

SPECIFICATION SHEET



OIL FILM DETECTOR (Flame-proof Version)

SODL-1600

The model SODL-1600 is a flame-proof type oil film detector.

This model 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 between water and oil.

Improved optical design and continuous scanning laser system enable the Model SODL-1600 to offer improved oil detection even for non-ideal water surfaces such as those with bubbles present.



Features

A robust aluminum-cast housing enables a flame-proof structure.

Non-contact detection by laser beam. Instrument not affected by water level variations within 0.3–3m range.

Scanning laser beam system provides enhanced detection even under difficult surface conditions such as the presence of floating debris, bubbles or curved oil surfaces.

Scanning system contains no moving parts reducing power consumption and increasing reliability.

Fast signal processing and short pulse cycle of laser beam provides excellent detection ability even on water surfaces with ripples and waves.

A single transmitter can control up to two detectors (optional).

Specifications

Product Name	: Oil Film Detector (Flame-proof version)
Model Code	: SODL-1600
Explosion-proof Type	: System Model Code ; SODL-1600 Transmitter Model Code ; SCWM-160-8 Detector Model Code ; SODL-160U
Measurement Object	: Oil slick floating on water surface or dry surface (floor)
Measurement Method	: Reflectance of visible light.
Sensor Distance	: 0.3–3m above water or dry surface (floor).
Light Source	: Class 3R semiconductor laser diode (red)
Configuration	: Detector and transmitter housed in separate enclosures.
Ingress Protection	: Dust and jets-proof IP65
Flame-proof Protection	: Flame-proof structure EXD II BT4 Certificate No. TC19296 (for transmitter) Certificate No. TC19299 (for detector)
Ambient Conditions	: Temperature ; -10–50°C Humidity ; 5–95% RH
Sample Temperature	: Non-freezing
Output Switching	: Contact Output items ; 4 items (Under-maintenance, Oil alarm, Instrument error, Measurement error) can be allocated to contact 1 contact point or No. 1-6 points.
Output Signals	: Power failure shall be always allocated to contact output No.1 Contact points; 6 Output 1 (c contact), Output 2-6 (a contacts or b contacts) shall be set at factory. Contact Capacity ; DC 30V, 0.1A or less (resistance load)

Digital Communication system : Based on RS-485 (isolated)
 -Available Baud rates ; 2,400/4,800/9,600/19,200/38,400/57,600 bps
 -Protocol ; MODBUS/RTU
 -Data length ; 8 bit
 -Parity ; Select from NONE/ODD/EVEN
 -Stop bits ; 1 bit
 -Data Order ; BIG ENDIAN
 Operating Power : 100-240 VAC +/- 10%, 50/60 Hz
 Power consumption : Approx. 25 VA (normal), approx. 30 VA (max)
 Weight : Transmitter ; Approx. 12 kg
 Detector section ; Approx. 27 kg
 External Dimensions : Transmitter ; Approx. 217 (W) x 153 (D) x 270 (H) mm
 Detector ; Approx. ø270 x 630 (L) mm

Material : Transmitter ; Aluminum-cast
 Detector ; Aluminum-cast
 Surface Finish : Metallic silver
 Electrical Connections : -Transmitter ; Six water-proof cable glands for 7–8mm diameter cable (two cable glands are used and four cable glands are plugged (G1/2x6))
 -Detector ; Four water-proof cable glands for 7-8mm diameter cable (one cable gland is used and three cable glands are plugged (G1/2 x6)).
 Connecting cable lengths : Transmitter to detector, power source and digital communication lines; Max 100 m

Principle of Operation

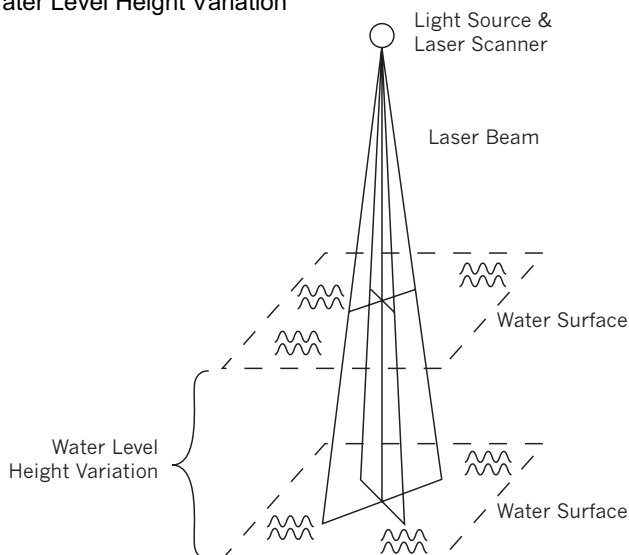
The reflectance of light from an oil film is greater than that of water. When an oil film is present on a water surface, it generates a "glistening" effect. From this property, the presence of oil can be detected by applying a light beam of constant intensity to the water surface and then measuring the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

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

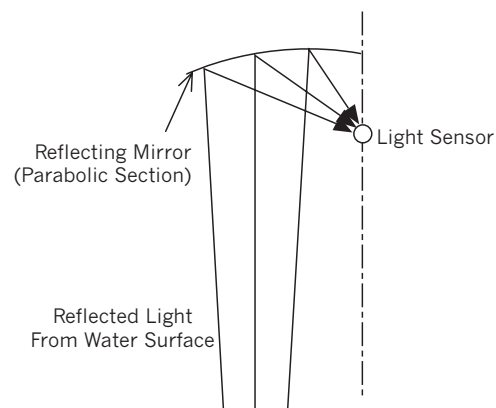
reflected back by the water surface is captured by a parabolic mirror and focused on to a sensor located at the focal point of the mirror.

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..

Water Level Height Variation



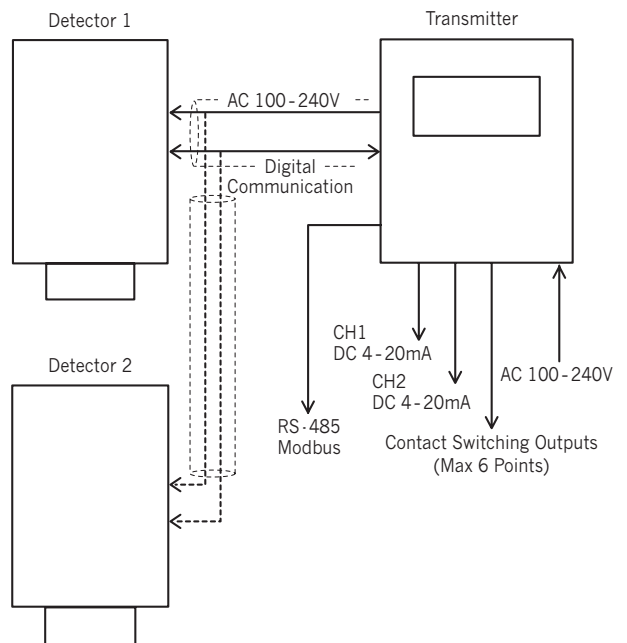
Mirror & Light Sensor



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..

As an option, 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) Oil Detection Modes

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. As an additional 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 analyser 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 six 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.

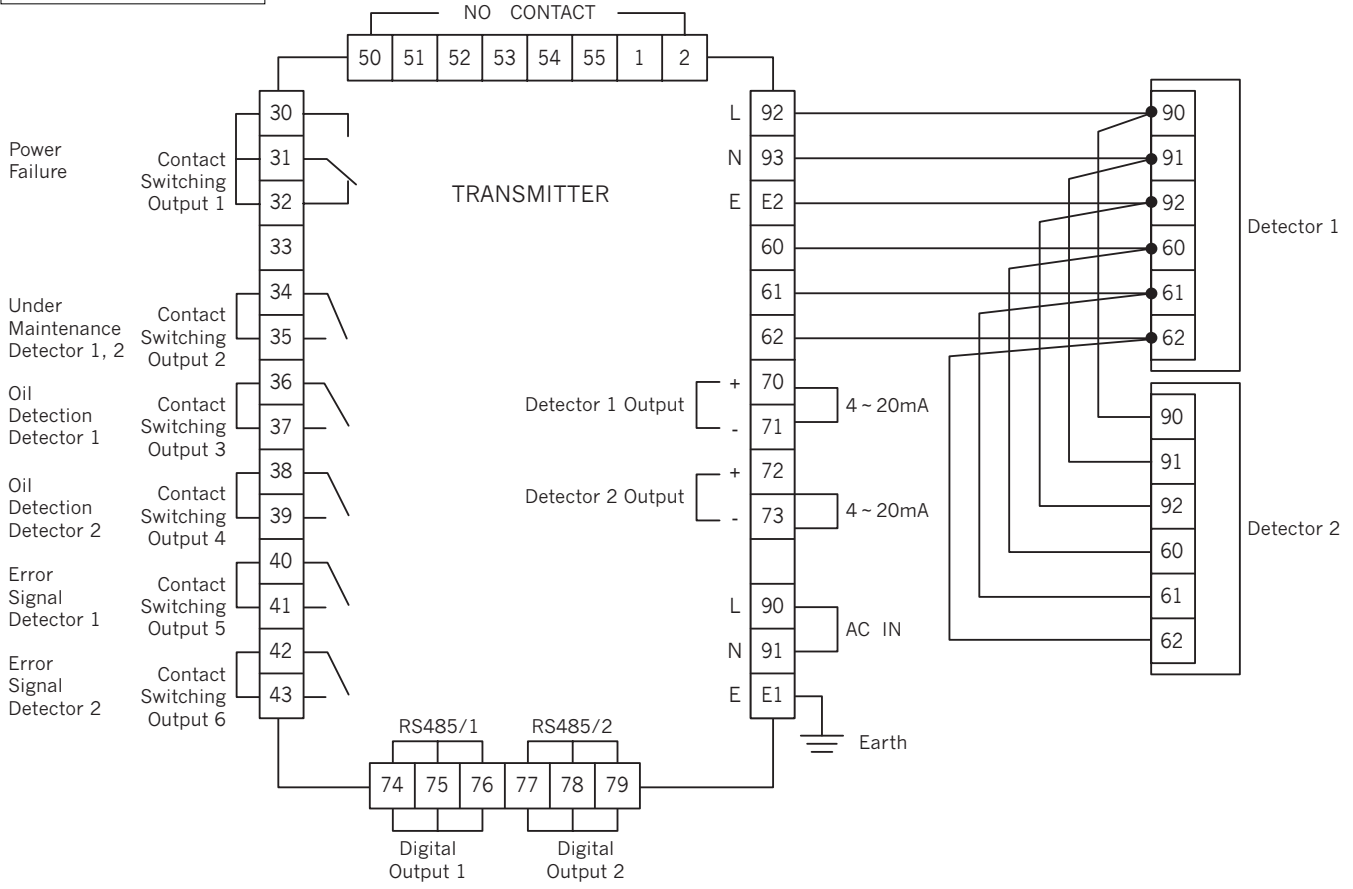
(6) Optional Dual Detector Capability

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

(7) Detection History Stored in Memory

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 sensitivity set-up etc..

Terminal Connections

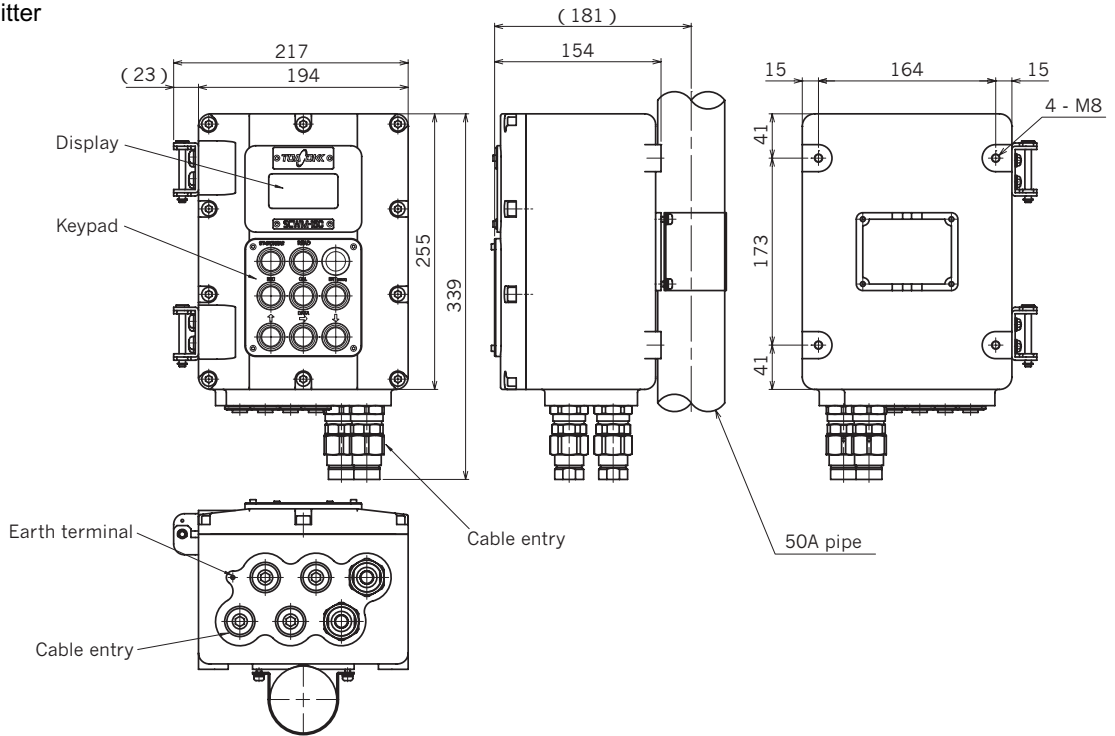


Detector 2 Connects to Terminals of Detector 1

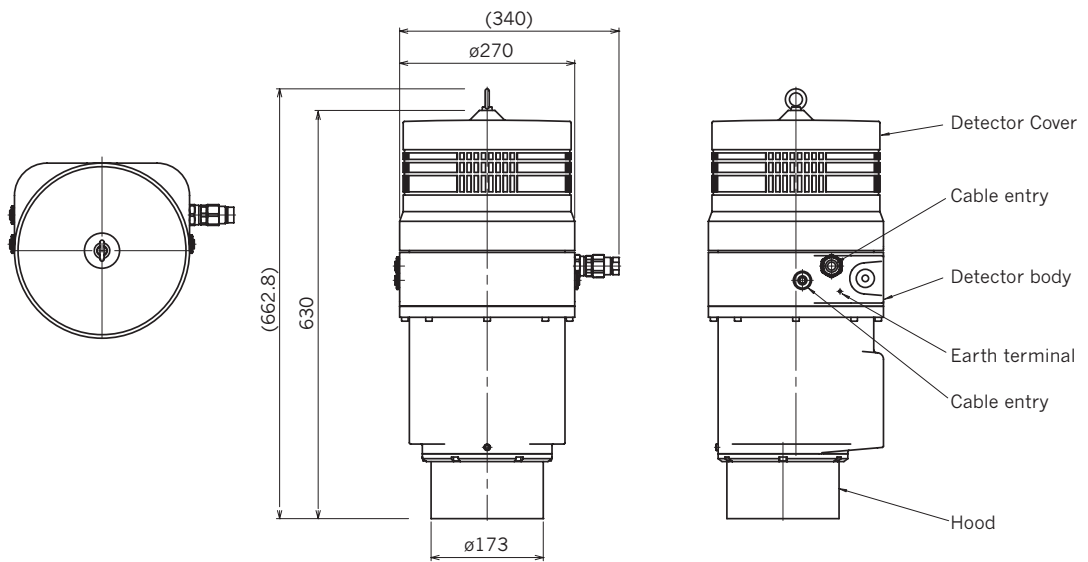
Dimensions

Unit : mm

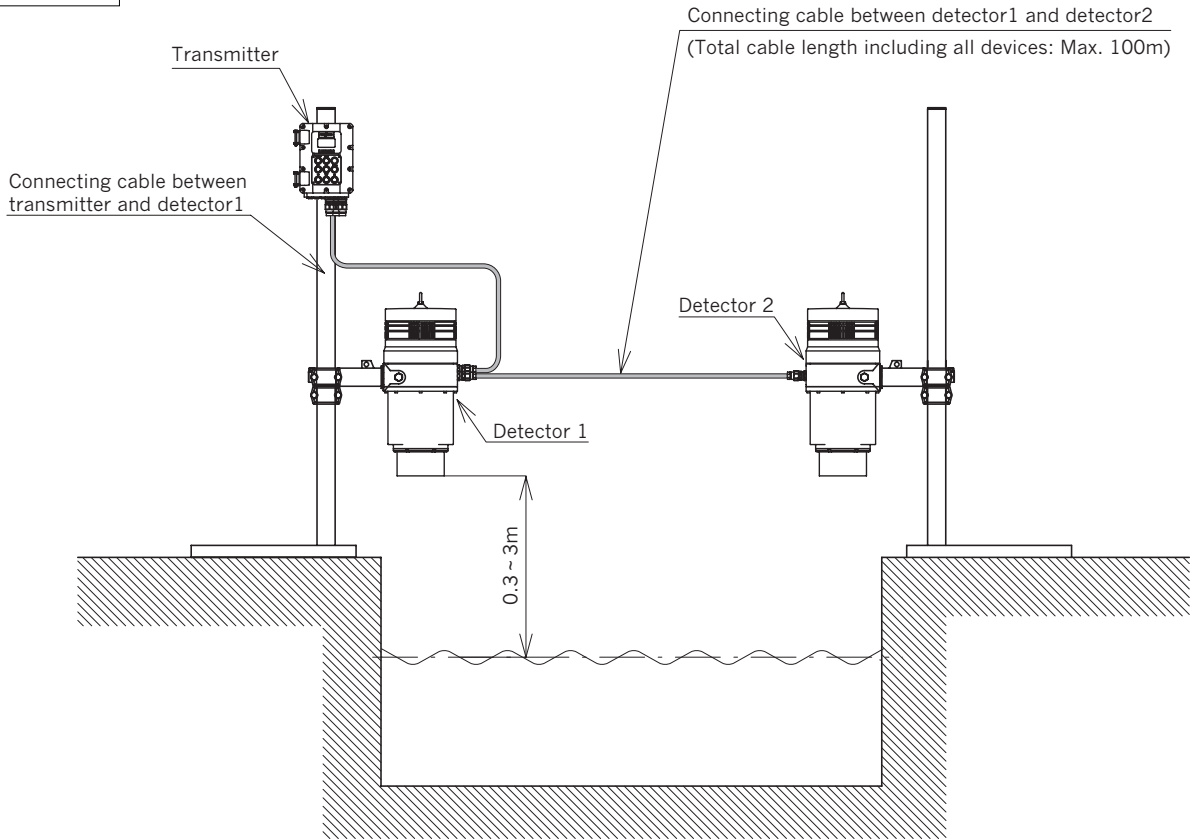
Transmitter



Detector



Installation



Installation Conditions

1. The detector should be mounted within 0.3m to 3m from the water surface for normal water conditions. 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. Install the instrument at 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.
7. 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.
8. 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.

Product Code

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		1										Transmitter Mounting	
		2										On a 50A pole	
												Wall or rack mounting	
												Number of Detectors Connected	
		1										One (Detector 1)	
		2										Two (Detectors 1 and Detector 2)	
												Cable Length from Transmitter to Detector *1	
		1										2m (standard)	
		2										10m	
		3										20m	
		4										100m	
		8										Custom specification (max 100m)	
												Cable Length from Detector 1 to Detector 2 *1	
		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 output2-6)*2	
		A										a contact (30VDC, 0.1A)	
		B										b contact (30VDC, 0.1A)	
		C										a contact (125VAC, 1A)	
		D										b contact (125VAC, 1A)	
												Anti Misting Heater for Detector Glass *3	
		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 SODL-12 *4	
		3										For Replacement of SODL-20 *4	
		4										For Replacement for others *4	
		9										Special *4	
												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 SODL-12 *4	
		3										For Replacement of SODL-20 *4	
		4										For Replacement for others *4	
		9										Special *4	
												Sun Shade	
		0										None	
		1										Equipped to Transmitter Only	
												Markings	
		A										Standard (Japanese Language)	
		B										English Language	

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

*1. The maximum total cable length between transmitter, detector 1 and detector 2 is 100m (i.e. if cable length from detector 1 to detector 2 is 98m then max cable length from transmitter to detector 1 is 2m. Cable lengths are specified in 1m increments. Dete

*2. This is for contact output #2 to #6. Capacity of the load for contact output #1 is limited to 30VDC, 0.1A. In the case of that supply power could be varied by like large powered instruments, we recommend installing a rely with time at the point receiving the contact output to avoid error alarm.

*3. An anti-misting heater for the detector glass is recommended. Select "equipped" if the installation location is prone to sudden temperature changes from low to high and/or the location is subject to high humidity. For example a heater would be required if the temperature changes from 10 deg C to 25 deg C within 30 minutes and ambient humidity is 90%.

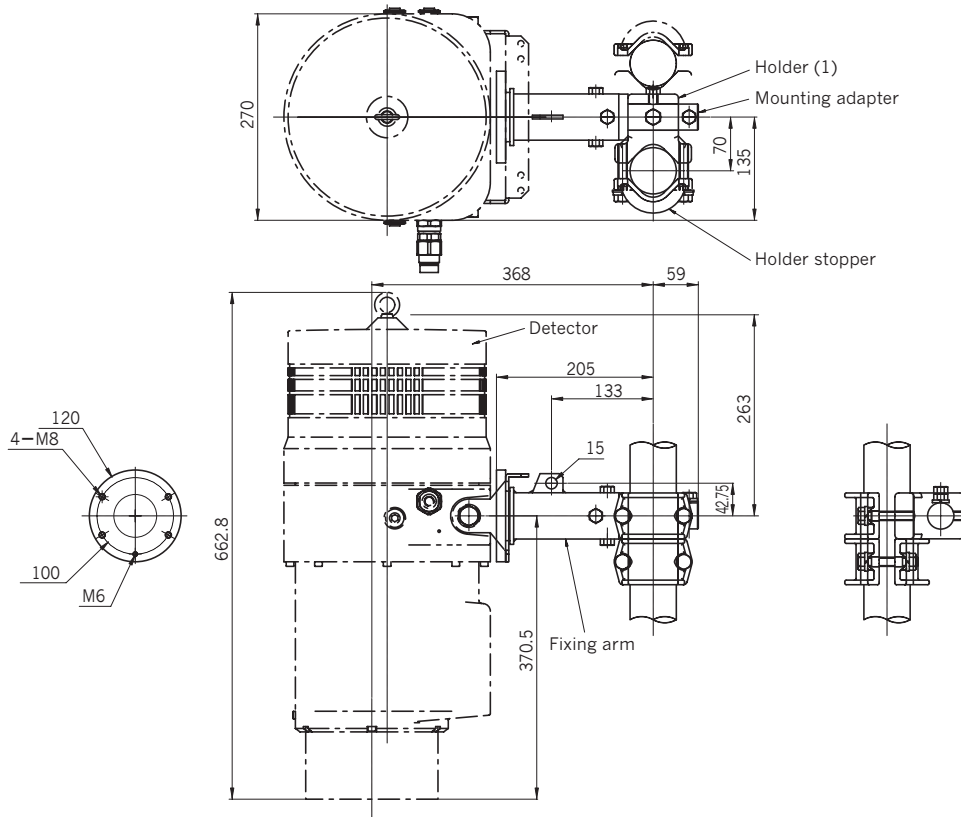
*4. If replacing existing Model SODL-12 or SODL-20 instruments, it is necessary to check types of existing fitting brackets and also analogue and alarm signals. Changes may be required to accommodate the new instrument - please consult with your local sales office or distributor.

Notes : 1. The instrument operates on multi-voltage supply of 100 to 240 VAC.
 2. Analogue output is 4-20mA.
 3. Order B-150 or ZB-1 if a mounting pole is required.
 4. In the case of replacement project for SODL-12 with hood for anti-steam or mist, ask the solution.

Dimensions

Unit : mm

Optional Adapter



DKK-TOA CORPORATION



Do not operate products before consulting instruction manual.

International Operations:
DKK-TOA Corporation
29-10, 1-Chome, Takadanobaba, Shinjuku-ku,
Tokyo 169-8648 Japan
Tel : +81-3-3202-0225 Fax : +81-3-3202-5685