

ifm electronic



Operating instructions

Binary level sensor

**efector160<sup>®</sup>**

**LI214x**

UK

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# 1 Preliminary note

## 1.1 Symbols used

- ▶ Instructions
- > Reaction, result
- [...] Designation of pushbuttons, buttons or indications
- Cross-reference
-  Important note  
Non-compliance can result in malfunction or interference.
-  Information  
Supplementary note.

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## 2 Safety instructions

- Please read the product description prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.
- Installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- The unit complies with the standard EN 61000-6-4. The unit may cause radio interference in domestic areas. If interference occurs, the user must take appropriate remedial actions.

### 3 Functions and features

The unit monitors the level of liquids in tanks.

#### 3.1 Applications

- Water, hydrous media, oils, coolant emulsions.

#### 3.2 Restriction of the application area

- The unit is not suitable for acids, alkalis, granulates, bulk materials.
- It is not suitable for hygienic areas.
- Highly conductive foam can trigger a switching operation. Check the consequences by performing a test in your application!
- Maximum tank pressure:  $\pm 0.5$  bar (when mounted using the appropriate mounting accessories; → chapter 5.2 Installation procedure).

### 4 Function

#### 4.1 Measuring principle

The unit operates to the capacitive measuring principle. By direct contact with the medium the unit detects whether the maximum level (limit level) is reached and indicates this by a switched signal.

Max. level reached	output open (OFF)
Max. level not reached	output closed (ON)

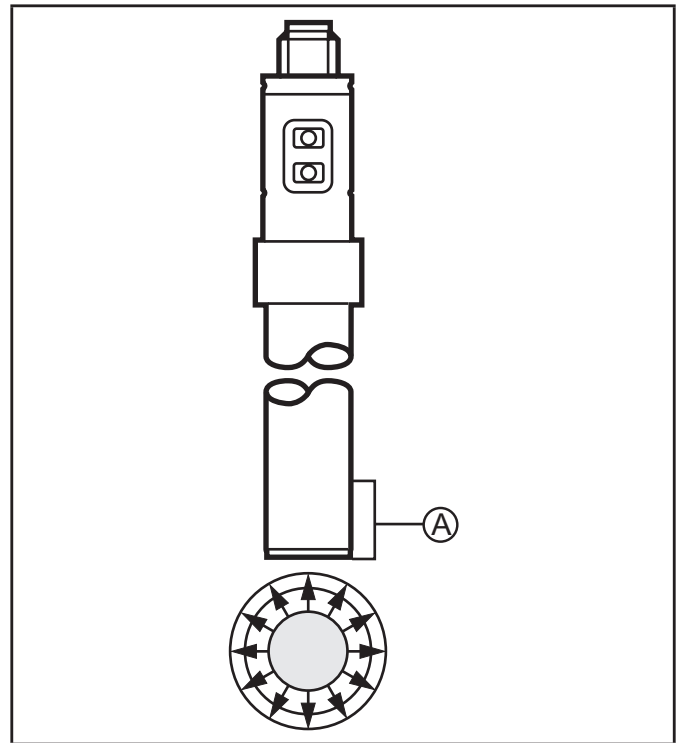
The dielectric constant of a medium is important for its detection. Media with a dielectric constant  $> 1.8$  are safely detected.



Dielectric constants of common liquids	
Mineral oil	$\approx 2$
Coolant emulsion	$\approx 25...75$
Glycol	$\approx 37$
Water	$\approx 80$
Water, demineralised	$\approx 30$

Electrically conductive and non conductive media are detected.

The unit operates with radial detection characteristics. Therefore media below the active zone are not detected. Despite different electrical properties media are only detected when the active zone (A) is covered.



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## 4.2 Features of the unit

- Automatic adjustment function to the medium to be detected by programming buttons (→ chapter 8 Settings). This allows reliable detection of media with a very low dielectric constant (e.g. oil).
- The installation depth determines the level (→ 5.3).
- The unit is virtually immune to almost any kind of build-up on the probe. The position of the switching level within the active zone can however change with build-up.
- Operating and switching status indication via LED ring.

## 5 Installation

### 5.1 Installation location / environment

- Installation of the unit: from the top (→ 5.3).
- The following minimum distances must be adhered to:
  - Distance tank bottom - end of the probe: 10 mm.
  - Distance metal tank wall - probe: 20 mm.

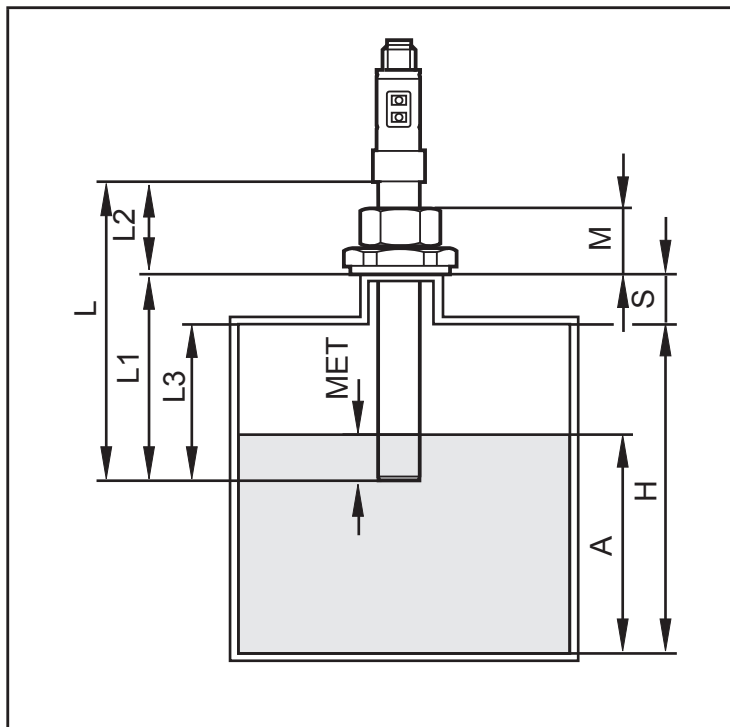
## 5.2 Mounting

The unit is mounted using a mounting clamp or an adapter. The following standard mounting accessories are available:

Order no.	Material
E43000	mounting clamp (for non-pressurised tanks)
E43001	flange plate 73-90 with clamp adapter (pressure rating of 0.5 bar)
E43002	welding adapter with clamp adapter (pressure rating of 0.5 bar)
E43003	mounting adapter G <sup>3</sup> / <sub>4</sub> with clamp adapter (stainless steel, pressure rating of 0.5 bar)
E43004	mounting adapter G1 with clamp adapter (stainless steel, pressure rating of 0.5 bar)
E43005	flange plate 100-125 with clamp adapter (aluminium, pressure rating of 0.5 bar)
E43006	flange plate 65-80 with clamp adapter (aluminium, pressure rating of 0.5 bar)
E43007	flange plate 54 - 52x52 with clamp adapter (aluminium, pressure rating of 0.5 bar)
E43016	mounting clamp with mounting bracket (for non-pressurised tanks)
E43019	mounting adapter G <sup>3</sup> / <sub>4</sub> with clamp adapter (brass, pressure rating of 0.5 bar)

Further accessories on request.

## 5.3 Set the installation depth



- A = response level
- H = tank height
- L = probe length
- L1 = installation depth
- L2 = extension length
- L3 = installation depth (min.: 60 mm)
- M = height mounting adapter
- MET = max. immersion depth  
(Active zone) = 31 mm
- S = height of the connection piece

- Select the installation depth L1 so that the MET zone is covered when the response level A has been reached, that is:  
 $L1 = (H - A) + MET + S.$

## 6 Electrical connection

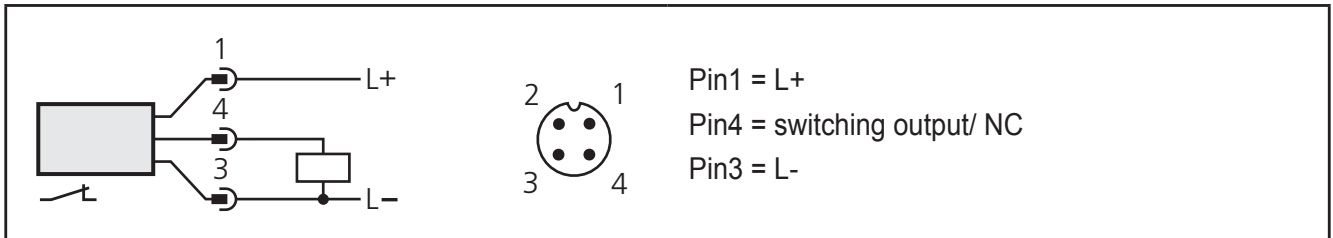


The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply to EN 50178, SELV, PELV.

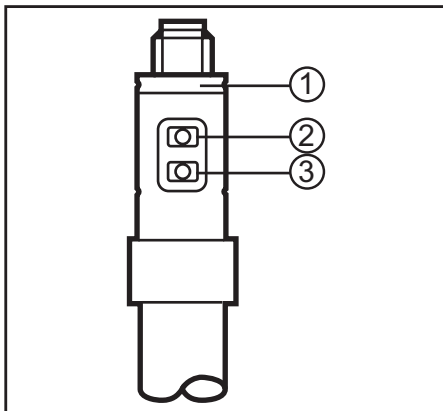
- ▶ Disconnect power.
- ▶ Connect the unit as follows:



Core colours of ifm sockets: 1 = BN (brown), 3 = BU (blue), 4 = BK (black)

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## 7 Operating and display elements



1: LED ring green / yellow

- green: max. level reached / output open (OFF)
- yellow: max. level not reached / output closed (ON)

2: programming button OUT OFF

3: programming button OUT ON

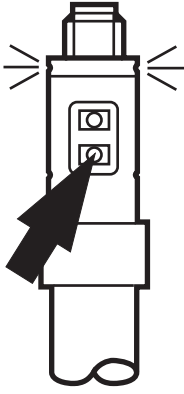
## 8 Settings

Before the first set-up the empty adjustment must be carried out.

### 8.1 Set to the empty vessel

This adjusts the unit to both the empty vessel and the installation conditions (e.g. the set installation depth). Previous settings are deleted.

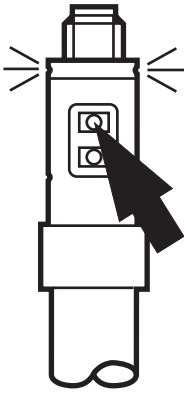
- ▶ Empty the tank until the medium is at least 20 mm below the end of the probe.

	<ul style="list-style-type: none"><li>▶ Press the programming button (OUT ON) for at least 2 s.</li><li>&gt; The yellow LED flashes slowly (approx. 1 Hz) (= unit is in the adjustment mode).</li><li>&gt; After the adjustment process the yellow LED is lit continuously (= unit is in the operating mode, sensor zone not covered).</li></ul>
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### 8.2 Set to the full vessel

The empty adjustment is sufficient for media with a low dielectric constant (e.g. oils). For aqueous media the sensitivity must be optimised by a full adjustment. The full adjustment does not change the settings of the empty adjustment.

- ▶ Fill the tank until the active zone of the unit is covered.

	<ul style="list-style-type: none"><li>▶ Press the programming button (OUT OFF), keep it pressed for at least 6 s.</li><li>&gt; The yellow LED flashes, after 6 s rapidly (approx. 2 Hz), (= device is in the adjustment mode).</li><li>&gt; After adjustment the green LED is lit continuously (unit is in the operating mode, sensor zone covered).</li></ul>
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### 8.3 Lock / unlock the unit

The unit can be locked electronically to prevent unintentional settings.

#### Locking

- ▶ Press both setting buttons simultaneously for 10 s in the operating mode.
- > The LED flashes green.
- > After the time (> 10 s) has elapsed, the colour of the LED changes from green to yellow (flashing) and the unit is locked.

#### Unlocking

- ▶ Press both setting buttons simultaneously for 10 s in the operating mode.
- > The LED continues to indicate the current operating status (no reaction of the LED).
- > After the time (> 10 s) has elapsed, the LED flashes green and the unit is unlocked.

On delivery: unlocked.

## 9 Operation

When the supply voltage has been applied, the unit is in the operating mode. It carries out its measurement and evaluation functions and switches the output.


Operation indication by LED:

LED	Status / function
Green	unit ready for operation, sensor zone covered (output open (OFF))
Yellow	unit ready for operation, sensor zone not covered (output closed (ON))

## 10 Maintenance, repair, disposal

Recommended maintenance:

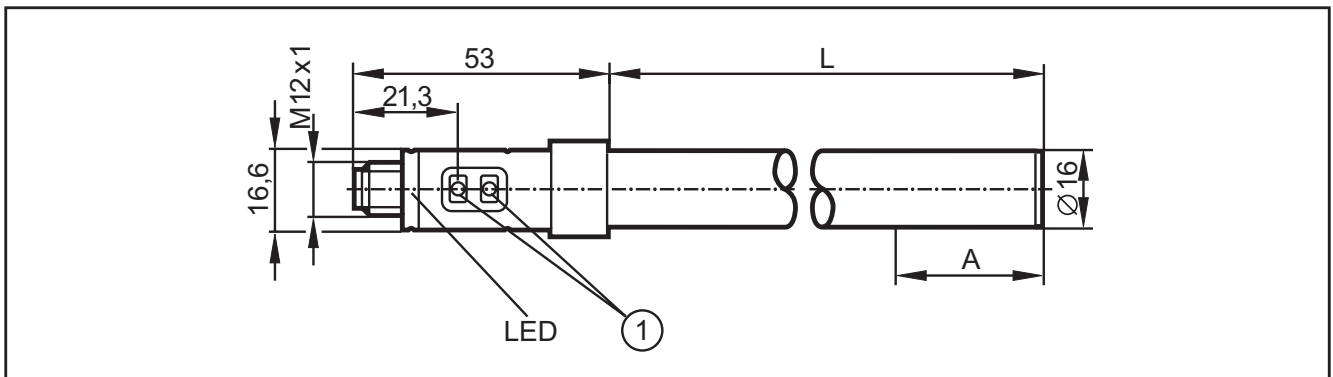
- ▶ Check the probe for build-up from time to time, clean it in case of strong soiling.

 After removal of the unit or a change of media with dielectric constants that differ greatly (e.g. oil / water) another adjustment should be carried out.

It is not possible to repair the unit.

After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

# 11 Scale drawing



Dimensions in mm

1: programming buttons			
A: active zone (31 mm)			
L: probe length in mm:	132 (LI2141)	273 (LI2142)	481 (LI2143)

# 12 Technical data

Operating voltage [V].....	10 ... 36 DC
Current rating [mA].....	200
Short-circuit protection (pulsed); protected against reverse polarity and overload	
Current consumption [mA].....	< 22
Voltage drop [V].....	< 2.5
Dielectric constant medium .....	> 1.8
Max. tank pressure [bar].....	± 0.5 <sup>1)</sup>
Housing materials.....	PP-GF orange; TPE-U
Materials (wetted parts).....	PP
Protection .....	IP 65, IP 67
Protection class .....	II
Ambient temperature [°C].....	0...60
Medium temperature oil [°C].....	0...65
Medium temperature water and media similar to water [°C] .....	0...35
Storage temperature [°C] .....	-25 ... 80
Shock resistance [g] .....	12 (DIN EN 60068-2-29, 11 ms)
Vibration resistance [g] .....	5 (DIN EN 60068-2-6, 10...2000 Hz)
EMC .....	EN 61000-6-2: 2005 + Corr. 2005
.....	EN 61000-6-4: 2007

<sup>1)</sup> when mounted using pressure-resistant mounting accessories (→ 5.2)

More information at [www.ifm.com](http://www.ifm.com)