

## Product Information ILM-2 | ILM-3

## FOOD

# Inductive Conductivity Meter ILM



## Application / Specified Usage

- Inductive measurement of the specific conductivity of liquid media in the range of 0...999 mS/cm.
- Designed for hygienic applications in food-, beverage- and pharmaceutical industries.

## Application Examples

- Controlling of CIP processes (e. g. phase separation detergents/water)
- Concentration measurement (e.g. Alkali and acid concentration in remaking)
- Monitoring of product quality, quality control

## Hygienic Design / Process Connection

- Flow optimized, hygienic and easy sterilizable installation by sleeve EMZ-352 or the build-in system EHG-.../1".
- CIP/SIP cleaning up to 140 °C / 30 minutes maximum
- Product contacting materials compliant to FDA
- Sensor made of stainless steel, bobbin case made of PEEK
- Conforming to 3-A Sanitary Standard 74-06
- Additional process connections:  
Tri-Clamp, dairy flange (DIN 11851), Varivent, APV, DRD et alli

## Features / Advantages

- Maintenance-free inductive measurement principle.
- Contrary to conductive measurement principle there are no problems caused by corrosion of the electrodes or polarization.
- Up to 14 measurement ranges selectable, max. four external switchable (ILM-3).
- Precise measurement by compensation of temperature influence. Each measurement range can be assigned a separate temperature coefficient (ILM-3).
- High reproducibility of  $\leq 1\%$  of measurement value.
- Analog output for conductivity and temperature is standard.
- Installation in pipes from DN 40 possible.

## Options / Accessories

- Electrical connection via M12 plug-in connector
- Version with longer toroid housing for pipes  $\geq$  DN 65 or for installation into T-fitting
- Preassembled cable for M12 plug-in connector

## Measuring Principle of the Inductive Conductivity Meter

An alternating current generates a magnetic field in the primary coil (sender) which induces a current in the circumfluent medium. The current flow in the medium generates another magnetic field in the secondary coil (receiver). The strength of the induced current in the secondary coil depends on the conductivity of the medium. The conductivity of the liquid medium is temperature dependent. To compensate the temperature error, an additional sensor (NTC) in the sensor tip is used for monitoring the temperature of the medium. The temperature coefficient (TC-value) of the liquid can be set up in the electronics of the ILM which is used for automatic compensation of the temperature error.

## Authorizations



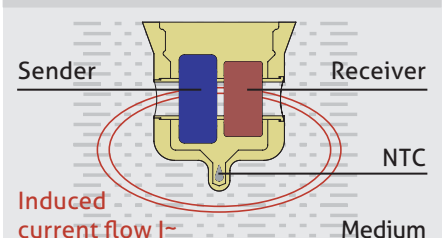
## ILM-2 / L20



## ILM-2 / L50 with Tri-Clamp



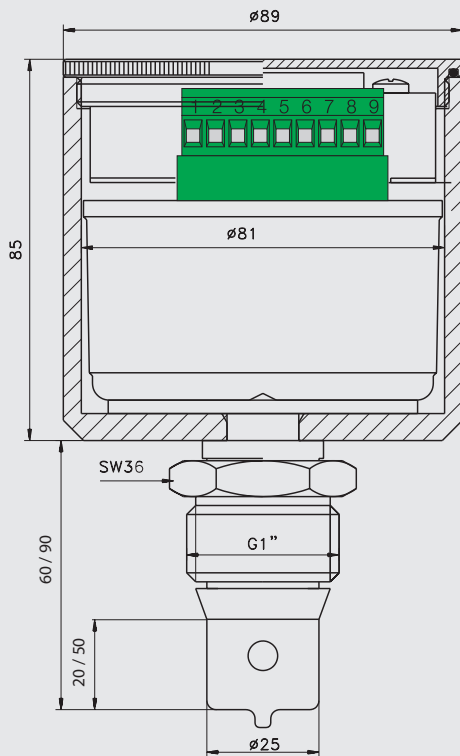
## Inductive Conductivity Measurement



| Specification                             |  |   |
|---|--|---|
| <b>Process connections</b>                | thread G1"<br>torque   | sensor, combined with Negele-weld-in sleeves<br>max. 20 Nm  |
| <b>Materials</b>                          | connector head<br>thread connection<br>toroid housing<br>window in lid | stainless steel 1.4305 (303), Ø 89 mm<br>stainless steel 1.4305 (303), SW 36 mm<br>PEEK, FDA-number (21CFR177.2415)<br>PMMA |
| <b>Temperature Ranges</b>                 | ambient<br>process<br>CIP/SIP cleaning                                 | -10...+60 °C<br>0...100 °C<br>up to 140 °C/30 minutes max.  |
| <b>Pressure</b>                           |  | 10 bar max.   |
| <b>Protection Class</b>                   |  | IP 69 K (with PG cable gland and suitable cable)  |
| <b>Reproducibility</b>                    | of conductivity  | ≤ 1 % of measurement value  |
| <b>Resolution</b>                         | measurement range<br>< 10 mS/cm<br>10...50 mS/cm<br>100...999 mS/cm    | 1 µS/cm<br>10 µS/cm<br>100 µS/cm  |
| <b>Accuracy</b>                           | span<br>offset   | ±2 % of upper range value<br>±20 µS/cm  |
| <b>Long Term Stability</b>                | span<br>offset   | ±0.5 % of upper range value<br>±20 µS/cm  |
| <b>Accuracy of the Temperature Output</b> | ≤ 100 °C<br>100...150 °C   | 0.5 °C max.<br>1.0 °C max.  |
| <b>Electrical Connection</b>              | cable gland<br>cable connection supply                                 | 2 x M16 x 1.5<br>2 x M12 plug 1.4305<br>18...36 V DC max. 190 mA  |
| <b>Inputs</b>                             | range switching  | E1 and E2 (24 V DC) galvanically isolated   |
| <b>Outputs</b>                            | conductivity<br>temperature  | analog 4...20 mA short-circuit-proof<br>analog 4...20 mA short-circuit-proof  |
| <b>LC-Display</b>                         | with backlight   | 2 x 8-digits  |
| <b>Measurement Principle</b>              | maintenance-free   | inductive   |

| Comparison ILM-2 / ILM-3               | ILM-2   | ILM-3   |
|--|---|---|
| <b>Measurement Ranges Conductivity</b> | 0...2 mS/cm up to 0...999 mS/cm<br>12 measurement ranges selectable<br>3 ranges extern switchable | 0...0.5 mS/cm up to 0...999 mS/cm<br>14 measurement ranges selectable<br>4 ranges extern switchable |
| <b>Measurement Ranges Temperature</b>  | 0...+150 °C<br>1 measurement range fix presetted  | -20...+150 °C<br>7 measurement ranges selectable  |
| <b>Temperature Coefficient (TC)</b>    | 0...5 %/K, free adjustable<br>1 TC for all measurement ranges                                     | 0...5 %/K, free adjustable<br>1 TC for each measurement range                                       |

## Dimensioned Drawing



## Mechanical Connection / Installation



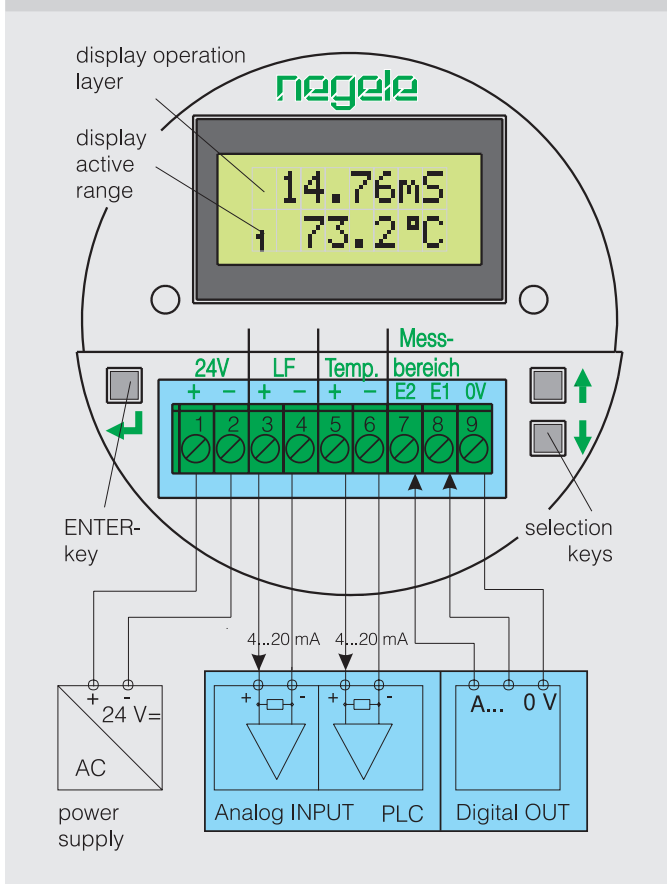
- The sensor has to be installed in that way that the bobbin case is entirely washed around by media and no bubbles can occur. Installation in a rising pipe is recommended.
- The inscription "FLOW" on the bottom side of the sensor has to show in flow direction of the medium.
- Very heavy vibrations can cause measurement errors (e. g. installation very near a pump).
- Use Negele **CLEANadapt** system for safe operation of measuring point!
- Attention: The maximum tightening torque for mounting is 20 Nm!
- Use a welding mandril for correct installation of **CLEAN-adapt** weld-in fittings. Please pay attention to the weld-in and installation details in the **CLEANadapt** product information.

## Conditions for a measuring point according to 3-A Sanitary Standard 74-06



- The sensors ILM-2 and ILM-3 conforming to the 3-A Sanitary Standard.
- Sensors are designed for CIP/SIP cleaning. Maximum 140 °C/30 minutes.
- Only with the build-in system **CLEANadapt** (EMZ, EMK, EHG with pipe diameter > DN25, ISO 20 and 1", Adapter AMC and AMV) allowed.
- Using the weld in sleeve EMZ, EMK the weld must comply to the requirements of the current 3-A Sanitary Standard.
- Mounting position, self draining and the position of the leakage hole must be in accordance to current 3-A Sanitary Standard.

### Electrical Connection



### Handling / Operation

#### Adjustment of Measuring Range

- Delivery status:  
measurement range 1: 0...20 mS/cm = 4...20 mA  
TC-value: 2 %/K
- Via the external control voltage +24 V DC (18...36 V) range 2 (E1=24 V), range 3 (E2=24 V) or range 4 (E1=E2=24 V) can be selected (see "Electrical Connection").
- At ILM-3 each measurement range can be assigned a separate temperature coefficient (TC).  
At ILM-2 one and the same TC is effective for all measurement ranges.
- At ILM-2 the temperature output is fix presetted to 0...150 °C.
- At ILM-3 the measurement range of the temperature output can be selected from 7 presetted ranges between -20...150 °C.

#### Switching the Measuring Range

The digital control inputs E1 and E2 are galvanically isolated from supply voltage.

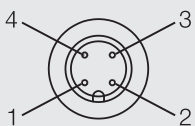
| E1 | E2 | Meas. Range |
|----|----|-------------|
| 0  | 0  | 1           |
| 1  | 0  | 2           |
| 0  | 1  | 3           |
| 1  | 1  | 4*          |

0 ≙ 0 V DC; 1 ≙ 24 V DC; Ground: clamp 9

\* only ILM-3

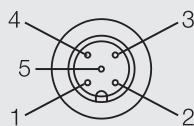
### With M12 plug

M12 plug left (4 pin)  
outputs 4...20 mA



- 1: output conductivity +  
2: output temperature +  
3: output temperature -  
4: output conductivity -

M12 plug right (5 pin)  
supply/control voltages



- 1: supply +24 V DC  
2: digital input E2  
3: 0 V (measurement range switching)  
4: supply  
5: digital input E1

### Advice



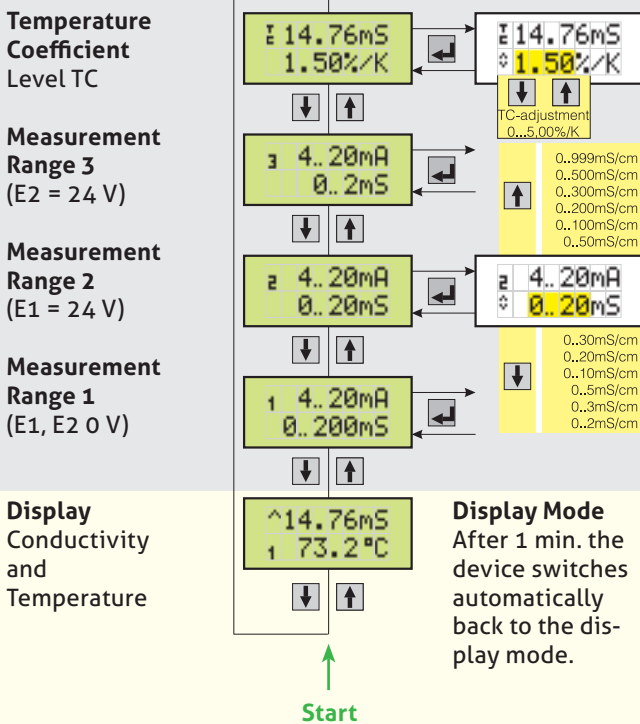
Occuring several media with very different conductivity in the application (e. g. CIP cleaning) switching to an adequate measuring range is necessary for a precise measurement!

### Detecting the Temperature Coefficient of the Medium

Delivery status: see Handling/Operation

1. Adjust "TC" to 0 %/K (see Adjustment).
2. Dip sensor into medium with 25 °C.
3. Wait until the measurement value is stable.
4. Metering and note the conductivity value from the display.
5. Warm up the medium to 60 °C minimum. Thereby the conductivity value in the display is changing.
6. Wait until the measurement value is stable.
7. Select "TC" in the operation menu and adjust the temperature coefficient until the measurement value is equal to the value noted at step 4.

## Operation Menu ILM-2



## Status Messages LM-2 / ILM-3

## ^-Symbol

"Current output conductivity overload", will be displayed if the measured value is higher than the selected measurement range.

$I_{out}$ : ca. 22 mA

## 4 (upper line)

currently editable range

## 1 (lower line)

currently activated measurement range

## ^...-Symbol

the currently measured value is higher than the maximum measurement value (999 ms/cm)

$I_{out}$ : ca. 22 mA

## ◇-Symbol

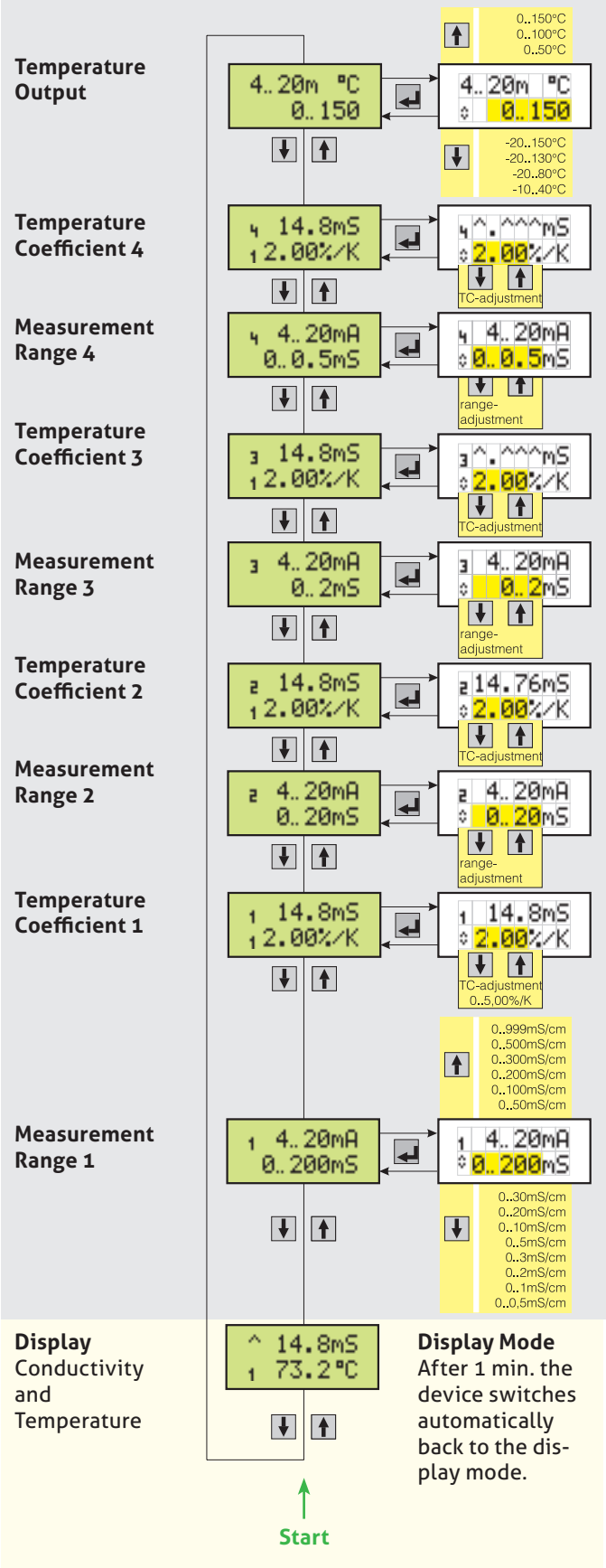
the adjoining value is now editable via arrow buttons

## vvv -Symbol

inductor error/sensor break

$I_{out}$ : 2.4 mA

## Operation Menu ILM-3



**Cleaning / Maintenance**

- In case of using pressure washers, don't point nozzle directly to electrical connections!

**Notice on conformity****Applicable directives:**

- Electromagnetic Compatibility Equipment Directive 2004/108/EC
- The CE label confirms compliance of this product with the applicable EC directives.
- You have to guarantee the compliance of all guidelines applicable for the entire equipment.

**Disposal**

- This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws.
- Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points.

**Transport / Storage**

- Do not store outside
- Store in an area that is dry and dust-free
- Do not expose to corrosive media
- Protect against solar radiation
- Avoid mechanical shock and vibration
- Storage temperature 0...40 °C
- Relative humidity max. 80%

**Reshipment**

- Sensors and process connection must be clean and must not be contaminated with hazardous media and/or heat-conductive paste. Note the cleaning information!
- Use suitable transport packaging only to avoid damage of the equipment!

**Phase separation in CIP-equipment with ILM-2****Phase separation in CIP-equipment with ILM-2**

Overview of further possible process connections (adapter must be ordered separately!)  
The complete overview of all available adapters you will find at product information **CLEANadapt**.

|                    |   |   |  |   |   |
|--------------------|---|---|--|---|---|
| ILM-2<br>ILM-3     |  |  |  |  |  |
| Process connection | Build-in system EHG (DIN 11850 series 2)  | Negele weld-in sleeve   | Negele weld-in sleeve  | Negele weld-in sleeve   | Tri-Clamp   |
| DN40               | EHG-DIN2-40/1"  | EMZ-352<br>suitable for installation in vessels                                   | EMZ-351<br>suitable for pipes and vessels with leakage hole                        | EMS-352<br>suitable for installation in pulled-out pipes                            | AMC-352/1"-1.5"   |
| DN50               | EHG-DIN2-50/1"  |   |  |   | AMC-352/2"  |
| DN65               | EHG-DIN2-65/1"  |   |  |   | AMC-352/3"  |
| DN80               | EHG-DIN2-80/1"  |   |  |   | AMC-352/80  |
| DN100              | EHG-DIN2-100/1"   |   |  |   | AMC-352/100   |

Overview of further possible process connections (adapter must be ordered separately!)

|                    |  |  |   |   |  |
|--------------------|--|--|---|---|--|
| ILM-2<br>ILM-3     |  |  |  |  |  |
| Process connection | Dairy flange (DIN 11851)   | Varivent   | APV-Inline  | Adapter G1½" to G1"   | Dummy flange   |
| DN40               | AMK-352/40   | AMV-352  | AMA-352   | AMG-352<br>suitable for existing G1½" connection  | BST-350<br>to close existing measurement points                                      |
| DN50               | AMK-352/50   | AMV-352  | AMA-352   |   |  |
| DN65               | AMK-352/65   | AMV-352  | AMA-352   |   |  |
| DN80               | AMK-352/80   | AMV-352  | AMA-352   |   |  |
| DN100              | AMK-352/100  | -  | AMA-352   |   |  |

## Order Code

**ILM-2** (12 measurement ranges, 1 temperature coefficient, 3 measurement ranges external switchable)  
**ILM-3** (14 measurement ranges, 4 temperature coefficients, 4 measurement ranges external switchable)

## Insertion-Length

**L20** (20 mm)  
**L50** (50 mm)

## Electrical Connection

**PG** (cable gland M16x1.5)  
**M12** (M12 plug-in 1.4305 (303))

ILM-2 / L20 / M12

## Accessories

**PVC-cable with M12-connection, 1.4305 (303), IP 69 K, unshielded**

**M12-PVC / 4-5 m** PVC-cable 4-pin, length 5 m  
**M12-PVC / 4-10 m** PVC-cable 4-pin, length 10 m  
**M12-PVC / 4-25 m** PVC-cable 4-pin, length 25 m

**M12-PVC / 5-5 m** PVC-cable 5-pin, length 5 m  
**M12-PVC / 5-10 m** PVC-cable 5-pin, length 10 m  
**M12-PVC / 5-25 m** PVC-cable 5-pin, length 25 m

**PVC-cable with M12-connection, brass nickel-plated, IP 67, shielded**

**M12-PVC / 4G-5 m** PVC-cable 4-pin, length 5 m  
**M12-PVC / 4G-10 m** PVC-cable 4-pin, length 10 m  
**M12-PVC / 4G-25 m** PVC-cable 4-pin, length 25 m

**M12-PVC / 5G-5 m** PVC-cable 5-pin, length 5 m  
**M12-PVC / 5G-10 m** PVC-cable 5-pin, length 10 m  
**M12-PVC / 5G-25 m** PVC-cable 5-pin, length 25 m

**M12-EVK** M12 plug-in screw cap, 1.4305 (303), with o-ring, as a protection against humidity and dirt

**CERT / 2.2** factory certificate 2.2 acc. to EN10204 (only product contacting surface)

**CAL / ILM** factory calibration certificate for ILM

## PVC-cable with M12-connection



## M12 plug-in screw cap

