

## 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 (284 °F)/30 minutes maximum
- Product contacting materials compliant to FDA
- Sensor made of stainless steel, toroid housing made of PEEK
- Conforming to 3-A Sanitary Standard 74-06
- Additional process connections:  
Tri-Clamp, dairy flange (DIN 11851), Varivent, APV

## 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

## 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



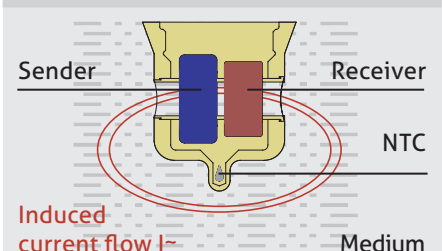
## ILM-2 - L50 with Tri-Clamp



## ILM-2 - L20 with EMZ-352



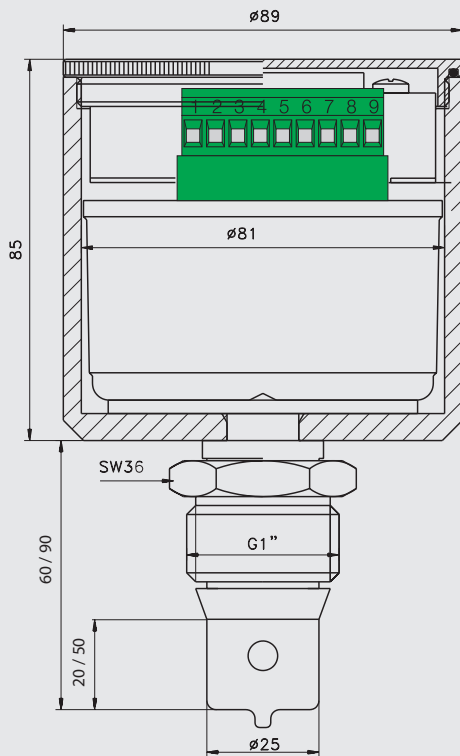
## Inductive conductivity measurement



Specification		
Process connections	thread G1" torque	sensor, combined with Negele-weld-in sleeves max. 20 Nm
Materials	connector head thread connection toroid housing window in lid	stainless steel 1.4305 (303), Ø 89 mm stainless steel 1.4305 (303), SW 36 mm PEEK, FDA-number (21CFR177.2415) PMMA
Temperature ranges	ambient process CIP/SIP cleaning	-10...+60 °C (14...140 °F) 0...100 °C (32...212 °F) up to 140 °C (284 °F)/30 minutes max.
Pressure		10 bar max.
Protection class		IP 69 K (with PG cable gland and suitable cable)
Reproducibility	of conductivity	≤ 1 % of measurement value
Resolution	measurement range < 10 mS/cm 10...50 mS/cm 100...999 mS/cm	1 µS/cm 10 µS/cm 100 µS/cm
Accuracy	span offset	±2 % of upper range value ±20 µS/cm
Long term stability	span offset	±0.5 % of upper range value ±20 µS/cm
Accuracy of the temperature output	≤ 100 °C 100...150 °C	0.5 °C max. 1.0 °C max.
Electrical connection	cable gland cable connection supply	2 x M16 x 1.5 2 x M12 plug 1.4305 18...36 V DC max. 190 mA
Inputs	range switching	E1 and E2 (24 V DC) galvanically isolated
Outputs	conductivity temperature	analog 4...20 mA short-circuit-proof analog 4...20 mA short-circuit-proof
LC-Display	with backlight	2 x 8-digits
Measurement principle	maintenance-free	inductive

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

## Dimensioned drawing



## Mechanical connection/Installation



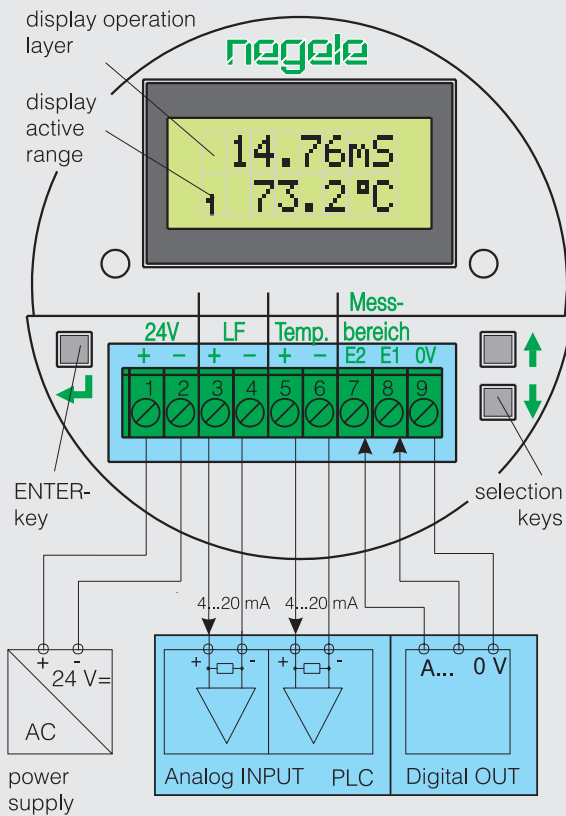
- The sensor has to be installed in a way that the toroid housing is entirely immersed in media and there are no bubbles present. Installation in a rising pipe is recommended.
- The inscription "FLOW" on the bottom side of the sensor has to show in-flow direction of the medium.
- Very heavy vibrations can cause measurement errors (e. g. installation very close to 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.

The sensors ILM-2 and ILM-3 conform to the 3-A sanitary standard 74-06 and are CIP/SIP cleanable when the following conditions are met:



- Installed using CLEANadapt AMC-351, EMZ-351, or EMK-351 fittings.
- Mounted such that the unit is self draining and the leak detection port on the fitting is located in accordance with the current 3-A standard.
- When using the weld-in fitting EMZ or EMK, the weld must be done in accordance to 3-A accepted practices.

## 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 preset ranges between -20...150 °C

## Switching the measuring range

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

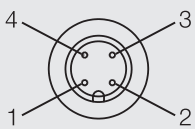
E1	E2	Meas. range
0	0	1
1	0	2
0	1	3
1	1	4*

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

\* only ILM-3

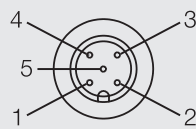
## With M12 plug

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



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

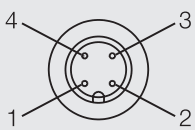
M12 plug right (5 pin)  
supply/control voltages



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

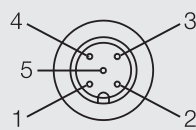
## With S12 option

Left (4 pin)



- 1: conductivity -  
2: conductivity +  
3: supply +24 VDC  
4: supply -

Right (5 pin)



- 1: output temperature +  
2: digital input E2  
3: 0 V (measurement range switching)  
4: output temperature -  
5: digital input E1

## Advice



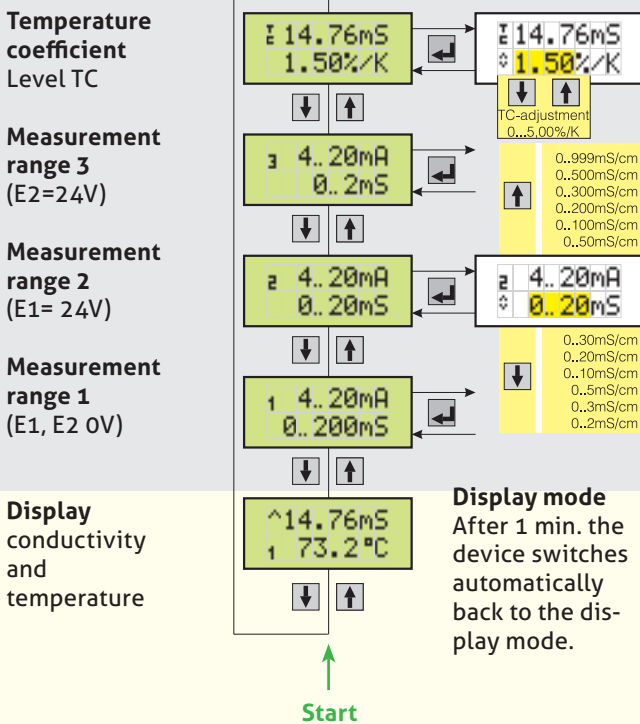
Occuring several media with very different conductivity in the application (e. g. CIP cleaning) switching to an adequate measuring range is necessary for a precise measurement!

## 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 (77 °F).
3. Wait until the measurement value is stable.
4. Record the conductivity value from the display.
5. Warm up the medium to 60 °C (140 °F) 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

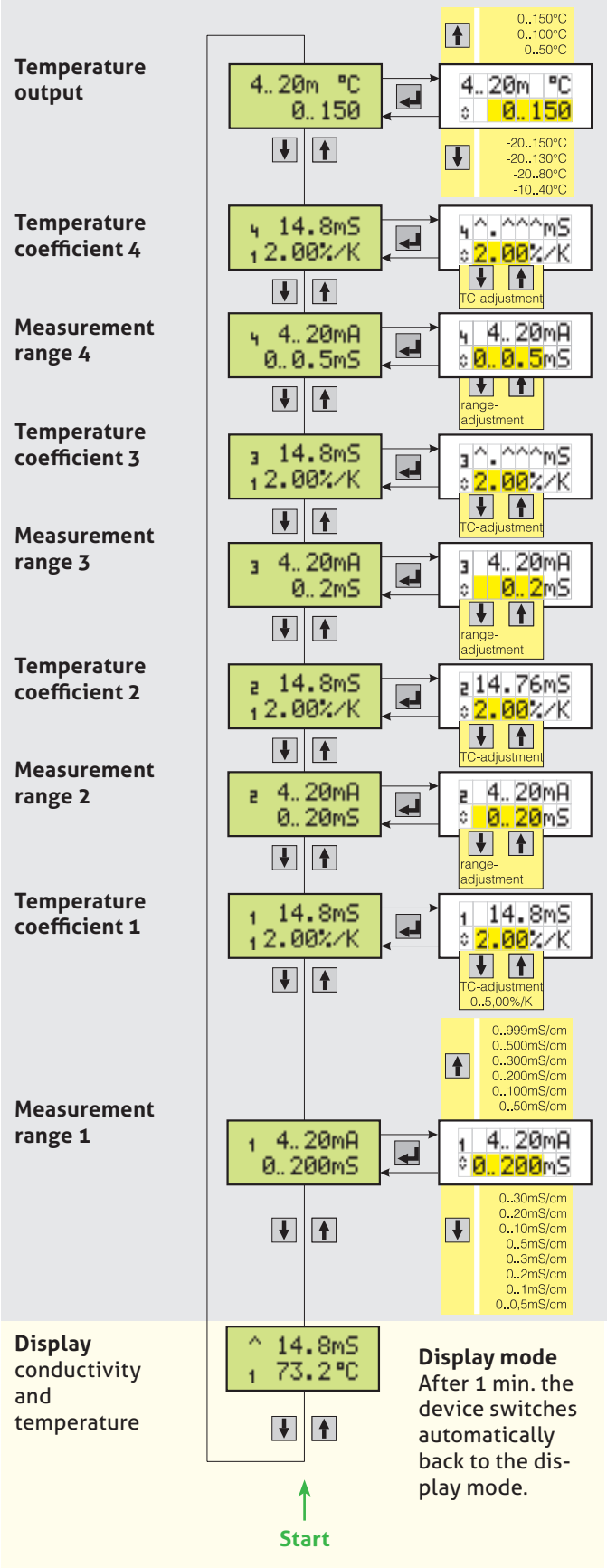
the adjoining value is now editable via arrow buttons

## 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!
- The ILM sensor is designed to be cleaned by CIP/SIP for a maximum temperature of 140 °C (284 °F) for 30 minutes.

**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 to a specialised recycling company and do not use the municipal collecting points.




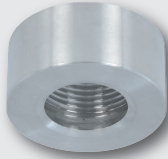

**Transport/Storage**

- 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 (32...104 °F)
- 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!

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**.

Use these fittings for applications requiring 3-A approval					
ILM-2 ILM-3					
Process connection	Tri-Clamp with leakage hole	Weld-in sleeve with leakage hole	Cylindrical sleeve with weld-in ring and leakage hole	Weld-in sleeve	Build-in system EHG (DIN 11850 series 2)
DN40	AMC-351/1"-1.5"	EMZ-351  suitable for pipes and vessels	EMS-351  suitable for installation in pulled-out pipes	EMZ-352  suitable for installation in vessels	EHG-DIN2-40/1"
DN50	AMC-351/2"				EHG-DIN2-50/1"
DN65	AMC-351/3"				EHG-DIN2-65/1"
DN80	AMC-351/80				EHG-DIN2-80/1"
DN100	AMC-351/100				EHG-DIN2-100/1"

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

ILM-2 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  suitable for existing G1½" connection	BST-350  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 (configuration see page 4)

**PG** (cable gland M16x1.5)  
**M12** (M12 plug-in 1.4305 (303))  
**S12** (M12 plug-in 1.4305 (303))

ILM-2 - L20 - S12

## Accessories

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

**CAL - ILM** factory calibration certificate for ILM

## Notes