

Hydraulic Filters

Series FH ☐

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

RoHS



Series	Operating pressure	Port size	Element (μm) nominal filtration	Accessory (Option)	Page
Vertical Suction Filter Series FHIA	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 (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blanking cap	1518
Suction Filter with Case Series FH99	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 (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blanking cap	1522
Suction Guard Series FHG	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 (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Air breazer Cap	1526
Line Filter Series FH34/44/54/64	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 (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blanking cap	1530
Vertical Return Filter Series FHBA	Max. 1.6 MPa	3/4, 1 1/4, 1 1/2	Paper 5, 10, 20 Micromesh 5, 10, 20	Differential pressure indicator (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blanking cap	1534
Return Filter Series FH100	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 (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blanking cap	1537
Oil Filter Series FH150	Max. 1 MPa	1/4, 3/8, 1/2	Paper 5, 10, 20 (Micromesh)	Differential pressure indicator (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Differential pressure indication switch (CB- <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Blanking cap Bracket	1541
Magnetic Separator Series FHM	—	—	—	—	1545

FH ☐

HOW ☐

Vertical Suction Filter Series FHIA

RoHS

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/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 casting
	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	1/2 ^B	30
FHIA□-06	3/4 ^B	50
FHIA□-08	1 ^B	95
FHIA□-10	1 1/4 ^B	150
FHIA□-12	1 1/2 ^B	220
FHIA□-16	2 ^B	350
FHIA□-20	2 1/2 ^B	550
FHIA□-24	3 ^B	770
FHIA□-28	3 1/2 ^B	1000
FHIA□-32	4 ^B	1300

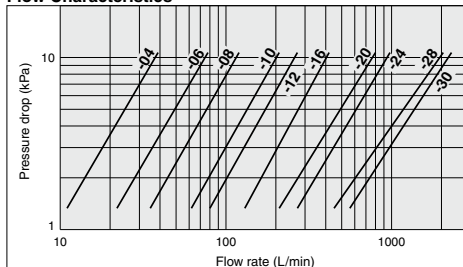
The symbol represented by □ indicates the type of applicable hydraulic fluid. N: Petroleum, W: Water-glycol, Emulsion, V: Phosphoric ester

(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



How to Order

FHIA 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 1/2^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
28 3 1/2^B
32 4^B

Made to Order

Nil None (Standard)
X0 Non-standard filtration
 (Note) Refer to page 1548 for details.

Relief valve

R With relief valve
D None (Blanking plate)

Differential pressure indication

M Differential pressure indicator
E Differential pressure indication switch (Note)
D None (Blanking cap)
 (Note) N.C. and N.O. common

Nominal filtration

074 74 µm
105 105 µm
149 149 µm

Element

M Micromesh

Replacement Element Part No.

Port size (Nominal size)	74 µm (200 mesh)	105 µm (150 mesh)	149 µm (100 mesh)	Element size
04 (1/2 ^B)	EM001H-074N	EM001H-105N	EM001H-149N	ø65 x 90
06 (3/4 ^B), 08 (1 ^B)	EM101H-074N	EM101H-105N	EM101H-149N	ø85 x 110
10 (1 1/4 ^B), 12 (1 1/2 ^B)	EM201H-074N	EM201H-105N	EM201H-149N	ø100 x 160
16 (2 ^B)	EM301H-074N	EM301H-105N	EM301H-149N	ø120 x 180
20 (2 1/2 ^B), 24 (3 ^B)	EM401H-074N	EM401H-105N	EM401H-149N	ø140 x 200
28 (3 1/2 ^B), 32 (4 ^B)	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 1548 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.

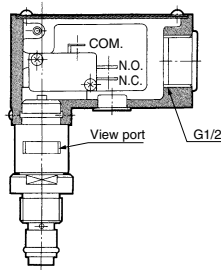
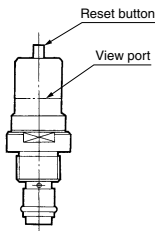
■ Differential pressure indicator

- Operating pressure—20 kPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (Reset type)
- Perform element replacement when the red ring floats up and covers the entire view port.

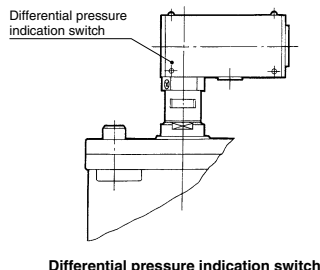
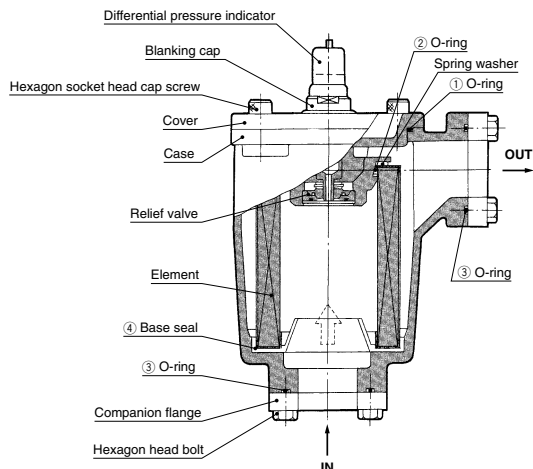
■ Differential pressure indication switch

- 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. 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

* Refer to page 1549 for "Microswitch for differential pressure indication switch".



Construction/Seal List



Differential pressure indication switch

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

Port size	Applicable hydraulic fluid	Material	① O-ring order no. (Nominal size)	② O-ring order no. (Nominal size)	③ O-ring order no. (Nominal size)	④ Base seal order no.
04	Petroleum, Water-glycol, Emulsion	NBR	KA00464 (1A-G70)	KA00061 (1A-G35)	KA00458 (1A-G30)	AL-196H
06 to 08			KA00466 (1A-G90)	KA00460 (1A-G50)	KA00062 (1A-G45)	AL-197H
10 to 12			KA00453 (1A-G105)	KA00463 (1A-G65)	KA00461 (1A-G55)	AL-198H
16			KA00787 (1A-G125)	KA00465 (1A-G80)	KA00464 (1A-G70)	AL-199H
20 to 24			KA00060 (1A-G145)	KA00452 (1A-G100)	KA00065 (1A-G95)	AL-200H
28 to 32			KA00732 (1A-G185)	KA00790 (1A-G140)	KA00787 (1A-G125)	AL-201H
04	Phosphoric ester	FKM or EPDM	KA00616 (4D-G70)	KA00696 (4D-G35)	KA00695 (4D-G30)	AL-196H-V
06 to 08			KA00704 (4D-G90)	KA00699 (4D-G50)	KA00698 (4D-G45)	AL-197H-V
10 to 12			KA00688 (4D-G105)	KA00614 (4D-G65)	KA00700 (4D-G55)	AL-198H-V
16			KA00689 (4D-G125)	KA00702 (4D-G80)	KA00616 (4D-G70)	AL-199H-V
20 to 24			KA00692 (4D-G145)	KA00610 (4D-G100)	KA00705 (4D-G95)	AL-200H-V
28 to 32			KA00693 (4D-G185)	KA00691 (4D-G140)	KA00689 (4D-G125)	AL-201H-V

Note) The material of seals (AL-196H-V to AL-201H-V) is EPDM.

Handling Precautions

① Mounting

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

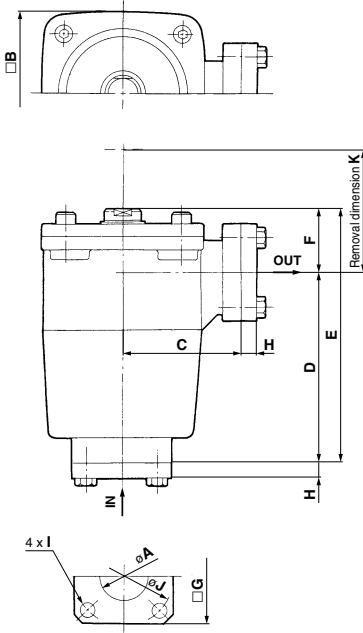
② Operation

- 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.

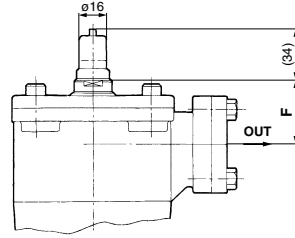
③ Element replacement

- 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.

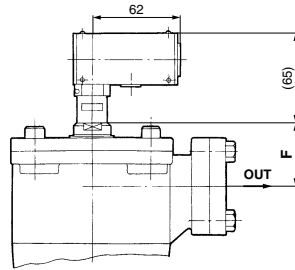
Dimensions



Differential pressure indicator



Differential pressure indication switch



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		95	185	234	49	86	15		86	340	4.6
FHIA□-10	43.2	128	110	214	268.5	54.5	100	15	M10 x 30	102	370	6.1
FHIA□-12	49.1	176	125	220	290.5	70.5	120	15	M12 x 35	130	410	9.5
FHIA□-16	61.1		155	280	364.5	84.5	150	15		166	490	14.0
FHIA□-20	77.1		224									13.5
FHIA□-24	90.0											
FHIA□-28	102.6											
FHIA□-32	115.4											

Suction Filter with Case

Series FH99

RoHS

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 (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 casting
	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 1/2^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
28 3 1/2^B
32 4^B

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

Made to Order
Nil None (Standard)
X0 Non-standard filtration
Note) Refer to page 1548 for details.

Companion flange
Nil None
F With companion flange

Nominal filtration
074 74 µm
105 105 µm
149 149 µm

Element
M Micromesh

Hydraulic fluid
0 Petroleum
1 Water-glycol, Emulsion
2 Phosphoric ester

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

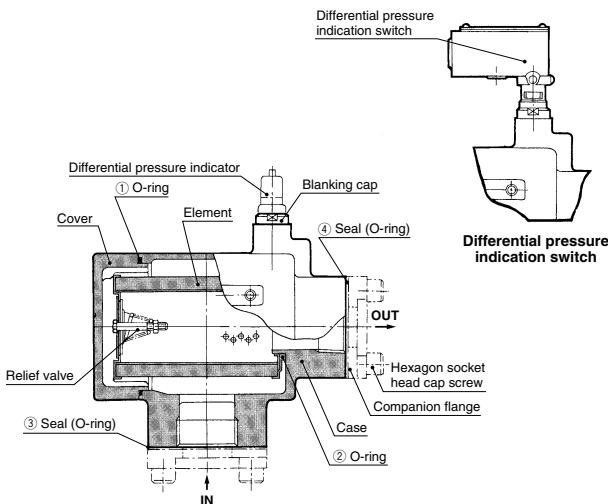
Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.

N: Petroleum, W: Water-glycol, Emulsion, V: Phosphoric ester

Note 2) Refer to page 1548 for non-standard filtration.

Note 3) Above elements require one element per filter.

Construction/Seal List



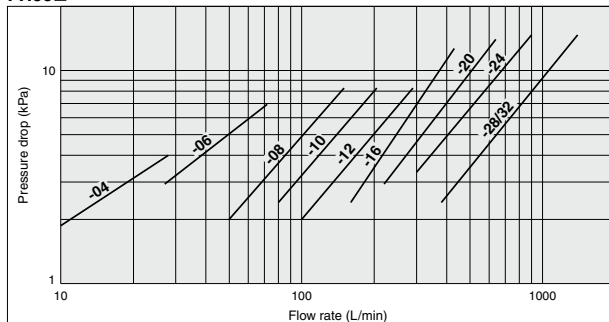
Replacement O-ring/Seal List (One each of the seal and O-ring types listed below are required per filter.)

Port size	Applicable hydraulic fluid	Material	① O-ring order no. (Nominal size)	② O-ring order no. (Nominal size)	③ Seal and O-ring order no. (Nominal size)	④ Seal and O-ring order no. (Nominal size)
04 to 06	Petroleum, Water-glycol, Emulsion	NBR	KA00815 (1A-V85)	KA00470 (1A-P28)	AL-130H	AL-128H
08 to 10			KA00812 (1A-V100)	KA00244 (1A-P42)	AL-133H	AL-131H
12 to 16			KA00813 (1A-V120)	KA00808 (1A-P60)	AL-135H	AL-132H
20 to 24			KA00814 (1A-V150)	KA00810 (1A-P90)	AL-136H	AL-134H
28 to 32			KA01800 (1A-V175)	KA00796 (1A-P120)	AL-137H	AL-135H
04 to 06	Phosphoric ester	FKM or EPDM	KA00731 (4D-V85)	KA00717 (4D-P28)	AL-130H-V	AL-128H-V
08 to 10			KA00727 (4D-V100)	KA00723 (4D-P42)	AL-133H-V	AL-131H-V
12 to 16			KA00728 (4D-V120)	KA00733 (4D-P60)	AL-135H-V	AL-132H-V
20 to 24			KA00729 (4D-V150)	KA00114 (4D-P90)	AL-136H-V	AL-134H-V
28 to 32			KA00730 (4D-V175)	KA00728 (4D-P120)	AL-137H-V	AL-135H-V

Note) The material of seals (AL-128H-V to AL-137H-V) is EPDM.

Flow Characteristics

FH99□



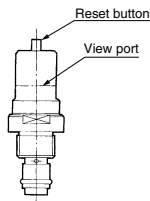
Conditions Fluid: Turbine oil Class 2 VG56
Viscosity: 45 mm²/s
Filter material: Micromesh
Nominal filtration: 74 μm

Differential Pressure Indication

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

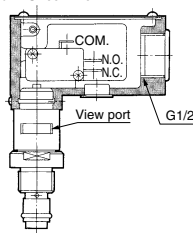
■ Differential pressure indicator

- Operating pressure—24 kPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (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. 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



* Refer to page 1549 for "Microswitch for differential pressure indication switch".

Handling Precautions

① Mounting

- Confirm IN and OUT 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.

Suction Guard Series FHG

RoHS

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

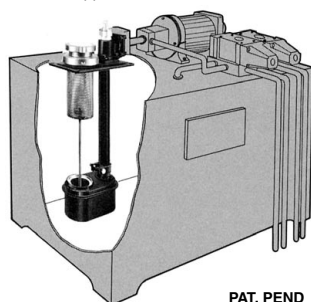
No special tools are required for maintenance, and insertion-type element replacement is quick and easy. This helps prevent air mixture into the suction line and pump damage.

Compact tank equipment

The lubrication port strainer, suction filter, and air breather 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 breather 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 breather	CW-4H	Petroleum
	CW-4H-W	For 1/2 ^B to 1 ^B Water-glycol, Emulsion
	CW-4H-V	Phosphoric ester
	CW-5H	Petroleum
	CW-5H-W	For 1 1/4 ^B to 2 ^B Water-glycol, Emulsion
	CW-5H-V	Phosphoric ester
	CW-6H	Petroleum
	CW-6H-W	For 2 1/2 ^B , 3 ^B Water-glycol, Emulsion
	CW-6H-V	Phosphoric ester
	D-73H	Petroleum
Cap	D-73H-W	For 1/2 ^B to 1 ^B Water-glycol, Emulsion
	D-73H-V	Phosphoric ester
	D-74H	Petroleum
	D-74H-W	For 1 1/4 ^B to 2 ^B Water-glycol, Emulsion
	D-74H-V	Phosphoric ester
	D-75H	Petroleum
	D-75H-W	For 2 1/2 ^B , 3 ^B Water-glycol, Emulsion
	D-75H-V	Phosphoric ester

How to Order

FH G 9 0 A

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

- M 074 - 04 - 0 0

Port size

04 1^{2B}
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

Nominal filtration

074 74 µm
105 105 µm
149 149 µm

Element

M Micromesh

0 0

Made to Order

Nil None (Standard)
X0 Non-standard filtration
(Note) Refer to page 1548 for details.

Air breather

Nil Air breather
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

Length below flange neck (T dimension)

Port size (Nominal size)	Standard T dimension		T dimension when shipped (Max. T dimension)
	Symbol	Length (mm)	
04 (1 ^{2B})	1	310	±30
	2	380	
	3	450	
	4	520	
	5	590	
06 (3/4 ^B)	1	385	±45
	2	485	
	3	585	
	4	685	
	5	785	
08 (1 ^B)	1	560	Fixed
	2	650	
	3	750	
	4	850	
	5	950	

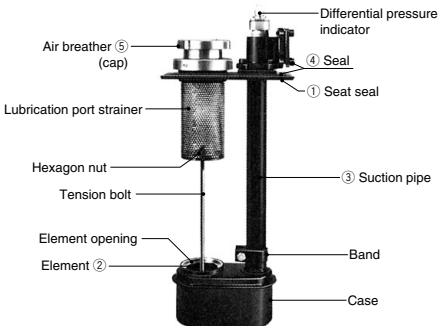
Port size (Nominal size)	74 µm (200 mesh)	105 µm (150 mesh)	149 µm (100 mesh)	Element size
04 (1 ^{2B}), 06 (3/4 ^B), 08 (1 ^B)	EM220-074N	EM220-105N	EM220-149N	ø70 x 90
10 (1 1/4 ^B), 12 (1 1/2 ^B), 16 (2 ^B)	EM320-074N	EM320-105N	EM320-149N	ø90 x 125
20 (2 1/2 ^B), 24 (3 ^B)	EM420-074N	EM420-105N	EM420-149N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

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 ^{2B}), 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 1548 for non-standard filtration.
Note 3) Above elements require one element per filter.

Construction/Seal List



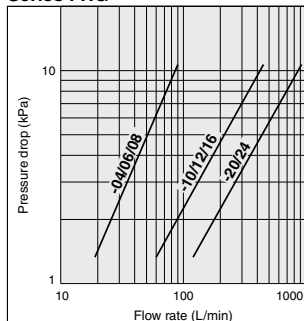
Replacement O-ring/Seal List (One each of the seal and O-ring types listed below are required per filter.)

Port size	Material	① Seal order no.	② O-ring order no. (Nominal size)	③ O-ring order no. (Nominal size)	④ Seal order no.	⑤ Seal order no.
06 to 08	NBR	AL-180H	KA00463 (1A-G65)	KA00080 (1A-P34)	AL-183H	AL-162H
		AL-181H	KA00793 (1A-G85)	KA00808 (1A-P60)	AL-184H	AL-163H
		AL-182H	KA00065 (1A-G95)	—	AL-185H	AL-164H
06 to 08	FKM or EPDM	AL-180H-V	KA00614 (4D-G65)	KA00105 (4D-P34)	AL-183H-V	AL-162H-V
		AL-181H-V	KA00703 (4D-G85)	KA00733 (4D-P60)	AL-184H-V	AL-163H-V
		AL-182H-V	KA00705 (4D-G95)	—	AL-185H-V	AL-164H-V
		—	—	—	—	—

(Note) The material of seals (AL-162H-V to AL-164H-V and AL-180H-V to AL-182H-V) is EPDM.

Flow Characteristics

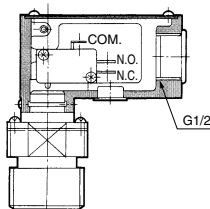
Series FHG



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

Differential Pressure Indication

- **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



* Refer to page 1549 for "Microswitch for differential pressure indication switch".

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 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 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 breather (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 1/2^B to 1^B and ±45 mm for 1 1/4^B to 2^B. The dimension for 2 1/2^B to 3^B is fixed, so no adjustment is possible.
- Refer to the operating manual for details of the adjustment method.

⑥ Lubrication

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

Differential Pressure Indication

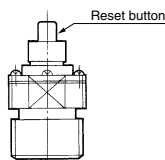
Two indication methods are available: differential pressure indicator and differential pressure indication switch. These can be mounted on all filter models.

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.



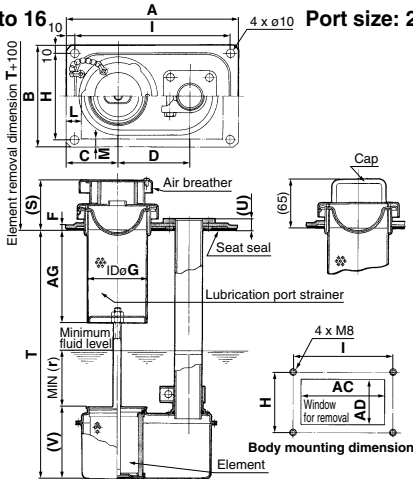
Handling Precautions

① Mounting

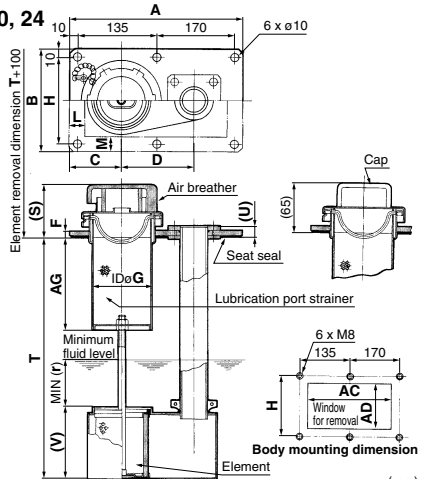
- The portion of the suction guard below the oil tank mounting flange is installed inside the oil tank, so check to make sure it is clean when mounting it. For maintenance, make sure to provide sufficient space above the filter for removing the element.
- Use caution to ensure airtightness when connecting 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 1/2^B to 1^B, 60 mm for 1 1/4^B to 1 1/2^B, 80 mm for 2^B, and 120 mm or more for 2 1/2^B to 3^B, 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.

Dimensions

Port size: 04 to 16

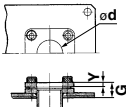


Port size: 20, 24



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

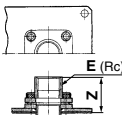
Connection part dimensions/ Companion flange



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

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

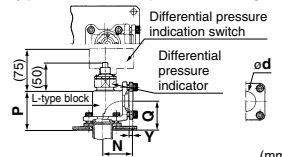
Female threaded companion flange



Port size	E	Z	Weight (kg)
1/2 ^B (04)	22.2	47	2.8
3/4 ^B (06)	27.7	47	2.8
1 ^B (08)	34.5	52	2.8
1 1/4 ^B (10)	43.9	58	5.3
1 1/2 ^B (12)	49.1	58	5.3
2 ^B (16)	61.1	63	5.4

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

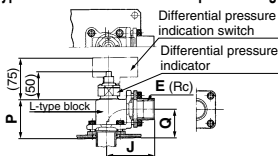
L-type block companion flange



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

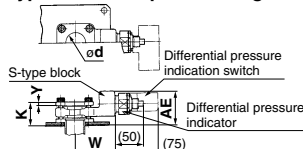
L-type block female threaded companion flange



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

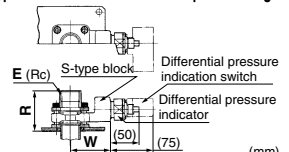
S-type block companion flange



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



Port size	E	R	W	Weight (kg)
1/2 ^B (04)	1/2	69	70	3.6
3/4 ^B (06)	3/4	69	70	3.6
1 ^B (08)	1	74	70	3.6
1 1/4 ^B (10)	1 1/4	90	85	6.4
1 1/2 ^B (12)	1 1/2	90	85	6.4
2 ^B (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

RoHS

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 (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
	O-ring	Aluminum casted (1 1/4, 1 1/2, 2)	
Element	NBR or FKM (Note)		
	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 (3/4 ^B)	50
	FH342-08	FH341-08	1	25 (1 ^B)	80
	FH340-10	FH341-10	1 1/4	32 (1 1/4 ^B)	120
	FH340-12	FH341-12	1 1/2	40 (1 1/2 ^B)	160
Max. 7 MPa	—	FH341-16	—	50 (2 ^B)	260
	FH440-03	—	3/8	—	10
	FH440-04	FH441-04	1/2	15 (1/2 ^B)	20
	FH440-06	FH441-06	3/4	20 (3/4 ^B)	50
	FH440-08	FH441-08	1	25 (1 ^B)	80
	FH440-10	FH441-10	1 1/4	32 (1 1/4 ^B)	120
Max. 14 MPa	FH440-12	FH441-12	1 1/2	40 (1 1/2 ^B)	160
	—	FH441-16	—	50 (2 ^B)	260
	FH540-03	—	3/8	—	10
	FH540-04	FH541-04	1/2	15 (1/2 ^B)	20
	FH540-06	FH541-06	3/4	20 (3/4 ^B)	50
	FH540-08	FH541-08	1	25 (1 ^B)	80
Max. 21 MPa	FH540-10	FH541-10	1 1/4	32 (1 1/4 ^B)	120
	FH540-12	FH541-12	1 1/2	40 (1 1/2 ^B)	160
	—	FH541-16	—	50 (2 ^B)	260
	FH640-03	—	3/8	—	10
	FH640-04	FH641-04	1/2	15 (1/2 ^B)	20
	FH640-06	FH641-06	3/4	20 (3/4 ^B)	50
Max. 21 MPa	FH640-08	FH641-08	1	25 (1 ^B)	80
	FH640-10	FH641-10	1 1/4	32 (1 1/4 ^B)	120
	FH640-12	FH641-12	1 1/2	40 (1 1/2 ^B)	160
	—	FH641-16	—	50 (2 ^B)	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 ¹ to FH44 ¹	Petroleum, Water-glycol, Emulsion
	CB-48H-V	FH44 ¹	Phosphoric ester
	CB-52H	FH342	Petroleum, Water-glycol, Emulsion
	CB-52H-V	FH342	Phosphoric ester
Differential pressure indication switch (N.C. and N.O. common)	CB-64H	FH54 ¹ to FH64 ¹	Petroleum, Water-glycol, Emulsion
	CB-64H-V	FH64 ¹	Phosphoric ester
	CB-49H	FH34 ¹ to FH44 ¹	Petroleum, Water-glycol, Emulsion
	CB-49H-V	FH44 ¹	Phosphoric ester
Blanking cap (for differential pressure indication part)	CB-53H	FH342	Petroleum, Water-glycol, Emulsion
	CB-53H-V	FH342	Phosphoric ester
	CB-65H	FH54 ¹ to FH64 ¹	Petroleum, Water-glycol, Emulsion
	CB-65H-V	FH64 ¹	Phosphoric ester
Blanking cap (for differential pressure indication part)	AG-9H	FH34 ¹ to FH64 ¹	Petroleum
	AG-9H-W	FH34 ¹ to FH64 ¹	Water-glycol, Emulsion
	AG-9H-V	FH64 ¹	Phosphoric ester
	AG-12H	FH342	Petroleum
	AG-12H-W	FH342	Water-glycol, Emulsion
	AG-12H-V	FH342	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*	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 (1/2 ^B)
06	3/4	20 (3/4 ^B)
08	1	25 (1 ^B)
10	1 1/4	32 (1 1/4 ^B)
12	1 1/2	40 (1 1/2 ^B)
16	—	50 (2 ^B)
20	—	65 (2 1/2 ^B)
24	—	80 (3 ^B)

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

Nominal filtration

005	5 μm
010	10 μm
020	20 μm

Note) For water-glycol or emulsion: only 10 μm.

Fluid direction

Nil	IN left
L	IN right

Element

P	Paper
M	Micromesh

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

Made to Order

Nil	None (Standard)
X0	Micromesh element equipped

Note) Refer to page 1548 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

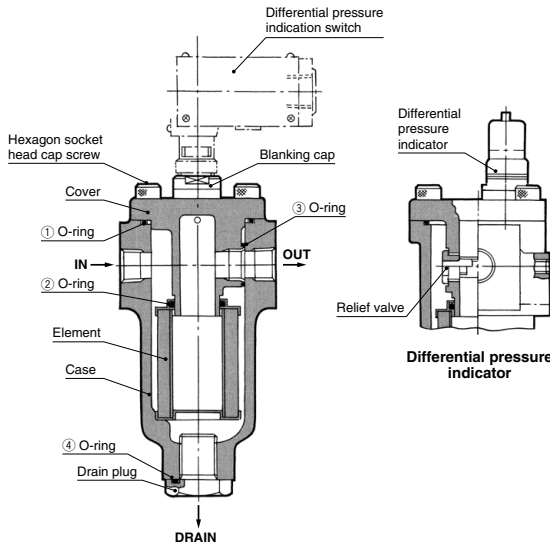
Note 1) The symbol at the end of the element part no. indicates the hydraulic fluid type.

N: Petroleum, V: Phosphoric ester, W: Water-glycol, Emulsion (10 μm only)

Note 2) Refer to page 1548 for micromesh elements.

Note 3) Above elements require one element per filter.

Construction/Seal List

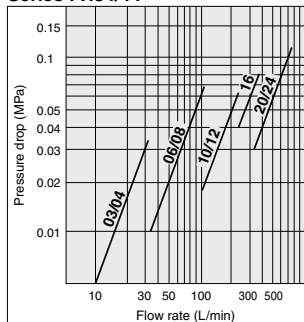


Replacement O-ring/Seal List (One each of the seal and O-ring types listed below are required per filter.)

Model	Port size	Applicable hydraulic fluid	Material	① O-ring order no. (Nominal size)	② O-ring order no. (Nominal size)	③ O-ring order no. (Nominal size)	④ O-ring order no. (Nominal size)
FH340	03 to 04	Petroleum, Water-glycol, Emulsion	NBR	KA00465 (1B-G80)	KA00471 (1A-P30)	KA00466 (1A-P22A)	KA00470
FH34*	06 to 08			KA00453 (1B-G105)	KA00382 (1A-P44)	KA00079 (1A-P32)	
FH44* to 64*	03 to 04			KA00463 (1B-G65)	KA00471 (1A-P30)	KA00074 (1A-P20)	
FH44* to 64*	06 to 08			KA00466	KA00382	KA00079 (1A-P32)	
FH34* to 64*	10 to 12			(1B-G80)	(1A-P44)	KA00803 (1A-P40)	
FH341 to 641	16			KA00453 (1B-G105)	KA00806 (1A-P50)	KA00806 (1A-P50)	
FH441	20 to 24	Phosphoric ester	FKM	KA00800 (1B-G145)	KA00809 (1A-P85)	KA00809 (1A-P85)	(P28)
FH340	03 to 04			KA01296M (G80-H80)	KA00104 (4D-P30)	KA00713 (4D-P22A)	
FH34*	06 to 08			KA02476 (G105-H80)	KA00107 (4D-P44)	KA00720 (4D-P32)	
FH44* to 64*	03 to 04			KA01759 (G65-H80)	KA00104 (4D-P30)	KA00102 (4D-P20)	
FH44* to 64*	06 to 08			KA01296	KA00107	KA00720 (4D-P32)	
FH34* to 64*	10 to 12			(G80-H80)	(4D-P44)	KA00722 (4D-P40)	
FH341 to 641	16			KA02476 (G105-H80)	KA00636 (4D-P50)	KA00636 (4D-P50)	
FH441	20 to 24			KA01760 (G145-H80)	KA00725 (4D-P85)	KA00725 (4D-P85)	

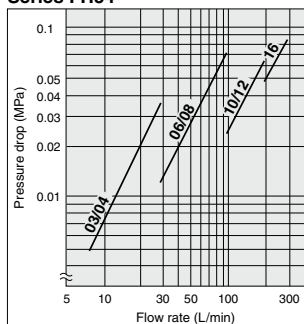
Flow Characteristics

Series FH34/44



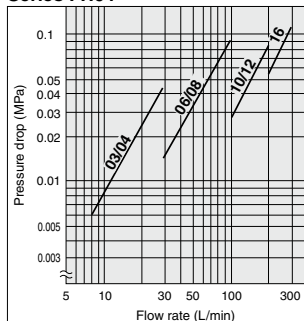
Conditions Fluid: Turbine oil Class 2 VG56
Measured pressure: 3.5, 7 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

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



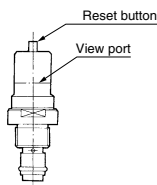
Conditions Fluid: Turbine oil Class 2 VG56
Measured pressure: 21 MPa
Viscosity: 45 mm²/s
Filter material: Paper
Nominal filtration: 10 μm

Differential Pressure Indication

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

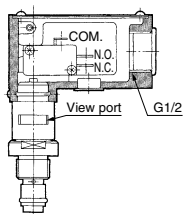
■ Differential pressure indicator

- Operating pressure—0.275 MPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (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. 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



* Refer to page 1549 for "Microswitch for differential pressure indication switch".

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.

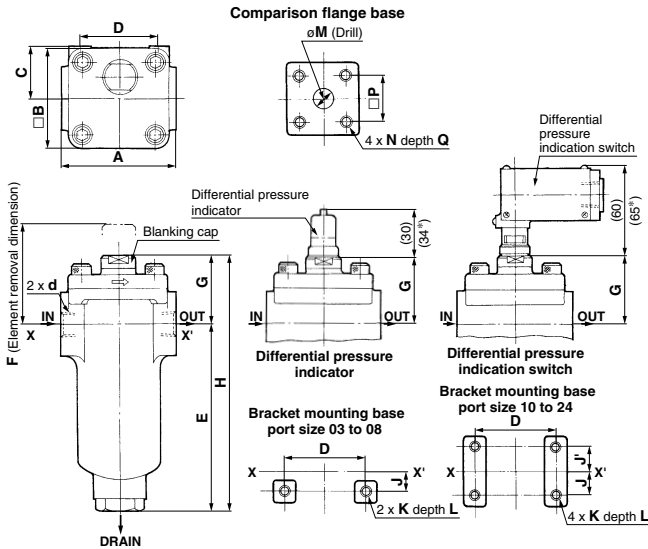
③ Element replacement

- 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	M10 x 1.5 x 30	SSA15	G25
	FH541			
	FH641	M10 x 1.5 x 40		
06	FH341	M10 x 1.5 x 30	SSA20	G30
	FH441			
	FH541	M10 x 1.5 x 40		
08	FH341	M12 x 1.75 x 40	SSA25	G35
	FH441			
	FH541	M12 x 1.75 x 45		
10	FH341	M12 x 1.75 x 40	SSA32	G40
	FH441			
	FH541	M12 x 1.75 x 45		
12	FH341	M16 x 2 x 50	SSA40	G50
	FH441			
	FH541	M16 x 2 x 60		
16	FH341	M16 x 2 x 50	SSA50	G60
	FH441			
	FH541	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 1) The companion flange mounting base conforms to JIS B 2291 (21 MPa pipe flanges for hydraulic use) SSA.

Note 2) This filter does not include any companion flange, companion flange bolt, and O-ring.

(*) : Internal dimensions for FH342 type

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	—	136	120	65	60	180	340	61	241	0	—	2 x M10 x 1.5	15	—	—	—	—	2.5
FH342-06	3/4	—	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
FH341-06	—	20 (3/4 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH341-08	—	25 (1 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH340-10	1 1/4	32 (1 1/4 ^h)	150	106	56	100	260	435	87	347	50	0	4 x M10 x 1.5	23	25	4 x M12 x 1.75	48	17	4.6
FH340-12	1 1/2	40 (1 1/2 ^h)	155	120	70	120	361	545	94	455	60	0	4 x M12 x 1.75	28	32	4 x M12 x 1.75	56	17	6.4
FH341-16	—	50 (2 ^h)	155	120	70	120	361	545	94	455	60	0	4 x M12 x 1.75	28	36	4 x M16 x 2	65	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
FH440-04	1/2	15 (1/2 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH440-06	3/4	20 (3/4 ^h)	135	108	57	80	182	330	73	255	0	—	2 x M10 x 1.5	18	16	4 x M10 x 1.5	36	12	8.7
FH440-08	1	25 (1 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH440-10	1 1/4	32 (1 1/4 ^h)	150	105	57	80	260	435	87	347	50	0	4 x M10 x 1.5	18	25	4 x M12 x 1.75	48	17	12.2
FH440-12	1 1/2	40 (1 1/2 ^h)	160	120	65	92	359	540	94	453	60	0	4 x M12 x 1.75	22	32	4 x M12 x 1.75	56	17	18.1
FH441-16	—	50 (2 ^h)	160	120	65	92	359	540	94	453	60	0	4 x M12 x 1.75	22	36	4 x M16 x 2	73	20	18.1
FH441-20	—	65 (2 1/2 ^h)	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 (3 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH540-03	3/8	—	105	86	45	70	152	285	62	214	0	—	2 x M8 x 1.25	14	—	—	—	—	5.2
FH540-04	1/2	15 (1/2 ^h)	145	108	56	100	182	330	73	255	0	—	2 x M10 x 1.5	18	16	4 x M10 x 1.5	36	12	9.7
FH540-06	3/4	20 (3/4 ^h)	155	124	65	120	182	330	73	255	0	—	2 x M10 x 1.5	18	20	4 x M10 x 1.5	40	12	12.8
FH540-08	1	25 (1 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH540-10	1 1/4	32 (1 1/4 ^h)	150	108	56	100	260	435	87	347	50	0	4 x M12 x 1.75	22	25	4 x M12 x 1.75	48	17	19.8
FH540-12	1 1/2	40 (1 1/2 ^h)	180	126	70	120	361	545	94	455	60	0	4 x M12 x 1.75	22	32	4 x M12 x 1.75	56	20	20.4
FH541-16	—	50 (2 ^h)	180	126	70	120	361	545	94	455	60	0	4 x M12 x 1.75	22	36	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
FH640-04	1/2	15 (1/2 ^h)	155	124	65	120	182	330	73	255	0	—	2 x M10 x 1.5	18	16	4 x M10 x 1.5	36	22	12.9
FH640-06	3/4	20 (3/4 ^h)	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
FH640-08	1	25 (1 ^h)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FH640-10	1 1/4	32 (1 1/4 ^h)	180	124	65	125	260	435	87	347	50	0	4 x M12 x 1.75	22	25	4 x M12 x 1.75	56	22	19.8
FH640-12	1 1/2	40 (1 1/2 ^h)	200	144	75	145	361	545	94	455	60	0	4 x M12 x 1.75	22	32	4 x M12 x 1.75	65	30	29
FH641-16	—	50 (2 ^h)	200	144	75	145	361	545	94	455	60	0	4 x M12 x 1.75	22	36	4 x M16 x 2	73	30	29

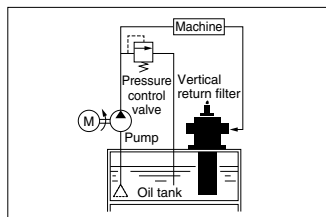
Note) Tapered female thread conforming to JIS B 0203 is compatible.

Flanges conforming to JIS B 2291 (21 MPa pipe flanges for hydraulic use) SSA are compatible.

Vertical Return Filter Series *FHBA*

RoHS

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)
Element	Material	Paper and micromesh
	Nominal filtration *	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

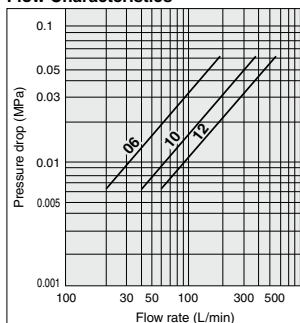
Model	Port size (Rc)	Max. flow rate (L/min)	Weight (kg)	Applicable hydraulic fluid
FHBA□-06	3/4	150	1.7	N : Petroleum W: Water-glycol Emulsion V : Phosphoric ester
FHBA□-10	1 1/4	300	3.7	
FHBA□-12	1 1/2	400	5	

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

FHBA N-06-P010MR

Hydraulic filter • **Operating pressure** • **Type** • **Hydraulic fluid** • **Port size (Rc)** • **Nominal filtration** • **Relief valve** • **Differential pressure indication**

B Max. 1.6 MPa

A Vertical

N Petroleum
W Water-glycol, Emulsion
V Phosphoric ester

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

005 5 µm
010 10 µm
020 20 µm

R With relief valve
D None

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

Element
P Paper
M Micromesh

Made to Order
NII None (Standard)
X0 Non-standard filtration

Note) The non-standard filtration is for micromesh elements only. Refer to page 1548 for details.

Replacement Element Part No.

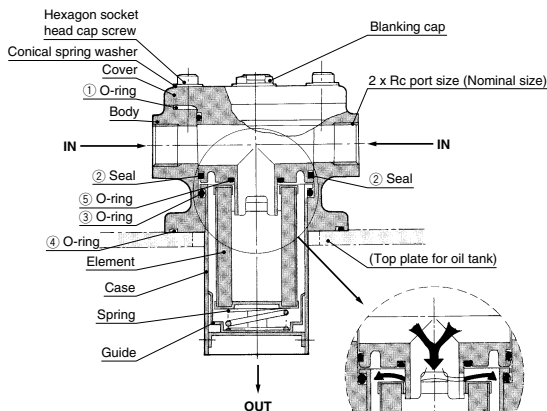
Port size (Nominal size)	Paper			Micromesh			Element size
	5 µm	10 µm	20 µm	5 µm	10 µm	20 µm	
06 (3/4 ^B)	EP001H-005N	EP001H-010N	EP001H-020N	EM601H-005N	EM601H-010N	EM601H-020N	ø56 x 180
10 (1 1/4 ^B)	EP101H-005N	EP101H-010N	EP101H-020N	EM701H-005N	EM701H-010N	EM701H-020N	ø76 x 190
12 (1 1/2 ^B)	EP201H-005N	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 1548 for non-standard filtration.

Note 3) Above elements require one element per filter.

Construction/Seal List



When actuating relief valve

Handling Precautions

① Mounting

- Confirm the IN 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 IN ports. If one is not used, it must be covered with a plug or the like.
- Before mounting the filter on the oil tank, install that ④ the O-ring (see "Construction") is confirmed on the body.

- Ensure that the opening in the case (OUT) 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

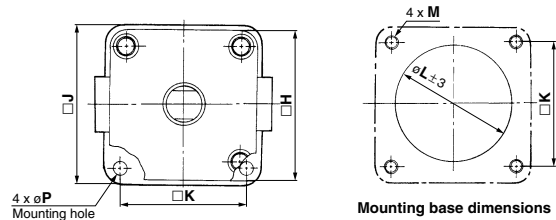
- When the pressure difference reaches 0.18 MPa during filter operation (actuating the differential pressure indicator), stop operation, and replace the paper element or wash the micromesh element. If the micromesh element has reached the end of its service life, replace it.
- When replacing the element,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

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

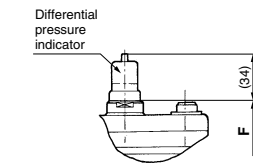
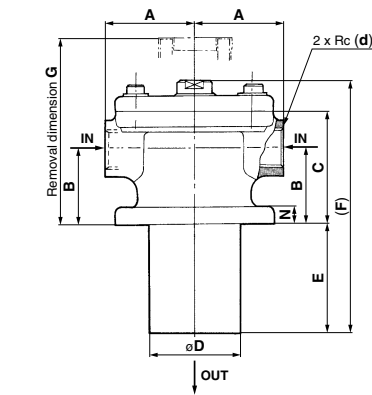
Port size	Applicable hydraulic fluid	Material	① O-ring order no. (Nominal size)	② Seal order no.	③ O-ring order no. (Nominal size)	④ O-ring order no. (Nominal size)	⑤ O-ring order no. (Nominal size)
06	Petroleum, Water-glycol, Emulsion	NBR	KA00465 (1A-G80)	AL-206H	KA00463 (1A-G65)	KA00465 (1A-G80)	KA00470 (1A-P28)
			KA00453 (1A-G105)	AL-207H	KA00793 (1A-G85)	KA00453 (1A-G105)	KA00244 (1A-P42)
06	Phosphoric ester	FKM or EPDM	KA00702 (4D-G80)	AL-206H-V	KA00614 (4D-G65)	KA00702 (4D-G80)	KA00717 (4D-P28)
			KA00688 (4D-G105)	AL-207H-V	KA00703 (4D-G85)	KA00688 (4D-G105)	KA00723 (4D-P42)

Note) The material of seals (AL-206H-V to AL-207H-V) is EPDM.

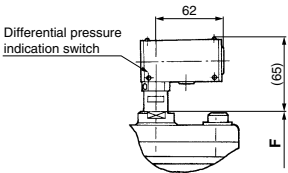
Dimensions



Mounting base dimensions



Differential pressure indicator



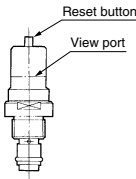
Differential pressure indication switch

Differential Pressure Indication

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

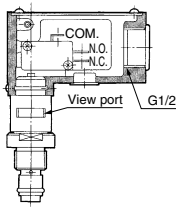
■ Differential pressure indicator

- Operating pressure—0.18 MPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped.
- 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. 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



* Refer to page 1549 for "Microswitch for 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							

Return Filter

Series FH100

RoHS

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 (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 casting	
	O-ring	NBR or FKM ^{Note)}	
	Seal	Stainless steel & NBR or Stainless steel & FKM ^{Note)}	
Element	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

FH □

HOW □

How to Order

FH 1 00

-06

-0

0

0

-P

005

Hydraulic filter

Operating pressure

Construction/Connection

Port size (Rc)

Differential pressure indication

Relief valve

1

Max. 1 MPa

00

Element downward removal, threaded

06

3/4

08

1

10

1 1/4

12

1 1/2

16

2

20

2 1/2

24

3

0

None

4

Differential pressure indicator

5

Differential pressure indication switch Note)

0

With relief valve

1

None

Made to Order

Nil

None (Standard)

X0

Non-standard filtration

Note)

The non-standard filtration is for micromesh elements only. Refer to page 1548 for details.

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.

Element

P

Paper

M

Micromesh

Hydraulic fluid

0

Petroleum

1

Water-glycol, Emulsion

2

Phosphoric ester

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 1548 for non-standard filtration.
Note 3) Above elements require one element per filter.

Construction/Seal List

The diagram illustrates the internal and external components of the FH100 hydraulic filter. Key parts labeled include: Blanking cap, Relief valve, Differential pressure indicator, Cover, IN/OUT ports, O-rings (1 and 2), Seal washer (3), Drain plug, Case, and Element. A secondary view shows the Differential pressure indication switch.

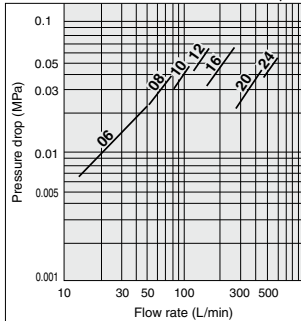
Replacement O-ring/Seal List (One each of the seal and O-ring types listed below are required per filter.)

Port size	Applicable hydraulic fluid	Material	① O-ring order no. (Nominal size)	② O-ring order no. (Nominal size)	③ Seal washer order no.
06 to 08	Petroleum, Water-glycol, Emulsion	NBR	KA00466	KA00800 (1A-P35)	NB00006
10 to 12			(1A-G90)	KA00082 (1A-P44)	
16			KA00788 (1A-G130)	KA00806 (1A-P50)	
20 to 24			KA00756 (AS528-250 H670)	KA00809 (1A-P85)	
06 to 08	Phosphoric ester	FKM	KA00704	KA00721 (4D-P35)	NB00074
10 to 12			(4D-G90)	KA00107 (4D-P44)	
16			KA00690 (4D-G130)	KA00636 (4D-P50)	
20 to 24			KA00676 (AS528-250 H670)	KA00725 (4D-P85)	

1538

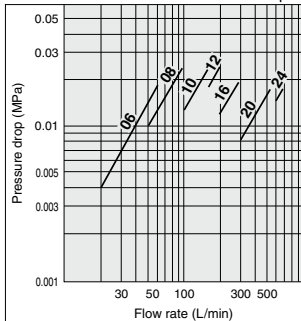
Flow Characteristics

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



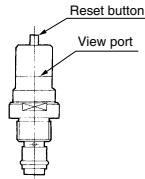
Conditions Fluid: Turbine oil Class 2 VG56
 Measured pressure: 1 MPa
 Viscosity: 45 mm²/s
 Filter material: Micromesh
 Nominal filtration: 74 μm

Differential Pressure Indication

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

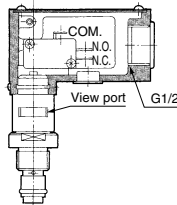
■ Differential pressure indicator

- Operating pressure—0.13 MPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (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. 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



* Refer to page 1549 for "Microswitch for differential pressure indication switch".

Handling Precautions

① Mounting

- Confirm IN and OUT 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

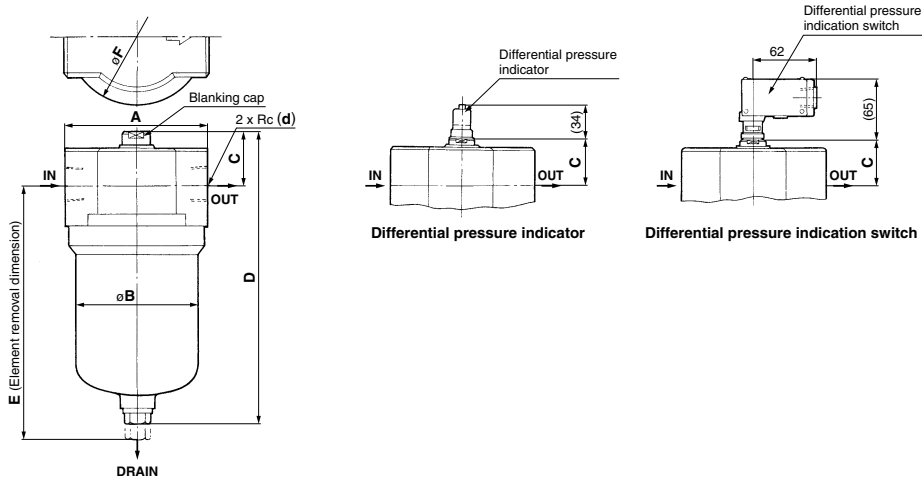
- Operation of the differential pressure indicator in cold weather, such as during winter, mostly occurs due to high viscosity, so check whether it is from clogging or not after normal operation starts.
- Once the differential pressure indicator is actuated, the indication continues to be displayed until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

Series FH100

Dimensions



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

Oil Filter

Series FH150

RoHS

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 (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	Steel plate
	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	—

FH□

HOW□

How to Order

FH 1 50

Hydraulic filter

02

Operating pressure

1	Max. 1 MPa
---	------------

01

Construction/Connection

50	Element downward removal, threaded
----	------------------------------------

0

Port size (Rc)

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

1

Differential pressure indication

0	None
4	Differential pressure indicator
5	Differential pressure indication switch <small>(Note)</small>

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

0

Relief valve

1	None
---	------

0

Made to Order

Nil	None (Standard)
X0	Micromesh element equipped

Note) Refer to page 1548 for details.

0

Bracket

Nil	None
B	With bracket

005

Nominal filtration

005	5 μm
010	10 μm
020	20 μm

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

P

Element

P	Paper
M	Micromesh

0

Hydraulic fluid

0	Petroleum
1	Water-glycol, Emulsion
2	Phosphoric ester

005

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 1548 for micromesh elements.
Note 3) Above elements require one element per filter.

Construction/Seal List

Oil filter

Blanking cap

IN

OUT

Cover

Clamp ring

Case

Element

1 O-ring

2 O-ring

Spring

Differential pressure indicator

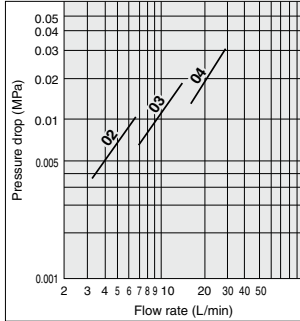
Differential pressure indication switch

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

Port size	Applicable hydraulic fluid	Material	① O-ring order no. (Nominal size)	② O-ring order no. (Nominal size)
02 to 04	Petroleum, Water-glycol, Emulsion	NBR	KA01022 (1A-S65)	KA00471 (1A-P30)
	Phosphoric ester	FKM	KA01105 (4D-S65)	KA00104 (4D-P30)

Flow Characteristics

FH150-02 to 04



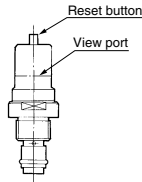
Conditions Fluid: Turbine oil Class 2 VG56
 Measured pressure: 1 MPa
 Viscosity: 45 mm²/s
 Filter material: Paper
 Nominal filtration: 10 μm

Differential Pressure Indication

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

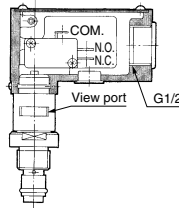
■ Differential pressure indicator

- Operating pressure—0.13 MPa
- Once a value is displayed, it will continue to be displayed until reset, even if the pump is stopped. (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. 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



* Refer to page 1549 for "Microswitch for differential pressure indication switch".

Handling Precautions

① Mounting

- Confirm IN and OUT 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.

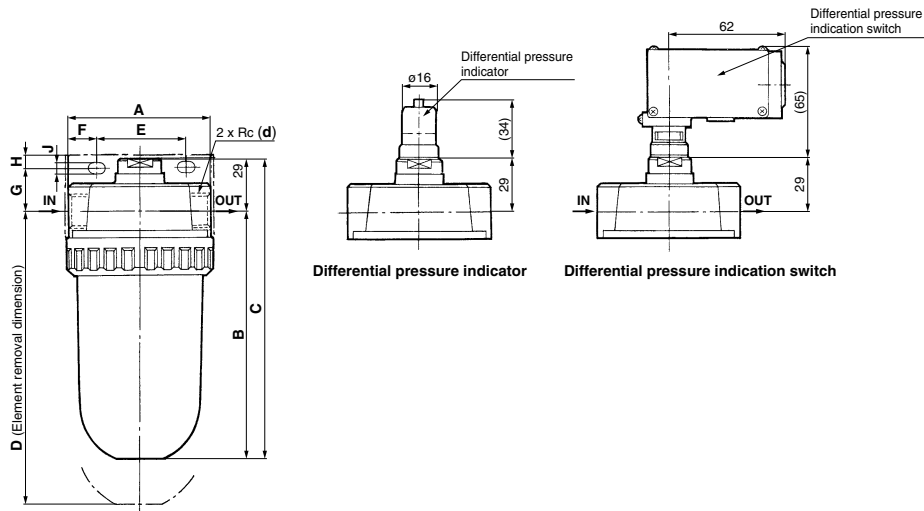
④ Other

- Refer to the operating manual regarding the tightening torque for clamping ring. Use a commercially available hook wrench (applicable sizes 80 to 85 mm) for tightening and removing clamping rings.

FH
HOW

Series FH150

Dimensions



(mm)										
Model	d	A	B	C	D	E	F	G	H	J
FH150-02	1/4									
FH150-03	3/8	80	168.5	197.5	259.5	50	15	25	7	6.5
FH150-04	1/2									
										Mass (kg)

Magnetic Separator Series *FHM*

RoHS

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

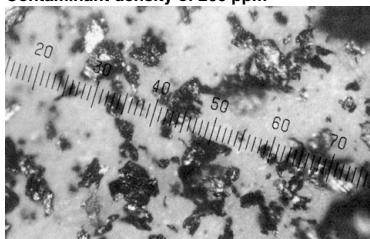
Fluid	FHMN: Petroleum, Water-glycol, Cutting oil, Emulsion FHM: Petroleum, Water-glycol, Cutting oil, Emulsion, Phosphoric ester
Operating temperature	Max. 80°C
Fluid speed	3 m/min or less

Model

Model	Applicable fluid storage volume (L/unit) <small>Note)</small>	Dimension (mm)	Weight (kg)
FHMN-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.

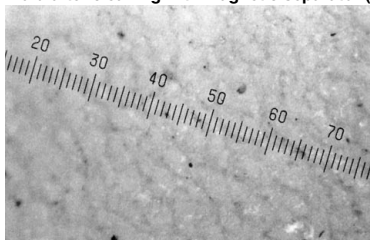
Contaminant density of 200 ppm



Separator after contaminant adsorption



Fluid after cleaning with magnetic separator (5 ppm)

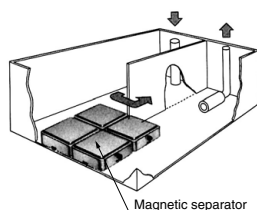


FH□

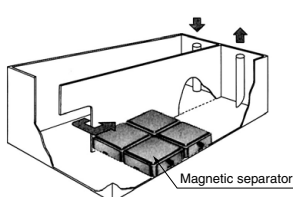
HOW□

Magnetic Separator Installation Examples

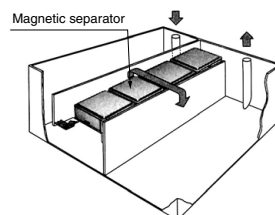
① U-turn flow type



② Underflow type



③ Overflow type



How to Order

Fluid	Petroleum, Water-glycol, Cutting oil, Emulsion
-------	--

FHMN - 055

- Main unit representative dimensions
055 □ 55 x 120
- Magnetic separator

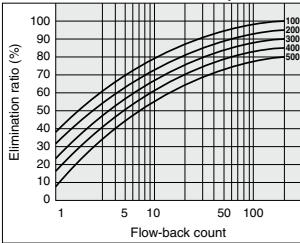
FHM - 100

- Main unit representative dimensions
100 □ 100 x 130
200 200 x 140 x 140
- Magnetic separator

Fluid Iron Content Elimination Performance by Iron Particle Concentration

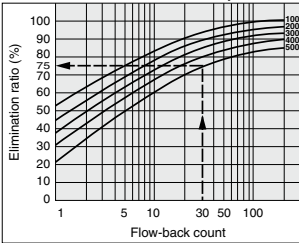
FHMN-055

Fluid: Hydraulic fluid



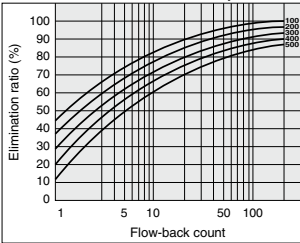
FHM-100

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.

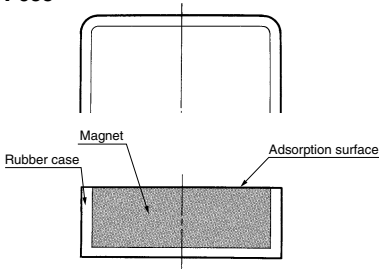
- Conditions
1. Volume of fluid in tank: 200 L
 2. Pump-out volume: 100 L/min
 3. Contaminant concentration of used fluid: 500 ppm (initial concentration, percentage by volume)
 4. Number of separators: 2 pcs. (applicable fluid storage volume of 100 L/unit)

Explanation of graph

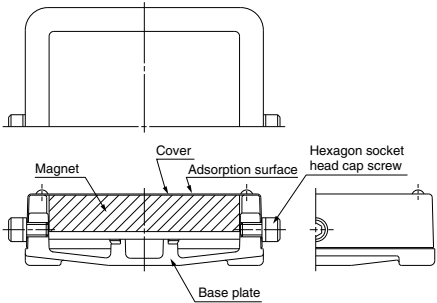
- ① Calculate the flow-back count (N).
$$N = \frac{\text{Pump-out volume} \times \text{Operation time}}{\text{Volume of fluid in tank}} = \frac{100 \times 60}{200} = 30$$
- ② Based on the elimination ratio data for the FHM-100 and the point where the 500 ppm line and flow-back count 30 line intersect (one hour after starting operation), the result is 75%.

Construction

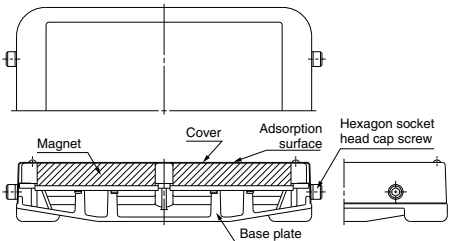
FHMN-055



FHM-100

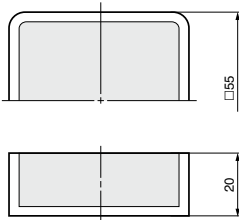


FHM-200

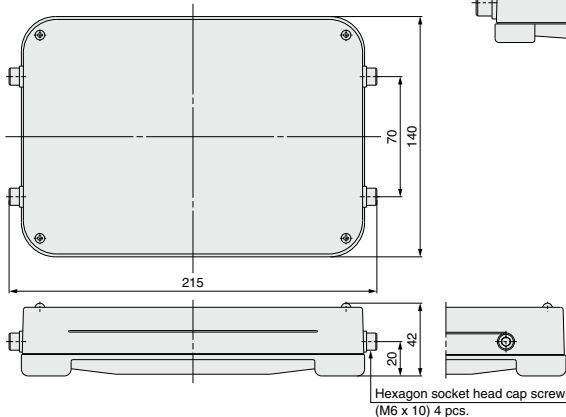


Dimensions

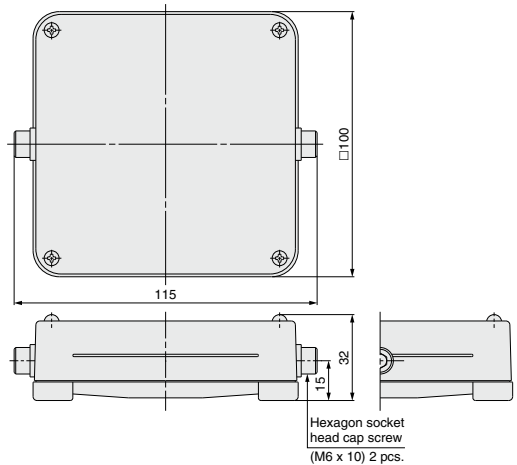
FHMN-055



FHM-200



FHM-100

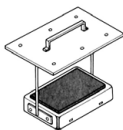
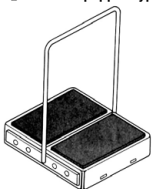


Handling Precautions

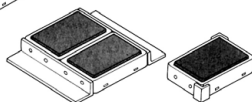
Mounting

- 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.

FH□

HOW□



Please consult with SMC for detailed specifications, delivery and prices.

1 Non-Standard Filtration

Symbol

X0

Filter symbol (Refer to “How to Order” for each series)

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

X0

● **Made to Order**
(Non-standard filtration or
Micromesh element equipped)

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	FH1A (Refer to P. 1519.)	1/2	EM001H- \rightarrow 1 \rightarrow 2	—	ø65 x L90
		3/4, 1	EM101H- \rightarrow 1 \rightarrow 2	—	ø85 x L110
		1 1/4, 1 1/2	EM201H- \rightarrow 1 \rightarrow 2	—	ø100 x L160
		2	EM301H- \rightarrow 1 \rightarrow 2	—	ø120 x L180
		2 1/2, 3	EM401H- \rightarrow 1 \rightarrow 2	—	ø140 x L200
Suction filter with case	FH99 (Refer to P. 1523.)	3 1/2, 4	EM501H- \rightarrow 1 \rightarrow 2	—	ø180 x L260
		1/2, 3/4	EM230- \rightarrow 1 \rightarrow 2	EM520- \rightarrow 1 \rightarrow 2	ø65 x L90
		1, 1 1/4	EM330- \rightarrow 1 \rightarrow 2	EM620- \rightarrow 1 \rightarrow 2	ø82 x L133
		1 1/2	EM430- \rightarrow 1 \rightarrow 2	EM720- \rightarrow 1 \rightarrow 2	ø104 x L177
		2	EM530- \rightarrow 1 \rightarrow 2	EM820- \rightarrow 1 \rightarrow 2	ø104 x L177
		2 1/2	EM630- \rightarrow 1 \rightarrow 2	EM920- \rightarrow 1 \rightarrow 2	ø132 x L212
		3	EM730- \rightarrow 1 \rightarrow 2	EM030- \rightarrow 1 \rightarrow 2	ø132 x L212
		3 1/2, 4	EM830- \rightarrow 1 \rightarrow 2	EM130- \rightarrow 1 \rightarrow 2	ø155 x L193
Suction guard	FHG (Refer to P. 1527.)	1/2, 3/4, 1	EM220- \rightarrow 1 \rightarrow 2	—	ø69 x L88
		1 1/4, 1 1/2, 2	EM320- \rightarrow 1 \rightarrow 2	—	ø89 x L123
		2 1/2, 3	EM420- \rightarrow 1 \rightarrow 2	—	ø109 x L188
Line filter	FH34 FH44 FH54 FH64 (Refer to P. 1531.)	3/8, 1/2	EM040- \rightarrow 1 \rightarrow 2	—	ø53.1 x L90
		3/4, 1	EM910- \rightarrow 1 \rightarrow 2	—	ø73.5 x L117
		1 1/4, 1 1/2	EM140- \rightarrow 1 \rightarrow 2	—	ø73.5 x L195
		2	EM930- \rightarrow 1 \rightarrow 2	—	ø87.6 x L282
		2 1/2, 3	EM240- \rightarrow 1 \rightarrow 2	—	ø118.7 x L280
Vertical return filter	FHBA (Refer to P. 1535.)	3/4	EM601H- \rightarrow 1 \rightarrow 2	—	ø56 x L180
		1 1/4	EM701H- \rightarrow 1 \rightarrow 2	—	ø76 x L190
		1 1/2	EM801H- \rightarrow 1 \rightarrow 2	—	ø76 x L290
Return filter	FH100 (Refer to P. 1538.)	3/4, 1	EM810- \rightarrow 1 \rightarrow 2	—	ø65 x L95
		1 1/4, 1 1/2	EM910- \rightarrow 1 \rightarrow 2	—	ø73.5 x L117
		2	EM020- \rightarrow 1 \rightarrow 2	—	ø87.6 x L157
		2 1/2, 3	EM120- \rightarrow 1 \rightarrow 2	—	ø118.7 x L207
Oil filter	FH150 (Refer to P. 1542.)	1/4, 3/8, 1/2	EM040- \rightarrow 1 \rightarrow 2	—	ø53 x L90

Note) In the table above \rightarrow 1 indicates nominal filtration and \rightarrow 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

Microswitch for Differential Pressure Indication Switch

(1) Contact specifications

Table 1 Contact specifications

Item	Specifications
Inrush current	Max. 15 A
Minimum applicable load	5 VDC 160 mA

(2) Rating

Table 2 Rating

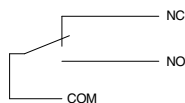
Rated voltage	Resistance load
250 VAC	5 A

(3) Other performance

Table 3 Other specifications

Item	Specifications
Insulation resistance	100 MΩ or more (Measured by 500 VDC, insulation resistance tester.)
Contact resistance	30 mΩ or less
Withstand voltage	Between terminals with the same pole. 1,000 VAC 50/60 Hz 1 min
	Between charged metal part and ground 1,500 VAC 50/60 Hz 1 min
	Between each terminal and non-charged metal part 1,500 VAC 50/60 Hz 1 min

(4) Electric circuit



(N.C. and N.O. common)

Precautions

1. Connect desired wiring to the micro switch indication symbols 1 (COM.), 2 (N.C.), and 3 (N.O.).
2. When a protection mechanism is required, take appropriate considerations on the electric circuit since the micro switch is a type of non-reset.

(5) Terminal type

Soldering terminal

FH□

HOW□



Series FH

Specific Product Precautions

Be sure to read this before handling.
Refer to front matter 38 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.