



INSTRUCATION MANUAL
FOR
PRESSURE SWITCH MODEL CE10

NAGANO KEIKI CO.,LTD.

MANUAL FOR ACCURATE AND SAFE OPERATION

SAFTY CHAPTER FOR PRESSURE TRANSMITTER PRESSURE TRANSDUCER AND ELECTRONIC PRESSURE SWITCH

To use these devices accurately and safely, carefully read this manual and the operation manual. Incorrect usage may cause malfunction and result in human injury, accidents, etc.
Be sure to keep this manual for reference after reading.

WARNING

1. Do not apply more than the maximum allowable pressure.
Human injury or damage to surroundings may result due to explosion or breakdown of the pressure elements.
2. Do not use these devices on measured objects which are corrosive to fluid or gas contacting areas.
Human injury or damage to surroundings may result due to explosion or breakdown of the pressure elements and exposure of dangerous measured objects.
3. Do not apply excessive weight, vibration or shock.
Human injury or damage to surroundings may result due to explosion or breakdown of the pressure elements and exposure of dangerous measured objects.
4. Use with the unspecified power supply may cause fire hazard or electric shock.
5. Use with the instrument temperature range.
Use outside the instrument temperature range may cause human injury or damage to surroundings due to explosion or breakdown of the devices.
6. Connect wiring accurately according to the wiring drawings or instructions in the operation manual.
Incorrect wiring may result in human injury or fire hazard.
7. Use devices with an explosion-proof construction when operating in place liable to have explosive gas.
Danger of ignition and explosion.
8. If the measured object is oxygen, use devices with "Use No Oil" treatment.
Standard devices may possibly contain remaining oil, and there is danger of combustion and explosion if oil acts on oxygen.
9. Accurately install these devices according to the installation instructions in the operation manual.
10. Never attempt to reconstruct the main body of devices nor add any new function to the devices, etc.
Contact us for repairs.

Note: Inform us in advance when using these devices in a way that may result in fatal or serious injury due to malfunction or incorrect operation.

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1. Preface

SEMICOM SWITCH is an electronic pressure switch which employs semiconductor pressure sensor and electronic circuit. Therefore it has no moving part and no contact. Furthermore it has long durability and does not suffer from general vibration. Its compact size is useful as input sensor of programmable controller or microcomputer. It is recommended that the user read this instruction manual carefully in order to use effectively SEMICOM SWITCH.

2. Application

SEMICOM SWITCH can be used as pressure alarm, pressure controller, input sensor of programmable controller or microcomputer, etc.

3. Features

○ Non-leak type

SEMICOM SWITCH does not require any drainpipe. The measuring media does not leak due to diaphragm pressure sensor in contrast to piston type pressure switch.

○ High reliability

SEMICOM SWITCH is comprised of semiconductor pressure sensor and electronic circuit employing hybrid IC. Therefore it has no moving part. As one or two open collector outputs can be provided, there is no trouble relation to the contact.

○ Excellent vibration and shock resistance

As the diaphragm has small diameter and light mass, SEMICOM SWITCH is not affected by general vibration.

○ LED display

It has LED (light emitting diode) which displays operational situation i.e.LED lights up when the transistor turns on.

○ Compact size and light weight

4. Specification

MODEL No.	CONNECTION	SEAL TYPE
CE10-333	G3/8B [JIS]	O-RING type
-373	R1/4 [JIS]	
-383	R3/8 [JIS]	
-334	G3/8B [JIS]	WELDING type
-374	R1/4 [JIS]	
-384	R3/8 [JIS]	

PRESSURE RANGE(MPa)	PROOF PRESSURE(MPa)
0~ 0.3	0.6
0~ 0.5	1
0~ 1	2
0~ 2	4
0~ 3	7
0~ 5	10
0~10	20
0~20	40
0~35	52.5
0~50	75
0~70	84
0~100	120
-0.1~ 0.3	0.6
-0.1~ 0.5	1
-0.1~ 1	2
-0.1~ 2	4

COMMON SPECIFICATION

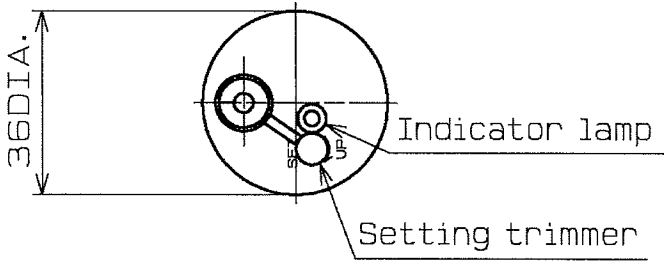
- ※
- Repeatability : Within ± 0.2 % F.S.
- Zero or span temperature coefficient : ± 0.05 %F.S./ $^{\circ}$ C [Pressure Range : 0.5~50MPa
or ± 0.1 %F.S./ $^{\circ}$ C (both zero and span)
(You can require either)]
- Electric source : 24VDC (10~ 28VDC)
- Output : Opencollector 30VDC 80mA
NPN transistor is standard.
You can require PNP transistor.
- Response time : Within 1ms.
- Current consumption : 20mA (single switch setting)
30mA (dual switch settings)
- Operating temperature : -20° C ~ 70° C
(No freezing or condensation permitted)
- Wetted materials : SUS 630 (17-4PH)
SUS 316 (JIS)
Nitrile butadiene rubber; This is used for some
ranges [≤ 10 MPa] except welding type
- Cable length : 2m
- Weight : About 200g
- Casing : Indoor type

※ It includes hysteresis and short time creep of pressure sensor.

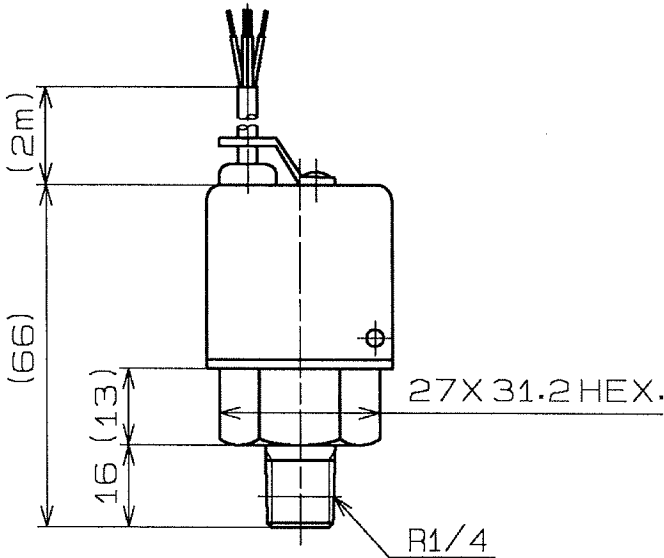
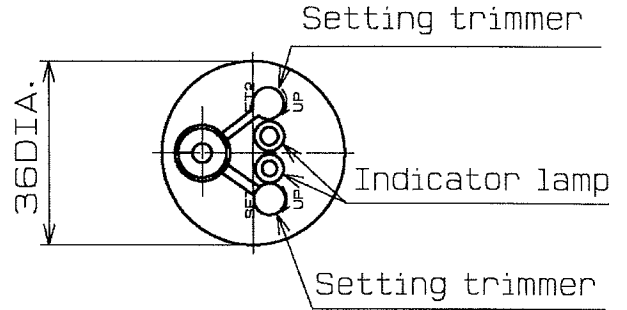
Fig.1

《DIMENSION》

SINGLE SWITCH SETTING



DUAL SWITCH SETTING



SINGLE SWITCH SETTING

SWITCHING HYSTERESIS TYPE

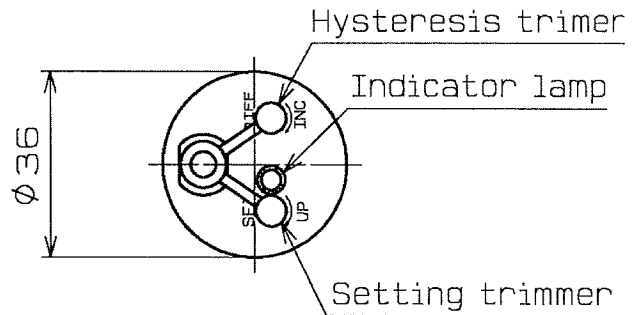
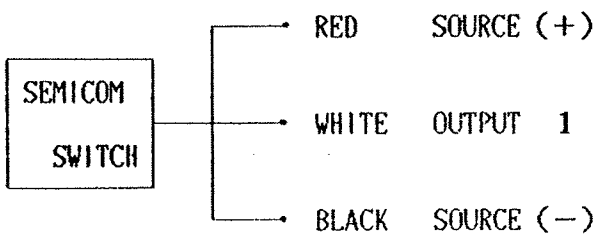


Fig.2

《 WIRING 》

SINGLE SWITCH SETTING



DUAL SWITCH SETTINGS

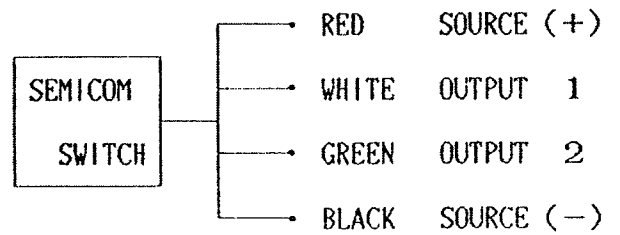
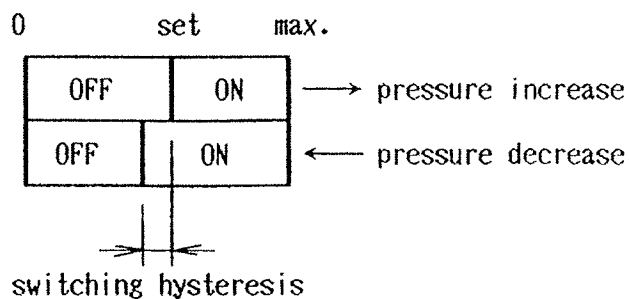


Fig.3

《 OPERATIONAL DIAGRAM 》

If the applied pressure increases and attains set pressure, the output transistor will be turned on.



5. Instructions for Transportation, Storage and Unpacking

(1) Instructions for transportation

This instrument, which is precision-built, may become inoperative if dropped or subjected to a shock. Take utmost care when relocating it.

(2) Instructions for storage

Keep the instrument in an environment not so humid and substantially free from vibrations and dust. When storing a number of them in stack, be sure that their packings are not distorted or dropped.

The direct sunlight, especially in summer, raises the meter to unexpected high-temperature. So, do not expose the meter to direct sunlight.

(3) Instructions for unpacking

In unpacking the meter, handle the packing carefully. It is important to unpack the meter in a sufficiently spacious place in order not to slip it down or otherwise harm it by mistake.

6. Construction

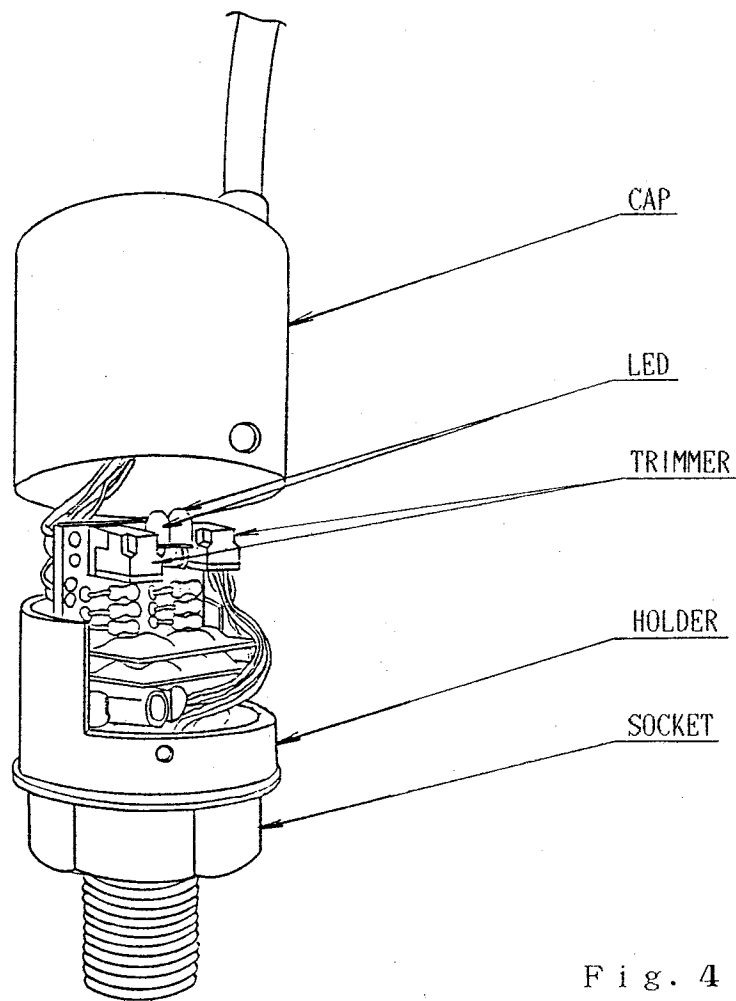


Fig. 4

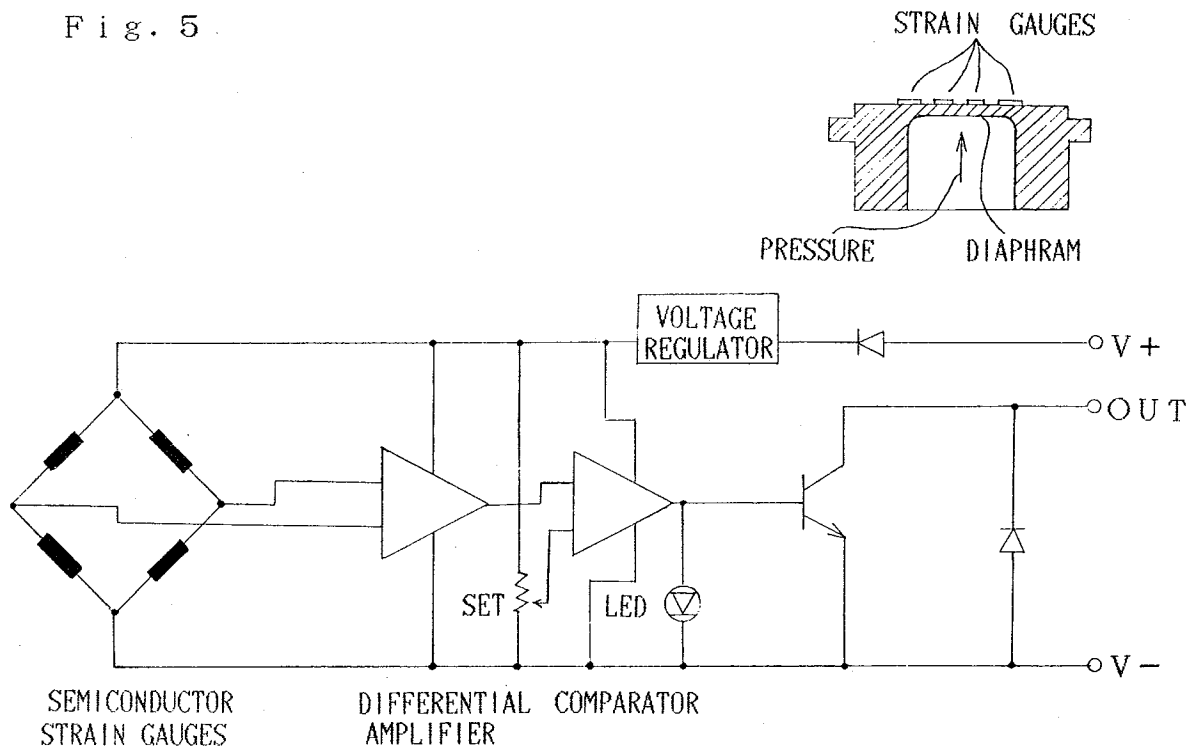


7. Principle of Operation

There are four strain gauges on the dielectric thin film which is deposited on the stainless steel diaphragm. They convert the strain of the diaphragm into variation of resistance. As the wheatstone bridge is comprised of these strain gauges, the output of the wheatstone bridge is amplified by the differential amplifier and compared with the setting pressure value by the comparator. Then the output of the comparator switches the output transistor.

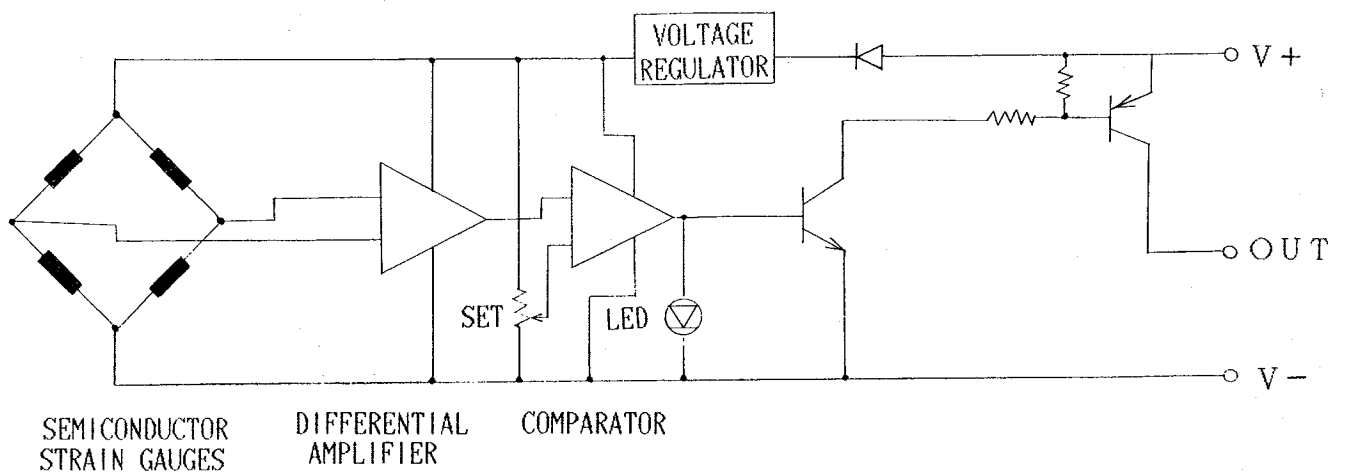
○ NPN TRANSISTER OUTPUT

Fig. 5



○ PNP TRANSISTER OUTPUT

Fig. 6





8. Setting Procedure

Before installing, you have to adjust the setting pressure value to a desired value except the switch had been adjusted by manufacturer. The adjusting procedure are as follows:

- ① Provide a pressure gauge which satisfies a desired accuracy of the setting pressure value, a 24VDC electric source and a pressure source such as a dead weight tester which is able to increase the applied pressure to the setting pressure. In case of vacuum setting, provide a vacuum source.
- ② Mount the pressure gauge and the switch on the dead weight tester.
- ③ Connect the red wire and the black wire of the switch to (+) and (-) terminal of the 24VDC electric source, respectively.

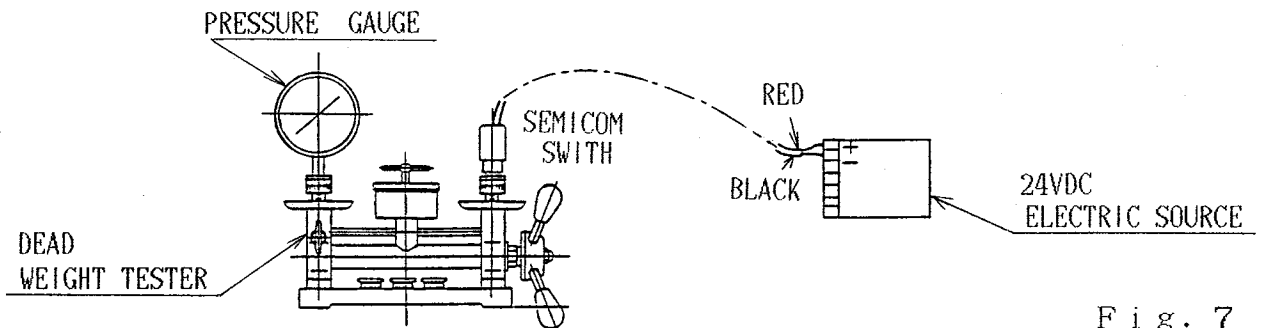
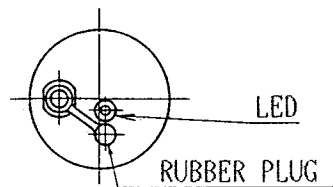


Fig. 7

- ④ Remove the rubber plug from the switch. Then you can see the trimmer and using (-) screwdriver, you can adjust the setting pressure value.

SINGLE SWITCH SETTING



DUAL SWITCH SETTINGS

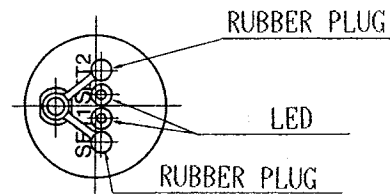


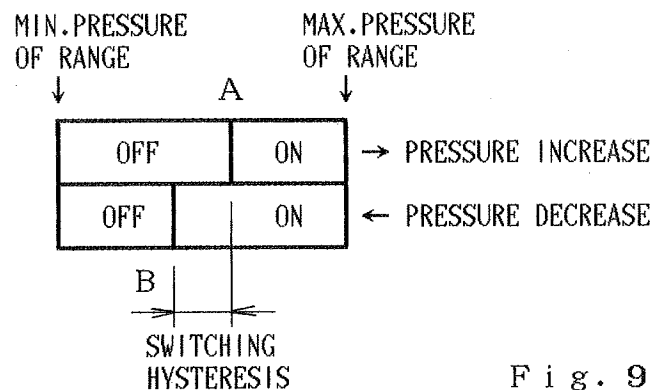
Fig. 8

(I) Procedures for Constant Switching Hysteresis type (Standard type)

A. If you want to adjust the setting

pressure value to "A" in Fig.9 ,
the setting procedures are as follows:

- (a) Turn the spindle of the setting trimmer clockwise until you can not turn it any more.



F i g . 9

- (b) Apply the setting pressure to the switch.
- (c) Turn the spindle of the setting trimmer counterclockwise little by little. If the LED lights up, stop turning at once.
- (d) To verify the setting pressure value, increase and decrease the applied pressure. If the switching pressure value does not coincide with the desired setting pressure value, repeat (a) , (b) and (c) procedure. In dual switch settings type, repeat above procedures at another one. Setting procedures are now complete.

B. If you want to adjust the setting pressure value to "B" in Fig.9, the setting procedures are as follows:

- (a) Turn the spindle of the setting trimmer counterclockwise until you can not turn it any more.
- (b) Apply the setting pressure to the switch.
- (c) Turn the spindle of the setting trimmer clockwise little by little. If the LED lights up, stop turning at once.
- (d) To verify the setting pressure value, increase and decrease the applied pressure. If the switching pressure value does not coincide with the desired setting pressure value, repeat (a), (b) and (c) procedure. In dual switch settings type, repeat above procedures at another one. Setting procedures are now complete.

(II) Procedures for Adjustable Switching Hysteresis type

To begin with, adjust the setting pressure value to "A" in Fig.9. Next adjust the switching hysteresis as shown in Fig.9. The procedures are as follows:

- (a) Turn the spindle of the setting trimmer clockwise until you can hear a click of it
- (b) Apply the setting pressure, "A", to the switch.
- (c) Turn the spindle of the setting trimmer counterclockwise little by little. If the LED lights up, stop turning at once.
- (d) To verify the setting pressure value, increase and decrease the applied pressure. If the switching pressure value does not coincide with the desired setting pressure value, repeat (a), (b) and (c) procedure.
- (e) Read the switching hysteresis by increasing and decreasing the applied pressure.
- (f) If it is more than the desired switching hysteresis, turn the spindle of the hysteresis trimmer counterclockwise slightly. On the contrary, if it is less than the desired switching hysteresis, turn the spindle of the hysteresis trimmer clockwise slightly.
- (g) Read the switching hysteresis by increasing and decreasing the applied pressure again. If it does not coincide with the desired switching hysteresis, repeat (f) procedure.

NOTICE

After setting, fill in the rubber plug on the cap.



9. Installing

- (1) If the switch has been adjusted to a desired setting pressure value, you can install it in your apparatus. If not so, adjust it to the desired value following "8.SETTING PROCEDURE". The switch should be installed in a location that is shown below. In installing, never turn the cap of the switch, be sure to turn the hexagonal part of it by wrench. It can be installed in any position but the recommended method is to install the cap directly above the socket so that the liquid to be measured may not soak into it. You can see the brightening LED even from the side direction.

A recommended location for installing is:

- where vibration is not very high.
- where humidity is not very high.
- where the switch is not exposed to the sun.
- where water or oil does not fall.

(2) Wiring

The wire distinction is shown below.

- RED Electric source (+)
- BLACK Electric source (-)
- WHITE Open collector output 1
- GREEN Open collector output 2 (This is an optional function.)

Either switching regulator or series regulator can be used for the electric source and it should be able to supply 24VDC and adequate current to operate the switch. In using a number of switches, pay attention to the current consumption.