

# Suction Filter with Case

# *FH99 Series*

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.<sup>(Note 3)</sup>

## 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

<b>Fluid</b>		Hydraulic fluid
<b>Operating pressure</b>		Negative pressure
<b>Operating temperature</b>		Max. 80°C
<b>Main material</b>	<b>Cover/Case</b>	Aluminum casting
	<b>O-ring</b>	NBR or FKM <sup>(Note 1)</sup>
	<b>Seal</b>	NBR or EPDM <sup>(Note 1)</sup>
<b>Element</b>	<b>Material</b>	Stainless steel, Carbon steel, Aluminum, Epoxy resin
	<b>Nominal filtration</b>	74, 105, 149 μm (200, 150, 100 mesh)
	<b>Differential pressure resistance</b>	0.2 MPa
<b>Differential pressure indicator operating pressure (Element replacement differential pressure)</b>		24.0 kPa
<b>Relief valve open pressure</b>		33.3 kPa

Note 1) 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 <sup>(Note 2)</sup>		Rated flow rate (L/min)
	INLET	OUTLET	
<b>FH990-04</b>	1 <sup>B</sup>	1/2 <sup>B</sup>	20
<b>FH990-06</b>	1 <sup>B</sup>	3/4 <sup>B</sup>	50
<b>FH990-08</b>	1 1/2 <sup>B</sup>	1 <sup>B</sup>	100
<b>FH990-10</b>	1 1/2 <sup>B</sup>	1 1/4 <sup>B</sup>	150
<b>FH990-12</b>	2 <sup>B</sup>	1 1/2 <sup>B</sup>	200
<b>FH990-16</b>	2 <sup>B</sup>	2 <sup>B</sup>	300
<b>FH991-20</b>	2 1/2 <sup>B</sup>	2 1/2 <sup>B</sup>	450
<b>FH991-24</b>	3 <sup>B</sup>	3 <sup>B</sup>	600
<b>FH991-28</b>	3 1/2 <sup>B</sup>	3 1/2 <sup>B</sup>	750
<b>FH991-32</b>	4 <sup>B</sup>	4 <sup>B</sup>	900

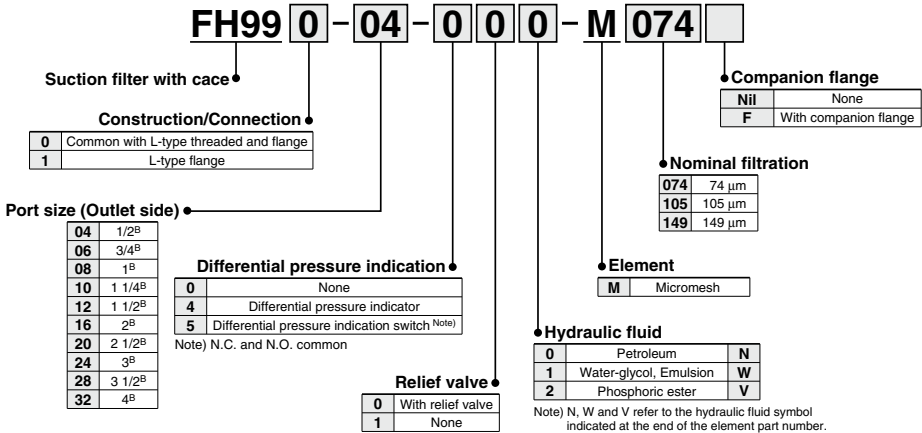
Note 2) Both flange and threaded connections are supported. However, only flange types for FH991-20 to FH991-32 are compatible. The flange configuration is exclusive to SMC. Tapered threaded types (female) conforming to JIS B 0203.

## 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

Note 3) When the differential pressure indicator and differential pressure indication switch are used, the body mounting orientation is only vertical upward.

## How to Order



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

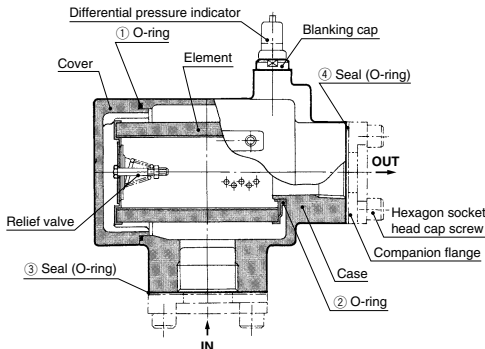
Model	With relief valve			Without relief valve			Element size
	74 μm (200 mesh)	105 μm (150 mesh)	149 μm (100 mesh)	74 μm (200 mesh)	105 μm (150 mesh)	149 μm (100 mesh)	
FH990-04/06	EM520-074N	EM520-105N	EM520-149N	EM230-074N	EM230-105N	EM230-149N	ø65 x 90
FH990-08/10	EM620-074N	EM620-105N	EM620-149N	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) 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	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	Petroleum, Water-glycol, Emulsion	NBR-70-1	KA00815 (V85)	KA00470 (P28)	AL-130H	AL-128H
06						AL-129H
08			KA00812 (V100)	KA00244 (P42)	AL-133H	AL-131H
10						AL-132H
12			KA00813 (V120)	KA00808 (P60)	AL-135H	AL-134H
16						AL-135H
20			KA00814 (V150)	KA00810 (P90)	AL-136H	AL-136H
24					AL-137H	AL-137H
28			KA01800 (V175)	KA00796 (P120)	KA00813 (V120)	KA00813 (V120)
32						
04	Phosphoric ester	FKM-70 or EPDM-70	KA00731 (V85)	KA00717 (P28)	AL-130H-V	AL-128H-V
06						AL-129H-V
08			KA00727 (V100)	KA00723 (P42)	AL-133H-V	AL-131H-V
10						AL-132H-V
12			KA00728 (V120)	KA00733 (P60)	AL-135H-V	AL-134H-V
16						AL-135H-V
20			KA00729 (V150)	KA00114 (P90)	AL-136H-V	AL-136H-V
24					AL-137H-V	AL-137H-V
28			KA00730 (V175)	KA03498 (P120)	KA00728 (V120)	KA00728 (V120)
32						

Note 1) The material and nominal size notations are based on JISB2401.

Note 2) (Nominal size) is not needed as the part number starting with the AL-□H is a dedicated number.

Note 3) The material of seals (AL-128H-V to AL-137H-V) is EPDM-70.

# FH99 Series

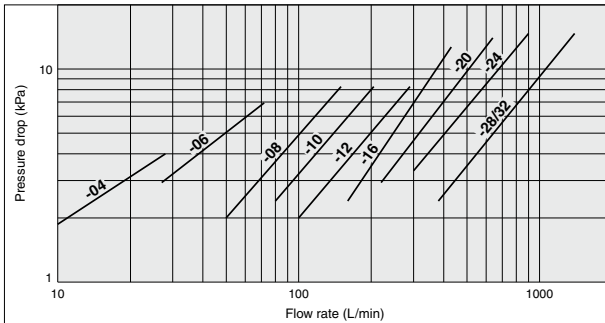
## Replacement parts

Description	Applicable model	Part no.		Set contents
		Connection side: IN	Connection side: OUT	
Companion flange set	FH990-04	FH99-FL006-N	FH99-FL004-N	One set each of companion flange, seal, hexagon socket head cap screws
	FH990-06	FH99-FL006-N	FH99-FL005-N	
	FH990-08	FH99-FL009-N	FH99-FL007-N	
	FH990-10	FH99-FL009-N	FH99-FL008-N	
	FH990-12	FH99-FL011-N	FH99-FL010-N	
	FH990-16	FH99-FL011-N		
	FH990-20	FH99-FL012-N		
	FH990-24	FH99-FL013-N		
	FH990-28	FH99-FL014-N		
	FH990-32	FH99-FL015-N		

(Note) Select the part number of either N: O-ring material NBR, or V: O-ring material FKM.

## Flow Rate Characteristics

FH99 □



Conditions Fluid: Turbine oil Class 2 VG56  
 Viscosity: 45 mm<sup>2</sup>/s  
 Filter material: Micromesh  
 Nominal filtration: 74 μm

## 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.
- When the differential pressure indicator and differential pressure indication switch are used, the body mounting orientation is only vertical upward.

### ② Operation

- The hydraulic fluid used becomes high viscosity when the temperature is low during the winter, etc., and the differential pressure indicator or the switch may activate. If this occurs, wait until the oil temperature rises by a warm-up operation, then check if this is caused by clogging.
- 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

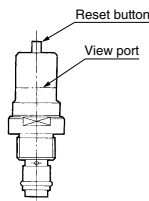
- When the pressure difference reaches 24 kPa during filter operation (actuating the differential pressure indicator), stop operation and either wash or replace the element.
- If any scratches or damage are found on the O-ring during assembly/disassembly, replace with a new O-ring.
- When installing 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.

## Differential Pressure Indication

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

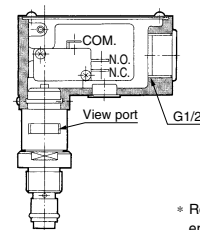
### ■ Differential pressure indicator

- Operating pressure—24 kPa
- Mounting orientation: Vertical upward
- 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.



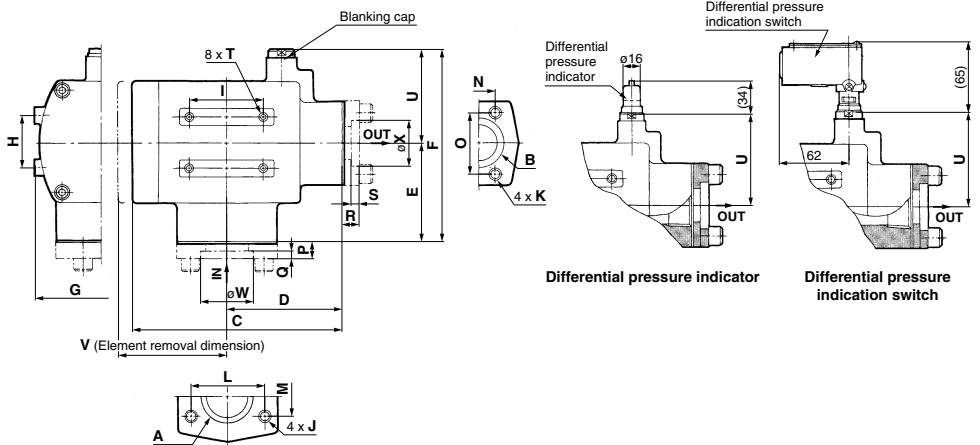
### ■ Differential pressure indication switch

- Operating pressure—24 kPa
- Mounting orientation: Vertical upward
- 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 529 for "Microswitch for differential pressure indication switch".

**Dimensions**



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

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

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



## (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**

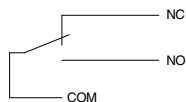
Rated voltage	Resistance load
250 VAC	5 A

## (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