

# MODEL SB-1S, SB-1F (Ball Type), SF-1S, SF-1F (Flap Type), SL-1S, SL-1F (Plain Type) SIGHT GLASS

## PRODUCT MANUAL

Thank you very much for choosing the Yoshitake's product. To ensure the correct and safe use of the product, please read this manual before use. This manual shall be kept with care for future references.

The symbols used in this manual have the following meanings.

|                                                                                   |                |                                                                                                                                                 |
|-----------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Warning</b> | This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.                          |
|  | <b>Caution</b> | This symbol indicates a hazardous situation that, if not avoided, may result in minor or moderate injury or may result in only property damage. |

### Table of Contents

|                                                                |       |
|----------------------------------------------------------------|-------|
| 1. Features .....                                              | 1     |
| 2. Specifications .....                                        | 1     |
| 3. Dimensions and Weights .....                                | 2~3   |
| 4. Minimum and Maximum Flow Rates of SB-1S and SB-1F<br>.....  | 4     |
| 5. Scale Reading/Flow Rate Charts for SF-1S and SF-1F<br>..... | 4     |
| 6. Installation and Operation .....                            | 5     |
| 6.1 Piping example .....                                       | 5     |
| 6.2 Precaution for installation .....                          | 5     |
| 6.3 Precaution for operation .....                             | 6     |
| 7. Troubleshooting .....                                       | 7     |
| 8. Exploded Drawing .....                                      | 8     |
| 9. Disassembly, Cleaning and Reassembly .....                  | 9     |
| 9.1 Precaution for disassembly, cleaning and reassembly .....  | 9     |
| 9.2 Disassembly .....                                          | 10    |
| 9.3 Reassembly .....                                           | 11~14 |
| Warranty Information                                           |       |



## 1. Features

The sight glasses of SB, SF, and SL series, designed as compact, space saving and lightweight, can be connected to either horizontal or vertical piping.

- SB-1S, SB-1F
  1. Fluid flow can be checked by the movement of the balls inside the product.
  2. Inner surface of the glass is less liable to water scale because the rolling balls contact the surface.
- SF-1S, SF-1F
  1. Variation in flow rate can be checked easily by flap and scale plates.
  2. Mica plates are used for the product for steam condensate.
- SL-1S, SL-1F
  1. Two component fluid can be checked by its color or mixed state.
  2. Intermittent fluid flow can be checked.
  3. Mica plates are used for the product for steam condensate.

## 2. Specifications

| Model                 |       | SB-1S                         | SB-1F              | SF-1S                                                             | SF-1F              | SL-1S          | SL-1F              |
|-----------------------|-------|-------------------------------|--------------------|-------------------------------------------------------------------|--------------------|----------------|--------------------|
| Type                  |       | Ball                          |                    | Flap                                                              |                    | Plain          |                    |
| Application           |       | Cold and hot water            |                    | Cold and hot water, Oil, Other non-dangerous fluids <sup>*2</sup> |                    |                |                    |
| Nominal size          |       | 15A-50A                       |                    |                                                                   |                    |                |                    |
| Max. working pressure |       | 1.0 MPa <sup>*2</sup>         |                    |                                                                   |                    |                |                    |
| Temperature range     |       | 5-85℃                         |                    | 5-150℃                                                            |                    |                |                    |
| Max. thermal shock    |       | -                             |                    | 100℃                                                              |                    |                |                    |
| Material              | Body  | Ductile cast iron             |                    |                                                                   |                    |                |                    |
|                       | Glass | Hardened glass <sup>*2</sup>  |                    |                                                                   |                    |                |                    |
|                       | Ball  | Synthetic resin <sup>*1</sup> |                    | -                                                                 |                    | -              |                    |
|                       | Flap  | -                             |                    | Stainless steel                                                   |                    | -              |                    |
| Connection            |       | JIS Rc screwed                | JIS 10K FF flanged | JIS Rc screwed                                                    | JIS 10K FF flanged | JIS Rc screwed | JIS 10K FF flanged |

\*1. Three colored balls for 15A-25A: Red (1), White (1), Blue (1)

Three colored balls for 32A-50A: Red (1), White (2)

The ball sizes are different between those for 15-25A and 32-50A.

\*2. When a flap type or a plain type is applied to steam condensate, use the product with mica plates (as the SFM-1S, SFM-1F, SLM-1S, or SLM-1F) within max. working pressure of 0.6 MPa and max. temperature of 150℃.

- Available with the product with protective wire mesh for flap and plain types. (as the SFP-1S, SFP-1F, SLP-1S, or SLP-1F)



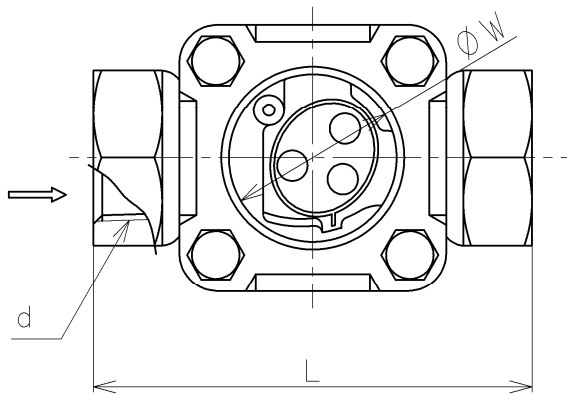
### Caution

Please read this manual and confirm that the product specifications are sufficient for the service condition.

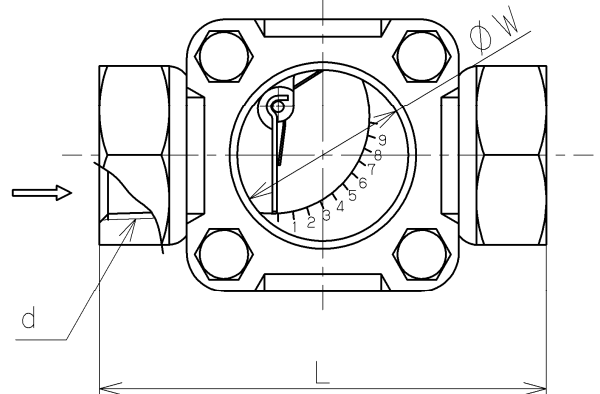
\* If they are insufficient, please contact us without using the product.

### 3. Dimensions and Weights

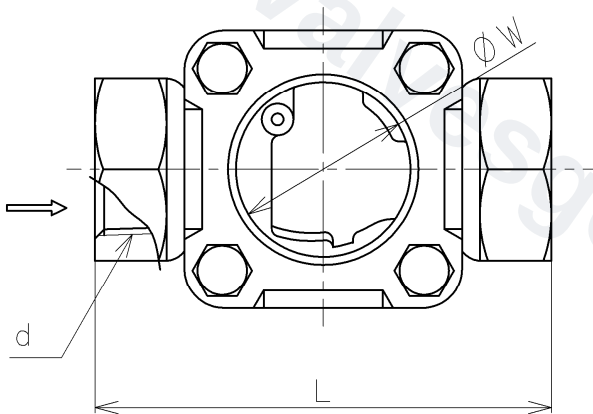
[SB-1S, SF-1S, SL-1S]



[SB-1S]



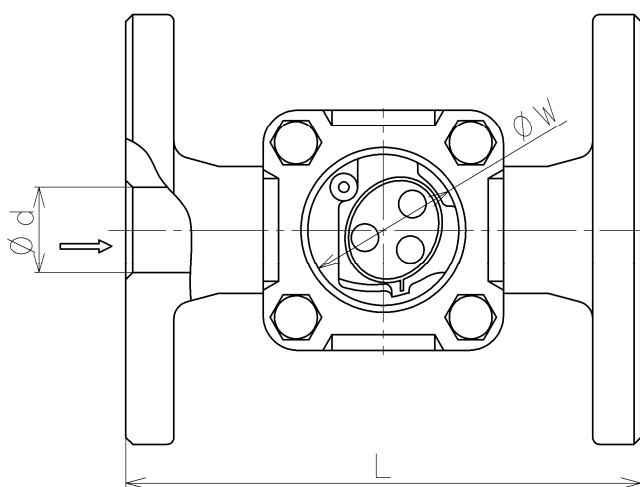
[SF-1S]



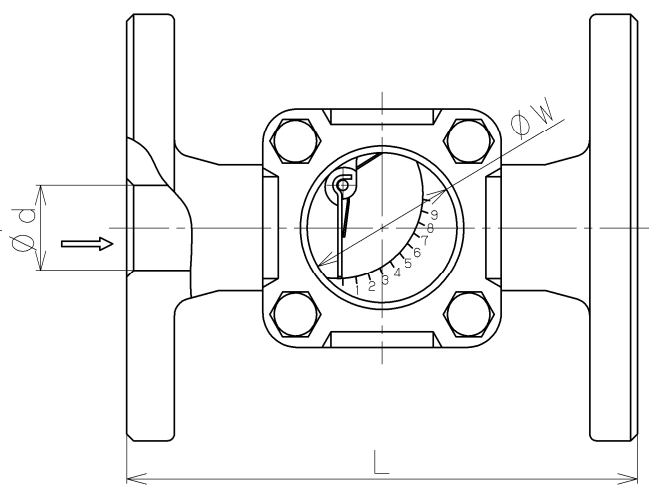
[SL-1S]

| Nominal size | d        | L   | W  | (mm)        |       |       |
|--------------|----------|-----|----|-------------|-------|-------|
|              |          |     |    | Weight (kg) |       |       |
|              |          |     |    | SB-1S       | SF-1S | SL-1S |
| 15A          | Rc 1/2   | 80  | 35 | 0.7         | 0.7   | 0.7   |
| 20A          | Rc 3/4   | 90  | 35 | 0.8         | 0.8   | 0.8   |
| 25A          | Rc 1     | 115 | 44 | 1.4         | 1.4   | 1.4   |
| 32A          | Rc 1 1/4 | 127 | 57 | 2.5         | 2.5   | 2.1   |
| 40A          | Rc 1 1/2 | 140 | 57 | 2.8         | 2.8   | 2.7   |
| 50A          | Rc 2     | 162 | 73 | 5.4         | 5.4   | 5.2   |

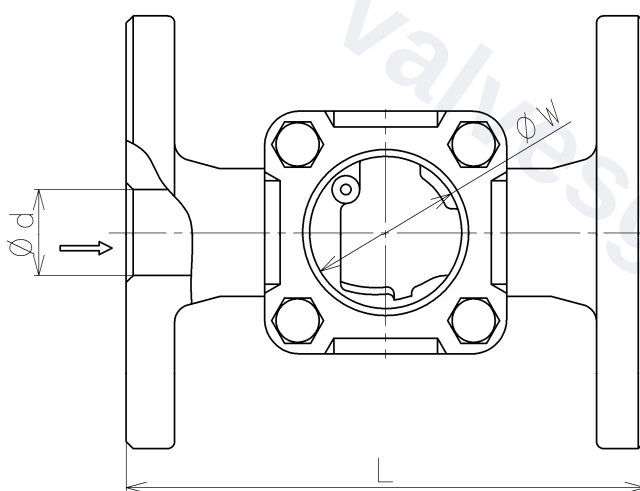
[SB-1F, SF-1F, SL-1F]



[SB-1F]



[SF-1F]



[SL-1F]

| Nominal size | d  | L   | W  | (mm)        |       |       |
|--------------|----|-----|----|-------------|-------|-------|
|              |    |     |    | Weight (kg) |       |       |
|              |    |     |    | SB-1F       | SF-1F | SL-1F |
| 15A          | 15 | 130 | 35 | 2.2         | 2.2   | 2.2   |
| 20A          | 20 | 130 | 35 | 2.6         | 2.6   | 2.6   |
| 25A          | 25 | 150 | 44 | 4.1         | 4.1   | 4.1   |
| 32A          | 32 | 160 | 57 | 5.9         | 5.9   | 5.7   |
| 40A          | 40 | 170 | 57 | 6.2         | 6.2   | 6.0   |
| 50A          | 50 | 200 | 73 | 9.5         | 9.5   | 9.3   |

#### 4. Minimum and Maximum Flow Rates of SB-1S and SB-1F

Table 1 Min. and max. flow rates of SB-1S and SB-1F (Fluid: Water, Unit: m<sup>3</sup>/h)

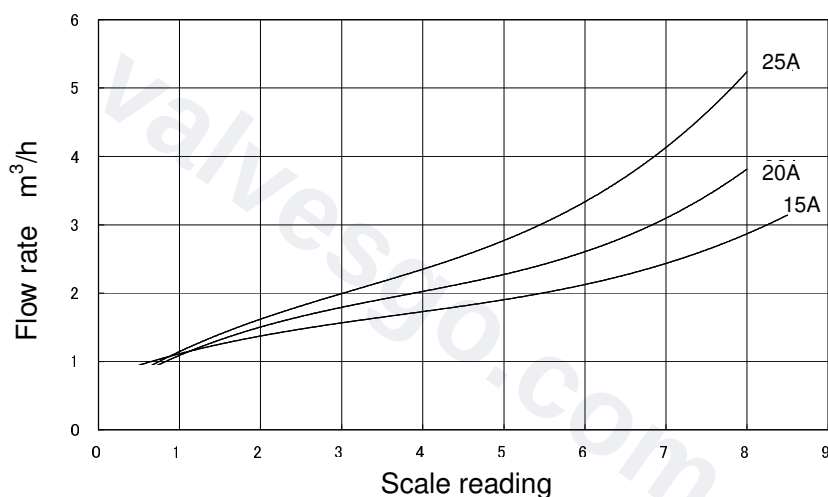
| Nominal size | Min. flow rate | Max. flow rate |
|--------------|----------------|----------------|
| 15A          | 0.6            | 1.5            |
| 20A          | 0.7            | 2.6            |
| 25A          | 0.8            | 4.3            |
| 32A          | 1.6            | 7.2            |
| 40A          | 2.0            | 9.8            |
| 50A          | 2.5            | 15.8           |

\* The min. flow rate means the lowest flow rate required to start moving one or more balls, while the max. flow rate means the flow rate at which the flow velocity reaches 2 m/s.

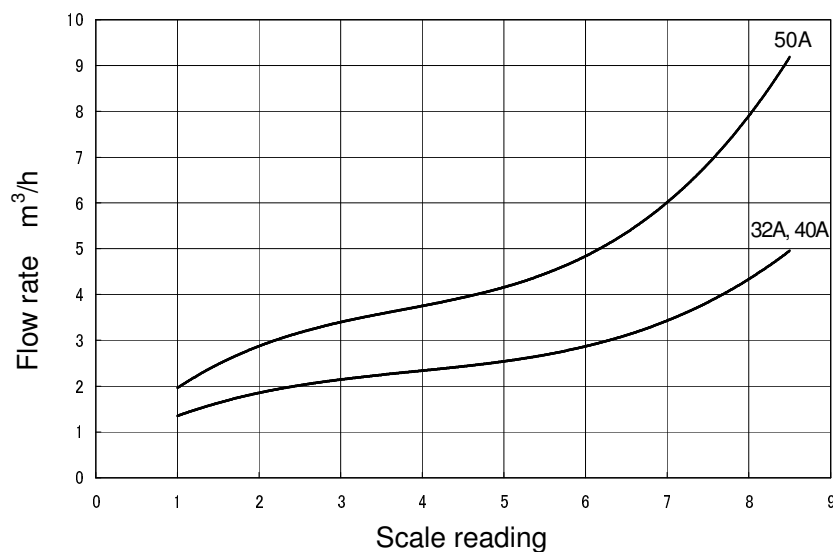
The pressure loss at the max. flow rate is 0.05 MPa. (For SF-1S, SF-1F, SL-1S and SL-1F, however, the pressure loss at the flow rate corresponding to the flow velocity of 2 m/s is negligible.)

#### 5. Scale Reading/Flow Rate Charts for SF-1S and SF-1F

- 15A-25A (Fluid: Water, Horizontal piping)



- 32A-50A (Fluid: Water, Horizontal piping)

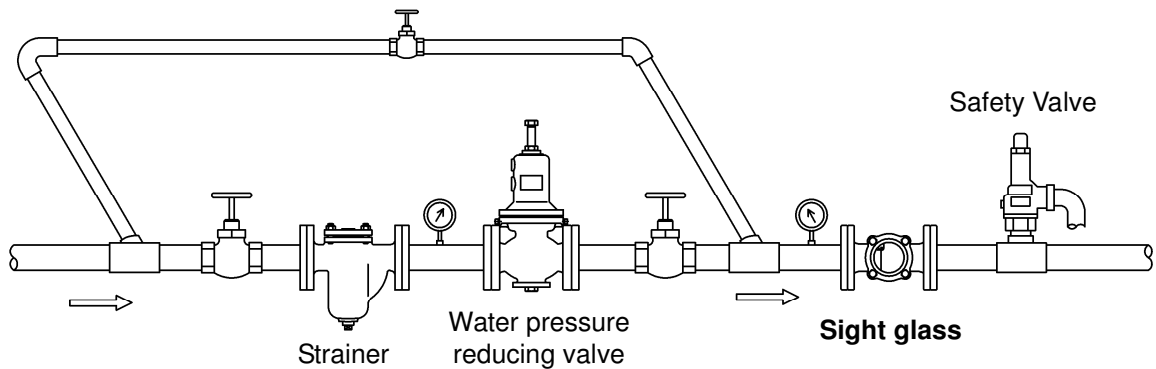


- The flow characteristics shown in the chart above are for reference only and cannot be used for actual measurement.

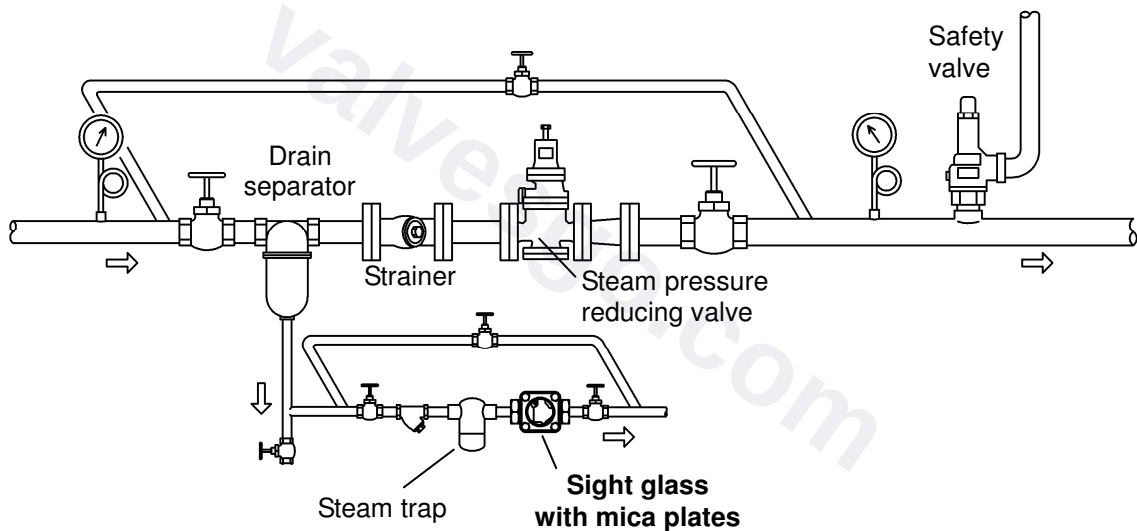
## 6. Installation and Operation

### 6.1 Piping example

- For cold and hot water



- For steam condensate



### 6.2 Precaution for installation

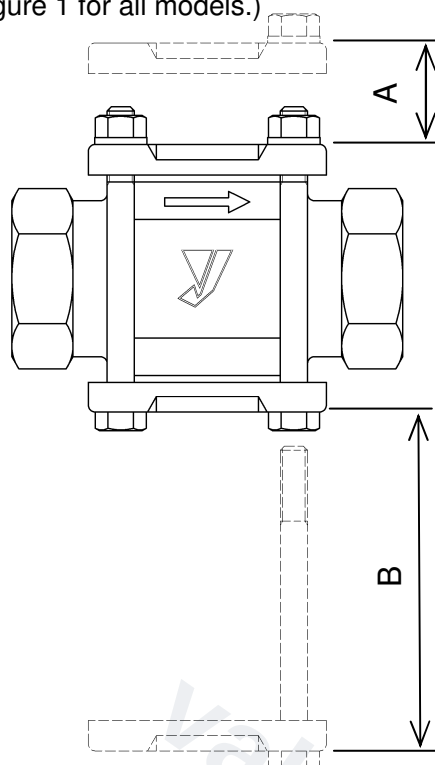


#### Caution

1. Before connecting the product to piping, remove foreign substances and dirt inside the piping.  
\* Failure to follow this notice may make the glass damaged due to scratches by foreign substances or may make the fluid cannot be seen through the glass due to glass opacity caused by scale stains.
2. When installing, check the direction of the product so that the fluid flowing and the arrow marked on the product are in the same direction.  
\* Setting the product in wrong directions prevents the product from functioning properly.
3. For steam condensate application, make sure to use the product with mica plates to protect the glasses.  
\* Failure to follow this notice may result in erosion on the glass.
4. Do not apply excessive load, torque or vibration to the product.  
\* Failure to follow this notice may result in leakage.
5. When using sealing material to install SB-1S, SF-1S or SL-1S, take care so that the sealing material does not get inside the piping.

- Secure the space required for disassembly or replacement of the product at maintenance or inspections.

(See Figure 1 for all models.)



| (mm)         |            |             |
|--------------|------------|-------------|
| Nominal size | A          | B           |
| 15A-25A      | 30 or more | 100 or more |
| 32A-40A      | 35 or more | 120 or more |
| 50A          | 40 or more | 150 or more |

Figure 1 Required space for disassembly/removal of the product.

### 6.3 Precaution for operation

#### Warning

1. Before applying the fluid to the product, confirm that the product is connected to the pipes securely.  
\* Failure to follow this notice may cause a blowout of the fluid, resulting in scalds (in the case of hot fluid) or property damage.
2. Do not apply a rapid temperature change to the product during both initial and usual operations. In case of a possible frozen line, take proper measures to remove the fluid inside the piping to avoid freezing.  
(See the max. thermal shock in 2. Specifications on page 1.)  
\* A rapid temperature change or freezing may damage the glass resulting in a blowout of the fluid.
3. Do not retighten the cover of the product.  
\* Failure to follow this notice may damage the glass resulting in fluid blowout.

#### Caution

1. The balls for SB-1S and SB-1F are consumable parts. When diameters of the balls become 5 mm or less for 15A-25A, or 7 mm or less for 32A-50A, replace the balls.
2. For SB-1S and SB-1F, make sure that the maximum flow rate is 2 m/s. If flow rate is too high, abrasion of the ball is accelerated. Use the product at a flow rate between the min. and max. flow rates specified in Table 1 on page 4.

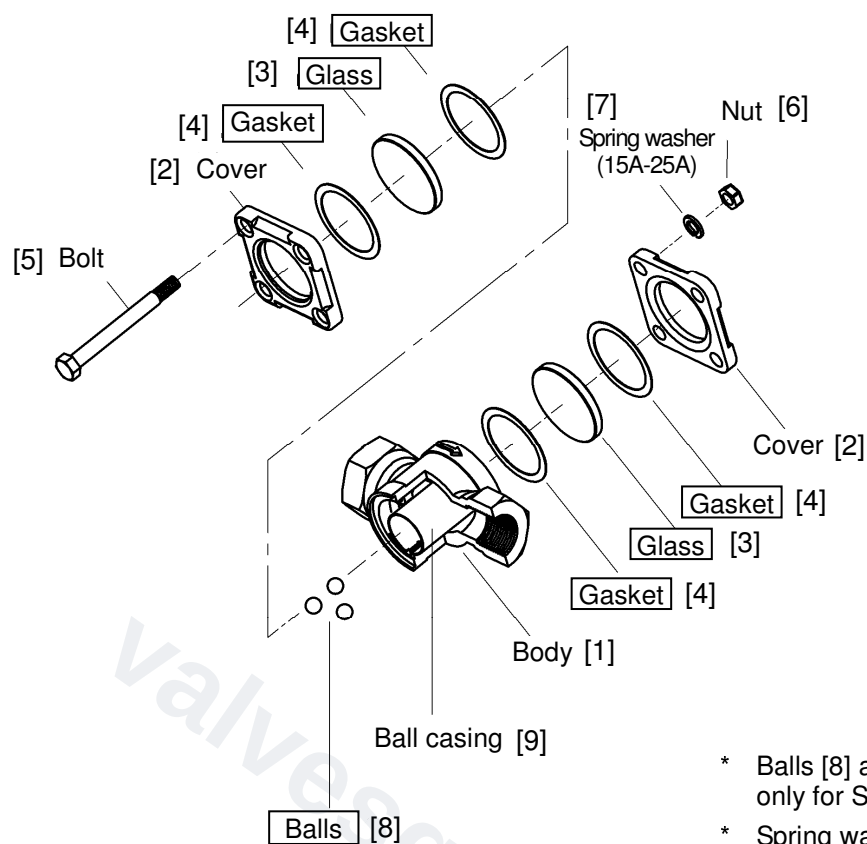
## 7. Troubleshooting

(See 8. Exploded Drawing on page 8 for each part)

| Trouble                                                                            | Cause                                                                                                                                                | Remedy                                                                                                                             |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Ball does not move.<br>(For SB-1S/1F)<br><br>Flap does not move.<br>(For SF-1S/1F) | 1. The balls [8] (of SB-1S/1F) or flap [8] (of SF-1S/1F) is caught by foreign substances sticking to the inner surface of the glass [3].             | 1. Disassemble and clean the product to remove the foreign substances.<br>(See 9. Disassembly, Cleaning and Reassembly on page 9.) |
|                                                                                    | 2. The balls [8] (of SB-1S/1F) or flap [8] (of SF-1S/1F) is caught by scratches on the balls (of SB-1S/1F) or on the inner surface of the glass [3]. | 2. Disassemble the product and replace the damaged parts.<br>(See 9. Disassembly, Cleaning and Reassembly on page 9.)              |
|                                                                                    | 3. Flow rate does not reach the min. limit.                                                                                                          | 3. Replace the product with the one of a nominal size that ensures a flow rate of the min. limit. (See Table 1 on page 4.)         |
|                                                                                    | 4. Fluid does not flow.                                                                                                                              | 4. Check the piping.                                                                                                               |
|                                                                                    | 5. The product is installed in the opposite direction of the fluid flow.                                                                             | 5. Reinstall the product correctly.<br>(Match the arrow mark on the body with the flow direction.)                                 |
| Fluid flow cannot be observed.                                                     | 1. Foreign substances stick to the inner surface of the glass [3], or the glass [3] is stained.                                                      | 1. Disassemble and clean the product to remove the foreign substances.<br>(See 9. Disassembly, Cleaning and Reassembly on page 9.) |
|                                                                                    | 2. The inner surface of the glass [3] has erosion or scratches.                                                                                      | 2. Disassemble the product and replace the glass [3].<br>(See 9. Disassembly, Cleaning and Reassembly on page 9.)                  |
|                                                                                    | 3. The balls [8] (of SB-1S/1F) move too fast due to excessively high flow rate.                                                                      | 3. Keep the flow velocity 2 m/s or less.<br>(See 6.3 Precaution for operation on page 6.)                                          |
| Outside leakage                                                                    | 1. The gasket [4] leaks.                                                                                                                             | 1. Disassemble the product and replace the gasket [4].<br>(See 9. Disassembly, Cleaning and Reassembly on page 9.)                 |
|                                                                                    | 2. The glass [3] is damaged.                                                                                                                         | 2. Disassemble the product and replace the glass [3].<br>(See 9. Disassembly, Cleaning and Reassembly on page 9.)                  |

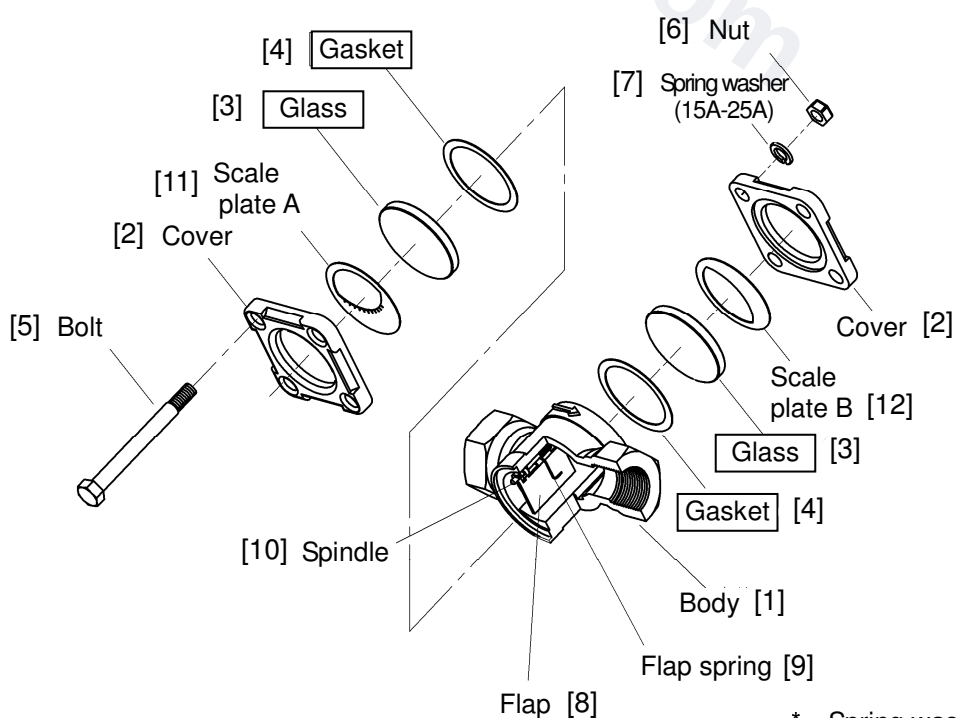
## 8. Exploded Drawing

- SB-1S (SB-1F)
- SL-1S (SL-1F)



- \* Balls [8] and ball casing [9] are only for SB-1S and SB-1F.
- \* Spring washer [7] is only for 15A-25A.

- SF-1S (SF-1F)



- \* Spring washer [7] is only for 15A-25A.

The parts shown in the rectangle boxes are available as consumables.

## 9. Disassembly, Cleaning and Reassembly

### 9.1 Precaution for disassembly, cleaning and reassembly



#### Warning

Completely discharge the pressure inside of the product, piping and equipment prior to disassembly and inspection. When fluid is hot, cool down the product to the condition that it can be touched with bare hands.

\* Failure to follow this notice may result in scalds or injury due to the residual pressure.



#### Caution

1. Clean the gasket spaces of the body, covers and glasses.  
\* Failure to follow this notice may cause leakage at the gasket.
2. The glasses are consumable parts. Replace the glass if it is eroded by more than 10% of its thickness or if it has scratches or flaws.  
\* Failure to follow this notice may cause the glass breakage.  
(Thickness of new glass for each size should be as follows:  
15A, 20A: 5 mm, 25A: 6 mm, 32A, 40A, 50A: 10 mm)
3. The gaskets are consumable parts. Replace them with new ones at the time of reassembly of the product.  
\* Failure to follow this notice may cause outside leakage.
4. The balls for SB-1S and SB-1F are consumable parts. Replace them when diameters of the balls become 5 mm or less for 15A-25A, or 7 mm or less for 32A-50A.  
\* 15A-25A has three colored balls:  
red (1), white (1) and blue (1); original size of 5/16 inches (approx. 8 mm) in diameter.  
32A-50A has three colored balls:  
red (1) and white (2); original size of 3/8 inches (approx. 9.5 mm) in diameter.
5. When disassembling, put a container under the product to collect fluid flowing out from the product.
6. The mica plates are consumable parts; however, the plates only cannot be replaced. Be sure to replace both of the glass and mica plate whenever either of them has scratches, flaws, or erosion.  
\* Failure to follow this notice may cause the glass breakage.

## 9.2 Disassembly (See 8. Exploded Drawing)

- Tools to be used

| Name of tool            | Nominal size of tool |
|-------------------------|----------------------|
| Spanner<br>(Two pieces) | 10 (15A-20A)         |
|                         | 13 (25A-40A)         |
|                         | 17 (50A)             |

- SB-1S, SB-1F

1. Completely discharge the pressure inside of the product.  
Remove the bolts [5], nuts [6], and spring washers [7] (for 15A-25A only) using spanners.  
(See Picture 1.)  
Take out gaskets [4], glasses [3], gaskets [4] and covers [2]. (See Picture 2.)  
\* Since the balls [8] can fall out when the glass [3] is detached from the body, be careful not to lose the balls.
2. Take out all the balls [8].



Picture 1



Picture 2

- SF-1S, SF-1F, SFM-1S, SFM-1F

1. Completely discharge the pressure inside of the product.  
Remove the bolts [5], nuts [6], and spring washers [7] (for 15A-25A only) using spanners.  
(See Picture 3.)  
Take out the gaskets [4], glasses [3], scale plates (A and B) [11] [12] and covers [2].  
(See Picture 4.)  
\* For SFM-1S and SFM-1F, mica plates are included.



Picture 3



Picture 4

- SL-1S, SL-1F, SLM-1S, SLM-1F

1. Completely discharge the pressure inside of the product.  
Remove the bolts [5], nuts [6], and spring washers [7] (for 15A-25A only) using spanners.  
(See Picture 1.)  
Take out the gaskets [4], glasses [3], gaskets [4], and covers [2]. (See Picture 2.)  
\* For SLM-1S and SLM-1F, mica plates are included.

### 9.3 Reassembly (See 8. Exploded Drawing)

- Tools to be used

| Name of tool  | Nominal size of tool                                                                                                                         |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Torque wrench | Use a tool that can tighten the bolts with the following torque.<br>7 N·m (15A-20A) (※1)<br>10 N·m (25A)<br>15 N·m (32A-40A)<br>25 N·m (50A) |
| Spanner       | 10 (15A-20A)<br>13 (25A-40A)<br>17 (50A)                                                                                                     |

(※1) SF-1S, SF-1F is 6 N·m .

- SB-1S, SB-1F

- Put the balls [8] into the ball casing [9], and then attach the gaskets [4], glasses [3], gaskets [4], and covers [2] in this order to the body. (See Figure 2.)

\* Check that the balls [8] are as specified in Caution 4, 9.1 Precaution for disassembly, cleaning and reassembly, before putting them into the casing.

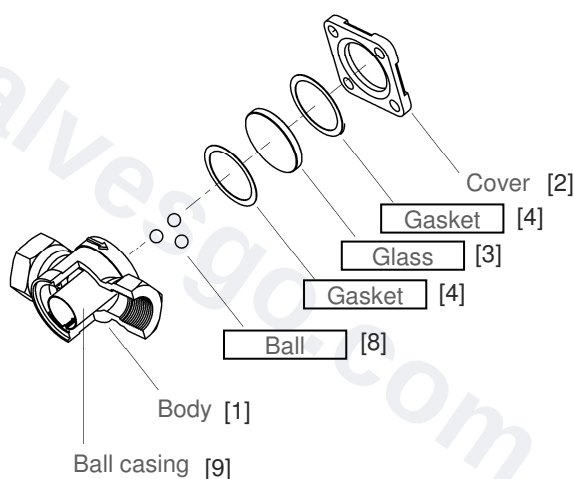
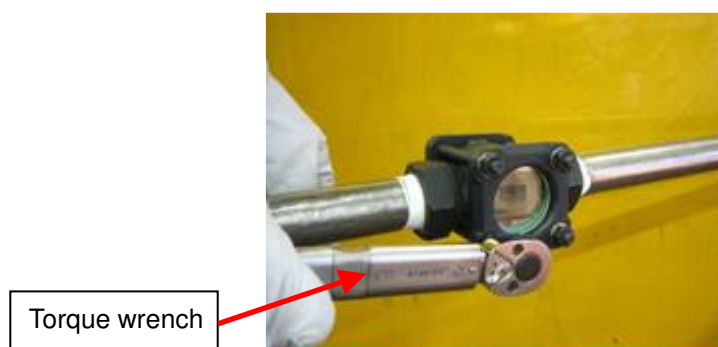


Figure 2

- To fix the covers [2] to the body [1], firstly tighten them temporarily with the bolts [5], spring washers [7] (for 15A-25A only), and nuts [6], and then tighten them evenly at the torque specified in Table 2 by using a torque wrench. (See Picture 5.)

\* Overtightening damages the glass [3].



Picture 5

Table 2 Tightening torque

| Nominal size | Tightening torque |
|--------------|-------------------|
| 15A, 20A     | 7 N·m (※1)        |
| 25A          | 10 N·m            |
| 32A, 40A     | 15 N·m            |
| 50A          | 25 N·m            |

(※1) SF-1S, SF-1F is 6N·m .

- SF-1S, SF-1F

1. Attach the gaskets [4], glasses [3], scale plates (A and B) [11] [12] and covers [2] in this order to the body. (See Figure 3.)

\* Attach the scale plates (A and B) in positions where they can be read from outside of the product. In addition, make the flap point at the minimum scale value. (See Picture 6.)

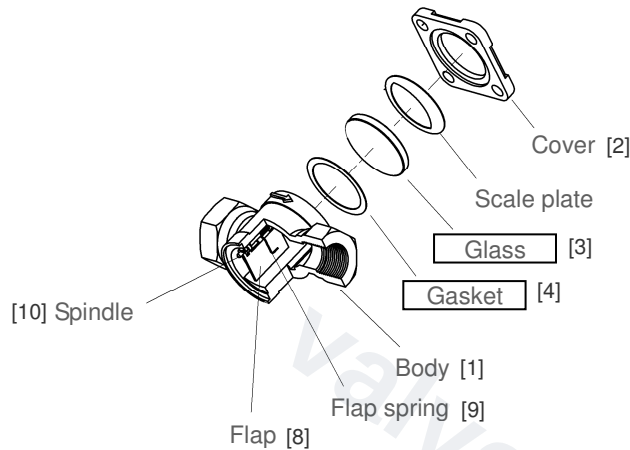


Figure 3



Picture 6

2. To fix the covers to the body, firstly tighten them temporarily with the bolts [5], spring washers [7] (for 15A-25A only), and nuts [6], and then tighten them evenly at the torque specified in Table 2 by using a torque wrench. (See Picture 5.)

\* Overtightening damages the glass [3].

- SL-1S, SL-1F

1. Attach the gaskets [4], glasses [3], gaskets [4], and covers [2] in this order to the body [1]. (See Figure 4.)

2. To fix the covers to the body, firstly tighten them temporarily with the bolts [5], spring washers [7] (for 15A-25A only), and nuts [6], and then tighten them evenly at the torque specified in Table 2 by using a torque wrench. (See Picture 5.)

\* Overtightening damages the glass [3].

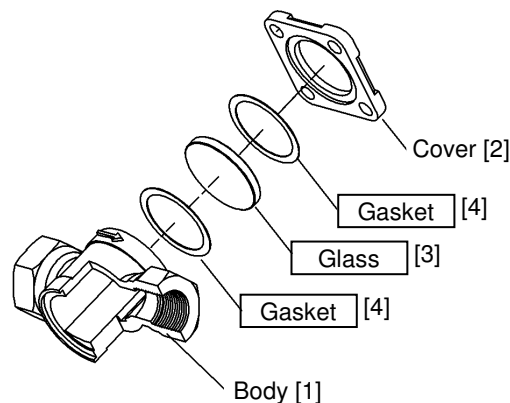


Figure 4

- SLM-1S, SLM-1F, SFM-1S, SFM-1F

Glasses [3] and mica plates [13] are not bonded. Please be careful when handling.

1. Attach the gaskets [4], mica plates [13], glasses [3], gaskets [4] (or scale plates [11] for SFM-1S and SFM-1F) and covers [2] in this order to the body [1]. (See Figure 5, Picture 7, and Picture 8)

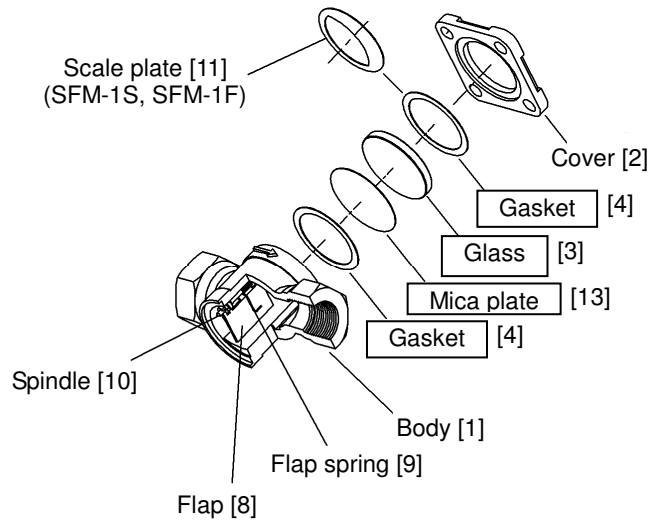


Figure 5

Attach the gaskets [4] to the body [1].

(See Picture 7.)

\* For SFM-1S and SFM-1F only, attach the gasket [4] in a manner that the end of spindle [10] is covered by the triangular part of the gasket [4]. (See Pictures 9 and 10.)



Picture 7



Attach the gaskets [4] (or scale plates [11] for SFM-1S and SFM-1F), glasses [3], and mica plates [13] in this order to the covers [2] and assemble them to the body. (See Picture 8.)



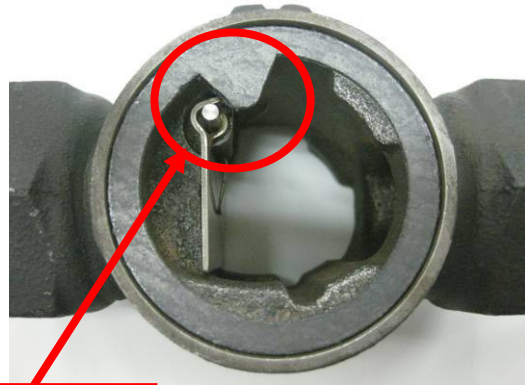
Picture 8

**OK**



Picture 9

**NG**



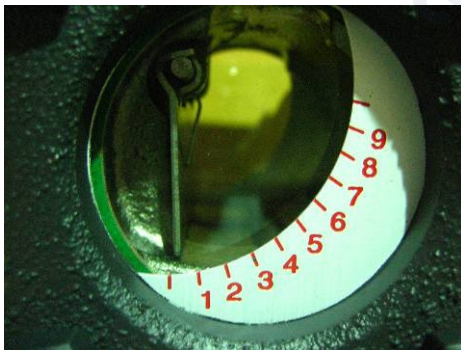
Picture 10

Attach gasket [4] in a manner that the end of spindle [10] is covered by the triangular part of gasket [4].

2. To fix the covers to the body, firstly tighten them temporarily with the bolts [5], spring washers [7] (for 15A-25A only) and nuts [6], and then tighten them evenly at the torque specified in Table 2 by using a torque wrench. (See Picture 12.)

\* Attach the scale plates [11] [12] in positions where they can be read from outside of the product. In addition, make the flap point at the minimum scale value. (See Picture 11.)

\* Overtightening damages the glass [3].



Picture 11



Torque wrench

Picture 12