

OPERATING MANUAL

Hydrolog® HLF4 |
Autonomous data logger
for pipe mounting
for measuring water
level, temperature, and
conductivity
with secure remote data
transmission to a web
portal



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1 Notes on the Document

1.1 Document function

This manual describes the product's design, functions, and use, and helps ensure that the product is operated as intended.

Read the manual carefully before using the product. This will help you avoid potential injury, property damage, and damage to the device.

The operating manual is an integral part of the device and must be kept accessible at all times in the immediate vicinity of the operating site.

The information in this document reflects the knowledge available at the time of printing. Subject to change without notice.

1.2 Terms

NOTE

Information on how to prevent malfunctions, operational failures, and damage to the device or system.



WARNING

Failure to follow these instructions may result in serious or fatal injury.

[04-5]

Note regarding a variant >> Product Code section

1.3 Additional documents

In addition to this document, you can find additional documents online.

2 Safety instructions

2.1 Authorized personnel

Installation, electrical connection, commissioning, operation, maintenance, disassembly, and disposal of the device must be performed by a qualified and authorized specialist in accordance with the instructions in the operating manual and applicable standards.

This specialist must have read and understood the operating instructions, particularly the safety instructions. The required personal protective equipment must always be worn when working on or with the device.

2.2 Intended use

The device is an electronic data logger with integrated remote data transmission, designed for the autonomous recording of various measured variables.

The device must not be used in areas where the use of cell phones is prohibited, such as in hospitals or in areas at risk of explosion. Electromagnetically sensitive devices may experience operational disruptions during data transmission due to the high-energy radio waves.

The device's operational safety is guaranteed only when used as intended. Improper or unintended use of this product may result in application-specific hazards, such as a container overflow due to incorrect installation or adjustment. This may result in property damage, personal injury, or environmental damage. Furthermore, this may impair the device's performance.

Improper use, failure to follow the operating instructions and technical regulations, the use of inadequately qualified personnel, unauthorized modifications, and damage to the device exclude the manufacturer's liability for any resulting damages. The manufacturer's warranty is void.

2.3 Operational safety

The device is designed and tested in accordance with the state of the art to ensure operational safety. It may only be operated when it is in technically sound and safe operating condition. The operator is responsible for ensuring the trouble-free operation of the device. The device may only be used within the permissible operating limits. Any use outside these intended limits may result in significant hazards.

The materials must be checked for compatibility with the application requirements prior to use. An unsuitable material can lead to damage, malfunction, or destruction of the device and the resulting hazards.

The device must not be used as the sole means of preventing hazardous conditions on machines and systems.

For safety and warranty reasons, any modifications beyond the described operating procedures may only be performed by personnel authorized by the manufacturer. Unauthorized modifications or alterations are expressly prohibited. For safety reasons, only accessories specified by the manufacturer may be used.

The device complies with the requirements of all relevant EU directives. This is confirmed by the CE mark affixed to the device. The corresponding EU Declaration of Conformity can be requested or downloaded from the website.

3 Product description

3.1 Function

The device is an electronic data logger with integrated remote data transmission for the autonomous recording of various measured variables.

The device is primarily used for location-independent measurement recording and remote data transmission from level probes, ultrasonic or radar sensors, or similar sensor technology designed for level measurement. The device was specifically developed for measurements in narrow pipes starting at 2".

The connected sensors—whether analog with a 0/4...20 mA current signal, digital RS485 Modbus RTU, or pulse/switch inputs—are powered by the device, and the recorded measurement values are stored internally with loss protection.

The measured values are automatically transmitted to a web portal or an FTP server via cellular networks.

Innovative alarm management enables the timely detection and reporting of hazards caused by flooding or low water levels.

The device is powered either by a high-performance long-life battery, a Li-ion rechargeable battery (possibly in combination with a PV module), or by an external DC voltage.

The device is hermetically sealed and submersible up to 3 m.

Configuration and operation can be performed via the integrated Bluetooth® interface or via the web portal.

3.2 Setup

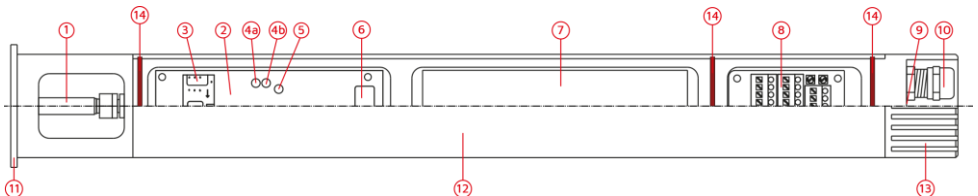


Figure 3.1 : grf00061_cmp_hlf4

- 1 Mobile Communications Antenna
- 2 Electronics cover
- 3 External SIM
- 4 4a - COM LED / 4b - Function LED
- 5 Reset tester
- 6 Battery/Rechargeable Battery Connector
- 7 Battery/Rechargeable Battery
- 8 Terminal blocks
- 9 Ventilation/Pressure Equalization
- 10 Cable gland
- 11 Mounting ring
- 12 Housing tube
- 13 Sealing screw
- 14 Gaskets

The cellular antenna (1) can be unscrewed and replaced with another type, such as a level tube cap antenna or a directional antenna.

The electronics are located under a cover plate (2). A push-pull SIM card holder (3) is mounted on this cover plate to accommodate an external SIM card as an alternative. The integrated SIM card should be used whenever possible.

Two status LEDs (4) indicate various operating states:

- COM LED for cellular communication
- Function LED for variable information

Reset button (5) to restart the device.

Note

Use the reset button only in exceptional cases! Risk of data loss!

The high-performance battery (7) or Li-ion rechargeable battery (7) ensures a reliable power supply for the device for many years, depending on usage. Connection is made via a socket (6).

Up to 5 sensors, a PV module, and/or an auxiliary power supply are connected via 3 cable glands (10) and the terminal blocks (8).

The reference air supply required for relative pressure measurement is provided via a hydrophobic/oleophobic membrane through the watertight pressure equalization port (9).

The device is mounted directly into a 2" plug in the system using the mounting ring (11). Installation in larger plugs is accomplished using adapter plates available as accessories.

The housing tube (12) and the sealing screw (13) seal the device watertight up to 3 meters of submersion.

Laser-etched labeling on the nameplate ensures the device can be identified throughout its entire service life.

3.3 Nameplate

The nameplate contains the most important data for identifying and operating the device.

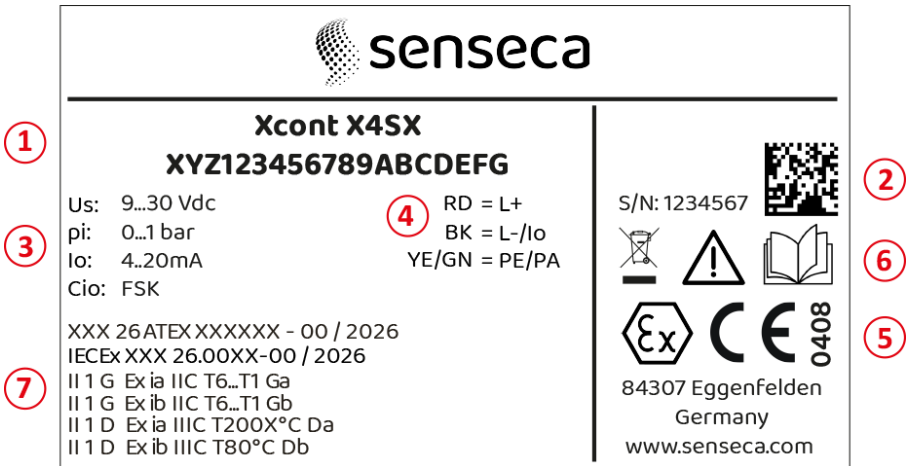


Figure 3.2 : grf00002_lab001

- 1 Product code
- 2 Serial number
- 3 Technical Specifications
- 4 Electrical Connection
- 5 Approvals
- 6 Safety Instructions
- 7 Type of ignition protection

3.4 Product code

HLF4 [01][02][03][04][05][06][07][08][95/98]

	Device	HLF4	Data logger with remote data transmission
01	Approval	S	Standard
02	Housing Design	R2	In-pipe housing Ø 48 mm / 2" pipe
03	Electronics – Power Supply	B1	Lithium battery 19 Ah / DC supply 7–32 Vdc
03		B2	Lithium battery 35 Ah / DC supply 7–32 Vdc
03		A1	Li-ion battery 20 Ah / DC supply 7–32 Vdc / PV module
04	Electronics – Function	0	Bluetooth® 5.2
04		5	LTE-M1, LTE-NB2, EGPRS / Bluetooth® 5.2
05	Electronics – Input	M	2x 0/4...20 mA / 2x RS485 / 1x Switch
06	Rate	0	Billed separately / not included
06		XS	DataComplete XS
06		S	DataComplete S
06		M	DataComplete M
06		L	DataComplete L
07	Group	1	Standard
08	Scope of Services	B	Basic
08		S	Standard
08		P	Premium
95	Additional Option	+ML	Measuring Point Designation / TAG - Laser Marking
98	Additional option	+KF	Configuration / Default Setting

Variants are generally identified by the letter Y in the product code.

3.5 Dimensions

Dimensions in mm

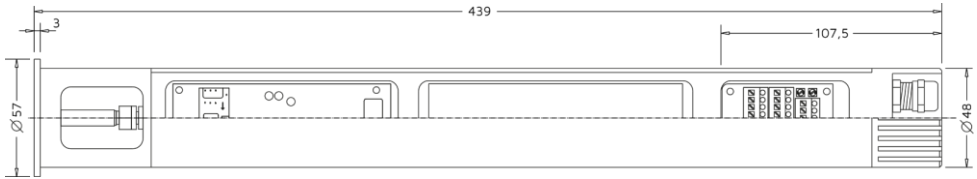


Figure 3.3 : grf00062_dim_hlf4

3.6 Packaging, transport, storage

The device is protected by its packaging, which is designed to withstand normal shipping conditions. Transport must be carried out in accordance with the instructions on the shipping packaging. Failure to do so may result in damage to the device.

Upon receipt, the shipment must be inspected immediately for correctness, completeness, and any transport damage. Any transport damage or hidden defects found must be handled accordingly.

The packages must be kept sealed until installation and, unless otherwise specified, stored only under the following conditions:

- Do not store outdoors
- Store in a dry, dust-free location
- Do not expose to corrosive substances
- Protect from direct sunlight
- Avoid mechanical shocks
- Storage and transport temperature: -20...+85 °C
- Relative humidity 20...85 %

3.7 Accessories

A comprehensive range of accessories, optimally tailored to the device, is available for installation and electrical connection.

4 Installation

4.1 Ambient and process conditions

Correct operation of the device within the specified technical data can only be guaranteed if the permissible environmental conditions at the installation site (see the Technical Data section) are not exceeded.

Before installation, ensure that all parts of the device (e.g., housing, cable glands, seals) are suitable for the conditions encountered (e.g., temperature, mechanical stresses).

4.2 Installation location

The installation location has a significant impact on the quality of the cellular connection. In particular, proximity to structures, vegetation, or coverage by leaves or snow can attenuate the signal or even block it completely.

Before installation, check the signal strength of the cellular network at the installation site. If the network signal is too weak, data transmission may be impossible, and significantly more battery power will be consumed. This considerably reduces the device's operating time. Signal strength can be significantly increased by using an optimally mounted external antenna or, if necessary, a directional antenna. The antenna must be protected from being covered by leaves or snow and cleaned regularly as needed. If necessary, a different location should be chosen.

Near flowing bodies of water, there is an increased risk of damage from floating debris, such as tree trunks, in the event of flooding. Adequate mechanical protection must be provided, or, if necessary, a different location should be chosen.

4.3 Installation instructions

Do not remove the packaging until immediately before installation, and inspect the device for any damage.

The device can be installed in end caps for level tubes starting at 2"; for larger end caps, use an adapter plate.

The device's design allows for damage-free submersion up to a water column of 3 m.

NOTE

Contamination or damage to the pressure equalization port (bottom of the housing) can lead to incorrect measurement results from a connected hydrostatic level sensor.

NOTE

At very cold temperatures, rising moist air can cause severe icing on the underside of the device, which may block the pressure equalization element. This can be significantly reduced by inserting an air-permeable foam piece into the level tube.

NOTE

Before inserting the device into the level tube, check that all cable glands, the housing tube, and the antenna connector are securely tightened.

NOTE

Slowly slide any connected sensors into the level tube. A sensor falling unchecked can overload the strain relief.

NOTE

Suspension sensors with Electrical Connection Option H—Hydrolog cable assembly and length L1—in combination with the data logger result in an installation length L1 relative to the mounting edge of the water level cap or adapter plate.

4.4 Opening the Device

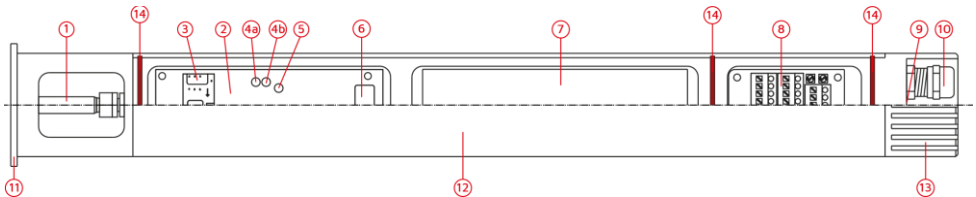


Figure 4 .1 : grf00061_cmp_hlf4

Unscrew the housing locking screw (13) counterclockwise and pull it off together with the housing tube (12).

NOTE

Prevent moisture or dirt from entering the interior of the device, as this may cause malfunction, damage, or even destruction, along with the resulting hazards.

4.5 Closing the device

If necessary, lightly coat the 3x gasket (14) all around with a suitable, silicone-compatible lubricant to allow the housing tube to slide easily. Replace damaged gaskets. These are available from the manufacturer.

Slide on the housing tube (12) and secure it by hand by turning the housing locking screw (13) clockwise until it is tight.

5 Electrical connection

NOTE

Instructions for opening the device—Section 4.4—and closing the device—Section 4.5.

NOTE

Install the device only when it is de-energized. Disconnect the DC power supply.

NOTE

The cable of the connected sensor is sealed by the cable gland but is not securely held in place. To reliably prevent the cable from slipping out, clamp, for example, a steel core, the cable shield, or unused strands into the double screw blocks located next to the 5-pin terminal. These provide strain relief for sensor weights up to a maximum of 1 kg.

Sensors weighing more than 1 kg must be secured with an additional heavy-duty strain relief. This heavy-duty strain relief is available separately as an accessory.

5.1 Terminal blocks

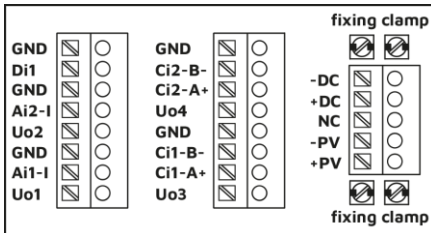


Figure 5.1 : grf00063_eac_hlf4_terminals

- 8 Uo1/2/3/4 - Sensor Power Supply, 4 Channels
- 9 Ai1-I - Analog Current Input 0/4-20 mA - Channel 1
- 10 Ai2-I - Analog current input 0/4-20 mA - Channel 2
- 11 Di1 - Digital Switching/Counting Input - Channel 1
- 12 Ci1-A+/B- - RS485 Modbus-RTU interface - Channel 1
- 13 Ci2-A+/B- - RS485 Modbus-RTU interface - Channel 2
- 14 GND - Ground
- 15 +DC/-DC - DC auxiliary power
- 16 +PV/-PV - PV module
- 17 NC - Not Connected
- 18 Fixing clamp - Strain relief for sensor weights up to 1 kg

The terminals are suitable for connecting:

Solid-core conductor / stranded conductor	0.2...1.5 mm ²
Stranded conductor with ferrule	0.25...1.0 mm ²
Strip length	8.5...9.5 mm
Clamping range for cable glands	2x 4...8 mm / 1x 3.5...5 mm

5.2 Pin assignment

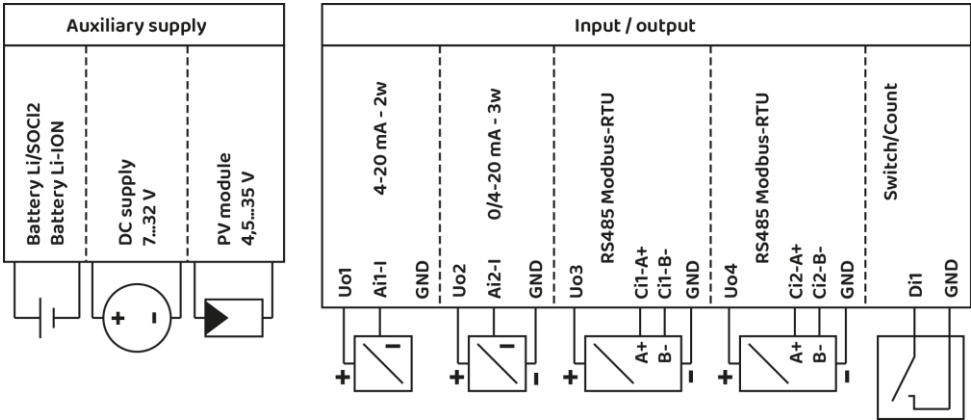


Figure 5.2 : grf00064_eac_hlf4_full_connection

5.3 Auxiliary power supply

! WARNING

Only suitable batteries/rechargeable batteries may be used; otherwise, this may result in malfunction, damage, or even destruction of the device and the resulting hazards.

! WARNING

The battery must not be recharged. There is a risk of explosion or fire.

NOTE

To ensure proper operation, the device must only be operated or stored with a functional, sufficiently charged battery. Long-term operation or storage without a battery or with a discharged battery may result in data loss or damage to the device.

NOTE

The rechargeable battery can be charged:

- internally via a connected PV module or a connected DC power source.
- externally via a DC power supply.

NOTE

The connector of the cable connecting to the battery can only be disconnected after pressing the locking lever on the connector housing.

NOTE

When converting from battery to rechargeable battery power, remove the three retaining clips.

5.3.1 Battery

The battery is the sole power source.
Replacement is required when the charge level is low.

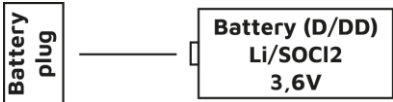


Figure 5 .3 : grf00065_eac_xlf4_supply_batt

5.3.2 Li-ION rechargeable battery

The rechargeable battery is the sole power source.
Recharging is required when the charge level is low.

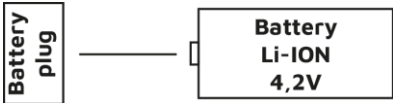


Figure 5 .4 : grf00066_eac_xlf4_supply_accu

5.3.3 Li-ION Battery / PV Module

The battery is the main power source.

The battery is recharged by the PV module.

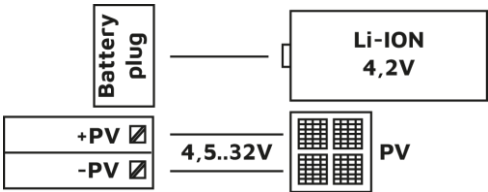


Figure 5.5 : grf00067_eac_xlf4_supply_accu_pv

5.3.4 DC Power Supply / Battery

The DC power supply is the main power source.

The battery takes over the power supply in the event of a DC power supply failure. The battery must be replaced when the charge level is low.

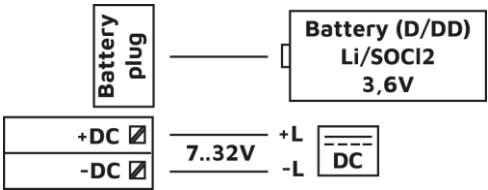


Figure 5.6 : grf00068_eac_xlf4_supply_batt_dc

5.3.5 DC Power Supply / Li-ION Battery

The DC power supply is the main power source.

The battery takes over power supply in the event of a DC power supply failure. The battery is recharged by the DC power supply.

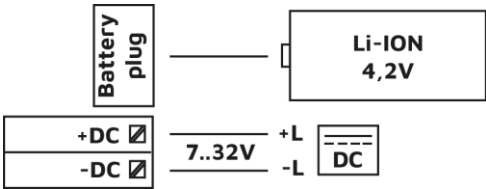


Figure 5.7 : grf00069_eac_xlf4_supply_accu_dc

5.4 Transmitter power supply

NOTE

The outputs Uo1...Uo4 are used for temporary sensor power supply.

5.4.1 Transmitter power supply Uo1/Uo2 – 16.6 V / 30 mA

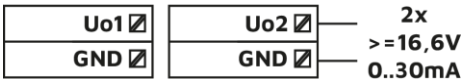


Figure 5.8 : grf00070_eac_xlf4_uo12

5.4.2 Transmitter power supply Uo3/Uo4 – 6.7 V / 100 mA

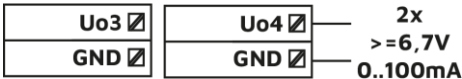


Figure 5.9 : grf00071_eac_xlf4_uo34

5.5 Analog measurement input – Ai

NOTE

The wiring diagrams apply to standard sensors. Using the user-specific sensor configuration, the energy-saving sensor power supplies Uo3/Uo4 can also be used for Ai1/Ai2.

5.5.1 Current 4...20 mA, 2-wire – Ai1 / Ai2

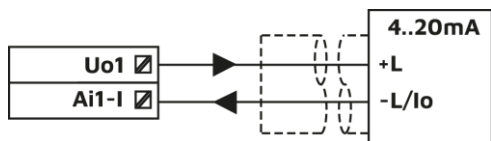


Figure 5.10 : grf00072_eac_xlf4_ai1_i_2w

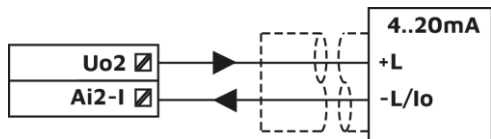


Figure 5.11 : grf00073_eac_xlf4_ai2_i_2w

5.5.2 Current 0...20 mA, 3-wire – Ai1 / Ai2

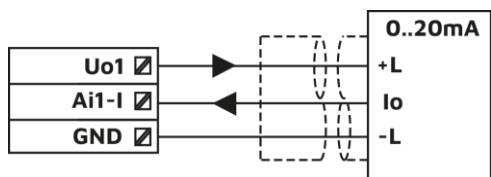


Figure 5.12 : grf00074_eac_xlf4_ai2_i_3w

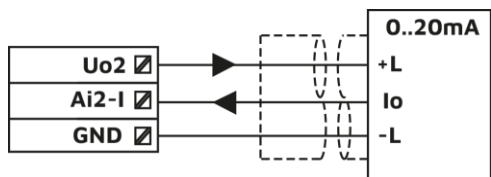


Figure 5.13 : grf00075_eac_xlf4_ai2_i_3w

5.6 Communication input – Ci

NOTE

The wiring diagrams apply to standard sensors. Using the user-specific sensor configuration, it is also possible to use the sensor power supply with higher voltage Uo1/Uo2 for Ci1/Ci2.

5.6.1 RS485 Modbus-RTU – Ci1 / Ci2

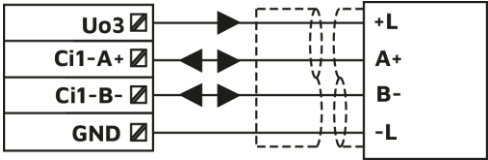


Figure 5.14 : grf00076_eac_xlf4_ci1

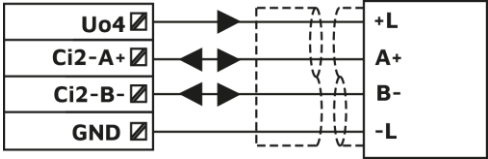


Figure 5.15 : grf00077_eac_xlf4_ci2

5.7 Digital input – Di

NOTE

The input can be configured either as a control input (e.g., float switch) or as a pulse counter (e.g., flow meter).

5.7.1 Switch / Counter – Di1

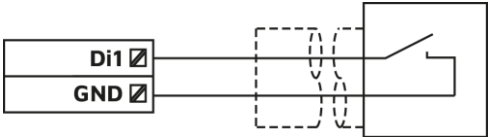


Figure 5.16 : grf00078_eac_xlf4_di1

6 Operation

NOTE

Instructions for opening the device—Section 4.4—and closing the device—Section 4.5.

NOTE

The device's configuration significantly affects its energy consumption. An unfavorable configuration can significantly reduce the device's service life.

The most significant factors affecting the device's service life are:

- Frequency of cellular data transmission
- Quality of the cellular network
- Frequency of data loggings
- Power consumption of the sensors
- Operating time of the sensors

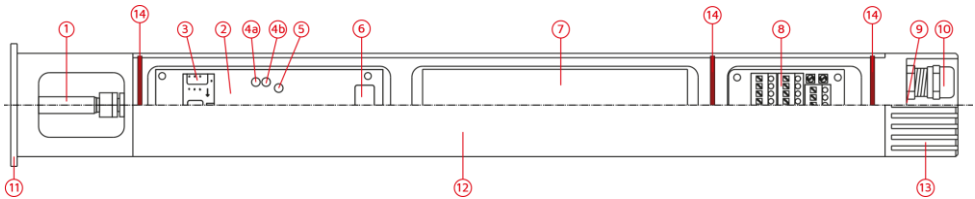


Figure 6.1 : grf00061_cmp_hlf4

NOTE

An active communication connection is indicated internally by the cyclic flashing of the function LED (4b) and the COM LED (4a).

Function LED (4b):

- 100 ms on / 100 ms off: Data transmission
- 500 ms on / 500 ms off: Bluetooth® connection
- 1000 ms on / 1000 ms off: Connection to the portal

COM LED (4a):

- 1800 ms on / 200 ms off: Connected to the network
- 200 ms on / 1800 ms off: Searching for a network
- 125 ms on / 125 ms off: Data transfer

6.1 Bluetooth®

NOTE

The control unit must support Bluetooth® 4.1 or higher; Bluetooth® 4.2 or higher is recommended.

NOTE

Operation is performed via the SmartConnect app, which can be downloaded and installed from app stores.

The password for initial access is the device serial number.

For security reasons, we recommend setting your own secure password.

6.2 Mobile Network

NOTE

To use the web portal, you must activate the built-in SIM card.

NOTE

An embedded SIM card is permanently installed at the factory and is permanently linked to the web portal.

If you wish to use your own SIM card, insert it into the SIM card holder (3) and activate it via the SmartConnect app. Using your own SIM card will prevent data from being transferred to the web portal, thereby disabling all of the web portal's features. The collected measurement values will then be transferred to an FTP server provided by the user.

NOTE

When the device connects to a provider in a non-German country for the first time, initial registration with the regional cellular network is required. Depending on the country and the provider, this may take several minutes. To reduce battery drain, perform the "Connection Test" action via the SmartConnect app under the "Service" menu item.

7 Diagnostics and troubleshooting

The system operator is responsible for taking appropriate measures to resolve any malfunctions that occur.

In the event of a malfunction, check:

Component / Area	Check	Remedy
Housing	Damage	Replace or return the device
Pressure equalization port	Contamination	Clean the device or send it in
	Damage	Replace or return the device
Battery / Rechargeable battery	Low charge	Replace the battery / Charge the rechargeable battery
	Contact	Replace the battery or rechargeable battery, or the connecting cable
	Damage	Replace the battery or rechargeable battery
Antenna	Contact	Replace or send in the antenna
	Damage	
Cable	Short circuit	Replace the cable
	Broken wire	Send in the connected device
	Damage	
Supply voltage	Operating voltage present	Turn on the operating voltage
		Check or repair the connection terminals
	Reverse polarity of operating voltage	Reverse the polarity of the operating voltage
	Operating voltage is too low	Adjust or repair
	Operating voltage too high	Send the unit in for repair
	Connection cable is damaged	Replace or repair the cable

If the problem cannot be resolved, please contact the manufacturer.

8 Maintenance

The device is maintenance-free when used as intended.

If energy consumption is high, it may be necessary to replace the battery or recharge the built-in battery externally.

A rechargeable battery can also be recharged during operation via a connected PV module or a DC voltage source. This eliminates the need for external recharging.

8.1 Battery Replacement

NOTE

Instructions for opening the device—Section 4.4—and closing the device—Section 4.5.

NOTE

To ensure proper operation, the device must only be operated or stored with a functional, sufficiently charged battery. Long-term operation or storage without a battery or with a discharged battery can result in data loss or damage to the device.

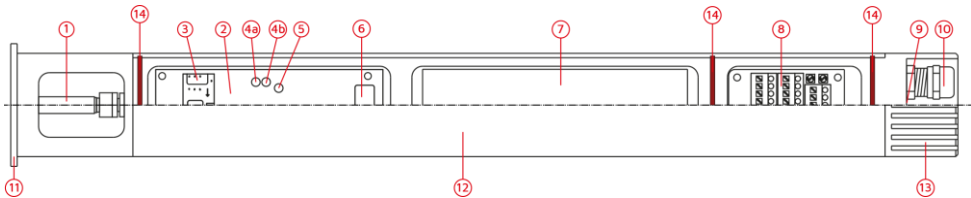


Figure 8.1 : grf00061_cmp_hlf4

Remove the battery connection cable plug from the socket (6). The battery connection cable plug can only be removed after pressing the locking lever on the plug housing.

Remove the battery and disconnect the cable from the battery as well.

Connect the cable to the new battery and insert the new battery into the battery compartment (7).

Insert the battery connection cable plug into the socket (6).

9 Repair

This device is not intended for repair by the user. Repairs may only be performed by the manufacturer.

9.1 Disassembly

Wear appropriate protective gear, such as safety glasses and gloves.



WARNING

Allow the device and system to cool sufficiently before disassembly. There is a risk from hot surfaces as well as leaking, hazardous, and hot measured media.

9.2 Returns

Returns can only be accepted if the device is accompanied by a decontamination declaration. The declaration is available for download on the website and must be fully completed and securely attached to the outside of the packaging to withstand weather and transport conditions.

9.3 Disposal



Figure 9.1 : sym00001_weee_can

In accordance with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), the product is marked with the symbol shown to minimize the disposal of WEEE as unsorted household waste. These products must not be disposed of as unsorted household waste and can be returned to the manufacturer for disposal. Returns are subject to the manufacturer's general terms and conditions or individually agreed terms.

10 Technical data

Reference Conditions	Ta = +15...+25 °C (+59...+77 °F) / Pa = 860...1060 kPa / r.F. = 45...75 %
	Battery 35 Ah / ton = 240 s
Measurement deviation	EN/IEC 60770-1: Calibration curve deviation – Setpoint adjustment

10.1 Auxiliary power supply

Battery B1	Lithium / 3.6 V – 19 Ah
Battery B2	Lithium / 3.6 V – 35 Ah
Rechargeable Battery A1	Li-ion / 4.1 V – 20 Ah
DC Voltage	7...32 Vdc / ≤ 350 mA
PV module	4.5...32 Vdc / ≤ 2 A

10.2 Inputs

10.2.1 Analog – Current 0/4–20 mA

Signal range Ai1 / Ai2	0/4...20 mA / FSI: 0...28 mA / Ri: 27 ohms
Resolution	FSI 16 bits
Characteristic curve deviation	≤ ±0.05% FSI
Temperature deviation	≤ ±0.1% FSI / 10 K
Long-term drift	≤ ±0.05% FSI/year

10.2.2 Communication – RS485 Modbus-RTU

Interface Ci1 / Ci2	RS485, bidirectional / Modbus-RTU / 9600 baud (4800...38400 baud)
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Input resistance	96 kOhm
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10.2.3 Digital – Switch / Counter

Di1 operating range	≤ 20 kOhm / ≤ 1 kHz
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10.3 Transmitter power supply

Voltage Uo1 / Uo2	16.6 V ±0.3 V (0 mA) / 15.9 V ±0.3 V (30 mA) / 0...30 mA, max. 40 mA
Voltage Uo3 / Uo4	6.7 V ±0.2 V (0 mA) / 6.6 V ±0.2 V (100 mA) / 0...100 mA, max. 300 mA

10.4 Outputs

10.4.1 Interface - Bluetooth®

Standard	Bluetooth® 5.2
Specifications	2 Mbit/s, Advertising Mode 2 s
Transmit Power	≤ 0.1 W
Range	Outdoors: max. 200 m / Indoors: max. 40 m

10.4.2 Interface - Mobile Communications LTE-M1 / LTE-NB2 / EGPRS

Standard	4G LTE-M1
	LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/ B66/B85
	4G LTE-NB2 (NB-IoT)
	LTE-FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/ B85
	2G EGPRS
	850/900/1800/1900 MHz

Priority	4G (LTE-M1 or LTE-NB2), fallback to 2G (EGPRS)
Transmit power	4G ≤ 0.2 W
	2G ≤ 2 W
SIM	Internal SIM + External Micro-SIM
Antenna connector	SMA connector / 50 ohms

10.5 Data logger

10.5.1 Memory

Type	Dataflash, non-volatile
Memory capacity	8 MB
Storage capacity	$\geq 800,000$ measured values

10.5.2 Time

Time accuracy	$\leq \pm 4$ s/month, Internet time synchronization once a day
	$\leq \pm 2$ minutes per month, without Internet time synchronization
Frequency standard	Quartz

10.6 Environmental conditions

Ambient temperature T_a	-20...+60 °C (-4...+140 °F)
	[03-A1] Li-ion battery
	Charging temperature 0...+45 °C (+32...+113 °F), internally limited
Protection Class	IP68 [≤ 3 m / ≤ 0.3 bar] (EN/IEC 60529)
Climate class	4K4H (EN/IEC 60721-3-4)
Shock resistance	15 g [11 ms] (EN/IEC 60068-2-27)
Vibration resistance	4 g [10...2000 Hz] (EN/IEC 60068-2-6)
EMC	Equipment Class B / Industrial Environment (EN/IEC 61326)

Operating altitude	2,000 m above sea level
MTTF	258 years
Weight	0.9 kg

10.7 Materials

In contact with the process	PA, aluminum/paint, PES, PUR, brass, nickel, silicone, NBR
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11 Revision

Version	Changes
UMN07.26	Initial release

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