 2 2 1/2, 3	Paper 5, 10, 20 Micromesh 74, 105	Differential pressure indicator Differential pressure indication switch Blanking cap	**21**
Oil Filter FH150 series	Max. 1 MPa	1/4, 3/8, 1/2	Paper 5, 10, 20 (Micromesh)	Differential pressure indicator Differential pressure indication switch Blanking cap Bracket	**25**
Magnetic Separator FHM series	—	—	—	—	**29**

Vertical Suction Filter
Series FHIA

These vertical suction filters are designed for installation between the pump and reservoir tank. Their main function is to protect the pump.

No air pockets
There are no places for air pockets to form. This prevents damage to the pump and enables normal operation to start immediately.

Elimination of all collected matter
All collected matter can be disposed of reliably when the element is replaced. There is no danger of collected matter dropping back into the tank.

No drain port required
The structure of the filter does not contain areas for drain fluid to collect, so there is no need to manually drain the pump.

Easy element replacement
Simply open the cover to quickly replace the element without touching the pipes. The element is extracted from the top, so no fluid can leak out.

Compact and lightweight
The compact and lightweight design employs an aluminum casted housing.

Clogging sensor
The sensor indicates when the element is becoming dirty, facilitating maintenance and helping to avoid pump damage such as cavitations.
Differential pressure indicator/two-stage indicator, reset type
Differential pressure indication switch/visual combined, non-reset type

Specifications

Fluid		Hydraulic fluid
Operating pressure		Negative pressure
Operating temperature		Max. 80°C
Main material	**Cover/Case**	Aluminum cast
	O-ring	NBR or FKM Note)
	Seal	NBR or EPDM Note)
Element	**Material**	Micromesh
	Nominal filtration	74, 105, 149 μm (200, 150, 100 mesh)
	Differential pressure resistance	0.15 MPa
Differential pressure indicator operating pressure		20.0 kPa
Relief valve open pressure		26.7 kPa

Note) The material of the O-rings and seals differs depending on the hydraulic fluid used.
Petroleum, Water-glycol, Emulsion: NBR; Phosphoric ester: FKM, EPDM

Model/Rated Flow Rate

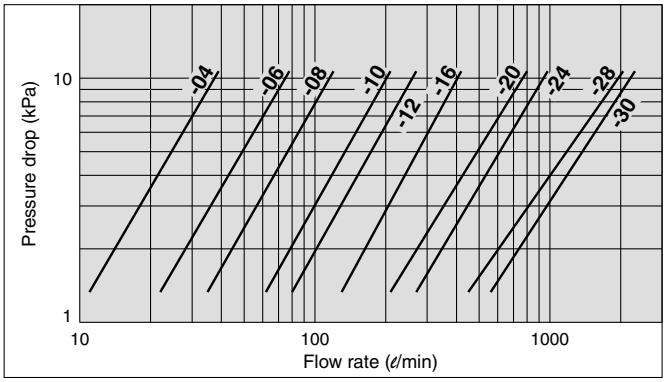
Model	Flange port size Note)	Rated flow rate (ℓ/min)
FHIA□-04	1/2B	30
FHIA□-06	3/4B	50
FHIA□-08	1B	95
FHIA□-10	1 1/4B	150
FHIA□-12	1 1/2B	220
FHIA□-16	2B	350
FHIA□-20	2 1/2B	550
FHIA□-24	3B	770
FHIA□-28	3 1/2B	1000
FHIA□-32	4B	1300

The symbol represented by □ indicates the type of applicable hydraulic fluid. N: Petroleum, W: Water-glycol, Emulsion, V: Phosphoric ester
Note) Fitted with companion flange. (Flange configuration is exclusive to SMC.)

Accessory/Option

Description	Part no.	Note
Differential pressure indicator	CB-56H	Petroleum, Water-glycol, Emulsion
	CB-56H-V	Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-57H	Petroleum, Water-glycol, Emulsion
	CB-57H-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
Viscosity: 45 mm²/s
Filter material: Micromesh
Nominal filtration: 74 μm to 149 μm

SMC

How to Order

FH I A N – 04 – M 074 M R

Hydraulic filter

Model

I	Suction

Type

A	Vertical

Hydraulic fluid

N	Petroleum
W	Water-glycol, Emulsion
V	Phosphoric ester

Port size

04	1/2B
06	3/4B
08	1B
10	1 1/4B
12	1 1/2B
16	2B
20	2 1/2B
24	3B
28	3 1/2B
32	4B

Element

M	Micromesh

Nominal filtration

074	74 µm
105	105 µm
149	149 µm

Differential pressure indication

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

Note) N.C. and N.O. common

Relief valve

R	With relief valve
D	None (Blanking plate)

Made to Order

Nil	None
X0	Non-standard filtration

Note) Refer to page 32 for details.

Replacement Element Part No.

Port size (Nominal size)	74 µm (200 mesh)	105 µm (150 mesh)	149 µm (100 mesh)	Element size
04 (1/2B)	EM001H-074N	EM001H-105N	EM001H-149N	ø65 x 90
06 (3/4B), **08** (1B)	EM101H-074N	EM101H-105N	EM101H-149N	ø85 x 110
10 (1 1/4B), **12** (1 1/2B)	EM201H-074N	EM201H-105N	EM201H-149N	ø100 x 160
16 (2B)	EM301H-074N	EM301H-105N	EM301H-149N	ø120 x 180
20 (2 1/2B), **24** (3B)	EM401H-074N	EM401H-105N	EM401H-149N	ø140 x 200
28 (3 1/2B), **32** (4B)	EM501H-074N	EM501H-105N	EM501H-149N	ø180 x 260

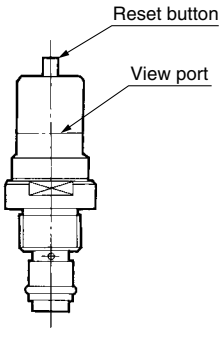
Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.
N: Petroleum, Phosphoric ester, W: Water-glycol, Emulsion.
Note 2) Refer to page 32 for non-standard filtration.
Note 3) Above elements require one element per filter.

Differential Pressure Indication

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

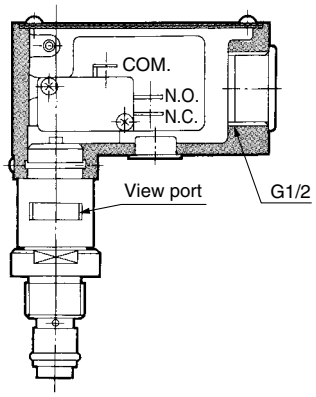
■ Differential pressure indicator

- Operating pressure—20 kPa
- 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—20 kPa
- 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



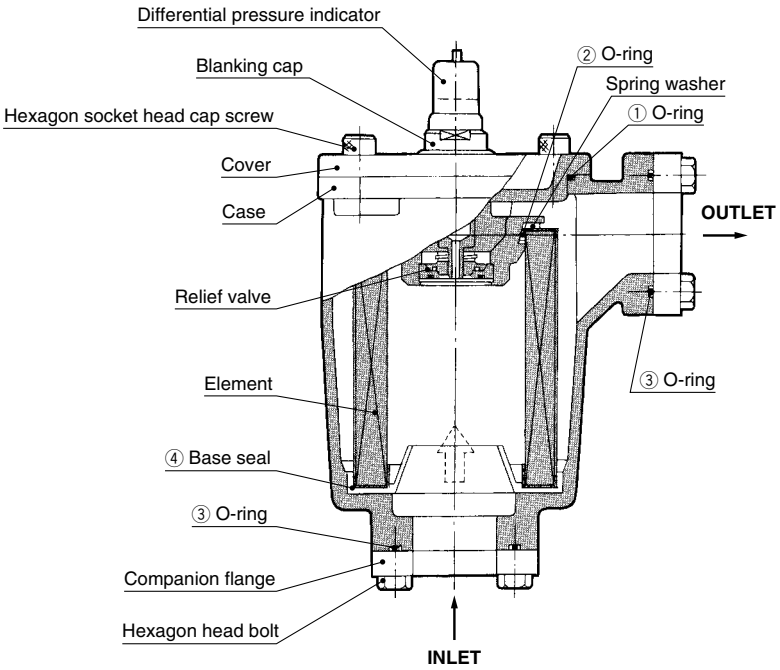
Microswitch Rating

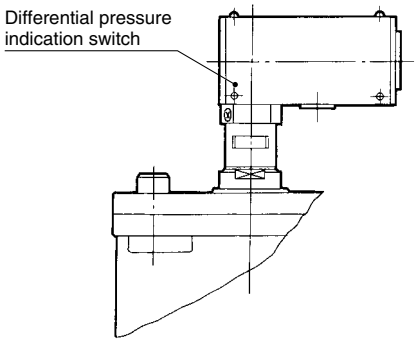
Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
	Resistance load		Light load		Inductive load		Motor load	
	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open
AC125	5		1.5	0.7	4		2.5	1.3
AC250	5		1	0.5	4		1.5	0.8
DC8	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.

Construction/Seal List





Differential pressure indication switch

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

No.			①	②	③	④
Description / Model		Hydraulic fluid type	O-ring for cover case	O-ring for element	O-ring for companion flange	Element base seal
			Standard	Standard	Standard	Part no.
FHIA N/W-	04	Petroleum, Emulsion, Water-glycol	JIS B2401-1A-G70	JIS B2401-1A-G35	JIS B2401-1A-G30	AL-196H
	06		JIS B2401-1A-G90	JIS B2401-1A-G50	JIS B2401-1A-G45	AL-197H
	08					
	10		JIS B2401-1A-G105	JIS B2401-1A-G65	JIS B2401-1A-G55	AL-198H
	12					
	16		JIS B2401-1A-G125	JIS B2401-1A-G80	JIS B2401-1A-G70	AL-199H
	20		JIS B2401-1A-G145	JIS B2401-1A-G100	JIS B2401-1A-G95	AL-200H
	24					
	28		JIS B2401-1A-G185	JIS B2401-1A-G140	JIS B2401-1A-G125	AL-201H
	32					
FHIA V-	04	Phosphoric ester	JIS B2401-4D-G70	JIS B2401-4D-G35	JIS B2401-4D-G30	AL-196H-V
	06		JIS B2401-4D-G90	JIS B2401-4D-G50	JIS B2401-4D-G45	AL-197H-V
	08					
	10		JIS B2401-4D-G105	JIS B2401-4D-G65	JIS B2401-4D-G55	AL-198H-V
	12					
	16		JIS B2401-4D-G125	JIS B2401-4D-G80	JIS B2401-4D-G70	AL-199H-V
	20		JIS B2401-4D-G145	JIS B2401-4D-G100	JIS B2401-4D-G95	AL-200H-V
	24					
	28		JIS B2401-4D-G185	JIS B2401-4D-G140	JIS B2401-4D-G125	AL-201H-V
	32					

Handling Precautions

① Mounting

- Confirm INLET and OUTLET before connecting.
- For maintenance, make sure to provide sufficient space above the filter for removing the element.

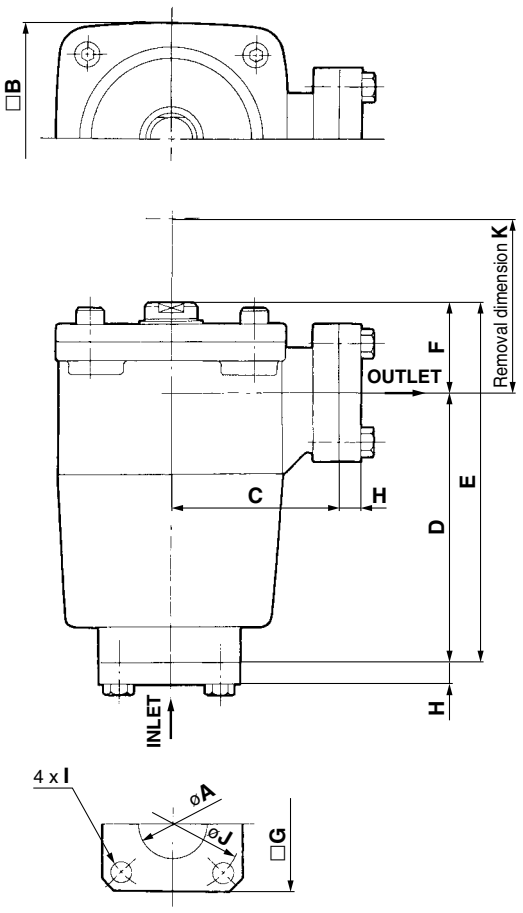
② Operation

- 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.
- If the differential pressure indicator is the reset type, make sure to reset it after normal operation starts in cold weather such as during winter.
- When using a differential pressure indication switch, 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.

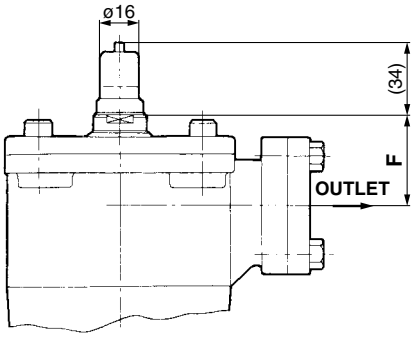
③ Element replacement

- When the pressure difference reaches 20 kPa during filter operation (actuating the differential pressure indicator), stop operation and either wash or replace the element.
- During disassembly and assembly, check that there is no cracking of or damage to the O-rings.
- When washing the element, do not wipe it using a stiff brush or rag.
- After washing the element, make sure the base seal is properly mounted.

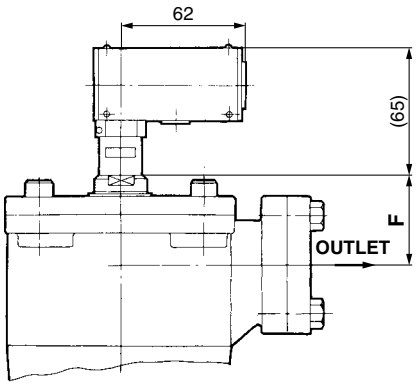
Dimensions



Differential pressure indicator



Differential pressure indication switch



(mm)

Model	A	B	C	D	E	F	G	H	I	J	K	Weight (kg)
FHIA□-04	22.2	90	72	116	154	38	60	11	M8 x 25	56	260	1.8
FHIA□-06	27.7	110	80	133	177	44	70	11	M8 x 25	70	290	2.7
FHIA□-08	34.5											
FHIA□-10	43.2	128	95	185	234	49	86	15	M10 x 30	86	340	4.6
FHIA□-12	49.1											
FHIA□-16	61.1	152	110	214	268.5	54.5	100	15	M12 x 35	102	370	6.1
FHIA□-20	77.1	176	125	220	290.5	70.5	120	15	M12 x 35	130	410	9.5
FHIA□-24	90.0											8.0
FHIA□-28	102.6	224	155	280	364.5	84.5	150	15	M16 x 40	166	490	14.0
FHIA□-32	115.4											13.5

Suction Filter with Case
Series FH99

Compact and lightweight
The compact and lightweight design employs an aluminum casted housing.

Prevents pump cavitation
The inlet size is larger than the outlet size to prevent pump cavitation.

Easy element maintenance
Simply open the cover to detach the element without touching the pipes.

Easy-mounting pipes
There is no mounting orientation, and two types are available: threaded and flange.

Accessories available for a variety of applications
Available accessories include differential pressure indicators (differential pressure indicator or differential pressure indication switch), relief valves, and companion flanges.

Clogging sensor
The filter can be fitted with a differential pressure indicator (two-stage indicator, reset type) or differential pressure indication switch (visual combined, non-reset type).

Specifications

Fluid		Hydraulic fluid
Operating pressure		Negative pressure
Operating temperature		Max. 80°C
Main material	**Cover/Case**	Aluminum cast
	O-ring	NBR or FKM Note)
	Seal	NBR or EPDM Note)
Element	**Material**	Micromesh
	Nominal filtration	74, 105, 149 μm (200, 150, 100 mesh)
	Differential pressure resistance	0.2 MPa
Differential pressure indicator operating pressure		24.0 kPa
Relief valve open pressure		33.3 kPa

Note) The material of the O-rings and seals differs depending on the hydraulic fluid used.
Petroleum, Water-glycol, Emulsion: NBR; Phosphoric ester: FKM, EPDM

Model/Rated Flow Rate

Model	Port size Note)		Rated flow rate (ℓ/min)
	INLET	OUTLET	
FH990-04	1^B	$1/2^B$	20
FH990-06	1^B	$3/4^B$	50
FH990-08	$1\ 1/2^B$	1^B	100
FH990-10	$1\ 1/2^B$	$1\ 1/4^B$	150
FH990-12	2^B	$1\ 1/2^B$	200
FH990-16	2^B	2^B	300
FH991-20	$2\ 1/2^B$	$2\ 1/2^B$	450
FH991-24	3^B	3^B	600
FH991-28	$3\ 1/2^B$	$3\ 1/2^B$	750
FH991-32	4^B	4^B	900

Note) Both flange and threaded connections are supported. However, only flange types for FH991-20 to FH991-32 are compatible. The flange configuration is exclusive to SMC. Tapered threaded types (female) conforming to JIS B 0203.

Accessory/Option

Description	Part no.	Note
Differential pressure indicator	CB-54H	Petroleum, Water-glycol, Emulsion
	CB-54H-V	Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-55H	Petroleum, Water-glycol, Emulsion
	CB-55H-V	Phosphoric ester
Blanking cap (for differential pressure indication part)	AG-12H	Petroleum
	AG-12H-W	Water-glycol, Emulsion
	AG-12H-V	Phosphoric ester

How to Order

FH 9 90 – 04 – 0 0 0 – M 074 [ ] [ ]

Hydraulic filter

Rated pressure

9	Negative pressure

Construction/Connection

90	Common with L-type threaded and flange
91	L-type flange

Port size (Outlet side)

04	1/2B
06	3/4B
08	1B
10	1 1/4B
12	1 1/2B
16	2B
20	2 1/2B
24	3B
28	3 1/2B
32	4B

Differential pressure indication

0	None
4	Differential pressure indicator
5	Differential pressure indication switch Note)

Note) N.C. and N.O. common

Relief valve

0	With relief valve
1	None

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

Element

M	Micromesh

Nominal filtration

074	74 µm
105	105 µm
149	149 µm

Companion flange

Nil	None
F	With companion flange

Made to Order

Nil	None
X0	Non-standard filtration

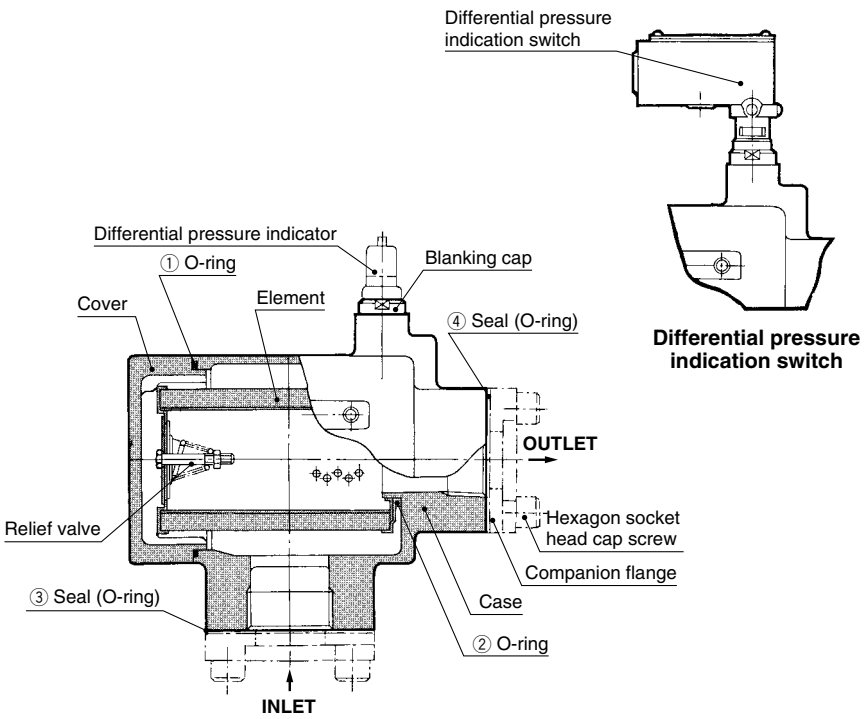
Note) Refer to page 32 for details.

Replacement Element Part No. (including O-ring for element)

Model	With relief valve			Without relief valve			Element size
	74 µm (200 mesh)	105 µm (150 mesh)	149 µm (100 mesh)	74 µm (200 mesh)	105 µm (150 mesh)	149 µm (100 mesh)	
FH990-04/06	EM520-074N	EM520-105N	EM520-149N	EM230-074N	EM230-105N	EM230-149N	ø65 x 90
FH990-08/10	EM620-074N	EM620-105N	EM620-149N	EM330-074N	EM330-105N	EM330-149N	ø82 x 133
FH990-12	EM720-074N	EM720-105N	EM720-149N	EM430-074N	EM430-105N	EM430-149N	ø104 x 177
FH990-16	EM820-074N	EM820-105N	EM820-149N	EM530-074N	EM530-105N	EM530-149N	ø104 x 177
FH991-20	EM920-074N	EM920-105N	EM920-149N	EM630-074N	EM630-105N	EM630-149N	ø132 x 212
FH991-24	EM030-074N	EM030-105N	EM030-149N	EM730-074N	EM730-105N	EM730-149N	ø132 x 212
FH991-28/32	EM130-074N	EM130-105N	EM130-149N	EM830-074N	EM830-105N	EM830-149N	ø155 x 193

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

Construction/Seal List

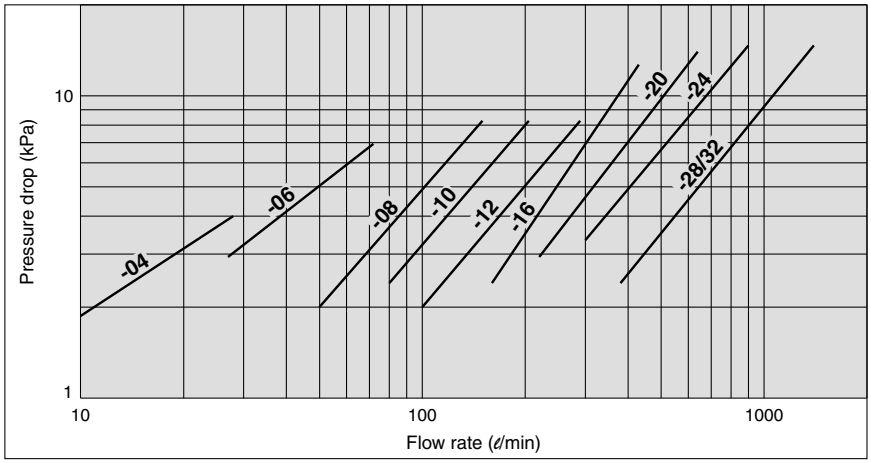


Replacement Seal List (One each of the seal and O-ring types listed below are required per filter.)

No.			①	②	③	④
Description / Model		Hydraulic fluid type	O-ring for cover case	O-ring for element	Seal for companion flange (O-ring) IN side	Seal for companion flange (O-ring) OUT side
			Standard	Standard	Part no.	Part no.
FH990-	04	Petroleum, Emulsion, Water-glycol	JIS B2401 -1A-V85	JIS B2401 -1A-P28	AL-130H	AL-128H
	06					AL-129H
	08		JIS B2401 -1A-V100	JIS B2401 -1A-P42	AL-133H	AL-131H
	10					AL-132H
	12		JIS B2401 -1A-V120	JIS B2401 -1A-P60	AL-135H	AL-134H
	16					AL-135H
FH991-	20		JIS B2401 -1A-V150	JIS B2401 -1A-P90	AL-136H	AL-136H
	24				AL-137H	AL-137H
	28		JIS B2401 -1A-V175	JIS B2401 -1A-P120	JIS B2401 -1A-V120	JIS B2401 -1A-V120
	32					
FH990-	04	Phosphoric ester	JIS B2401 -4D-V85	JIS B2401 -4D-P28	AL-130H-V	AL-128H-V
	06					AL-129H-V
	08		JIS B2401 -4D-V100	JIS B2401 -4D-P42	AL-133H-V	AL-131H-V
	10					AL-132H-V
	12		JIS B2401 -4D-V120	JIS B2401 -4D-P60	AL-135H-V	AL-134H-V
	16					AL-135H-V
FH991-	20		JIS B2401 -4D-V150	JIS B2401 -4D-P90	AL-136H-V	AL-136H-V
	24				AL-137H-V	AL-137H-V
	28		JIS B2401 -4D-V175	JIS B2401 -4D-P120	JIS B2401 -4D-V120	JIS B2401 -4D-V120
	32					

Flow Characteristics

FH99□



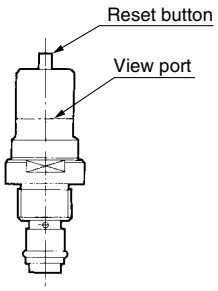
Conditions
Fluid: Turbine oil Class 2 VG56
Viscosity: 45 mm²/s
Filter material: Micromesh
Nominal filtration: 74 μm

Differential Pressure Indication

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

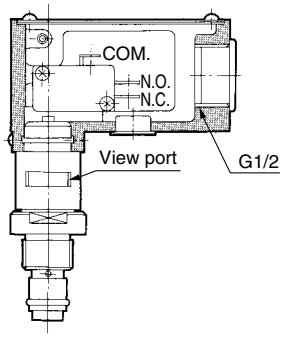
■ Differential pressure indicator

- Operating pressure—24 kPa
- 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—24 kPa
- 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.

Handling Precautions

① Mounting

- Confirm INLET and OUTLET before connecting.
- For maintenance, make sure to provide sufficient space above the filter for removing the element.

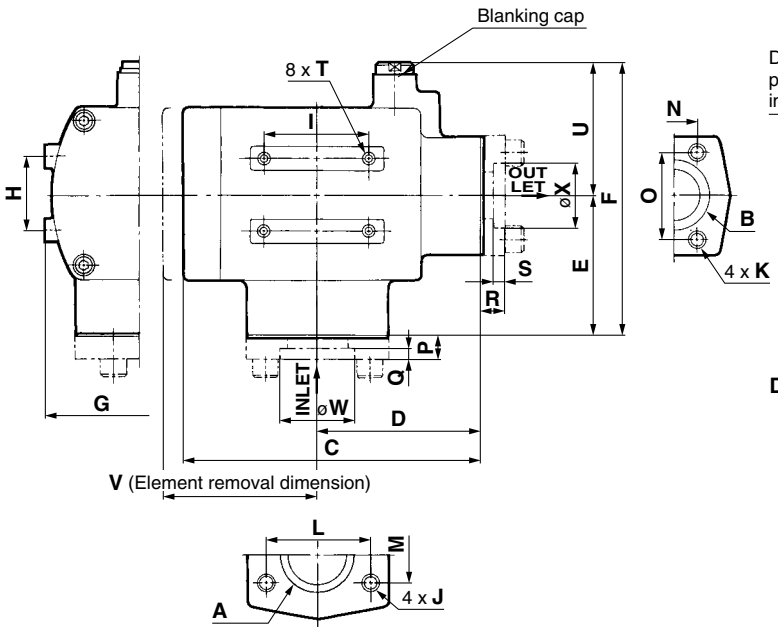
② Operation

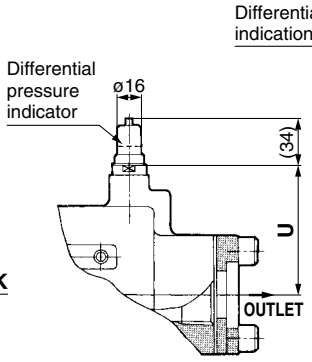
- Operation of the differential pressure indicator in cold weather, such as during winter, mostly occurs due to high viscosity, so check whether it is from clogging or not after normal operation starts.
- If the differential pressure indicator is the reset type, make sure to reset it after replacing the element 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

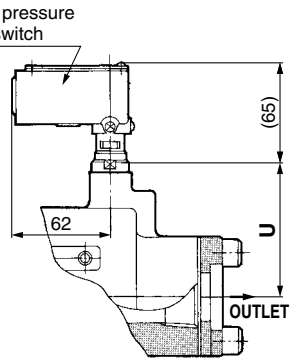
- When the pressure difference reaches 24 kPa during filter operation (actuating the differential pressure indicator), stop operation and either wash or replace the element.
- During disassembly and assembly, check that there is no cracking of or damage to the O-rings.
- When installing and removing an element, do not scratch or damage it by touching the corners of the case, etc.
- When washing the element, do not wipe it using a stiff brush or rag.

Dimensions





Differential pressure indicator



Differential pressure indication switch

(mm)

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
FH990-04	1B	1/2B	150	75	80	164	112	40	40	M10 x 1.5 Thread depth 22	M10 x 1.5 Thread depth 22	52.4	26.2	22.2	47.6	16.5	6	16.5
FH990-06		3/4B																
FH990-08	1 1/2B	1B	200	110	95	186	126	50	70	M12 x 1.75 Thread depth 23	M12 x 1.75 Thread depth 23	69.9	35.7	30.2	58.7	16.5	8	16.5
FH990-10		1 1/4B																
FH990-12	2B	1 1/2B	250	140	115	218	150	60	90	M12 x 1.75 Thread depth 23	M12 x 1.75 Thread depth 23	77.8	42.9	42.9	77.8	21.5	10	21.5
FH990-16		2B																
FH991-20	2 1/2B		300	170	150	268	180	80	120	M16 x 2 Thread depth 34	M16 x 2 Thread depth 34	106.4	61.9	61.9	106.4	21.5	10	21.5
FH991-24	3B																	
FH991-28	3 1/2B		280	145	140	273	210	80	120	M16 x 2 Thread depth 30	M16 x 2 Thread depth 30	130	78	78	130	20	5	20
FH991-32	4B																	

Model	S	T	U	V	W	X	Weight (kg)	
							Threaded without flange	With flange
FH990-04	6	M8 x 1.25 Thread depth 8	84	180	35	23	2.4	3.4
FH990-06						28		
FH990-08	8	M8 x 1.25 Thread depth 8	91	240	50	35	3.6	5.0
FH990-10						44		
FH990-12	10	M8 x 1.25 Thread depth 9	103	300	62	50	5.4	7.8
FH990-16						62		
FH991-20	10	M10 x 1.5 Thread depth 12	118	360	77		9.7	13.5
FH991-24					90			
FH991-28	5	M10 x 1.5 Thread depth 12	133	340	102		10.6	14.4
FH991-32					115			

Note) Both flange and thread connections are supported. However, only flange types for FH991-20 to FH991-32 are compatible. The flange configuration is exclusive to SMC. Tapered thread types (female) conforming to JIS B 0203.

Suction Guard
Series FHG

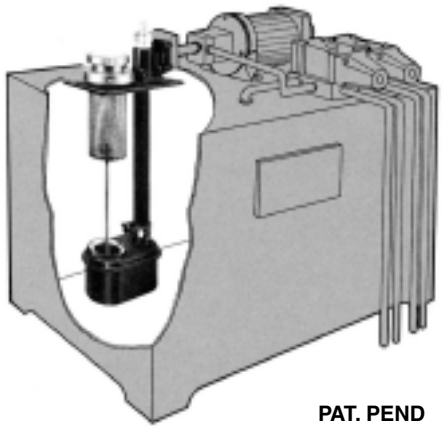
Designed to prevent collected dust from falling into the tank
All collected dust can be disposed completely when the element is replaced. There is no danger of collected matter dropping back into the tank.

No need to replace flushing oil
Since all dust is eliminated during trial operation, it is not necessary to replace flushing oil. This reduces both labor and wasted oil.

Easy maintenance and no air mixing
No special tools are required for maintenance, and insertion-type element replacement is quick and easy. This helps prevent air mixture into the suction line and pump damage.

Compact tank equipment
The lubrication port strainer, suction filter, and air breezer are all integrated into a single unit, reducing the volume of equipment around the tank.

Selection of connection methods and accessories for a variety of applications
Six methods are available as standard. Differential pressure indicators (visual and switch) are available and can be selected to match the application.



PAT. PEND

Specifications

Fluid		Hydraulic fluid
Operating pressure		Negative pressure
Operating temperature		Max. 80°C
Main material	**Top flange**	Steel plate
	Case	Steel plate
	Inlet pipe	Steel plate
	O-ring	NBR or FKM Note)
	Seal	NBR or EPDM Note)
Element	**Material**	Micromesh
	Nominal filtration	74, 105, 149 μm (200, 150, 100 mesh)
	Differential pressure resistance	0.2 MPa
Differential pressure indicator operating pressure		24.0 kPa
Air breezer nominal filtration		40 μm
Lubrication port strainer nominal filtration		10 mesh or equivalent

Note) The material of the O-rings and seals differs depending on the hydraulic fluid used.
Petroleum, Water-glycol, Emulsion: NBR; Phosphoric ester: FKM, EPDM

Connection

Companion flange,
Female threaded companion flange,
L-block companion flange,
L-block female threaded companion flange,
S-block companion flange,
S-block female threaded companion flange

Note 1) Female threaded connection ports are $1/2^B$ to 2^B only.
Note 2) Flange configuration is exclusive to SMC.

Model/Rated Flow Rate

Model	Port size	Rated flow rate (ℓ/min)
FHG9□A□-M□-04	$1/2^B$	18
FHG9□A□-M□-06	$3/4^B$	32
FHG9□A□-M□-08	1^B	53
FHG9□B□-M□-10	$1\ 1/4^B$	90
FHG9□B□-M□-12	$1\ 1/2^B$	120
FHG9□B□-M□-16	2^B	200
FHG9□C□-M□-20	$2\ 1/2^B$	315
FHG9□C□-M□-24	3^B	450

Accessory/Option

Description	Part no.	Note	
Differential pressure indicator	CB-21H	Petroleum, Water-glycol, Emulsion	
	CB-21H-V	Phosphoric ester	
Differential pressure indication switch (N.C. and N.O. common)	CB-67H	Petroleum, Water-glycol, Emulsion	
	CB-67H-V	Phosphoric ester	
Air breezer	CW-4H	For $1/2^B$ to 1^B	Petroleum
	CW-4H-W		Water-glycol, Emulsion
	CW-4H-V		Phosphoric ester
	CW-5H	For $1\ 1/4^B$ to 2^B	Petroleum
	CW-5H-W		Water-glycol, Emulsion
	CW-5H-V		Phosphoric ester
	CW-6H	For $2\ 1/2^B$, 3^B	Petroleum
	CW-6H-W		Water-glycol, Emulsion
	CW-6H-V		Phosphoric ester
Cap	D-73H	For $1/2^B$ to 1^B	Petroleum
	D-73H-W		Water-glycol, Emulsion
	D-73H-V		Phosphoric ester
	D-74H	For $1\ 1/4^B$ to 2^B	Petroleum
	D-74H-W		Water-glycol, Emulsion
	D-74H-V		Phosphoric ester
	D-75H	For $2\ 1/2^B$, 3^B	Petroleum
	D-75H-W		Water-glycol, Emulsion
	D-75H-V		Phosphoric ester

How to Order

FH G 9 0 A ☐ – M 074 – 04 – 0 0 ☐ ☐

Hydraulic filter

Suction guard

Rated pressure

9	Negative pressure

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

Port size category

A	1/2^{B}, 3/4^{B}, 1^{B}
B	1 1/4^{B}, 1 1/2^{B}, 2^{B}
C	2 1/2^{B}, 3^{B}

Length below flange neck (T dimension)

Port size (Nominal size)	Standard T dimension			T dimension when shipped (Max. T dimension)
	Symbol	Length (mm)	Adjustment range (mm)	
04 (1/2^{B}) **06** (3/4^{B}) **08** (1^{B})	**1**	310	±30	340
	2	380		410
	3	450		480
	4	520		550
	5	590		620
10 (1 1/4^{B}) **12** (1 1/2^{B}) **16** (2^{B})	**1**	385	±45	430
	2	485		530
	3	585		630
	4	685		730
20 (2 1/2^{B}) **24** (3^{B})	**1**	560	Fixed	560
	2	650		650
	3	750		750
	4	850		850

Element

M	Micromesh

Nominal filtration

074	74 μm
105	105 μm
149	149 μm

Port size

04	1/2^{B}
06	3/4^{B}
08	1^{B}
10	1 1/4^{B}
12	1 1/2^{B}
16	2^{B}
20	2 1/2^{B}
24	3^{B}

Made to Order

Nil	None
X0	Non-standard filtration

Note) Refer to page 32 for details.

Air breezer

Nil	Air breezer
C	Cap

Connection

0	Companion flange
1	Female threaded companion flange
2	L-block companion flange
3	L-block female threaded companion flange
4	S-block companion flange
5	S-block female threaded companion flange

Differential pressure indication

0	None
1	Differential pressure indicator
5	Differential pressure indication switch Note)

Note) N.C. and N.O. common

Note) The symbol Z indicates lengths other than the standard T length and adjustment range. Specify the T length in this case.

Port size (Nominal size)	T dimension allowable range for symbol Z (mm)
04 (1/2^{B}), 06 (3/4^{B}), 08 (1^{B})	630 to 1,040
10 (1 1/4^{B}), 12 (1 1/2^{B}), 16 (2^{B})	740 to 1,130
20 (2 1/2^{B}), 24 (3^{B})	570 to 1,200

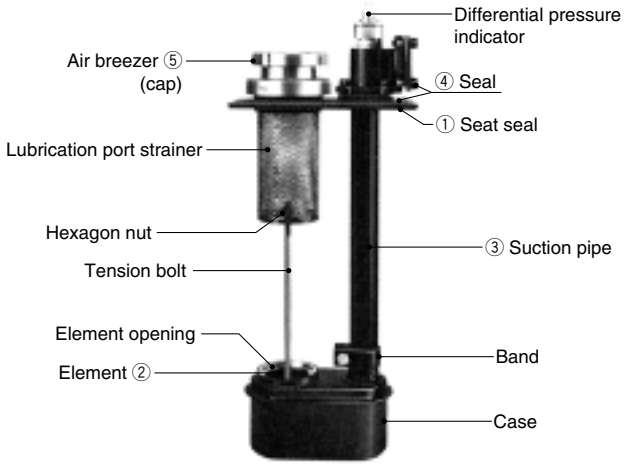
∗ Standard T dimensions are excluded for 20 (2 1/2^{B}), 24 (3^{B}).

Replacement Element Part No. (including O-ring for element)

Port size (Nominal size)	74 μm (200 mesh)	105 μm (150 mesh)	149 μm (100 mesh)	Element size
04 (1/2^{B}), **06** (3/4^{B}), **08** (1^{B})	EM220-074N	EM220-105N	EM220-149N	ø70 x 90
10 (1 1/4^{B}), **12** (1 1/2^{B}), **16** (2^{B})	EM320-074N	EM320-105N	EM320-149N	ø90 x 125
20 (2 1/2^{B}), **24** (3^{B})	EM420-074N	EM420-105N	EM420-149N	ø110 x 190

Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.
N: Petroleum, V: 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

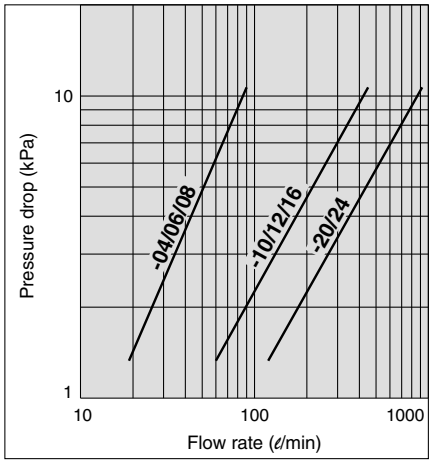


Replacement Seal List (One each of the seal and O-ring types listed below are required per filter.)

No.		①	②	③	④	⑤
Description / Port size	Hydraulic fluid type	Top flange seal	O-ring for element	Bottom case O-ring for suction pipe	OUT connection packing	Seal for air breezer/ cap
		Part no.	Standard	Standard	Part no.	Part no.
04 to **08**	Petroleum, Emulsion, Water-glycol	AL-180H	JIS B2401 -1A-G65	JIS B2401 -1A-P34	AL-183H	AL-162H
10 to **16**		AL-181H	JIS B2401 -1A-G85	JIS B2401 -1A-P60	AL-184H	AL-163H
20 / **24**		AL-182H	JIS B2401 -1A-G95	—	AL-185H	AL-164H
04 to **08**	Phosphoric ester	AL-180H-V	JIS B2401 -4D-G65	JIS B2401 -4D-P34	AL-183H-V	AL-162H-V
10 to **16**		AL-181H-V	JIS B2401 -4D-G85	JIS B2401 -4D-P60	AL-184H-V	AL-163H-V
20 / **24**		AL-182H-V	JIS B2401 -4D-G95	—	AL-185H-V	AL-164H-V

Flow Characteristics

Series FHG



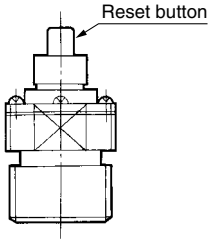
Conditions
Fluid: Turbine oil Class 2 VG32
Viscosity: 45 mm²/s
Filter material: Micromesh
Nominal filtration: 74 µm

Differential Pressure Indication

Two indication methods are available: differential pressure indicator and differential pressure indication switch. These can be mounted on all filter models.
Direct mounting is possible if the connection method is L-block or S-block. Otherwise, an Rc1 female thread fitting is required.
In addition, if no differential pressure indication is required, use a commercially available plug (R1).

■ Differential pressure indicator

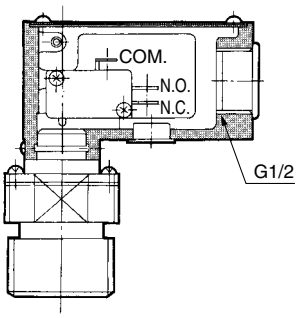
- Operating pressure—24 kPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (Reset type)
- The element should be replaced when the red indication is visible.



Differential Pressure Indication

■ Differential pressure indication switch

- Operating pressure—24 kPa
- When a value has been displayed, it will be automatically reset when the pump is stopped. (Non-reset type)
- The element should be replaced when the switch is actuated.
- 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.

Handling Precautions

① Mounting

- The portion of the suction guard below the oil tank mounting flange is installed inside the oil tank, so check to make sure it is clean when mounting it. For maintenance, make sure to provide sufficient space above the filter for removing the element.
- Use caution to ensure airtightness when connecting an outlet and installing a differential pressure indicator (especially for the thread type).
- Ensure that the oil tank fluid volume (minimum fluid level MIN(r) dimension) is 30 mm for 1/2B to 1B, 60 mm for 1 1/4B to 1 1/2B, 80 mm for 2B, and 120 mm or more for 2 1/2B to 3B, measured when there is no turbulence in the flow from the element opening or fluctuation in the fluid level. Also, select a T dimension (length below flange neck) that will ensure that the fluid level does not reach the lubrication port strainer.

Handling Precautions

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 stars.
- 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 24 kPa during filter operation (triggering the differential pressure indicator), stop operation and either wash or replace the element.
- When replacing the element, check the O-rings and replace them if they are damaged.
- When installing and removing an element, do not scratch or damage it by touching the corners of the case, etc.
- When washing the element, do not wipe it using a stiff brush or rag.

④ Removing the element

- Rotate the air breezer (cap) one-third of a turn counterclockwise and remove it. Grasp the handle of the lubrication port strainer inside and, while rotating it clockwise, pull it up vertically. The suction element is screwed onto one end of the tension bolt and along with the lubrication port strainer, can be removed and installed freely. Do not remove the suction element while the pump is operating.

⑤ T dimension (length below flange neck) adjustment

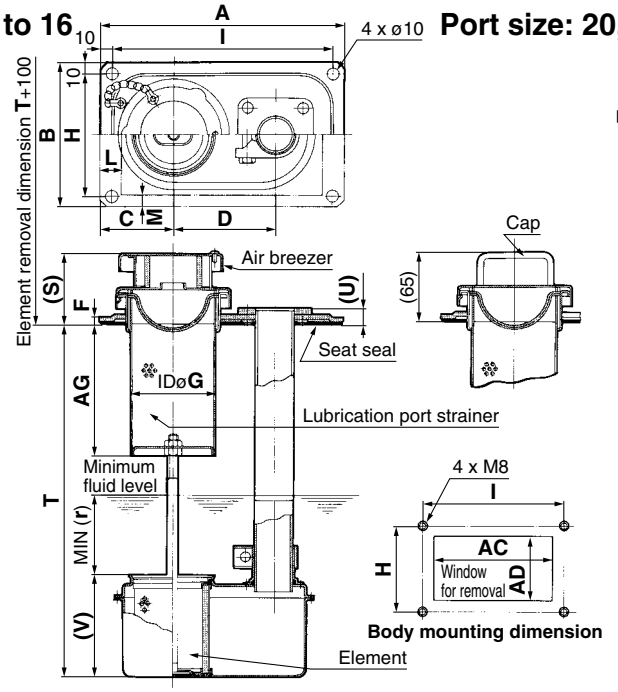
- The product is shipped from the factory with the maximum T dimension, so the user must adjust it to the required T dimension.
- The T dimension adjustment range, relative to the standard T dimension, is ±30 mm for 1/2B to 1B and ±45 mm for 1 1/4B to 2B. The dimension for ±30 mm for 2 1/2B to 3B is fixed, so no adjustment is possible.
- Refer to the operating manual for details of the adjustment method.

⑥ Lubrication

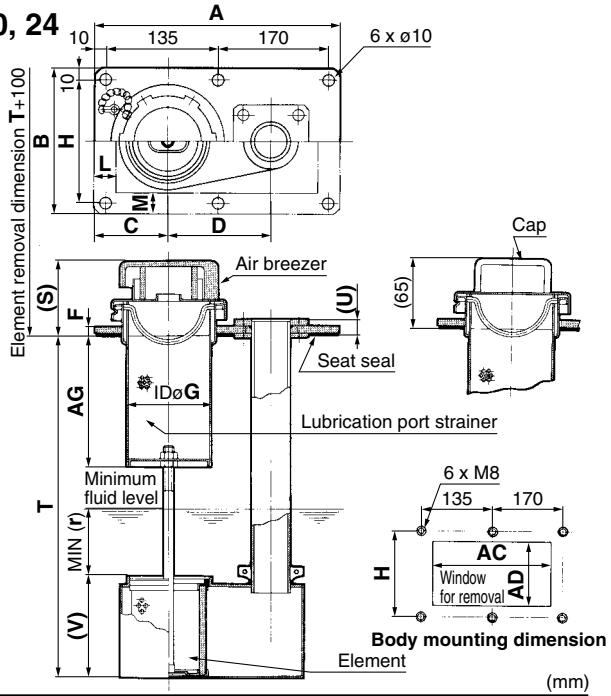
- Remove the air breezer (cap) and lubricate through the lubricatioin port strainer. Be careful not to let oil, etc., get onto the cap while it is being removed.

Dimensions

Port size: 04 to 16



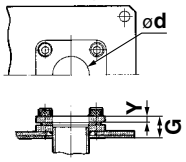
Port size: 20, 24



(mm)

Port size (Nominal size)	A	B	C	D	F	G	H	I	L	M	S	U	V	r	AC	AD	AG	Standard T dimension 1	2	3	4	5	T dimension adjustment range
1/2B (04)	215	130	65	90	6	72	110	195	19	10	63	14	90	30	177	110	120						
3/4B (06)	215	130	65	90	6	72	110	195	19	10	63	14	90	30	177	110	120	310	380	450	520	590	±30
1B (08)	215	130	65	90	6	72	110	195	19	10	63	14	90	30	177	110	120						
1 1/4B (10)	265	150	75	115	6	86	130	245	19	10	63	17	126	60	227	130	140						
1 1/2B (12)	265	150	75	115	6	86	130	245	19	10	63	17	126	60	227	130	140	385	485	585	685	—	±45
2B (16)	265	150	75	115	6	86	130	245	19	10	63	17	126	80	227	130	140						
2 1/2B (20)	325	190	85	145	8	106	170	—	20	20	76	17	197	120	285	150	170	560	650	750	850	—	Fixed
3B (24)	325	190	85	145	8	106	170	—	20	20	76	17	197	120	285	150	170						

Connection part dimensions/ Companion flange

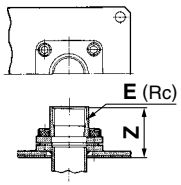


(mm)

Port size	d	G	Y	Weight (kg)*
1/2B (04)	22.2	25	9	2.7
3/4B (06)	27.7	25	9	2.7
1B (08)	34.5	25	9	2.7
1 1/4B (10)	43.9	28	9	5.1
1 1/2B (12)	49.1	28	9	5.1
2B (16)	61.1	28	9	5.0
2 1/2B (20)	77.1	28	9	10.3
3B (24)	90.0	28	9	10.3

* Weight values are for the minimum T dimension (symbol 1) in each standard T dimension.

Female threaded companion flange

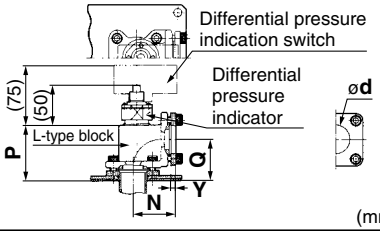


(mm)

Port size	E	Z	Weight (kg)*
1/2B (04)	1/2	47	2.8
3/4B (06)	3/4	47	2.8
1B (08)	1	52	2.8
1 1/4B (10)	1 1/4	58	5.3
1 1/2B (12)	1 1/2	58	5.3
2B (16)	2	63	5.4

* Weight values are for the minimum T dimension (symbol 1) in each standard T dimension.

L-type block companion flange

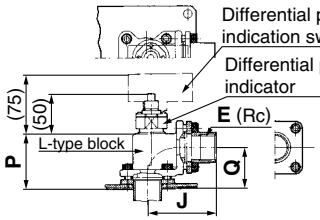


(mm)

Port size	d	N	P	Q	Y	Weight (kg)*
1/2B (04)	22.2	56	71	53	9	3.6
3/4B (06)	27.7	56	71	53	9	3.6
1B (08)	34.5	56	71	53	9	3.6
1 1/4B (10)	43.9	76	104	74	9	7.3
1 1/2B (12)	49.1	76	104	74	9	7.3
2B (16)	61.1	76	104	74	9	7.1
2 1/2B (20)	77.1	101	129	94	9	14.5
3B (24)	90.0	101	129	94	9	14.5

* Weight values are for the minimum T dimension (symbol 1) in each standard T dimension.
* The "OUT" direction can be mounted up to 90° to the left or right.

L-type block female threaded companion flange

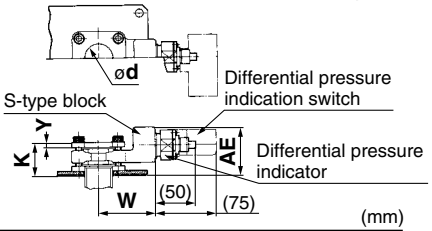


(mm)

Port size	E	J	P	Q	Weight (kg)*
1/2B (04)	1/2	78	71	53	3.7
3/4B (06)	3/4	78	71	53	3.7
1B (08)	1	83	71	53	3.7
1 1/4B (10)	1 1/4	106	104	74	7.4
1 1/2B (12)	1 1/2	106	104	74	7.4
2B (16)	2	111	104	74	7.5

* Weight values are for the minimum T dimension (symbol 1) in each standard T dimension.
* The "OUT" direction can be mounted up to 90° to the left or right.

S-type block companion flange

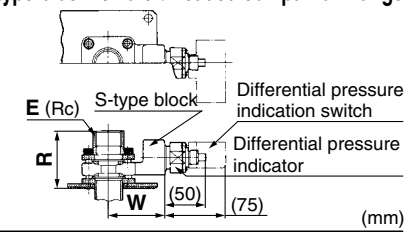


(mm)

Port size	d	K	W	Y	AE	Weight (kg)*
1/2B (04)	22.2	47	70	9	62	3.5
3/4B (06)	27.7	47	70	9	62	3.5
1B (08)	34.5	47	70	9	62	3.5
1 1/4B (10)	43.9	50	85	9	65	6.2
1 1/2B (12)	49.1	50	85	9	65	6.2
2B (16)	61.1	50	85	9	65	6.1
2 1/2B (20)	77.1	50	105	9	65	11.9
3B (24)	90.0	50	105	9	65	11.9

* Weight values are for the minimum T dimension (symbol 1) in each standard T dimension.
* The differential pressure indication entry can be mounted up to 90° to the left or right.

S-type block female threaded companion flange



(mm)

Port size	E	R	W	Weight (kg)*
1/2B (04)	1/2	69	70	3.6
3/4B (06)	3/4	69	70	3.6
1B (08)	1	74	70	3.6
1 1/4B (10)	1 1/4	80	85	6.4
1 1/2B (12)	1 1/2	80	85	6.4
2B (16)	2	85	85	6.5

* Weight values are for the minimum T dimension (symbol 1) in each standard T dimension.
* The differential pressure indication entry can be mounted up to 90° to the left or right.

Line Filter

Series FH34/44/54/64

Rated Pressure: 3.5, 7, 14, 21 MPa

Compact, solid, and safe design
The case and cover have undergone testing in which they were subjected 100,000 times to impacts equivalent 1.5 times the rated pressure (confirming to MIL standard).

Easy element replacement
The element is extracted from the top, and secured in place by inserting an O-ring seal. The element can be installed and removed easily, simplifying maintenance.

Reliable outlet side
A firm seal is secured through a special configuration combining a pressure clamp from an O-ring around the inner perimeter of the case with support from the cover, and there is no resistance when the cover is installed and removed.

Large drain exhaust port
The large M24 drain exhaust port assures rapid drainage.

Easy fluid flow direction reversal
Simply turn the cover 180° relative to the case mounting base to reverse the fluid flow direction.

Clogging sensor
The filter can be mounted with a differential pressure indicator (two-stage indicator, reset type) or differential pressure indication switch (common with visual, non-reset type).

Specifications

Fluid		Hydraulic fluid	
Operating pressure		Max. 3.5 MPa	Max. 7, 14, 21 MPa
Operating temperature		Max. 80°C	
Main material	**Cover/Case**	Aluminum die-cast (3/8, 1/2, 3/4, 1)	Cast iron
		Aluminum casted (1 1/4, 1 1/2, 2)	
	O-ring	NBR or FKM Note)	
Element	**Material**	Paper	
	Nominal filtration	5, 10, 20 μm	
	Differential pressure resistance	0.6 MPa	
Differential pressure indicator operating pressure		0.275 MPa	
Relief valve open pressure		0.35 MPa	

Note) The material of the O-rings and seals differs depending on the hydraulic fluid used. Petroleum, Water-glycol, Emulsion: NBR; Phosphoric ester: FKM

Model/Rated Flow Rate

Operating pressure	Model		Port size		Rated flow rate (ℓ/min)
	Threaded connection	Flange connection	Threaded Rc	Flange SSA	
Max. 3.5 MPa	**FH340-03**	—	3/8	—	10
	FH340-04	—	1/2	—	20
	FH342-06	**FH341-06**	3/4	20 (3/4B)	50
	FH342-08	**FH341-08**	1	25 (1B)	80
	FH340-10	**FH341-10**	1 1/4	32 (1 1/4B)	120
	FH340-12	**FH341-12**	1 1/2	40 (1 1/2B)	160
	—	**FH341-16**	—	50 (2B)	260
Max. 7 MPa	**FH440-03**	—	3/8	—	10
	FH440-04	**FH441-04**	1/2	15 (1/2B)	20
	FH440-06	**FH441-06**	3/4	20 (3/4B)	50
	FH440-08	**FH441-08**	1	25 (1B)	80
	FH440-10	**FH441-10**	1 1/4	32 (1 1/4B)	120
	FH440-12	**FH441-12**	1 1/2	40 (1 1/2B)	160
	—	**FH441-16**	—	50 (2B)	260
	—	**FH441-20**	—	65 (2 1/2B)	450
	—	**FH441-24**	—	80 (3B)	600

Operating pressure	Model		Port size		Rated flow rate (ℓ/min)
	Threaded connection	Flange connection	Threaded Rc	Flange SSA	
Max. 14 MPa	**FH540-03**	—	3/8	—	10
	FH540-04	**FH541-04**	1/2	15 (1/2B)	20
	FH540-06	**FH541-06**	3/4	20 (3/4B)	50
	FH540-08	**FH541-08**	1	25 (1B)	80
	FH540-10	**FH541-10**	1 1/4	32 (1 1/4B)	120
	FH540-12	**FH541-12**	1 1/2	40 (1 1/2B)	160
	—	**FH541-16**	—	50 (2B)	260
Max. 21 MPa	**FH640-03**	—	3/8	—	10
	FH640-04	**FH641-04**	1/2	15 (1/2B)	20
	FH640-06	**FH641-06**	3/4	20 (3/4B)	50
	FH640-08	**FH641-08**	1	25 (1B)	80
	FH640-10	**FH641-10**	1 1/4	32 (1 1/4B)	120
	FH640-12	**FH641-12**	1 1/2	40 (1 1/2B)	160
	—	**FH641-16**	—	50 (2B)	260

Note) Tapered female thread connection conforming to JIS B 0203 is compatible.
Flanges conforming to JIS B 2291 (21 MPa piping flanges for hydraulic use) SSA are compatible.

Accessory/Option

Description	Part no.	Model	Note
Differential pressure indicator	CB-48H	**FH34□ to FH44□**	Petroleum, Water-glycol, Emulsion
	CB-48H-V		Phosphoric ester
	CB-52H	**FH342**	Petroleum, Water-glycol, Emulsion
	CB-52H-V		Phosphoric ester
	CB-64H	**FH54□ to FH64□**	Petroleum, Water-glycol, Emulsion
	CB-64H-V		Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-49H	**FH34□ to FH44□**	Petroleum, Water-glycol, Emulsion
	CB-49H-V		Phosphoric ester
	CB-53H	**FH342**	Petroleum, Water-glycol, Emulsion
	CB-53H-V		Phosphoric ester
	CB-65H	**FH54□ to FH64□**	Petroleum, Water-glycol, Emulsion
	CB-65H-V		Phosphoric ester
Blanking cap (for differential pressure indication part)	AG-9H	**FH34□ to FH64□**	Petroleum
	AG-9H-W		Water-glycol, Emulsion
	AG-9H-V		Phosphoric ester
	AG-12H	**FH342**	Petroleum
	AG-12H-W		Water-glycol, Emulsion
	AG-12H-V		Phosphoric ester

How to Order

FH 3 40 – 03 – 0 0 0 – P 005 L

Hydraulic filter

Operating pressure (Max.)

3	3.5 MPa
4	7 MPa
5	14 MPa
6	21 MPa

Construction/Connection

40	Element upward removal	Threaded
42*		
41	Element upward removal	Flange

* Indicates 42 for 3.5 MPa, Port sizes 3/4 and 1.

Port size

Symbol	Threaded Rc	Flange SSA
03	3/8	—
04	1/2	15 (1/2B)
06	3/4	20 (3/4B)
08	1	25 (1B)
10	1 1/4	32 (1 1/4B)
12	1 1/2	40 (1 1/2B)
16	—	50 (2B)
20	—	65 (2 1/2B)
24	—	80 (3B)

Note) For selection from thread and flange, refer to "Model/Rated Flow Rate" on page 14.

Differential pressure indication

0	None
1	Differential pressure indicator
2	Differential pressure indication switch Note)
4★	Differential pressure indicator
5★	Differential pressure indication switch Note)

Note) N.C. and N.O. common
★ Construction 42 only

Relief valve

0	With relief valve
1	None

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

Nominal filtration

005	5 μm
010	10 μm
020	20 μm

Note) 10 μm only for water-glycol or emulsion.

Element

P	Paper
M	Micromesh

Fluid direction

Nil	IN left
L	IN right

Made to Order

Nil	None
X0	Non-standard filtration

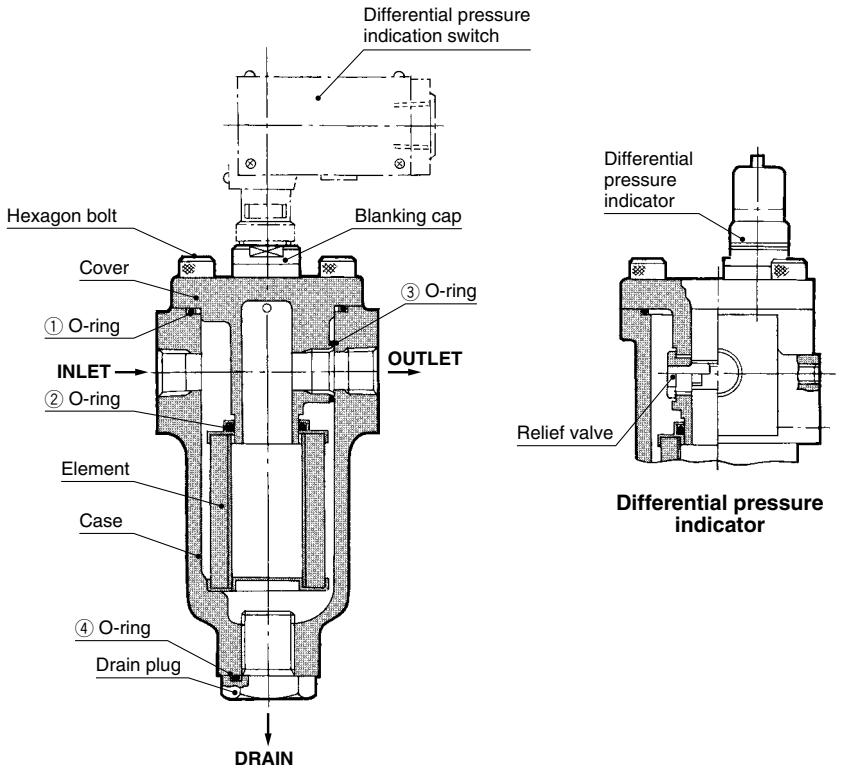
Note) The non-standard filtration rating is for micromesh elements only. Refer to page 32 for details.

Replacement Element Part No. (Including O-ring for element)

Port size	5 μm	10 μm	20 μm	Element size
03 (3/8), **04** (1/2)	EP910-005N	EP910-010N	EP910-020N	ø53 x 90
06 (3/4), **08** (1)	EP020-005N	EP020-010N	EP020-020N	ø74 x 117
10 (1 1/4), **12** (1 1/2)	EP120-005N	EP120-010N	EP120-020N	ø74 x 195
16 (2)	EP220-005N	EP220-010N	EP220-020N	ø88 x 282
20 (2 1/2), **24** (3)	EP820-005N	EP820-010N	EP820-020N	ø119 x 280

Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.
N: Petroleum, V: Phosphoric ester, W: Water-glycol, Emulsion (10 μm only)
Note 2) Refer to page 32 for non-standard filtration.
Note 3) Above elements require one element per filter.

Construction/Seal List

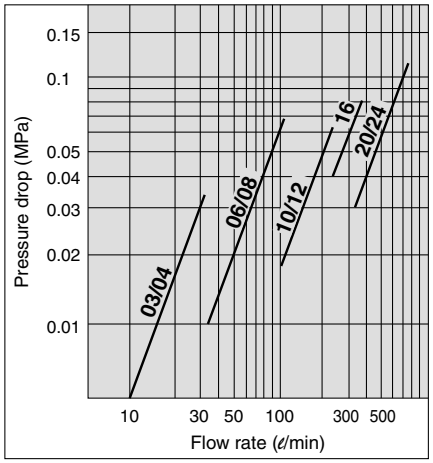


Replacement Seal List (One each of the O-ring types listed below are required per filter.)

No.			①	②	③	④
Description / Model		Hydraulic fluid type	O-ring for cover case	O-ring for element	O-ring for OUT side	O-ring for element
			Standard	Standard	Standard	Standard
FH340	-03	Petroleum, Emulsion, Water-glycol	JIS B2401 -1B-G80	JIS B2401 -1A-P30	JIS B2401 -1A-P22A	JIS B2401 -1B-P28
	-04					
FH34□	-06		JIS B2401 -1B-G105	JIS B2401 -1A-P44	JIS B2401 -1A-P32	
	-08					
FH440 to FH640	-03		JIS B2401 -1B-G65	JIS B2401 -1A-P30	JIS B2401 -1A-P20	
FH44□ to FH64□	-04					
FH44□ to FH64□	-06		JIS B2401 -1B-G90	JIS B2401 -1A-P44	JIS B2401 -1A-P32	
	-08					
FH34□ to FH64□	-10				JIS B2401 -1A-P40	
	-12					
FH341 to FH641	-16		JIS B2401 -1B-G105	JIS B2401 -1A-P50	JIS B2401 -1A-P50	
FH441	-20		JIS B2401 -1B-G145	JIS B2401 -1A-P85	JIS B2401 -1A-P85	
	-24					
FH340	-03	Phosphoric ester	JIS B2401G80 FPM/Hs = 90	JIS B2401 -4D-P30	JIS B2401 -4D-P22A	JIS B2401 -4D-P28
	-04					
FH34□	-06		JIS B2401G105 FPM/Hs = 90	JIS B2401 -4D-P44	JIS B2401 -4D-P32	
	-08					
FH440 to FH640	-03		JIS B2401G65 FPM/Hs = 90	JIS B2401 -4D-P30	JIS B2401 -4D-P20	
FH44□ to FH64□	-04					
FH44□ to FH64□	-06		JIS B2401G90 FPM/Hs = 90	JIS B2401 -4D-P44	JIS B2401 -4D-P32	
	-08					
FH34□ to FH64□	-10				JIS B2401 -4D-P40	
	-12					
FH341 to FH641	-16		JIS B2401G105 FPM/Hs = 90	JIS B2401 -4D-P50	JIS B2401 -4D-P50	
FH441	-20		JIS B2401G145 FPM/Hs = 90	JIS B2401 -4D-P85	JIS B2401 -4D-P85	
	-24					

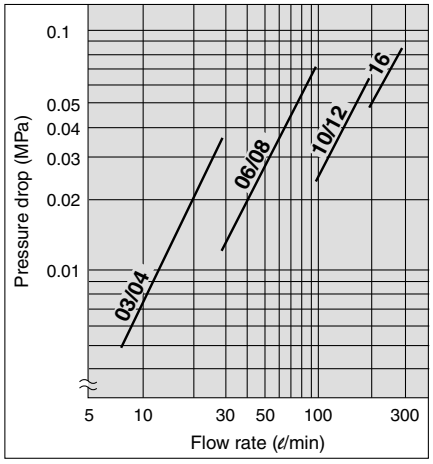
Flow Characteristics

Series FH34/44



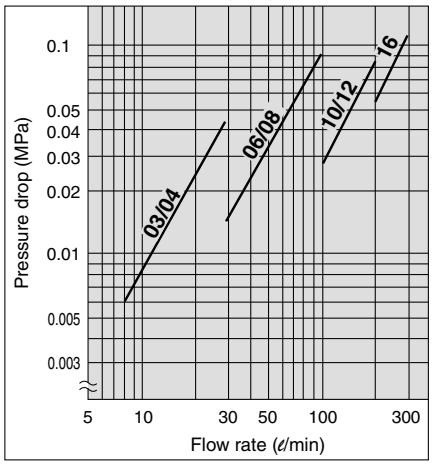
Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 3.5, 7 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

Series FH54



Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 14 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

Series FH64

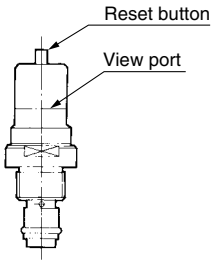


Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 21 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

Differential Pressure Indication

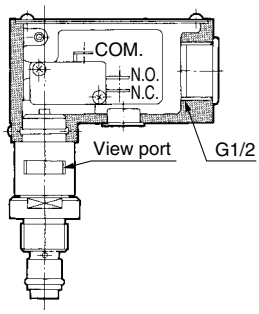
Two indication methods are available: differential pressure indicator and differential pressure indication switch. These can be mounted on all filter models.

- Operating pressure—0.275 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—0.275 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.

Handling Precautions

① Mounting

- Confirm INLET and OUTLET before mounting. Then connect so that the drain is oriented downward. For maintenance, make sure to provide sufficient space above the filter for removing the element.

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 actuated, 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.

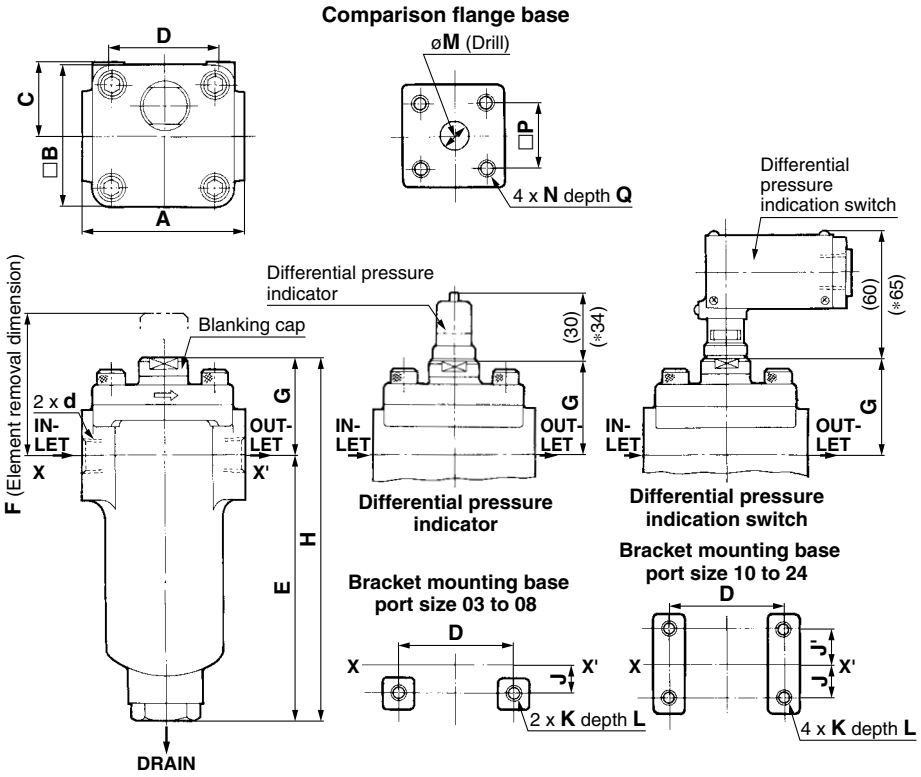
③ Element replacement

- When the pressure difference reaches 0.275 MPa during operation (actuating the differential pressure indicator), stop operation, drain the oil from the case, and replace the element.
- When replacing the element, check the O-rings and replace them if they are damaged.
- When installing and removing an element, do not scratch or damage it by touching the corners of the case, etc.

④ Others

- For the top cover O-ring, use a product of hardness 90 to prevent leaks or damage.
- If there is back pressure, install a check valve on the outlet side to prevent damage to the element.
- Turn the top cover 180° to reverse the oil flow direction.
- Use an auxiliary pipe or the like and apply force evenly when tightening the cap screws on the cover and case.

Dimensions



Companion Flange Bolt Dimensions

Port size	Model	Bolt dimension	Flange (JIS B2291)	O-ring (JIS B240-1-A)
04	FH441 FH541	M10 x 1.5 x 30	SSA15	G25
	FH641	M10 x 1.5 x 40		
06	FH341 FH441 FH541	M10 x 1.5 x 30	SSA20	G30
	FH641	M10 x 1.5 x 40		
08	FH341 FH441 FH541	M12 x 1.75 x 40	SSA25	G35
	FH641	M12 x 1.75 x 45		
10	FH341 FH441 FH541	M12 x 1.75 x 40	SSA32	G40
	FH641	M12 x 1.75 x 45		
12	FH341 FH441 FH541	M16 x 2 x 50	SSA40	G50
	FH641	M16 x 2 x 60		
16	FH341 FH441 FH541	M16 x 2 x 50	SSA50	G60
	FH641	M16 x 2 x 60		
20	FH441	M20 x 2.5 x 65	SSA65	G75
24	FH441	M22 x 2.5 x 65	SSA80	G85

Note) The companion flange mounting base conforms to JIS B 2291 (21 MPa pipe flanges for hydraulic use) SSA.

(∗): Internal dimensions for FH342 type

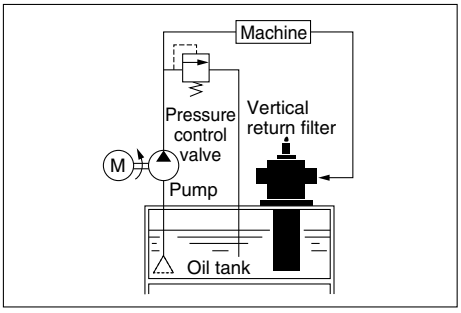
(mm)

Model	d		A	B	C	D	E	F	G	H	J	J'	K	L	M	N	P	Q	Weight (kg)
	Threaded Rc	Flange SSA																	
FH340-03	3/8	—	105	96	50	80	160.5	275	57	217.5	5	—	2 x M8 x 1.25	19	—	—	—	—	1.8
FH340-04	1/2	—																	
FH342-06	3/4	—	136	120	65	60	180	340	61	241	0	—	2 x M10 x 1.5	15	—	—	—	—	2.5
FH342-08	1	—																	
FH341-06	—	20 (3/4B)	141	120	63	100	199.5	330	69	268.5	0	—	2 x M10 x 1.5	23	20	4 x M10 x 1.5	40	12	3.5
FH341-08	—	25 (1B)													25	4 x M12 x 1.75	48	17	
FH34□-10	1 1/4	32 (1 1/4B)	150	106	56	100	260	435	87	347	50	0	4 x M10 x 1.5	23	32	4 x M12 x 1.75	56	17	4.6
FH34□-12	1 1/2	40 (1 1/2B)													36	4 x M16 x 2	65	20	
FH341-16	—	50 (2B)	155	120	70	120	361	545	94	455	60	0	4 x M12 x 1.75	28	46	4 x M16 x 2	73	20	6.4
FH440-03	3/8	—	100	80	45	60	152	285	62	214	0	—	2 x M8 x 1.25	14	—	—	—	—	4.5
FH44□-04	1/2	15 (1/2B)													16	4 x M10 x 1.5	36	12	
FH44□-06	3/4	20 (3/4B)	135	105	57	80	182	330	73	255	0	—	2 x M10 x 1.5	18	20	4 x M10 x 1.5	40	12	8.7
FH44□-08	1	25 (1B)													25	4 x M12 x 1.75	48	17	
FH44□-10	1 1/4	32 (1 1/4B)	150	105	57	80	260	435	87	347	50	0	4 x M10 x 1.5	18	32	4 x M12 x 1.75	56	17	12.2
FH44□-12	1 1/2	40 (1 1/2B)													36	4 x M16 x 2	65	20	
FH441-16	—	50 (2B)	160	120	65	92	359	540	94	453	60	0	4 x M12 x 1.75	22	46	4 x M16 x 2	73	20	18.1
FH441-20	—	65 (2 1/2B)	220	170	100	130	390	615	119	509	40	25	4 x M12 x 1.75	22	60	4 x M20 x 2.5	92	27	35.9
FH441-24	—	80 (3B)													70	4 x M22 x 2.5	103	27	
FH540-03	3/8	—	105	86	45	70	152	285	62	214	0	—	2 x M8 x 1.25	14	—	—	—	—	5.2
FH54□-04	1/2	15 (1/2B)													16	4 x M10 x 1.5	36	12	
FH54□-06	3/4	20 (3/4B)	145	108	56	100	182	330	73	255	0	—	2 x M10 x 1.5	18	20	4 x M10 x 1.5	40	12	9.7
FH54□-08	1	25 (1B)													25	4 x M12 x 1.75	48	17	
FH54□-10	1 1/4	32 (1 1/4B)	150	108	56	100	260	435	87	347	50	0	4 x M12 x 1.75	22	32	4 x M12 x 1.75	56	17	12.8
FH54□-12	1 1/2	40 (1 1/2B)													36	4 x M16 x 2	65	20	
FH541-16	—	50 (2B)	180	126	70	120	361	545	94	455	60	0	4 x M12 x 1.75	22	46	4 x M16 x 2	73	20	20.4
FH640-03	3/8	—	120	98	51	90	152	285	62	214	0	—	2 x M10 x 1.5	18	—	—	—	—	6.9
FH64□-04	1/2	15 (1/2B)													16	4 x M10 x 1.5	36	22	
FH64□-06	3/4	20 (3/4B)	155	124	65	120	182	330	73	255	0	—	2 x M10 x 1.5	18	20	4 x M10 x 1.5	40	22	12.9
FH64□-08	1	25 (1B)													25	4 x M12 x 1.75	48	22	
FH64□-10	1 1/4	32 (1 1/4B)	180	124	65	125	260	435	87	347	50	0	4 x M12 x 1.75	22	32	4 x M12 x 1.75	56	22	19.8
FH64□-12	1 1/2	40 (1 1/2B)													36	4 x M16 x 2	65	30	
FH641-16	—	50 (2B)	200	144	75	145	361	545	94	455	60	0	4 x M12 x 1.75	22	46	4 x M16 x 2	73	30	29

Note) Tapered female thread conforming to JIS B 0203 is compatible.
Flanges conforming to JIS B 2291 (21 MPa pipe flanges for hydraulic use) SSA are compatible.

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

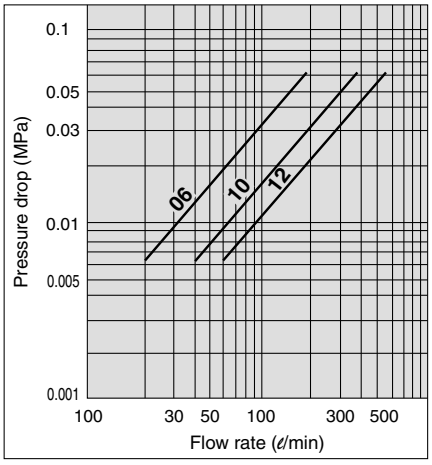
Model	Port size (Rc)	Max. flow rate (ℓ/min)	Weight (kg)	Applicable hydraulic fluid
FHBA□-06	3/4	150	1.7	N: Petroleum W: Water-glycol Emulsion V: Phosphoric ester
FHBA□-10	1 1/4	300	3.7	
FHBA□-12	1 1/2	400	5	

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

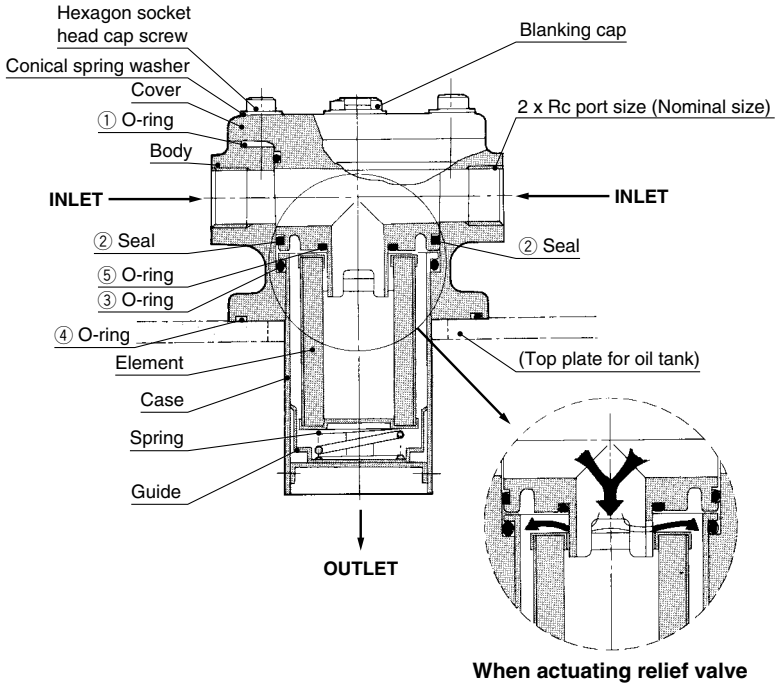
Note) The non-standard filtration is for micromesh elements only. Refer to page 32 for details.

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.

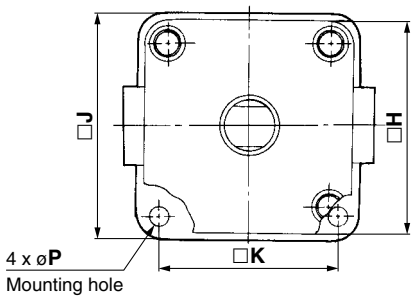
② Operation

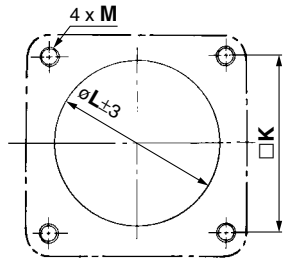
- Operation of the differential pressure indicator in cold weather, such as during winter, mostly occurs due to high viscosity, so check whether it is from clogging or not after normal operation starts.
- Once the differential pressure indicator is triggered, the indication continues to be displayed 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

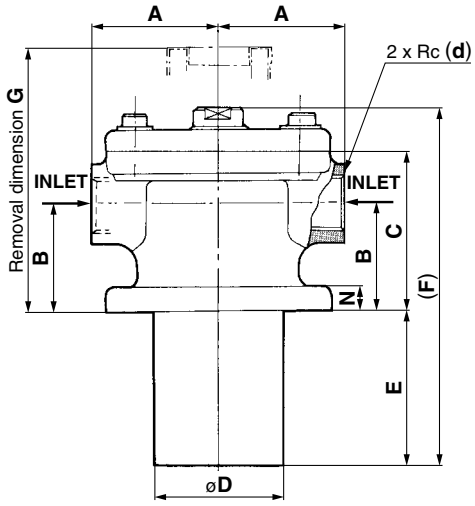
- When the pressure difference reaches 0.18 MPa during filter operation (actuating the differential pressure indicator), stop operation, and replace the paper element or wash the micromesh element. If the micromesh element has reached the end of its service life, replace it.
- When replacing the element, 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.

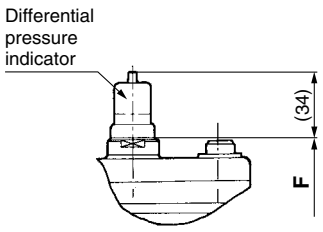
Dimensions



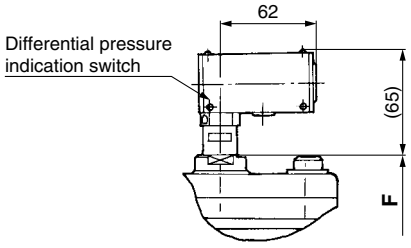


Mounting base dimensions





Differential pressure indicator



Differential pressure indication switch

(mm)

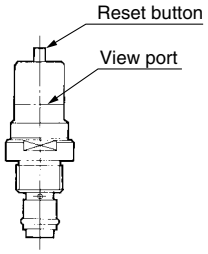
Port size Rc (d)	A	B	C	D	E	F	G	H	J	K	L	M	N	P
3/4	55	54	76	65	200	299	270	95	100	75	70	M8	12	10
1 1/4	75	76	112	89.1	210	342	320	120	128	100	95	M10	14	12
1 1/2					310	442	420							

Differential Pressure Indication

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

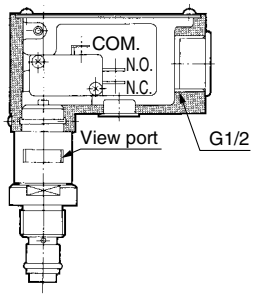
■ Differential pressure indicator

- 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.

Return Filter
Series FH100

Selection of elements for different applications
Depending on the application, the user can choose among several standard element types, paper elements (5, 10 and 20 μm) and micro-mesh elements (74 and 105 μm).

Easy maintenance
The element slides into place and is sealed with an O-ring, making it easy to install and remove.

Large drain exhaust outlet
The large M16 drain exhaust outlet assures rapid drainage.

Clogging sensor
The filter can be fitted with a differential pressure indicator (two-stage indicator, reset type) or differential pressure indication switch (visual combined, non-reset type).

Specifications

Fluid		Hydraulic fluid	
Operating pressure		Max. 1 MPa	
Operating temperature		Max. 80°C	
Main material	**Cover**	Cast iron	
	Case	Aluminum-cast	
	O-ring	NBR or FKM Note)	
Element	**Seal**	Stainless steel & NBR or Stainless steel & FKM Note)	
	Material	Paper	Micromesh
	Nominal filtration	5, 10, 20 μm	74, 105 μm (200, 150 mesh)
	Differential pressure resistance	0.6 MPa	
Differential pressure indicator operating pressure		0.13 MPa	
Relief valve open pressure		0.15 MPa	

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)	Rated flow rate (ℓ/min)	
		Paper	Micromesh
FH100-06	3/4	50	60
FH100-08	1	80	100
FH100-10	1 1/4	120	150
FH100-12	1 1/2	160	200
FH100-16	2	260	300
FH100-20	2 1/2	450	550
FH100-24	3	600	700

Accessory/Option

Description	Part no.	Note
Differential pressure indicator	CB-50H	Petroleum, Water-glycol, Emulsion
	CB-50H-V	Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-51H	Petroleum, Water-glycol, Emulsion
	CB-51H-V	Phosphoric ester
Blanking cap (for differential pressure indication part)	AG-12H	Petroleum
	AG-12H-W	Water-glycol, Emulsion
	AG-12H-V	Phosphoric ester

How to Order

FH 1 00 – 06 – 0 0 0 – P 005

Hydraulic filter

Operating pressure

B	Max. 1 MPa

Construction/Connection

00	Element downward removal, threaded

Port size (Rc)

06	3/4
08	1
10	1 1/4
12	1 1/2
16	2
20	2 1/2
24	3

Differential pressure indication

0	None
4	Differential pressure indicator
5	Differential pressure indication switch Note)

Note) N.C. and N.O. common

Relief valve

0	With relief valve
1	None

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

Element

P	Paper
M	Micromesh

Nominal filtration

005	5 μm
010	10 μm
020	20 μm
074	74 μm
105	105 μm

Note) The paper elements for water-glycol or emulsion is 10 μm only.

Made to Order

Nil	None
X0	Non-standard filtration

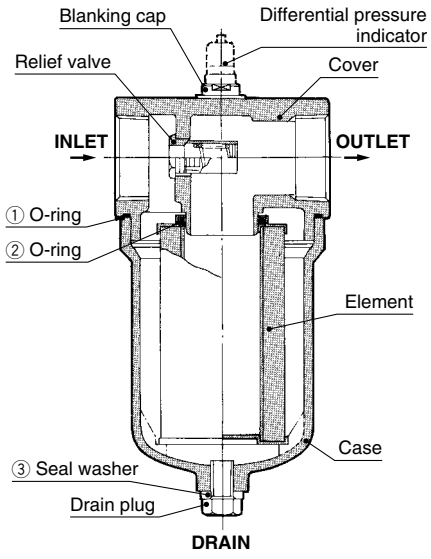
Note) The non-standard filtration is for micromesh elements only. Refer to page 32 for details.

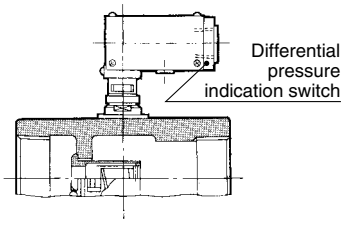
Replacement Element Part No. (including O-ring for element)

Model	Paper			Micromesh		Element size
	5 μm	10 μm	20 μm	74 μm (200 mesh)	105 μm (150 mesh)	
FH100-06	EP420-005N	EP420-010N	EP420-020N	EM810-074N	EM810-105N	ø64 x 95
FH100-08	EP420-005N	EP420-010N	EP420-020N	EM810-074N	EM810-105N	
FH100-10	EP020-005N	EP020-010N	EP020-020N	EM910-074N	EM910-105N	ø74 x 117
FH100-12	EP020-005N	EP020-010N	EP020-020N	EM910-074N	EM910-105N	
FH100-16	EP520-005N	EP520-010N	EP520-020N	EM020-074N	EM020-105N	ø88 x 158
FH100-20	EP620-005N	EP620-010N	EP620-020N	EM120-074N	EM120-105N	ø119 x 208
FH100-24	EP620-005N	EP620-010N	EP620-020N	EM120-074N	EM120-105N	

Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.
N: Petroleum, V: Phosphoric ester, W: Water-glycol, Emulsion (10 μm only for paper)
Note 2) Refer to page 32 for non-standard filtration.
Note 3) Above elements require one element per filter.

Construction/Seal List





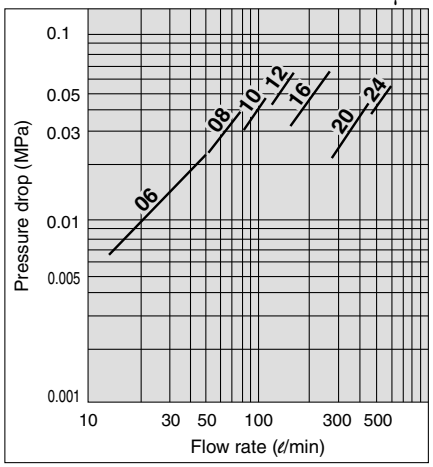
Differential pressure indication switch

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

No.			①	②	③
Description / Model		Hydraulic fluid type	O-ring for cover case	O-ring for element	Seal washer
			Standard	Standard	Part no.
FH100-	06	Petroleum, Emulsion, Water-glycol	JIS B2401 -1A-G90	JIS B2401 -1A-P35	SM-16
	08				
	10			JIS B2401 -1A-P44	
	12				
	16		JIS B2401 -1A-G130	JIS B2401 -1A-P50	
	20		AN6230-37 NBR/Hs = 70	JIS B2401 -1A-P85	
	24				
FH100-	06	Phosphoric ester	JIS B2401 -4D-G90	JIS B2401 -4D-P35	SM-16-V
	08				
	10			JIS B2401 -4D-P44	
	12				
	16		JIS B2401 -4D-G130	JIS B2401 -4D-P50	
	20		AN6230-37 FPM/Hs = 70	JIS B2401 -4D-P85	
	24				

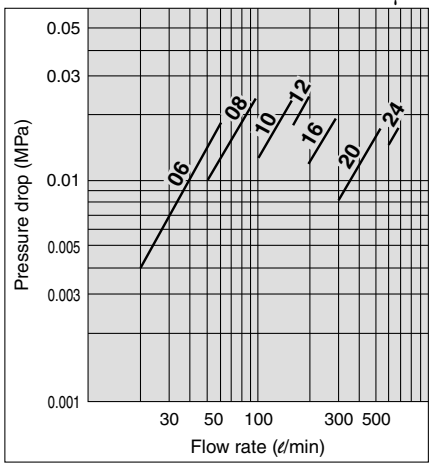
Flow Characteristics

FH100-06 to 24: Nominal filtration 10 μm



Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 1 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

FH100-06 to 24: Nominal filtration 74 μm



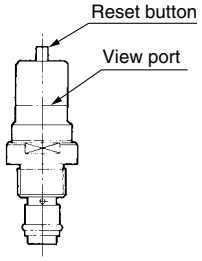
Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 1 MPa
Viscosity: 45 mm²/s
Filter material: Micromesh
Nominal filtration: 74 μm

Differential Pressure Indication

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

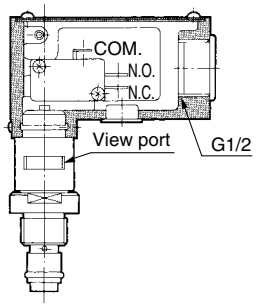
■ Differential pressure indicator

- Operating pressure—0.13 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—0.13 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 point).
- 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.

Handling Precautions

① Mounting

- Confirm INLET and OUTLET before mounting. Then connect so that the drain is oriented downward. For maintenance, make sure to provide sufficient space above the filter for removing the element.

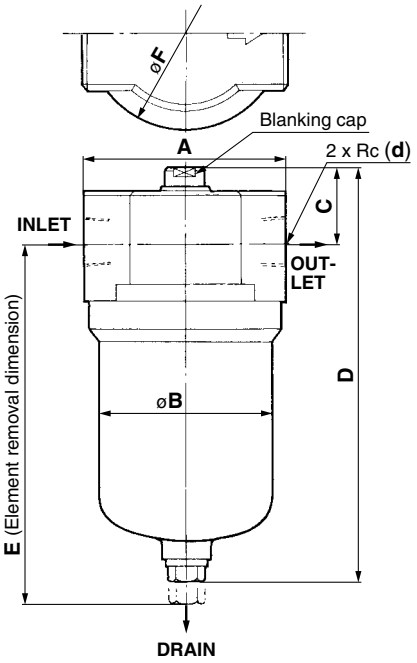
② Operation

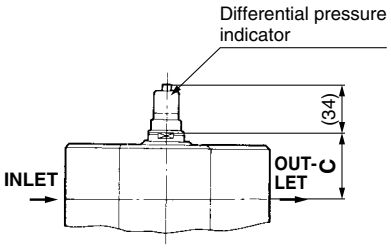
- Operation of the differential pressure indicator in cold weather, such as during winter, mostly occurs due to high viscosity, so check whether it is from clogging or not after normal operation starts.
- Once the differential pressure indicator is actuated, the indication continues to be displayed until 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

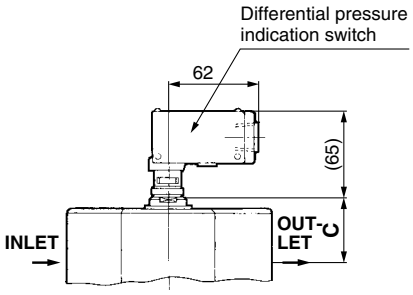
- When the pressure difference reaches 0.13 MPa during filter operation (actuating the differential pressure indicator), stop operation, drain the oil from the case, and replace the paper element or wash the micromesh element. If the micromesh element has reached the end of its service life, replace 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





Differential pressure indicator



Differential pressure indication switch

(mm)

Model	d	A	B	C	D	E	F	Weight (kg)
FH100-06	3/4	102	90	35	200	290	104	2.5
FH100-08	1							
FH100-10	1 1/4	110	100	45	265	380		4.3
FH100-12	1 1/2							
FH100-16	2	150	128	52	299	430	144	6.8
FH100-20	2 1/2	200	157	70	387	540	175	17.5
FH100-24	3							

Oil Filter
Series FH150

Compact and lightweight
The compact and lightweight design employs an aluminum alloy cover.

Easy maintenance
The element slides into place, making it easy to install and remove.

Clogging sensor
The filter can be fitted with a differential pressure indicator (two-stage indicator, reset type) or differential pressure indication switch (visual combined, non-reset type).

Specifications

Fluid		Hydraulic fluid
Operating pressure		Max. 1 MPa
Operating temperature		Max. 80°C
Main material	**Cover**	Aluminum die-cast
	Case	Cast iron
	O-ring	NBR or FKM Note)
Element	**Material**	Paper
	Nominal filtration	5, 10, 20 μm
	Differential pressure resistance	0.6 MPa
Differential pressure indicator operating pressure		0.13 MPa

Note) The material of the O-rings and seals differs depending on the hydraulic fluid used.
Petroleum, Water-glycol, Emulsion: NBR; Phosphoric ester: FKM

Model/Rated Flow Rate

Model	Port size (Rc)	Rated flow rate (ℓ/min)
FH150-02	1/4	5
FH150-03	3/8	10
FH150-04	1/2	20

Accessory/Option

Description	Part no.	Note
Differential pressure indicator	CB-50H	Petroleum, Water-glycol, Emulsion
	CB-50H-V	Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-51H	Petroleum, Water-glycol, Emulsion
	CB-51H-V	Phosphoric ester
Blanking cap (for differential pressure indication part)	AG-12H	Petroleum
	AG-12H-W	Water-glycol, Emulsion
	AG-12H-V	Phosphoric ester
Bracket	B-44P	

How to Order

FH 1 50 – 02 – 0 1 0 – P 005 [ ] [ ]

Hydraulic filter

Operating pressure

1	Max. 1 MPa

Construction/Connection

50	Element downward removal, threaded

Port size (Rc)

02	1/4
03	3/8
04	1/2

Differential pressure indication

0	None
4	Differential pressure indicator
5	Differential pressure indication switch Note)

Note) N.C. and N.O. common

Relief valve

1	None

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

Element

P	Paper
M	Micromesh

Nominal filtration

005	5 μm
010	10 μm
020	20 μm

Note) 10 μm only for water-glycol or emulsion.

Bracket

Nil	None
B	With bracket

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.

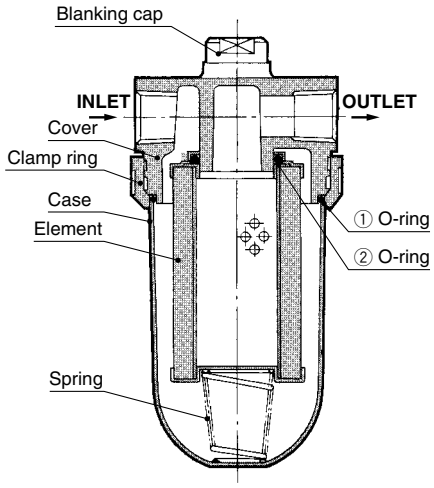
Replacement Element Part No. (including O-ring for element)

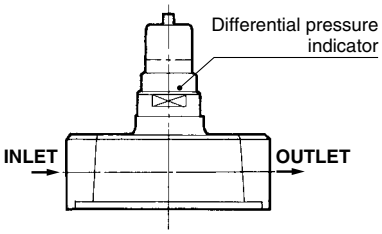
Model	5 μm	10 μm	20 μm	Element size
FH150-02	EP910-005N	EP910-010N	EP910-020N	ø53 x 90
FH150-03				
FH150-04				

Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.
N: Petroleum, V: Phosphoric ester, W: Water-glycol, Emulsion (10 μm only)
Note 2) Refer to page 32 for non-standard filtration.
Note 3) Above elements require one element per filter.

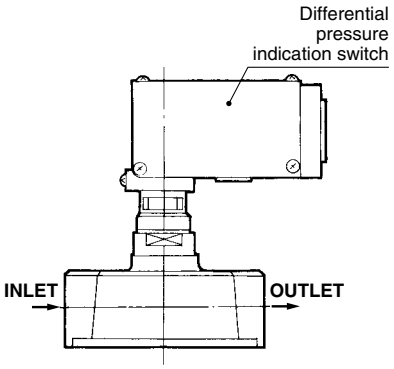
Construction/Seal List

Oil filter





Differential pressure indicator



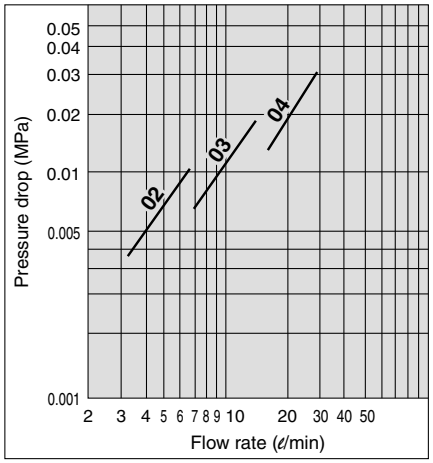
Differential pressure indication switch

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

No.			①	②
Model \ Description		Hydraulic fluid type	O-ring for cover case	O-ring for element
			Standard	Standard
FH150-	02	Petroleum, Emulsion, Water-glycol	1A-S65	JIS B2401 -1A-P30
	03			
	04			
FH150-	02	Phosphoric ester	4D-S65	JIS B2401 -4D-P30
	03			
	04			

Flow Characteristics

FH150-02 to 04



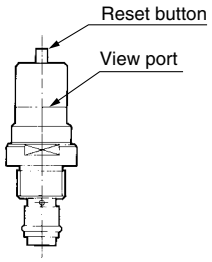
Conditions
Fluid: Turbine oil Class 2 VG56
Measured pressure: 1 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

Differential Pressure Indication

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

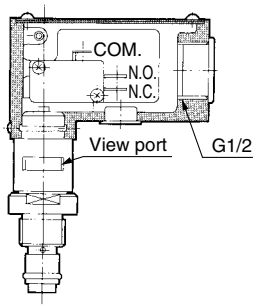
■ Differential pressure indicator

- Operating pressure—0.13 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—0.13 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.

Handling Precautions

① Mounting

- Confirm INLET and OUTLET 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.

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 actuated, 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.

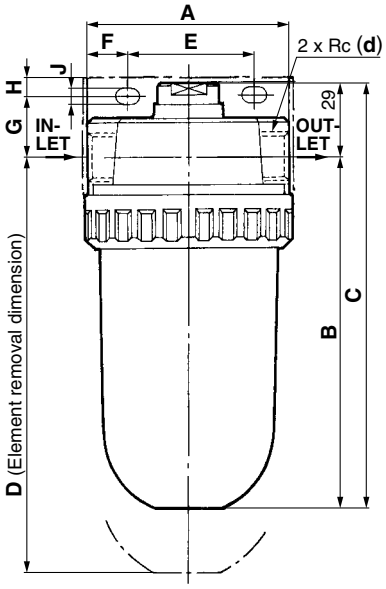
③ Element replacement

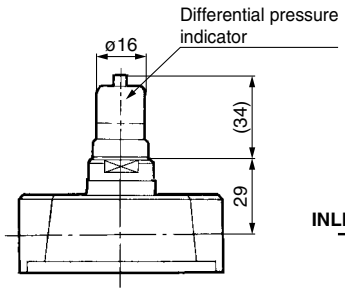
- When the pressure difference reaches 0.13 MPa during operation (actuating the differential pressure indicator), stop operation and replace the element.
- When replacing the element, drain the fluid from the case. Also, check the O-rings and replace them if they are damaged.

④ Other

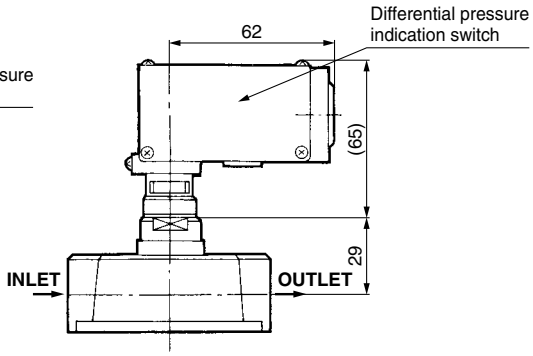
- Refer to the operating manual regarding the tightening torque for clamping ring.

Dimensions





Differential pressure indicator



Differential pressure indication switch

(mm)

Model	d	A	B	C	D	E	F	G	H	J	Weight (kg)
FH150-02	1/4										
FH150-03	3/8	80	139	168	230	50	15	25	7	6.5	0.7
FH150-04	1/2										

Magnetic Separator
Series FHM

These magnetic separators protect machinery from malfunctions, reduced precision, and burnout by adsorbing and eliminating contaminants in the fluid by means of magnetism. This helps extend the service life of hydraulic equipment.

Zero running cost
Since there are no consumable parts, the running cost is basically zero and the magnetic separator can be used semi-permanently.

Extends service life of hydraulic fluid
By adsorbing and eliminating contaminants, the magnetic separator retards deterioration of the hydraulic fluid and makes it possible to extend the fluid replacement time.

Reduced maintenance costs
The magnetic separator prevents mechanical problems caused by contaminants such as abrasive particles and greatly reduces maintenance costs.

Specifications

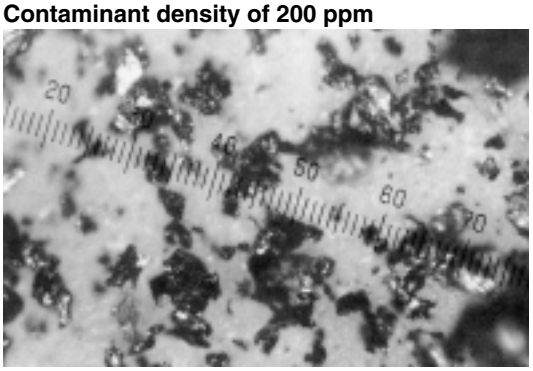
Fluid	FHMN: Petroleum, Water-glycol, Cutting oil, Emulsion FHMV: Phosphoric ester
Operating temperature	Max. 80°C
Fluid speed	3 m/min or less

Model

Model	Applicable fluid storage volume (ℓ/unit) Note)	Dimension (mm)	Weight (kg)
FHM□-055	20	□55 x t20	0.2
FHM-100	100	□100 x t30	0.9
FHM-200	200	200 x 140 x t40	2.5

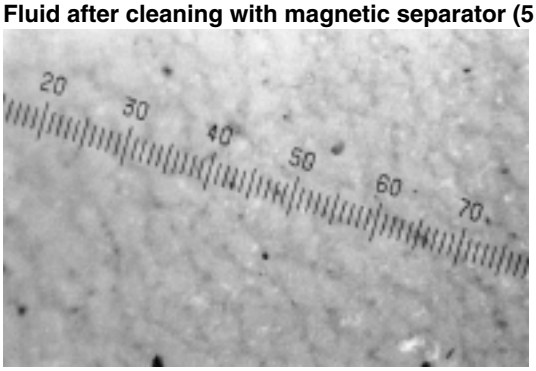
Note) For example, three FHM100 magnetic separator units would be sufficient for a 300-liter fluid storage tank.

Contaminant density of 200 ppm



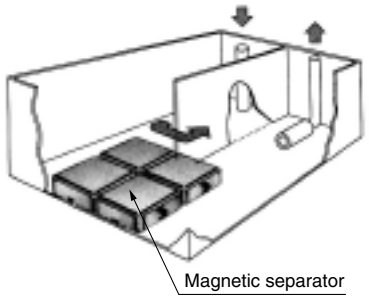
Separator after contaminant adsorption

Fluid after cleaning with magnetic separator (5 ppm)

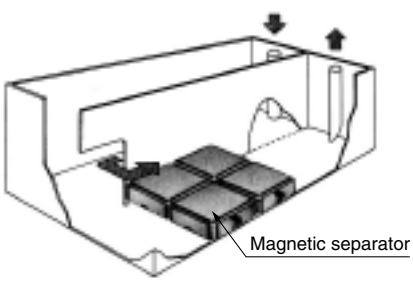


Magnetic Separator Installation Examples

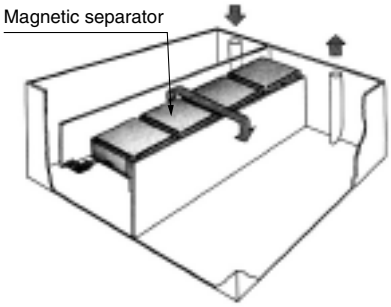
① **U-turn flow type**



② **Underflow type**



③ **Overflow type**



How to Order

FHM N – 055

- **Magnetic separator**
- **Fluid**

N	Petroleum, Water-glycol, Cutting oil, Emulsion
V	Phosphoric ester

- **Main unit representative dimensions**

055	□55 x t20

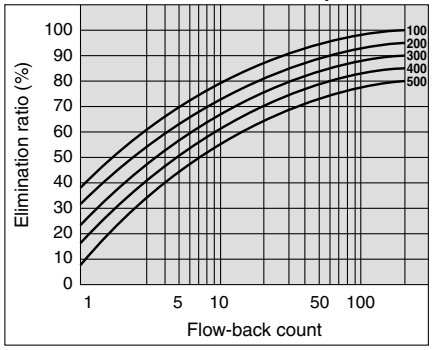
FHM – 100

- **Magnetic separator**
- **Main unit representative dimensions**

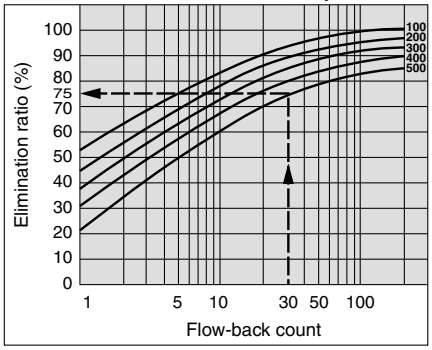
100	□100 x t30
200	200 x 140 x t40

Fluid Iron Content Elimination Performance by Iron Particle Concentration

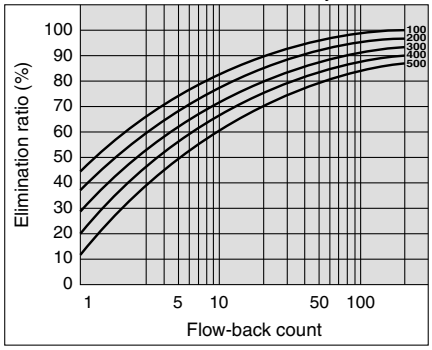
FHM□-055 Fluid: Hydraulic fluid



FHM-100 Fluid: Hydraulic fluid



FHM-200 Fluid: Hydraulic fluid



Explanation of graph

Example: Elimination ratio and concentration after using the FHM-100 for one hour under the following conditions.

Conditions 1. Volume of fluid in tank: 200 ℓ
2. Pump-out volume: 100 ℓ/min
3. Contaminant concentration of used fluid: 500 ppm (initial concentration, percentage by volume)
4. Number of separators: 2 pcs. (applicable fluid storage volume of 100 ℓ/unit)

Explanation of graph

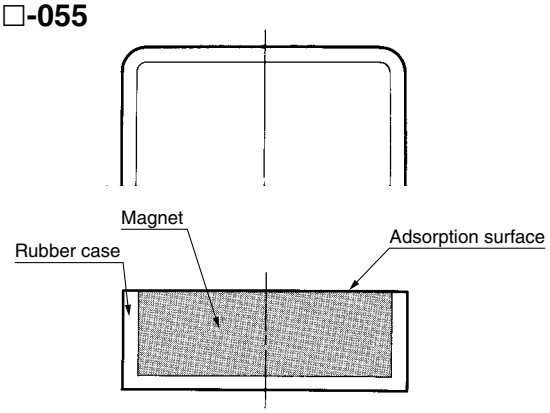
① Calculate the flow-back count (N).

$$N = \frac{\text{Pump-out volume} \times \text{Operation time}}{\text{Volume of fluid in tank}} = \frac{100 \times 60}{200} = 30$$

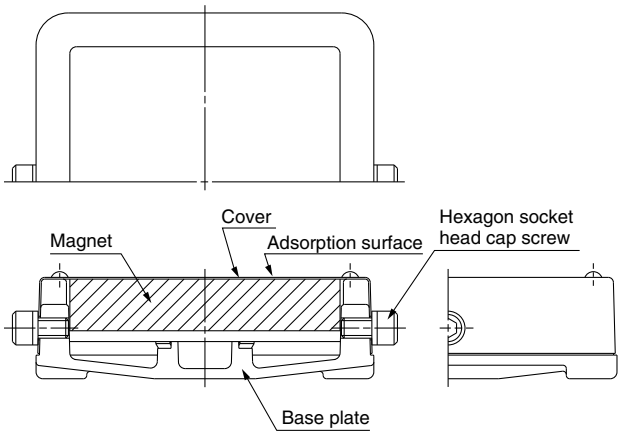
② Based on the elimination ratio data for the FHM□-100 and the point where the 500 ppm line and flow-back count 30 line intersect (one hour after starting operation), the result is 75%.

Construction

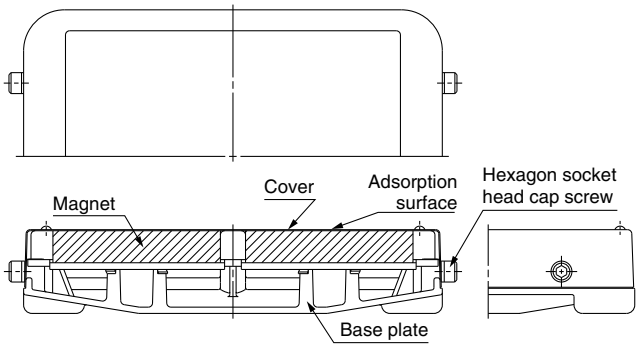
FHM□-055



FHM-100

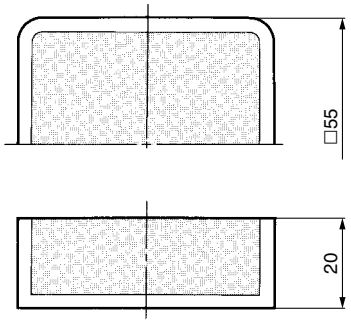


FHM-200

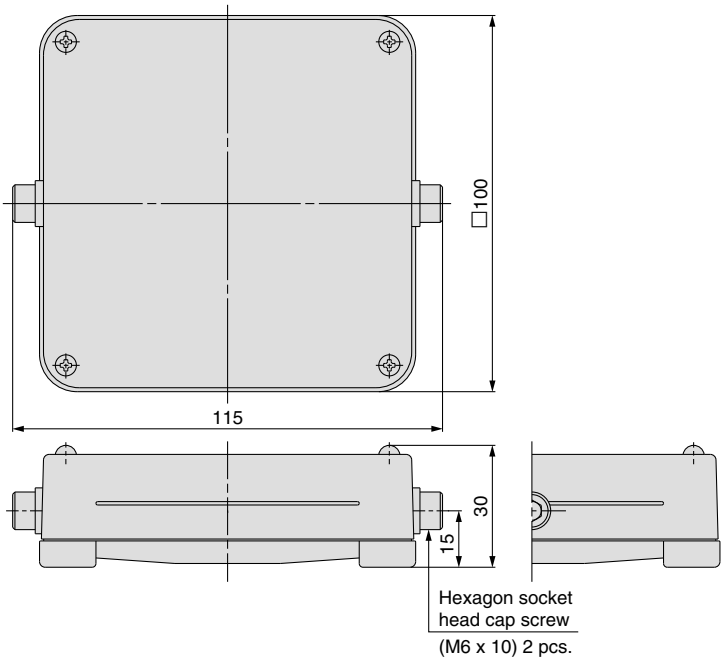


Dimensions

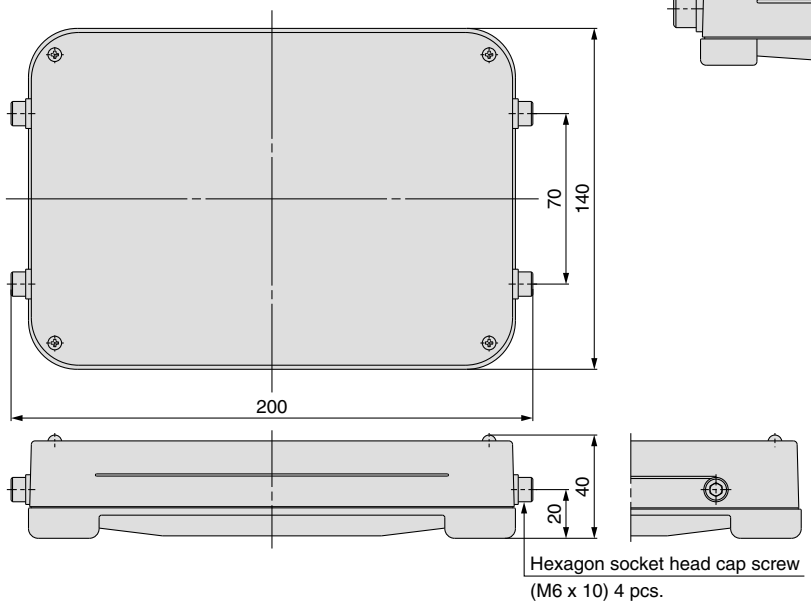
FHM□-055



FHM-100



FHM-200



Handling Precautions

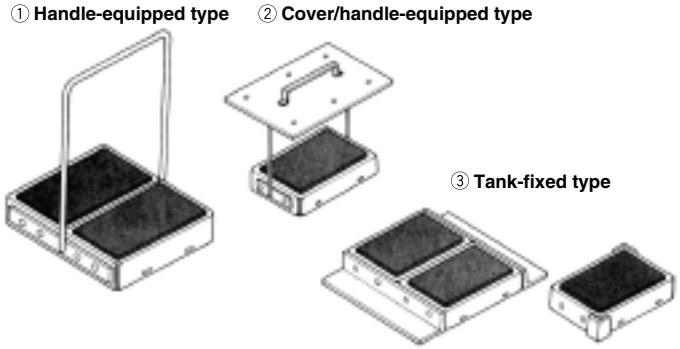
Mounting

① The flat portion of the stainless steel cover functions as the contaminant adsorption surface. However, for FHM□-055, the flat portion of the magnetic material functions as the contaminant adsorption surface.

② Mount the magnetic separator in a location where fluid is constantly flowing by in laminar flow.

③ Avoid locations such as near the suction pipe or return pipe, places where there is turbulence, and locations where the flow speed is 3 m/min or greater.

① **Handle-equipped type** ② **Cover/handle-equipped type**



③ **Tank-fixed type**

④ If necessary, fix the separator in place. If frequent cleaning will be necessary, it can be suspended from the top panel of the tank.

⑤ If a fluid switch (built-in lead switch) or the like is used, it should be installed in a location where it will not be affected by magnetism from the separator. (Refer to the technical data sheet (SM-82-006) for information on magnetic fields.)

Maintenance

① Clean the separator regularly. Make sure to clean it once the accumulation of contaminants reaches a thickness of 20 mm or so.

② Clean the adsorption surface of the separator by wiping away the accumulated contaminants using a soft rag or the like.

Handling

① Do not bring the top surface of the separator near magnetically attractive objects such as iron plates.

② Handle the separators individually and do not bring them into close proximity with each other.

③ Be careful not to get your fingers caught between iron plates, etc., when installing the separator.

④ Do not bring objects that are affected by magnetism (cards with magnetic strips, watches, etc.) near the separator.

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

Series FH
Specific Product Precautions

Be sure to read this before handling.
Refer to the back of page 1 for Safety Instructions.

Design

⚠Caution

1. **Do not use at a pressure that exceeds the operating pressure range.**
2. **Do not use at a temperature that exceeds the operating temperature range.**
3. **Fluid**
   Do not use the product with gases. Do not use fluid other than hydraulic fluid.
4. **Fatigue damage**
   Under the following conditions, special measures are required:
   1. If the product will be subjected to pressure surges.
   2. If the product is not mounted securely and will be subject to friction or vibrations.
5. **Corrosion**
   The product may corrode depending on usage conditions and environment.

Selection

⚠Warning

1. **When selecting products, carefully consider the usage purpose, the required specifications, and the usage conditions (fluid, pressure, flow rate, temperature, environment), and ensure that the specification range is not exceeded.**
2. **The fluid used must not be heated to the boiling point.**
3. **Do not use the product with air or other gases under any circumstances.**
4. **Do not use the product in circumstances where it will be exposed to pressure that exceeds the rated operating pressure range, such as with a water hammer or surge pressure.**

Fluid

⚠Warning

1. **Do not use fluid other than hydraulic fluid.**

Piping

⚠Caution

1. **Make sure to allow sufficient space for maintenance when installing and piping.**
2. **Connections**
   Make sure no cutting chips from pipe threads or sealing material gets inside the piping. If sealing tape is used, leave 1.5 to 2 thread ridges exposed at the end of the male thread.
3. **Filter installation**
   Use stays or the like to secure the inlet and outlet pipes so that the filter unit is not subjected to external force such as vibration.

Operating Environment

⚠Caution

1. **If the product is used in an environment or location conducive to corrosion, discoloration or deterioration due to corrosion may occur.**
2. **Fatigue damage may occur if the product is used in a location subject to vibrations or impacts.**

Maintenance

⚠Caution

1. **The differential pressure will increase if the filter becomes clogged with foreign matter.**
   The differential pressure indicator operation pressure is the pressure difference at which the element should be replaced. When the pressure difference rises to this level, replace the element with a new one. A differential pressure indicator and differential pressure indication switch are available as options.

Record of changes	
H edition	* Page 32 Addition of Made to Order (Non-standard fitration) * Number of pages from 48 to 52. LY

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