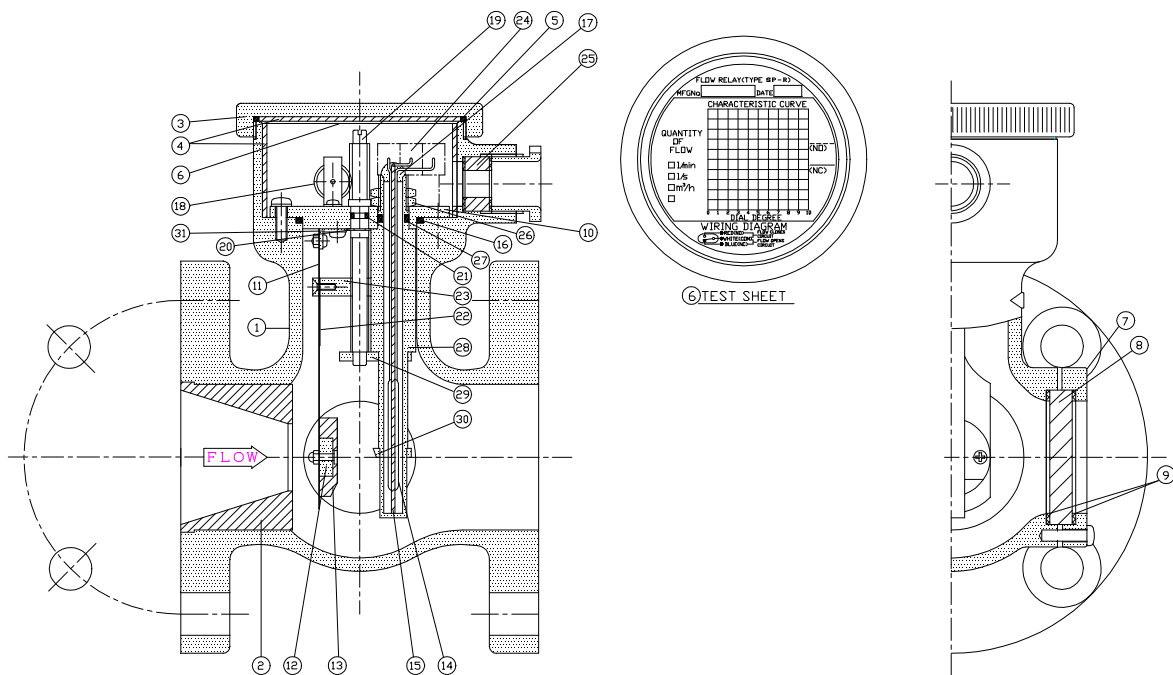


OPERATION MANUAL FOR FLOW RELAY SP-R

1 General

The Flow Relay SP-R is used to detect the flow of fluid in pressurized lines. Applicable lines are horizontal lines (horizontal flow) and vertical lines (downward flow and upward flow).

2 Construction, Function and Adjustment



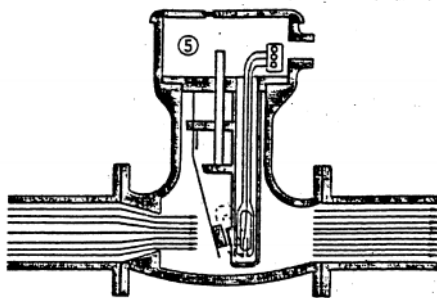
- 1: CASING 2: NOZZLE 3: COVER 4: INSULATION 5: "O" RING 6: TEST SHEET
 7: FRAME 8: SIGHT GLASS 9: PACKING 10: FIT UP STAND 11: FIXED PLATE
 SPRING 12: MAGNET 13: CAP 14: REED SWITCH 15: SUPPORTER 16: "O" RING
 17: BUSH 18: DIAL 19: SCREW 20: STOP RING 21: "O" RING 22: MOVING PLATE
 SPRING 23: FULCRUM 24: TERMINAL 25: PACKING 26: LOCK NUT 27: "O" RING
 28: PIPE 29: STOPPER 30: STOPPER 31: FIT UP PLATE

Construction Drawing of Flow Relay SP-R

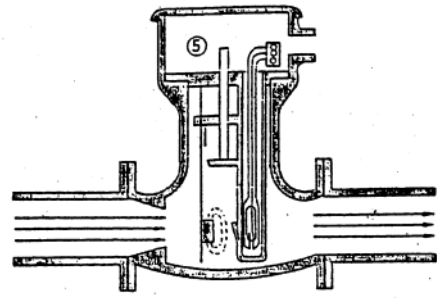
As illustrated, plain spring(22) mounted on fit up stand(10) receives a fluid stream at the fluid receiving part of its free end. As the fluid velocity increases, plain spring(22) begins to deflect and approaches pipe(28) sealed with reed switch(14). At the back face of the fluid receiving part is provided permanent magnet(12). When the magnet approaches a certain distance from reed switch(14), the reed switch senses the magnetism and actuates one of the transfer contacts. Conversely, if flow decreases, permanent magnet(12) goes away from reed switch(14) to a certain distance at which the contacts operate in the opposite way. plain spring(22) is supported by fulcrum(23) of which position may be changed externally by means of adjust screw(19). fulcrum(23) is provided with moving plate spring(22). Thus, if fulcrum(23) is moved, the strength of the spring varies which in turn changes flow rate, remove cover(3) and turn adjust screw(19) till the scale of dial(18) comes at a desired position, looking at the operating characteristics graph adhered to the rear face of the cover. The flow condition in the Flow Relay and the fluid receiving part can be clearly seen through sight glass(8).

■ Function and Contact Makeup

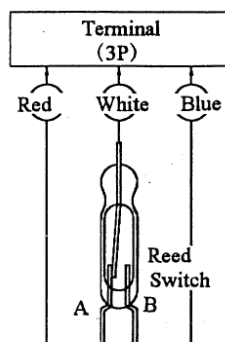
The Flow Relay SP-R is provided with single transfer contacts that operate on proper differentials.



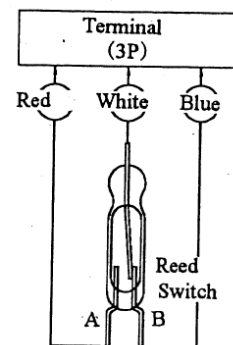
When flow is increased
The permanent magnet approaches the reed switch on sensing the magnetism, close contact A and opens contact B.



When flow is suspended or decreased
The Permanent magnet goes away from the reed switch which upon being freed from the influence of the magnetism, opens contact A and closes contact B.



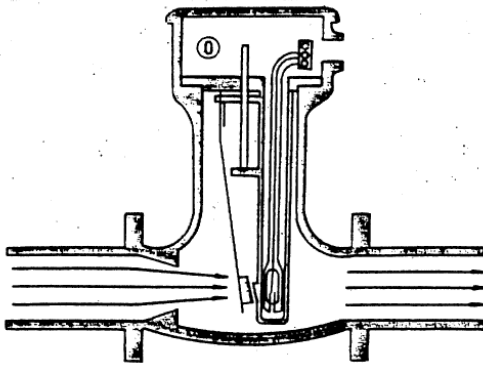
Red : At an increase of flow -- ON
At a suspension of flow -- OFF
White : Common
Blue : At a decrease of flow -- ON
At an increase of flow -- OFF



■ Adjustment

Adjust to minimum operating flow.

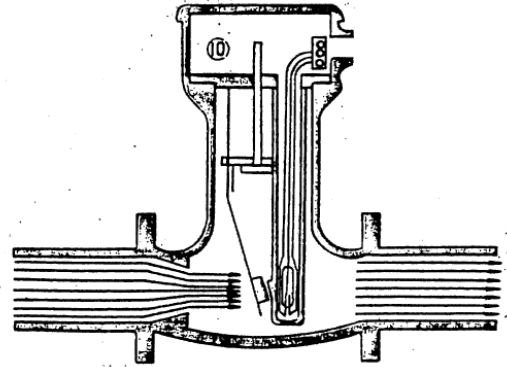
(reading:0)



The moving fulcrum and the moving plate spring are in their uppermost position. (minimum spring force)

Adjust to maximum operating flow.

(reading:10)

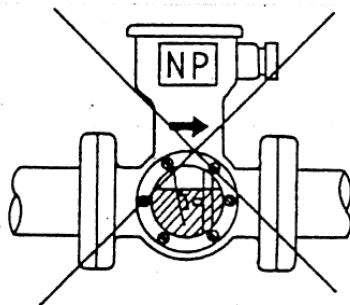


The moving fulcrum and the moving plate spring are in their lowermost position. (maximum spring force)

Remove the cover at the top. Turn the adjust screw and set to required operating flow, looking at the indicator reading. For the relation between the operating flow and the indicator reading, refer to the operating characteristics chart adhered at the back of the cover. If the required flow is not known, let fluid run freely and adjust the flow rate, looking at the flow receiving part through the sight glass.

3 Precautions on Handling

- Always use the relay when it is filled up with fluid.



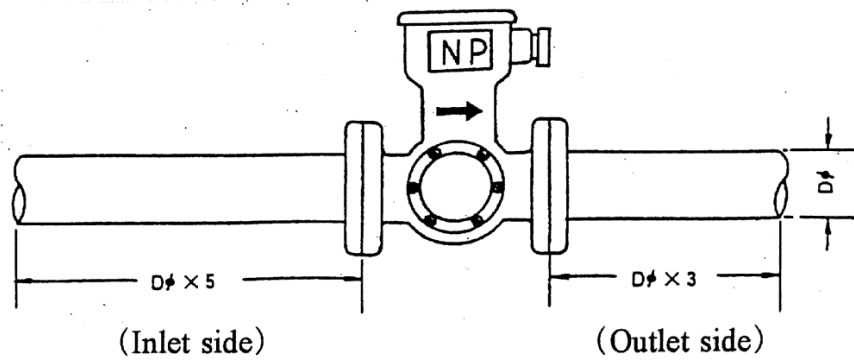
Prohibited use.

Use the relay when it is filled up with airless running fluid as seen through the sight glass. If the relay is used in an unfilled condition, it may cause erroneous action or result in a deviation of the operating flow rate from the operating characteristics curve.

- Always install the relay in a straight pipeline.

The pipeline upstream of the inlet connection of the Flow Relay shall have a minimum straight length five times the nominal bore diameter and the pipeline downstream of the outlet connection of the Flow Relay shall have a minimum straight length three times the nominal bore diameter.

Use of an anisotropic tube, a pipe line or a valve having a bore diameter smaller than the nominal bore diameter of the relay connection close to the Flow Relay may cause erroneous action or result in a deviation of the flow rate from the operating characteristics curve.



- Violent impact with a water hammer may break the window glass.
- When disassembling or assembling the relay, use care so as not to cause permanent strains and not to change the setting.
Exercise care not to improperly set "O"rings and to unevenly tighten screws.
Improper installation may cause water leaks.

4 Detail of Major Components

1) Reed Switch

The Reed Switch is the best switching element with contacts that has been developed meeting the needs of recent electronics industries. It consists of a glass tube containing dry inert gas, and one make of reed contacts made of magnetic material or a transfer. (The standard model SP-R is provided with a transfer.) These contacts are covered with gold, silver, rhodium, tungsten, molybdenum or their alloys. The contacts open and close when they receive external magnetism. The Reed Switch which is free from dust, moisture and gas has excellent characteristics in that its operating time is one milli second or below, its service life is more than 10^7 hours and its movable temperature range is $-55\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$

2) Spring material (plain spring and Moving Plate Spring)

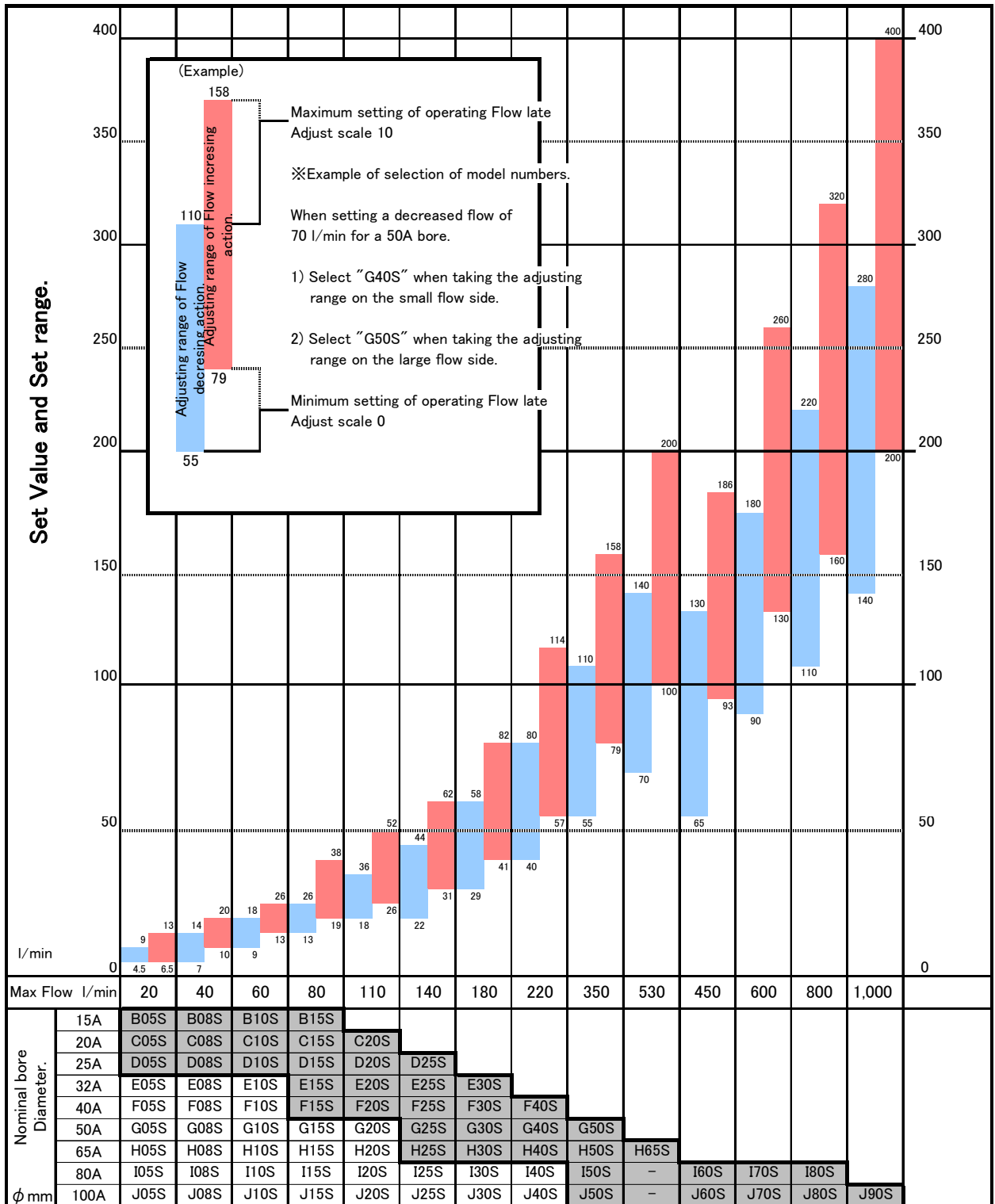
The material is the best of all spring materials in terms of tensile strength, elasticity and fatigue resistance. It is extremely excellent in corrosion resistance equivalent to SUS316 for sulphuric acids and to Hastelloy C for chloric acids.

3) Permanent Magnet

The permanent Magnet is powder-metallurgically processed inter-metallic compound of cobalt and rare earth metal, and a drastically innovated magnet with the highest coercivity and maximum energy product.

5 Operating Characteristics Table

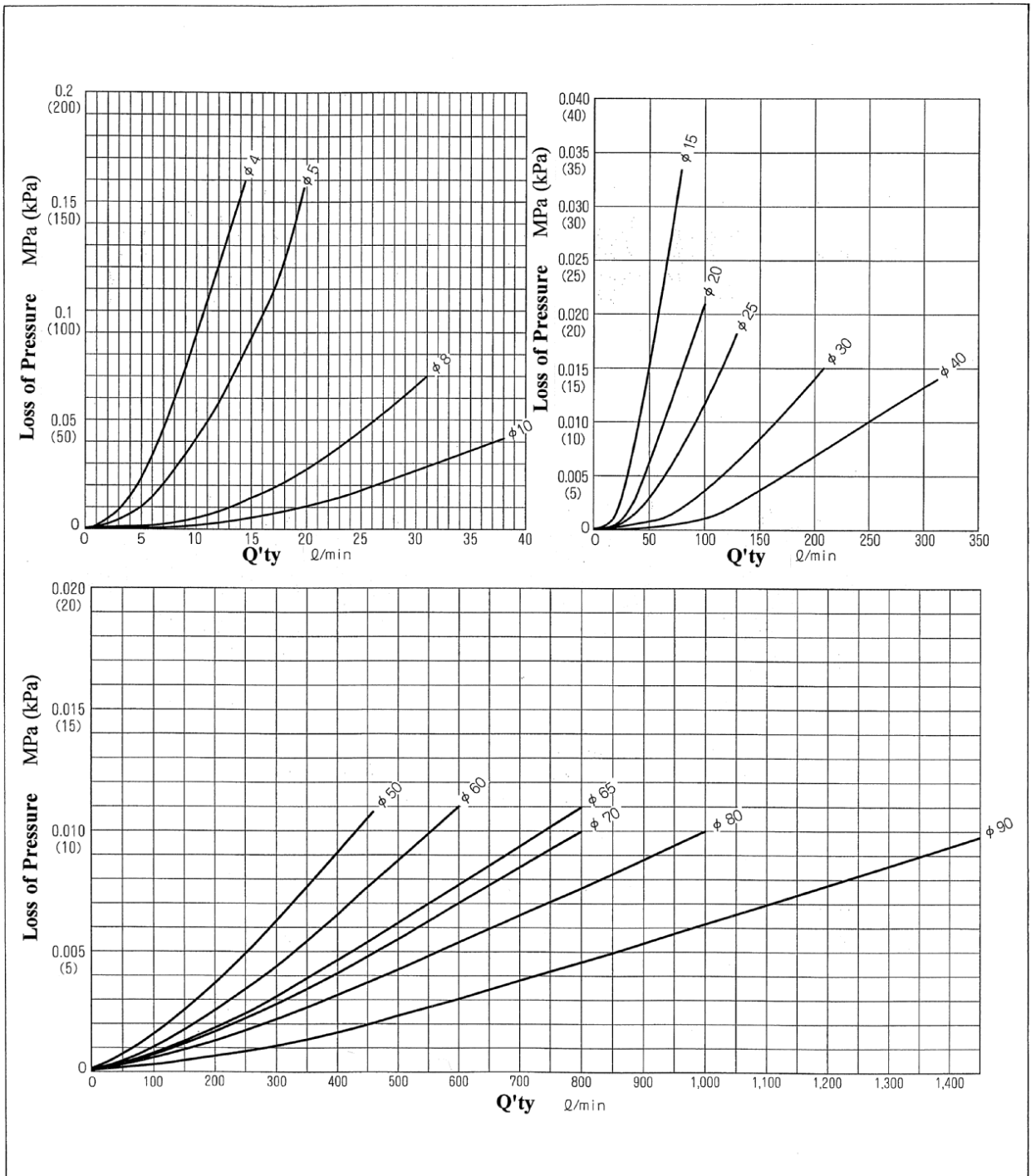
(Horizontal : FC200)



※ Model number in large flames are of standard specifications.

6 Loss of Pressure Curve

ϕ : Diameter of Nozzle



7 Operating Condition

■ Electric capacity

Always use an auxiliary relay if the contact capacity is short because overcurrent may cause fusion and damage of the contacts.

Contact capacity	:	AC 200V 0.3A	DC 100V 0.6A
(Resistance load)	:	AC 100V 0.6A	DC 50V 0.6A
			DC 24V 0.6A

Contact makeup : 1C (1 transfer)

■ Pressure

The standard relays have a working pressure of 0.98Mpa or under.

(Test pressure is 1.57MPa)

■ Fluid quality

Fluids usually used are as follows. Contact us if you use a fluid of which any one of the qualities listed below is intense.

Water ······Fresh Water, Well Water, River Water and Sea Water

Oil ······Lube Oil, Insuration Oil and Fuel Oil

Chemicals ······Acids and Alkali

■ Corrosiveness

■ Viscosity

■ Volatility

■ Solubility

■ Inflammability and Explosiveness

■ Mixed objects

other dangerous quality

(IMPORTANT NOTE)

For dangerous applications, use pressure-tight explosionproof Flow Relay Model SP-RX (d2G4), Model SP-REX (Exd II CT4).

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