

Oil Film Detector (Non-Explosion-Proof Version)

ODL-1600A

The Model ODL-1600A monitors a water surface for the presence of an oil film floating on the surface. The instrument projects a laser beam onto the water surface and measures the differences in the reflection properties between water and oil at an early stage.

Our series of oil on water monitors have been field proven over decades and are used in a wide variety of installations worldwide. These instruments include the Models ODL-12 and ODL-20.

This instrument is a slightly enhanced version of the existing oil film detector ODL-1600. While it inherits the proven technology employed by the existing model, such as laser beam scanning and high-speed pulsing, this model also comes with optimized optical design and higher level of noise immunity to accommodate various conditions in the field. These design enhancements enable the ODL-1600A to deliver more reliable oil detection.

If installation in hazardous areas is required, we recommend our flameproof enclosure type Model SODL-1600.



Features

- Non-contact laser beam detection system.
- Scanning laser beam system provides enhanced detection even under difficult surface conditions such as the presence of floating debris, bubbles or curved oil surfaces with higher reliability.
- Laser scanning system contains no moving parts reducing power consumption and increasing reliability in continuous run.
- Fast signal processing and short pulse cycle of laser beam provides excellent detection ability even on water surfaces with ripples and waves.
- Internal micro-computer provides comprehensive diagnostic and maintenance information including reflected light intensity, oil detection history etc.
- The instrument is also capable of detecting leakage of water or oil on dry surfaces.
- Optimized optical design enables mounting of the detector from 0.3m up to 4m from the water surface (mounting up to 6.5m is possible for smooth water surfaces). Detection at water surface with turbulence is now enabled.
- Rugged, cast aluminum enclosures suitable for mounting in harsh, industrial environments.
- The optional simple, easy to adjust mounting brackets allow easy installation and maintenance.
- A single transmitter can control up to two detectors.
- The Korean KC mark acquired.
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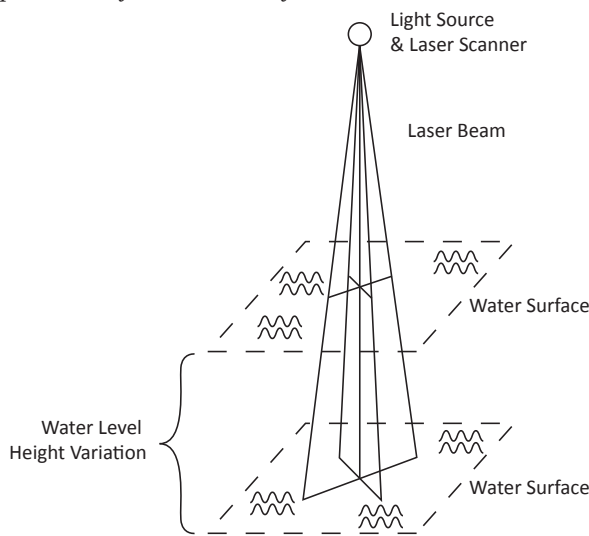
Specifications

<p>Product Name : Oil Film Detector (non-explosion-proof version)</p> <p>Model Code : ODL-1600A</p> <p>Measurement Object : Oil slick floating on water surface or dry surface (floor)</p> <p>Measurement Method : Reflectance of visible light</p> <p>Sensor Distance : 0.3m to 4m above water or floor surface (0.3m to 6.5m for smooth water surfaces - for example located indoors)</p> <p>Light Source : Class 2 semiconductor laser diode (red)</p> <p>Configuration : Detector and transmitter housed in separate enclosures</p> <p>Ingress Protection : Transmitter; IP-65 Detector; IP65 / IP67 Ambient</p> <p>Ambient Conditions : Temperature; -10 to 50 deg C Humidity ; 5 to 95% RH</p> <p>Environmental conditions : Altitude 2000m or lower Installation category II Pollution degree 3</p> <p>Sample Temperature : No freezing</p> <p>Output Signals : 4 to 20mADC max load 600Ohms insulation transmitter can be selected from below 2 options. 1) Standard Output Mode Normal status; Around 10.4mA (Static water) Detecting status; Around 13.6mA or more Alarm status; Around 4mA (No reflection) 2) ODL-20 Compatible Mode Normal status; 18mA (Fixed value) Detecting status; 20mA (Fixed value) Alarm status; 16mA (Fixed value) Burnout is selectable for Mode 1 Oil-detected alarm ON; 21mA (Fixed value) Trouble-detected alarm ON: 3mA (Fixed value) (Trouble alarm refers to all abnormal situations of measurement, machinery, etc.)</p> <p>Alarm contact output signals : Total of 6 available alarm contacts (5 for "a" or "b" contacts*1, one for a "c" contact) *1; Please specify "a" or "b" when placing an order. Contact capacity; 240VAC 1A, or 30VDC 1A (resistance load) The following alarm contact outputs can be freely assigned; 1; Power cut-off, 2; Maintenance in progress, 3; Oil-on-water alarm, 4; Measurement error, 5; Instrument error. The same item can be assigned to multiple contact outputs. (However, contact output 1 is set to the power cut-off signal.)</p>	<p>Digital Communication System : Based on RS-485 (isolated) Available Baud rates; 2400, 4800, 9600, 19200, 38400, 57600 Protocol; MODBUS/RTU Data length; 8 bits Parity; select from None, Odd, Even Stop bits; 1 Bit Data Order; Big Endian</p> <p>Operating Power : 100 to 240VAC, 50/60Hz Tolerance range +/- 10%</p> <p>Power Consumption : 100V, approx.13VA (max 17VA) 240V, approx.26VA (max 30VA) When using optional heater, max 35VA</p> <p>Weight : Transmitter; approx. 2.2 kg Detector section ; approx. 14 kg</p> <p>External Dimensions : Transmitter; approx. 181(W) x 180(H) x 95(D)mm Detector ; approx. 240(diameter) x 443(L)mm</p> <p>Construction Materials : Transmitter ; die cast aluminum Detector ; die cast aluminum</p> <p>Surface Finish : Metallic silver</p> <p>Electrical Connections : Transmitter; 6 cable glands for 6 to 12mm diameter cable, G1/2 threaded connections when gland removed. Detector ; 1 cable glands for 6 to 12mm diameter cable, G1/2 threaded connections when gland removed, 1 Spare wire port, (G1/2 plug-in)</p> <p>Connection Cable Lengths : Transmitter to detector ; max 100m (power and communication cable)</p> <p>Applicable Specifications1 : Safety EN61010-1 EMC EN 61326-1 Class A Korea Electromagnetic Compatibility Standard Class A Laser JISC 6802 (IEC 60825-1)</p>
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Principle of Operation

The reflectance of light from an oil film is greater than that of water. When an oil film is present on a water surface, it generates a "glistening" effect. Therefore, the presence of oil can be detected by applying a light beam of constant intensity to the water surface and then measuring the intensity of the reflected light.

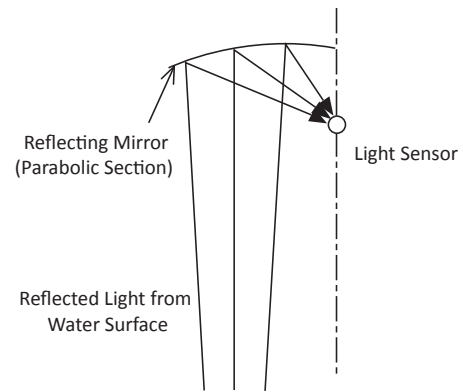
The detector contains a semiconductor laser diode, a laser scanner, reflecting mirror (semi-conductor laser diode) and a photodiode light sensor. The light output from the laser tube is scanned across the water surface periodically across the x-y axis.



<Water surface fluctuation and irradiation light>

The light that is reflected back by the water surface is captured by a parabolic mirror and focused on to a sensor located at the focal point of the mirror.

The signal from the light sensor is processed by the micro-electronics in the transmitter. From the processed signal it can be determined whether an oil film is present or not. The transmitter provides output signals indicating the detection status such as contact switching signals, analogue signals etc.



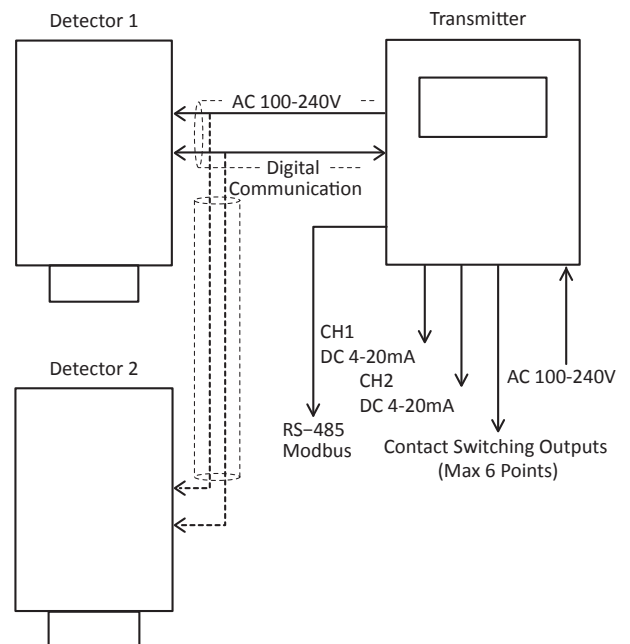
<Reflecting mirror and Light Sensor>

Reception of reflected light

System Configuration

The instrument comprises a detector and transmitter. The detector and transmitter continuously communicate. The raw detection signal and diagnostic information are sent from the detector to the transmitter. The transmitter provides local status display and generates output signals for onward transmission to an external plant control system or external receiving device. The transmitter allows set up of operating parameters such as detection mode and alarm settings etc.

Two detectors can share a single transmitter. In this configuration the transmitter communicates with each detector individually and provides individual alarm and analogue output signals corresponding to each detector. (max 6 contact switching points).



Transmitter Functions

(1) Display

The transmitter displays information on calibration, oil film detection status, raw light intensity, self-diagnostics and error conditions.

(2) Various Oil Detection Modes

The condition of oil floating may be sparse or wide-spread. The transmitter allows the detector to be set up for particular water surface conditions such as still, smooth surfaces or unstable surfaces with waves and bubbles etc. The transmitter allows the operator to establish a suitable set up for the particular installation conditions.

(3) Analogue Output Signals

A 4 - 20mA output signal is available representing the light intensity signal. By using burnout function, the analogue output can also be set to indicate alarm status of the instrument (oil detection, instrument malfunction). It does this by changing the analyzer output to an out of scale value (21mA, 3mA). Thus a single analogue signal can transmit three detection conditions (normal operation with raw intensity signal, instrument malfunction and oil alarm)

(4) Contact Switching Output Signals

A total of 6 contact switching signal are available. These can be configured by the operator to represent alarm and self-diagnostic information. The available signals are as follows: -

- Oil film detection.
- Under maintenance (ST-BY mode).
- Detection error (water surface detection error, reflected light error, ambient light error).
- Instrument malfunction (laser output trouble, internal

temperature alarm).

- Power failure (open or closed contact available).

(5) External Device Communication

Digital communication with external devices is available using MODBUS protocol from the RS485 output signal.

(6) Optional Dual Detector Capability

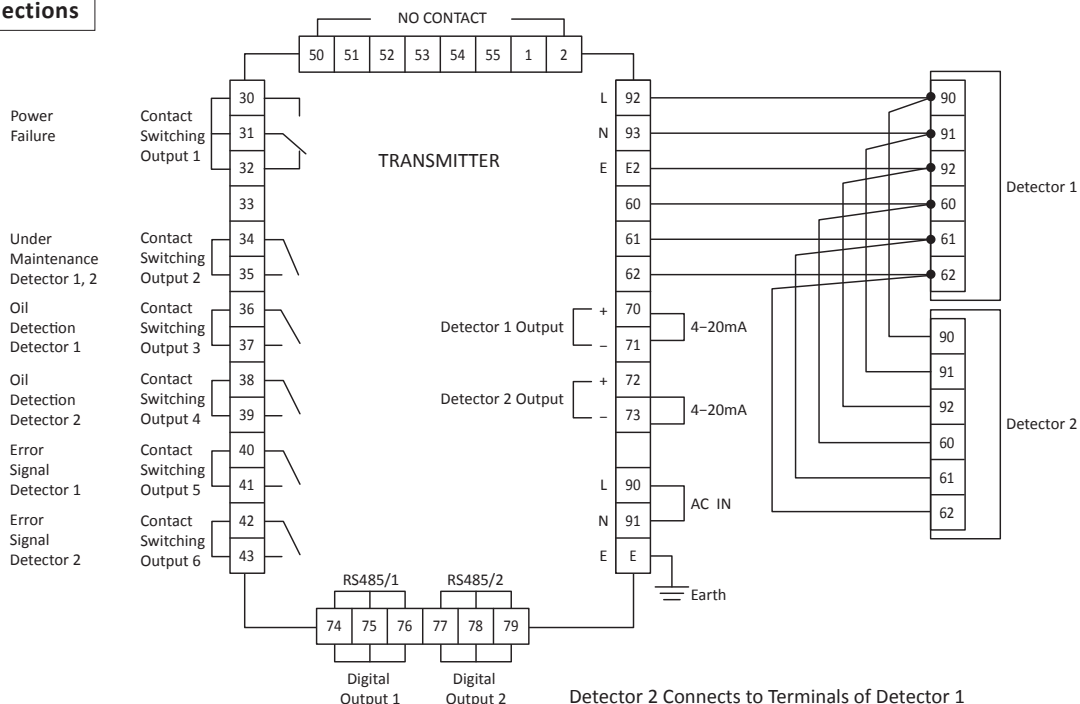
It is possible to connect two detectors to a single transmitter enabling the monitoring of 2 different locations simultaneously.

(7) Detection History Stored in Memory

Oil Film Alarm History (ALM LOG) and Fault Alarm History (ERRLOG) can be stored for each of the past 10 cases.

Detection parameters are stored in memory together with date and time of detection. This data can be recalled by the operator. The historical data can be used to evaluate instrument performance and assist in fine tuning the senility set-up etc.

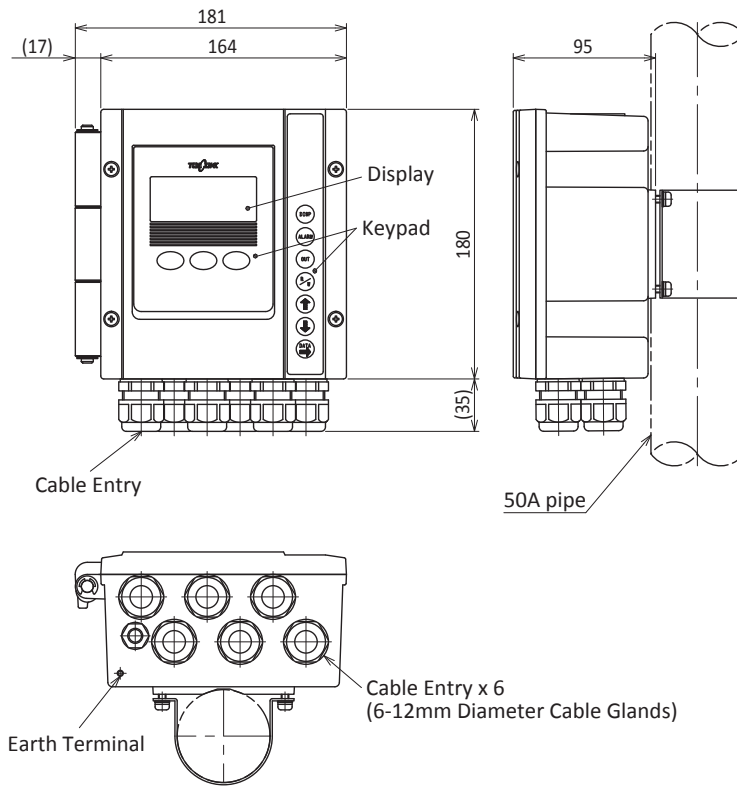
Terminal Connections



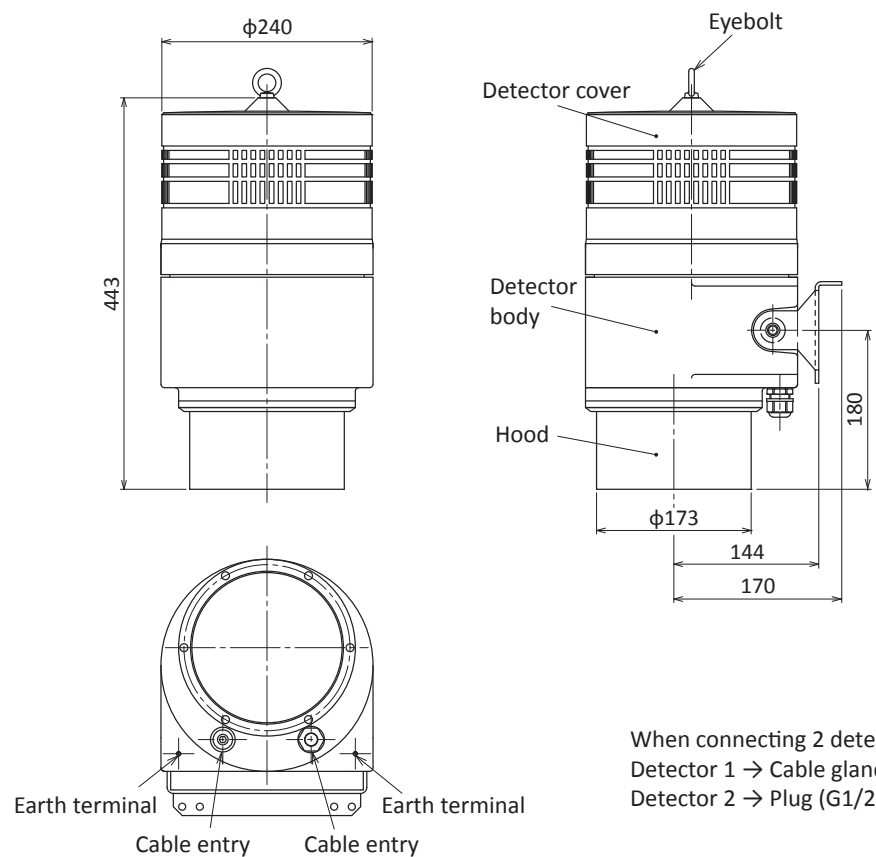
Dimensions

Unit : mm

● Transmitter

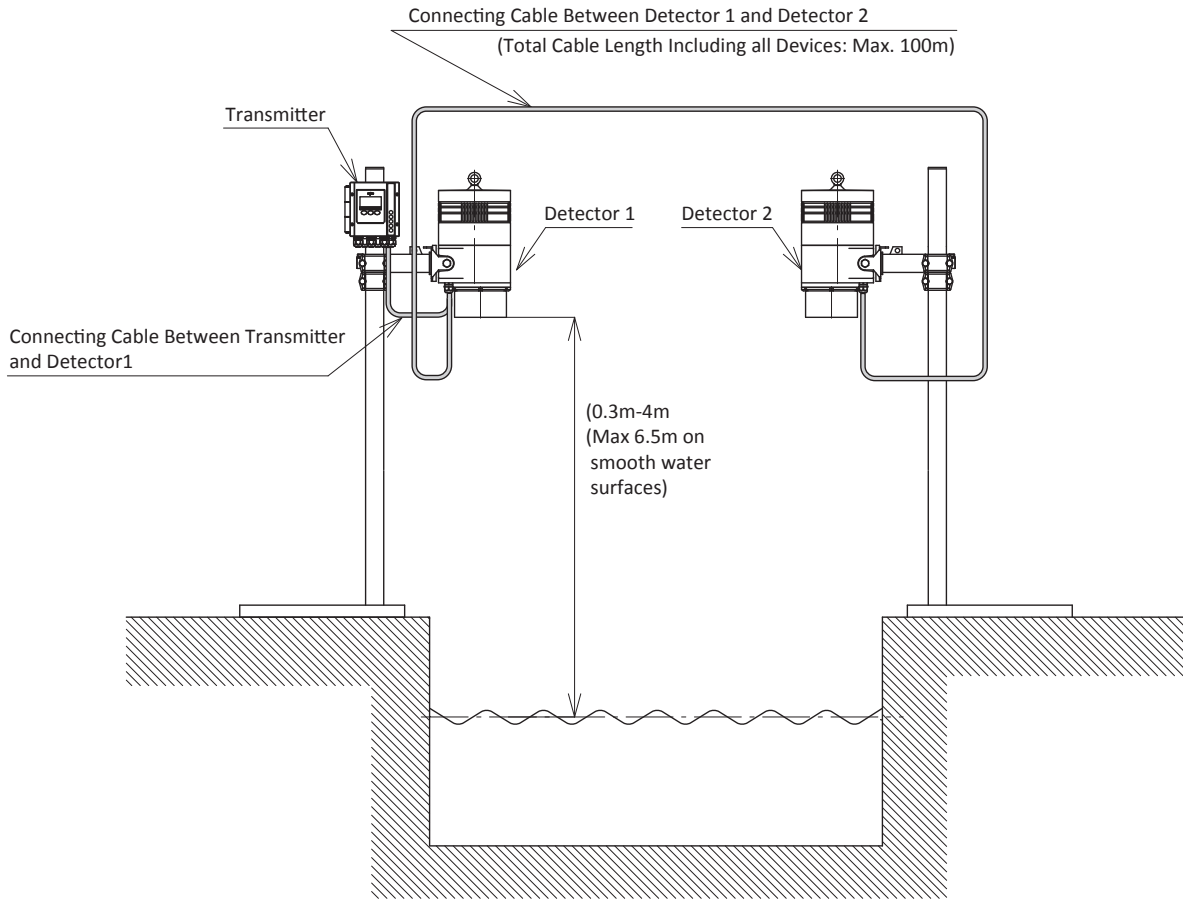


● Detector



When connecting 2 detectors
 Detector 1 → Cable glands (G1/2)
 Detector 2 → Plug (G1/2) SBP-16

Installation



Installation Conditions

1. The detector should be mounted within 0.3m to 4m from the water surface for normal water conditions. In ideal conditions (for example smooth water surfaces located indoors) the distance can be increased to within 0.3m to 6.5m. When evaluating installation locations consider water level changes, these must be within the distances given above. Avoid mounting too close to the water surface in order to avoid splashing and potential damage due to immersion during unexpected flooding, heavy rain, etc.
2. Install the analyzer at a location where the water flows smoothly. Avoid locations where there is turbulence.
3. Install the analyzer at the location where the monitoring surface will not be subjected to direct rainfall or direct wind disturbance, because a severely rippled water surface may make it difficult for oil film detection. For such locations, protection against direct rainfall or wind disturbance will be required.
4. Avoid installing the detector in locations where dead leaves or other debris may accumulate on the water surface. These may affect water flow characteristics and cause detection problems.
5. Avoid locations where sunlight may disturb detection. If strong sunlight causes detection problems, move the detector to a shady location or install a sun shade.
6. Strong, direct sunlight may cause high temperatures inside the instrument enclosures. When the instrument is installed in locations subject to strong sunlight, protection with the optional sun-shade is recommended.
7. Install the instrument in a location where vibrations and mechanical shocks are minimized. Secure a space around the analyzer and scaffolding if necessary for a safe and easy access during maintenance.
8. Avoid locations where there is rising mist due to high water temperature. If this is unavoidable, supplying a gentle airflow will effectively clear the vapor away. Please consult us for set up.
9. If using the instrument to monitor liquid leakage on dry surfaces (such as floors etc.), ensure that the surface is level. A sloping surface will not reflect the light from the laser beam correctly and cause detection problems. Select a part of the surface where any leaked liquid will form a smooth liquid film. If the dry surface is excessively shiny, place a non-reflective surface over it such as a rubber mat etc.

Product Code

Code	Description
ODL1600A-1-	Transmitter Mounting
1	On a 50A pole
2	Wall or rack mounting
	Surface finish (coating) *1
1	Standard coating
2	High performance coating (in case of 1 detector)
3	High performance coating (in case of 2 detector)
	Arrester*2
0	None
1	Included
	Power, Transmission, Signal Cable Entry *3
A	Cable glands for ø6 - 12 cable (standard)
B	G1/2 conduit threads when the cable glands are detached
C	NPT 1/2 supplied with 6 adapters
	Number of Detectors Connected
1	1 (Detector 1: ODL-160U)
2	2 (Detector 1: ODL-160U and Detector 2: ODL-160U)
8	2 (Others)
	Cable Length from Transmitter to Detector 1*4
1	2m (standard)
2	10m
3	20m
4	100m
8	Custom specification (max 100m)
	Cable Length from Detector 1 to Detector 2*4
0	None (in case of only one detector)
1	2m
2	10m
3	20m
4	98m
8	Custom specification (max 98m)
	Alarm Contact Output (contact output 2 - 6) *5
A	a contact (240VAC 1A or 30VDC 1A)
B	b contact (240VAC 1A or 30VDC 1A)
	Anti Misting Heater for Detector Glass *6
0	None
1	Equipped to Detector 1 only
2	Equipped to Detector 2 only
3	Equipped to both Detectors 1 and 2
	Mounting Bracket for Detector 1
1	For Mounting on 50A pole (Pole available as an option)
2	For Replacement of ODL-12*7
3	For Replacement of ODL-20 *7
4	For Replacement for others*7
9	Special*7
	Mounting Bracket for Detector 2
0	None (in case of only one detector)
1	For mounting on 50A pole (pole available as an option)
2	For Replacement of ODL-12*7
3	For Replacement of ODL-20 *7
4	For Replacement for others*7
9	Special *7
	Sun Shade
0	None
1	Equipped to Transmitter Only
	Markings
A	Japanese Language (Standard)
B	English Language

Code indicating special specifications
 Numeric digit: 9
 Alphabetic character: Z

- *1. The standard painting for both the transmitter and detector consists of a melamine resin applied as the primer coat and finish coat. The average film thickness is 30µm or more. The heavy duty coating for both the transmitter and detector consists of an epoxy resin applied as the primer coat and middle coat, and polyurethane resin applied as the finish coat. The average film thickness is 100µm or more.
- *2. The ceramic surge arrester (simplified) is mounted on the power line and transmission line.
- *3. There are 6 cable ports that come with ø6 to ø12 cable glands. The size of the conduit thread is G1/2. It is clearly recognizable when the cable gland is removed. If you request a NPT1/2 cable port, 6 SUS-316 adapters will be supplied. For this reason, replace the necessary number of the cable glands with adapters from the ports. If some of the ports are not used as conduits, leave the cable glands in place to seal the ports.
- *4. The total maximum cable length between the transmitter, detector 1, and detector 2 is 100m. For example, if the cable length from detector 1 to detector 2 is 2m, then the maximum cable length from detector 1 to detector 2 is 98m. The cable lengths are specified in 1m increments. (Detector 2 must be connected to the terminals of detector 1, it must not be connected directly to the transmitter.)
- *5. There are 6 available alarm contact output signals. Contact output 1 is set to the power cut-off signal. Contact outputs 2 through 6 can be configured by the operator to indicate oil-on-water alarm, maintenance in progress, abnormal signals, and other items. The only "c" contact is contact output 1, but its contact capacity is the same as that of contact outputs 2 through 6. The contact configuration ("a" contact or "b" contact) is specified at the factory. In principle, the contact configuration cannot be changed after the device is shipped. When using the device in an environment where there is machinery with a large-power capacity that

- causes extreme fluctuations in the power supply, we recommend attaching a relay with a timer to the terminal used to receive contact output signals. This relay can help prevent false alarms.
- *6. We recommend equipping the anti-misting heater for the detector glass. Select "equipped" if the location in which the device is installed is prone to sudden, extreme temperature changes, or if the location is exposed to high levels of humidity. (For example, a heater would be required if the temperature changes from 10 deg C to 25 deg C within a 30-minute period, and if the ambient humidity is 90%.)
- *7. When replacing the ODL-12 or ODL-20 currently in use or instruments from other manufacturers, it might be necessary to change the mounting bracket type to accommodate the new instrument. If you select "Replacement type" or "Custom spec.", contact one of our sales representatives.

Notes

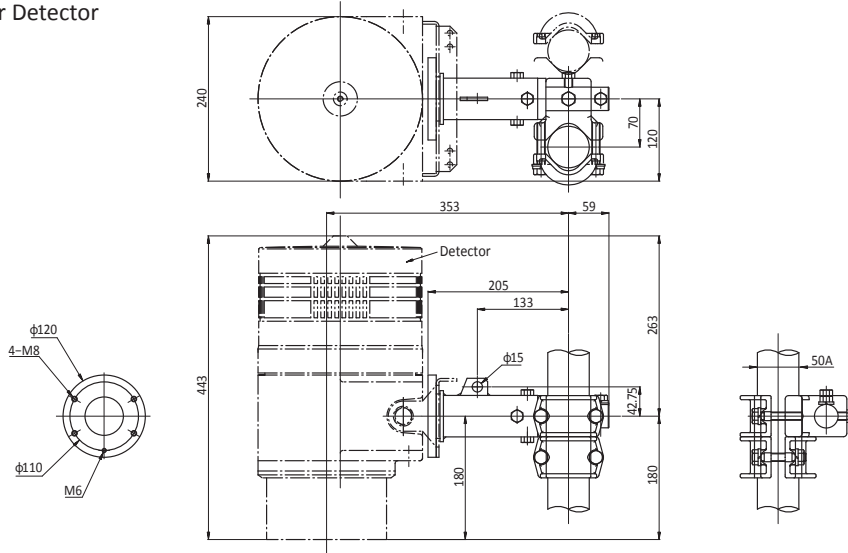
- 1. The instrument is powered by a universal AC power supply with automatic voltage regulation (100 to 240VAC).
- 2. The transmission output is 4 to 20mA DC. When replacing the model currently in use or instruments from other manufacturers, it might be necessary to change the transmission and alarm signal configurations. For details, please contact our sales representatives.
- 3. Order the B-150 or ZB-1 if a pole stand is required to mount the transmitter and detectors. If you plan to set up the instrument in an environment in which it might be exposed to strong winds, a more durable pole stand might be required. For details, please contact our sales representatives.
- 4. The transmitter and detector have an IP65 construction. If you plan to use the detector in an environment in which it might be submerged in water, please contact our sale representatives.

Option

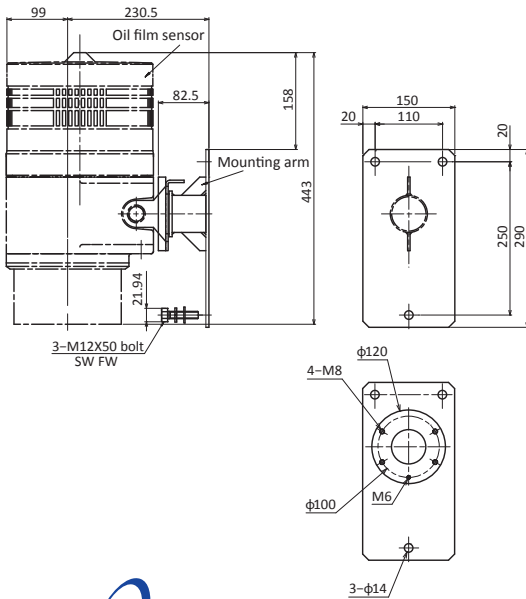
Dimensions

Unit : mm

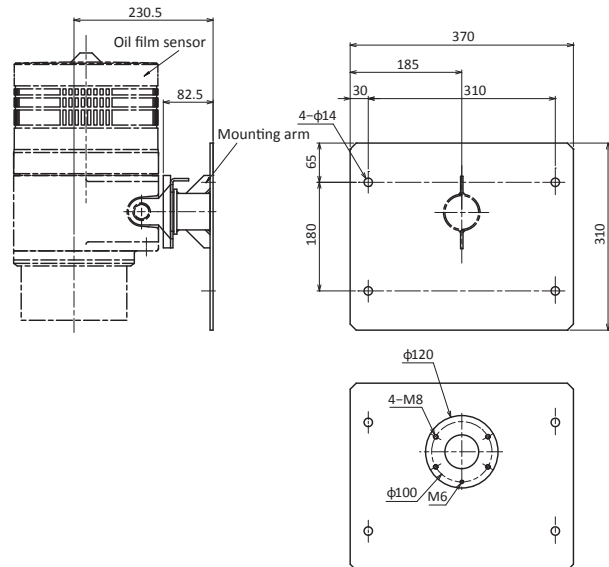
- Mounting Bracket for Detector (50A Pole Type)



- Wall Mount Mounting Bracket 1 (Previous model ODL-12 replacement compatible)



- Wall Mount Mounting Bracket 2 (Previous model ODL-20 compatible replacement example)



DKK-TOA CORPORATION

Overseas Sales Division:
 DKK-TOA Corporation
 29-10, 1-Chome, Takadanobaba, Shinjuku-ku,
 Tokyo 169-8648 Japan
 Tel : +81-3-3202-0225 Fax : +81-3-3202-5685
 E-mail : intsales@dkktoa.com



CAUTION

Please read the operation manual carefully before using products.