

## 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.
- Conforms to CE marking
- The Korean KC mark acquired.

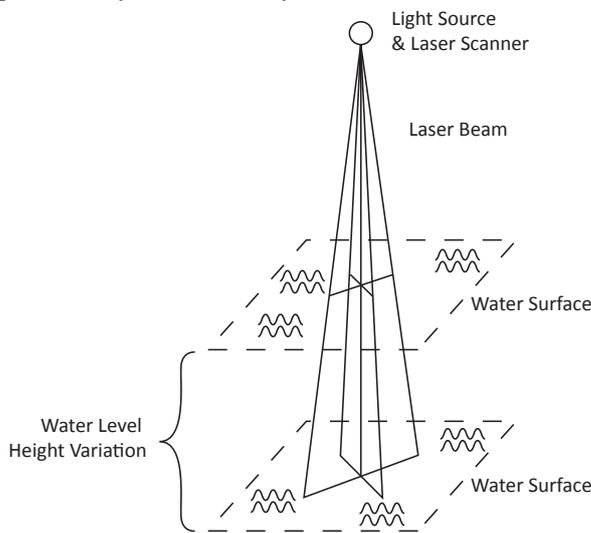
## Specifications

Product Name	: Oil Film Detector (non-explosion-proof version)	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
Model Code	: ODL-1600A	Operating Power	: 100 to 240VAC, 50/60Hz Tolerance range +/- 10%
Measurement Object	: Oil slick floating on water surface or dry surface (floor)	Power Consumption	: 100V, approx.13VA (max 17VA) 240V, approx.26VA (max 30VA) When using optional heater, max 35VA
Measurement Method	: Reflectance of visible light	Weight	: Transmitter: approx. 2.2 kg Detector section : approx. 14 kg
Sensor Distance	: 0.3m to 4m above water or floor surface (0.3m to 6.5m for smooth water surfaces - for example located indoors)	External Dimensions	: Transmitter: approx. 181(W) x 180(H) x 95(D)mm Detector : approx. 240(diameter) x 443(L)mm
Light Source	: Class 2 semiconductor laser diode (red)	Construction Materials	: Transmitter ; die cast aluminum Detector ; die cast aluminum
Configuration	: Detector and transmitter housed in separate enclosures	Surface Finish	: Metallic silver
Ingress Protection	: Transmitter: IP-65 Detector: IP65 / IP67 Ambient	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)
Ambient Conditions	: Temperature: -10 to 50 deg C Humidity ; 5 to 95% RH	Connection Cable Lengths	: Transmitter to detector ; max 100m (power and communication cable)
Environmental conditions	: Altitude 2000m or lower Installation category II Pollution degree 3	Applicable Specifications1	: Safety EN61010-1 EMC EN 61326-1 Class A Korea Electromagnetic Compatibility Standard Class A Laser JISC 6802 (IEC 60825-1)
Sample Temperature	: No freezing		
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.)		
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.)		

### 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.

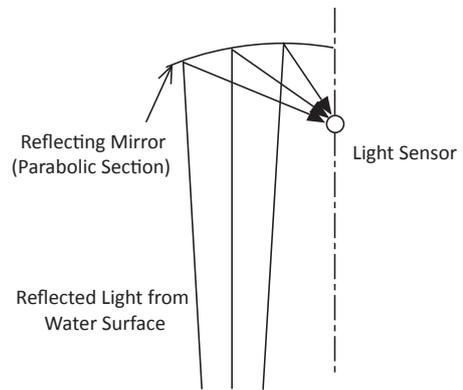
The detector contains a semiconductor laser diode, a laser scanner, reflecting mirror (semi-conductor laser diode) and a photodiode light sensor. The light output from the laser tube is scanned across the water surface periodically across the x-y axis.



<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.



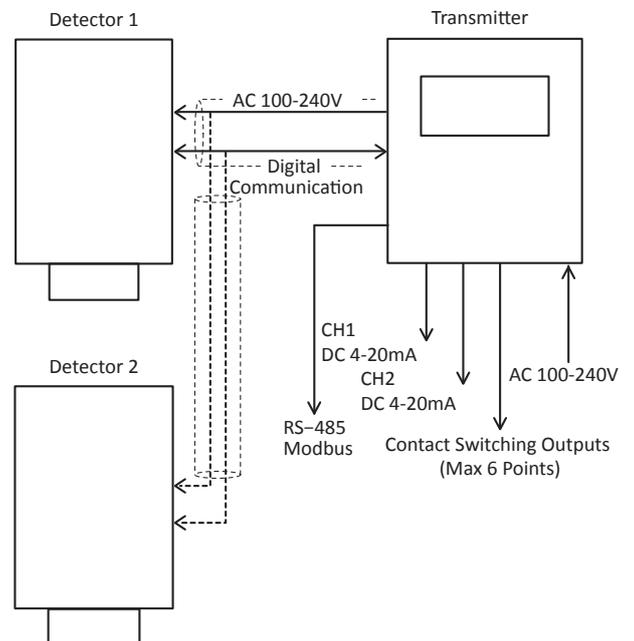
<Reflecting mirror and Light Sensor>

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 widespread. 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

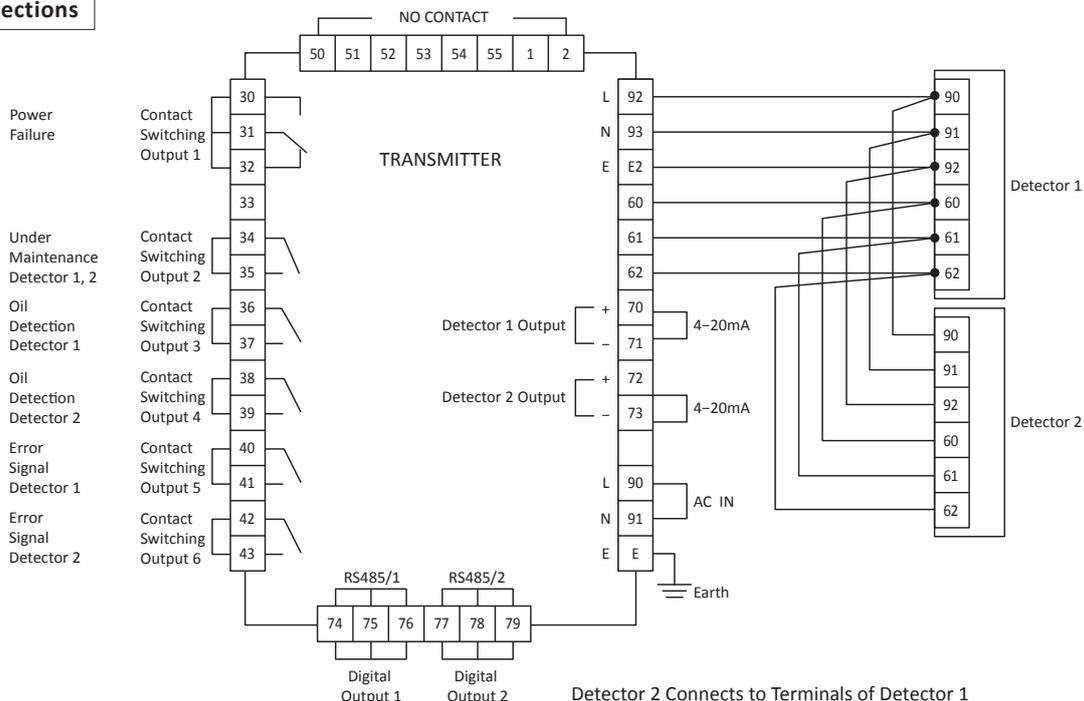
It is possible to connect two detectors to a single transmitter enabling the monitoring of 2 different locations simultaneously.

### (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.

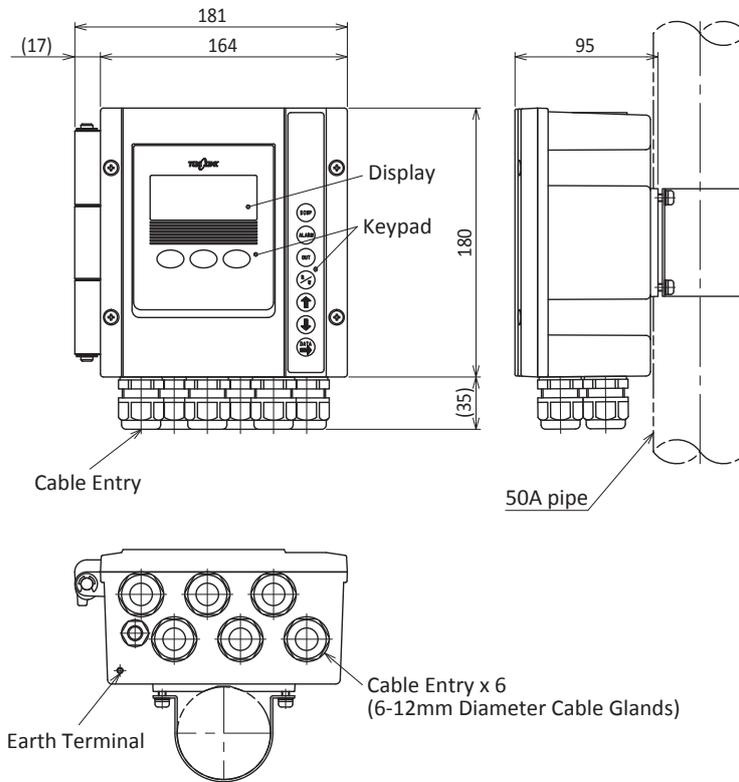
## Terminal Connections



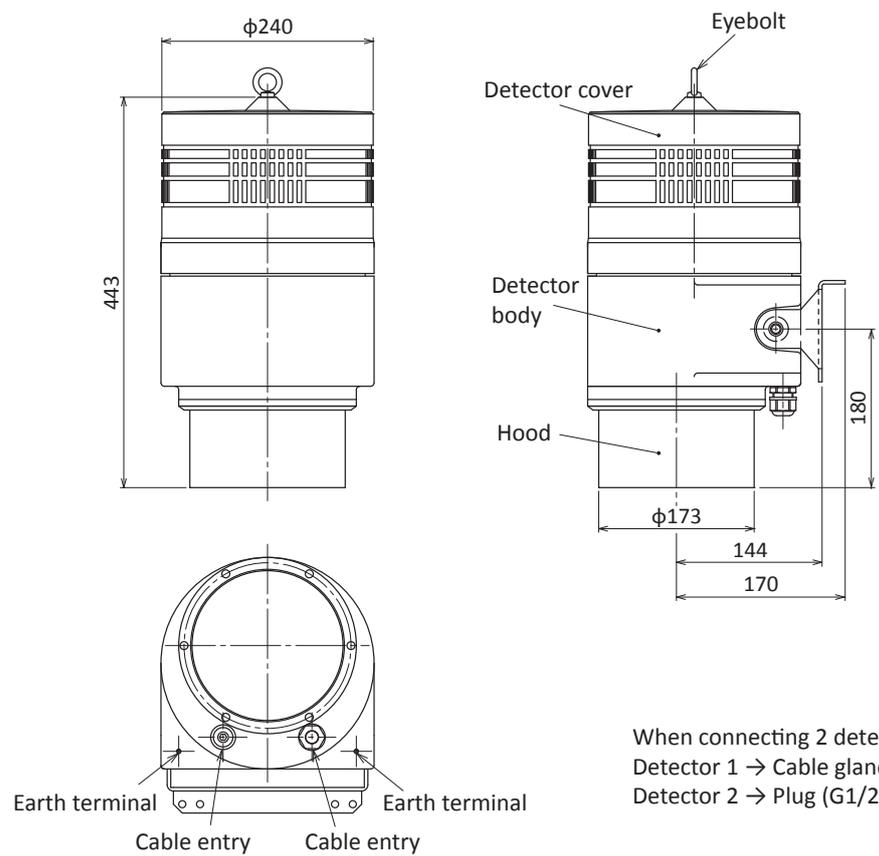
**Dimensions**

Unit : mm

● Transmitter

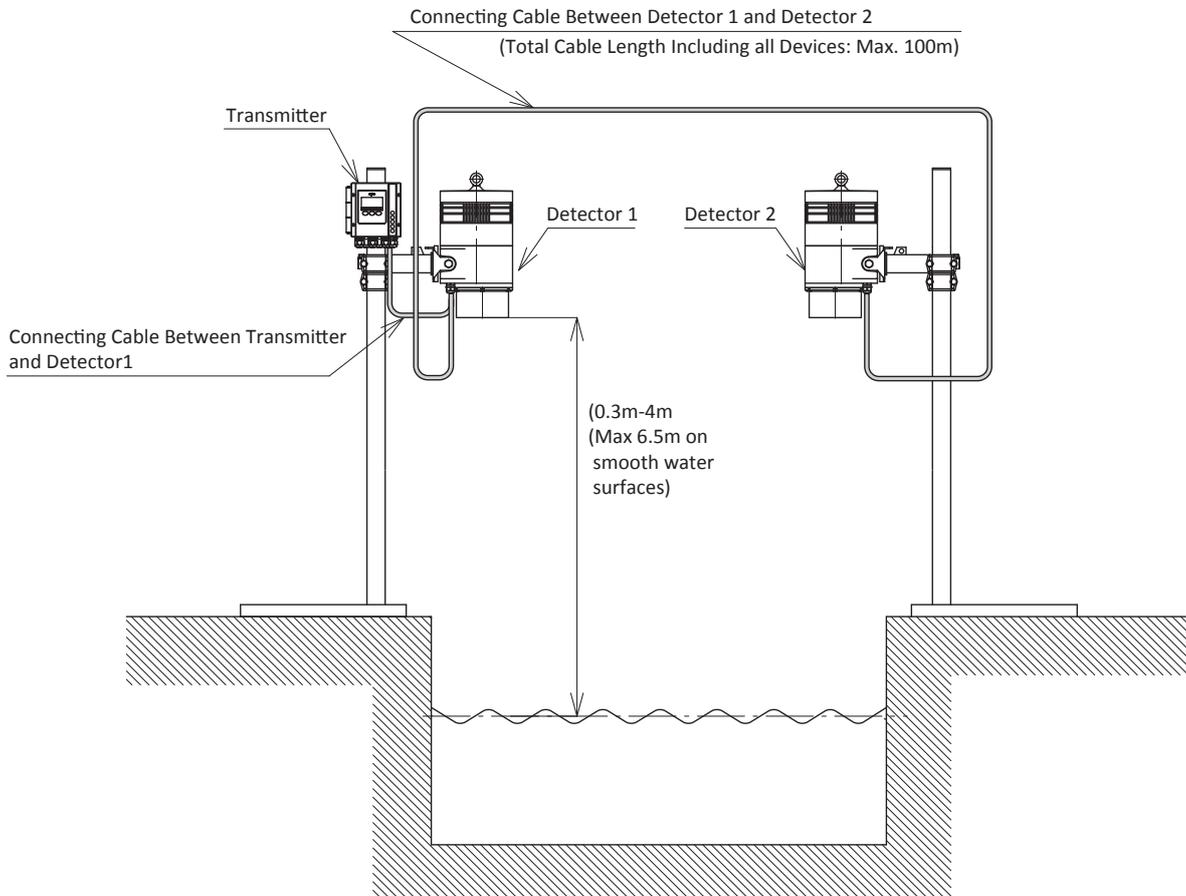


● Detector



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.

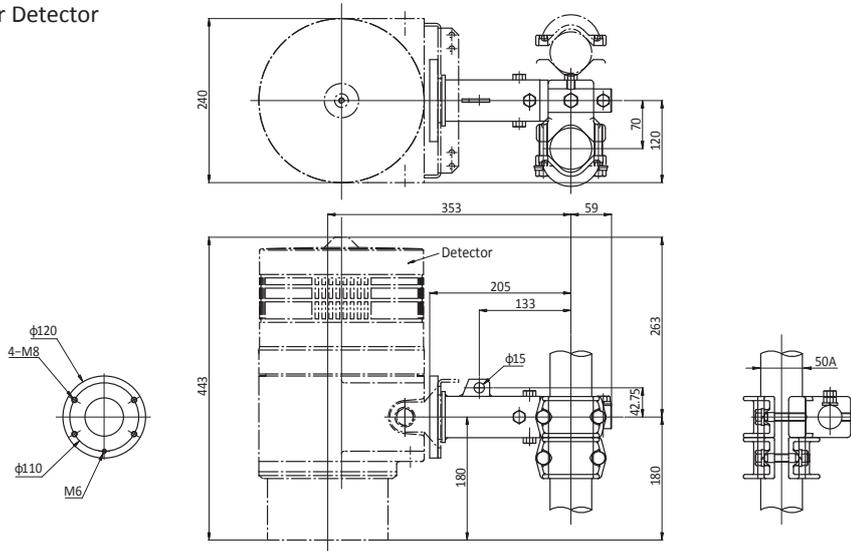


**Option**

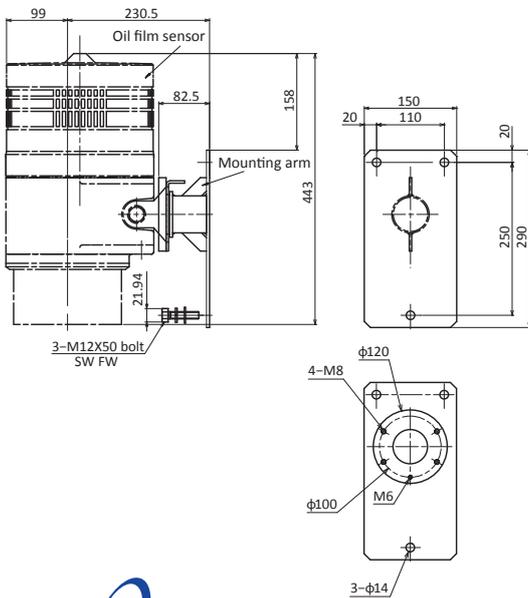
**Dimensions**

Unit : mm

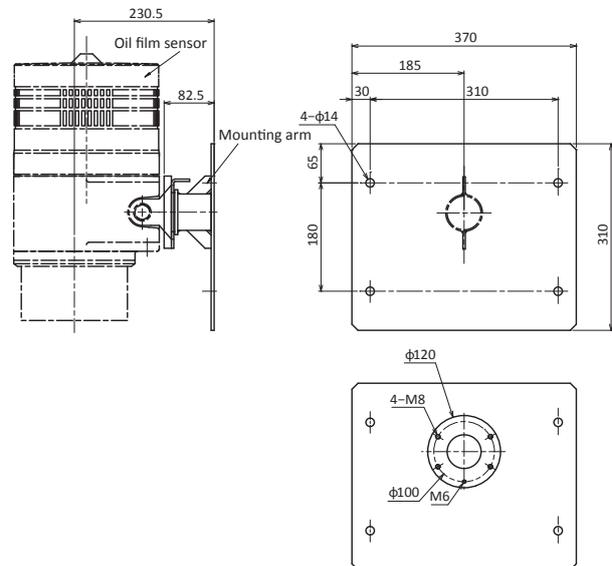
- Mounting Bracket for Detector (50A Pole Type)



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



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



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**CAUTION**

Please read the operation manual carefully before using products.