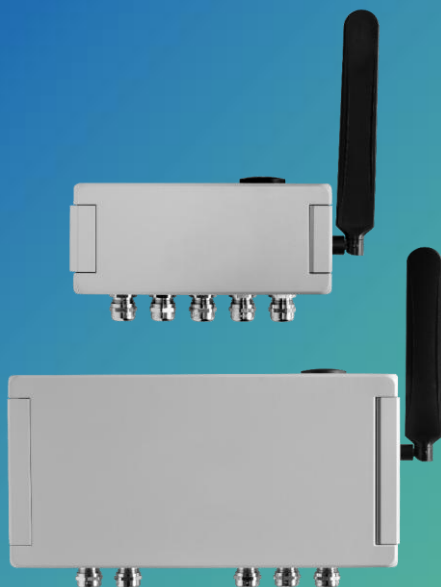


OPERATING MANUAL

DLF4 | Autonomous Data
logger - Sensorgateway
for multi-channel
measurement data
acquisition
with secure remote data
transmission to a web
portal



umn_fam_dlf4_vs1.01_en
07/2026



Contents

1	About this documentation	5
1.1	Document function	5
1.2	Terms.....	5
1.3	Other documents.....	5
2	Safety Instructions.....	6
2.1	Authorized Personnel	6
2.2	Intended Use.....	6
2.3	Operational Safety	6
2.4	Equipment for Potentially Explosive Atmospheres.....	7
3	Product Description	9
3.1	Function.....	9
3.2	Setup	10
3.3	Nameplate	13
3.4	Product Code.....	13
3.5	Dimensions.....	15
3.5.1	Standard Approval – [01-S].....	15
3.5.2	ATEX Certification - [01-X5]	16
3.6	Packaging, Transport, Storage.....	16
3.7	Accessories.....	17
4	Installation	18
4.1	Ambient and process Conditions.....	18
4.2	Installation location	18
4.3	Installation instructions.....	18
4.4	Opening and closing the device	19
5	Electrical connection.....	20
5.1	Terminal blocks	20
5.2	Pin assignment	21
5.3	Auxiliary power supply	21
5.3.1	Battery.....	22
5.3.2	Li-ION rechargeable battery	22
5.3.3	Li-ION Battery / PV Module.....	23
5.3.4	DC Power Supply / Battery	23

5.3.5	DC Power Supply / Li-ION Battery.....	23
5.4	Transmitter power supply.....	24
5.4.1	Transmitter Power Supply Uo1/Uo2 – 16.6 V / 30 mA.....	24
5.4.2	Transmitter Supply Uo1/Uo2 Ex – 21.8 V / 30 mA.....	24
5.4.3	Transmitter power supply Uo3/Uo4 – 6.7 V / 100 mA.....	24
5.4.4	Transmitter power supply Uo5 – 3.8 V / 100 mA.....	25
5.5	Analog measurement input – Ai.....	25
5.5.1	Current 4...20 mA, 2-wire – Ai1 / Ai2.....	25
5.5.2	Current 0...20 mA, 3-wire – Ai1 / Ai2.....	26
5.5.3	Voltage 0...10 V, 3-wire – Ai1 / Ai2.....	26
5.5.4	Resistance 0...2200 ohms, 2-wire – Ai3.....	27
5.6	Communication input – Ci.....	27
5.6.1	RS485 Modbus-RTU – Ci1 / Ci2.....	27
5.7	Digital input – Di.....	29
5.7.1	Switch / Counter – Di1.....	29
6	Operation	30
6.1	Bluetooth®.....	31
6.2	Mobile Network	31
7	Diagnostics and troubleshooting	32
8	Maintenance	34
8.1	Battery Replacement.....	34
9	Repair	36
9.1	Disassembly	36
9.2	Returns.....	36
9.3	Disposal	36
10	Technical data	37
10.1	Auxiliary power supply	37
10.2	Inputs.....	37
10.2.1	Analog – Current 0/4–20 mA.....	37
10.2.2	Analog – Voltage 0...10 V.....	37
10.2.3	Analog – Resistance 0...2200 ohms.....	38
10.2.4	Communication – RS485 Modbus-RTU.....	38
10.2.5	Digital – Switch / Counter	38
10.3	Transmitter power supply.....	38
10.4	Outputs.....	39

- 10.4.1 Interface - Bluetooth® 39
 - 10.4.2 Interface - Mobile Communications LTE-M1 / LTE-NB2 / EGPRS 39
- 10.5 Data logger 39
 - 10.5.1 Memory 39
 - 10.5.2 Time 40
- 10.6 Environmental conditions..... 40
- 10.7 Materials 40
- 11 Revision..... 41**

1 About this documentation

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]

Reference to a variant >> Product Code section

1.3 Other documents

In addition to this document, you can find additional documentation 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.

If the device is intended for use in potentially explosive atmospheres, the safety instructions for electrical equipment intended for use in potentially explosive atmospheres must be observed in particular.

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 explosive atmospheres. Electromagnetically sensitive devices may experience operational disruptions during data transmission due to 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 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 marking affixed to the device. The corresponding EU Declaration of Conformity can be requested or downloaded from the website.

2.4 Equipment for Potentially Explosive Atmospheres

If a device is installed and operated in potentially explosive atmospheres, the general Ex installation regulations (EN/IEC 60079-14, VDE 0165), these operating instructions, the EU type examination certificate, or the IECEx certificate of conformity, including any supplements, must be observed.

The installation of equipment in potentially explosive atmospheres must be performed by qualified personnel.

ATEX Marking	Ambient temperature range at the Tamb electronics housing
II (1) G [Ex ia Ga] IIC	-20...+60 °C
II (1) D [Ex ia Da] IIIC	-20...+60 °C

The device is an associated piece of equipment and may only be used outside the hazardous area.

Since the intrinsically safe circuits are galvanically connected to ground potential, potential equalization must be maintained throughout the entire installation of the intrinsically safe circuits. The two PA terminals on the outside of the housing must be connected to the potential equalization system of the hazardous area.

The devices are designed for connecting sensors in hazardous areas that require Category 1, 1/2, or 2 devices. The measurement media of the sensors may also include flammable liquids, gases, vapors, or dusts.

If the intrinsically safe circuit is routed into dust explosion-hazardous areas of Zone 20 or 21, it must be ensured that the devices connected to this circuit meet the requirements for Category 1D or 2D, respectively, and are certified accordingly.

The sensor circuits must be installed separately from all other circuits.

Maximum permissible values for intrinsically safe circuits:

Connection Uo1 + Ai1-I / Uo2 + Ai2-I >> Safety barrier, steel, Type 9001/01-280-110-101		
Voltage	Uo	28 V
Current	Io	110 mA
Power	Po	770 mW
Max. allowable external capacitance	Co	IIC/IIIC: 0.083 μ F / IIB/IIIB: 0.65 μ F
Max. allowable external inductance	Lo	IIC/IIIC: 1.2 mH / IIB/IIIB: 9 mH

Connection Di1 or Di2 >> Safety barrier, steel, Type 9001/02-093-030-101		
Voltage	Uo	9.3 V
Current	Io	30 mA
Power	Po	69.8 mW
Max. allowable external capacitance	Co	IIC/IIIC: 4.1 μ F / IIB/IIIB: 31 μ F
Max. allowable external inductance	Lo	IIC/IIIC: 40 mH / IIB/IIIB: 150 mH

3 Product Description

3.1 Function

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

The device is designed for long-term, location-independent measurement recording and remote data transmission from a wide variety of sensors for a broad range of applications.

The connected sensors—analogue with a current signal of 0/4...20 mA, a voltage signal of 0...10 V, or a resistance signal of 0...2200 ohms; or digital with RS485 Modbus RTU or a pulse/switch input—are powered by the device, and the recorded measurement values are stored internally with loss protection.

The measured values are automatically transmitted to the ACS 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

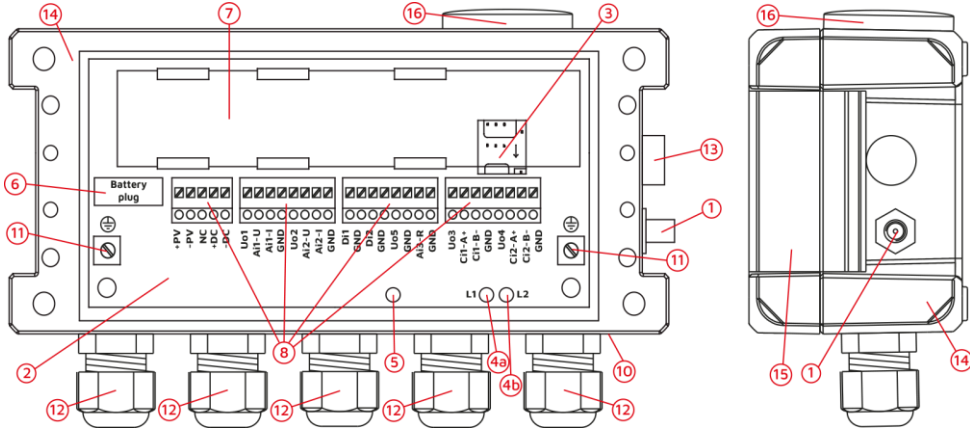


Figure 3.1: grf00079_cmp_dlf4_1

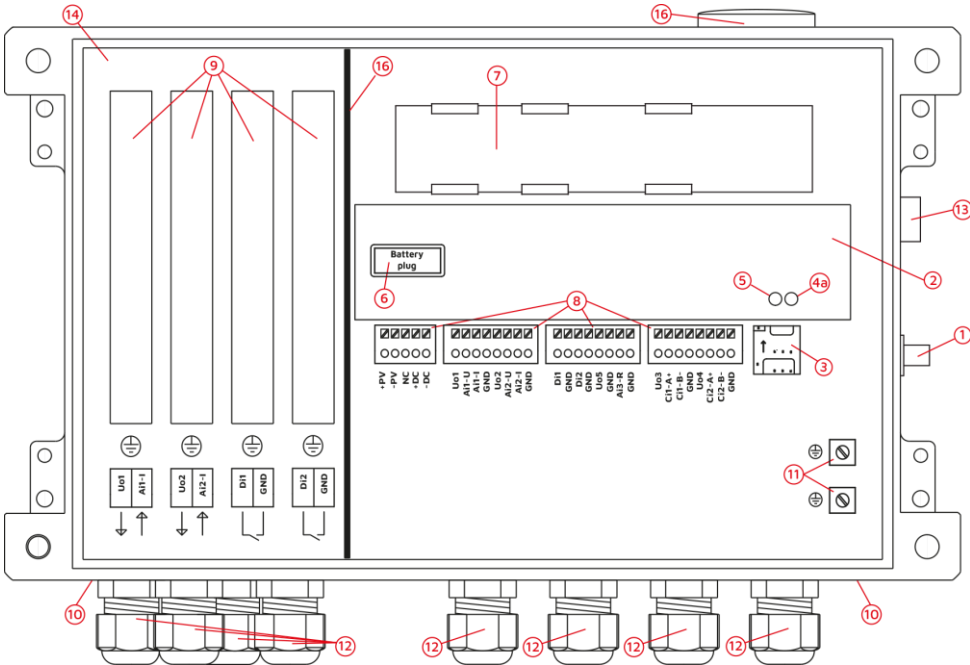


Figure 3.2: grf00080_cmp_dlf4_x5_1

- 1 Mobile Radio Antenna Connection
- 2 Electronics Cover
- 3 External SIM

- 4 (4a) Function LED L1
- 5 (4b) COM LED L2
- 6 Reset button
- 7 Battery/Rechargeable Battery Connector
- 8 Battery/Rechargeable Battery
- 9 Terminal blocks
- 10 Ex safety barriers
- 11 External connection PA
- 12 Internal connection for protective conductor/cable shield
- 13 Cable glands 5x/8x
- 14 Ventilation/Pressure Equalization
- 15 Enclosure
- 16 Housing cover
- 17 Bluetooth® interface
- 18 Separator plate

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

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

Two status LEDs indicate various operating states.

- Function LED L1 (4a) for variable information
- COM LED L2 (4b) for cellular communication (option [01-S] only)

Reset button (5) to restart the device. CAUTION: Use 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 connector socket (6)

Up to 7 sensors, a PV module, and/or an auxiliary power supply can be connected via 5/8 cable glands (12) and the terminal blocks (8) or Ex terminal blocks (9). Ground conductors and cable shields can be connected internally (11). The metal housing can be connected externally (10) to PA.

The reference air supply required for relative pressure measurement is provided through a hydrophobic/oleophobic membrane via the watertight pressure equalization port (13).

The housing (14) can be mounted directly on a wall or on a mast using a mountable bracket.

The housing cover (15) seals the device hermetically.

The Bluetooth® interface (16) enables wireless on-site communication,

Laser engraving of the nameplate ensures the device's identifiability throughout its entire service life.

3.3 Nameplate

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

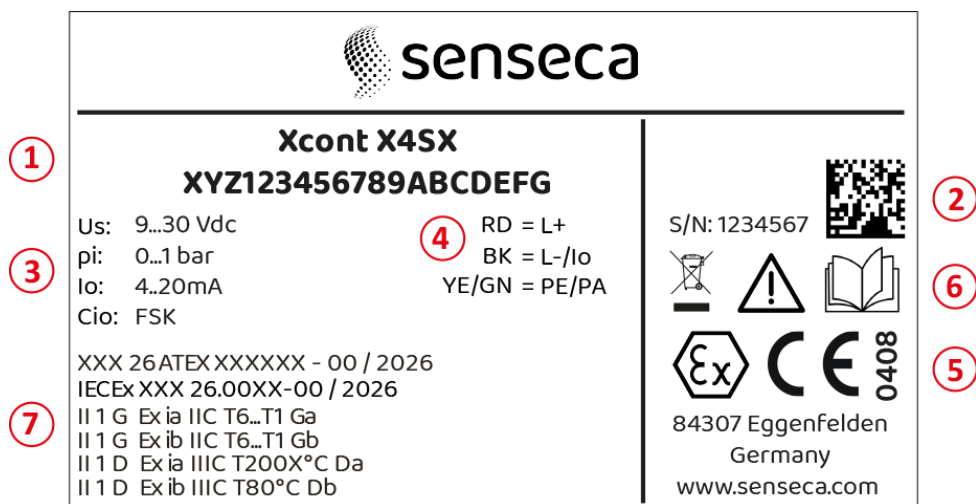


Figure 3.3: grf00002_lab001

- 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

DLF44 [01][02][03][04][05][06][07][08][09][95/98]

	Device	HLF4	Data logger with remote data transmission
01	Approval	S	Standard
01		X5	ATEX: II (1) G [Ex ia Ga] IIC / II (1) D [Ex ia Da] IIIC
02	Enclosure Type	FA	Wall-mounted housing, aluminum

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...20 mA, 0...10 V / 2200 ohms / 2x RS485 / 2x Di - [01-S]
05		R	4...20 mA Ex / 0...20 mA, 0...10 V / 2200 R / 2x RS485 / 2x Di - [01-X5]
05		S	2x 4...20 mA Ex / 2200 ohms / 2x RS485 / 2x Di - [01-X5]
05		T	4...20 mA Ex / Di Ex / 0...20 mA, 0...10 V / 2200 R / 2x RS485 / Di - [01-X5]
05		U	2x 4...20 mA Ex / 2x Di Ex / 2200 ohms / 2x RS485 - [01-X5]
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
09		S	Standard
95	Additional option	+ML	Measurement 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

3.5.1 Standard Approval - [01-S]

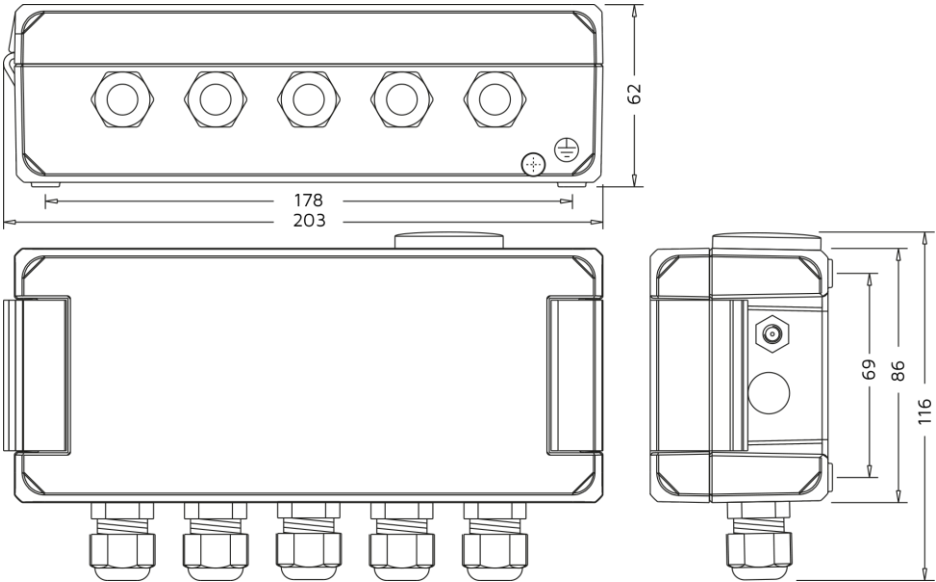


Figure 3.4: grf00079_dim_dlf4

3.5.2 ATEX Certification - [01-X5]

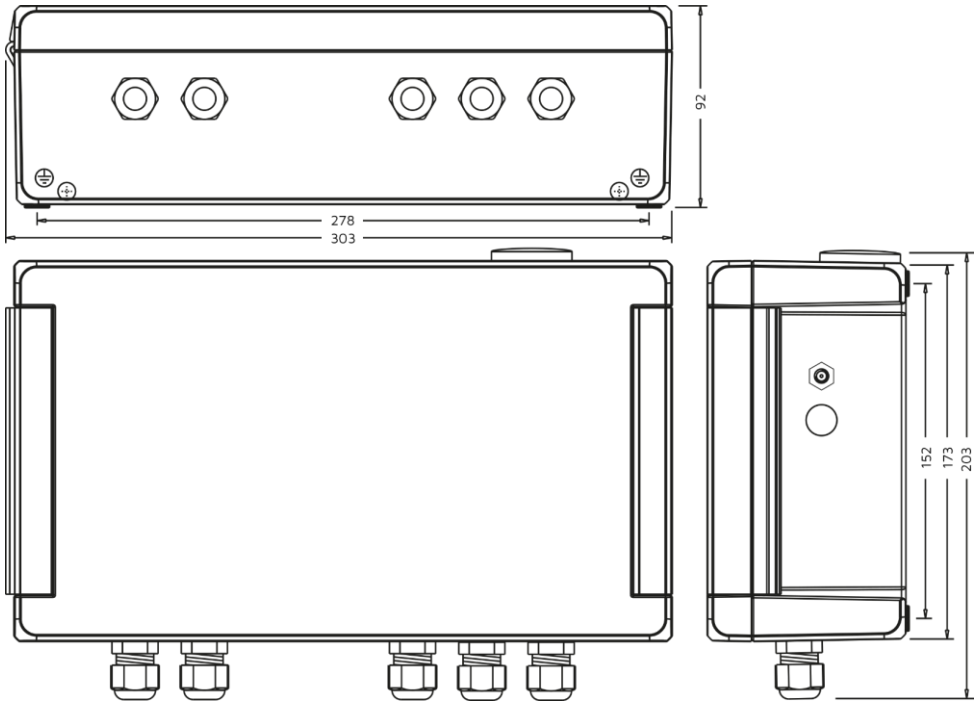


Figure 3.5: grf00080_dim_dlf4_x5

3.6 Packaging, Transport, Storage

The device is protected by packaging designed to withstand normal transport stresses. 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

Proper 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, choose a different location.

4.3 Installation instructions

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

NOTE

During installation, maintain a minimum lateral clearance of 15 cm on the left side of the housing to allow the housing cover to open fully.

NOTE

A mast bracket for diameters of 50–90 mm is available for mounting on a mast.

NOTE

To ensure the enclosure is watertight, secure the enclosure lid on the right side with the two screws. The locking bracket can then be snapped into place.

NOTE

After installing the device, check that all cable glands, the housing cover, and the antenna connector are securely tightened.

NOTE

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

4.4 Opening and closing the device

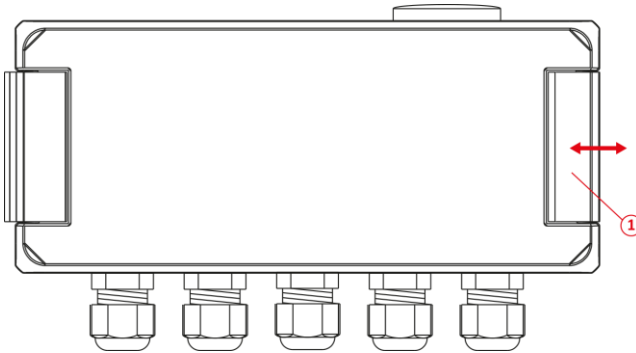


Figure 4.1: grf00081_cmp_dlf4_2

To open, flip the latch (1) outward, loosen both screws underneath, and open the housing cover.

To close, fold the housing cover shut and hand-tighten the two screws in the recess on the right side. Fold the latch (1) open over the cover.

NOTE

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

5 Electrical connection

NOTE

Instructions for Opening and Closing the Device - Section 4.4.

NOTE

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

5.1 Terminal blocks

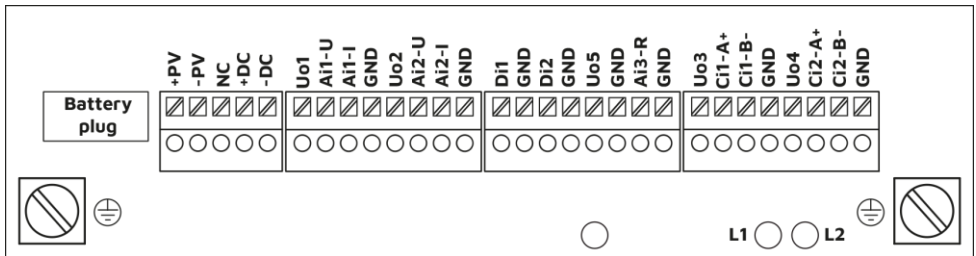


Figure 5.1: grf00082_eac_dlf4_terminals

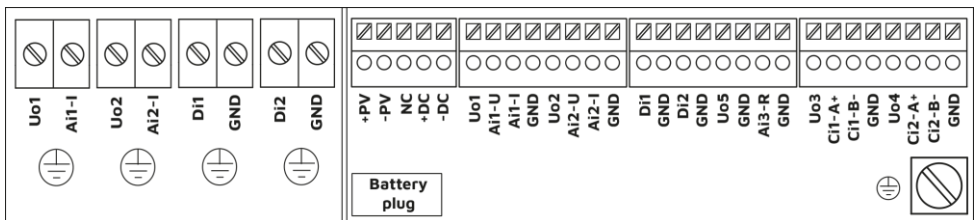


Figure 5.2: grf00083_eac_dlf4_x5_terminals

- Battery plug - Battery/Rechargeable Battery Connector
- +DC/-DC - Auxiliary DC power
- +PV/-PV - PV module
- NC - not connected
- Uo1/2 - Sensor power supply, channels [01-S/01-X5]
- Uo3/4 - Sensor power supply, 2 channels
- Uo5 - Sensor power supply, 1 channel
- Ai1-I - Analog current input 0/4-20 mA - Channel 1 [01-S/01-X5]
- Ai1-U - Analog input, voltage 0-10 V - Channel 1
- Ai2-I - Analog Current Input 0/4-20 mA - Channel 2 [01-S/01-X5]
- Ai2-U - Analog Input (Voltage) 0-10 V - Channel 2
- Ai3-R - Analog input (resistance) 0-2200 ohms - Channel 3

- Di1 - Digital Switching/Counting Input - Channel 1 [01-S/01-X5]
- Di2 - Digital Switching/Counting Input - Channel 2 [01-S/01-X5]
- Ci1-A+/B- - RS485 Modbus-RTU interface - Channel 1
- Ci2-A+/B- - RS485 Modbus-RTU interface - Channel 2
- GND - Ground
- PA - Protective conductor / Cable shield

The terminals are suitable for connecting:

Solid-core wire / stranded wire	0.2...1.5 mm²
Stranded conductor with ferrule	0.25...1.0 mm²
Strip length	8.5...9.5 mm
Clamping range for cable glands	5 × 4.5...10 mm

NOTE

The housing must be connected to PE/PA via the screw terminal on the outside of the housing.

5.2 Pin assignment

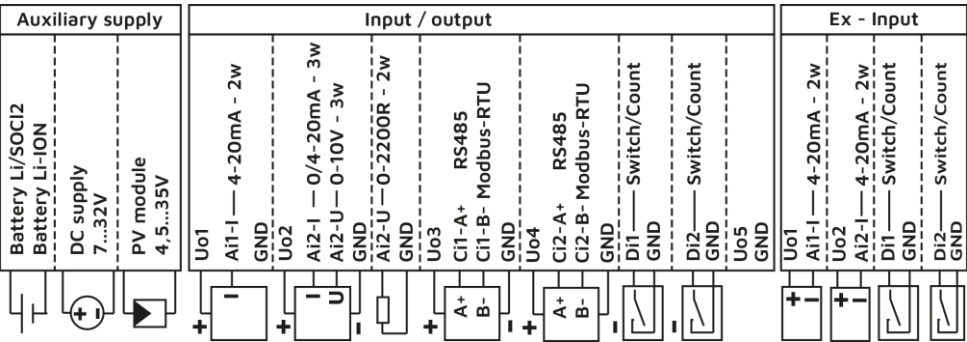


Figure 5.3: grf00084_eac_dlf4_full_connection

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, along with 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.

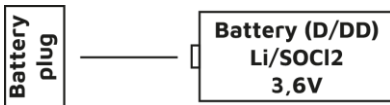


Figure 5.4: grf00065_eac_xlf4_supply_batt

5.3.2 Li-ION rechargeable battery

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

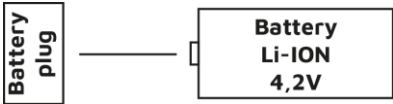


Figure 5 .5 : grf00066_eac_xlf4_supply_accu

5.3.3 Li-ION Battery / PV Module

The battery is the main power source.

The battery is recharged by the PV module.

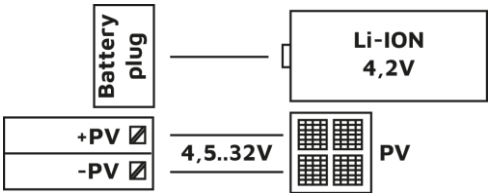


Figure 5.6: grf00067_eac_xlf4_supply_accu_pv

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.

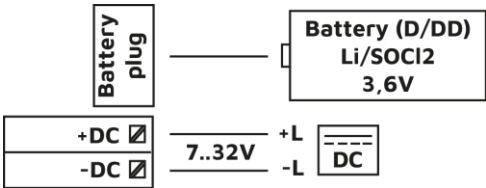


Figure 5.7: grf00068_eac_xlf4_supply_batt_dc

5.3.5 DC Power Supply / Li-ION Battery

The DC power supply is the main power source.

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

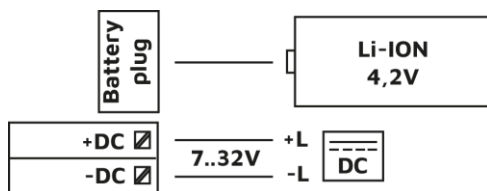


Figure 5.8 : grf00069_eac_xlf4_supply_accu_dc

5.4 Transmitter power supply

NOTE

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

NOTE

Output Uo5 can be used either as a control output in the event of an alarm or as a continuously active output voltage, e.g., for the continuous power supply of an external device.

5.4.1 Transmitter Power Supply Uo1/Uo2 – 16.6 V / 30 mA

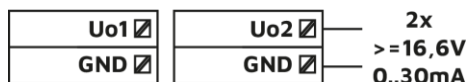


Figure 5.9: grf00070_eac_xlf4_uo12

5.4.2 Transmitter Supply Uo1/Uo2 Ex – 21.8 V / 30 mA

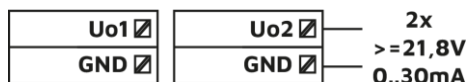


Figure 5.10: grf00085_eac_xlf4_uo12_x5

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

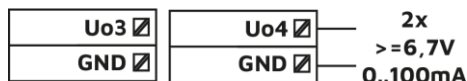


Figure 5.11: grf00071_eac_xlf4_uo34

5.4.4 Transmitter power supply Uo5 – 3.8 V / 100 mA



Figure 5.12 : grf00086_eac_xlf4_uo5

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

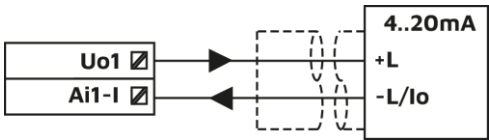


Figure 5.13: grf00072_eac_xlf4_ai1_i_2w

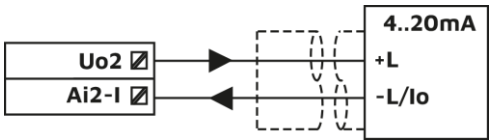


Figure 5.14 : grf00073_eac_xlf4_ai2_i_2w

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

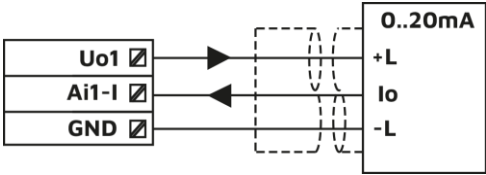


Figure 5.15: grf00074_eac_xlf4_ai1_i_3w

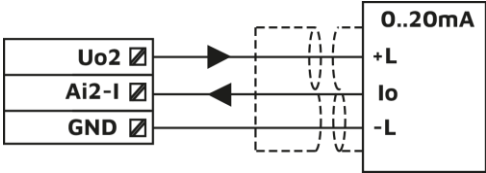


Figure 5.16: grf00075_eac_xlf4_ai2_i_3w

5.5.3 Voltage 0...10 V, 3-wire – Ai1 / Ai2

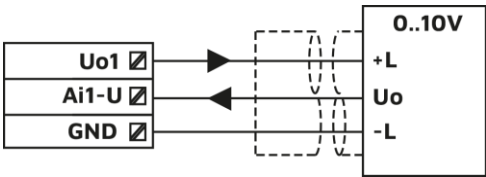


Figure 5.17: Figure 5.18: grf00087_eac_xlf4_ai1_u_3w

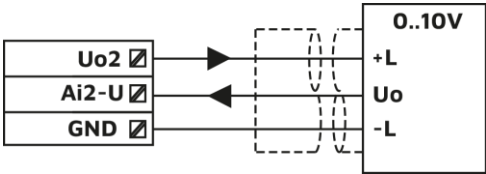


Figure 5.19: grf00088_eac_xlf4_ai2_u_3w

5.5.4 Resistance 0...2200 ohms, 2-wire – Ai3

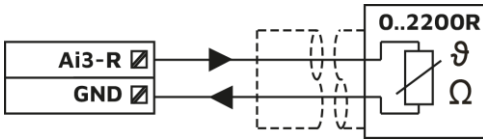


Figure 5.20: grf00089_eac_xlf4_ai3_r_2w

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.

NOTE

The two communication inputs Ci1 and Ci2 are internally connected to each other (terminals A+ and B-) and are operated alternately when two sensors are connected simultaneously.

A termination resistor $R_T = 180\ \Omega$ is built into the device between A+ and B-.

5.6.1 RS485 Modbus-RTU – Ci1 / Ci2

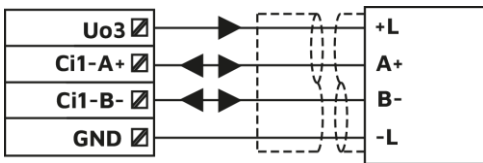


Figure 5.21: grf00076_eac_xlf4_ci1

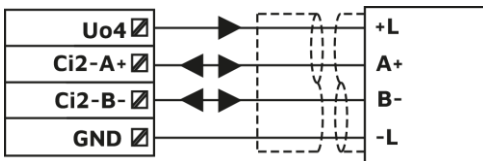


Figure 5.22: grf00077_eac_xlf4_ci2

The Modbus protocol is a communication protocol based on a master/slave architecture. All devices are connected via two data lines (A+ / B-) and a COMMON line (C/L-).

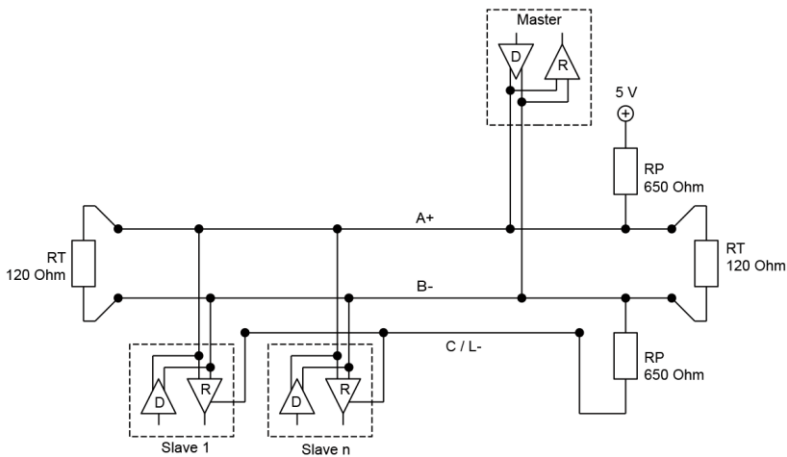


Figure 5.23: grf00011_eac_modbus_line_termination

A standard RS485 allows for the connection of 32 slaves in a single segment. The device has a load of only 1/8 of the standard load ($R_{in} \geq 96 \text{ k}\Omega$), so that theoretically up to 256 of these devices can be operated in a single network segment. However, the number is limited to 247 by the Modbus address space.

The two terminating resistors RT prevent reflections on the data lines. The optimal resistance value depends on the characteristic impedance of the cable used; however, a value of 120 ohms is a common choice.

The polarization network is required to ensure appropriate potentials when none of the devices is transmitting and the A+ and B- lines are therefore undefined (high-impedance). The value of RP depends, for example, on the bus load or the terminating resistors. Recommended values range from 450 to 650 ohms.

The use of a polarization network is recommended to maintain a stable network. Typically, the polarization resistors are built into the master device or can be enabled as needed.

Arrange the devices in a bus topology (line). Avoid branch lines.

Use a 4-wire cable in accordance with the EIA-485 recommendation:

Impedance	135–165 ohms @ 3–20 MHz
Cable capacitance	< 30 pF/m

Cable diameter	> 0.64 mm
Cable cross-section	0.34 mm² / AWG 22
Loop resistance	< 110 ohms/km
Shielding	Braided shield / shielding foil
Cable length	38,400 baud ≤ 1,200 m

5.7 Digital input – Di

NOTE

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

5.7.1 Switch / Counter – Di1

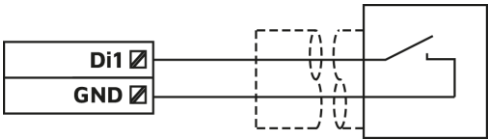


Figure 5.24: grf00078_eac_xlf4_di1

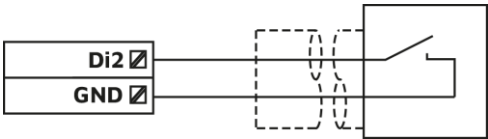


Figure 5.25: grf00090_eac_xlf4_di2

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 improper 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

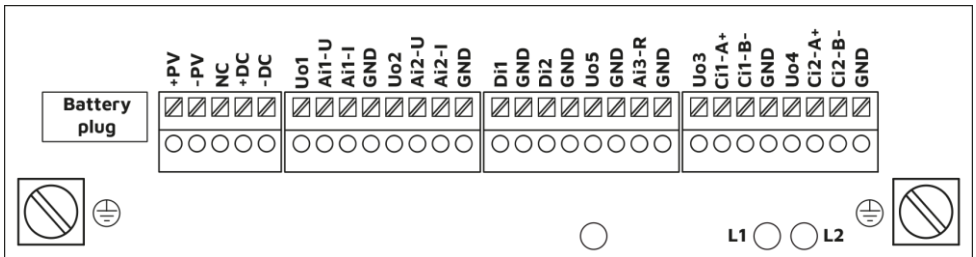


Figure 6.1: grf00082_eac_dlf4_terminals

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

NOTE

In the event of a malfunction, the device can be reset using an internal RESET button (5). A successful restart is indicated by the function LED (4b) flashing twice.

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 operating voltage
		Check or repair the connection terminals
	Operating voltage polarity reversed	Reverse the operating voltage polarity
	Operating voltage 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.

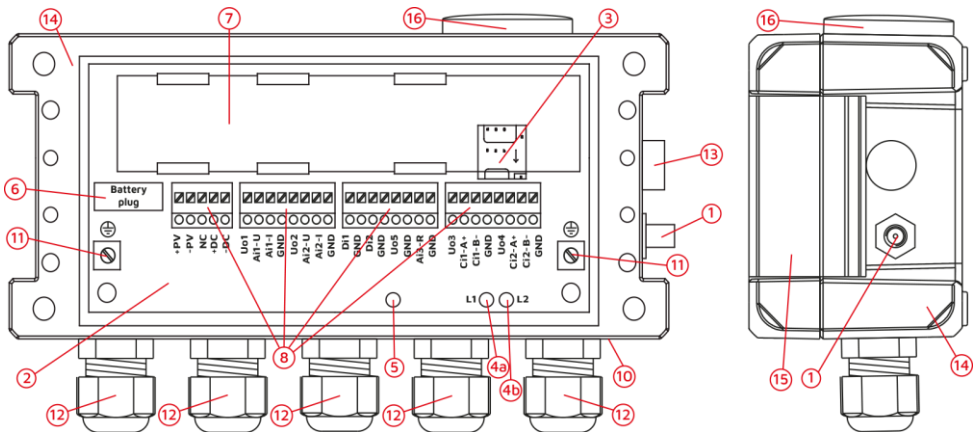


Figure 8.1: grf00079_cmp_dlf4_1

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

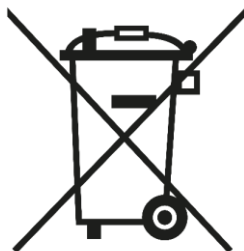


Figure 9.1: sym00001_weee_can

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 Analog – Voltage 0...10 V

Signal range Ai1 / Ai2	0...10 V / F.S.: 0...19 V / Ri 1.2 MΩ
Resolution	FSI 16 bits

Characteristic Curve Deviation	$\leq \pm 0.05\%$ FSI
Temperature deviation	$\leq \pm 0.1\%$ FSI / 10 K
Long-term drift	$\leq \pm 0.05\%$ FSI/year

10.2.3 Analog – Resistance 0...2200 ohms

Ai3 signal range	0...2200 ohms / FSI: 0...2200 ohms / Io: 340 μ A
Resolution	FSI 16 bits
Characteristic curve deviation	$\leq \pm 0.05\%$ FSI
Temperature deviation	$\leq \pm 0.1\%$ FSI / 10K
Long-term drift	$\leq \pm 0.05\%$ FSI/year

10.2.4 Communication – RS485 Modbus-RTU

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

10.2.5 Digital – Switch / Counter

Operating range Di1 / Di2	≤ 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
	Ex: 21.8 V ± 0.3 V (0 mA) / 11.8 V ± 0.3 V (30 mA) / 0...30 mA, max. 40 mA (Ri ≤ 306 ohms)
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
Voltage Uo5	3.8 V ± 0.2 V (0 mA) / 3.0 V ± 0.2 V (100 mA) / 0...100 mA, max. 220 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
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Memory capacity	8 MB
Storage capacity	≥ 800,000 measured values

10.5.2 Time

Time accuracy	≤ ±4 s/month, Internet time synchronization once a day
	≤ ±2 minutes per month, without Internet time synchronization
Frequency standard	Quartz

10.6 Environmental conditions

Ambient temperature Ta	-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	Class B equipment / industrial environment (EN/IEC 61326)
Operating altitude	2,000 m above sea level
MTTF	258 years
Weight	[01-S] 1.2 kg
	[01-X5] 2.8 kg

10.7 Materials

In contact with the process	Aluminum, PA, PUR, brass, nickel, silicone, NBR
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11 Revision

Version	Changes
UMN07.26	Initial release

senseca.com



Senseca Germany GmbH

Lauterbachstr. 57 ½

84307 Eggenfelden

GERMANY

INFO.EGGENFELDEN@SSENSECA.COM

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