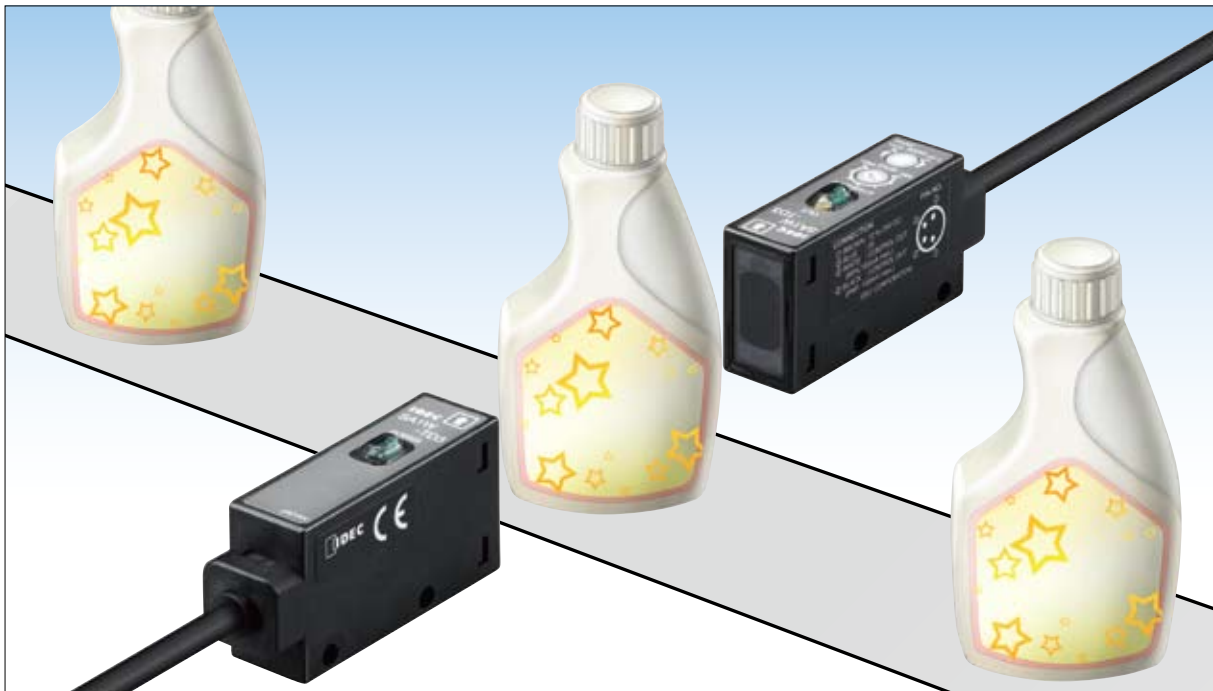


# SA1W-TD3

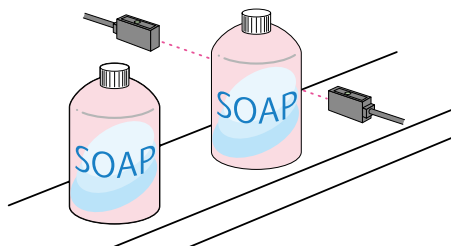
## Water Detection Sensor (Through-beam Lens Type)

High-power water sensor detects water inside opaque containers.  
 X-rays are no longer required for detecting soft drinks or hair-care products.  
 Class 1 laser (safe under all conditions of normal use).

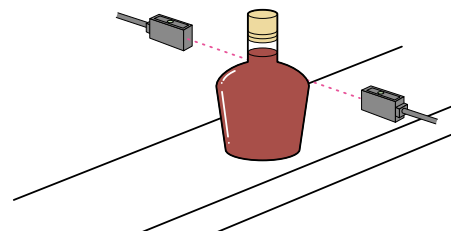


### Application Examples

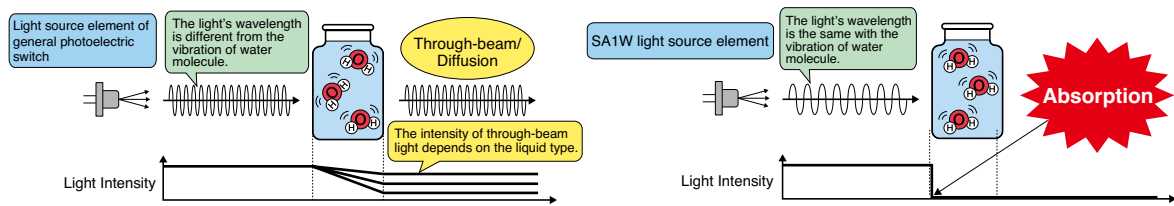
Detects water-based liquids in opaque, plastic or glass containers.



Detects water-based liquids in containers of any shape or color.



### Detection Principle



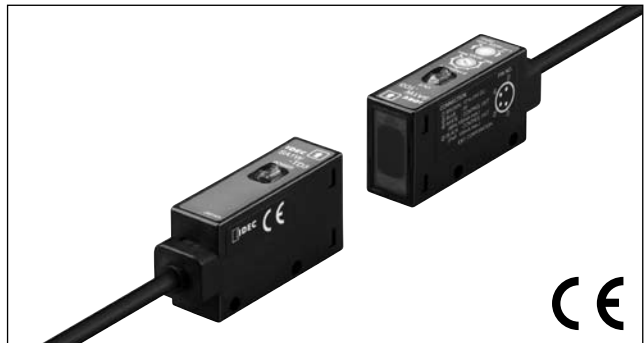
# SA1W-TD3 Water Detection Sensor

**High-power, laser type water sensor.**  
**Detects water-based liquid in opaque containers.**

- The wavelength of the infrared laser is the same as the vibration of water molecule. Detect water-based liquid without failure.
- High-power laser detects the liquid level inside opaque or labeled containers. Passes through ten 1mm-thick, opaque white acrylic plates (Note 1).
- Detects any water-based liquid, regardless of color or type.
- High-power, yet safe Class 1 laser (Note 2)

Note 1: IDEC's color screen SLDN-3C-FW

Note 2: Safe under reasonably foreseeable conditions (IEC 60825-1)



## Types

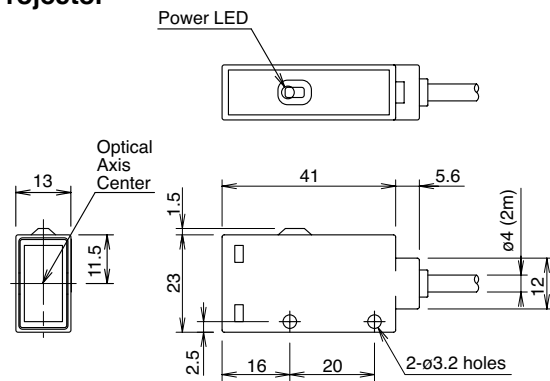
|                   |
|-------------------|
| Ordering Type No. |
| SA1W-TD3          |

## Specifications

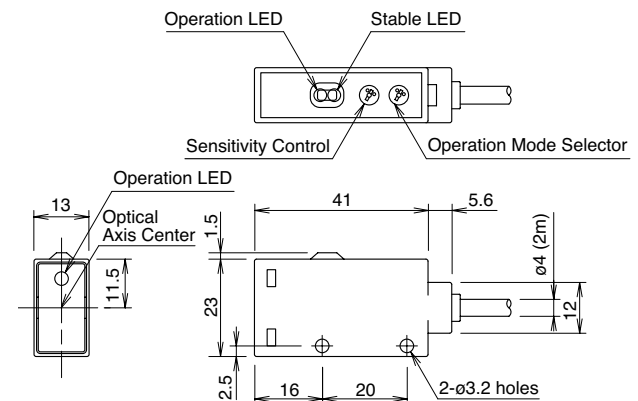
|                           |   |
|---------------------------|---|
| Sensing Method            | Through-beam type   |
| Detectable Object         | Water or water-based liquid   |
| Sensing Range             | 10m   |
| Power Voltage             | 10.8 to 26.4V DC (incl. allowable ripple 10% p-p maximum)   |
| Current Draw              | Projector: 30 mA maximum<br>Receiver: 20 mA maximum   |
| Control Output            | NPN + PNP open collector<br>1st output: NPN 30V DC, 100mA, voltage drop 1.5V max.<br>2nd output: PNP 30V DC, 100mA, voltage drop 2.0V max.<br>With short-circuit protection |
| Operation Mode            | Light ON or Dark ON (operation mode selector)   |
| Response Time             | 1.5 ms maximum  |
| LED Indicators            | <Projector> Power LED: green<br><Receiver> Operation LED: yellow (OUT)<br>Stable LED: green (STAB)  |
| Sensitivity Adjustment    | Adjustable using a potentiometer  |
| Light Source Element      | Infrared laser diode (Class 1: IEC 60825-1)   |
| Light Receiving Element   | Photodiode  |
| Operating Temperature     | 0 to +45°C (no freezing)  |
| Storage Temperature       | -5 to +50°C (no freezing)   |
| Operating Humidity        | 35 to 85% RH (no condensation)  |
| Extraneous Light Immunity | Sunlight: 10000 lx max.<br>Incandescent lamp: 5000 lx max. (on the receiver surface)  |
| Insulation Resistance     | Between live and dead parts: 20 MΩ min. (500V DC megger)  |
| Dielectric Strength       | Between live and dead parts: 1000V AC (50/60 Hz), 0.5 mA, 1 minute  |
| Vibration Resistance      | 10 to 55 Hz, Amplitude 1.5 mm p-p, 20 cycles each in 3 axes (1 cycle: 5 minutes)  |
| Shock Resistance          | 300 m/s <sup>2</sup> , 5 shocks each in 3 axes, 6 directions  |
| Degree of Protection      | IP65 (IEC 60529)  |
| Connection Method         | 2-m vinyl cabtyre cable, 0.2 mm <sup>2</sup> , ø4.0, Projector: 2-core, Receiver: 4-core  |
| Material                  | Housing: PBT, LCP, Lens: PC   |
| Attachments               | Sensitivity control screwdriver, mounting bracket (2 pcs)   |
| Weight (approx.)          | Projector: 70g, Receiver: 70g   |

## Dimensions

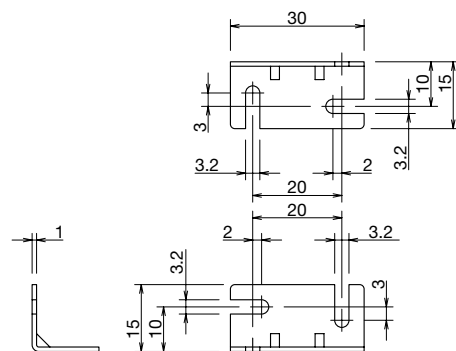
### • Projector



### • Receiver

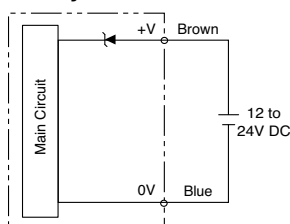


### • Mounting Bracket

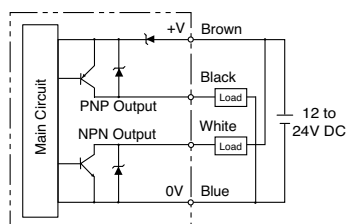


## Output Circuit & Wiring Diagram

### • Projector



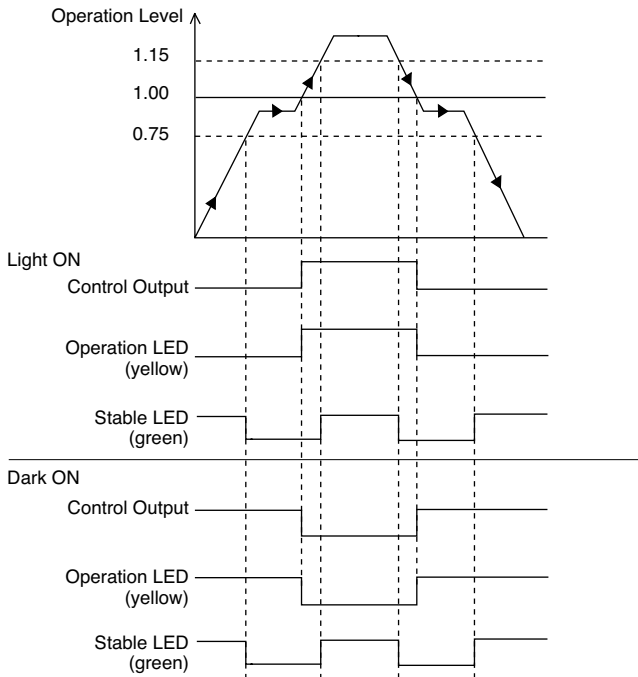
### • Receiver



All dimensions in mm.

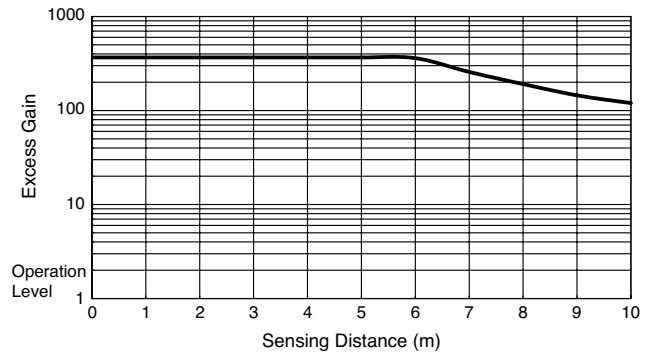
# SA1W-TD3 Water Detection Sensor

## Operation Chart

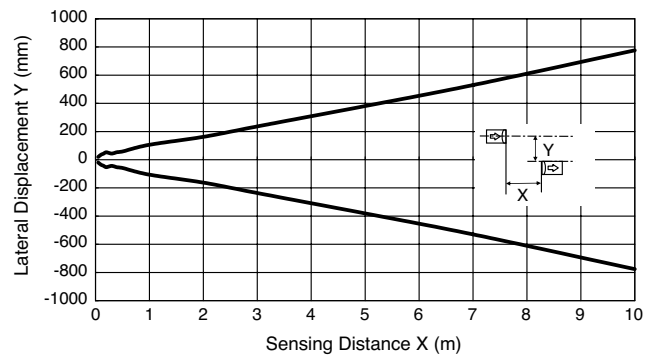


## Characteristics (Typical)

### • Excess Gain



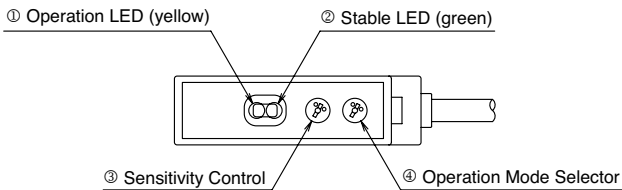
### • Lateral Displacement



## Safety Precautions

### 1. Indicators and Output Operation

#### • Control Panel



#### • Control Panel Function

##### ① Operation LED

##### ② Stable LED

| Receiving Light Intensity Level               | Light Receiving Status | Stable LED (green) | Operation LED (yellow)/ Control Output |         |
|---|------------------------|--------------------|--|---------|
|   |                        |                    | Light ON                               | Dark ON |
| Operation Level<br>1.15 ▷<br>1.00 ▶<br>0.75 ▷ | Stable Incident        | ON                 | ON                                     | OFF     |
|   | Unstable Incident      | OFF                | OFF                                    | ON      |
|   | Unstable Interruption  |                    |  |         |
|   | Stable Interruption    | ON                 | OFF                                    | ON      |

Make sure to use the water detection sensor after the stable operation is ensured.

##### ③ Sensitivity Control

When detecting water or water-based liquid in a thin container, perform sensitivity adjustments as shown in 3 at right. When sensitivity adjustment is not required, set the control to Max.

##### ④ Operation Mode Selector

Use this selector to select Light ON or Dark ON. Make sure to turn the selector completely.

### 2. Optical Axis Alignment (Light ON)

Fasten the receiver temporarily. Place the projector to face the receiver. Move the projector up, down, right and left to find the range where the operation LED turns on (turns off with dark ON type). Fasten the projector in the middle of the range. Next, move the receiver up, down, right and left in the same manner in the middle of the range where the operation LED turns on (turns off with dark ON type). Make sure that stable LED turns on (turns off with dark ON type) at stable incident and stable interruption.

### 3. Sensitivity Adjustment (Light ON)

| Step | Sensor Status                              | Sensitivity Control | Adjusting Procedure   |
|------|--|---------------------|---|
| 1    | Receiving Light (No object)                |                     | Turn the control counter-clockwise to the minimum. Then turn clockwise until the operation LED turns on (turns off with dark ON type) (point A).  |
| 2    | Light is interrupted (Detecting an object) |                     | At interruption status, turn the control clockwise from point A, until the operation LED turns on (turns off with dark ON type) even though the control has reached the maximum, set the maximum position as point B. |
| 3    | -  |                     | Set the control at the mid point C between point A and B.   |

# SA1W-TD3 Water Detection Sensor

## Safety Precautions

### 4. Power Supply and Wiring

- Do not use the water detection sensor during the transient status immediately after turning on the power (approx. 20 ms).
- Operation is unstable immediately after power-up because of heating in the internal circuit. Warming up for 15 minutes is recommended for stable detection.
- Make sure that the water detection sensor is wired correctly according to the wiring diagram and output circuit, otherwise the internal circuit will be damaged.
- Use a power supply with little noise, and use the water detection sensor within the rated voltage range. Make sure that ripple factor is within the allowable limit.
- When using a switching power supply, make sure to ground the FG (frame ground) terminal, otherwise high-frequency noise may affect the water detection sensor.
- Avoid parallel wiring with high-voltage or power lines in the same conduit, otherwise noise may cause malfunction and damage. When wiring is long or the water detection sensor may be affected by a power line or electromagnetic equipment, use a separate conduit for wiring.
- Use a cable of 0.3 mm<sup>2</sup> minimum core wires, then the cable can be extended up to 100m.

### 5. Installation

- Do not install the water detection sensors in an area where the sensors are subject to the following conditions, otherwise malfunction and damage may be caused.
  - Inductive devices or heat source
  - Extreme vibration or shocks
  - Large amount of dust
  - Toxic gases
  - Water (on the lens), oil, chemicals
  - Outdoor
- Tighten the mounting screws to a torque of 0.5 to 0.8 N·m. Do not tighten the mounting screws excessively or hit the water detection sensor with a hammer, otherwise the protection degree cannot be maintained.
- Make sure to prevent sunlight and especially the fluorescent light of inverters from entering the receiver of the water detection sensor directly.
- Polycarbonate resin is used for optical elements. Do not use ammonia or caustic soda for cleaning, otherwise optical elements will be dissolved. To remove dust and moisture build-up, use ethanol or soft dry cloth.
- Do not mount two or more water detection sensors in close proximity, because interference prevention is not provided. Maintain appropriate distance between the sensors referring to the lateral displacement characteristics.

## SA1W Water Detection Sensor (Fiber Type)

### As easy to use as photoelectric switches

- The laser light's wavelength is the same as the water molecule vibration. Even transparent water-based liquids can be detected.
- The highly-efficient optic design allows for sensing liquid level inside a colored container (lens attachment needed).
- Sensor can be positioned easily using the visible red LED.
- Fiber optics cable fits into small areas.

### Types

#### • Water Detection Sensor

| Ordering Type No. | Control Output     | Package Quantity |
|-------------------|--------------------|------------------|
| SA1W-FN3F         | NPN open collector | 1                |
| SA1W-FP3F         | PNP open collector | 1                |



#### • Fiber Unit

| Item                                | Ordering Type No. | Sensing Distance | Package Quantity |
|-------------------------------------|-------------------|------------------|------------------|
| Through-beam type                   | SA9W-TS31         | 100 mm           | 1                |
| Reflex type                         | SA9W-DD81         | 30 mm            | 1                |
| Lens attachment (through-beam type) | SA9Z-F21          | 800 mm           | 2                |

Specifications and other descriptions in this catalog are subject to change without notice.



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