Product Information ILM-4 **FOOD**

Inductive Conductivity Meter ILM-4

CLEANadapt

Application/Specified Usage

- Inductive measurement of the specific conductivity of liquid media in the range of 0...1,000 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

- 3-A Sanitary Standard compliance for Tri-Clamp and Varivent process connections
- All wetted materials are FDA-conforming
- Sensor completely made of stainless steel
- Complete overview of process connections (see order code)
- The CLEANadapt system offers a flow-optimized, hygienic and easily sterilizable installation solution for sensors.
- Hygienic process connection with CLEANadapt

Features/Advantages

- CIP/SIP cleaning up to 302°F (150°C)/maximum 60 minutes
- Wear-free, inductive measurement
- In contrast to contacting measurement methods there is no electrode deterioration or polarization.
- Accurate measurement through temperature compensation.
- High reproducibility of ≤ 1% of measurement value.
- Analog outputs for conductivity and temperature are a standard feature.
- Analog outputs for conductivity, temperature or concentration are easily adjustable.
- Short response time of 1...2 seconds for highest efficiency
- Installation in tube diameters from DN 40

Options/Accessories

- Longer toroid housing version available for pipes ≥ DN 65 or for installation into T-fitting
- Simple User Interface (SUI) and Large User Interface (LUI) display modules available
- Remote version with up to 30 m cable length
- Pre-assembled cable for M12 plug-in connector

Communication

IO-Link 4...20 mA

ILM-4 / L50 Compact Version

ILM-4 / L20 Remote Version

Large User Interface (LUI)

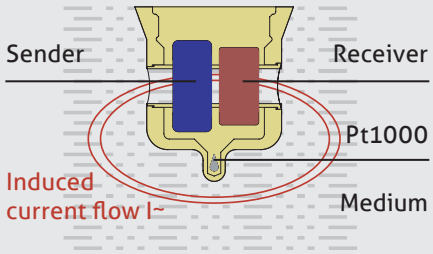
Specification		
Process connection	CLEANadapt Tri-Clamp Varivent	G1" hygienic 1½", 2", 2½", 3" DN 25 (type F), DN 40/50 (type N)
Materials	Connecting head Threaded connector Immersible body Plastic cap/sight glass	Stainless steel 1.4308 Stainless steel 1.4305 PEEK, FDA number (21CFR177.2415) Polycarbonate
Temperature ranges	Ambient Process CIP/SIP cleaning	+14...+158°F (-10...+70°C) +14...+266°F (-10...+130°C) Up to 302°F (150°C) max. 60 min
Operating pressure		Max. 16 bar
Protection class		IP 69 K
Reproducibility	of conductivity	≤ 1% of measurement value
Resolution	Measurement range 0.000...0.001 mS/cm 1.00...9.99 mS/cm 10.0...99.9 mS/cm 100...999 mS/cm	 1 µS/cm 10 µS/cm 100 µS/cm 1000 µS/cm
Accuracy	Slope Offset	±2% of measurement value ±20 µS/cm
Long-term stability		±0.5% of upper range limit
Accuracy of temperature output	≤ 212°F (100°C) 212...300°F (100...150°C)	Max. 0.9°F (0.5°C) Max. 1.8°F (1.0°C)
Electrical connection	Cable gland Cable connection Power supply	2 x M16 x 1.5 2 x M12 connector 1.4301 (AISI 304) 18...36 V DC max. 190 mA
Connection cable (ILM-4R only)	PVC-cable	8-pin, twisted pair, unshielded, with M12 coupling/straight plug
Communication	Analog Digital	2x Analog Output 4...20 mA, short circuit proof 1x Digital Input (24 V DC) IO-Link v1.1
LCD display (optional)	Backlit display	5 lines
Measuring principle	Maintenance free	Inductive

Measuring Principle of the Inductive Conductivity Meter

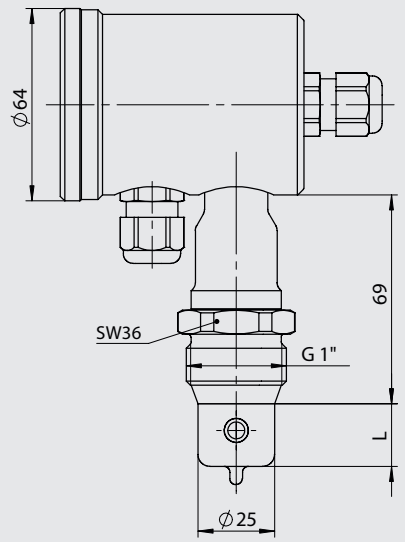
An alternating current generates a magnetic field in the primary coil (sender) which induces a current in the surrounding medium. The current flow in the medium generates another magnetic field in the secondary coil (receiver). The strength of the induced current in the secondary coil depends on the conductivity of the medium.

The conductivity of the liquid medium is temperature dependent. To compensate for any temperature influences, an additional sensor (Pt1000) in the sensor tip is used to monitor 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 temperature compensation.

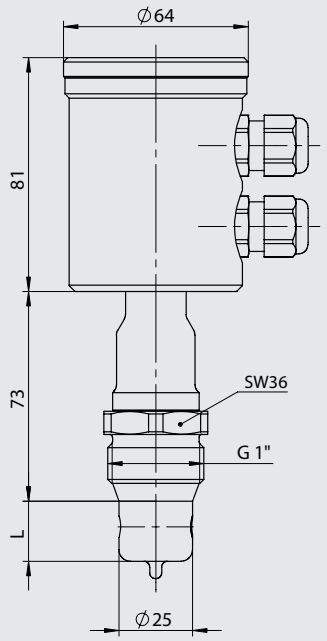
Inductive Conductivity Measurement



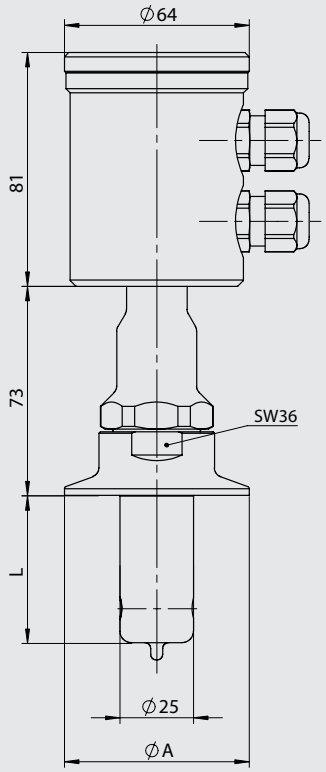
ILM-4 / G1" horizontal



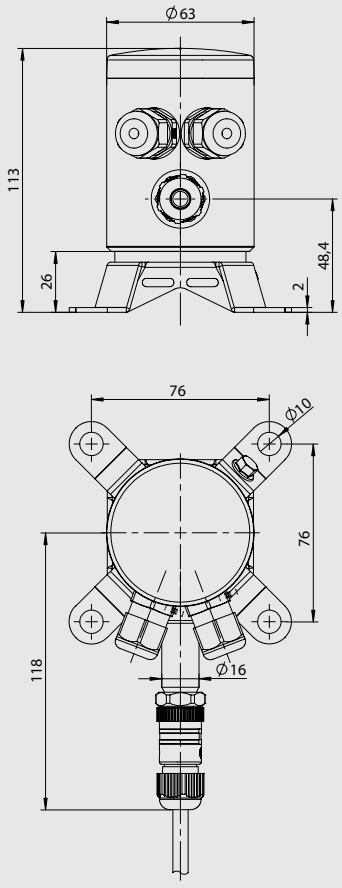
ILM-4 / G1" vertical



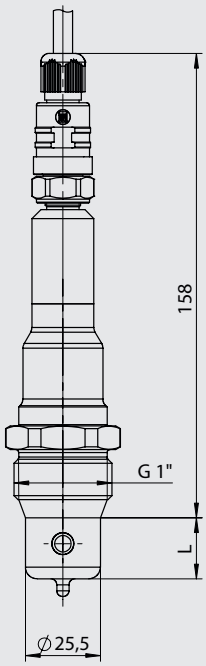
ILM-4 / Tri-Clamp vertical



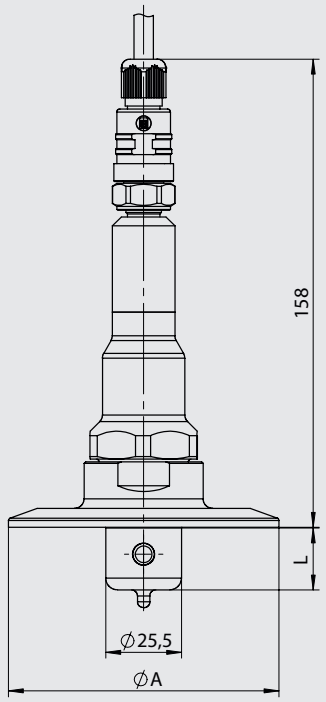
HUR / Head Unit Remote Version



ILM-4S / G1" CLEANadapt



ILM-4S / Tri-Clamp



Submersion length	
Type	**L**
ILM-4 / L20	20 mm
ILM-4 / L50	50 mm

Tri-Clamp size	
Type	**Ø A**
TC1	50.5 mm
TC2	64 mm
T25	77.5 mm
TC3	91 mm

Mechanical Connection / Installation

- Install the sensor so the bobbin case is completely surrounded by media and no bubbles occur.
- Installation in a rising pipe is recommended.
- The inscription "FLOW" on the bottom side of the sensor has to align with the media flow direction.
- Heavy vibrations can cause measurement errors (e.g. installation close to a pump).
- Use Negele CLEANadapt system for safe operation of measuring point.
- The maximum tightening torque for mounting is 20 Nm.
- Use a welding mandril for correct installation of CLEANadapt 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 ILM-4 is 3-A compliant.
- The sensors are designed for CIP/SIP cleaning. Maximum temperature of 300°F (150°C) for 60 minutes.
- Only permitted with the CLEANadapt build-in system (EMZ-351, EMK-351, EHG..., adapter AMC-351 and AMV-351).
- When using the EMZ and EMK weld-in sleeves, the weld must comply with the requirements of the current 3-A Sanitary Standard.
- Mounting position: The mounting position, self-draining properties and position of the leakage hole must be in accordance with the current 3-A Sanitary Standard.

Conventional usage

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipment (SIL).

Note on CE

- Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

Disposal

- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.

Transport/Storage

- No outdoor storage
- Store in a dry and dust-free area
- Do not expose to corrosive media
- Protect against solar radiation
- Avoid mechanical shock and vibration
- Storage temperature 32...104°F (0...40 °C)
- Relative humidity max. 80%

Cleaning/Maintenance

- When using a pressure washer, do not point the nozzle directly at the electrical connections.

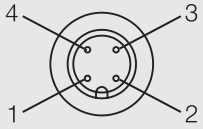
Reshipment

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

Electrical connection "M" (Signal Module / I42)

M12 connector (4-pin)

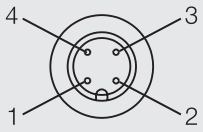
1: Power supply +24 V DC
2: Analog Output X45 +
3: Analog Output X45 -
4: Power supply -



Electrical connection "A" (Signal Module I62 / I63)

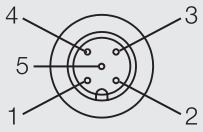
M12 connector (4-pin)

1: Analog Output X45 -
2: Analog Output X45 +
3: Power Supply +24 V DC
4: Power Supply -



M12 connector (5-pin)

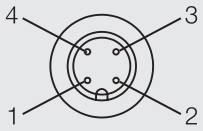
1: Analog Output X67 +
2: Not assigned
3: Not assigned
4: Analog Output X67 -
5: Digital input X3



Electrical connection "N" (Signal Module I62 / I63)

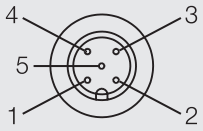
M12 connector (4-pin)

1: Analog Output X45 +
2: Analog Output X67 +
3: Analog Output X67 -
4: Analog Output X45 -

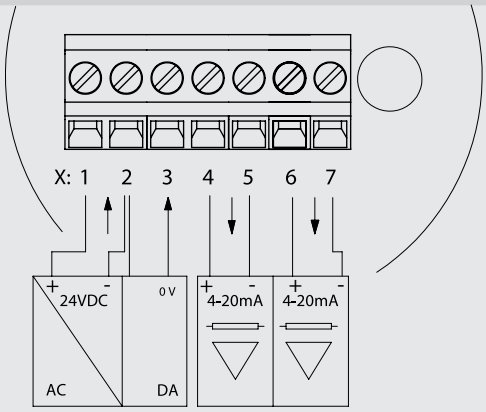


M12 connector (5-pin)

1: Power supply +24 V DC
2: Not assigned
3: Not assigned
4: Power supply -
5: Digital input X3



Electrical Connection (Signal Module I63)

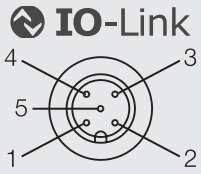


1: Power supply +24 V DC
2: Power supply -
3: IO-Link/Digital Input X3
4: Analog Output X45 +
5: Analog Output X45 -
6: Analog Output X67 +
7: Analog Output X67 -

Electrical connection "C" (Signal Module I42)

M12 connector (5-pin)

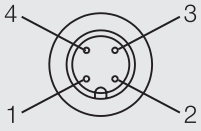
1: Power supply +24 V DC
2: Analog output X45-
3: Power supply -
4: IO-Link
5: Analog output X45+



Electrical connection "R" (Signal Module I63)

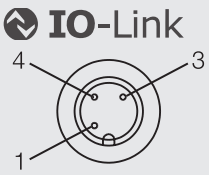
M12 connector (4-pin)

1: Analog Output X45 +
2: Analog Output X67 +
3: Analog Output X67 -
4: Analog Output X45 -



M12 connector (3-pin)

1: Power supply +24 V DC
3: Power supply -
4: IO-Link / Digital Input X3



Signal modules use cases

The ILM-4 conductivity sensor operates with the default factory settings. Depending on the chosen signal module, different input/output signals are available

I42 Signal Module (Analog and/or IO-Link capable
- 1x Analog Output X45 for conductivity
- Use Electrical Connection M for analog output

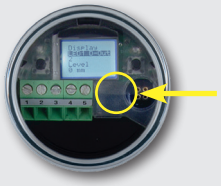
I62 Signal Module (Analog and/or IO-Link capable)
- IO-Link communication X-3
- 2X Analog output X45 and X67 for conductivity and temperature
- No external range selection of conductivity
- Use Electrical Connections "A" or "N" for Analog output; use Electrical Connection "R" for IO-Link

I63 Signal Module (Analog and/or IO-Link capable)
- IO-Link communication X3
- 2x Analog Output X45 and X67 for conductivity and temperature
- 1x Digital Input X3 for external range selection of conductivity
- Use Electrical Connections "A" or "N" for Analog output; use Electrical Connection "R" for IO-Link

Sensor configuration

Monitoring or configuring the sensor can be performed using IO-Link or the MPI-200 programming adapter with MPI-200-F. It must be ensured that the sensor is completely connected to the supply voltage while the parameters are being set.

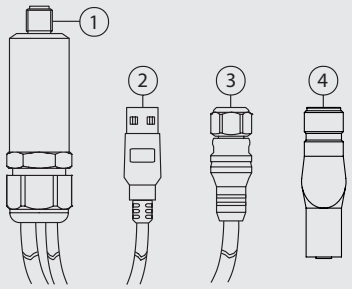
Programming adapter MPI-200-F connection



Connection plug for MPI-200-F adapter as an intermediate plug between the ILM-4 electronics and the MPI-200 connection (3) (see figure below).

Connection of programming adapter MPI-200

1: Connection for M12 connector
2: USB port for connecting to a PC
3: Connection cable to adapter for ILM-4



Creating settings with the User Interface (SUI or LUI)

The User Interface Software is similar to the PC version. The system is operated using two control buttons to the left and right of the display. These buttons can be used to navigate to the required parameter. The button functions are as follows:

Button	Press briefly	Press and hold
R (right)	Jump to next node, parameter	Edit a node, parameter
L (left)	Jump back to previous node, parameter	Leave editing mode without saving, return to next higher level
R/L	Scroll up and down	
R and L simultaneously		Press both buttons for 10 seconds: the menu jumps back to the beginning (attention: this is not a reset)

The parameters can be changed by clicking through the menu or using an ID code. To use the ID code, press and hold the right button next to the sensor prompt "ID-Search No". The sensor opens the "ID-Search" page where the required ID code can be entered directly.

In the Adjust menu, the following parameters can be set using the ID code:

Parameter/parameter name	Access/setup mode (must be set prior to change)	Search Number (ID Nummer)	Node/module	Value name
Display				
Language	1 Adjust	451010	4 Display	(#)
Conductivity Measurement				
Conductivity 1:				
Temp. Comp. 1	1 Adjust	013031	0 Measure	Conducty 1
Upper Range Value 1	1 Adjust	013091	0 Measure	Conducty 1
Conductivity 2:				
Temp. Comp. 2	1 Adjust	013033	0 Measure	Conducty 2
Upper Range Value 2	1 Adjust	013093	0 Measure	Conducty 2
Concentration C:				
Temp. Compensation C	1 Adjust	013032	0 Measure	Concentr C
Media Concentr. Range	1 Adjust	013061	0 Measure	Concentr C
Upper Range Value C	1 Adjust	013092	0 Measure	Concentr C

Advice

As media can have different conductivities in a given application (e.g. CIP Cleaning), it is necessary to switch to an appropriate measuring range for the specific media to get a precise measurement.

Detecting the Temperature Coefficient of the Medium

Default setting: TC = 2 %/K

1. Set "TC" to 0 %/K.
2. Submerge the device in 77°F (25°C) medium.
3. Wait until the measurement value stops changing.
4. Read the conductivity from the display and write down the value.
5. Heat the medium to at least 140°F (60°C).
   The conductivity value will change on the display.
6. Wait until the measurement value stops changing.
7. Select the "Temp. Comp." parameter and set the determined TC value.

Order code

ILM-4R Inductive Conductivity Sensor - remote version, remote cable must be ordered separately

Submersion length of toroid
- **L20** 20 mm
- **L50** 50 mm

Process connection (3-A compliant)
- **S01** CLEANadapt G1" hygienic
- **TC1** Tri-Clamp 1½"
- **TC2** Tri-Clamp 2"
- **T25** Tri-Clamp 2½"
- **TC3** Tri-Clamp 3"
- **V25** Varivent type F, DN 25
- **V40** Varivent type N, DN 40/50

Signal module
- **I42** IO-Link and 1x 4...20 mA conductivity
- **I62** IO-Link and 2x 4...20 mA conductivity/temperature selectable, no external range switching
- **I63** IO-Link and 2x 4...20 mA conductivity/temperature selectable, external range switching

Electrical connection
- **P*** 1x Cable gland M16x1.5 for I42 Analog Output
- **D*** 2x Cable gland M16x1.5 for I62 or I63 Analog Output
- **M** 1x M12 connector, 4-pin for output I42
- **N** 2x M12 connector, 4-pin for output/input, 5-pin for power supply
- **A** 2x M12 connector, 4-pin for power supply, 5-pin for output/input
- **C** 1x M12 connector, 5-pin analog output and IO-Link
- **R** 2x M12 connector, 4-pin for analog output, 3-pin for IO-Link and input

Display
- **X** Without
- **L** Large User Interface with big display

Enclosure
- **X** Plastic cap without sight glass
- **P** Plastic cap with sight glass
- **M** Stainless steel cap without sight glass
- **W** Stainless steel cap with sight glass

Configuration
- **X** Default factory settings
- **S** Special order

ILM-4R /	L20 /	S01 /	I63 /	D /	S /	P /	X

*Electrical connections P & D may not be watertight. Sensors returned for water damage may not be covered under warranty.

Connection cable for ILM-4R (remote version)

PVC-Cable, 8 pin, twisted pair unshielded, IP69K
Length selectable in steps of 1 meter, 30 m max

- **M-12 PVC / 8-PBT** M12 plug/coupling made of PBT plastic
- **M-12 PVC / 8-SS** M12 plug/coupling made of stainless steel

PVC-cable with M12-connection

Information

The components ILM-4S (stem only) and HUR (Head Unit Remote) can be purchased as spare parts separately.
The valid configuration can be seen on the product labels.

Order code

ILM-4 Inductive Conductivity Sensor

Submersion length of toroid
- **L20** 20 mm
- **L50** 50 mm

Process connection (3-A compliant)
- **S01** CLEANadapt G1" hygienic
- **TC1** Tri-Clamp 1½"
- **TC2** Tri-Clamp 2"
- **T25** Tri-Clamp 2½"
- **TC3** Tri-Clamp 3"
- **V25** Varivent type F, DN 25
- **V40** Varivent type N, DN 40/50

Head orientation
- **H** horizontal head orientation
- **V** vertical head orientation

Signal module output
- **I42** IO-Link and 1x 4...20 mA conductivity
- **I62** IO-Link and 2x 4...20 mA conductivity/temperature selectable, no external range switching
- **I63** IO-Link and 2x 4...20 mA conductivity/temperature selectable, external range switching

Electrical connection
- **P*** 1x Cable gland M16x1.5 for I42 Analog Output
- **D*** 2x Cable gland M16x1.5 for I62 or I63 Analog Output
- **M** 1x M12 connector, 4-pin for output I42
- **N** 2x M12 connector, 4-pin for output/input, 5-pin for power supply
- **A** 2x M12 connector, 4-pin for power supply, 5-pin for output/input
- **C** 1x M12 connector, 5-pin analog output and IO-Link
- **R** 2x M12 connector, 4-pin for analog output, 3-pin for IO-Link and input

Display
- **X** Without
- **S** Simple User Interface with small display
- **L** Large User Interface with big display

Enclosure
- **X** Plastic cap without sight glass
- **P** Plastic cap with sight glass
- **M** Stainless steel cap without sight glass
- **W** Stainless steel cap with sight glass

Configuration
- **X** Default factory settings
- **S** Special order

ILM-4 L20 / S01 / V / I63 / D / S / P / X

*Electrical connections P & D may not be watertight. Sensors returned for water damage may not be covered under warranty.

50089 / 1.7 / 2020-07-20 / SD / NA

NEGELE MESSTECHNIK GMBH
Raiffeisenweg 7
87743 Egg an der Guenz

ANDERSON INSTRUMENT COMPANY INC.
Fultonville, NY 12072`
USA

Phone: 518-922-5315
Fax: 518-922-8997
info@anderson-negele.com