ifm electronic

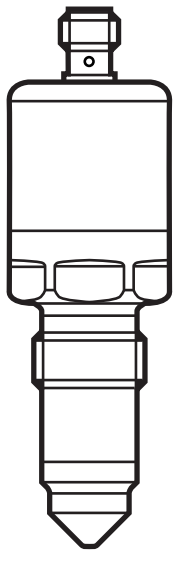
CE

Operating instructions
Binary level sensor

efector160®

**LMT**

UK



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# 1 Preliminary note

## 1.1 Symbols used

▶ Instruction

→ Cross-reference

Important note
Non-compliance can result in malfunction or interference.

Information
Supplementary note.

UK

# 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. In domestic areas (EN 61000-6-3) the unit must be installed in closed metal tanks / pipes.
- For units the scope of validity cULus:
  The device shall be supplied from an isolating transformer having a secondary Listed fuse rated either
  a) max 5 amps for voltages 0~20 Vrms (0~28.3 Vp) or
  b) 100/Vp for voltages of 20~30 Vrms (28.3~42.4 Vp).

# 3 Functions and features

The unit monitors the level of liquid, viscous and powdery media in tanks and pipes. It can be used for limit detection and run-dry protection.

## 3.1 Application area

- Suitable for food and hygienic areas due to food-grade materials and hygienic installation possibilities.
- Detection of almost all media, even extremely adhering (e.g. ketchup) or non-conductive ones (e.g. vegetable oil).
  In the following table you can find a selection of tested media and the corresponding recommended unit type.
  A detailed list is available at www.ifm.com.

| Medium | LMT100 | LMT110 |
|---|---|---|
| Alcohol (40 % vol) | ● | |
| Beer (lager) | ● | |
| Butter | | ● |
| CIP solution | ● | *) |
| Chocolate (at approx. 40 °C) | | ● |
| Grease | | ● |
| Jam | ● | |
| Ketchup | ● | |
| Milk | ● | |
| Non-dairy creamer | | ● |
| Olive oil | | ● |
| Remoulade | ● | |
| Sugar (granulated sugar) | | ● |
| Water (distilled) | ● | |
| Water (tap water) | ● | |
| Yogurt, natural | ● | |

*) In the case of heavy wetting by CIP solution, the LMT110 switches as in the case of “medium detected”. OUT1 = ON und OUT2 = OFF (i.e. the cleaning operation is detected).

▶ Always check whether the sensor is appropriate for the corresponding applications without restriction.

- The unit can be operated at the following medium temperatures:
  - 0…85 °C (aqueous media).
  - 0…100 °C (oils, fats and powdery media).
- For a limited time (1 h) it can be used at 150 °C. Therefore it is suitable for all standard cleaning and sterilisation processes (CIP, SIP).
- Tank pressure: -1…16 bar.

### 3.2 Restriction of the application area

- Not suitable for very abrasive media (e.g. quartz sand).
- For use in very aggressive media (strong acids and alkali):
  ▶ First check the compatibility of the product materials (→ 10 Technical data).
- Media which are very inhomogeneous separate from each other thus forming separation layers (e.g. oil layer on water):
  ▶ Check the function by an application test.



## 4 Function

### 4.1 Measuring principle

The unit operates to the impedance spectroscopy method. It evaluates the electrical behaviour of the media to be monitored in the frequency range between 50 and 200 MHz. The different media show characteristic behaviour. Also deposits or foam show significantly different behaviour. The presetting of the unit allows detection of the presence of certain media; deposits or foam, however, are suppressed.

### 4.2 Processing of the measured signals

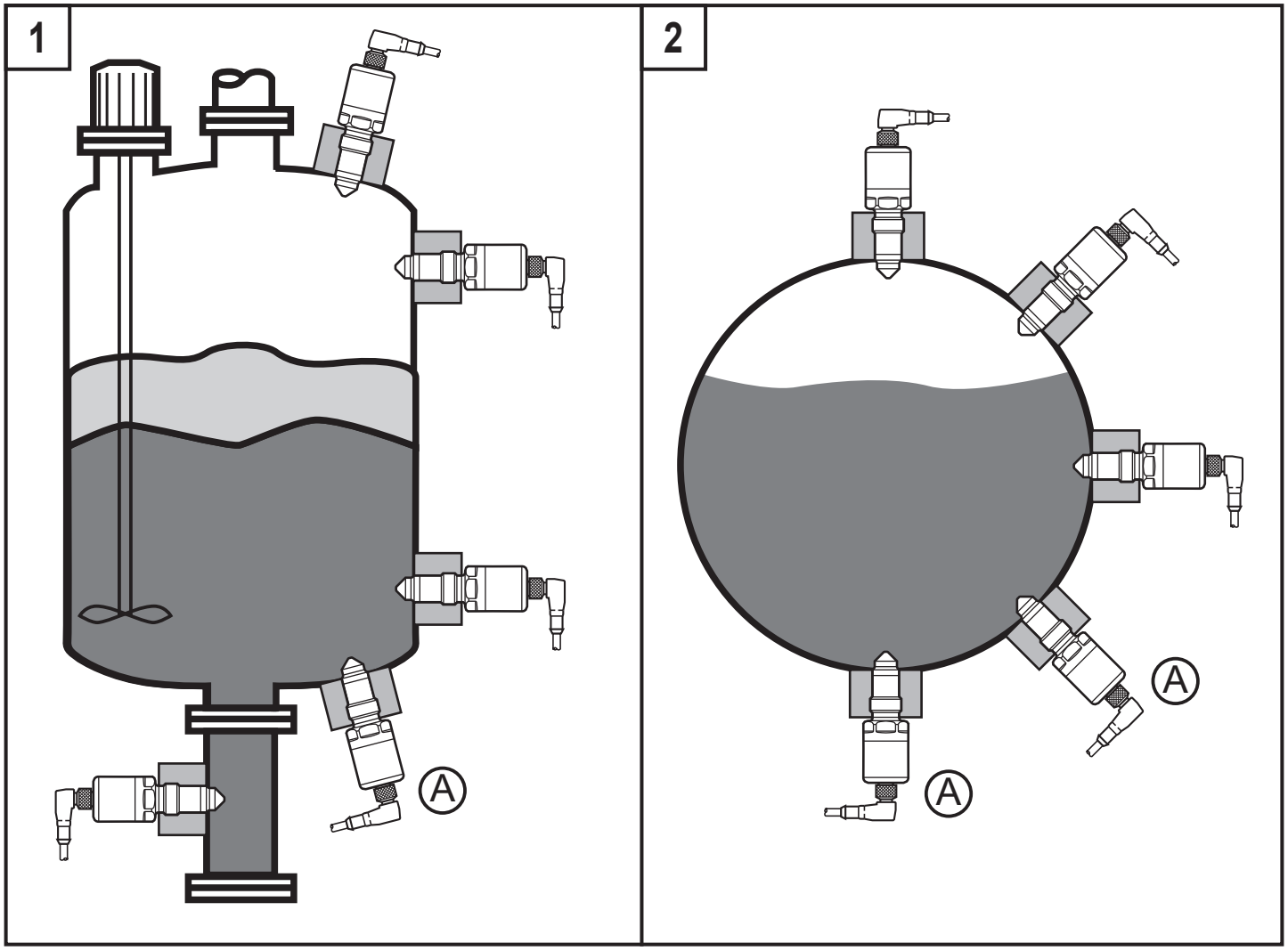
Outputs OUT1 and OUT2 complement each other:
- no medium detected: OUT1 = OFF and OUT2 = ON.
- medium detected: OUT1 = ON and OUT2 = OFF.

### 4.3 Features of the unit

- Food-grade materials: 316L, PEEK.
- Hygienic installation possibilities without dead band.
- Approvals / conformities: FDA, EG 1935 / 2004, EHEDG, 3A, UL.
- Status indication by yellow LED.
- After application of the operating voltage immediately ready for operation. No settings on the unit necessary.
- Short response time: switching delay approx. 0.1 s.
- Defined position of the cable outlet for angled sockets for use of ifm welding adapters.

- Streamlined sensor geometry, no blockage of the pipe, no pressure loss.

## 4.4 Application examples




The unit can be installed at any position.
1: Different installation positions in a tank, e.g. to avoid influences by incomplete mixing of the medium or air inclusions.
2: The fill level in pipes can be monitored by means of a corresponding installation position.
In case of strongly adhering and viscous media the installation positions (A) are only suited to some extent. Residues might be detected as level.

# 5 Installation

## 5.1 Installation location / environment

- Installation in pipes from DN25 onwards.
- Lateral distance to tank walls or structures: min. 15 mm.
- A correct fit and function of the unit and ingress resistance of the connection are only ensured using ifm adapters.
- In industrial areas the unit can be installed in non-metal tanks / pipes. For non-metal tanks the metallic surface of the mounting adapter is sufficient as reference earth.

- In domestic areas the unit must be installed in closed metal tanks / pipes.
- Do not use additional sealing material (e.g. Teflon tape) at the probe tip (sealing cone).
- Protect the probe tip against direct sunlight.

## 5.2 Mounting

The unit is installed by means of a mounting adapter. The following components are available as accessories:

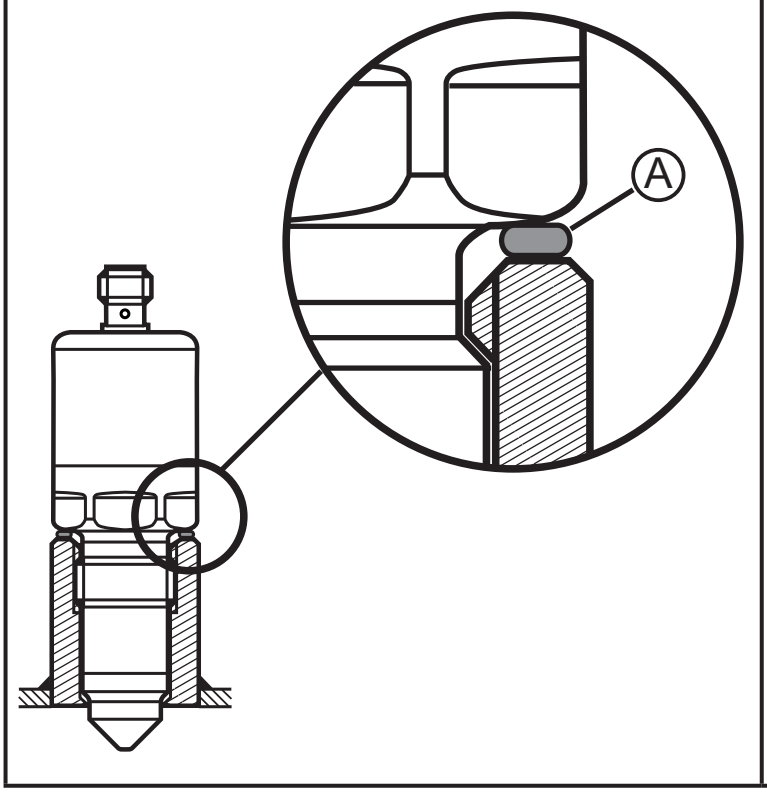
| | | |
|---|---|---|
| Welding adapters G½ | Version | Order no. |
| | ball | E30055 |
| | collar | E30056 |
| | cylindrical for tanks | E43300 |
| | cylindrical for pipes | E43301 |
| Welding adapter G½ with 3A approval | cylindrical for tanks | E43309 |
| | cylindrical for pipes | E43310 |
| Mounting adapters G½ | G ¾ | E43302 |
| | G 1 | E43303 |
| | DIN11851 DN25 | E43304 |
| | DIN11851 DN40 | E43305 |
| | Varivent D50 | E43306 |
| | Varivent D68 | E43307 |
| | clamp 1-1,5“ ISO 2852 / DIN 32676 | E33401 |
| | clamp 2“ ISO 2852 / DIN 32676 | E33402 |
| | DN25 SMS | E33430 |
| Mounting adapter G½ with 3A approval | clamp 1-1,5“ ISO 2852 / DIN 32676 | E43311 |
| | clamp 2“ ISO 2852 / DIN 32676 | E43312 |
| Cover plug G½ | for adapter | E43308 |

### 5.2.1 Clamp adapter / adapter for pipes

- ▶ Slightly grease the thread of the sensor using a lubricating paste which is suitable and approved for the application.
- ▶ Screw the unit into the adapter until it is hand-tight. Do not damage the sealing chamfers.
- ▶ Clamp sensor and adapter into a clamping device. Tighten the clamping device only slightly so that the adapter does not warp.
- ▶ Tighten the sensor using a spanner .
  Tightening torque: 20...25 Nm.
- ▶ Fix the unit + adapter to the process connection by means of a coupling nut, a clamp flange or the like.

### 5.2.2 Welding / screw-in adapter

- ▶ Ensure cleanliness of the sealing areas. Remove protective packaging only just before mounting. In case of damaged sealing areas replace the unit or the adapter.
- ▶ Weld or screw the adapter into the tank / pipe.
- ▶ If required, slide the O-ring (A) onto the sensor. It seals the gap on the back between the sensor and the adapter.




Some of the adapters listed above are supplied with the O-ring.

- ▶ Only use O-rings that are supplied with the sensor.

Unsuitable O-rings can cause problems with ingress resistance:

- O-ring too large: leakage on the sensor tip.
- O-ring too flat: leakage on the gap on the back between sensor and adapter.

- ▶ Slightly grease the thread of the sensor using a lubricating paste which is suitable and approved for the application.
- ▶ Screw the sensor into the adapter and tighten. Tightening torque: 20…25 Nm.

▶ After installation check the tank / pipe for ingress resistance.

## 5.3 Notes on 3A compliant installation

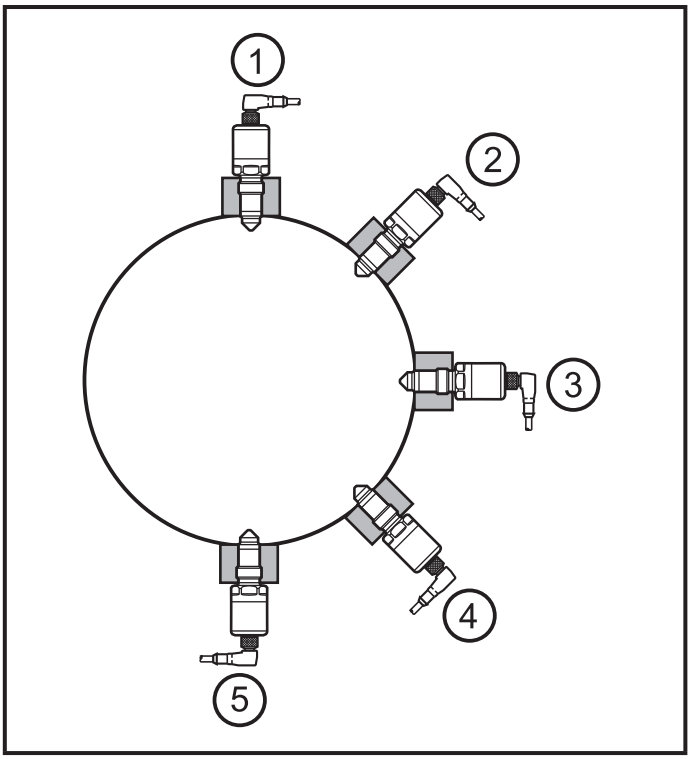
The unit has a 3A approval. It is only valid in conjunction with adapters with 3A approval (→ table above).

The welding spot must comply with the 3-A standard 74-03, D6.1.4: "The minimum radii for fillets of welds in product contact surfaces shall be not less than 1/4 in. (6.35 mm) except that the minimum radii for such welds may be 1/8 in. (3.18 mm) when the thickness of one or both parts joined is less than 3/16 in. (4.76 mm)."



Self-emptying must be ensured by an appropriate installation position (position 1...3).

The process connection must be provided with a self-emptying leakage port. This is ensured by using the adapter with 3A approval (→ table above).




## 5.4 Note on the use in accordance with EHEDG

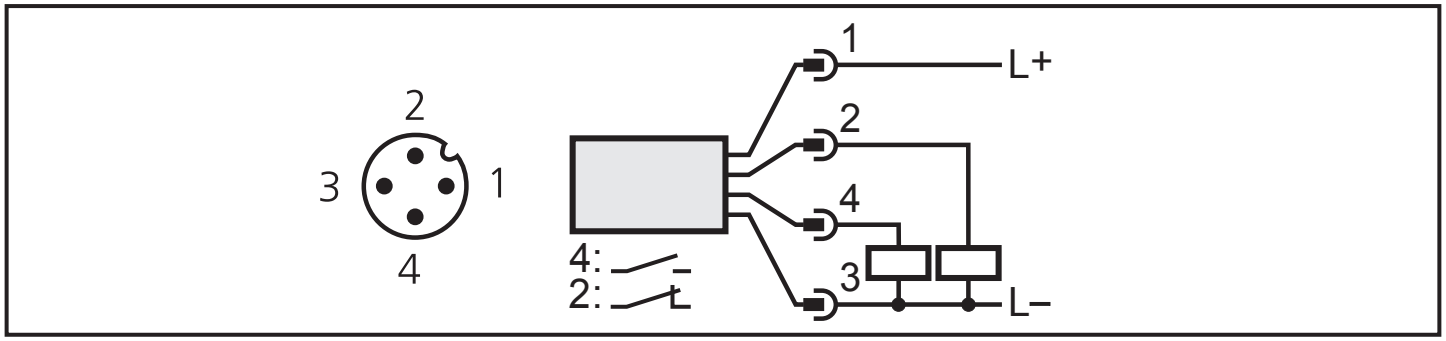
The unit has an approval in accordance with EHEDG. When the unit is used in hygienic areas to EHEDG in conjunction with the above listed adapters, the following applies:

▶ Make sure that the sensors are integrated into the system in accordance with EHEDG.

# 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:




For information about available sockets/connectors see:
www.ifm.com → Products → Accessories

# 7 Operation

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

Operation indication by LED and output signals:

| | LED | OUT1 | OUT2 |
|---|---|---|---|
| unit ready for operation, no medium detected | OFF | OFF | ON |
| unit ready for operation, medium detected | lights | ON | OFF |
| no operating voltage | OFF | OFF | OFF |
| error / failure | flashes | OFF | OFF |

# 8 Maintenance, repair, disposal

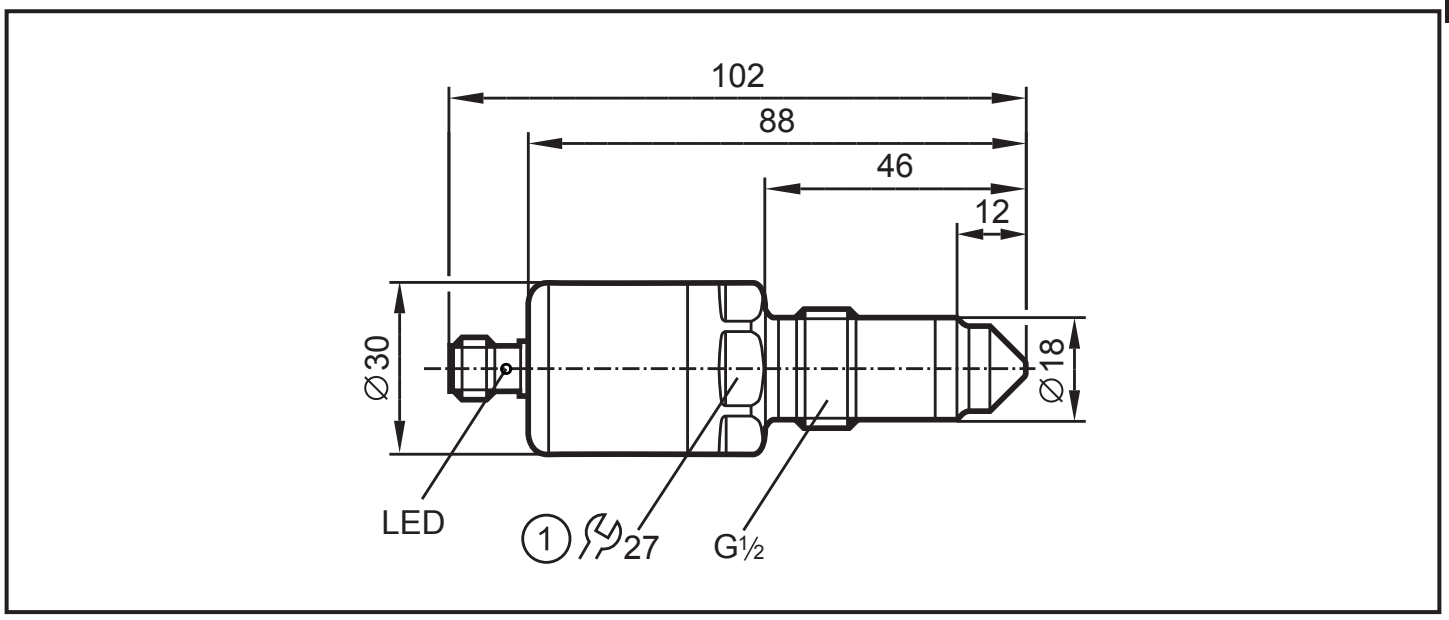
▶ From time to time check the probe cap for build-up and damage. Clean the unit if badly soiled In case of damage replace the unit.
▶ After removal and before reinstallation of the unit carefully clean the probe neck and the installation slot - especially the sealing cone - with appropriate methods to ensure that it is resistant to ingress and without dead band.
▶ 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.
- ▶ In case of returns ensure that the unit is free from soiling, especially of dangerous and toxic substances. For transport only use appropriate packaging to avoid damage of the unit.

When changing the medium it might also be necessary to change the type of unit (→ 3.1, table).

## 9 Scale drawing






Dimensions in mm
1: tightening torque 20...25 Nm

# 10 Technical data

| | |
|---|---|
| Operating voltage [V] | 18 ... 30 DC |
| Current rating [mA] | 50 |
| Short-circuit protection, pulsed; protected against reverse polarity and overload | |
| Voltage drop [V] | < 2.5 |
| Current consumption [mA] | < 40 |
| Max. tank pressure [bar] | -1...16 |
| Housing materials | PEEK; stainless steel (316L/1.4404), PA12; FPM (Viton) |
| Materials (wetted parts) | PEEK |
| | surface characteristics: Ra < 0.8 |
| Protection | IP 68 / IP 69K |
| Protection class | III |
| Ambient temperature [°C] | 0...60 |
| Medium temperature aqueous media [°C] | |
| - Duration | 0...85 |
| - Peak | 150 (1 h) |
| Medium temperature oils, fats, bulk materials [°C] | |
| - Duration | 0...100 |
| - Peak | 150 (1 h) |
| Storage temperature [°C] | -25...80 |
| Shock resistance [g] | IEC 60068-2-27: 50 g (11 ms) |
| Vibration resistance [g] | DIN EN 60068-2-6: 20 g (10…2000 Hz) |
| EMC | EN 61000-6-2 :2005 |
| | closed tanks: EN 61000-6-3: 2006 |
| | open tanks: EN 61000-6-4: 2006 |

# 11 Notes on the regulation (EC) 1935/2004

The following components of the product are designed according to the regulation (EC) 1935/2004 for permanent contact with food:

- Sensor tip made of PEEK

More information at www.ifm.com