

Low Maintenance Filter  
**Series FN1**

**Eco-friendly  
regenerative filter**



**A unique element design with back-flush feature generates no industrial waste, thus requires no element replacement.**

# No more element replacement!

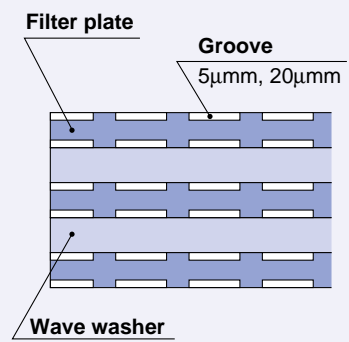
## Our unique element construction with back-flushing capability

The element of the filter is constructed of a series of grooved filter plates and wave washers placed one above the other and compressed by the compact cylinder on the top filter.



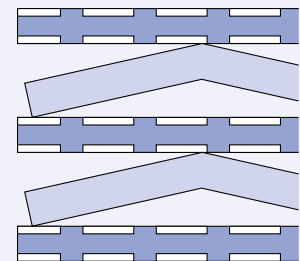
### Element construction

#### When compressed



Gaps between the filter plates and wave washers filter foreign matter.

#### When decompressed



Decompressing the element widens the gap between filter plates and wave washers. While the gap is widened, dust and foreign particles caught between plates can be washed away by back flushing the element. This restores the element and enables repeated use of the element.

**The gaps between filter plates are equally maintained by the wave washers to allow stable back-flush operation.**



### • 2 types of elements are available according to the type of dust.

(Refer to page 2 for details.)

**Cylindrical type (5µm, 20µm)**

**Step type (5µm)**

### • Maximum flow rate: 40 /min, 80 /min.

### ■ Options


#### • Reservoir tank: Series FNR

To store the fluid required to back-flush the clogged element.

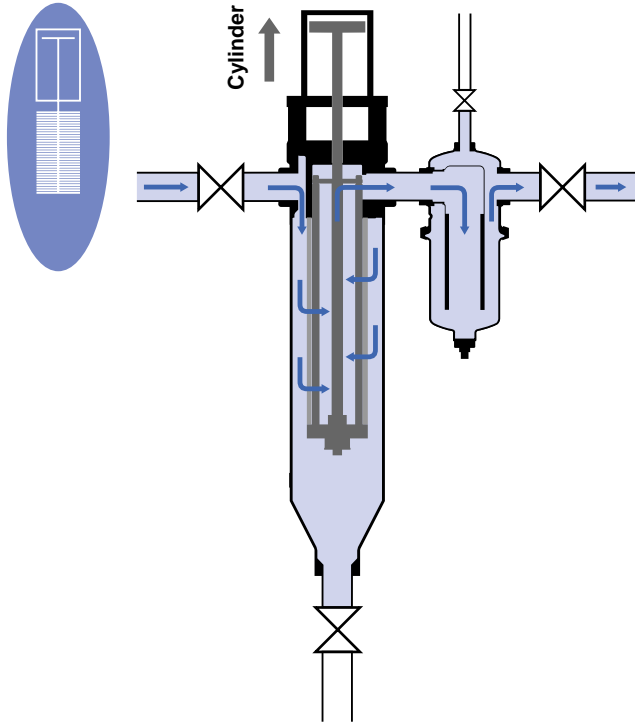
#### • Dust removal filter: Series FND

To remove dust and foreign particles from the fluid after back-flushing the element.

# Operating principle

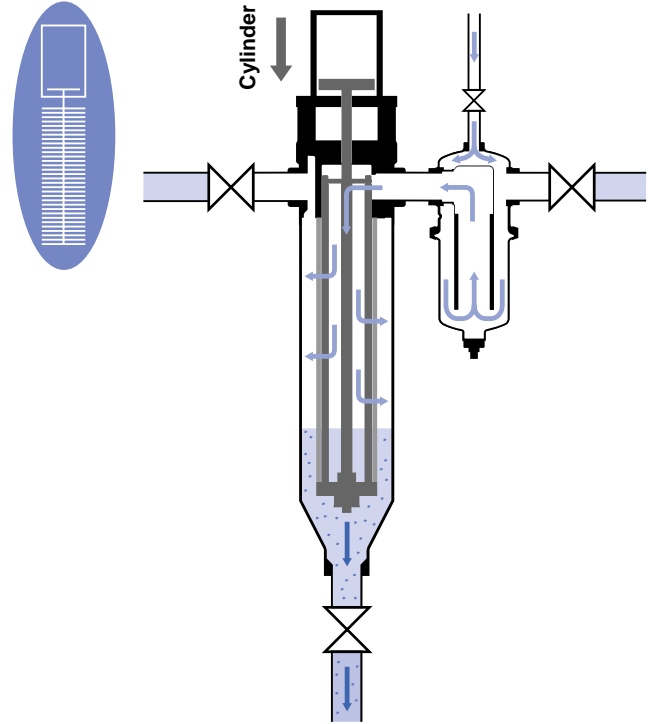
 Flow flow    
  Air flow

## Filtering



The element compressed by the cylinder filters the fluid.

## Back-flushing

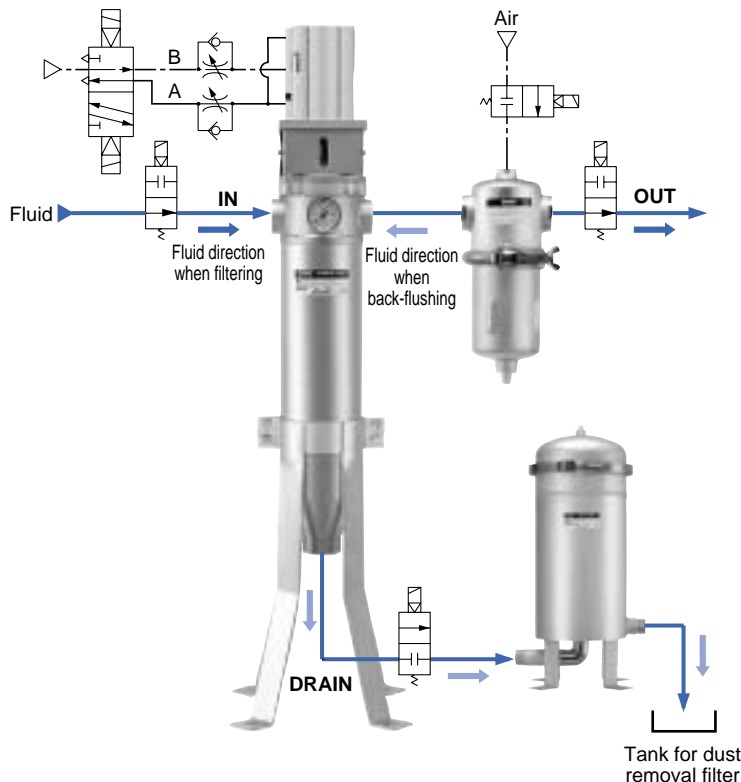


As the cylinder extends downward, the element is decompressed. Air pressure forces the fluid in the reservoir out to the filter and back-flushes the element.

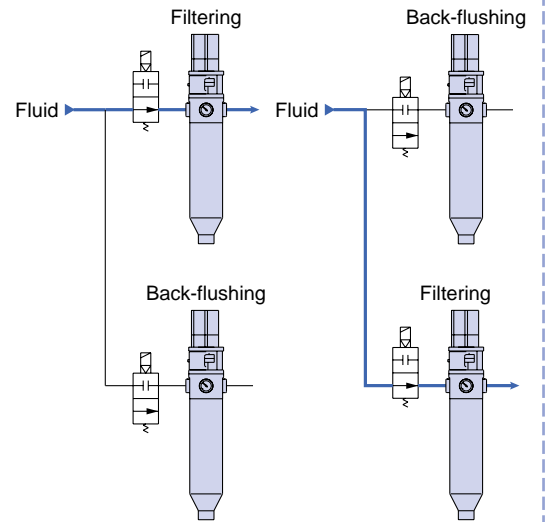
## Automatic back-flushing.

System circuit allows the automatic back-flushing when the element is clogged.

(Refer to page 5 for details.)



Setting up filters in a line and flushing the fluid alternately allow continuous operation during back-flushing.



# Low Maintenance Filter Series FN1

## How to Order

**FN1 1 0 1 N — 10 — S 020**

**Housing material**

1	Stainless steel SUS304
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**Element type**

0	Cylindrical type
1 <sup>Note)</sup>	Step type

Note) Only 5μm of filtration is available.

**Element length**

1	250mm
2	500mm

**Seal material**

N	NBR
V	FPM

**Pressure gauge**

Nil	Without pressure gauge (with plug)
G <sup>Note)</sup>	G46-15-02 (Wetted part: Brass)

Note) Contact SMC for the pressure gauge specification for stainless steel wetted parts.

**Filtration**

005	5μm (Cylindrical type, Step type)
020	20μm (Cylindrical type)

**Element material**

S	Stainless steel SUS304
---	------------------------

**Port size**

10	Rc 1
----	------

## Specifications

### Filter

Model	FN1111	FN1101	FN1102	FN1112	
Element dimension	ø65 x 250/		ø65 x 500/		
Fluid	Cleaning solvent, Coolant <sup>Note1)</sup>				
Operating pressure	MAX. 1.0MPa				
Operating fluid temperature	MAX. 80°C				
Flow rate <sup>Note2)</sup>	40/min		80/min		
Bore size	Rc 1 (IN, OUT, DRAIN)				
Material	Case and cover: Stainless steel SUS304, O-ring: NBR/FPM				
Element	Material	Stainless steel SUS304			
	Construction	Cylindrical type	Step type	Cylindrical type	Step type
	Filtration	5μm, 20μm	5μm	5μm, 20μm	5μm
	Differential pressure proof	0.6 MPa			
Weight	13kg	12.5kg	15kg	14.5kg	

Note 1) Refer to the fluid compatibility table on page 2 for details.

Note 2) Values under the following conditions:

Fluid: Water; Filtration: 20μm; Pressure drop: 0.02MPa or less.

### Operating part

Model	CDLQB63-□D-F	
Auto switch	Without auto switch (built-in magnet) <sup>Note 1)</sup>	
Fluid	Air	
Operating pressure	0.2 to 1.0MPa <sup>Note 2)</sup>	
Ambient and fluid temperature	-10 to 70°C (with no freezing) <sup>Note 3)</sup>	
Lock	Unlocking pressure	0.2MPa or more
	Locking pressure	0.05MPa or more
	Locking direction	Extension locking

Note 1) Auto switch must be ordered separately. Refer to Series CLQ (Compact Cylinder with Lock) catalog (CAT.ES20-155) for details.

Note 2) The minimum operating pressure for the cylinder is 0.1MPa when the cylinder port and the lock port are separately piped.

Note 3) The temperature will be 0°C to 60°C when the auto switch is mounted on the cylinder.



**Option**



**Reservoir**

Model	FNR100N-10	FNR100V-10	FNR101N-10	FNR101V-10
Tank capacity	1.1 /		1.8 /	
Port size	Rc 1			
Material	Bowl & Cover			
	Stainless steel SUS304			
Material	O-ring		O-ring	
	NBR	FPM	NBR	FPM
Weight	1.5kg		1.9kg	
Applicable filter	FN11□1□ (Element 250mm)		FN11□2□ (Element 500mm)	

**Dust recovery filter**

Model	FND100N-10-M149X0	FND100V-10-M149X0
Port size	R1	
Material	Bowl & Cover	
	Stainless steel SUS304	
Material	O-ring	O-ring
	NBR	FPM
Material	Element	
	Stainless steel SUS304	
Element filtration	149μm	
Weight	7.5kg	

Note) Produced upon receipt of order.

**Fluid Compatibility (Guide)**

Fluid		Water			Coolant		Petroleum		Alkali	
		Potable water	Industrial water	Distilled water	Water soluble	Oil-based	Gas oil Kerosene	Xylene	Ammonium hydroxide	Sodium hydroxide
Nitrile rubber	NBR	◎	◎	◎	◎	◎	◎	×	◎	◎
Fluoro rubber	FPM	○	○	○	○	○	○	◎	×	×

◎... Most compatible    ○... Compatible    ×... Not compatible

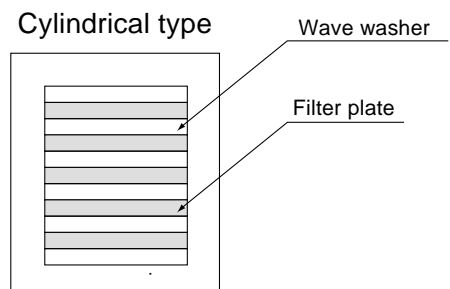
Note 1) Contact SMC when PTFE is required for seal material.  
 Note 2) Contact SMC regarding the compatibility of the seal and pressure gauge.

**Cylindrical Type and Step Type Elements**

**1. Cylinder type element (5μm, 20μm)**

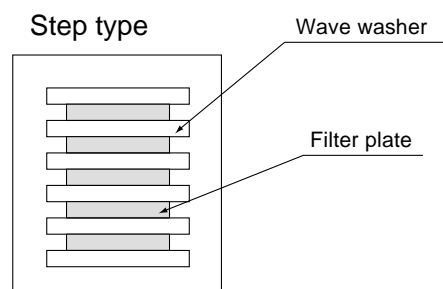
•The cylindrical type construction has a smooth peripheral surface since the dimension of the filter plate and wave washer is the same. The use of the entire peripheral surface of the element to collect dust allows larger filtration area and easy dust separation. For this reason, this type of element is ideal for filtering the fluids that contain dust with the same particle size.  
 If the cylindrical type element is used for fluids containing dust particles with a great variance in sizes, large-size dust particles can cover the element's peripheral surface. This can clog the element prematurely and thus you may no longer use it. (Especially for soft and sticky foreign matter)

(Example: the cylindrical type is recommended to filter polishing chips and the step type for cutting chips)



**2. Step type element (5μm)**

•The step type construction has an uneven (stepped) surface since the dimension of the filter plate is smaller than that of the wave washer. When filtering uneven dust particles, larger particles are caught on the peripheral surface of the wave washers, and smaller particles are filtered out with filter plates. This construction can extend the element life and make the effective filtering possible when filtering fluids containing dust particles with a great variance in sizes. Select the appropriate element type (cylindrical or step type) depending on the dust size variance in the fluid.

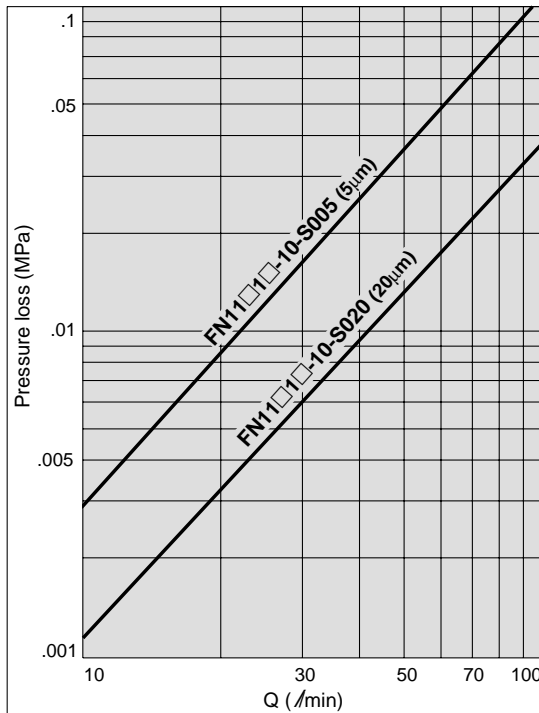


# Series FN1

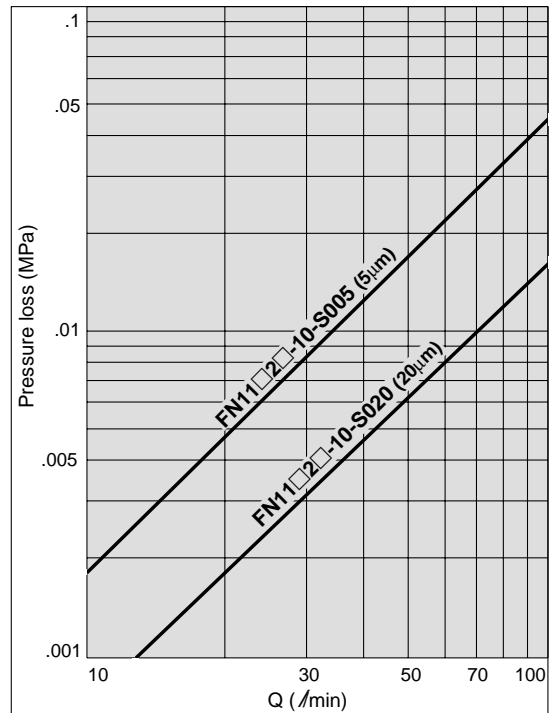
## Flow Characteristics (Initial Value)

- Test fluid: Potable water ● Liquid temperature: 17 to 20°C (room temperature)
- Test method: Per SMC test method (sanitary test stand)

Element length 250mm: FN1□1□□-10-S□□

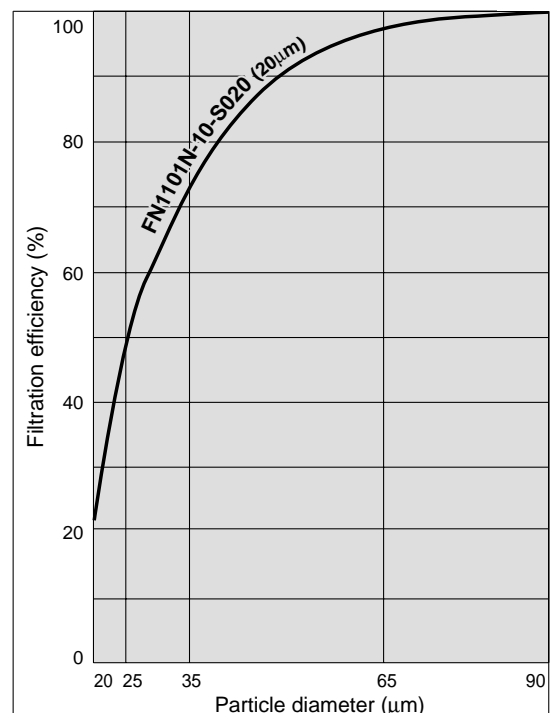
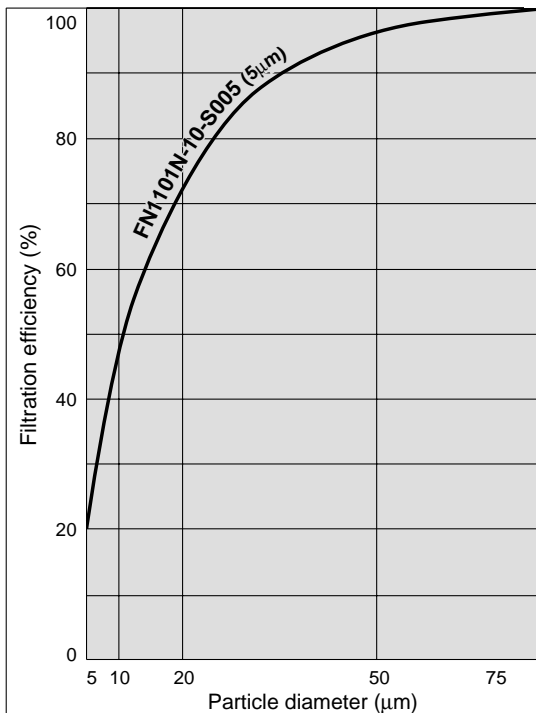


Element length 500mm: FN1□2□□-10-S□□



## Filtration Efficiency (Initial Value)

- Fluid: Potable water ● Flow rate: 20 l/min ● Liquid temperature: Room temperature ● Test dust: AC course ● Amount of dust: 0.2mg/min
- Test method: Per SMC test method (sanitary test stand, HIAC particle counter)



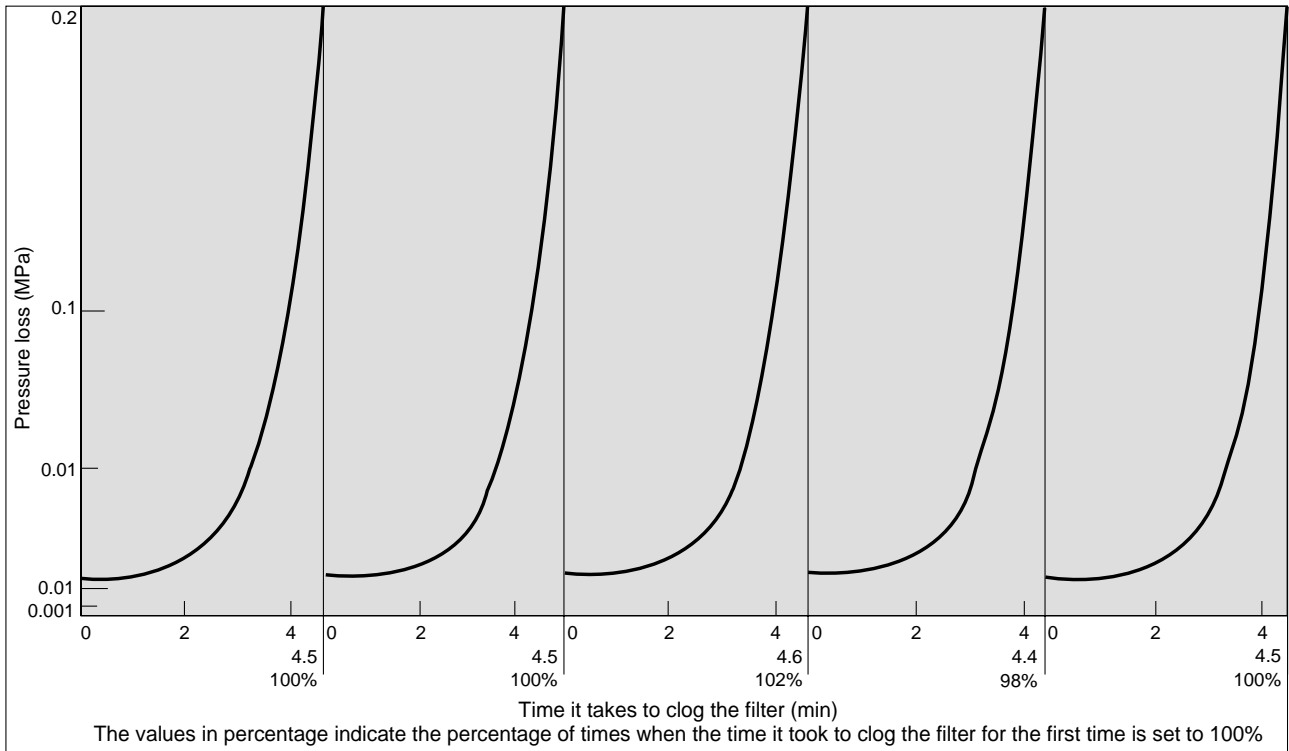
## Blocking Characteristics (Repeatability Characteristics)

●Fluid: Potable water ●Supply pressure: 0.2MPa ●Flow rate: 20 /min ●Test dust: AC course test dust

●Test method: Per SMC test method

Filter part no.: FN1101N-10-020

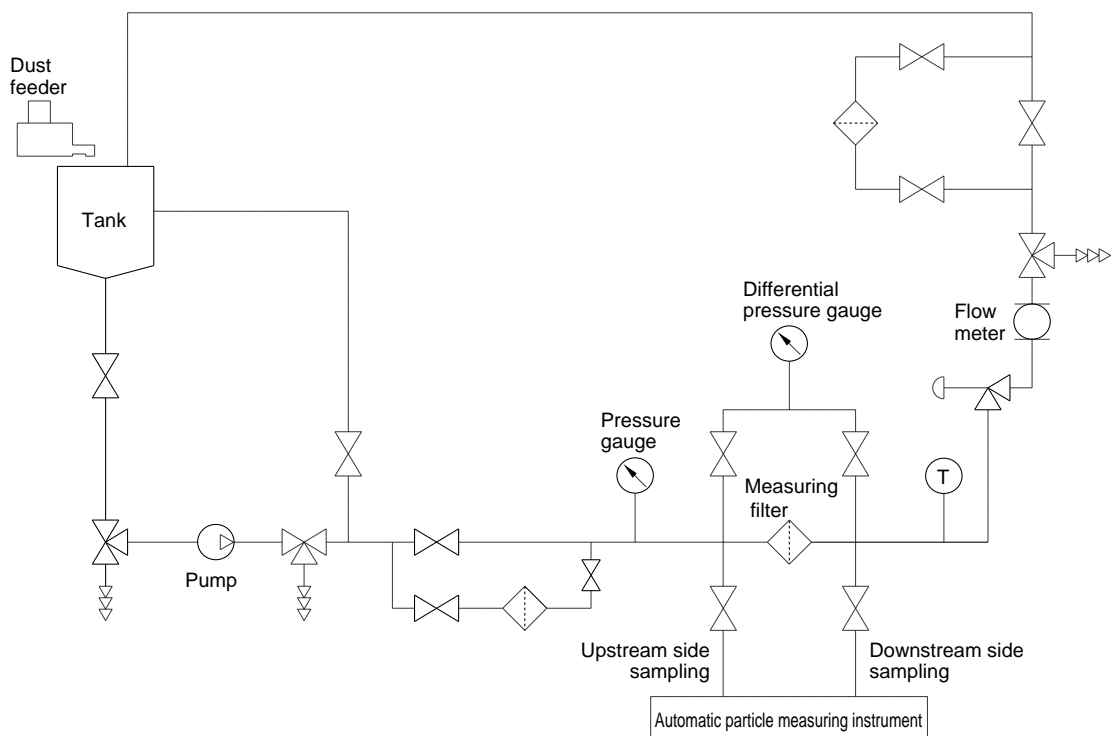
Element: END100-020 (cylindrical type with 20 $\mu$ m filtration)



Introduce a certain concentration of dust and back-flush the filter when the pressure loss reaches 0.2 MPa. Repeat filtering and back flushing process (up to five times shown in the graphs).

The graphs above show that the initial pressure loss ( $\Delta P=0.015\text{MPa}$ ) and time it takes to reach the pressure loss of  $\Delta P=0.2\text{MPa}$  return to the rough initial value even after repeated back-flushing.

## Measurement Circuit

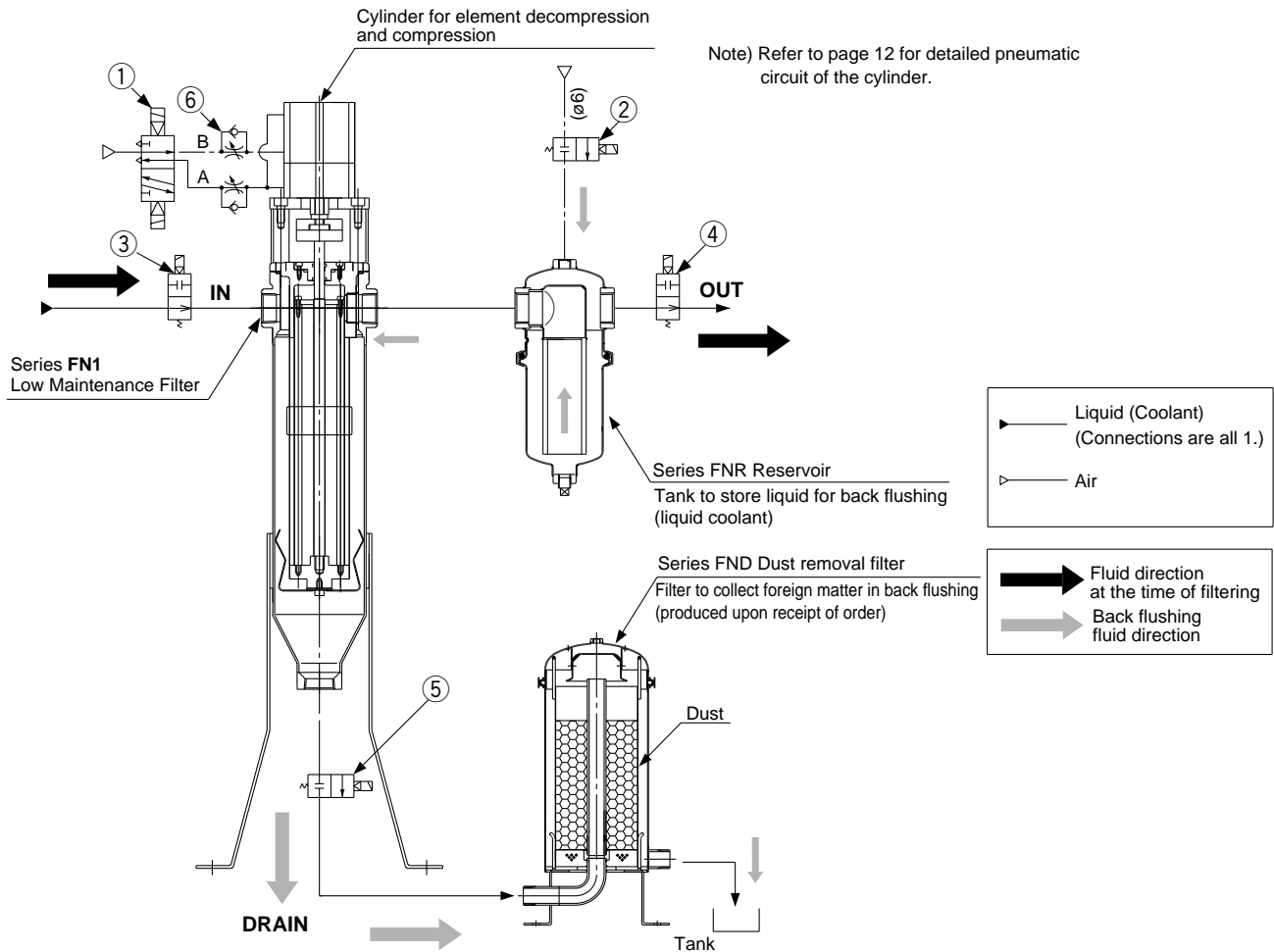


# Series FN1

## Piping Example

Series FN1 Low Maintenance Filter cannot be used alone.

Please follow the component configuration and operation steps illustrated below.

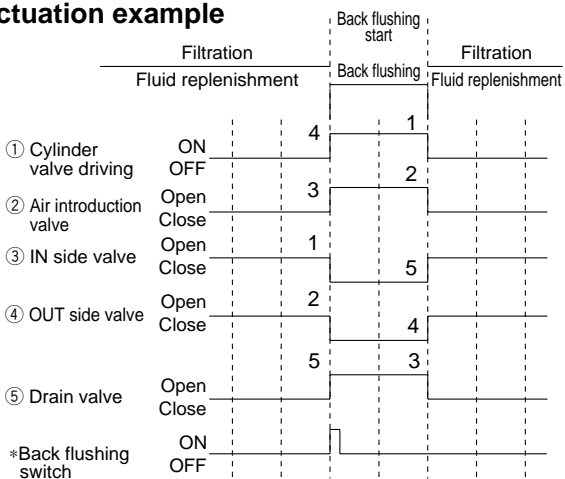


### Example of connection device

No.	Description	Device	No.	Description	Device
①	Cylinder driving valve	5-port solenoid valve (Series SY)	④	OUT side valve	Coolant valve (Series VNC)
②	Air supply valve	Process valve (Series VNB)	⑤	Drain valve	Coolant valve (Ball type)
③	IN side valve	Coolant valve (Ball type)	⑥	Speed controller	Speed controller (Series AS)

Series inside ( ) indicate SMC products. Contact SMC regarding the valves 3 to 5.

### Actuation example



\*The M/C stop signal and a signal for element clogging (differential signal switch) are used to start back flushing. Numbers in the chart indicate the operation order for each operation.

Step	Operation description
Back flushing	1 ③ IN side valve: Close Stops fluid supply to the filter.
	2 ④ OUT side valve: Close Seals the filter and reservoir containing fluid.
	3 ② Air supply valve: Open Supply the fluid in the reservoir to the filter.
	4 ① Cylinder driving valve: ON Lowers the cylinder to decompress the element.
	5 ⑤ Drain valve: Open The fluid in the reservoir passes through the decompressed element and forces out to the tank.
At the time of filtering operation	1 ① Cylinder driving valve: OFF Raises the cylinder to compress the element.
	2 ② Air supply valve: Close Stops pressure feed.
	3 ⑤ Drain valve: Open
	4 ④ OUT side valve: Open
	5 ③ IN side valve: Open



## Caution

### 1. Cylinder for element decompression and compression

- Do not overthrottle the speed controller when adjusting the cylinder retraction speed (element decompression). If the element is decompressed too slowly, the back flushing may become ineffective.
- Refer to page 12 for "Cylinder for element decompression and compression" regarding the detailed pneumatic circuit of the cylinder and lock.

### 2. Reservoir installation

- Installation of a reservoir (optional) is recommended to store fluid for back flushing. If a reservoir is not going to be installed, make sure to allow piping capacity equivalent to a size of reservoir between the low maintenance filter and air supply valve.

### 3. Air pressure

- Set the pressure of the air supply valve to 0.25 to 0.3 MPa. Increasing the pressure will not improve the back flushing effect.
- Use the same set pressure for the supply pressure of the lock cylinder. Exceeding this pressure range may increase the load applied to the filtering plate when the element is compressed, causing malfunction.

### 4. Air pressure

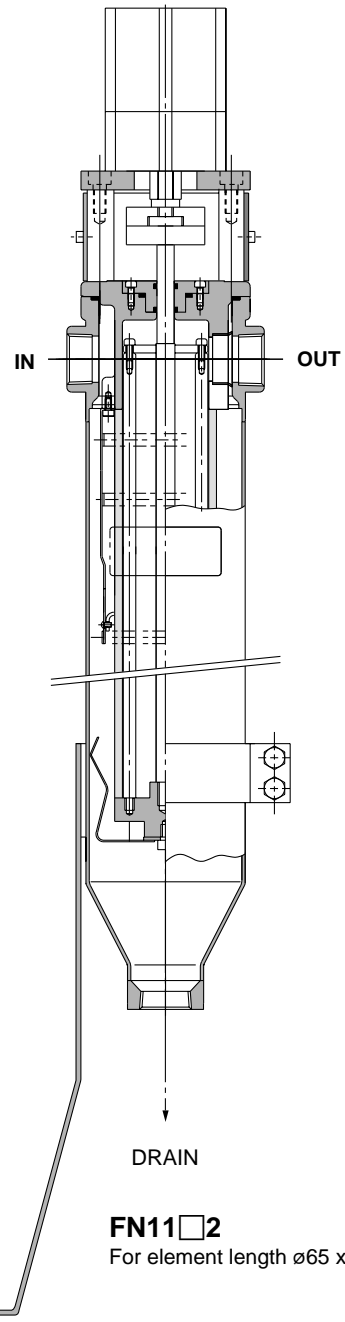
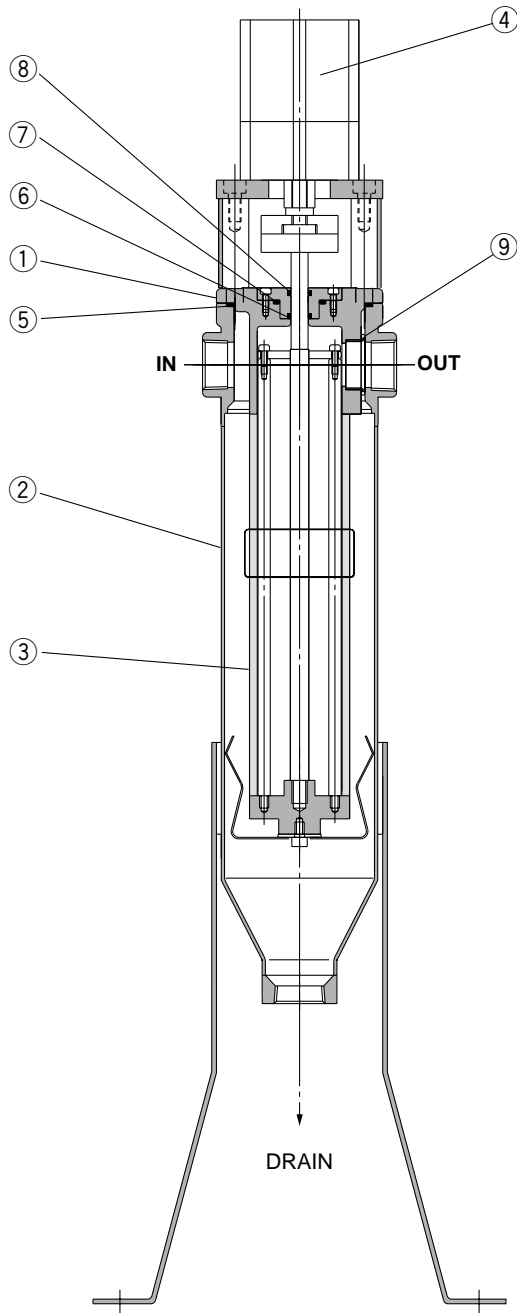
- Devise the by-pass circuit on the upstream side of IN side valve to prevent the line pressure during back flushing from rising and to protect the pump.

### 5. Maintenance

- The filter should be back flushed until the differential pressure reaches 0.1 MPa to avoid a drop in the flow rate due to the element clogging and to maintain back flushing efficiency.
- Time it takes to clog the element varies depending on the dust condition. Monitor the clogging condition of the element using a detection switch for differential pressure. The detection switch for differential pressure is sold separately. Contact SMC for more information.
- Since the element of this low maintenance filter provides rough filtration efficiency (with conventional notch wire level), it can be used as a pre-filter to extend the life of the check filter depending on the fluid condition in use. Installing these low maintenance filters side by side to use them alternately enables continuous operation during back flushing. Use an element with 500 mm in length for highly contaminated fluid. A sufficient flow rate can be ensured by installing two to three low maintenance filters in a row in case of the insufficient flow capacity.

# Series FN1

## Construction



### Parts list

No.	Description	Material	Note
1	Cover	SCS13	
2	Bowl	SCS13	
3	Element	SUS304	ø65 x 250mm
			ø65 x 500mm
4	Compact cylinder with lock	FN1□1	CDLQB63-30D-F
		FN1□2	CDLQB63-50D-F

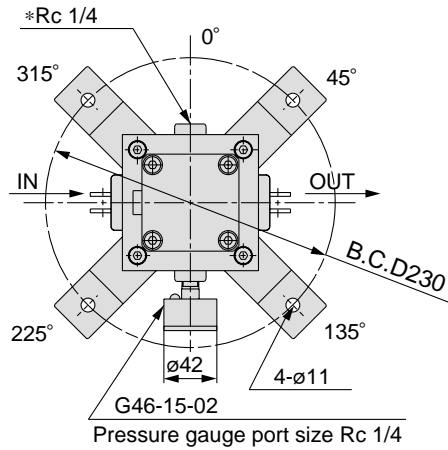
### Replacement parts

No.	Description	Material
5	O-ring	NBR
6	Seal	
7	O-ring	
8	Scraper	
9	O-ring	FPM

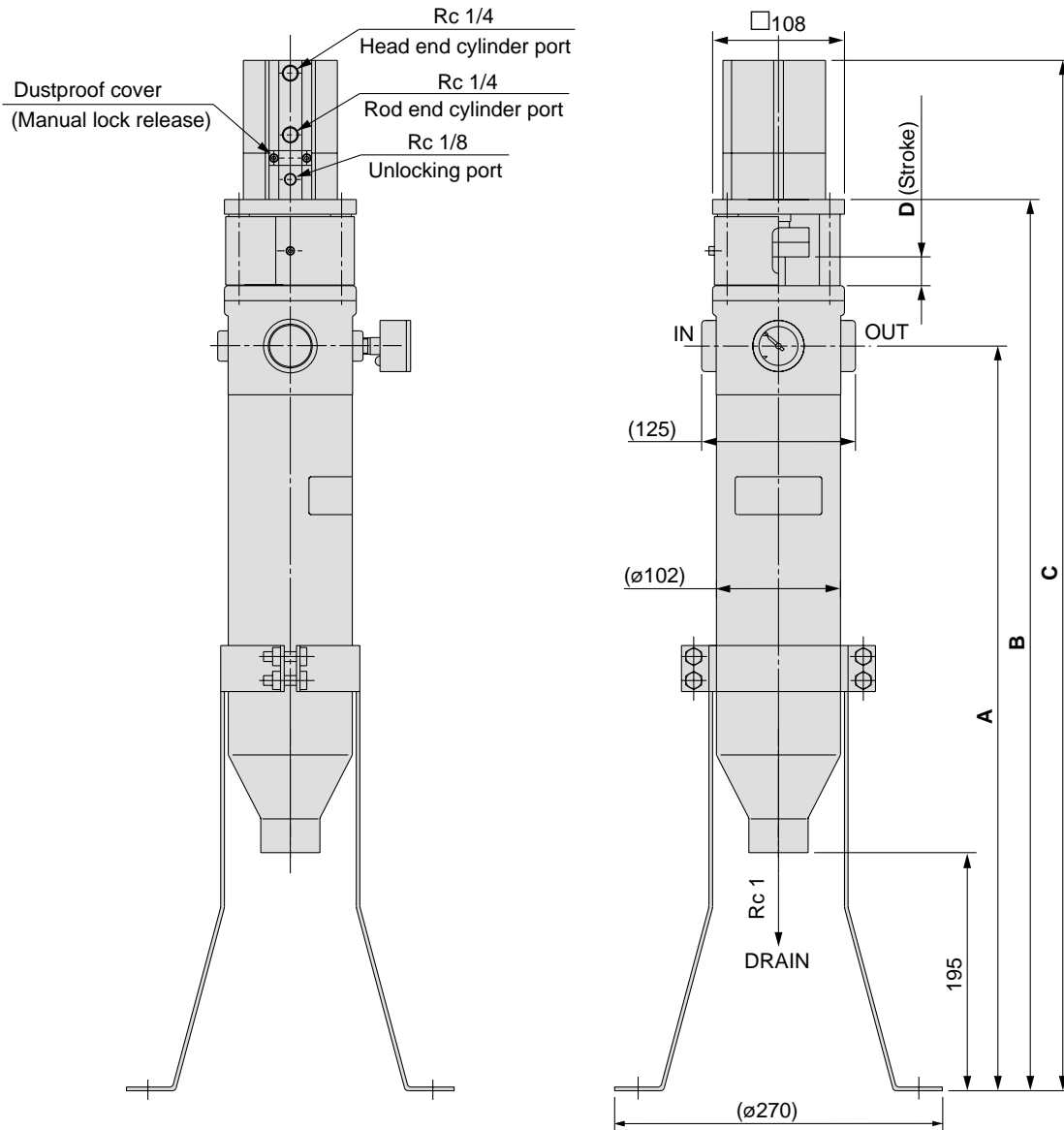
### Replacement parts: Seal kit

Model	Order no.	Material	Note
FN1□□N	KT-FN11N	NBR	Items 5 through 9 from the above chart.
FN1□□V	KT-FN11V	FPM	

**Dimensions**



Note) Use the Pc 1/4 port marked with an asterisk when designing an air release circuit.



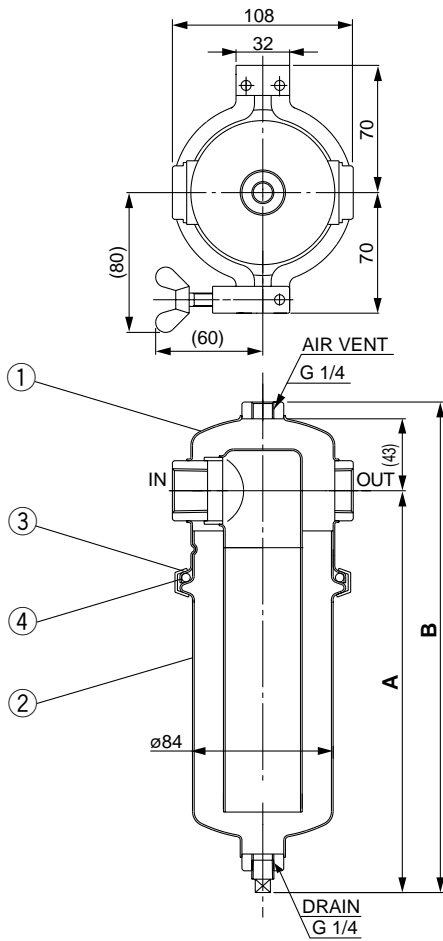
**Dimensions** (mm)

Model	Bore size (Nominal size B)	A	B	C	D
FN11□1	Rc 1	610	(730)	(844)	20
FN11□2		860	(1000)	(1134)	40

# Series FN1

## Options

### Reservoir



### Dimensions

Model	Bore size (Nominal size B)	(mm)	
		A	B
<b>FNR100<sup>N</sup>-10</b>	Rc 1	194	(257)
<b>FNR101<sup>N</sup>-10</b>		332	(385)

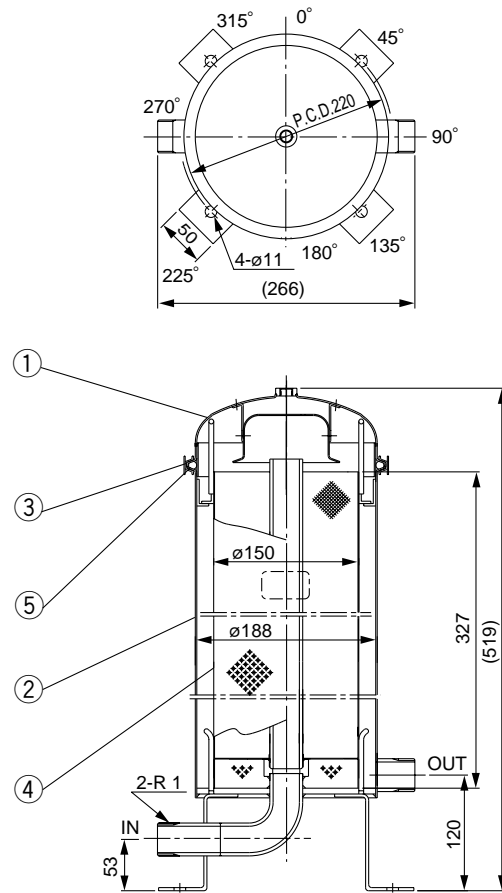
### Parts list

No.	Description	Material	Note
1	<b>Cover</b>	Stainless steel SUS304	
2	<b>Bowl</b>	Stainless steel SUS304	
3	<b>V-band</b>	Stainless steel SUS304	

### Replacement parts

No.	Description	Material	Note
4	<b>O-ring</b>	NBR	JIS B 2401-1A-P85
		FPM	JIS B 2401-4D-P85

### Dust removal filter



### Parts list

No.	Description	Material	Note
1	<b>Cover</b>	Stainless steel SUS304	
2	<b>Bowl</b>	Stainless steel SUS304	
3	<b>V-band</b>	Stainless steel SUS304	

### Replacement parts


No.	Description	Material	Note
4	<b>Element</b>	Stainless steel SUS304	EZH710AS-149
5	<b>O-ring</b>	NBR	JIS B 2401-1A-P185
		FPM	JIS B 2401-4D-P185





*Series FN1*

# Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "Caution", "Warning", or "Danger". To ensure safety, be sure to observe these and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

## Warning

**1. Determining the compatibility of the products featured in this catalog is the responsibility of the person who designs the system or decides its specifications.**

Since the products specified here are used in various operating conditions, their compatibility with the specific system must be based on specifications or after analysis and/or tests to meet your specific requirements. Particularly, give due consideration when determining a fluid.

**2. Only trained personnel should operate machinery and equipment.**

Fluids can be dangerous if an operators unfamiliar with them. Assembly, handling or repair of systems should be performed by trained and experienced operators.

**3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.**

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safety measures against danger caused by fluids.
2. When equipment is to be removed, confirm the safety process, the fluid flow, and that there is no danger from residual fluid in the system.
3. Before machinery/equipment is restarted, make sure to confirm safety.

**4. Contact SMC if the product is to be used in any of the following conditions:**

1. Conditions and environments beyond the given specifications.
2. The use of a fluid whose suitability causes concern due to its type and additives.
3. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency shutdown circuits, press applications, brake circuits, or safety equipment.



# Series FN1 Specific Product Precautions 1

Be sure to read before handling.  
Refer to page 10 for safety instructions.

## Design

### ⚠ Caution

1. Do not operate exceeding the operating pressure range.
2. Do not operate exceeding the operating temperature range.
3. **Fluid**  
Do not operate with gases.
4. **Fatigue failure**  
Be sure to implement necessary measures for the following operating conditions:
  - 1) When surge pressure is applied to the element
  - 2) Unstable filter causes sliding or vibration.
  - 3) When the element repeatedly expands and shrinks due to thermal effect.
5. **Pressure drop**  
Adjust the initial pressure drop to 0.01MPa to 0.02MPa or less.
6. **Corrosion**  
Corrosion may occur depending on the operating condition and environment.  
The wetted part of the pressure gauge is made of brass. Confirm the compatibility with fluid in use.

## Selection

### ⚠ Warning

1. For model selection, confirm application purpose, required specification, and operating condition (such as fluid, pressure, flow rate, temperature, and environment) so that the selected model is within the specified range.
2. Do not use at temperature that exceeds the boiling point of the fluid.
3. Never use with gases, including air.
4. Do not use in locations where pressure rises over 1MPa due to water hammer or surge pressure.

### ⚠ Caution

1. Design circuits to prevent back pressure or back-flow. Back pressure can damage the element.

## Fluid

### ⚠ Warning

1. Use a low maintenance filter for filtration of water, alkali, and cleaning solvent.  
There may be circumstances where a seal or an O-ring deteriorates, causing leakage.

## Piping

### ⚠ Caution

1. Ensure sufficient clearance for maintenance when piping.
2. Before piping is connected, it should be thoroughly flushed out with air or water to remove chips, cutting oil, and other debris.
3. Before piping is connected, confirm IN and OUT sides.
4. **Connection**  
When screwing together pipes and fittings, be certain that chips from the pipe threads and sealing material do not get inside the piping.  
Also, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the male threads.
5. **Line flushing**  
Flush the piping lines at the time of initial use and when replacing the element.
6. **Connect piping to prevent rise of line pressure on the IN side at the time of back flushing.**
7. **When starting normal operation after back flushing, release residual pressure in the filter to completely replace the air with the fluid.**

## Operating Environment

### ⚠ Caution

1. Discoloration or material deterioration may occur in an atmosphere where there is a possibility of corrosion. As a corrosion advances, the filter will lose its function.
2. When the filter used in locations where there is a vibration or impact, fatigue failure may occur.  
Provide proper reinforcement for operation.

## Maintenance

### ⚠ Caution

1. The pressure drop fluctuates depending on operating conditions. Since the pressure drop is one of the factors indicating filter characteristics, set a control standard for the filter.
2. Be sure to conduct a back-flush to prevent dust adhesion before operation stop (pause).



# Series FN1 Specific Product Precautions 2

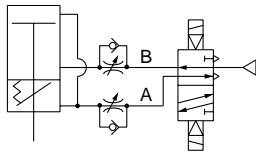
Be sure to read before handling.  
Refer to page 10 for safety instructions.

## <Cylinder for element decompression and compression>

### Pneumatic Circuit

### Warning

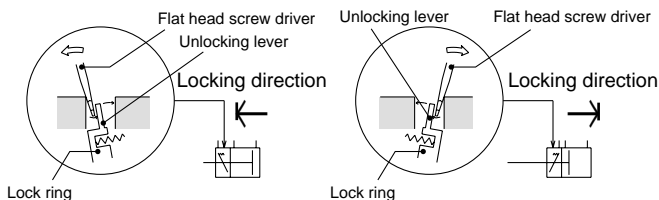
- 1. Do not use 3-position valves.**  
Unlocking pressure may unlock the lock.
- 2. Use a speed controller with meter-out control.**  
Malfunction may occur if meter-in control is used.
- 3. Be careful of backflow of pressure exhausted from a common exhaust type valve manifold.**  
A backflow of exhaust pressure may release the lock. Use an individual exhaust type manifold or single type valve.
- 4. Split the pneumatic piping for the lock unit between the cylinder and the speed controller.**  
Splitting the piping outside of these 2 components may shorten a service life.
- 5. Keep the piping of the lock unit from the branching short.**  
Long piping can cause malfunctioning of unlocking and shorten a service life of the lock.



### Manual Lock Release

### Warning

- 1. Follow the steps shown below for manual release after confirming safety.**  
Make sure that there will be no danger even when the load moves suddenly. Also confirm that no personnel is present in the movement range of the load.



#### Extension locking

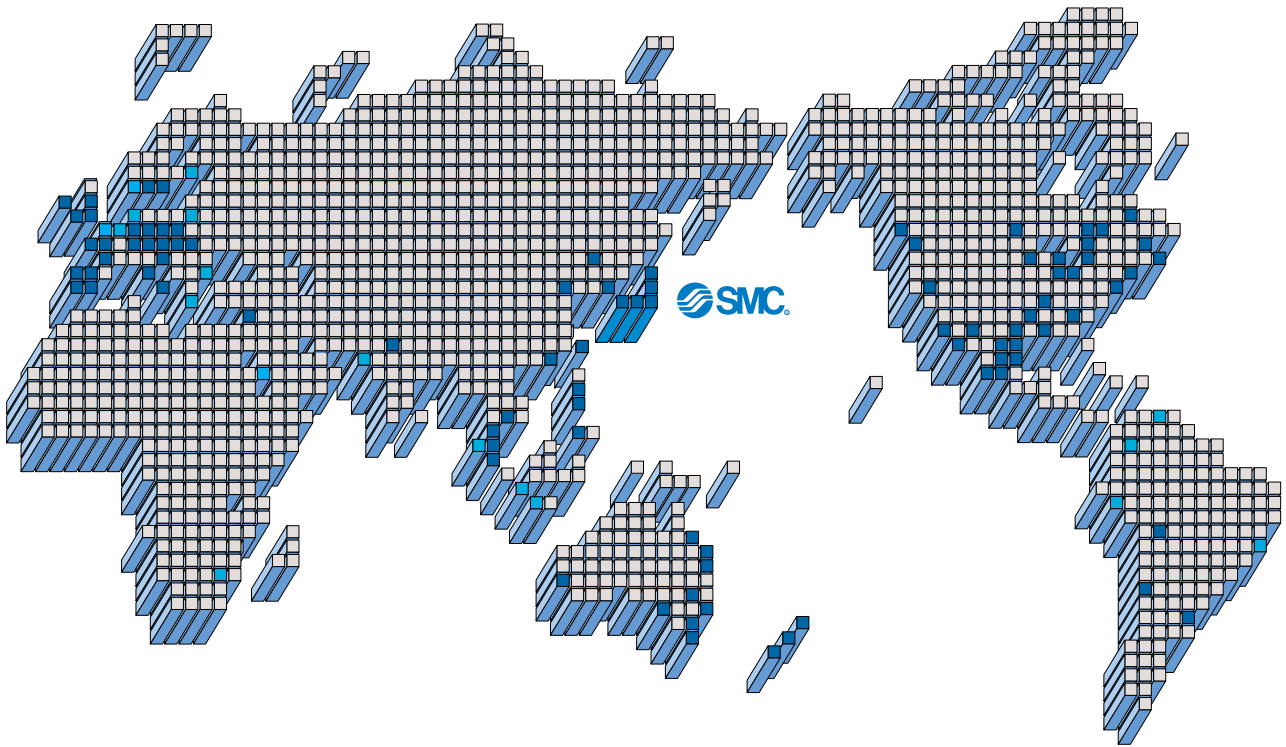
- 1) Remove the protective cover.
- 2) As shown above, insert a flat head screw driver in the clearance of the rod side of the manual lock release lever. Tilt the driver slightly toward the direction indicated by the arrow (to the rod side) to release the lock.

#### Retraction locking

- 1) Remove the protective cover.
- 2) As shown above, insert a flat head screw driver in the clearance of the head side of the manual lock release lever. Tilt the driver slightly toward the direction indicated by the arrow (to the head side) to release the lock.



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