

SET/DM3AL

Level sensor

OPERATION AND INSTALLATION MANUAL



SYMBOLS

 To be considered in installations in potentially explosive atmospheres.

 Warning / Attention

1. YLEISTÄ

SET/DM3AL is a level switch sensor, which is to be connected to analogical and digital SET control units of Labkotec. Operating principle of the sensor is based on the measurement of electric conductance.

SET/DM3AL sensor is suitable to be used as a level alarm device for liquids. It can be used to indicate the interface between oil and water or water and air. Typical applications of the sensor include oil and grease separators.

The SET/DM3AL has been certified according to the ATEX Directive (94/9/EC) in equipment category 1 and it can be installed in potentially explosive atmospheres in zoned areas 0, 1, and 2.

SET/DM3AL replace SET DM/3 sensor and it can be installed directly in its place.

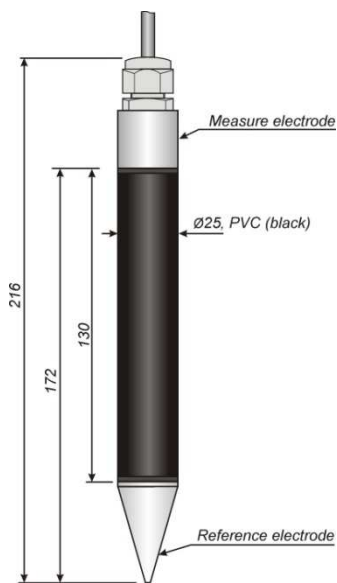


Figure 1.
Dimensional drawing of the SET/DM3AL-sensor

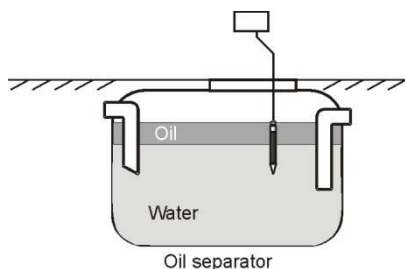





Figure 2.
Application: Oil alarm for the oil separator

2. TECHNICAL DATA


Control unit:	SET-1000, SET-2000 –control units by Labkotec Oy
Signal Operating voltage	Analogical 3 mA/10 mA 8 V...16 V (DC)
Cable:	Shielded oil-proof cable 2 x 0.75 mm ² . Standard length 5 m. Other lengths optional. The max. length of the fixed cable is 15 m. Can be extended with a shielded cable. The recommended maximum cable loop resistance is 75 Ω.
Material:	PVC (black), AISI 316, NBR, PA
Temperature range:	Operation: 0...+60 °C Safety: -30...+60 °C
EMC Emissions Immunity	IEC/EN 61000-6-3 IEC/EN 61000-6-2
IP-classification:	IP68
Ex-classification: Special conditions (X) ATEX IECEX	 II 1 G Ex ia IIA T5 Ga (Ta -30...+60°C) VTT 09 ATEX 026X IECEX VTT 10.0001X
Electrical parameters:	U _i = 16 V I _i = 80 mA P _i = 400 mW C _i = 3,5 nF L _i = 85 µH
Operating principle:	Conductance
Manufacturing year: Please see the serial number on the type plate.	x xxx x xxxxx xx YY x where YY = manufacturing year (e.g.. 10=2010)
 The sensor may be installed in potentially explosive atmospheres of zones 0, 1, and 2 with the following special conditions (X): – The ambient temperature is –30...+60°C. – The risk of electrostatic charge must be observed!	
 Standards to be considered in the installation: IEC/EN 60079-25 Intrinsically-safe electrical systems "i", and/or IEC/EN 60079-14 Electrical installations in hazardous areas. If the cabling is voltage-tested, the sensor must be disconnected from the system.	

3. CONNECTIONS AND INSTALLATION

The SET/DM3AL sensor is equipped with a shielded 2-wire cable. The numbered wires 1 and 2 of the cable are connected to the corresponding connectors (1 = +, 2 = -) in the control unit. Unnumbered wire is connected to the cable shield. Always check the connections from the installation and operation manual of the control unit as well.

In figure 3 the connection example 1; a LJB2-78-83 junction box has been used to connect the cabling to the equipotential bonding.

In figure 3 connection examples 2 and 3; equipotential bonding is not available. The shield is connected to the appropriate connector in the supply device.

 In these kinds of arrangements, it must be ensured that the electrostatic charges do not cause a hazard. Make sure in the installation that the device and cabling are not close to any strong current or other installations, and that they are not exposed to any strong stream flows, mechanical abrasions, or impacts.

The cable may be shortened or extended with a junction box, if necessary. The sensor may be installed by hanging it from its cable (upper limit alarm) or immersed in the liquid to be measured (lower limit or interface alarms).

The example in figure 3 shows an oil separator application in which the switch data is received when the upper electrode is covered in oil i.e. is no longer immersed in the conductive liquid.

4. OPERATION

This chapter provides a general description of the operation of the oil alarm in different situations. For a more detailed description, please refer to the manual of the control unit in use.

<i>Normal mode</i>	The SET/DM3AL oil level sensor is entirely immersed in water. The indicator lights are off. The relays are energized.
<i>Oil chamber full</i>	The SET/DM3AL sensor is immersed in oil. (The sensor does not issue an alarm before the upper electrode is covered in oil. The alarm is issued at the latest when the entire sensor is immersed in oil.) The Oil chamber is full indicator lights up. The buzzer sounds The relays are de-energized. (Please note. A similar alarm is issued when the SET/ DM3AL sensor is in the air.) Once the alarm is off, the indicator lights switch off, the buzzer stops, and the relays are energized.
<i>Fault alarm</i>	The sensor is broken, there is a sensor cable break or a short circuit, or the sensor signal is not recognized (digital system). The sensor circuit's Fault indicator is on. The buzzer sounds. The relays are de-energized.

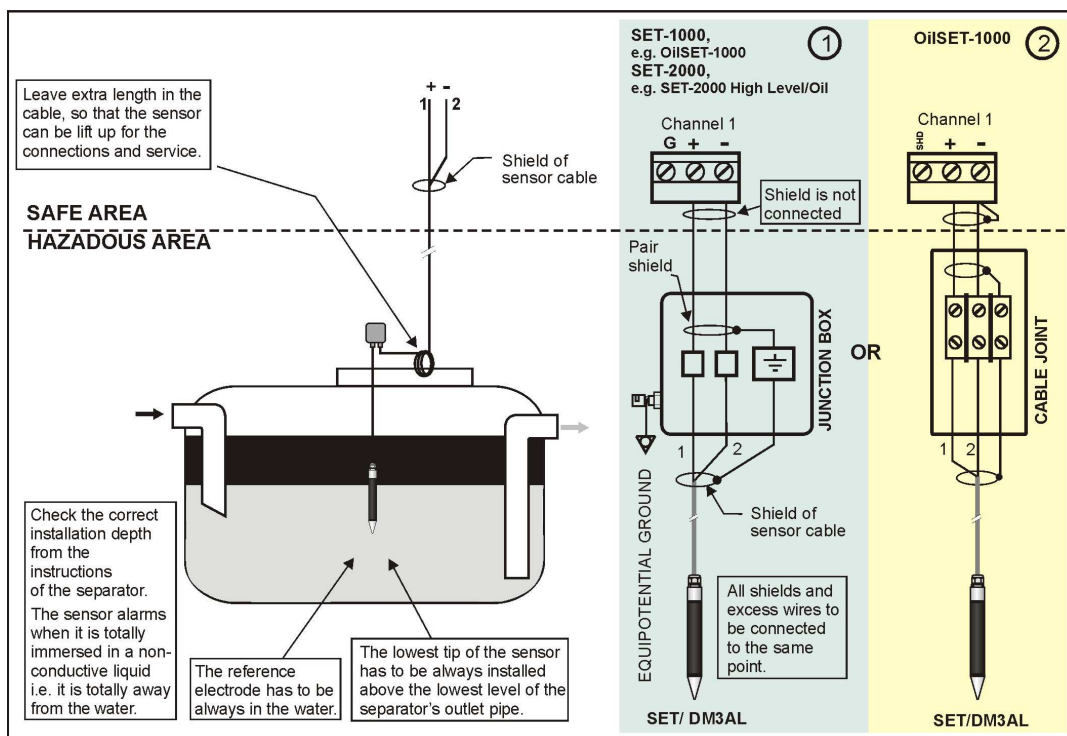


Figure 3. Installation example in an oil separator.

5. OPERATION TEST

Always check the correct operation of the alarm after the installation and after making the connections. You should also check the operation every time the separator is emptied or at least once a year.

Testing the operation

1. Immerse the sensor entirely in water. The device should be in normal mode (see chapter 4).
2. Lift the sensor in the air or immerse it in oil. The "Oil chamber full" alarm should be issued (see Chapter 4).
3. Put the sensor back into water. The alarm should stop after a while. Clean the sensor before installing it into the separator.

If the sensor does not function as described, check the device settings from the control unit manual or contact the representative of the manufacturer

6. SERVICE AND REPAIR

The sensor must be cleaned and tested when emptying the storage chamber and in connection with the annual maintenance. A mild detergent (e.g. washing-up liquid) and a scrubbing brush can be used for cleaning the sensor, if necessary.



During maintenance procedures (such as servicing the oil/fuel separator systems), the sensor should not be lifted out of the separator tank or installed back until there is water in the tank.



The instructions concerning the inspection and maintenance of Ex equipment contained in the standards IEC/EN 60079-17 and IEC/EN 60079-19 should be observed when executing service, inspection, or repair procedures

In fault situation check the cabling and connections of possible short-circuits or interruptions, then, if necessary, measure the sensor current and compare it with current values below.

Attention! If the sensor is located in an explosive atmosphere, the multimeter must be Exi-approved!

Sensor in the water: 3 – 4 mA

Sensor in the air: 9 – 11 mA

Sensor in the oil or grease: 9 – 11 mA

Also measure the output voltage of control unit. It is typically between 10-12 V with Labkotec Oy's SET-control units. See details from the manual of the control unit.

In case of queries, please contact Labkotec Oy's service: labkotec.service@labkotec.fi.

7. SET/DM3AL – and SET/DM3DL –SENSORS

SET/DM3AL –sensor is designed to use with analogical SET-control units, such as e.g. SET-1000, OilSET-1000, SET-2000, SET-2000 Hi Level/Oil.

SET/DM3DL -sensor is primarily designed to use with control units that communicate digitally, such as e.g. LevelSET S.

Visually the difference of SET/DM3AL- and SET/DM3DL –sensors is that SET/DM3AL sensor body is black and SET/DM3DL sensor body is grey.

This operation and installation manual applies only to SET/DM3AL-sensor.

Declaration of Conformity

This declaration certifies that the below mentioned apparatus conforms to the essential requirements of the EMC directive 2004/108/EC and ATEX directive 94/9/EC.

Description of the apparatus: Level sensor
Type: SET/DM3D, SET/DM3DL, SET/DM3AL
Manufacturer: Labkotec Oy
Myllyhaantie 6
FI-33960 Pirkkala
FINLAND

The construction of the appliance is in accordance with the following standards:

EMC:

EN 61000-6-2 (2005) Electromagnetic compatibility, Generic immunity standard, class: Industrial environment.
EN 61000-6-3 (2007) Electromagnetic compatibility, Generic emission standard, class: Residential, commercial and light industry.

ATEX:

EN 60079-0 (2012) Electrical apparatus for explosive gas atmospheres — Part 0: General requirements
EN 60079-11 (2012) Explosive atmospheres — Part 11: Equipment protection by intrinsic safety 'i'

EC-type examination certificate: VTT 09 ATEX 026X

Ex-classification : Ex II 1 G Ex ia II B T5 Ga Ta = -30...+60°C (SET/DM3D)
 Ex II 1 G Ex ia II A T5 Ga Ta = -30...+60°C (SET/DM3DL, SET/DM3AL)

Production quality assessment notification:

VTT 01 ATEX Q 001

Notified Body:

VTT Expert Services Ltd; notified body number 0537.

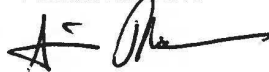
Address of the notified body:

P.O. Box 1001, FI-02044 VTT, Finland

Signature

The authorized signatory to this declaration, on behalf of the manufacturer, and the Responsible Person based within the EU, is identified below.

Pirkkala 25.9.2013



Ari Tolonen
CEO
Labkotec Oy