

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
- Certification acc. to sanitary 3-A standard 74-03
- Additional process connections: Tri-Clamp, Milchröhr (DIN 11851), Varivent, APV, DRD et alli

Features / Advantages

- Wearless 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 as standard.
- Installation in pipes from DN 40 possible.

Options / Accessories

- Electrical connection via M12 plug-in connector
- Version with longer bobbin case 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



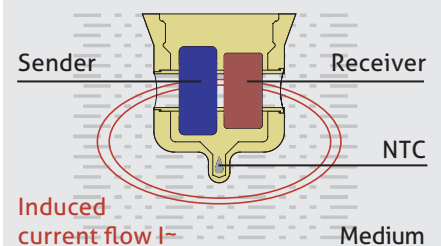
ILM-2 / L20 with EMZ-352



ILM-2 / L50 with EHG-system



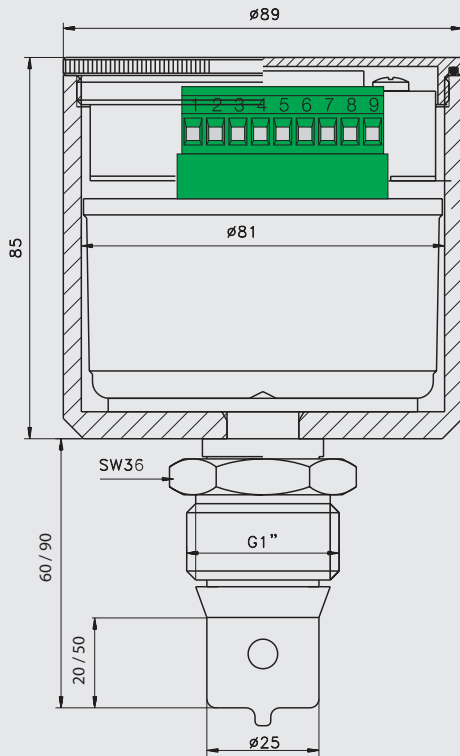
Inductive Conductivity Measurement



Specification		
Process connections	thread G1" torque	sensor, combined with Negele-weld-in sleeves max. 20 Nm
Materials	connector head thread connection bobbin case window in lid	stainless steel 1.4305 (303), Ø 89 mm stainless steel 1.4305 (303), SW 36 mm PEEK, FDA-number (21 CFR 177.2415) PMMA
Temperature Ranges	ambient process CIP-/ SIP-cleaning	-10...+60 °C 0...100 °C up to 140 °C / 30 minutes max.
Pressure		10 bar max.
Protection Class		IP 69 K (with M12 plug-in)
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 und 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	wearless	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 measurment 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

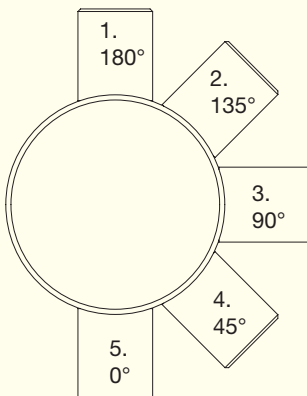


- The sensor has to be installed in that way that the bobbin case is entirely washed around by media and no bubbles can occur. Installation in a rising pipe is recommended.
- The inscription "FLOW" on the bottom side of the sensor has to show in flow direction of the medium.
- Very heavy vibrations can 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-Standard 74-03

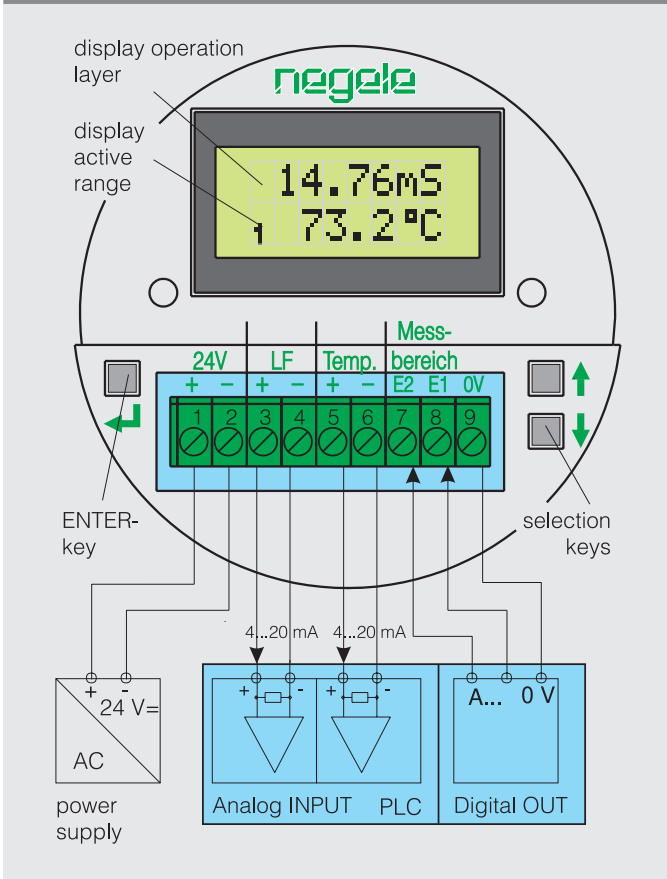


- The sensors ILM-2 and ILM-3 are approved according to the 3-A-Standard.
- Only with the build-in system **CLEANadapt** (EMZ, EMK, EHG with pipe diameter > DN25, ISO 20 und 1", Adapter AMC, AMV, AMA and AMB) allowed.
- The welding seam by using of EMZ and EMK has to correspond with 3-A-Standard 74-03, 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 draining has to be warranted by the build-in position (pos. 1, 2 or 3).



- The process connection needs a self-draining leakage hole.

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

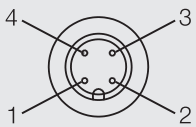
The digital control inputs E1 and E2 are galvanically isolated from supply voltage.

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

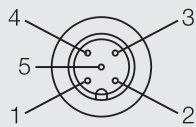
With M12 plug-in

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



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

M12 plug-in 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

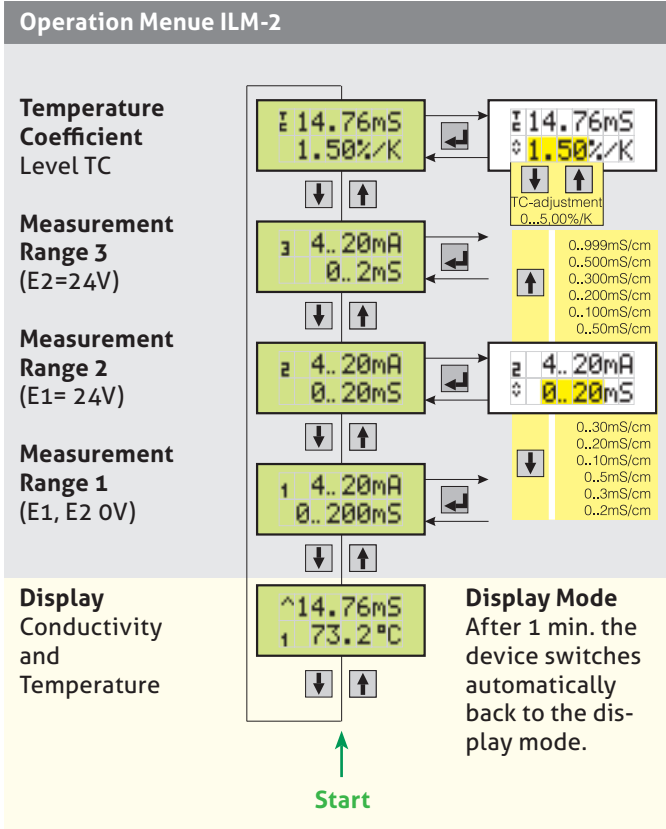


Occuring several media with very different conductivity in the application (e. g. CIP-cleaning) switching to an adequate measuring range is necessary for a precise measurement!

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.



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

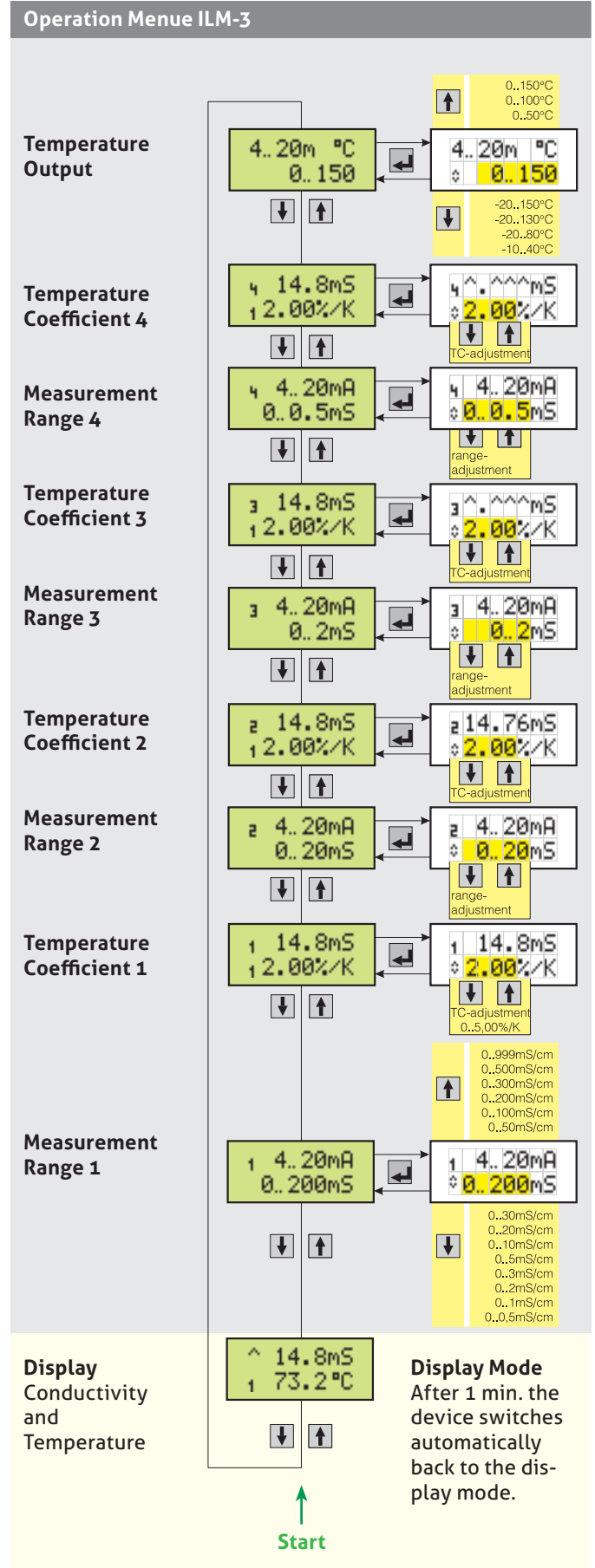
4 (upper line)
 currently editable range

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



Cleaning / Maintenance

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

Advice to EMC**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 EMC directives 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

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature 0...40 °C
- Relative humidity max. 80 %

Reshipment

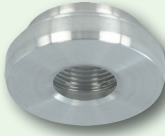




- Sensors shall be clean and must not be contaminated with dangerous media!
- Use suitable transport packaging only to avoid damage of the equipment!

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 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 suitable for installation in vessels	EMZ-351 suitable for pipes and vessels with leakage hole	EMS-352 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 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

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 conductivity meter ILM

PVC-cable with M12-connection



M12 plug-in screw cap

