Product Information ILM-4   **FOOD**

Inductive Conductivity Meter ILM

CLEANadapt

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

· Use of Negele CLEANadapt build-in system results in a hygienic installation situation that is free of gaps and dead space and is easy to sterilize.
· Process connection G1" hygienic or Tri-Clamp, adapters available for milk pipe (DIN 11851), Varivent, DRD (see CLEANadapt product information)
· CIP/SIP cleaning up to 150°C/maximum 60 minutes
· All parts with product contact are FDA-compliant
· Sensor made entirely of stainless steel, submersible body made of PEEK
· Conformity with 3-A standard

Features/Advantages

· Wear-free, inductive measurement
· In contrast to conductive measurement procedures, no problems with electrode deterioration or polarization.
· Accurate measurement through compensation of temperature influences.
· 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 freely adjustable.
· Rapid temperature response time T_{90} 15...60 s
· Installation in tube diameters from DN 40

Options/Accessories

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

Authorizations

FDA

A3
74-06

ILM-4 / L20

ILM-4 / L50 with Tri-Clamp

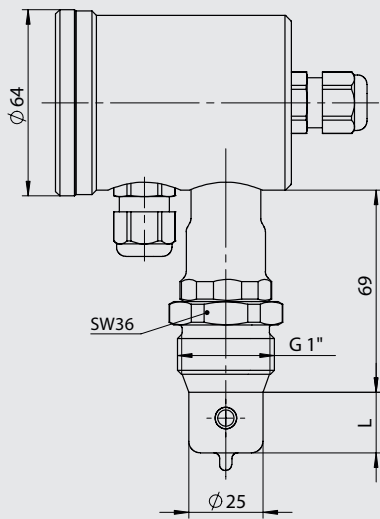| Specification		
Process connection	Thread G1" Tri-Clamp Varivent	CLEANadapt G1" hygienic 1½", 2", 2½", 3" DN 25 (type F), DN 40/50 (type N)
Materials	Connecting head Threaded connector Immersible body Plastic cap/sight glass	Stainless steel 1.4308 Stainless steel 1.4305, 36 mm PEEK, FDA number (21CFR177.2415) Polycarbonate
Temperature ranges	Ambient Process CIP/SIP cleaning	-10...+70°C -10...+130°C Up to 150°C max. 60 min
Operating pressure		Max. 16 bar
Protection class		IP 69 K (with PG fitting only with use of suitable cable)
Reproducibility	of conductivity	≤ 1% of measurement value
Resolution	Measurement range < 10 mS/cm 10...100 mS/cm 100...999 mS/cm	 1 µS/cm 10 µS/cm 100 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	≤ 100°C 100...150°C	Max. 0.5°C Max. 1.0°C
Electrical connection	Cable gland Cable connection Power supply	2 x M16 x 1.5 2 x M12 connector 1.4305 18...36 V DC max. 190 mA
Inputs	Range switching	Input E1 (24 V DC), galvanically isolated
Outputs	2 outputs, free configurable	Analog 4...20 mA, short-circuit proof
LCD display	Backlit display	5 lines
Measuring principle	Wear-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 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 (Pt1000) 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.
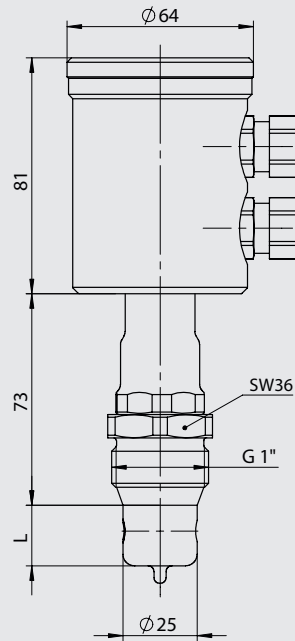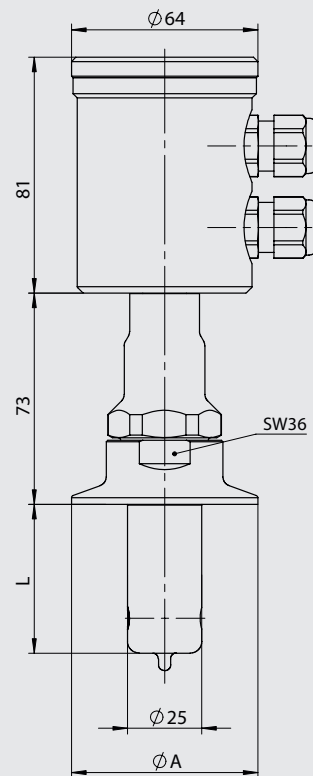
Inductive Conductivity Measurement
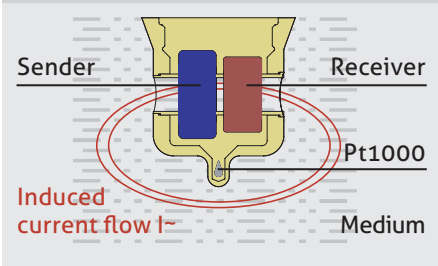
G1" horizontal dimensional drawing	G1" vertical dimensional drawing	Tri-Clamp dimensional drawing

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

· The sensor has to be installed in that way that the bobbin case is entirely washed around by media and no bubbles can occure.
  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 **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 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.

Electrical Connection
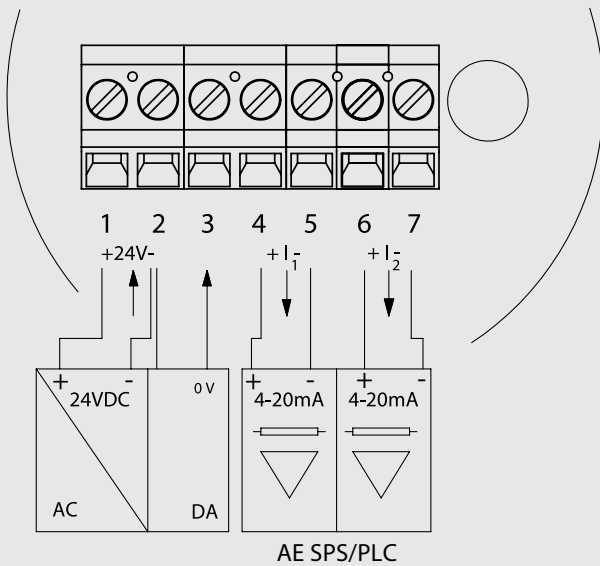
1: Power supply +24 V DC
2: Power supply -
3: Digital input E1
4: Output 1 +
5: Output 1 -
6: Output 2 +
7: Output 2 -

Parameterization

The ILM-4 conductivity sensor is set to operate without requiring special settings. Should the parameters need to be changed, this can be performed using the PC-based MPI-200 programming adapter or the Simple User Interface.

The following parameters can be changed directly on-site – in the Justage mode – or using a dry simulation in the office.

Display:
· Language and contrast of operating panel

Conductivity measurement:
· Conductivity 1:
  Temperature compensation 1 and upper range limit 1
· Concentration:
  Temperature compensation C, medium concentration range and upper range limit C
· Conductivity 2:
 Temperature compensation 2 and upper range limit 2

Settings using the MPI-200 programming adapter

The MPI-200 programming adapter is connected to the ILM-4 conductivity sensor via the external MPI-200-F adapter piece. It must be ensured that the ILM-4 conductivity sensor is permanently connected to the supply voltage while the parameters are being set.

With M12 plug

M12 connector, top (4-pin)

1: Output 1 +
2: Output 2 +
3: Output 2 -
4: Output 1 -
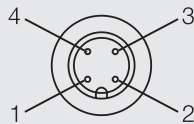
M12 connector, bottom (5-pin)

1: Power supply +24 V DC
2: Not assigned
3: Not assigned
4: Power supply -
5: Digital input E1
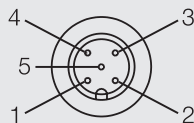
M12 connector assignment

The M12 standard assignment is compatible with the predecessor model ILM-2.

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 next figure).

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 Simple User Interface

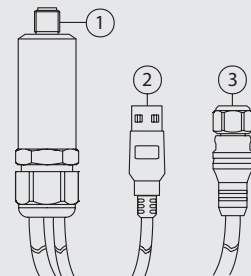The software structure of the Simple User Interface is similar to that of the PC version. The system is operated using two control buttons to the left and right of the display. These buttons can be used to navigate to the required parameter. The button functions are as follows:

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 on which the necessary 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	(#)
Contrast User Interface	1 Adjust	451020	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

Occuring several media with very different conductivity in the application (e. g. CIP cleaning) switching to an adequate measuring range is neccessary for 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 25°C medium.
3. Wait until the measurement value stops changing.
4. Read off the conductivity from the display and note down the value.
5. Heat the medium to at least 60°C. The conductivity value changes in the display.
6. Wait until the measurement value stops changing.
7. Select the „Temp. Komp." parameter and set the determined TC value.

Cleaning/Maintenance

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

Notice on conformity

Applicable directives:
· Electromagnetic Compatibility 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 equipement.

Disposal

· This instrument is not subject to the WEEE directive 2002/96/EC and the respective national laws.
· Give the instrument directly to a specialized recycling company and do not use the municipal collecting points.

Transport/Storage

· No outdoor storage
· 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!
· To avoid damage of the equipment, use suitable transport packaging only.

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

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-4					
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"**				**AMC-352/1"-1.5"**
DN50	**EHG-DIN2-50/1"**	**EMZ-352**	**EMZ-351**	**EMS-352**	**AMC-352/2"**
DN65	**EHG-DIN2-65/1"**	suitable for installation in vessels	suitable for pipes and vessels with leackage hole	suitable for installation in pulled-out pipes	**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-4					
Process connection	**Dairy flange** (DIN 11851)	**Varivent**	**APV-Inline**	**Adapter G1½" to G1"**	**Dummy flange**
DN40	**AMK-352/40**	**AMV-352**	**AMA-352**		
DN50	**AMK-352/50**	**AMV-352**	**AMA-352**	**AMG-352**	**BST-350**
DN65	**AMK-352/65**	**AMV-352**	**AMA-352**	suitable for existing G1½" connection	to close existing measurement points
DN80	**AMK-352/80**	**AMV-352**	**AMA-352**		
DN100	**AMK-352/100**	**-**	**AMA-352**		

Order code

ILM-4   (inductive conductivity sensor)

Submersion length
L20   (20 mm)
L50   (50 mm)

Process connection (other process connections on request)
S01   (standard, 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)

Output
A42   (1x 4...20 mA conductivity value only, display prepared)
A62   (2x 4...20 mA conductivity/temperature selectable,
               no external range switching, display prepared)
A63   (2x 4...20 mA conductivity/temperature selectable,
               external range switching, display prepared)

Electrical connection
P   (cable gland M16x1.5)
D   (2x cable gland M16x1.5)
M   (1x M12 connector, 5-pin)
N   (2x M12 connector, standard)
A   (2x M12 connector, 4-pin, power supply/output, 5-pin output/input)

Interface/Display
X   (without Interface)
S   (Simple User Interface with small 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)

Parameter configuration
X   (standard)
S   (write out details)

ILM-4 /   L20 /   S01 /   V /   A63 /   D /   S /   P /   X