Liquid Level Photoelectric Sensors

BL Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- Detects liquid in a transparent/semitransparent pipe diameter Ø6 to 13mm, thickness 1mm
- Compact size: W 23 × H 14 × L 13 mm
- Selectable Light ON/Dark ON mode by operation mode switching button
- Easy to check operation status by operation mode indicator [green (Light ON: on, Dark ON: off)], operation indicator [red]
- Built-in reverse power protection circuit and output short overcurrent protection circuit
- Protection bracket (sold separately) helps to minimize the effects of external environment [Ø 12.7 mm (1/2 inch) pipes]
- IP64 protection rating (IEC standard)

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g., nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.

02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
Failure to follow this instruction may result in explosion or fire.

03. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire.

04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire.

05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

⚠ Caution Failure to follow instructions may result in injury or product damage.

01. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.

02. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- When connecting an inductive load such as DC relay or solenoid valve to the output, remove surge by using diodes or varistors.
- Use the product after 0.2 sec of the power input.
  When using a separate power supply for the sensor and load, supply power to the sensor first.
- The power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Wire as short as possible and keep it away from high voltage lines or power lines to prevent surge and inductive noise.
- When using switching mode power supply (SMPS), ground F.G. terminal and connect a condenser between 0V and F.G. terminal to remove noise.
- When using a sensor with a noise-generating equipment (e.g., switching regulator, inverter, and servo motor), ground F.G. terminal of the equipment.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000 m
  - Pollution degree 3
  - Installation category II

Product Components

- Product
- Binding band (Ø 6 to 13 mm) × 2
- Instruction manual
- Anti-slip tube × 2

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

BL	13	-	❶	❷	❸	-	❹

❶ Sensing type
T: Through-beam

❷ Power supply
D: 12 - 24 VDC⎓

❸ Output
T: Solid state (transistor)

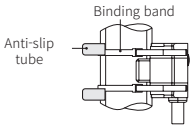
❹ Control output
No mark: NPN open collector output
P: PNP open collector output

Sold Separately

- Protection bracket for Ø 12.7 mm (1/2 inch) pipes: BK-BL13-P

Cautions during Installation

- Be sure to install this product by following the usage environment, location, and specified ratings. Consider the listed conditions below.
  - Installation environment
  - Sensing target
  - Applied pipe
- When installing multiple sensors closely, it may result in malfunction due to mutual interference.
- Be sure that if there is water drop or bubble inner/outer wall of the pipe, it may result in malfunction.
- Do not impact with a hard object or bend the cable excessively. That could decrease the product's water resistance.
- Do not pull the cable with a tensile strength of 30 N or over. Failure to follow this instruction may result in fire due to open circuit.
- Use this product after the test. Check whether the indicator works appropriately for the positions of the detectable object.
- Fix the pipe and the sensor tightly with binding bands (width: ≤ 2.5 mm) and anti-slip tubes and cut the spare part of binding bands with scissors or a knife.
  When connecting binding bands, be careful not to transform the pipe.



Setting Operation Mode

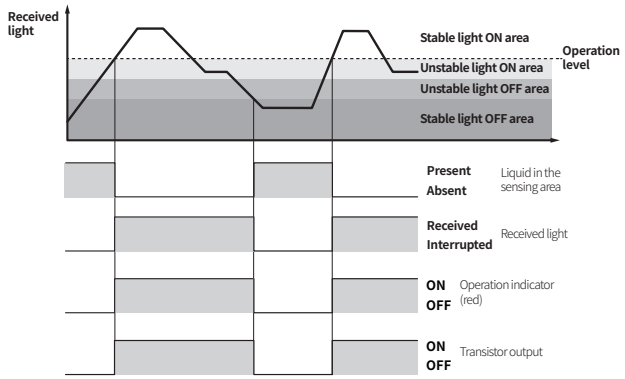
- Press the operation mode switching button once to select the mode.

Light ON mode	Dark ON mode
Operation mode indicator (green) ON	Operation mode indicator (green) OFF

- Hole the operation mode switching button for 3 seconds to lock/unlock the mode. (The operation mode indicator (green) flashes 3 times.)

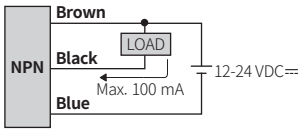
Operation Timing Chart and Indicators

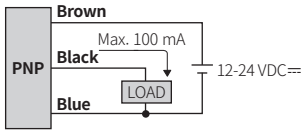
■ Light ON mode



- In Dark ON mode, the waveforms are reversed.

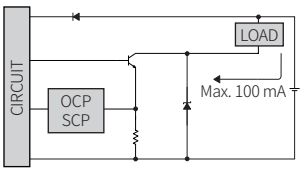
Connections



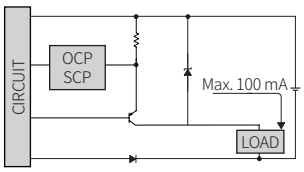


Circuit

■ NPN open collector output



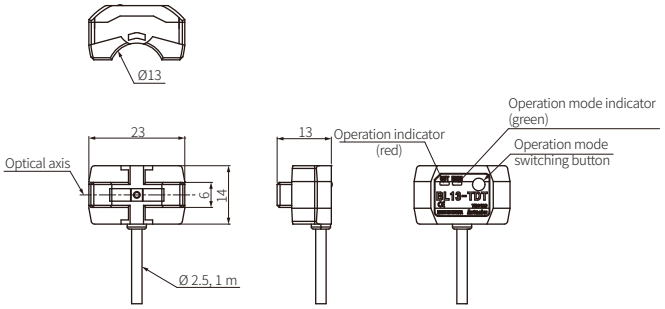
■ PNP open collector output



- OCP (over current protection), SCP (short circuit protection)
- If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the protection circuit.

Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.



Specifications

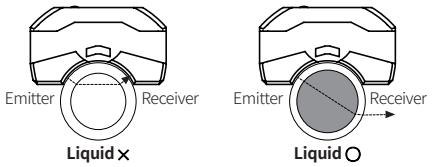
Model	BL13-TDT-□
Sensing type	Through-beam
Applicable pipe	Transparent pipes in 1mm thickness (FEP (fluoroplastic) or with equivalent transparency) Using binding band: Ø 6 to 13 mm Using protection bracket: Ø 12.7 mm (1/2 inch)
Sensing target	Liquid in a pipe 01)
Response time	≤ 2 ms
Light source	Infrared
Peak emission wavelength	950 nm
Operation mode	Light ON mode - Dark ON mode selectable (Button)
Indicator	Operation indicator (red), operation mode indicator (green)
Approval	CE UK CA EAC
Unit weight (packaged)	≈ 13 g (≈ 50 g)

01) This may not detect the liquid with low transparent, with high viscosity, or with floating matters.

Power supply	12-24 VDC⎓ ±10 % (ripple P-P: ≤ 10 %)
Current consumption	≤ 30 mA
Control output	NPN open collector output / PNP open collector output model
Load voltage	≤ 30 VDC⎓
Load current	≤ 100 mA
Residual voltage	NPN: ≤ 1 VDC⎓, PNP: ≤ 1 VDC⎓
Protection circuit	Reverse power protection circuit, output short overcurrent protection circuit
Insulation resistance	≥ 20 MΩ (500 VDC⎓ megger)
Noise immunity	±240 VDC⎓ the square wave noise (pulse width: 1 μs) by the noise simulator
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 min
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	500 m/s² (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient illuminance (receiver)	Sunlight: ≤ 3,000 lx, incandescent lamp: ≤ 3,000 lx
Ambient temperature	10 to 55 °C, storage: -25 to 65 °C (no freezing or condensation)
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
Protection rating	IP64 (IEC standard)
Connection	Cable type
Cable spec.	Ø 2.5 mm, 3-wire, 1 m
Wire spec.	AWG28 (0.08 mm, 19-core), insulator outer diameter: Ø 0.9 mm
Material	Case: PC

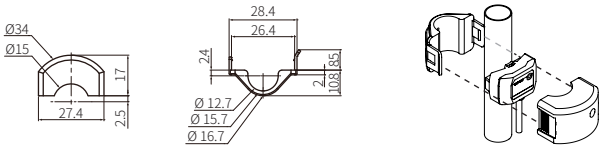
Principle of Detection

This sensor detects the presence/absence of liquid in the pipe by the refractive index of light.



Sold Separately: Protection Bracket (BK-BL13-P)

- Unit: mm, For the detailed drawings, follow the Autonics website.
- For Ø 12.7 mm (1/2 inch) pipes



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