

# Industrial radar level sensor

## For industrial applications

### Model ILT-C01

WIKA data sheet LM 50.17

#### Applications

- Suitable for liquid, highly viscous and solid media
- Particularly suitable for continuous level measurement of liquids in containers and tanks
- Suitable for industrial applications and mobile working machines

#### Special features

- Developed for the extreme operating conditions in mobile working machines
- Continuous, accurate measuring signal
- Compact design for easy integration
- Can also be installed outside a container (plastic)
- Adjustment function for complex container geometries possible



Radar level sensor, model ILT-C01

#### Description

The ILT free-beam radar level sensor enables non-contact level measurement, even through plastic vessel walls.

The free-beam radar for level measurement emits electromagnetic waves that are reflected by the surface of the material to be measured. The reflected signals are received and analysed, providing information about the level. Up to two additional switch points can be integrated to enable further switching outputs, e.g. for overflow and/or dry run protection.

Thanks to its compact design and easy handling, the model ILT radar sensor is ideal for measuring applications in industrial environments and in mobile working machines.

It has been prepared for the requirements of mobile working machines and offers high-precision measurements at temperatures of  $-40 \dots +100 \text{ }^{\circ}\text{C}$  [ $-40 \dots +212 \text{ }^{\circ}\text{F}$ ]. Thanks to metal shielding, the sensor operates, interference-free, at field strengths of up to  $100 \text{ V/m}$  and remains reliable even with vibrations of up to  $40\text{g}$  and shocks of up to  $100\text{g}$ . The model ILT is particularly safe in operation, even under difficult conditions such as dust, moisture and heat. The non-contact measuring principle, combined with a maintenance-free design, ensures low total cost of ownership.

# Specifications

| Basic information                 |                                                                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------|
| Media                             | <ul style="list-style-type: none"> <li>■ Water-based</li> <li>■ Oil-based</li> <li>■ Solids</li> </ul> |
| Dielectric constant of the medium | ≥ 2                                                                                                    |
| Measurement principle             | FMCW (60 GHz technology); frequency band 57.4 ... 61.4 GHz                                             |

| Accuracy specifications |                     |
|-------------------------|---------------------|
| Non-repeatability       | ≤ 2 mm [0.079 in]   |
| Accuracy                | ±5 mm <sup>1)</sup> |
| Reference conditions    | Per IEC 62828-4     |

1) Depending on the medium

| Measuring range                         |                                                                |
|-----------------------------------------|----------------------------------------------------------------|
| Min. measuring distance to sealing face | 100 mm [3.94 in]                                               |
| Max. measuring distance to sealing face | 5,000 mm [196.85 in]<br>→ Other measuring distances on request |
| Beam angle                              | ±6°                                                            |
| Measuring frequency                     | > 1 Hz                                                         |
| Min. diameter of tank/silo/pipe etc.    | 18 mm [0,71 in]<br>→ Further diameters on request              |

| Process connection (with installation from outside) |                                                                               |
|-----------------------------------------------------|-------------------------------------------------------------------------------|
| DIN EN ISO 1179-2                                   | <ul style="list-style-type: none"> <li>■ G ½ A</li> <li>■ 1/2" NPT</li> </ul> |
|                                                     | → Other process connections on request                                        |

| Output signal                         |                                                                                                                                         |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Switching output 1/2 (SP1/SP2)</b> |                                                                                                                                         |
| Switching output                      | <ul style="list-style-type: none"> <li>■ PNP</li> <li>■ NPN</li> </ul>                                                                  |
| Number of switching outputs           | Max. 2                                                                                                                                  |
| Switching function                    | <ul style="list-style-type: none"> <li>■ Normally closed (NC)</li> <li>■ Normally open (NO)</li> </ul>                                  |
| Switching delay <sup>1)</sup>         | <ul style="list-style-type: none"> <li>■ Without</li> <li>■ 1 s</li> <li>■ 2 s</li> <li>■ 3 s</li> <li>■ 5 s</li> <li>■ 10 s</li> </ul> |
| <b>Analogue signal output (S+)</b>    |                                                                                                                                         |
| Current (3-wire)                      | 4 ... 20 mA                                                                                                                             |
| Voltage (3-wire)                      | DC 0 ... 5 V                                                                                                                            |
| Load                                  | 600 Ω                                                                                                                                   |
| <b>Auxiliary power (U+/U-)</b>        |                                                                                                                                         |
| 4 ... 20 mA current output (3-wire)   | DC 8 ... 36 V                                                                                                                           |
| DC 0 ... 5 V voltage output (3-wire)  | DC 8 ... 36 V                                                                                                                           |
| Current supply                        | Max. 200 mA                                                                                                                             |
| Overvoltage resistance                | See EMC Directive: EN 61326 emission (group 1, class B) and immunity (industrial environment)                                           |
| Electrical safety                     | Protection class III                                                                                                                    |

| Output signal                 |       |
|-------------------------------|-------|
| Dynamic behaviour             |       |
| Settling time per IEC 62828-1 | 1 s   |
| Switch-on time                | < 3 s |

1) Adjustable only ex-works.

| Electrical connection                                    |                                                                                                                                                                                                                        |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection type                                          | <ul style="list-style-type: none"> <li>■ Circular connector M12 x 1, 4-pin</li> <li>■ Circular connector M12 x 1, 5-pin</li> <li>■ Cable outlet, unshielded</li> </ul>                                                 |
| Wire cross-section                                       | 0.25 mm [0.01 in]                                                                                                                                                                                                      |
| Cable diameter                                           | 4 ... 10 mm [0.16 ... 0.39 in] (depending on the number of wires)                                                                                                                                                      |
| Cable material                                           | <ul style="list-style-type: none"> <li>■ PVC</li> <li>■ PUR</li> <li>■ Silicone</li> </ul>                                                                                                                             |
| Cable length                                             | <ul style="list-style-type: none"> <li>■ 2 m [6.6 ft]</li> <li>■ 5 m [16.4 ft]</li> <li>■ Customised: 1 ... 50 m [3.3 ... 164 ft]</li> </ul>                                                                           |
| Pin assignment                                           | → See „Pin assignment“                                                                                                                                                                                                 |
| Ingress protection (IP code) per IEC 60529 <sup>1)</sup> | IP67                                                                                                                                                                                                                   |
| Short-circuit resistance                                 | Yes                                                                                                                                                                                                                    |
| Reverse polarity protection                              | Yes                                                                                                                                                                                                                    |
| Adjustment                                               | <ul style="list-style-type: none"> <li>■ Empty vessel adjustment</li> <li>■ Empty vessel adjustment + measuring range adjustment (0 % at the vessel bottom)</li> <li>■ Without subsequent adjustment option</li> </ul> |

1) The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

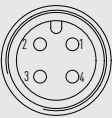
| Materials                                  |                                                                                            |
|--------------------------------------------|--------------------------------------------------------------------------------------------|
| Materials (wetted)                         |                                                                                            |
| Sensor lens                                | <ul style="list-style-type: none"> <li>■ PEEK</li> <li>■ FKM (seal)</li> </ul>             |
| Process connection                         | Stainless steel 1.4404                                                                     |
| Material (in contact with the environment) |                                                                                            |
| Case                                       | Stainless steel 1.4404                                                                     |
| Cable                                      | <ul style="list-style-type: none"> <li>■ PVC</li> <li>■ PUR</li> <li>■ Silicone</li> </ul> |
| Electrical connection M12 x 1              | <ul style="list-style-type: none"> <li>■ Nickel-plated brass</li> <li>■ PA</li> </ul>      |

## Pin assignment

### Legend

- U+ Positive power supply terminal
- U- Negative power supply terminal
- S+ Analogue signal output
- SP1 Switching output 1
- SP2 Switching output 2

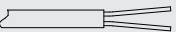
#### Circular connector M12 x 1

| 4-pin                                                                             | Level + 1 switch point |     |
|-----------------------------------------------------------------------------------|------------------------|-----|
|  | 1                      | U+  |
|                                                                                   | 2                      | S+  |
|                                                                                   | 3                      | U-  |
|                                                                                   | 4                      | SP1 |

#### Circular connector M12 x 1

| 5-pin                                                                             | Level + 2 switch points |     |
|-----------------------------------------------------------------------------------|-------------------------|-----|
|  | 1                       | U+  |
|                                                                                   | 2                       | S+  |
|                                                                                   | 3                       | U-  |
|                                                                                   | 4                       | SP1 |
|                                                                                   | 5                       | SP2 |

#### Cable outlet

| Unshielded                                                                          | Level + 2 switch points |     |
|-------------------------------------------------------------------------------------|-------------------------|-----|
|  | Brown                   | U+  |
|                                                                                     | White                   | U-  |
|                                                                                     | Green                   | S+  |
|                                                                                     | Yellow                  | SP1 |
|                                                                                     | Pink                    | SP2 |

| Operating conditions                             |                                               |
|--------------------------------------------------|-----------------------------------------------|
| Medium temperature limit                         | -40 ... +100 °C [-40 ... +212 °F]             |
| Ambient temperature limit                        | -40 ... +100 °C [-40 ... +212 °F]             |
| Storage temperature limit                        | -40 ... +70 °C [-40 ... +158 °F]              |
| Pressure limit of medium                         | 0 ... 25 bar [0 ... 362 psi]                  |
| Vibration resistance per IEC 60068-2-6           | 40g, 10 ... 2,000 Hz                          |
| Permanent vibration resistance per IEC 60068-2-6 | 10g, 10 ... 2,000 Hz                          |
| Shock resistance per IEC 60068-2-27              | 100g, 11 ms                                   |
| Free fall in line with IEC 60068-2-31            |                                               |
| Single instrument                                | 1 m [3.28 ft]                                 |
| Multiple packaging                               | 0.5 m [1.64 ft]                               |
| Mounting position                                | Vertical                                      |
| Ingress protection (IP code) per IEC 60529       | IP67                                          |
| EMC                                              |                                               |
| ESD per ISO 10605                                | ±8 kV contact discharge, ±15 kV air discharge |
| HF field per ISO 11452-2                         | 100 V/m                                       |
| BCI per ISO 11452-4                              | 200 mA                                        |
| Pulse 1 per ISO 7637-2 <sup>1)</sup>             | Level III                                     |
| Pulse 2a per ISO 7637-2 <sup>1)</sup>            | Level III                                     |
| Pulse 2b per ISO 7637-2 <sup>1)</sup>            | Level III                                     |
| Pulse 3a per ISO 7637-2 <sup>1)</sup>            | Level III                                     |
| Pulse 3b per ISO 7637-2 <sup>1)</sup>            | Level III                                     |
| Fast transient pulses per ISO 7637-3             | Level IV                                      |
| Radio disturbance per CISPR 25                   | 30 ... 1,000 MHz                              |

1) Does not apply for ratiometric output signal

| Packaging and instrument labelling   |                                                                                                                                      |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Packaging                            | <ul style="list-style-type: none"> <li>■ Individual packaging</li> <li>■ Multiple packaging (up to 50 pieces possible)</li> </ul>    |
| Instrument labelling (product label) | <ul style="list-style-type: none"> <li>■ WIKA product label, adhesive foil</li> <li>■ Customised product label on request</li> </ul> |

## Approvals

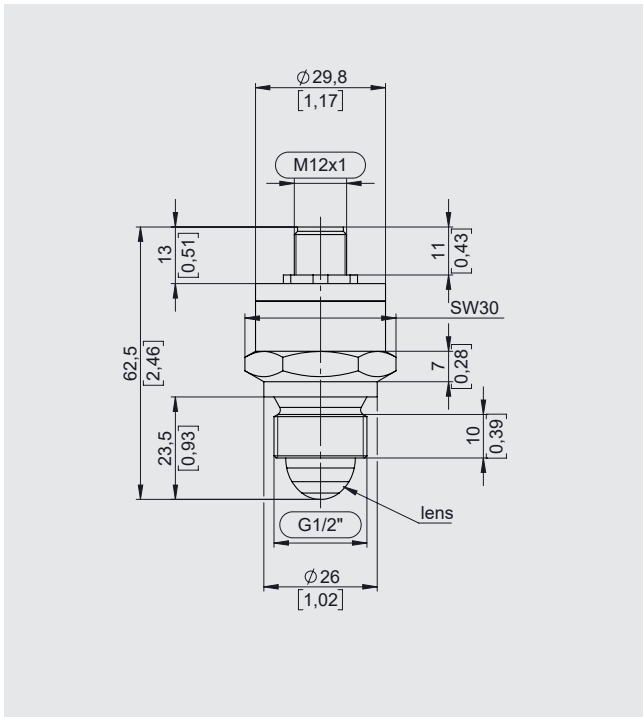
| Logo                                                                              | Description                                                                                  | Region         |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------|
|  | <b>EU declaration of conformity</b>                                                          | European Union |
|                                                                                   | EMC Directive<br>EN 61326 emission (group 1, class B) and immunity (industrial environments) |                |
|                                                                                   | RED – Radio Equipment Directive                                                              |                |
|                                                                                   | ETSI EN 305 550                                                                              |                |
|                                                                                   | The instrument may be used without restrictions in the EU and in the EFTA countries.         |                |
|                                                                                   | RoHS directive                                                                               |                |
|  | <b>Federal Communications Commission (FCC) for US</b><br>Radio approval                      | USA            |
| -                                                                                 | <b>Innovation, Science and Economic Development (ISED) for Canada</b><br>Radio approval      | Canada         |
|  | <b>ACMA (Australian Communication and Media Authority)</b><br>Radio approval                 | Australia      |
|  | <b>RSM (Radio Spectrum Management)</b><br>Radio approval                                     | New Zealand    |

## Certificates

| Description         |                                                                                                                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Certificates</b> | <ul style="list-style-type: none"> <li>■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof)</li> <li>■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts)</li> </ul> |

→ Other certificates on request

### Dimensions in mm [in]



## Accessories and spare parts

| Description                                                                       |                                                                                      | Temperature range                  | Cable diameter   | Cable length   | Order number |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------|------------------|----------------|--------------|
| Circular connector M12 x 1 with moulded cable                                     |                                                                                      |                                    |                  |                |              |
|  | Straight version, cut to length, 4-pin, PUR cable, UL Listed, IP67                   | -20 ... +80 °C<br>[-4 ... +176 °F] | 4.5 mm [0.18 in] | 2 m [6.6 ft]   | 14086880     |
|                                                                                   |                                                                                      |                                    |                  | 5 m [16.4 ft]  | 14086883     |
|                                                                                   |                                                                                      |                                    |                  | 10 m [32.8 ft] | 14086884     |
|  | Angled version, cut to length, 4-pin, PUR cable, UL Listed, IP67                     | -20 ... +80 °C<br>[-4 ... +176 °F] | 4.5 mm [0.18 in] | 2 m [6.6 ft]   | 14086889     |
|                                                                                   |                                                                                      |                                    |                  | 5 m [16.4 ft]  | 14086891     |
|                                                                                   |                                                                                      |                                    |                  | 10 m [32.8 ft] | 14086892     |
| Connection cable M12 x 1 with integrated LED display                              |                                                                                      |                                    |                  |                |              |
|  | Connection cable, 4-pin, PUR cable, UL Listed, IP67<br>1 x LED green, 2 x LED yellow | -20 ... +80 °C<br>[-4 ... +176 °F] | 4.5 mm [0.18 in] | 2 m [6.6 ft]   | 14252834     |
|                                                                                   | Connection cable, 4-pin, PUR cable, UL Listed, IP67<br>1 x LED green, 2 x LED yellow | -20 ... +80 °C<br>[-4 ... +176 °F] | 4.5 mm [0.18 in] | 5 m [16.4 ft]  | 14252835     |

| Description       | Order number |
|-------------------|--------------|
| Adjustment magnet | 14760395     |

## Ordering information

Model / Medium / Process connection / Switching functions / Electrical connection / Options

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