Model GD-20RC
Primary Pressure Regulating Valve
Pressure Sustaining Valve

Please read this bulletin thoroughly before using the pressure reducing valve, so that you may do so correctly and safely. Please carefully store this bulletin in a handy place.

————————The following safety symbols are used in this manual. ————————

⚠ Warning

This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ Caution

This symbol indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

Contents

YOSHITAKE

1. Specifications & Performance

1.1 Specifications

Table 1

Model	GD-20RC	
Application (Fluid)	Hot and cold water	
Nominal size	15～80A	100～150A
Inlet pressure (MPa)	(A) 0.05～0.25MPa (B) 0.26～0.7MPa	(A)0.05～0.25MPa (B)0.26～0.5MPa
Installation posture	Vertical or horizontal installation	Horizontal installation (Spring chamber is vertically upward)
Fluid temperature	5 – 60 ℃	
Connection	JIS 10K FF Flanged (Thicker than JIS standard.)	

* Body, spring chamber, cap and cover (65 - 150 A) are coated with nylon11.
* Parts where nylon coating cannot be applied are treated with rust prevention measures such as painting.
* This product cannot completely prevent rust.
* A pressure gauge connection joint (JIS Rc 3/8) is attached to the inlet side of the product.
* We also manufacture products with a pressure gauge (⌀75: 0.5 MPa or 1.0 MPa).
  The pressure gauge will be shipped together with the product, installation is to be done by the customer.

⚠ Caution

Please collate with attached nameplate and specification of ordered model.
*Please consult factory in case they do not match each other.

1.2 Flow Rate Characteristics Chart

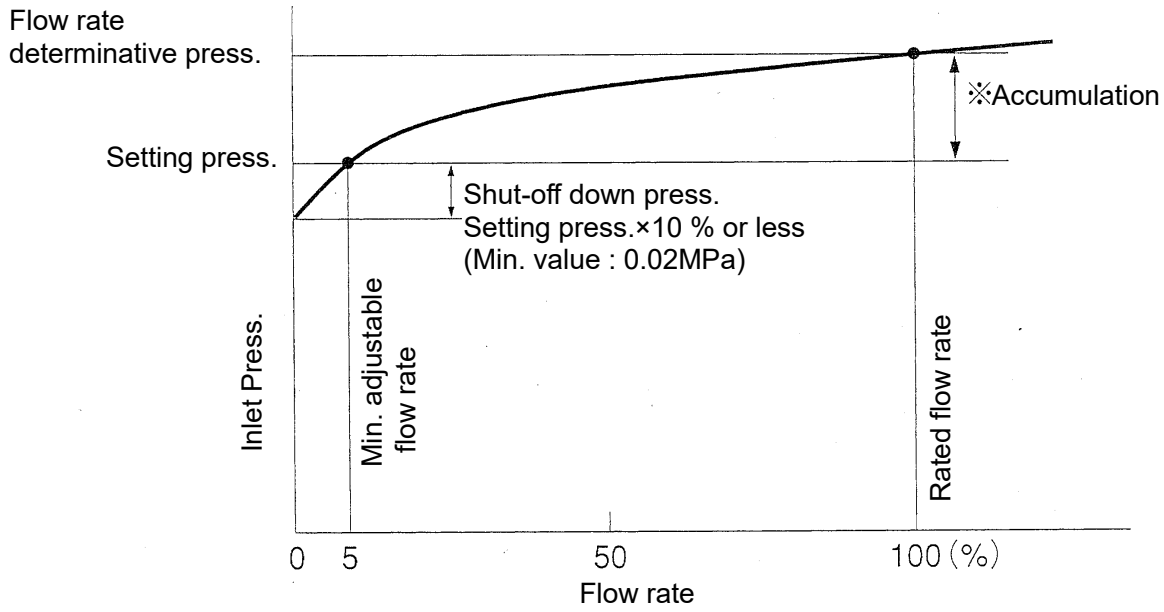


Fig. 1

Table 2

Setting range (MPa)	Accumulation (MPa)
0.05 - 0.25	0.05
0.26 - 0.7	0.105

2. Dimension & Weight

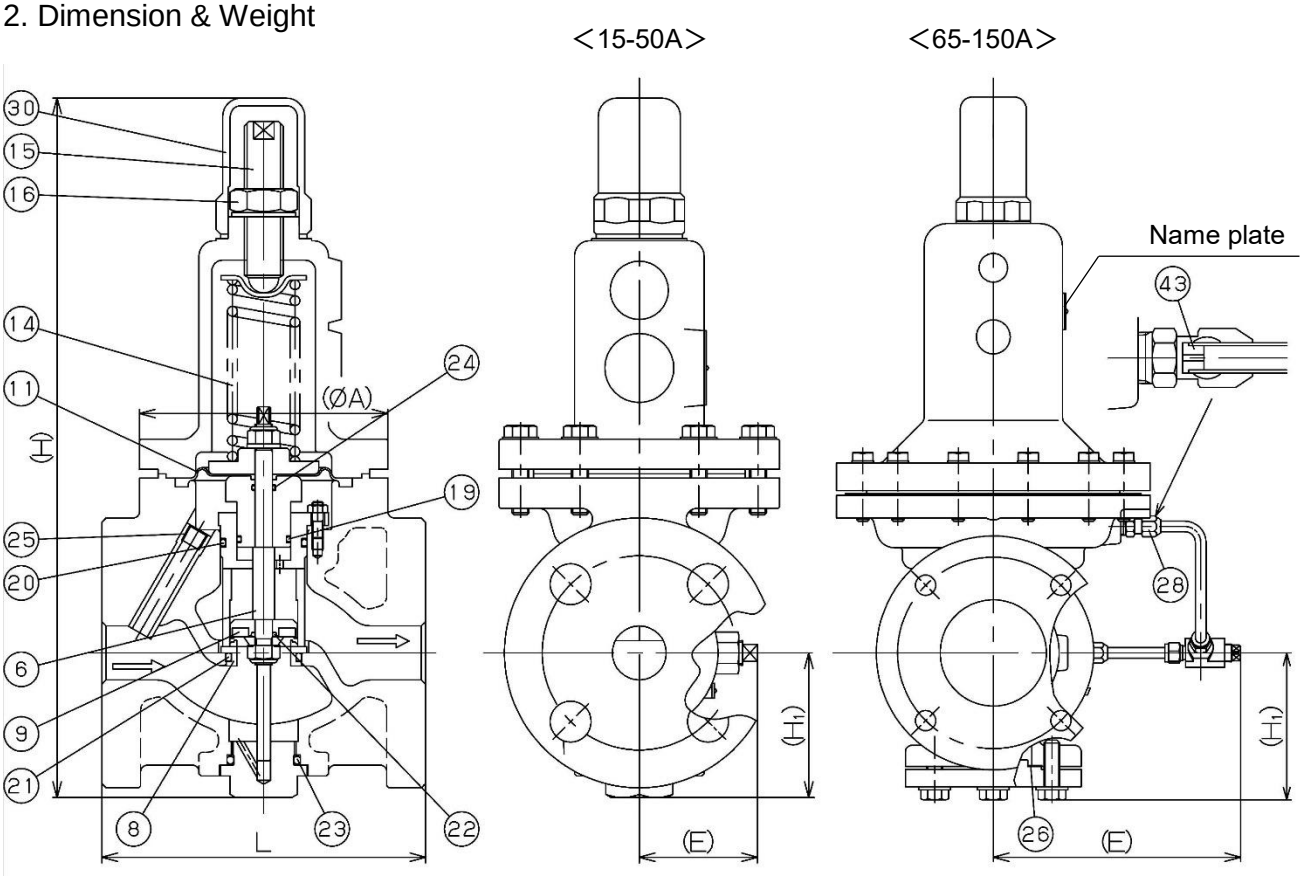


Fig. 2

* The parts shape differs according to the nominal size.
* Please refer to the drawings for the part shape.

Table 3

No.	Parts Name	No.	Parts Name
6	Spindle	21	O ring
8	Valve seat	22	O ring
9	Valve	23	O ring
11	Diaphragm	24	O ring
14	Spring	25	Conductor Pipe
15	Adjusting Screw	26	Cover Gasket
16	Lock Nut	28	Joint
19	O ring	30	Cap
20	O ring	43	Orifice

Table 4 Dimension & Weight

Size	L	H	H_1	A	E	Weight (kg)
15A	145	296	57	130	68	8.3
20A	150	296	57	130	68	8.3
25A	150	318	67	130	73	10.1
32A	195	398	76	175	82	17.4
40A	195	398	76	175	82	17.4
50A	195	412	81	175	89	19.3
65A	270	575	110	255	199	45
80A	270	600	125	255	209	50
100A	308	670	143	295	227	75
125A	380	902	179	408	265	145
150A	400	971	204	408	272	180

3. Operation

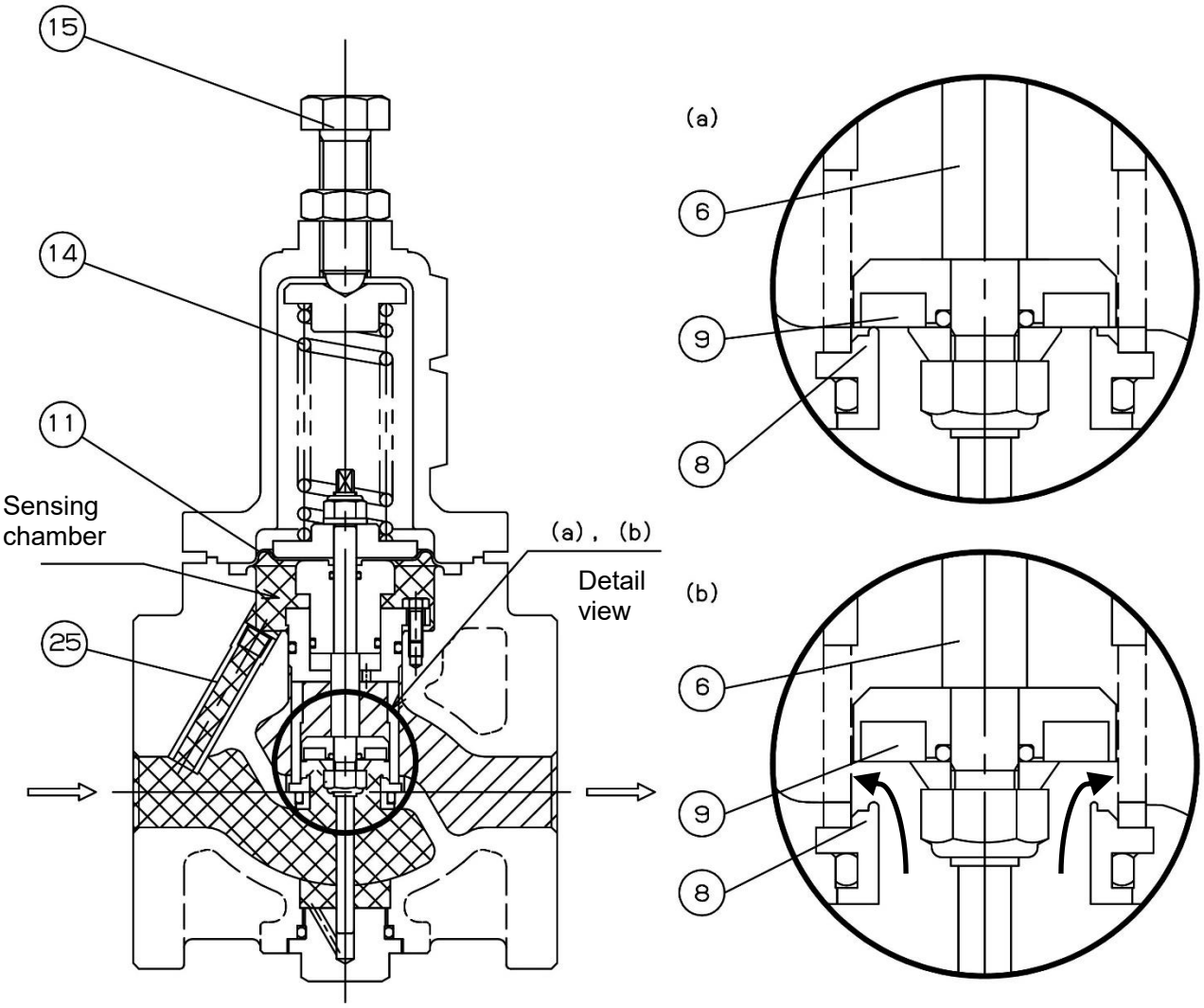


Fig. 3
*The parts shape differs according to the nominal size.

If the adjusting screw [15] is turned right, the diaphragm [11] will be depressed with the [14] and valve disc [9] connected with spindle [6] will close. (a)

Fluid passes along a conductor pipe [25] and the sensing chamber under the diaphragm [11]. If the pressure of the sensing chamber becomes higher than setting pressure, the load of the diaphragm [11] bottom will overcome the load of the spring [14], will push up the valve [9], and will relieve excessive pressure. (b)

If the pressure of the sensing chamber falls below setting pressure, the valve [9] will be again closed by the load of the spring [14].

4. Nominal Size Selection Method

When selecting nominal size, please take piping condition and application into consideration and secure a safety rate of 20% or more for the performance value.

4.1 Nominal Size Selection Chart

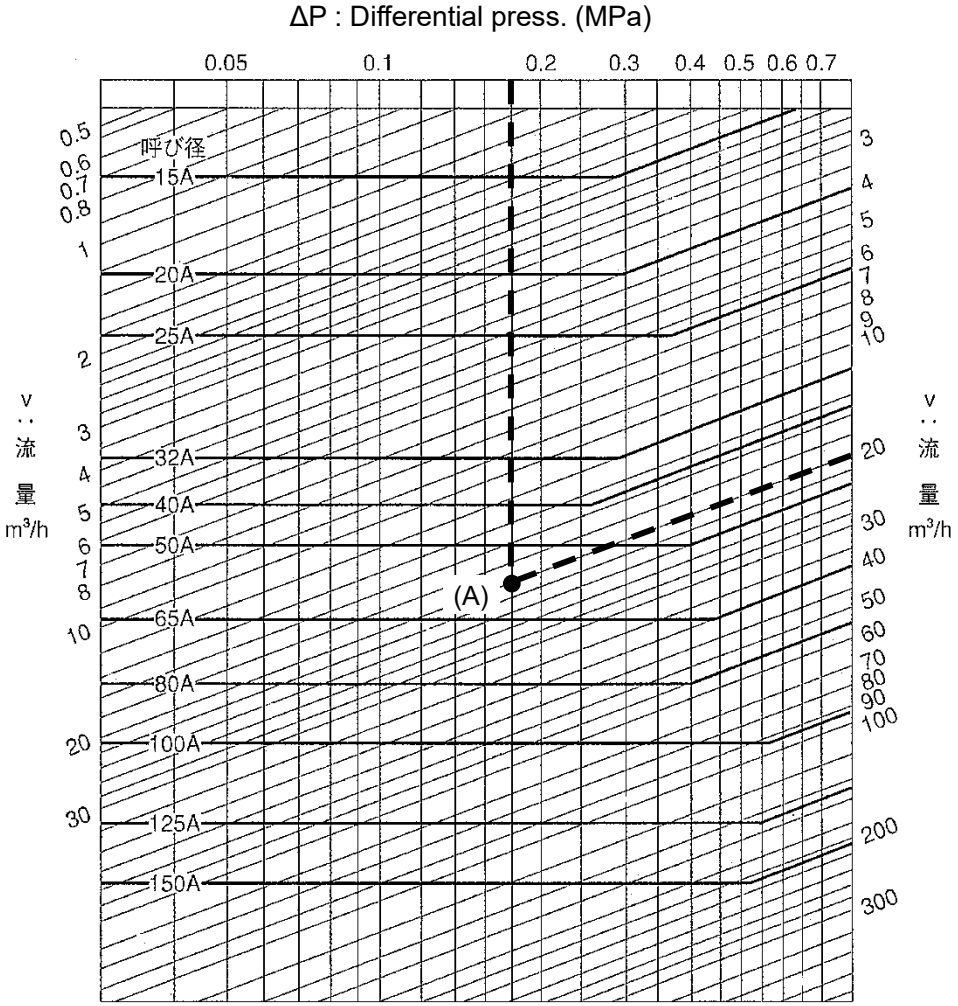


Fig. 4

Example of Selection

For example, take a pressure regulating valve whose pressure differential before/after a valve (ΔP) is 0.18 MPa, flow rate (V) is 20 m^3/h. Firstly, vertically proceed on the line of pressure differential 0.18 MPa to come across the flow rate 20 m^3/h, and regard this point as (A). Point (A) is between nominal size 50 A and 65 A. Select the lager nominal size 65 A.

4.2 Selection Formula for Nominal Size

When selecting the nominal diameter by calculation, use the formula to find the required Cv value based on the usage conditions, and then select the nominal diameter with a Cv value that satisfies that value (see Table 5). However, the Max. flow rate (V) should be 3 m/s or less

$$C_v = \frac{0.365V\sqrt{G}}{\sqrt{\Delta P}}$$

ΔP : $P_1 - P_2$ {MPa}
G : Specific gravity relative to water
V : Max. liquid flow rate {m^3/h}
Cv : Cv value of the nominal size

Table 5

Nominal Size	15A	20A	25A	32A	40A	50A	65A	80A	100A	125A	150A
Cv value	1.5	2.7	4	8.5	11	14	23	32.5	48	75	108
Flow rate at flow velocity 3 m/s	2.2	3.96	6.46	10.81	14.67	23.72	39.09	55.21	94.00	145.05	204.21

4.3 Pressure Sustaining Valve Selection

For selection of Pressure sustaining valve, follow the directions listed below.

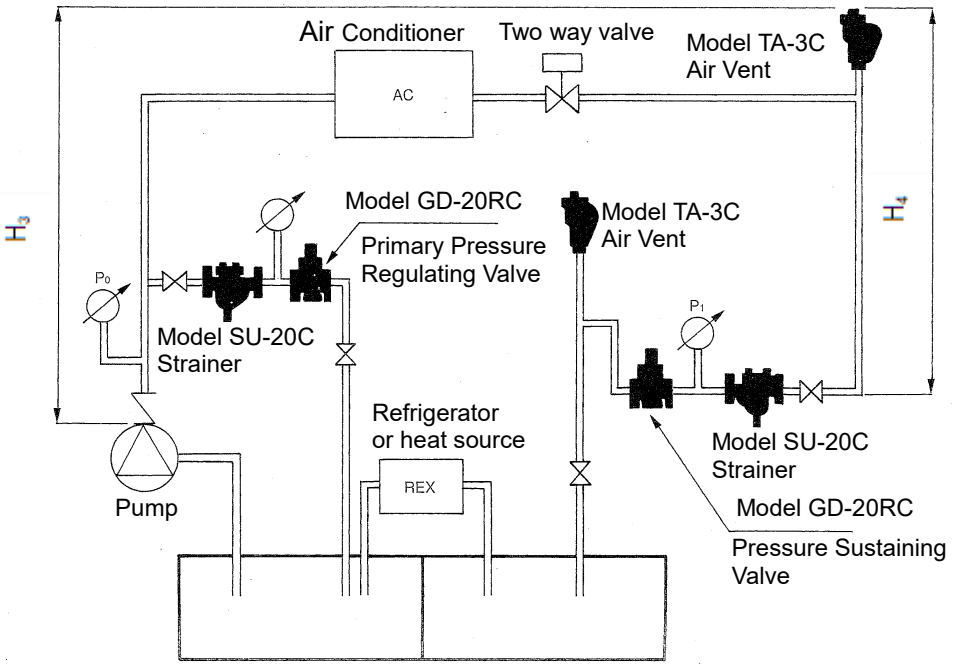


Fig. 5

Table 6

H_4 (m)	Pb (MPa)
5～20	0.02
21～40	0.04
41～70	0.06

①Please check the following items.

		Examples
Pump discharge pressure with designated flow rate (Maximum flow rate)	P_0 (MPa)	0.5
Designated flow rate	V (m^3/h)	20
Height from pump to the highest part of piping	H_3 (m)	18
Height from pressure sustaining valve to the highest part of piping	H_4 (m)	16
The sum total of piping resistance from pump outlet to the inlet of Pressure sustaining valve and resistance of machinery	W_1 (MPa)	0.22

②Calculate the following items and determine the piping system and nominal diameter.

If the judgment is passed, you can use the product with the specifications of the selection result.

			Examples
Shut-off down pressure (See table.9)		Pb (MPa)	0.02
Minimum setting pressure	$P = \frac{0.098\,H_4}{10} + P_b$	P (MPa)	0.176
Nominal size (Please select size from Figure 5 using P and V values)		(A)	65
Rated flow rate (Calculate the maximum flow rate using "4.2 Selection Formula for Nominal Size " and take a safety factor of 20% for that flow rate. However, the Max. flow rate should be 3 m/s or less.)	$V_1 = \frac{Cv\sqrt{P}}{0.365} \times 0.8$	V_1 (m^3/h)	21.3
Rated Accumulation (See table.2)		(MPa)	0.05
Accumulation with designated flow rate	$P_a = \frac{V}{V_1} \times \text{Rated Accumulation}$	Pa (MPa)	0.05
Inlet pressure of Pressure sustaining valve	$P_1 = P_0 - \frac{0.098\,(H_3 - H_4)}{10} - W_1$	P_1 (MPa)	0.26
Pump margin	$\alpha = P_1 - P - P_a$	α (MPa)	0.03
Judgement ① ⊿P ＞ P (If it does not pass, please review the piping system.) ② α ＞ 0 (If it does not pass, please increase the piping size.)			① OK ② OK
Selection result		Size (A)	65A
Select the set pressure between P and P+α.		Setting press. range (MPa)	0.18 - 0.21

5. Installation

5.1 Example of Piping

○Primary Pressure Regulating Valve

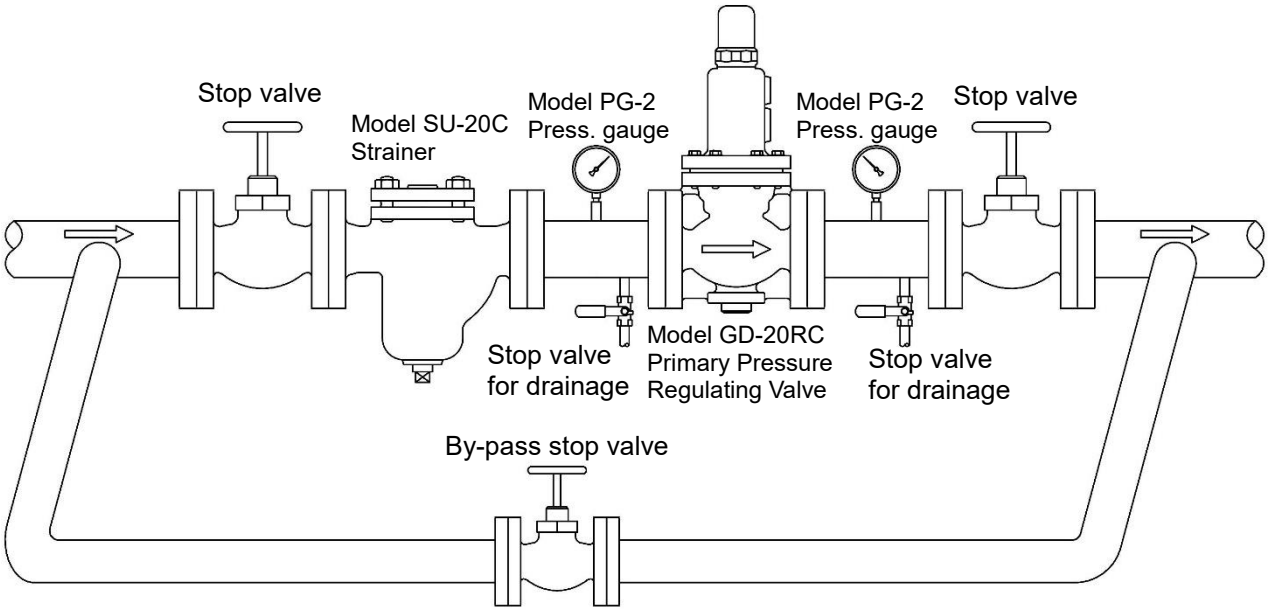
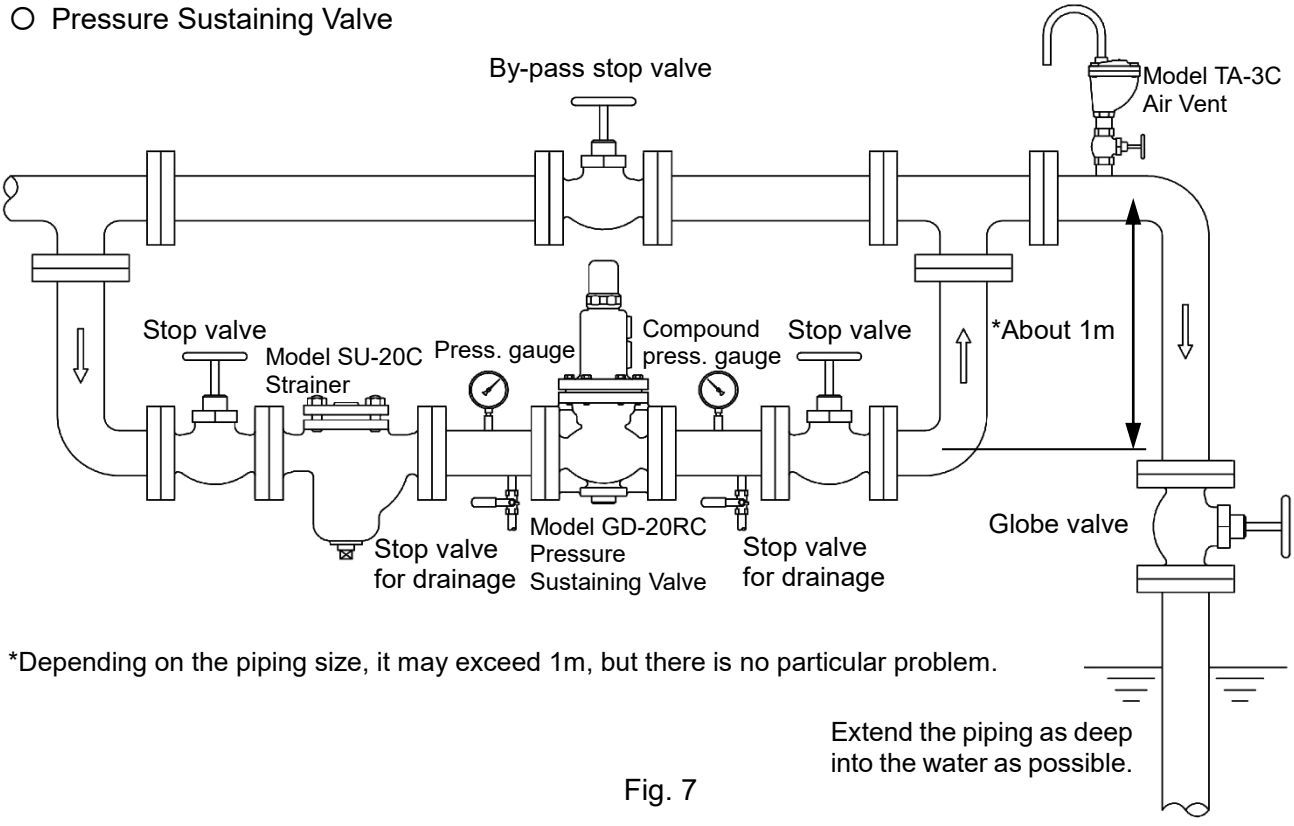


Fig. 6

○ Pressure Sustaining Valve



*Depending on the piping size, it may exceed 1m, but there is no particular problem.

Fig. 7

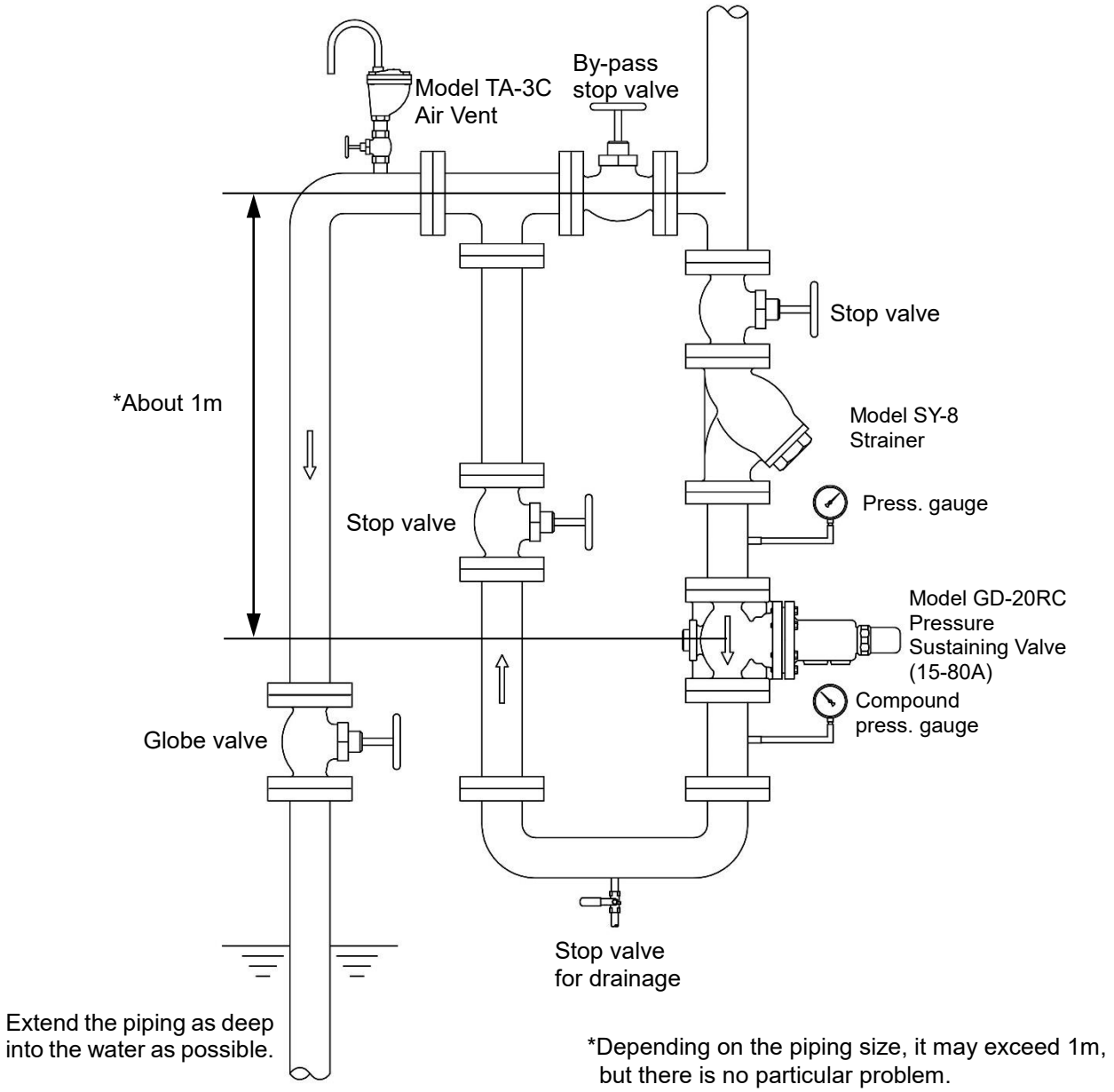

Model TA-3C
Air Vent
By-pass
stop valve
Stop valve
*About 1m
Model SY-8
Strainer
Press. gauge
Stop valve
Model GD-20RC
Pressure
Sustaining Valve
(15-80A)
Compound
press. gauge
Globe valve
Stop valve
for drainage
Extend the piping as deep
into the water as possible.
*Depending on the piping size, it may exceed 1m,
but there is no particular problem.

Fig. 8

5.2 Precautions before Operation

⚠ Caution

(1) The product or parts will be damaged if an impact due to sudden pressure fluctuations such as water hammer is applied.

(2) If the product is in a closed pipe state, the fluid in the pipe will expand in volume due to the rise in fluid temperature, and the product will be damaged.

(3) Since it is weight thing, this product should use lifting equipment etc., and please support a product certainly and install it in piping.
* There is a possibility that it may be injured, by fall of product.

(4) Do not disassemble the product.
* Disassembly prevents the product from functioning properly.

(5) Install a by-pass pipe.
* If a bypass pipe is not installed, system operation will need to be stopped in the event of product failure.

(6) Before installing the product in the piping, be sure to remove foreign substances and scale from the piping. Keep foreign substances from entering the piping, including seal tape or liquid seal agent for piping connection.
* Ingress of foreign substances, scale or seal agent into the product leads to valve leakage or malfunction of the product.

(7) Be sure to install a strainer at the inlet side of the product.
* Ingress of foreign substances or scale into the product leads to malfunction of the product. It is recommended to use a strainer of 60 mesh or more.

(8) Be sure to install pressure gauges at the inlet and outlet sides of the product.
* Failure to follow this notice hampers correct pressure adjustment.

(9) Install pipes so that excessive load, torque or vibration is not applied to the product.
* Doing so may result in malfunction or drastically shortened service life.

(10) Install the product properly by checking the inlet, outlet and proper posture.
* Installing the product in wrong directions prevents the product from functioning properly.

(11) Use flat washers when tightening bolts during piping.
* Failure to do so may result in peeling off of the nylon coating on the flange.

(12) The product can be installed either horizontally or vertically (nominal size 15A to 80A). In the case of the nominal size 100A to 150A, install the product horizontally.

(13) When releasing water into an open tank, the secondary piping should be raised approximately 1m from the product and an air vent valve should be installed. Additionally, extend the piping as deep into the water as possible (see Fig. 7,8).
* Failure to do so may result in malfunction or drastically shortened service life.

(14) To maintain easily, install a drainpipe between stop valve and primary pressure regulating valve.

(15) Above the center of the pipe line, be sure to reserve space larger than H_2 (Fig.9). Please see the Table 7.

Table 7

Size	15A	20A	25A	32A	40A	50A	65A	80A	100A	125A	150A
H_2	400	400	400	500	500	500	600	600	700	900	1000

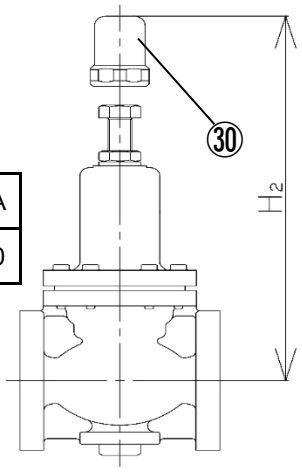


Fig. 9

(16) Before performing the water pressure test, close the stop valves upstream and downstream of the product.
* The test pressure may damage the product.

6. Operating Procedure

6.1 Precautions for Operation

⚠ Warning

(1) When the product is used for hot fluid, do not touch the product with bare hands.
    * The product having hot fluid may scald your skin.
(2) Before leading fluid, make sure that there is no danger even if fluid leads to the piping end.

⚠ Caution

(1) Before leading fluid into the product, close the stop valves at the inlet and outlet of the product and remove foreign substances and scale from the piping completely by using a bypass line.
    * Failure to follow this notice may prevent the product from functioning properly due to the ingress of foreign substances and scale into the product.
(2) To adjust the set pressure, turn the adjusting screw slowly.
    * Failure to follow this notice may result in damage to the product and other equipment due to hunting or other cause.
(3) If closing outlet side of the product and keeping fluid inside the product for an extended period, sliding parts become stuck and it causes malfunction of the product.
    * Check if the product operates normally when resuming the product.
(4) If there is a possibility of freezing or the product is not used for an extended period, completely discharge fluid from the product and pipes, and close the stop valves at the inlet and outlet sides of the product.
    * Failure to follow this notice causes malfunction of the product due to rusting inside the product and the pipes or damaged by freezing.
(5) If the systems have been out of service for a long time, please perform the following operational checks before restarting the systems.
    ・Check if the set pressure changes when turning the adjustment screw (see Fig. 10).
    ・Check whether the primary pressure is stable at the adjusted pressure.
    * If there is any abnormality, please ask a professional to take measures.
(6) The set pressure may be affected by ambient temperature (external temperature) and fluid temperature. Install pipes so that the product may not be exposed to direct sunlight.
(7) Follow the steps below, and slowly turn the adjusting screw to set pressure. Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.

6.2 Adjustment Procedure

(1) Close the stop valves at both sides of the valve, and thoroughly purge the system through the by-pass line. When completed, be sure to close the by-pass valve.
(2) Loosen the lock nut [16] (see Table 8).
(3) Slowly open the inlet stop valve, then fully open the outlet stop valve, allowing a trickle to be discharged.
(4) Slowly turn the adjusting screw [15] (clockwise to increase, counterclockwise to reduce) while observing the pressure gauge on the inlet side (see Fig. 10).
(5) After the adjustment, tighten the lock nut [16] and the cap [30].

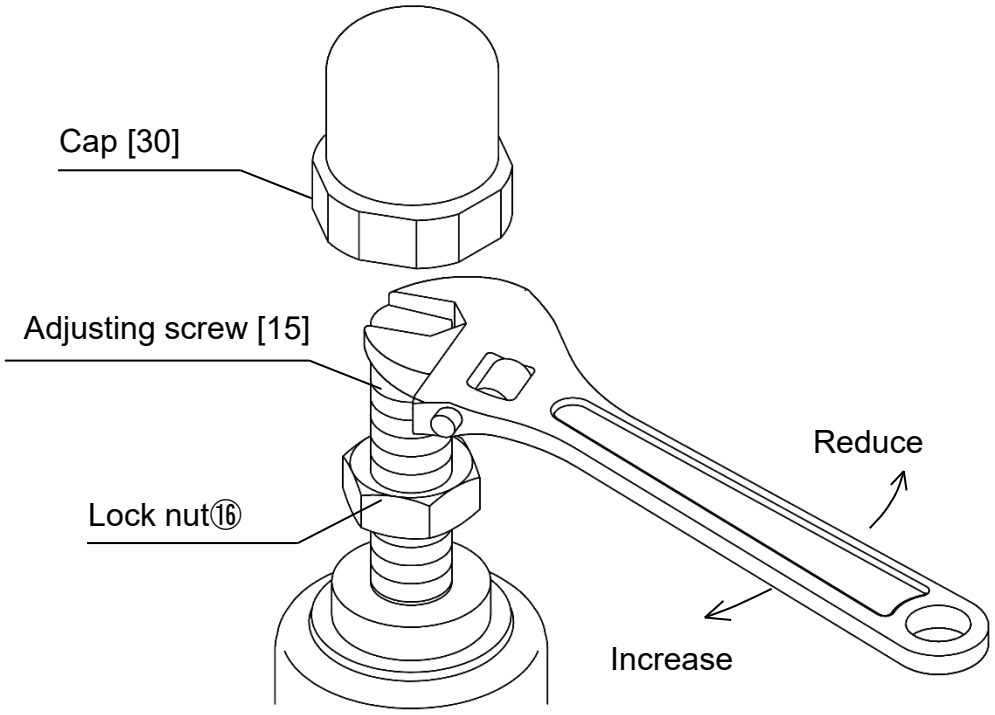


Fig. 10

Table 8 (mm)

Size	15-50A	65-100A	125-150A
Width across flats	27	36	55

7. Maintenance Procedure

7.1 Troubleshooting

Problem	Causes	Solutions
Primary pressure increases	1. Nominal size is too small for these specifications.	1. Replace with the correct nominal sized item. (Refer to the “4. Nominal Size Selection Method”.)
	2. Incorrect adjustment.	2. Re-adjust according to the adjustment procedure. (Refer to the “6.2 Adjustment Procedure”.)
	3. Poor sliding of internal parts.	3. It will need to be repaired at our factory or replaced. Please contact us. * Do not disassemble the product.
	4. Strainer is clogged.	4. Disassemble and clean.
	5. Pressure gauge malfunction.	5. Replace the pressure gauge.
	6. Orifice [43] is clogged with foreign matter.	6. Remove the joint [28] and clean.
Primary pressure drops	1. Foreign matter is embedded in the valve [9] and/or valve seat [8], or else scratches exist.	1. It will need to be repaired at our factory or replaced. Please contact us. * Do not disassemble the product.
	2. Incorrect adjustment.	2. Re-adjust according to the adjustment procedure. (Refer to the “6.2 Adjustment Procedure”.)
	3. Poor sliding of internal parts.	3. It will need to be repaired at our factory or replaced. Please contact us. * Do not disassemble the product.
	4. By-pass valve is leaking.	4. Repair or replace the valve.
	5. Diaphragm [11] or O rings is broken.	5. It will need to be repaired at our factory or replaced. Please contact us. * Do not disassemble the product.
Outside leakage	1. Diaphragm [11] is broken.	1. It will need to be repaired at our factory or replaced. Please contact us. * Do not disassemble the product.
	2. O ring [23] or Cover gasket [26] is broken.	2. It will need to be repaired at our factory or replaced. Please contact us. * Do not disassemble the product.
Abnormal noise	1. Nominal size is too large for these specifications.	1. Replace with the correct nominal sized item. (Refer to the “4. Nominal Size Selection Method”.)
	2. Air problem is caused.	2. Install a trap.

* Foreign matter and scales in pipe may cause most of problems of pressure reducing valve. Be careful sufficiently to foreign matter in pipe.
* Phenomenon alike valve trouble may happen by fault of pressure gauge, fluid leakage from by-pass valve, forgetting to close the by-pass valve, clogging strainer, etc. First, check the said before above troubleshooting.

7.2 Precautions for Maintenance

⚠ Caution

(1) Perform daily inspection to maintain product functions and performance.
* General users shall request countermeasures to installers or maintenance companies.

(2) Rubber parts and components shown below are consumables. Note that the life expectancy depends on the conditions under which they are used.
* It will need to be repaired at our factory. Please contact us.
* Do not disassemble the product.

Table 9

Recommended replacement period	Parts name
3 years	Valve, O ring, Diaphragm

7.3 Daily Inspection

Conduct daily inspections in order to maintain the optimal performance of the product.
See ”7.1 Troubleshooting” for the remedies if trouble is observed.

● Daily inspection (once a day)

Items	Standards for Inspection
Inlet pressure	There should be maintained at the set pressure.
Outside leakage	There should be no outside leakage.
Abnormal noise	There should be no abnormal noise

Warranty Information

1. Limited warranty

   This product has been manufactured using highly-advanced techniques and subjected to strict quality control. Please be sure to use the product in accordance with instructions on the manual and the label attached to it.

   Yoshitake warrants the product to be free from any defects in material and workmanship under normal usage for a period of one year from the date of receipt by the original user, but no longer than 24 months from the date of shipment from Yoshitake's factory.

2. Parts supply after product discontinuation

   This product may be subject to discontinuation or change for improvement without any prior notice. After the discontinuation of the product, Yoshitake supplies the repair parts for 5 years otherwise individually agreed.

3. This warranty does not cover the damage due to any of below:
   (1) Valve seat leakage or malfunction caused by foreign substances inside piping.
   (2) Improper handling or misuse.
   (3) Improper supply conditions such as abnormal water pressure/quality.
   (4) Water scale or freezing.
   (5) Trouble with power/air supply.
   (6) Any alteration made by other than Yoshitake.
   (7) Use under severe conditions deviating from the design specifications
   (e.g. in case of corrosion due to outdoor use).
   (8) Fire, flood, earthquake, thunder and other natural disasters.
   (9) Consumable parts such as O-ring, gasket, diaphragm and etc.

   Yoshitake is not liable for any damage or loss caused by malfunction or defect of the product.

YOSHITAKE