

INSTRUCTION MANUAL FOR DUST SWITCH

Model:PFM-DWS10

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※An operator should read carefully this instruction manual and conduct correct handling.

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Safety Precautions

- Be sure to thoroughly read the instruction manual before using the products.
- Keep the instruction manual in a safe, convenient location for future reference.
- All or part of the contents described in this manual may be changed without any notice.
- Due to our constant striving for further improvement of products, parts or products that differ from those described in this manual may be substituted.



WARNING (Failure to observe this WARNING may cause a fatal or serious injury.)

- Be sure to confirm that any peripheral equipment does not move before installation work.
In addition, observe safety requirements for installation work where high-place work is expected.
- Be sure to turn off the power source before wiring, mounting and transportation work. (Failure to observe this WARNING may result in an electric shock/ injury or equipment damage due to short-circuit.)
- Carry out wiring work correctly with reference to a proper drawing.
- Never disassemble the equipment. (Failure to observe this WARNING may result in an electric shock.)
- Do not open the cover under an explosive environmental condition when power is entered. (Failure to observe this WARNING may result in an injury or equipment damage.)
- Do not place or store the equipment in any hostile environmental place where it will be subjected to direct sunlight, rain, water droplet, hazardous gas/water, etc..



CAUTION (Failure to observe this CAUTION may cause a moderate injury or equipment damage.)

- Do not use the equipment for any purpose other than the original purpose of use.
- Be sure to confirm the specification of equipment and use the equipment within the range of specification. (Mounting conditions such as temperature, power source, frequency, etc.)
- Make sure a correct wiring before applying power source.
- Do not have a shock or strong impact to the equipment.
(Failure to observe this CAUTION may result in equipment damage.)
- Be sure to connect necessary terminals (grounding, etc.).
- Remove all wiring to the equipment before doing electrical welding work near the equipment.
- Do not forcibly bend or pull the lead wire also do not use unnecessarily long wire.
- Tighten the cover, lead outlet, etc. properly so that dust, rainwater, etc. do not enter inside the equipment.
- Do not use the equipment under a corrosive condition (NH₃, SO₂, Cl₂, etc.).
- Be sure to tighten the cable grand so that outer air does not enter inside the equipment.
- When applying piping connection such as conduit, etc. instead of cable grand, apply putty or equivalents on the cable entry so that outer air does not enter inside the equipment.



IMPORTANT (indicates notes or information to help customers.)

Limitations of Warranty:

- Warranty period shall be one year from the date of delivery (ex-factory).
- Any damage of any other products that have occurred for use of the equipment is not covered by this warranty. Also any loss induced by failure or malfunction of the equipment is not covered by this warranty.
- Failure or malfunction caused by following are not covered by this warranty:
 - a. Modification or repair by a party other than MATSUSHIMA's authorized personnel, or replacement of parts not recommended by MATSUSHIMA.
 - b. Inadequate storage, installation, use, inspection or maintenance that does not comply with Specification.
 - c. Cause for any peripheral equipment or device.
 - d. Accident beyond control and force majeure (fire, earthquake, flood, riots, etc.).

Lack of instructions to MATSUSHIMA for information or safety requirements that can be predicted only by customers' side.

This warranty conditions do not limit customers' legal right.

Price for the equipment does not include any charge for services such as commissioning, supervising, etc..

1. Introduction

This dust switch can be installed on small or medium-sized dust collectors and detects dust discharged from the dust collector. Dust particles coming in contact with or passing near the electrode of the switch cause an electric charge to transfer from the dust particles to the electrode.

The dust switch detects this transfer of electric charge and outputs ON/OFF signals.

2. Specification

Table 1 Specification

1. Type		PFM-DSW10
2. Structure		Sensor with integrated transducer
3. Equipment Specification		
1) Power supply		24 VDC \pm 10%
2) Power consumption		2 W
3) LED indicators	Power indicator	Green (Power is ON when it is lit)
	Detection level indicator	Red (Dust has been detected when it is lit)
4) Signal output	Open collector output	1 output (NPN)
5) Capacity		Load voltage: 5 to 30 VDC, load current: 50 mA max.
6) Lead outlet		G 1/2 (Applicable cable size: 8 to 12 mm in dia.)
7) Protection		IP54 (The cover is tightly closed, the lead runs through the lead outlet, and the outlet is tightly closed.)
8) Dimensions	Probe	50 mm (Not including the Isolation)
	Isolation	50 mm
9) Material	Probe	SUS 304
	Isolation	Polyacetal (POM)
	Housing	Aluminum casting
10) Temperature		0 to +55 °C
11) Humidity		90% max. (No condensation)
12) Mounting		G 1/2 screw
13) Mass		Approx. 0.5 kg
14) Coating		Munsell 7.5GY 6/10

3. Dimension Drawing

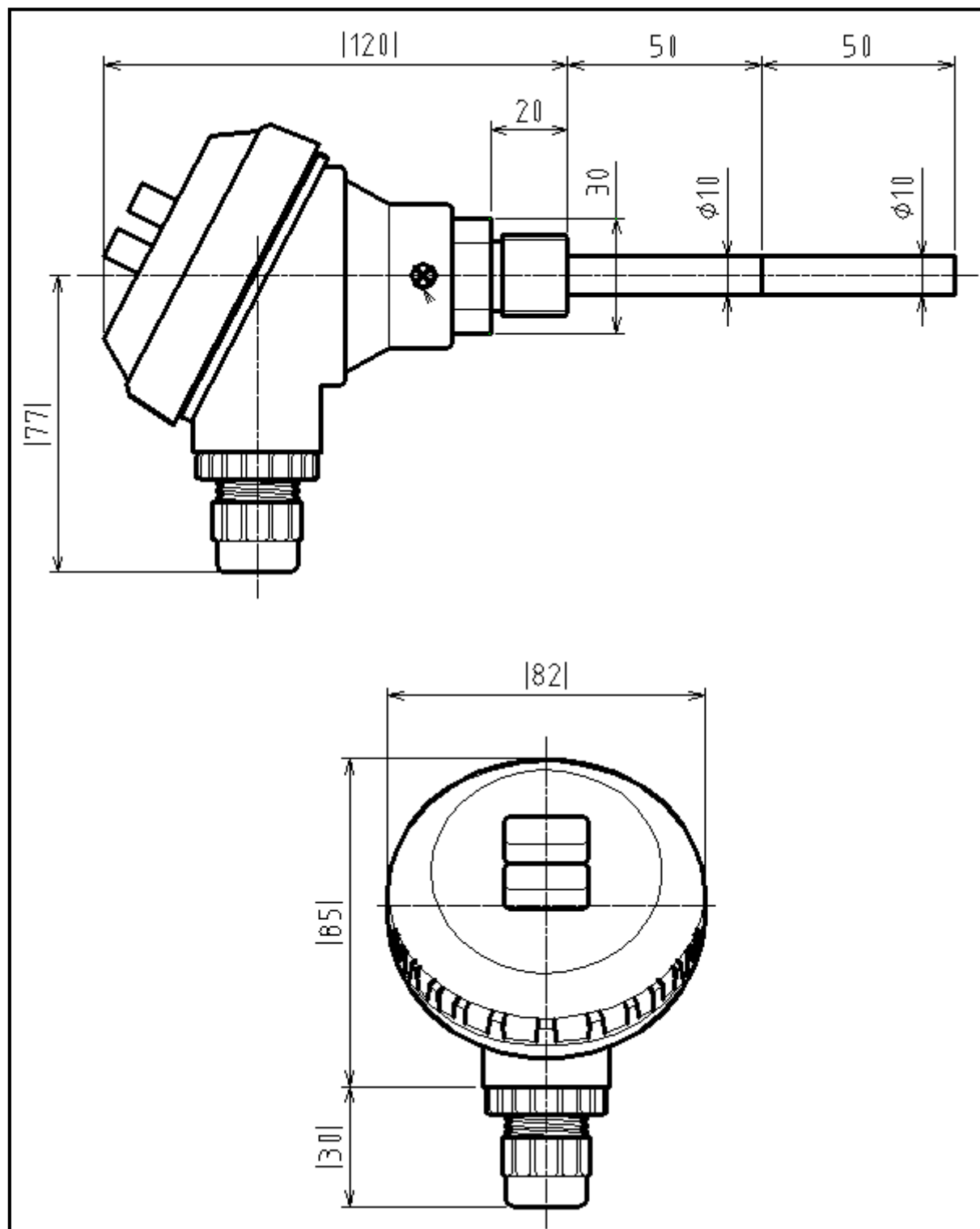


Fig. 1 External Dimensions

4. Installation

The dust switch must be installed horizontally or vertically.

- A: The Isolation must protrude at least 10 mm from the side wall of the duct.
- B: The distance between the probe tip and the side wall of the duct must be at least 10 mm.

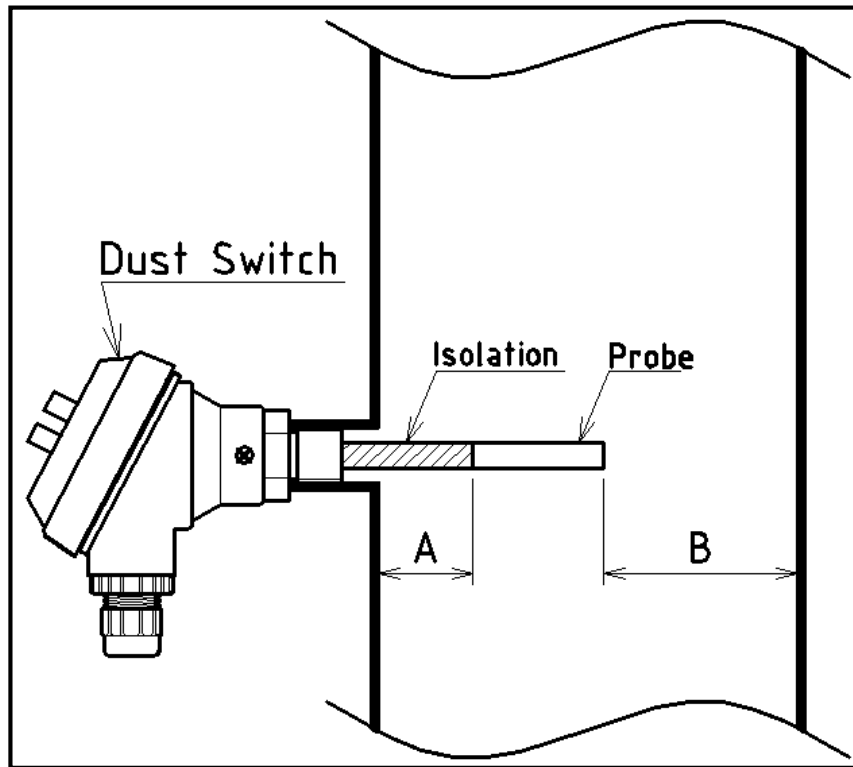


Fig. 2 Installation 1

The dust switch might malfunction if not installed under appropriate operating conditions. Do not install the dust switch under the following conditions or in an environment.

- Close to a very narrow section.
- A nonconductive pipe, short pipe, or duct is used.
- Environment and conditions do not comply with the Specification.
- There is a chance that dust may accumulate between the pipe wall and the probe when the base pipe is extended with a short pipe.
- The space between the probe tip and the side wall is less than 10 mm.

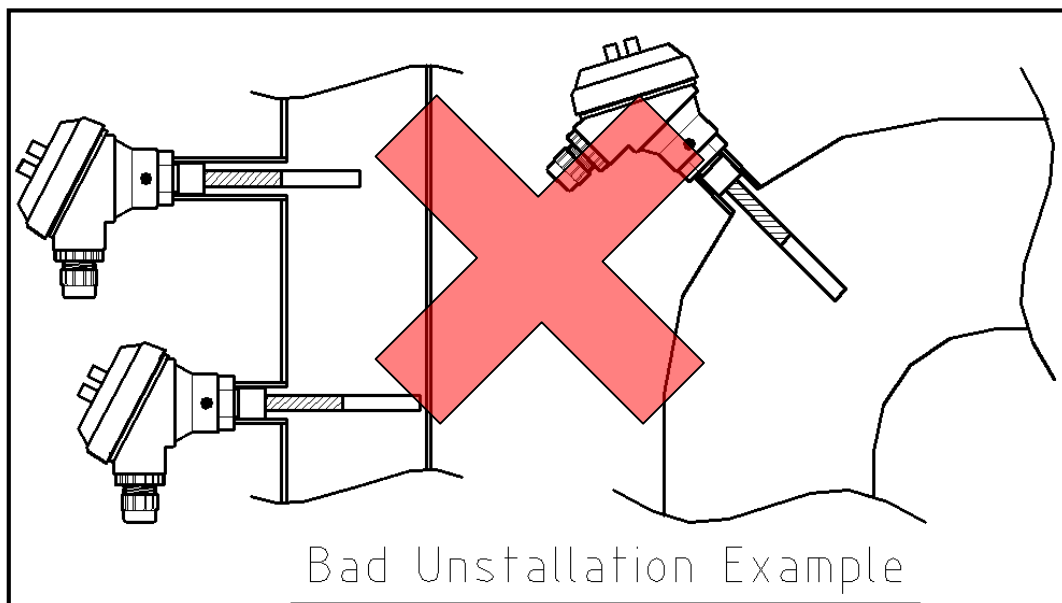
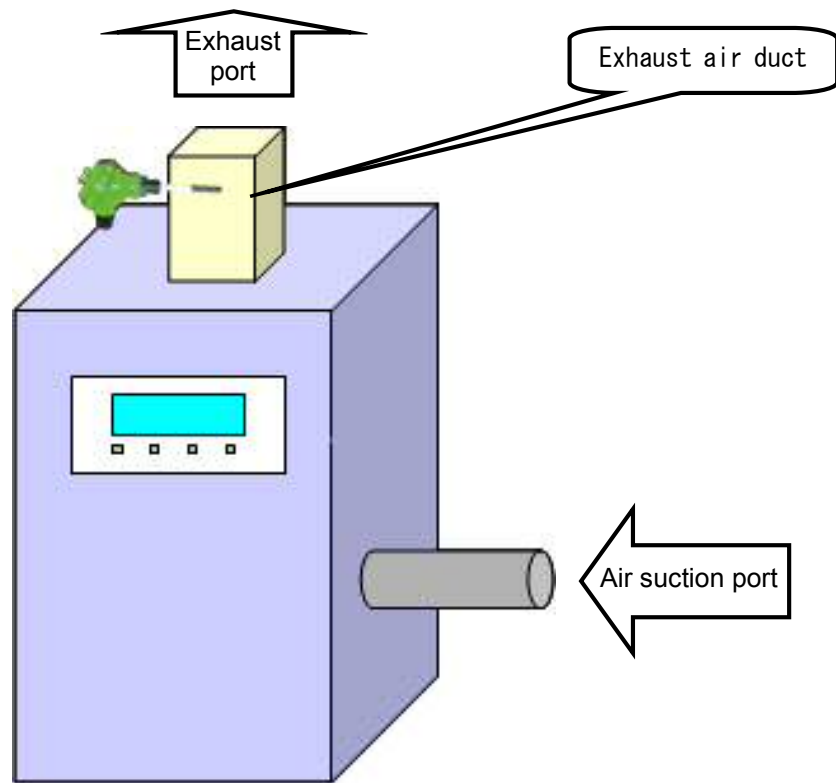


Fig. 3 Installation 2

● Installation example to Dust Collector

Prepare a duct for installing Dust Switch to the Exhaust port of Dust Collector.

If Dust Switch is installed to this duct, it is possible to deduct the filter breakage of Dust Collector in the early stage.



5. Wiring

5-1. Wiring Connections

Before wiring, be sure to confirm that the power supply has been turned off.

Failure to observe this instruction may result in an electric shock, electric leakage, fire or other such accident.

Use shielded pair cable: 0.32 mm to 0.65 mm in diameter x 2.

The cable length should be no more than 100 m taking into consideration the voltage drop.

- Power supply: 24 VDC $\pm 10\%$
- Open collector output

The wiring method for the output of the open collector differs in accordance with the power supply used and the output method of the signal. Use the connection method best suited for the application.

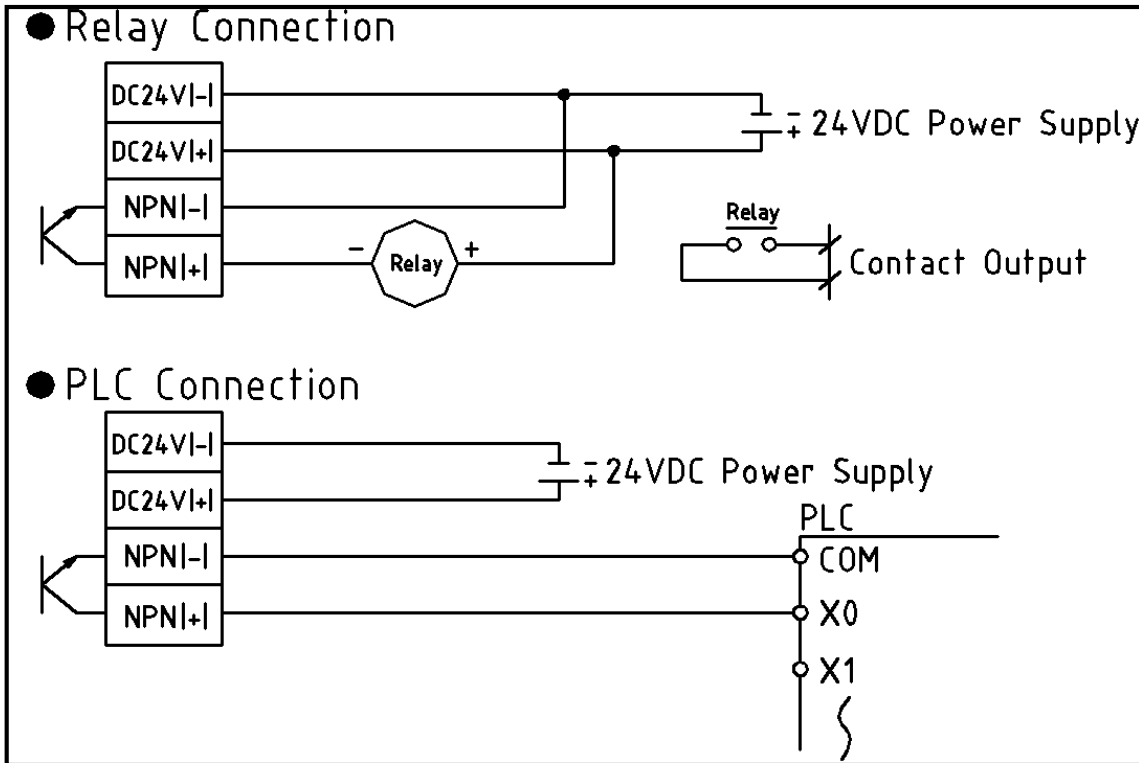


Fig. 4 Schematic Diagram

5-2 Earth connection

The earth terminal is located on the side of the housing.

Be sure to earth the dust switch through the earth terminal.

If not, noise might cause the dust switch to malfunction.

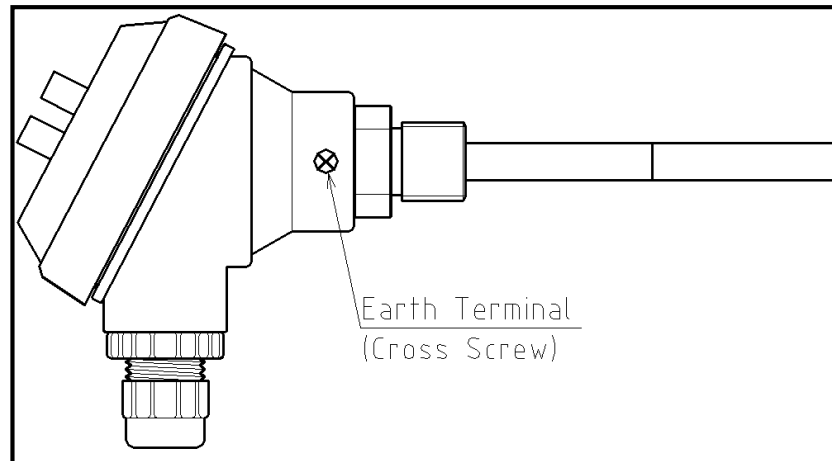


Fig. 5 Earth Terminal



Caution : The earth line should not be removed even at the maintenance in case it may cause a fault.

6. Operation

6-1. Parts Arrangement

The names and layout of the parts on the board are as shown in the figure below.

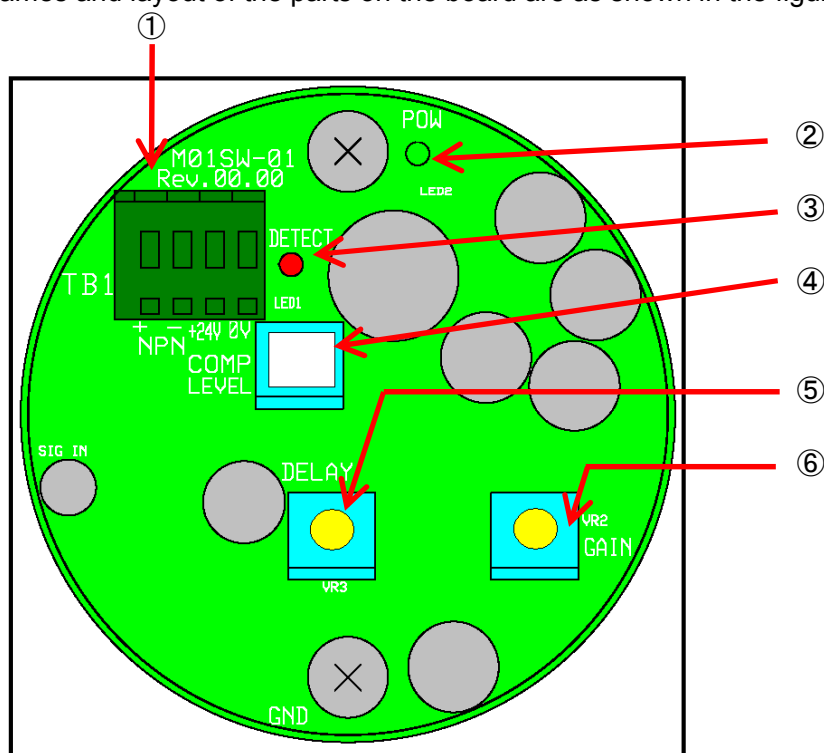


Fig. 6 Parts Arrangement on the Board

Table 2 Parts Names

No.	Name	Description
①	Terminal block	Power input, open collector output
②	Power indicator (green)	Lights up when the power is turned ON.
③	Detection level indicator (red)	Lights up when dust is detected.
④	Detection level adjusting volume	Do not change the factory setting.
⑤	Detection level delay setting volume	Operating time: 0 (0 sec.) to 10 (10 sec.)
⑥	Sensitivity adjusting volume	Sensitivity level: 0 (lowest sensitivity) to 10 (highest sensitivity)

* The volumes for adjustment can be turned either clockwise (toward 10) or counterclockwise (toward 0).

6-2. Adjustment

1) Sensitivity adjusting volume

The sensitivity adjusting volume is used to adjust the detection sensitivity according to the environment.

The setting range is 0 to 10. The detection sensitivity decreases as the volume is turned counterclockwise toward 0, and increases as turned clockwise toward 10.

<<Adjustment>>

- Operate the facility after installing Dust Switch.
- Turn Sensitivity adjusting volume clockwise to the position where Detection Level Indicator(red) lights up.
- After Detection Level Indicator lights up, turn Sensitivity adjusting volume counterclockwise little by little to the position Detection Level Indicator goes out.
- Turn it further counterclockwise one or two more scales from the position Detection Level Indicator goes out in order to prevent chattering.

●When a small amount of dust leakage is required:

Turn Sensitivity adjusting volume clockwise for higher sensitivity to detect a small amount of dust.

●When a small amount of dust leakage needs not to be detected:

Turn Sensitivity adjusting volume counterclockwise for lower sensitivity and the small amount of dust leakage will not be detected.

2) Detection level delay setting volume

Detection delay setting is a setting to delay the output of detection alarm (called “delay function”).

This delay function can alleviate the effect of chattering if chattering occurs in the signal under detection. The delay can be adjusted at roughly one-second increments/decrements between 0 and 10 seconds.

[Delay Operation Example]

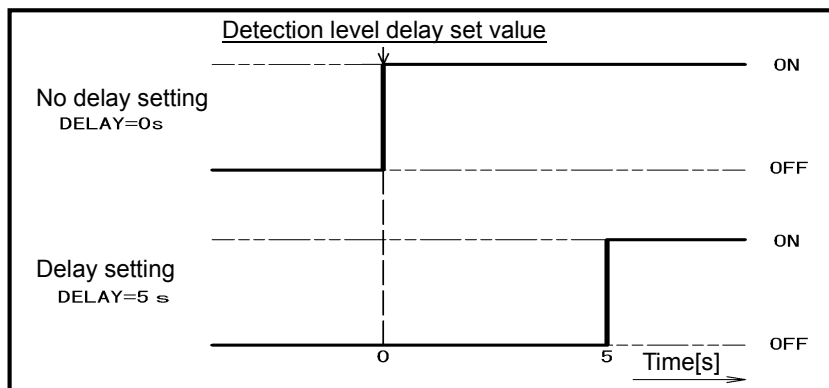


Fig. 7 Detection Level Delay Operation Chart

7. Troubleshooting

If the problem cannot be solved by taking the applicable actions, please contact Matsushima Machinery Laboratory.

Table 3 Troubleshooting

Problem	Probable cause	Items to be checked
• Power indicator does not light up.	1) Power is not supplied. 2) Power supply Specification differ from what was confirmed at the delivery.	1) Check wiring connections. 2) Check if the voltage of the power supply is correct.
• Detection level indicator does not light up.	1) Sensitivity adjusting volume is set to the lowest (0). 2) Material is adhering to the probe. 3) The dust switch is not earthed or is not earthed correctly. 4) Failure of the device	1) Check by turning the volume to change the level of sensitivity. 2) Check for any material adhering to the probe section. 3) Check whether the dust switch is earthed through the earth terminal on the side of the housing. 4) Contact Matsushima Machinery Laboratory.
• Detection level indicator does not go out.	1) Sensitivity adjusting volume is set to the highest (10). 2) Material is adhering to the probe. 3) The dust switch is not earthed or is not earthed correctly. 4) Failure of the device 5) A large amount of material is flowing.	1) Check by turning the volume to change the level of sensitivity. 2) Check for any material adhering to the probe. 3) Check whether the dust switch is earthed through the earth terminal on the side of the housing. 4) Contact Matsushima Machinery Laboratory.

* Specification, design, etc. are subject to