INSTRUCTION MANUAL FOR PRESSURE SWITCH

MODEL CQ20

NAGANO KEIKI CO., LTD.

Contents

1. Introduction

Before using Model CQ20 pressure switch, read this manual carefully to understand how to use it correctly and effectively.

2. Applications

This switch outputs an ON-OFF signal when the pressure around it reaches the set value.

Accordingly, it can be used to control a process or to turn on an alarm and a pilot lamp when any trouble occurs in that process.

3. Features

(1) Less number of parts and simple structure. High resistance to vibration.
(2) Stable, accurate and reliable operation.
(3) A setting scale is installed.
(4) Both internal and external adjustment are available.

4. Specifications and Outline Dimensions

(1) Specifications

Material of case: Al-alloy die casting (ADC 12)
Case construction: Drip-proof type
Material of Bourdon tube: Stainless steel (SUS316)
Material of socket: Brass casting (CAC203) or St. St. casting (SCS14)
Finish: Gray crystal (Standard) or specified color
Adjusting method: External adjustment (Setting is being unlocked)
Internal adjustment (Setting is being locked)
Mass: About 1 kg
Accuracy (Repeatability): 1% of MAX, PRESS. (Compound: 1% of F.S.)
Setting accuracy: ±3% of MAX. PRESS. (Compound: ±3% of F.S.)
Ambient temperature:-20～60℃

Electrical characteristics

Electrical rating		Withstand voltage	Insulation resistance
Resistive load	Inductive load		
125V AC 15A 250V AC 15A 30V DC 2A 125V DC 0.5A	125V AC 15A 250V AC 15A 30V DC 1A 125V DC 0.05A	1,500V AC for 1 min (Between case and terminal)	100 MΩ min. when measured at 500V DC (Between case and terminal)

Inductive load is Power factor: 0.4 MIN. Time constant: 7 ms MAX.

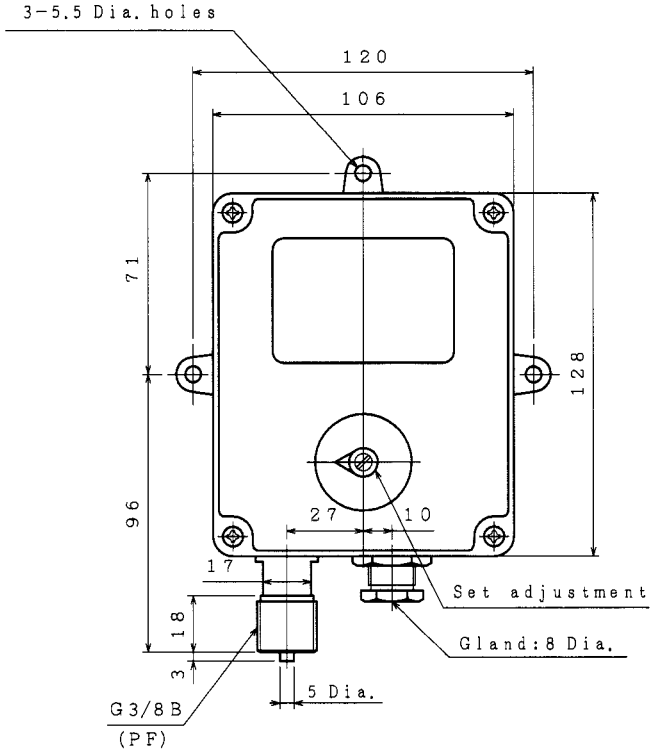
Pressure range, dead band and withstand pressure

Pressure range MPa(kgf/cm^2)	Dead band MPa (kgf/cm^2)	withstand pressure MPa(kgf/cm^2)
-0.1～0 (-1～0)	0.01 MAX. (0.1 MAX.)	0.05 (0.5)
* 0～0.1 (0～1)	0.01 〃 (0.1 〃)	0.15 (1.5)
* 0.2 (2)	0.016 〃 (0.16 〃)	0.3 (3)
* 0.3 (3)	0.024 〃 (0.24 〃)	0.45 (4.5)
* 0.4 (4)	0.024 〃 (0.24 〃)	0.6 (6)
* 0.6 (6)	0.039 〃 (0.39 〃)	0.9 (9)
* 1 (10)	0.06 〃 (0.6 〃)	1.5 (15)
* 1.5 (15)	0.068 〃 (0.68 〃)	2.25 (22.5)
* 2 (20)	0.08 〃 (0.8 〃)	3 (30)
2.5 (25)	0.15 〃 (1.5 〃)	3.75 (37.5)
3.5 (35)	0.14 〃 (1.4 〃)	5.25 (52.5)
5 (50)	0.175 〃 (1.75 〃)	7.5 (75)
7 (70)	0.24 〃 (2.4 〃)	10.5 (105)
10 (100)	0.65 〃 (6.5 〃)	15 (150)
15 (150)	0.52 〃 (5.2 〃)	22.5 (225)
25 (250)	1.25 〃 (12.5 〃)	37.5 (375)
35 (350)	1.05 〃 (10.5 〃)	52.5 (525)
50 (500)	2.2 〃 (22 〃)	75 (750)
70 (700)	3.1 〃 (31 〃)	105 (1050)
20～100kPa(0.2～1)	10kPa 〃 (0.1 〃)	150kPa (1.5)

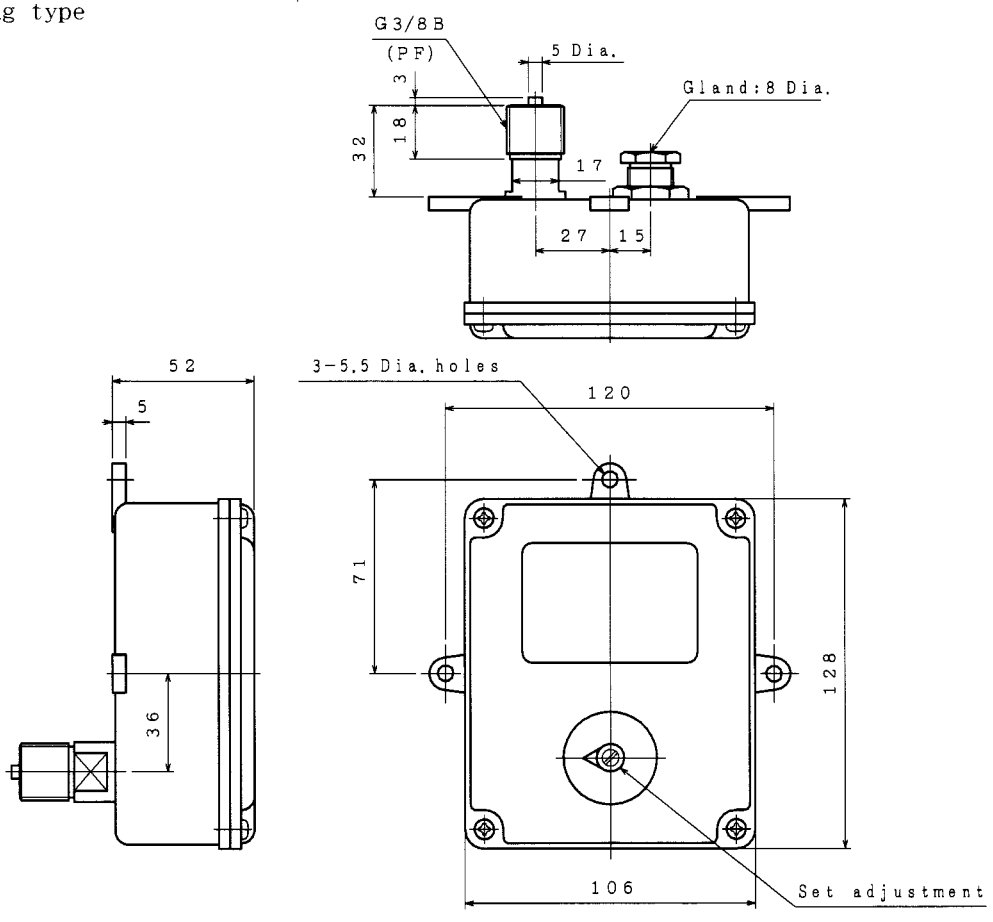
Pressure ranges marked * are available for compound pressure switch also.

(2) Outline dimensions

Surface mounting type



Flush mounting type



The above figures indicate the connection of G3/8B (PF) with the gland of JIS20b.

5. Cautions for Transportations, Storage and Unpacking

(1) Cautions for transportations

If this switch drops or receives an impact, its performance may be lowered. Accordingly, take care in transportations.

(2) Cautions for storage

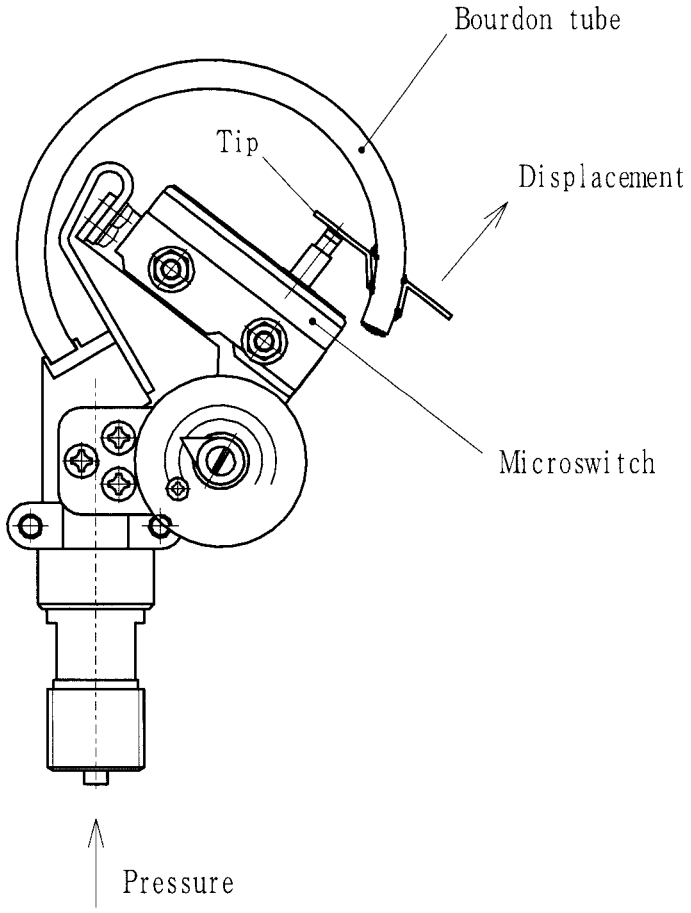
Store this switch in a dry place where there is not vibration and dust.
When piling up the boxes of this switch, limit the height to a level at which they will not be deformed and take care not to drop them.

(3) Cautions for unpacking

When unpacking this switch, handle its package carefully.
Unpack this switch in a wide place so that you will not drop it by mistake.

6. Principle of Operation

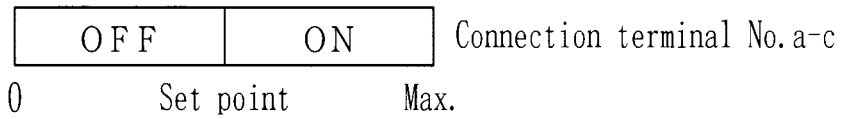
A Bourdon tube is used as the operating element of this switch as shown below.
If any pressure is applied to it to displace it, the displacement is directly transferred to the microswitch to open or close the latter.

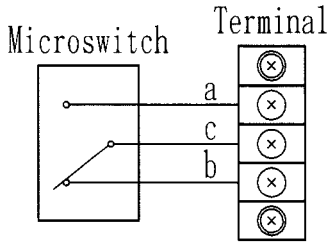


7. Kinds and Wiring according to Operation of Switching System

(1) Upper limit setting (H) and reverse lower limit setting (LR)

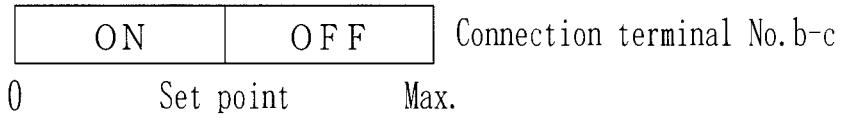
A switch of this kind turns on its circuit when the pressure rises above the set point (Upper limit setting) or turns off its circuit when the pressure drops below the set point (Reverse lower limit setting).

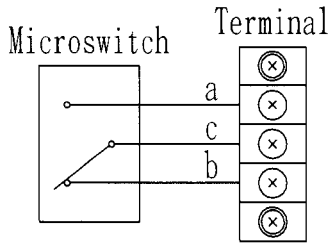




(2) Lower limit setting (L) and reverse upper limit setting (HR)

A switch of this kind turns on its circuit when the pressure drops below the set point (Lower limit setting) or turns off its circuit when the pressure rises above the set point (Reverse upper limit setting).





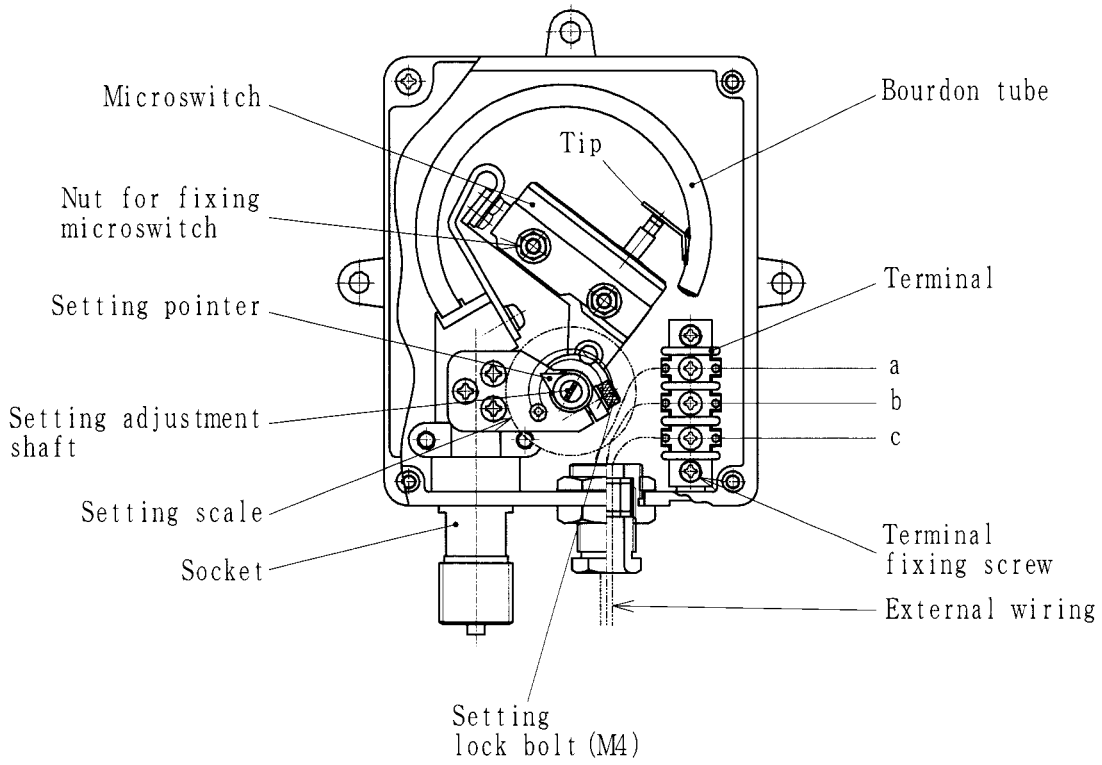
(3) Cautions for wiring

① Connect each wire to the terminal securely by using a crimp-style terminal of M4 size.

② Use polyvinyl chloride insulated wires, cabtire cables, etc. matched to the load.

③ Each switch does not have a grounding terminal. Connect the grounding wire to the case, if necessary.

8. Setting method

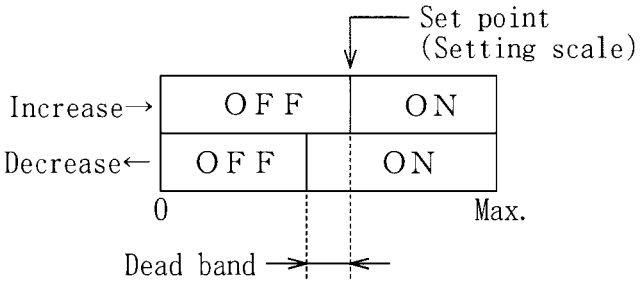


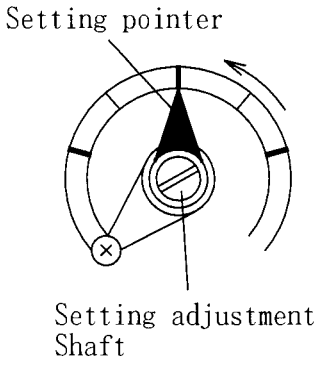
When the set value was demanded with order, the setting lock bolt (M4 with hexagon socket head) is tightened.
For setting again, remove the front cover. Loosen the setting lock bolt (about 1/8 turn) to the degree that the setting adjustment shaft can be turned, then adjust the setting adjustment shaft with a screwdriver.
After the setting lock bolt is tightened, the set value may change. Accordingly, confirm it again. If the set value has changed, set it again.
When the set value was not demanded with order, the setting lock bolt is not tightened and torque is prescribed. Therefore, external adjustment is available.
For setting, remove the front plug, and by means of screwdriver or the like, turn the adjustment shaft.
Adjust the torque of setting lock bolt within the following range when the setting lock bolt, which usually keep tightened, keep loosened.
Prescribed torque : 0.78 ～ 1.18 N·m
The setting method of each type of contact is shown as follows.

(1) Upper limit setting (H)

This switch is turned on when the pressure rises to the value of the setting pointer.

When adjusting the setting pointer, lower it from above to a desired value.

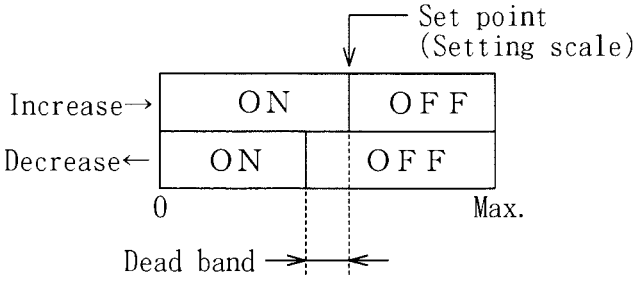


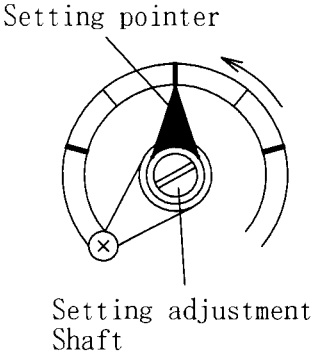


(2) Reverse upper limit setting (HR)

This switch is turned off when the pressure rises to the value of the setting pointer.

When adjusting the setting pointer, lower it from above to a desired value.

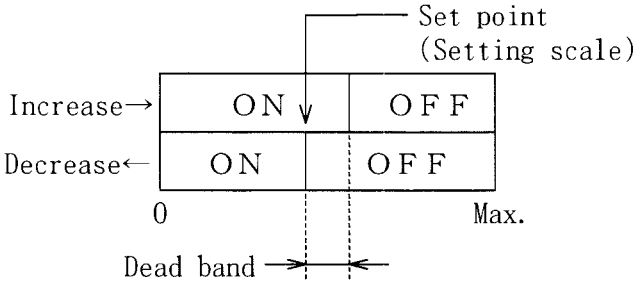


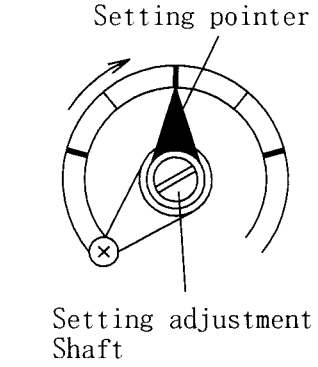


(3) Lower limit setting (L)

This switch is turned on when the pressure drops to the value of the setting pointer.

When adjusting the setting pointer, heighten it from below to a desired value.

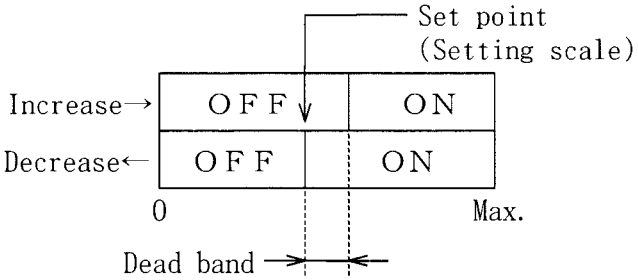


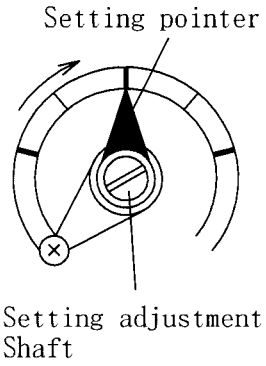


(4) Reverse lower limit setting (LR)

This switch is turned off when the pressure drops to the value of the setting pointer.

When adjusting the setting pointer, heighten it from below to a desired value.





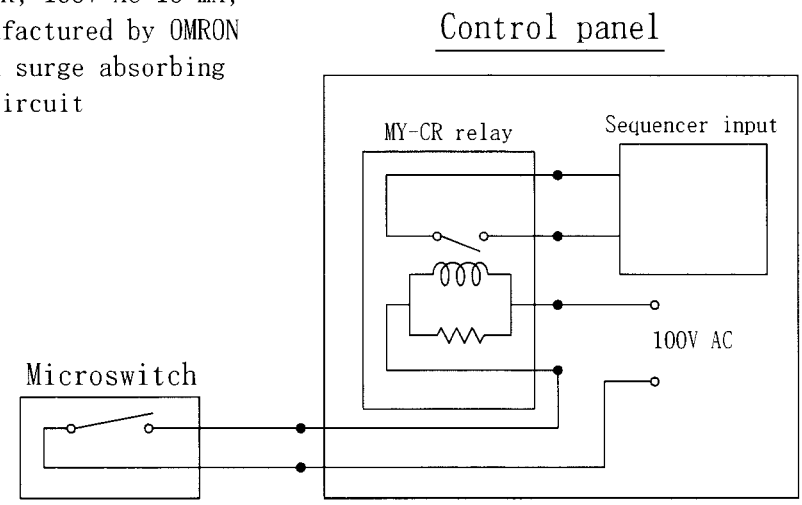
9. Installation
   (1) Install each switch to a place where there is less moisture, vibration, dust, corrosive gas, etc.
   Do not install it in a place where the ambient temperature exceeds the value specified in this manual (-20～60℃).
   Protect it from rain, dew, and steam by taking proper countermeasures.
   (2) When install the switch to a panel by using its holes, use M5 machine screws or bolts.
   (3) Use a flexible pressure piping so that an extreme force will not be applied to the switch.
   (4) When connecting the switch, be sure to apply a spanner to the flats part of the socket.

10. Wiring
   (1) Take care that an extreme force will not be applied to the body of the switch.
   (2) When using a conduit, be sure to use flexible one.
   (3) When wiring, check the product name plate and type of contact shown on the back side of the front cover to prevent a mistake.

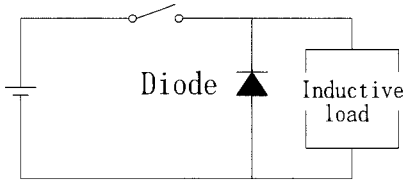
11. Cautions for Maintenance and Operation
   (1) If the switch has dropped or received an impact, be sure to confirm the operation of the contacts before using it.
   (2) Do not apply pressure exceeding the specified range.
   (3) Do not heighten or drop the pressure suddenly.
   (4) If pulsating pressures or a surge pressure are probably applied to the switch, install a protective device such as a throttle, dampener, etc.
   (5) Do not supply oil to the moving parts in the switch.
   (6) Do not apply a force to the tip to operate the microswitch.
   (7) Confirm the operation of the contacts once or twice in six months.
   (8) If the set value of the switch has changed largely, remove and check the switch. The possible causes of this trouble are wear and rusting of each part and shifting of it by vibration or external impacts.
   In this case, remove the cause, and adjust or replace the switch.
   (9) The standard electrical rating is shown in 4. (1). It may change, however, if a special microswitch is used.
   Accordingly, use each switch at a fully low value within the specified rating, considering a rush current, etc.

(10) The contact resistance of a microswitch increases as time passes, although very slowly.
In particular, when a little load is applied in the atmosphere containing Si, SiO_2 is accumulated on the contacts, and the contact resistance increases in a short length of time.
To prevent this, use the switch in a well ventilated clean atmosphere.
If the switch is used as a sequencer input for control, the contacts may have a trouble for the above reason.
Accordingly, connect the switch through a 100V AC relay in this case.

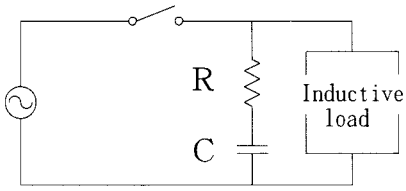
Example of usage: MY-CR, 100V AC 10 mA, manufactured by OMRON with surge absorbing CR circuit



(11) When using the switch in a circuit to open and close an inductive load, insert a protective circuit to protect the contacts.
When using a relay, select one having a contact-protection circuit in it.



Can be used only for a DC circuit.
Use a diode having the reverse withstand voltage more than 10 times as high as the circuit voltage and the forward current as large as the load current or more.



Can be used for an AC circuit.
R: several tens ohm
C: 0.1 ～ 0.2 μF