Panasonic® **INSTRUCTION MANUAL**

Pipe-mountable Liquid Level Photoelectric Sensor
EX-F1

MJEC-EXF1 No.0065-98V

Thank you very much for purchasing Panasonic products. Read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

⚠ Warning

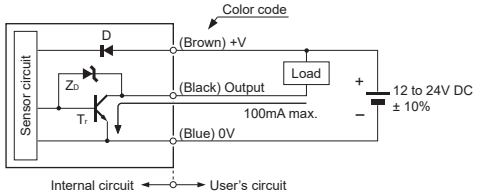
- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

1 Specifications

Item \ Designation / Model No.	Amplifier built-in · pipe-mountable liquid level sensor
	EX-F1
Sensing object	Liquid (Note 1)
Applicable pipe diameter	Outer diameter φ6 to φ13 mm transparent resin pipe [PFA (Fluorine resin) or equivalent, having the same transparency, thickness 1mm] (Note 2)
Repeatability	0.5mm or less
Supply voltage	12 to 24V DC±10% Ripple P-P 10% or less
Current consumption	30mA or less
Output	NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)
Output operation	Switchable either Light-ON or Dark-ON
Short-circuit protection	Incorporated
Response time	2ms or less
Operation indicator	Red LED (lights up when the output is ON)
Ambient temperature (Note 3)	-10 to +55°C (No dew condensation or icing allowed), Storage: -20 to +70°C
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH
Emitting element	Infrared LED (modulated)
Material	Enclosure: Polycarbonate Tying band: Nylon Anti-slip tube: Silicone
Cable	0.1mm² 3-core cabtyre cable, 1m long
Weight	15g approx.
Accessories	Tying band: 2 pcs., Anti-slip tube: 2 pcs.

Notes: 1) Unclear or highly viscous liquid may not be detected stably.
2) Do not use the sensor with pipes other than the above specified. Furthermore, take care that if the pipe is made from glass, the detection may be unstable due to refraction.
3) Liquid being detected should also be kept within the rated ambient temperature range.

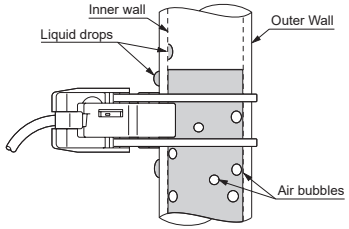
2 I/O Circuit Diagram



Symbols...D : Reverse supply polarity protection diode
ZD : Surge absorption zener diode
Tr : NPN output transistor

3 Cautions

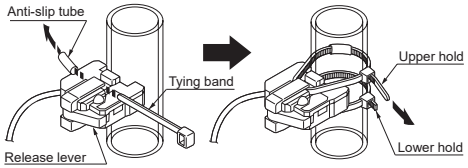
- This product has been developed / produced for industrial use only.
- The thin cable (0.1mm²) is used for this product. Thus, take care that if the cable is pulled with excessive force, it may cause cable break.
- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Extension up to total 50m, is possible with 0.3mm², or more, cable for both, emitter and receiver. However, in order to reduce noise, make the wiring as short as possible.
- Do not use during the initial transient time (50ms) after the power supply is switched on.
- Take care that the sensor is not directly exposed to fluorescent lamp from a rapid-starter lamp, a high frquency lighting device or sunlight etc., as it may affect the sensing performance.
- This sensor is suitable for indoor use only.
- Make sure that stress by forcible bend or pulling is not applied directly to the sensor cable joint.
- Since the cable end is not waterproof, do not use the sensor in the application where water may seep in from the cable end.
- This sensor cannot be used with a non-transparent pipe.
- Fit the sensor to a pipe securely, otherwise the operation may be erroneous.
- If a liquid drop flows down across the sensing point or an air bubble sticks on the wall at the sensing point, the operation may be affected. Make sure that no bubble forms in the liquid, and no dew or liquid drop attaches on either surface.



- **EX-F1** does not provide water-tightness, oil-resistance or chemical-resistance. Avoid installation at any place that it could be exposed to water, chemical or oil.

4 Mounting On a Pipe

- Mount the sensor on a pipe with the attached tying bands and anti-slip tubes as shown in the figure below. Make sure the release lever is retracted (position as in the figure) before mounting. Fasten two tying bands, as shown, and cut off the excess portions.



After mounting the sensor, make sure that the output inverts when the condition changes from a liquid-absent state to a liquid-present state, and vice versa. If the output does not invert, the sensor may not be mounted properly. Check the sensor installation condition.

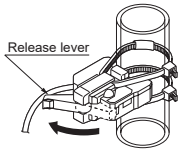
- If other tying bands are to be used, the dimension Ⓐ shown in the figure below should be 2.5mm or less.

5 Position Adjustment

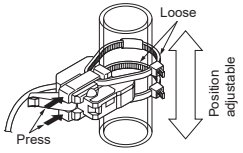
- After it is mounted on the pipe with tying bands, the sensor position can be easily adjusted.

Adjustment

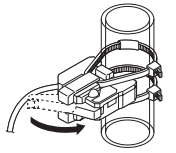
1. Unlock the release lever (in the direction of the arrow).



2. Press the movable center holders forward to loosen the tying bands and adjust the position.



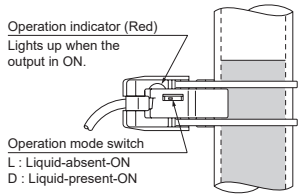
3. Lock the release lever to its original place.



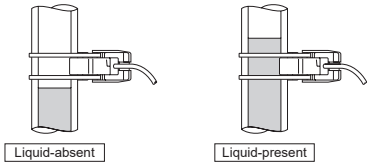
Note: The lever mechanism must be used only to adjust the position, and not for tightening the tying bands. If tying bands are tightened while the lever is open, and then the lever is locked, the sensor may be damaged.

6 Selecting Output Operation

- Either Light-ON (Liquid-absent-ON) or Dark-ON (Liquid-present-ON) can be selected with the operation mode switch according to your application.



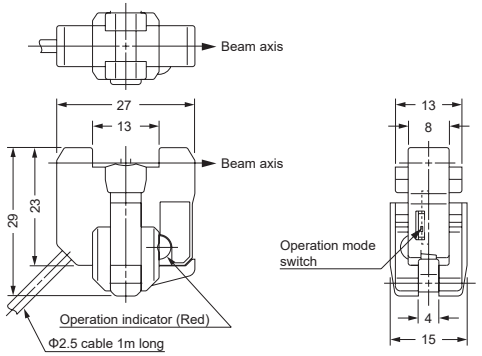
- The indicator operation and the output operation change with the setting of the operation mode switch as given in the table below.



☼ : Lights up, ● : Turns off

MODE	Sensing condition	Operation indicator	Output operation
Light-ON (Liquid-absent-ON)	Liquid-present	●	OFF
	Liquid-absent	☼	ON
Dark-ON (Liquid-present-ON)	Liquid-present	☼	ON
	Liquid-absent	●	OFF

7 Dimensions (Unit: mm)



8 Intended Products For CE Marking

- The models listed under "**1 Specifications**" come with CE Marking. As for all other models, please contact our office.

- **Contact for CE**
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