



# Operation Manual

**Product Name**

**Industrial Filter**

**Model / Series / Product Number**

**FGD series**

**SMC Corporation**

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# Industrial Filter Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)<sup>\*1)</sup>, and other safety regulations.

- \*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems
- ISO 4413: Hydraulic fluid power -- General rules relating to systems
- IEC 60204-1: Safety of machinery -- Electrical equipment of machines (Part1:General requirements) General requirements)
- General requirements)
- ISO 10218-1992: Manipulating industrial robots-Safety
- etc

<b>Caution</b>	<b>Caution</b> indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>Warning</b>	<b>Warning</b> indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>Danger</b>	<b>Danger</b> indicates a hazard with a high level of risk which, if not avoided, will resulting death or serious injury.

## Warning

- 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**  
 Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.  
 The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.  
 This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.
- 2. Only personnel with appropriate training should operate machinery and equipment.**  
 The product specified here may become unsafe if handled incorrectly.  
 The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
  - 1.The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  - 2.When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
  - 3.Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
  - 1.Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  - 2.Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
  3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
  - 4.Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



# Industrial Filter

## Safety Instructions

### Caution

**The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

## Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".

Read and accept them before using the product.

### Limited warranty and Disclaimer

**1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.**

**Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.**

**2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.**

**This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.**

**3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.**

### Compliance Requirements

**1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.**

**2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.**

**3 Check the law for pressure vessels or operating fluids specified in each country in advance and determine whether or not the product can be used.**

**4 This product does not correspond to regulations or standards for pressure vessel of any country or region.**



## FGD Series/Specific Product Precautions

Be sure to read this before handling.

These safety instructions are intended to prevent hazardous situations and/or equipment damage. Make sure to follow every instruction since they are for safety.

### ■ Handling

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

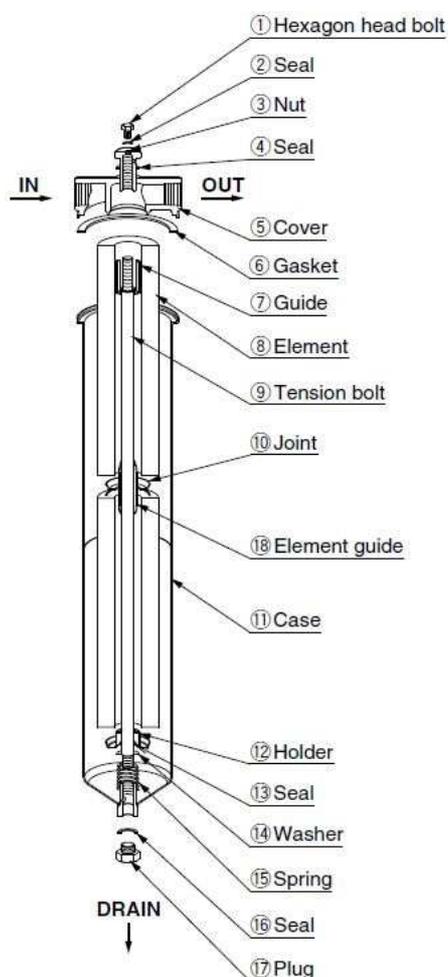
### Warning

- Do not operate the product outside of the specifications.
  - Operating pressure: If pressure outside of the specified range due to such things as water hammer or surge pressure is possible, install an accumulator. When the product is used for gas, the maximum operating pressure shall be 0.5Mpa.
  - Operating temperature: Even if the specified temperature range is satisfied, the product cannot be used if the temperature is over the boiling point of the operating fluid.
  - Fluid: Do not use fluid which is harmful to the human body.
  - Do not use any fluid which will cause the seal or element to swell or deteriorate.
  - Operating environment: Note that the valve is not for outdoor use. - Do not use the product where it can be exposed to vibration or impact.
  - Do not use in environments where there is a danger of corrosion.
- Do not use the product with flammable or highly permeable fluids.
  - Usage may cause a fire, explosion or leakage.
- Do not disassemble with pressure applied.
  - Never loosen the connecting part (bolt) while pressure is being applied to the product. Make sure that the gauge pressure in the line is zero before loosening the bolts. Otherwise it may cause an injury.
- Do not modify the product.
  - Broken parts may cause an injury or failure.

 **Caution**

- Do not touch the filter or piping when hot fluid is used.
  - Using this product at high temperatures (40 to 80 °C) may cause burns.
  - Do not touch the surface until it is cooled down to less than 40°C.
- Connect IN and OUT correctly. (Make sure that reverse flow will not be generated)
  - Make sure that back flow will not be generated. The element might break due to exposure to back flow.
- Perform regular leakage inspections and release trapped air when supplying pressure after the maintenance.
  - Stop operation if there are abnormalities such as leakage.  
Do not restart operation until the corrective action (replacement with a new gasket, retightening of the fitting etc.) is taken.
  - Release the air.
- Determine the replacement period of the element by referring to the differential pressure.
  - Replace the element when the differential pressure reaches 0.1MPa. If the element is not replaced, the element can be damaged.
- Wear personal protective equipment when replacing the element.
  - When replacing, make sure to wear protective gloves, protective glasses, etc. Fluid and captured foreign matter may cause injury.
- Make sure that load such as vibration or weight is not applied to the filter piping.
  - Fix the IN/OUT piping to the base using U bolts, or fix to the panel using a bracket. Otherwise, the filter may be damaged.
- For fluid with high viscosity at low temperature, do not start operation until it is warmed to the appropriate temperature.
  - During cold period such as winter time, operating fluid viscosity may become high depending on the fluid properties, generating a large differential pressure, damaging the element.  
In this case, warm up the fluid until it reaches the customer's operating temperature before starting the operation.

## 1. Parts Descriptions and Functions



**Figure 1** Parts descriptions and functions  
(Figure shows the product with two FGD□B elements.)

**Table 1-1** Parts Descriptions and Functions

No.	Description	Material	Function
(1)	Hexagon head bolt	Stainless steel or iron	Plug to release air in the housing.
(2)	Seal	Resin	
(3)	Nut	Stainless steel or iron	Tightens the cover.
(4)	Seal	Resin	
(5)	Cover	Stainless steel or Aluminum	The lid of the filter body.
(6)	Gasket	Resin or rubber	
(7)	Guide	Stainless steel	Holds the elements
(8)	Element	Depends on the element type	The mounted element collects residue.
(9)	Tension bolt	Stainless steel or iron	Connects the case and cover.
(10)	Joint	Stainless steel	Seals the area between elements. (when two FGD□B elements are used)
(11)	Case	Stainless steel or iron	Filter body.
(12)	Holder	Stainless steel	Seals the elements.
(13)	Seal	Resin or rubber	
(14)	Washer	Stainless steel	
(15)	Spring	Stainless steel	Stabilizes the element.
(16)	Seal	Resin	
(17)	Plug	Stainless steel or iron	Drainage discharging plug.
(18)	Element guide	Stainless steel	Holds the elements

**Table 1-2** Replacement parts

Name	Part No.	Applicable model	Kit contents (Part No.)
Nut kit	FGD-KT001	FGDC	Each of (1)(2)(3) and (4) are provided as a kit.
	FGD-KT002	FGDE	
	FGD-KT003	FGDT	
	FGD-KT004	FGDF	
Replacement cover	FGD-CV005-03	FGDT,F*-03	(5)
	FGD-CV005-04	FGDT,F*-04	
	FGD-CV005-06	FGDT,F*-06	
	FGD-CV006-03	FGDC,E*-03	
	FGD-CV006-04	FGDC,E*-04	
Joint	FGD-OP001	FGD*B	(10)
	KT-FGDC	FGDC	Each of (2)(4)(6)(13) and (16) are provided as a kit.
KT-FGDE	FGDE		
Seal kit	KT-FGDT	FGDT	
	KT-FGDF	FGDF	
Replacement case assembly	FGD-CA002	FGDT,F(L250)	Each of (7)(9)(11)(12)(13)(14)(15)(16) and (17) are provided as a kit. Note) (18) is included in the set for L500.
	FGD-CA003	FGDT,F(L500)	
	FGD-CA004	FGDC,E(L250)	
	FGD-CA005	FGDC,E(L500)	

**2. Product Specifications****Table 2 Specifications**

Model		FGDCA/B	FGDEA/B	FGDTA/B	FGDFA/B
Fluid		Various kind of liquid (Industrial water, washing liquid, general solvent, etc.)			
Port size(Rc)		3/8、1/2、3/4			
Max. operating pressure(MPa) <sup>Note1)</sup>		0.7		1.0	
Max. operating temperature(°C)		80			
Number of elements		FGD*A:1 FGD*B:2 <sup>Note2)</sup>			
Element size(mm) <sup>Note3)</sup>		FGD*A:Φ65 to 70x250 FGD*B:Φ65 to 70x500(For 2 elements:Φ65 to 70x250)			
Differential pressure for element replacement(MPa)		0.1			
Main materials <sup>Note4)</sup>	Cover	Aluminum		SCS14	
	Case	SPCE		Stainless steel 316	
	Gasket/O-ring	NBR		Fluororesin	
	Seal	Nylon	Fluororesin (Antistatic specification)	Fluororesin	Fluororesin (Antistatic specification)
Weight(kg) body only		FGDCA/FGDEA:1.3 FGDCB/FGDEB:2.2		FGDTA/FGDFA:2.3 FGDTB/FGDFB:3.8	
Internal capacity(L)		FGD*A:1.7 FGD*B:3.4			

Note1) Max. operating pressure for gas is 0.5MPa

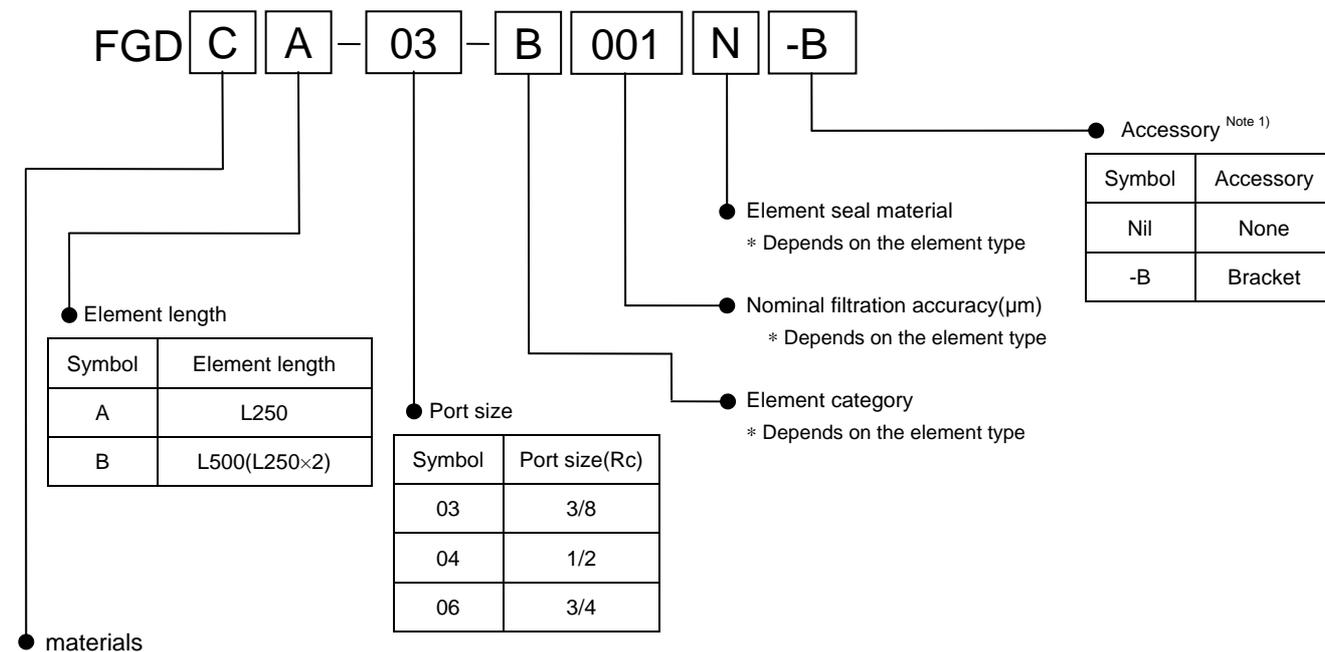
Note2) Number of sintered metal or paper elements is one (φ65 x 500mm).

Note3) The element size is a nominal length.

Note4) Nylon or fluororesin seal may lose its performance over time.

Please confirm the tightening torque periodically.

### 3.How to order

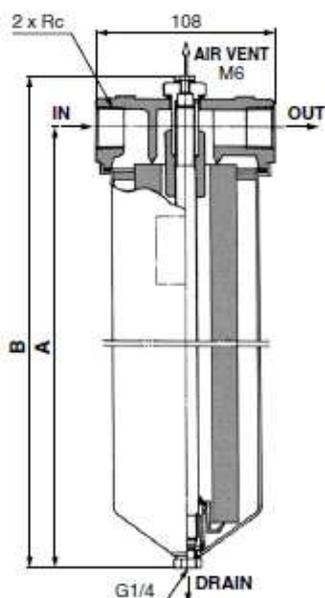


Symbol	Cover	Case	Gasket/O-ring	Seal
C	Aluminum	SPCD	NBR	Nylon
E	Aluminum	SPCD	NBR	Nylon/Fluororesin (Antistatic specification)
T	SCS14	Stainless steel 316	Fluororesin	Fluororesin
F	SCS14	Stainless steel 316	Fluororesin	Fluororesin (Antistatic specification)

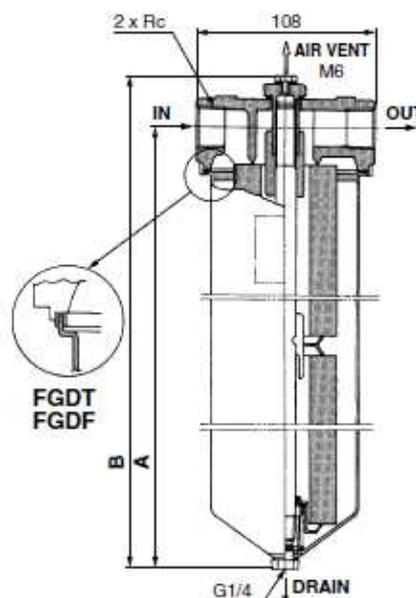
## 4. Dimensions

### Dimensions

#### FGD□A (1 element)



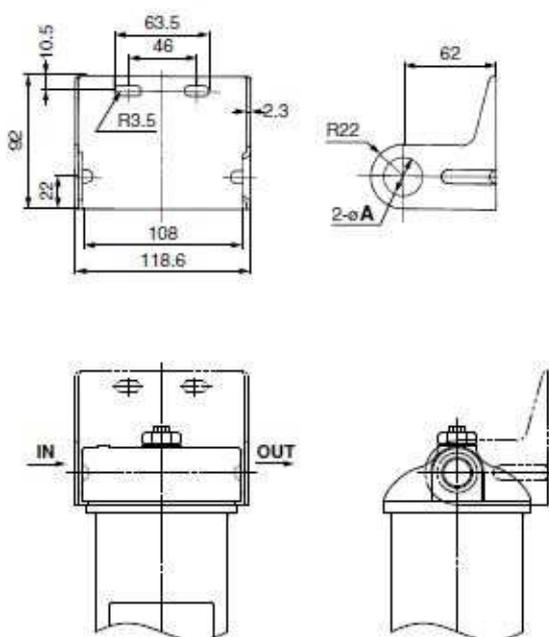
#### FGD□B (2 elements)



\* Element removal dimension: 50 mm

Model	Element length	A	B	Port size Rc
FGDC	A (L250)	314	346	3/8, 1/2, 3/4
FGDE	B (L500)	574	606	
FGDT	A (L250)	314	349	
FGDF	B (L500)	574	608	

### Accessory/Bracket



Part no.	øA	Port size Rc	Material	Surface treatment
BP-1S	17.5	3/8	SPCC	Zinc chromated
BP-2S	22	1/2		
BP-3S	27.5	3/4		

Note) Fix the filter with steel piping.  
Use the bracket to support the piping.  
(Flexible piping will not support the filter)

Mounting position

## **5. Installation and Piping**

### **[1] Installation**

- 1) When installing, allow sufficient space for maintenance.  
Reserve a space of 50mm or more beneath the reservoir.
- 2) Start with a flow with an initial differential pressure across the element of 0.02MPa or less.  
If operation starts with differential pressure exceeding 0.02MPa, the element replacement will be shortened significantly.
- 3) This filter generates particles at first. Before initial operation, flush the piping enough to remove the particles completely.

### **[2] Piping**

- 1) Check each port size for selecting valves and fittings suitable for operating conditions.  
Please check Safety Instruction before use.
- 2) For filter piping, apply a spanner to the filter cover so that force is not applied to the filter case. (It can cause leakage)

## **6. Maintenance**

Replace the element when the differential pressure across it reaches 0.1MPa due to clogging.

Replacement of element should be performed according to the procedure below.

### **[1] Pull out the element. (See Fig. 1)**

- 1) Stop operation.
- 2) Check following before maintenance.



**Confirm that the pressure of the system in which the filter is installed is zero.**



**When using the product at a high temperature, be sure to check that the surface temperature of the filter container is not more than 40 °C before starting operation in order to prevent burns.**

- 3) After closing the piping valve on the IN side of the filter, close the piping valve on the OUT side of the filter.
- 4) Discharge the residual fluid inside from the drain port.
- 5) Loosen the nut and remove the element.
- 6) Move the case downward to remove it.
- 7) Remove the element.

**\*When two elements (250 mm) are used, be careful not to lose the joint which seals the elements. It will be reused later.**

- 8) Clean the inside of the case, gasket, seals and plug with clean fluid or solutions.

### **[2] Mounting of element (See Fig. 1)**

- 1) Assemble in the reverse order of section 6 Maintenance [1].
- 2) Replace any deteriorated or swollen gasket or seals with new ones.
- 3) Put the tension bolt through the hole of the element, and then insert the element into the case.

#### **[When two elements (250mm) are used.]**

\* When inserting the element, do not drop the element until the lower end reaches the element guide.

\* Insert the joint between the elements.

- 4) Align the tension bolt with the center hole of the cover, and insert the case, in which the element has been inserted, into the cover.

5) Push the case from the bottom and tighten the nut from the top of the cover with tightening torque below. (Control the torque to avoid leakage)

**\*Tightening torque control value: FGDT/F 25N · m, FGDC/E 15N · m**

**[3] Restart the operation**

1) After the replacement of the element, check the parts are assembled correctly before restarting operation. In case of fluid leakage, stop the operation immediately. Check the sealing condition and take corrective actions.

2) When supplying pressure by starting the pump, open the relief port (hexagon bolt) to discharge air. After the air is released, close the air exhaust port (hexagon bolt) and start operation.

**7. Maintenance parts**

**[1] Replacement Element**

To order a replacement element, check the product number printed on the product label of the filter and refer to the catalog, specifying the necessary quantity.

**[2] Consumables**

For other consumables such as gasket or seals, see Table 1 and order specifying the quantity.

Revision history
Revision A:P6,Seal kits contentPacking and gaskets for 10pcs.→1pcs.
Revision B: Complete revision

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