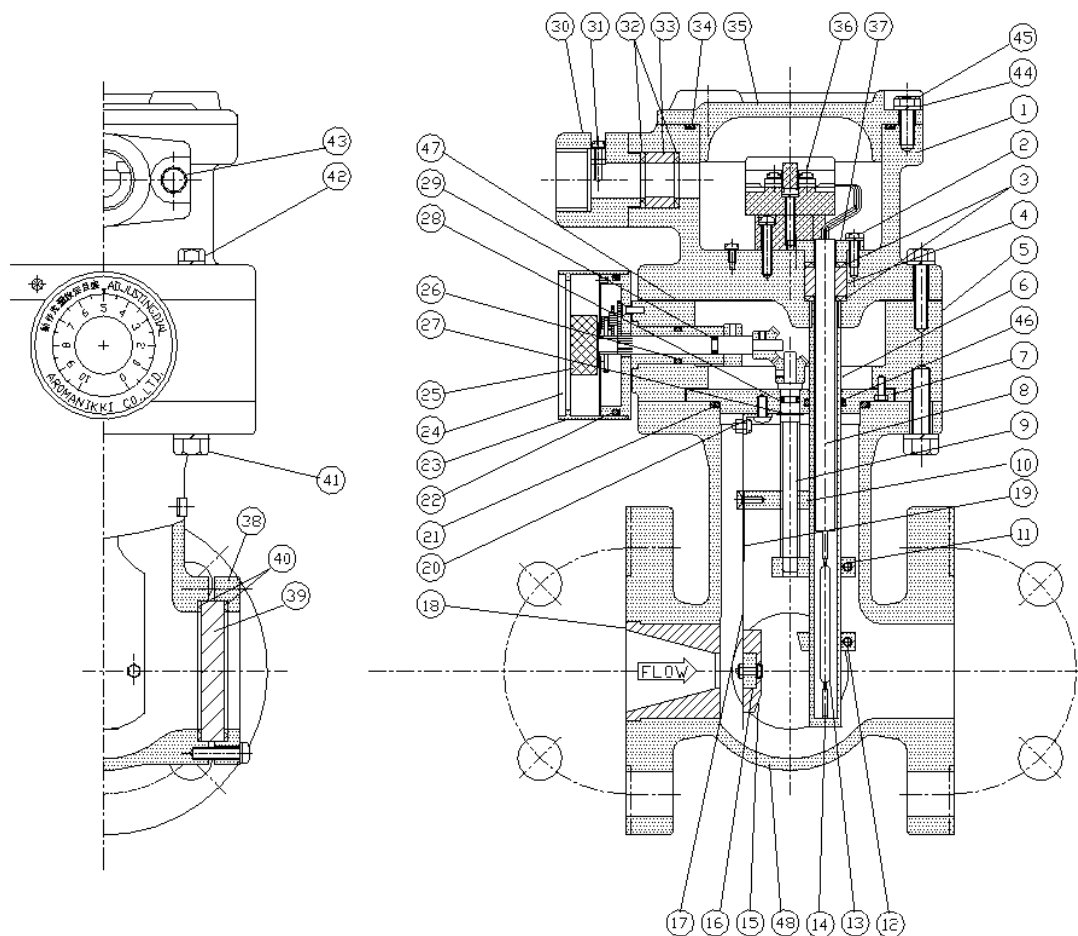


# OPERATION MANUAL FOR FLOW RELAY SP-REX / SP-REXC

TECHNOLOGY INSTITUTION OF INDUSTRIAL SAFETY CERTIFICATE NO.TC13992 / PAT NO.525884  
(PRESSURE-EXPLOSION-PROOF TYPE Exd II CT4)

## 1 General



- 1:TERMINAL BOX 2:BOLT 3:PLAIN WASHER 4:PACKING 5:CASING 6:PIPE  
7:FIT UP STAND 8:CABTIRE CABLE 9:SCREW 10:FULCRUM 11:STOPPER 12:STOPEER  
13:REED SWITCH 14:SUPPORTER 15:CAP 16:MAGNET 17:FIXED PLAIN SPRING 18:NOZZLE  
19:MOVING PLAIN SPRING 20:FIT UP PLATE 21:"O"RING 22:"O"RING 23:DIAL COVER  
24:GLASS 25:DIAL 26:"O"RING 27:STOP RING 28:"O"RING 29:"O"RING 30:CABLE GRAND  
31:CABLE CLANP 32:PLAIN WASHER 33:PACKING 34:"O"RING 35:COVER 36:TERMINAL  
37:GRAND 38:FRAME 39:SIGHT GLASS 40:PACKING 41:BOLT 42:BOLT 43:BOLT  
44:SPRING WASHER 45:BOLT 46:"O"RING 47:PACKING 48:BODY

### Constraction Drawing of Flow Relay SP-REX

## ■ Cable Specification

	OD of Cable	Washer (a)	Packing (b)	Cable used
A	$\phi$ 9 ~ $\phi$ 11	$\phi$ 11.5	$\phi$ 11.5	CVV,
B	$\phi$ 11 ~ $\phi$ 12.5	$\phi$ 13	$\phi$ 13	CEV, CEE
C	$\phi$ 12.5 ~ $\phi$ 14.5	$\phi$ 15	$\phi$ 15	CCV

## ■ Outline

Model SP-REX/SP-REXC Flow Relay is designed just after the mechanism of Model SP-R Flow Relay having a very simple mechanism and a highest reliability, and is an "almighty" flow relay with standing pressure and explosion-proof constructed so that it assures you of absolute safety from dangerous materials such as chemicals, fuel, etc. As can be seen from the above explanatory drawing, the flow receiver located at the end of the fixed plate spring is displaced by receiving a flow of liquid, and the reed switch turns on and off actuated by magnetism of the permanent magnet mounted into the back of the receiver. The tension of the plate spring can be controlled by the moving fulcrum which can be moved by the adjusting dial, and the moving plate spring, thus, the operating flow of the switch can be selectively set.

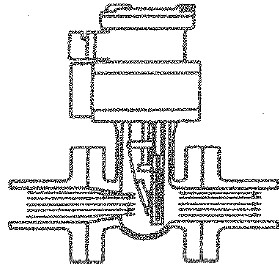
## 2 Construction, Function and Adjustment

### ■ Construction

As illustrated, fixed plain spring(17) mounted on fit up plate(20) receives a fluid stream at the fluid receiving part of its free end. As the fluid velocity increases, fixed plain spring(17) begins to deflect and approaches pipe(6) sealed with reed switch(13). At the back face of the fluid receiving part is provided permanent magnet(16). When the magnet approaches a certain distance from reed switch(13), the reed switch senses the magnetism and actuates one of the transfer contacts. Conversely, if flow decreases, permanent magnet(16) goes away from reed switch(13) to a certain distance at which the contacts operate in the opposite way. Fixed plain spring(17) is supported by fulcrum(10) of which position may be changed externally by means of adjust screw(9). fulcrum(10) is provided with moving plate spring (19). Thus, if fulcrum(10) is moved, the strength of the spring varies which in turn changes flow rate, remove dial cover(23) and turn adjust screw(9) till the scale of dial(25) comes at a desired position, looking at the operating characteristics graph. The flow condition in the Flow Relay and the fluid receiving part can be clearly seen through sight glass(39).

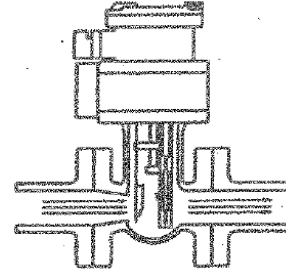
■ **Function and Contact Makeup**

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



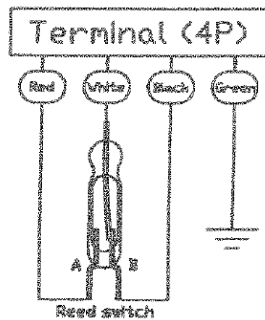
When flow is increased

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

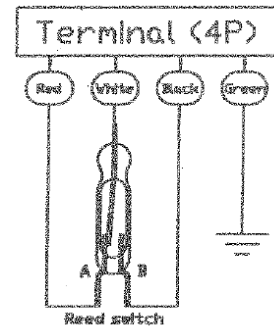


When flow is suspended or decreased

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.

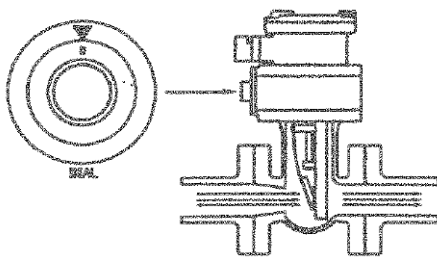


Red : At an increase of flow-----ON  
 At a suspension or a decrease---OFF  
 White :Common  
 Black :At a decrease of flow-----ON  
 At an increase of flow-----OFF  
 Green:Earth



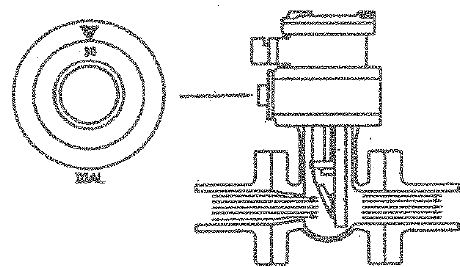
■ **Adjustment**

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)

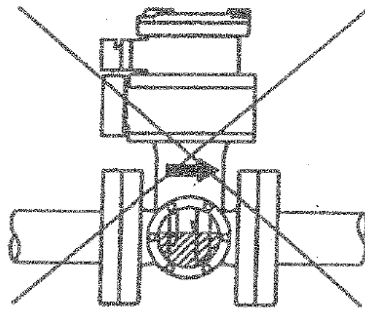


The moving fulcrum and the moving plate spring are in their lowermost position. (maximum spring force)

Remove the cap of the scale, turn the adjusting knob, and set the scale at the reading for a desired operating flow as you watch the scale. As to the relation between the operating flow and the scale, refer to the operating characteristic graph in the Table of Test Results. If a required flow is unknown, have a flow as necessary, and observe a movement of the flow receiver through the sight glass.

### 3 Precautions on Handling

- The terminal box adopts a withstanding-pressure packing system for cable connection. Tighten the cables lest they should loosen after connection.
- Be sure to connect to the grounding terminal.
- Surely tighten all the parts of the gland at all the times as required.
- When releasing the gland, be sure to make a novoltage condition by turning the power supply off.
- Always use the relay when it is filled up with fluid.

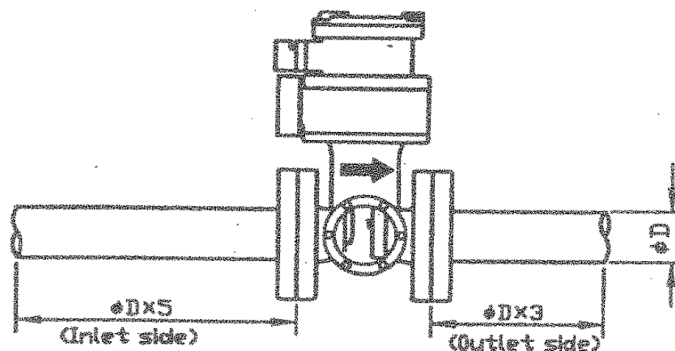


Use the relay when it is filled up with airless running fluid as seen through the sight glass. If the relay is used in an unfilled condition, it may cause erroneous action or result in a deviation of the operating flow rate from the operating characteristics curve.

- Always install the relay in a streight pipeline.

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

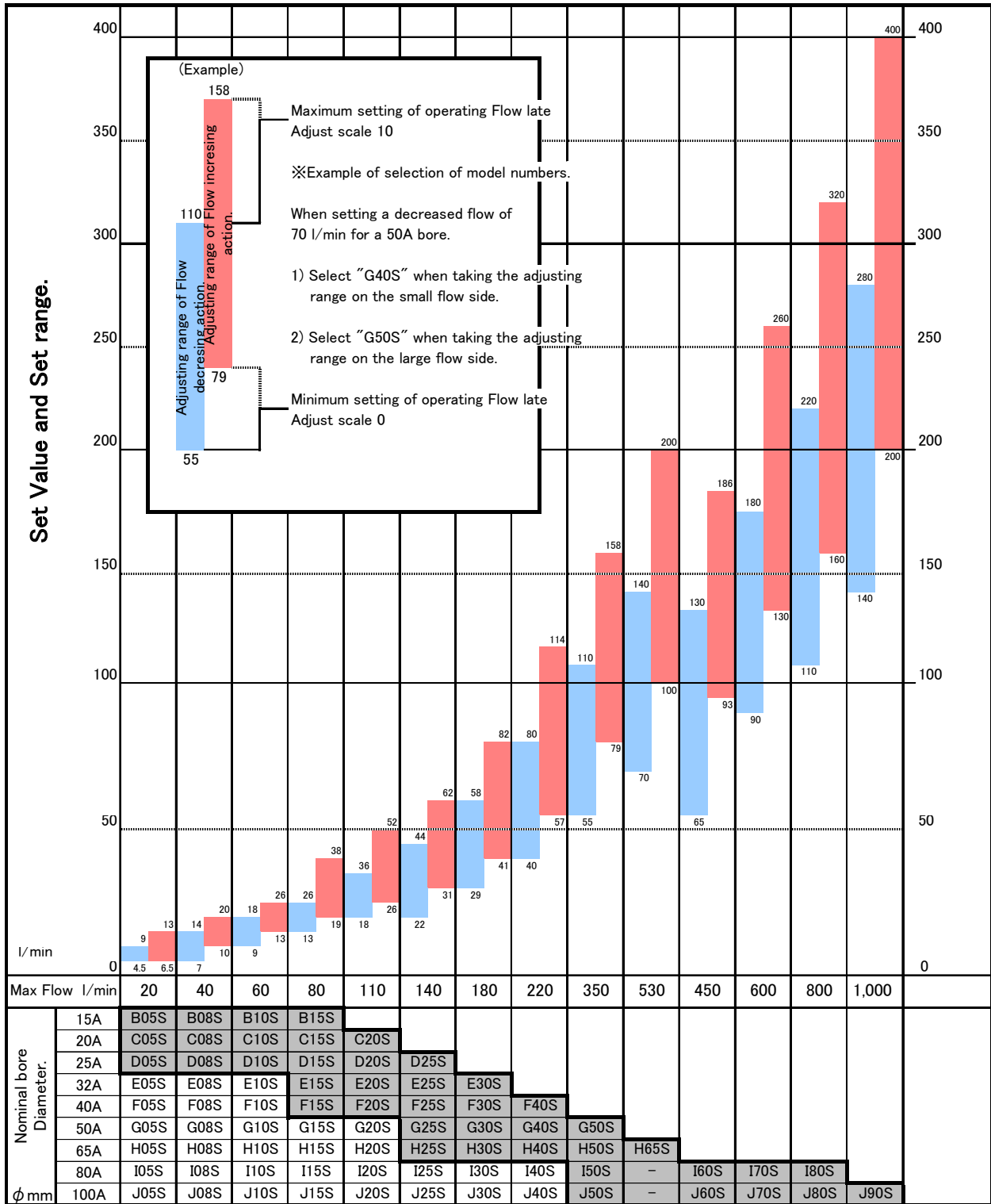


- Violent impact with a water hammer may break the sight glass.
- When disassembling or assembling the relay, use care so as not to cause permanent strains and not to change the setting.  
Exercise care not to improperly set "O"rings and to unevenly tighten screws.  
Improper installation may cause water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

# 4 Operating Characteristics Table

for Flow Relay Type SP-REX/SP-REXC (horizontal FC200)

(Horizontal : FC200)



※ Model number in large frames are of standard specifications.

## 5 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-REX/SP-REXC 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 hours and its movable temperature range is  $- 55^{\circ}\text{C}$  to  $+ 150^{\circ}\text{C}$ .

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

### 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.

## 6 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 0.3A
(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)

### ■ Temperature

The standard relays temperature range is  $- 10^{\circ}\text{C}$  to  $+ 60^{\circ}\text{C}$ .

■ 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

■ Materials

Body:FC200, SCS13 and SCS14

Element:SUS304 and SUS316

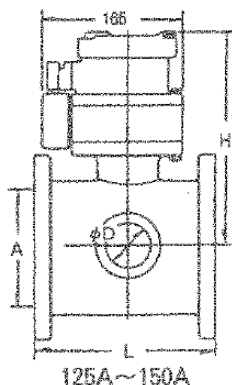
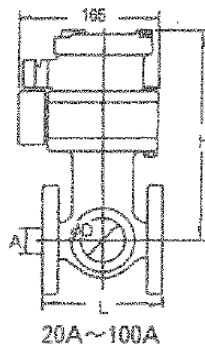
■ Type of cable used

CVV, CEV, CEE, CCV

■ Cable conduit

G3/4, G1/2 and other

## 7 Outline Dimensions



Nominal Aperture (Amm)	Lenth Between Both (Lmm)	Height (Hmm)	Sight Glass (Dmm)	Weight (kg)
15	140	248	50	13.7
20	140	248	50	14.3
25	140	248	50	14.7
32	140	248	50	15.5
40	140	248	50	15.7
50	160	248	50	16.7
65	160	248	50	17.6
80	200	248	50	21.2
100	200	248	50	26.0
125	300	248	50	34.5
150	300	248	50	38.7

**AROMANIKKI Co.,LTD.**  
 MINAGA 4-CHOUME 1-1, SAEKI-KU  
 HIROSHIMA, JAPAN (〒 731-5124)  
 TEL: (082) 943-7775 FAX: (082) 943-7776