OPERATING MANUAL - BA10.25

DLF4

Data logger with data remote transmission
for general applications

Index

1. About this document

1.1. Dokument function

These instructions for use describe the structure, functions and the use of the product and will help to operate the product as intended.

Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device.

The Operating manual is part of the device and must be kept always accessible nearest its installation location.

All statements within this document correspond to the information available at the time of printing. Subject to change without prior notice.

1.2. Terms

NOTE	Notes to prevent failures, malfunctions, damage to devices or plants.

WARNING	Non-observance of the information may result in serious or fatal personal injury.

[04-5]	Exemplary notice to a type variant (>> chapter Product description - Product code)

1.3. Other documents

Besides this document the following material can be found on the Internet at www.acs-controlsystem.com:

- EU Declaration of Conformity (current version)
- Manufacturer declarations
- Certificates
- 3D-CAD models

2. Safety instructions

2.1. Autorized personnel

Installation, electrical connection, commissioning, operation, maintenance, dismounting and disposal of the device must be made by a qualified and authorized expert according to the information's in the Operating manual and the relevant standards and rules.

This expert must have read and understood the Operating manual and especially the safety instructions. During work on and with the device, the required personal protective equipment must always be worn.

If the device is intended for connection of other devices in explosion-hazardous areas, the safety instructions for electrical apparatus for explosion-hazardous areas must be observed in particular.

2.2. Appropriate use

The device is an electronic data logger with integrated data remote transmission, for autonomous recording of different measurands.

The device may not be used in areas where the using of mobile phones is not allowed, e.g. in hospitals or explosive hazardous areas. Electromagnetically sensitive devices can be interfered in their operation because of the high energetic radio waves at the moment of data transmission.

The operational reliability of the device is ensured only at the intended use. Inappropriate or incorrect use of this product can give risk to application specific hazards, e.g. vessel overflow through incorrect mounting or adjustment.
Damage to property and persons or environmental contamination can result. Also, the characteristics of the instrument can be impaired.

An inappropriately use, disregarding the Operating manual and the technical rules, using under-qualified personnel, making unauthorized alterations as well as damage of the device releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

2.3. Operational safety

The device is safely built and tested according to state-of-the-art technology. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.
The device may only be used within the permitted operation limits. Every use besides these limits as agreed can lead to serious dangers.

The materials must be checked for compatibility with the application requirements before use.
An unsuitable material can lead to damage, abnormal behavior or destruction of the device and to the resulting dangers.

The sensors may not be used as sole device for prevention of dangerous conditions in machines and plants.

For safety and warranty reasons, any invasive work on the device beyond that described may be carried out only by personnel authorized by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

The device meets the requirements of all relevant EU directives. This is confirmed by attaching the CE mark to the device.
The associated EU-Declaration of Conformity can be ordered or downloaded from the homepage.

2.4. Operating supplies for explosive hazardous areas

If a device is installed and operated in explosive hazardous areas, the general Ex construction standards (EN/IEC 60079-14, VDE 0165), this operating manual as well as the EU type examination certificate resp. the IECEx certificate of conformity incl. supplements must be observed.
The installation of explosive hazardous systems must be carried out by specialist staff.

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

The device is an affiliated operating supply and may only be used outside explosion hazardous areas.

The intrinsically save input circuits are galvanically connected with earthing potential. Due to this there must be a potential compensation in the complete area of the installed intrinsically safe circuits. The both terminals PA at the outside of the enclosure has to be connected with the potential equalization of the explosion hazardous area.

The devices are conceived for connection of sensors in explosive hazardous areas, that needs devices of category 1 resp. 1/2 resp. 2. The measured medium of the sensors may also be combustible liquids, gases, fogs or vapors.

If the intrinsically save input circuit is run into dust explosion hazardous areas zone 20 resp. 21, it must be ensured, that the devices, that are connected to this circuit, fulfills the requirements for category 1D resp. 2D and are certificated accordingly.

The intrinsically save circuits has to be installed separately from all other circuits.

Permitted maximum values of the intrinsically safe circuits:

Terminals Uo1 + Ai1-I / Uo2 + Ai2-I >> Safety barrier Stahl Typ 9001/01-280-110-101		
Voltage	Uo	28V
Current	Io	110mA
Power	Po	770mW
Max. permitted external capacitance	Co	IIC/IIIC: 0,083µF / IIB/IIIB: 0,65µF
Max. permitted external inductivity	Lo	IIC/IIIC: 1,2mH / IIB/IIIB: 9mH

Terminals Di1 bzw. Di2 >> Safety barrier Stahl Typ 9001/02-093-030-101		
Voltage	Uo	9,3V
Current	Io	30mA
Power	Po	69,8mW
Max. permitted external capacitance	Co	IIC/IIIC: 4,1µF / IIB/IIIB: 31µF
Max. permitted external inductivity	Lo	IIC/IIIC: 40mH / IIB/IIIB: 150mH

3. Product description

3.1. Function

The device is an electronic data logger with integrated data remote transmission, for autonomous recording of different measurands.

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

The connected sensors, analogue with current signal 0/4...20mA, voltage signal 0...10V, resistance signal 0...2200R, or digital with RS485 Modbus RTU, or pulse/switch inputs, are powered by the device, and the recorded measured values are stored internally in a loss-proof manner. The measured values are automatically transmitted to the ACS web portal or an FTP server via mobile communications.
Innovative alarm management enables timely detection and notification of hazards.

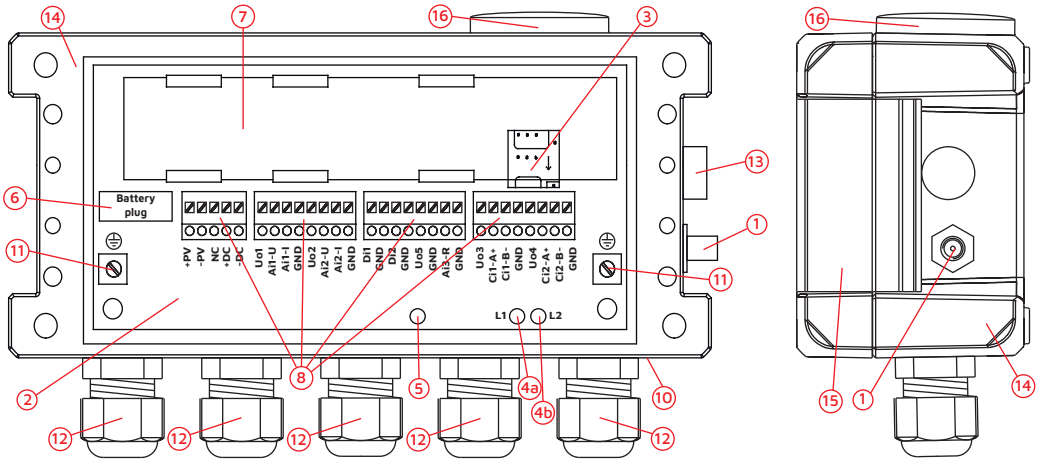
The energy supply of the device can be made either by a high performance battery, a Li-ION rechargeable battery, possibly in combination with a PV module or by an external direct voltage.

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

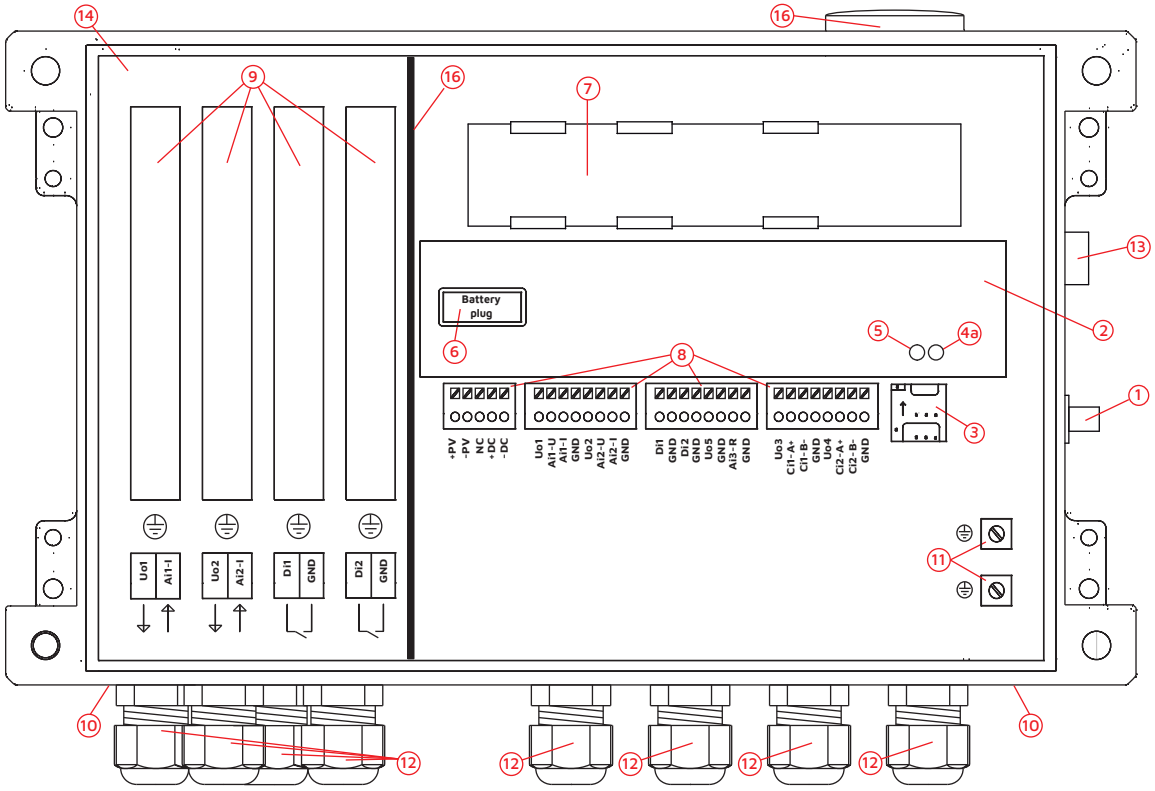
The parameterization and operation can be made by the integrated Bluetooth® interface or by the ACS-Web-Portal.

3.2. Construction

[01-S] Approval standard



[01-X5] Approval ATEX



(1) Mobile antenna terminal (2) Electronic cover plate (3) External SIM (4a) COM-LED (4b) Function-LED (5) Reset button	(6) Battery connector plug (7) Battery (8) Connection terminals (9) Safety barrier Ex (10) External terminal PA (11) Terminals protective conductor/ cable shield	(12) Cable glands 5x/8x (13) Vent/Pressure compensation (14) Housing (15) Housing cover (16) Bluetooth® interface (17) Sepatation plate

The mobile radio antenna (1) can be unscrewed and replaced with another one, e.g. a directional radio antenna.

The electronics is located under a cover plate (2). A SIM card holder (3) is mounted on the main board to alternatively accommodate an external SIM card. The integrated SIM card should preferably be used.

Two function LEDs signal different operating states.
- Function-LED L1 (4a) for various informations
- COM-LED L2 (4b) for cellular communication

Reset button (5) for restart of the device. ATTENTION: Use only in exceptional cases! Risk of data loss!

The high-performance battery (7) or the LiION rechargeable battery (7) used ensures a reliable energy supply for the device for many years, depending on use. The connection is made via a socket (6)

Up to 7 sensors, a PV module and/or an auxiliary power supply are connected via 5/8 cable glands (12) and the connection terminals (8) resp. Ex connection terminals (9). Protective conductors and cable shields can be connected internally (11). The metallic enclosure can be connected externally (10) with PA.

The reference air supply required for a relative pressure measurement occurs via a hydrophobic/oleophobic membrane via the waterproof pressure compensation opening (13).

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

The housing cover (15) provides a hermetically sealed seal.

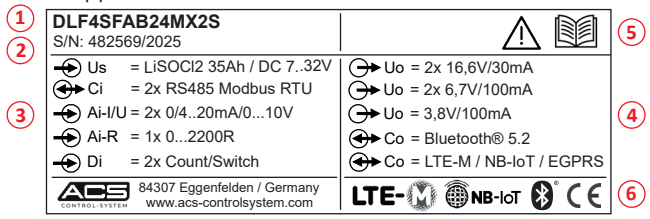
The Bluetooth® interface (16) enables wireless on-site communication.

A laser marking of the product label ensures the identifiability of the device throughout the entire lifetime.

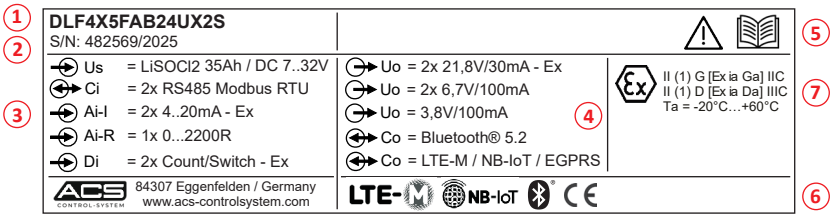
3.3. Product label

The product label contains the most important data for identification and use of the instrument.

[01-S] Approval standard



[01-S] Approval s



(1) Product code
(2) Serial number
(3) Technical data supply / input
(4) Technical data output
(5) Safety notes
(6) Approvals
(7) Ignition protection type

3.4. Product code

DLF4 [01][02][03][04][05][06][07][95][98]

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 housing, aluminum
03	Electronic – Supply	B1	Battery lithium 19Ah / DC supply 7...32V
03		B2	Battery lithium 35Ah / DC supply 7...32V
03		A1	Rechargeable battery Li-ION 20Ah / DC supply 7...32V / PV module
04	Electronic – Function	0	Bluetooth® 5.2
04		5	LTE-M, NB-IoT, EGPRS / Bluetooth® 5.2
05	Electronic – Input	M	2x Ai 0/4..20mA, 0..10V / Ai 0..2200R / 2x Ci RS485 / 2x Di - [01-S]
05		R	Ai 4..20mA Ex / Ai 0..20mA, 0..10V / Ai 2200R / 2xCi / 2xDi - [01-X5]
05		S	2xAi 4..20mA Ex / Ai 2200R / 2xCi RS485 / 2xDi - [01-X5]
05		T	Ai 4..20mA Ex / Di Ex / Ai 0..20mA, 0..10V / Ai 2200R / 2xCi / Di - [01-X5]
05		U	2xAi 4..20mA Ex / 2xDi Ex / Ai 2200R / 2xCi RS485 - [01-X5]
06	Tariff	0	Separate billing / without
06		XS1B	ACS DataComplete XS, Basic
06		XS1S	ACS DataComplete XS, Standard
06		XS1P	ACS DataComplete XS, Premium
06		S1B	ACS DataComplete S, Basic
06		S1S	ACS DataComplete S, Standard
06		S1P	ACS DataComplete S, Premium
06		M1B	ACS DataComplete M, Basic
06		M1S	ACS DataComplete M, Standard
06		M1P	ACS DataComplete M, Premium
06		L1B	ACS DataComplete L, Basic
06		L1S	ACS DataComplete L, Standard
06		L1P	ACS DataComplete L, Premium
07		S	Standard

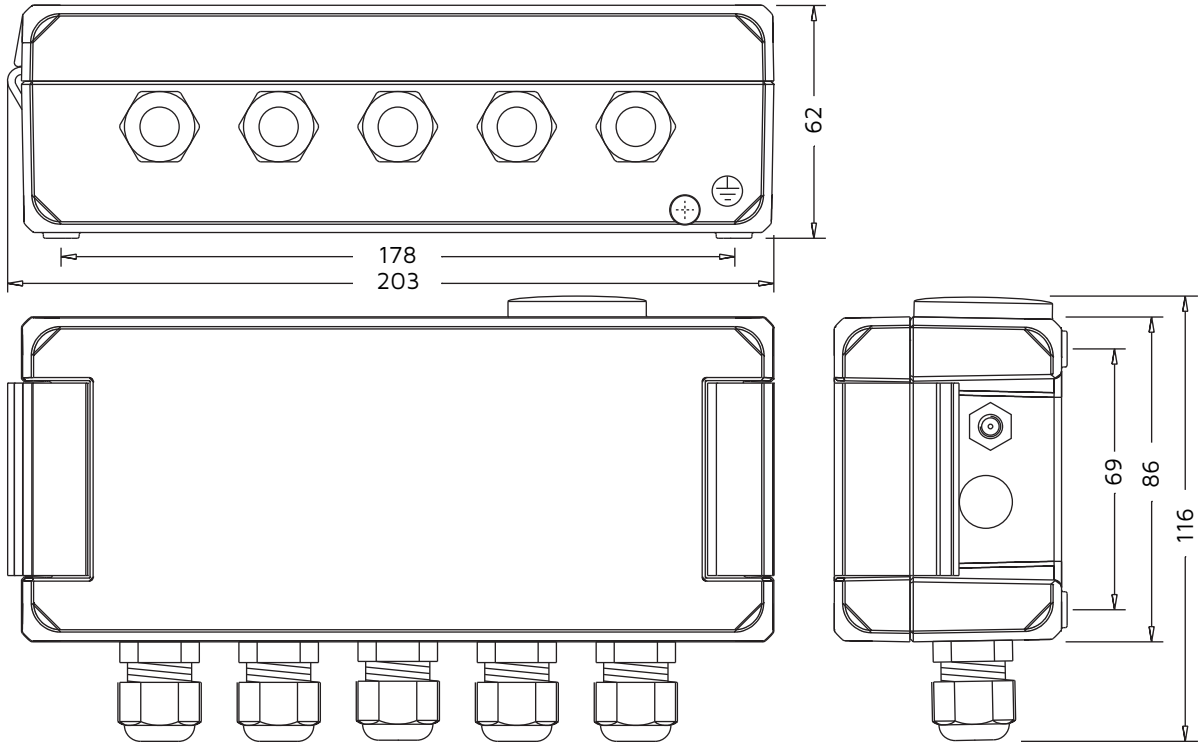
95	Additional option	-ML	Measurement point designation / TAG – Laser marking
98	Additional option	-KF	Configuration / Preset

Differing versions are normally marked by the character Y at the product code.

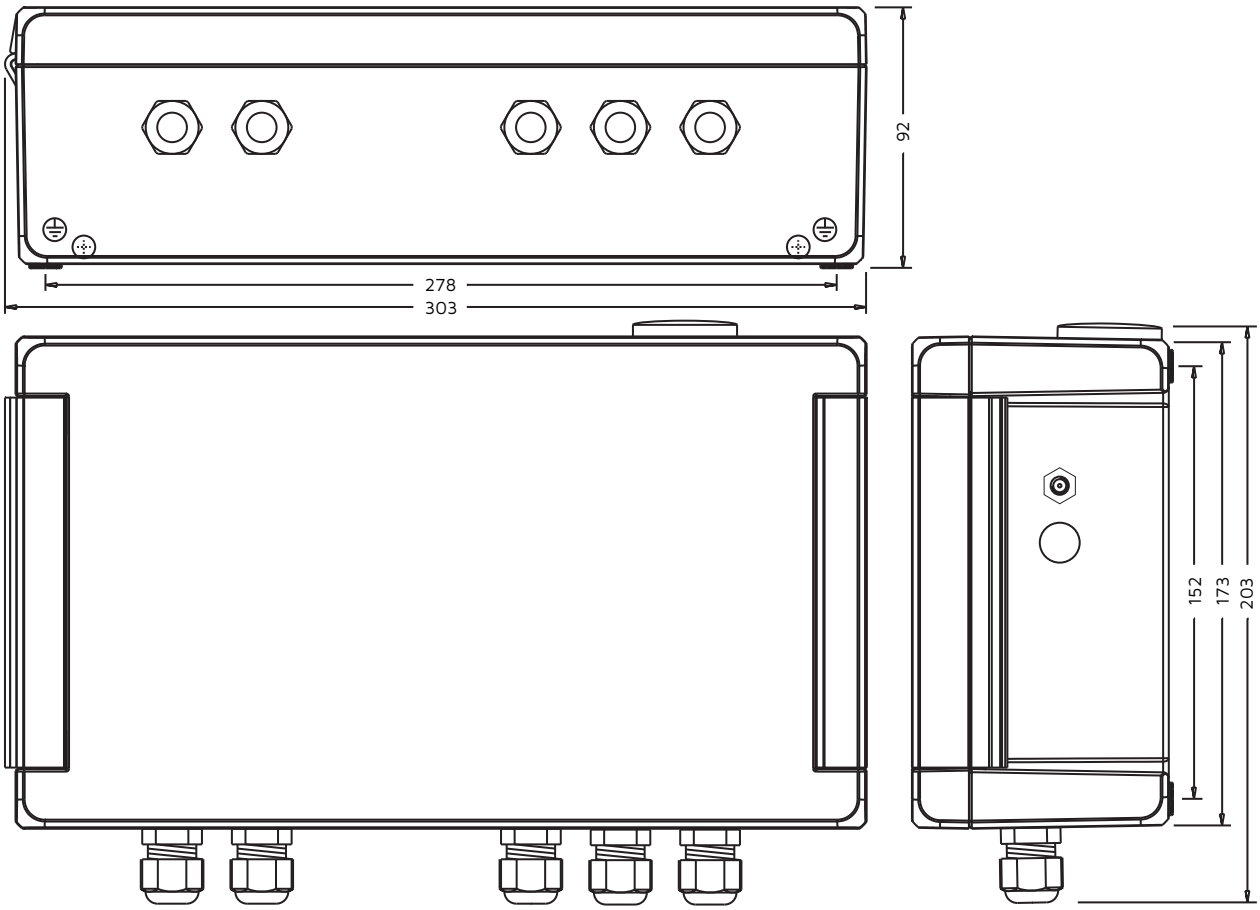
3.5. Dimensions

Dimensions in mm

[01-S] Approval standard



[01-X5] Approval ATEX



3.6. Packaging, transport, storage

The device is protected by packaging. It can handle normal loads during transport. Transport must be carried out in due consideration of the notes on the transport packaging.
Nonobservance of these instructions can cause damage to the device.

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Up to the time of installation, the packages must be left closed and, unless otherwise indicated, must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage and transport temperature -20...+85°C
- Relative humidity 20...85%

3.7. Accessories

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

- Antennas (rod, dome, flat, or directional antennas)
- Mounting parts
- Batteries / rechargeable batteries
- PV module
- Mast/wall mount
- Connection cables
- Sensors for a wide range of measured variables

4. Installation

4.1. Ambient and process conditions

The correct function of the device within the specific technical data can only be guaranteed, if the permitted ambient conditions at the installation place (» chapter Technical Data) will not be exceeded.
Make sure before mounting that all parts of the instrument (e.g. enclosure, cable glands, seals) are suitable for the existing conditions (e.g. temperature, mechanical influences).

4.2. Installation place

The installation place has substantial influence to the quality of the mobile communication connection. Especially near buildings, vegetation, covering by leaves or snow can damp or even block the signal.

Before installation the signal strength of the mobile network at the installation place must be checked. At insufficient mobile network strength a data transmission can be impossible and there will be exhausted essentially more battery capacity. This will considerably reduce the run time of the device. By use of an optimal mounted external antenna or eventually a directional antenna the signal strength can be substantially increased. The antenna must be protected against covering by leaves or snow resp. must be cleaned if necessary. Eventually another installation place must be chosen.

4.3. Installation notes

Do not remove packaging until just before mounting and check the device for any damage.

NOTE	At the installation a lateral minimum distance of 15cm at the left enclosure side must be kept, to allow a compete opening of the enclosure cover.

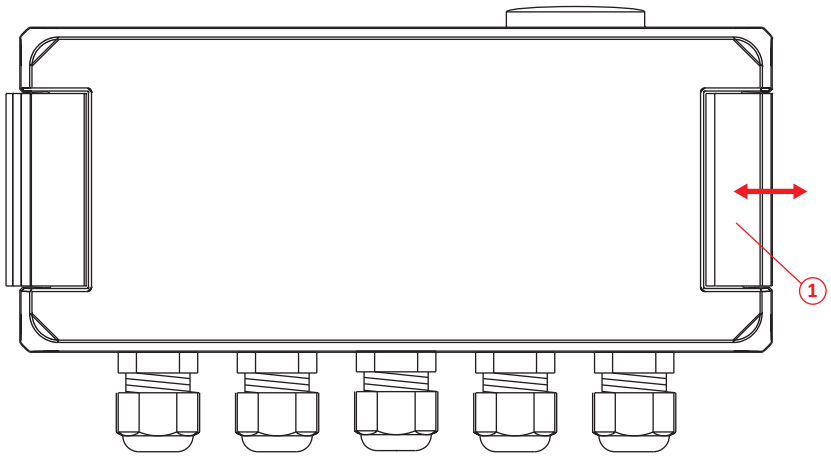
NOTE	For the installation at a mast a mast fixation for a diameter from 50...90mm is available.

NOTE	To ensure the tightness of the enclosure, the enclosure cover must be fixed at the right side with the two screws. Subsequently the fastening bracket can be locked.

NOTE	After installing the device check if all cable glands, the enclosure tube and the antenna plug are tightly screwed.

NOTE	Pollution or damaging of the pressure compensation opening (enclosure right side) can lead to faulty measuring results of a connected hydrostatic water level sensor.

4.4. Open the device



To open, fold the locking latch (1) outwards, loosen both screws underneath and open the housing cover.

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

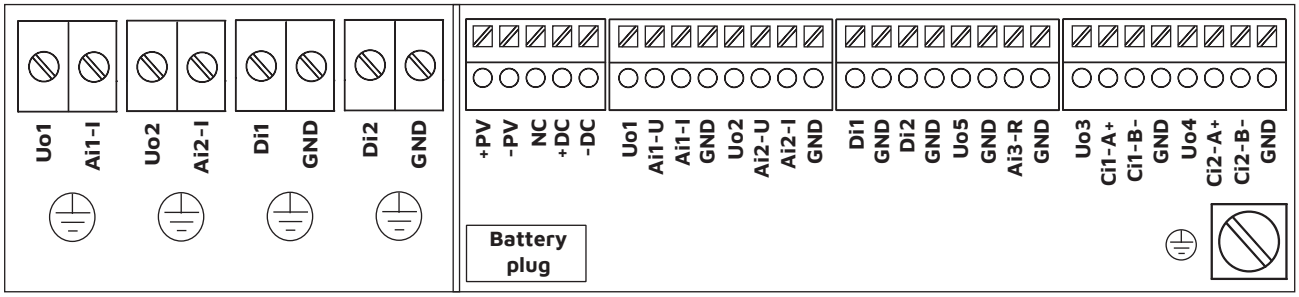
NOTE	Avoid the pollution of the internal area of the device with humidity or dirt, otherwise this can lead to abnormal behavior, damage or destruction and to the resulting dangers.

5. Electrical connection

NOTE	Instructions for opening and closing the device - Section 4.4.

NOTE	Install the device only when power supply is off. Switch off DC supply.

5.1. Terminals



Battery plug - Connection plug batterie

+DC/-DC - Auxiliary power DC voltage
+PV/-PV - PV module
NC - not connected

Uo1/2 - Sensor supply 2 channels [01-S/01-X5]
Uo3/4 - Sensor supply 2 channels
Uo5 - Sensor supply 1 channel
Ai1-I - Analogue input current 0/4-20mA - channel 1 [01-S/01-X5]
Ai1-U - Analogue input voltage 0-10V - channel 1
Ai2-I - Analogue input current 0/4-20mA - channel 2 [01-S/01-X5]
Ai2-U - Analogue input voltage 0-10V - channel 2
Ai3-R - Analogue input resistance 0-2200R - channel 3
Di1 - Digital switch / count input - channel 1 [01-S/01-X5]
Di2 - Digital switch / count input - channel 2 [01-S/01-X5]
Ci1-A+/B- - Interface RS485 Modbus-RTU - channel 1
Ci2-A+/B- - Interface RS485 Modbus-RTU - channel 2
GND - reference potential

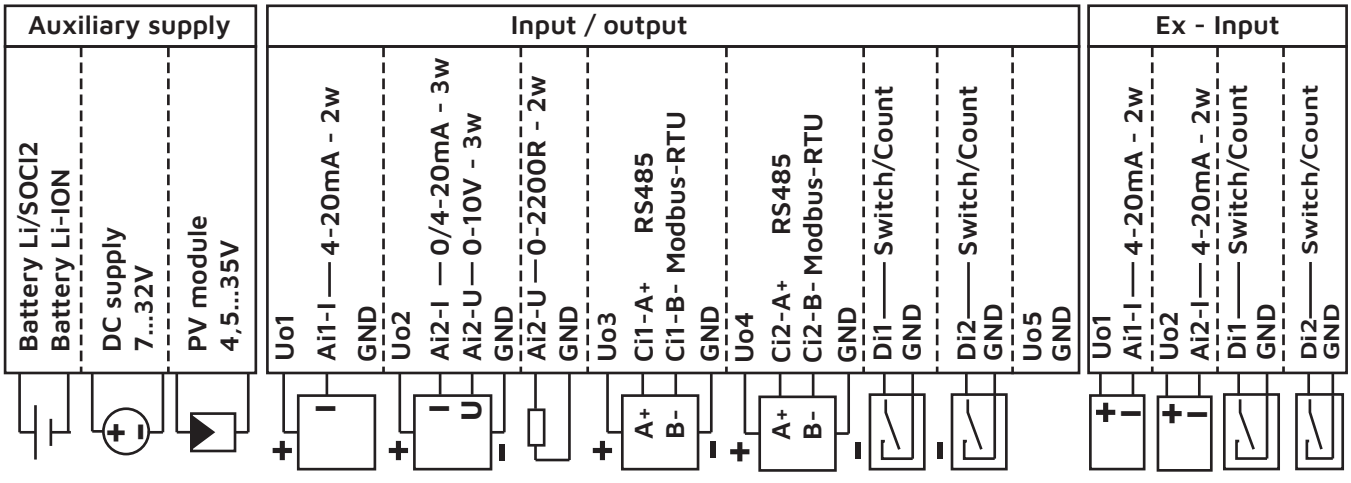
PA - Protective conductor / Cable shield

The terminals are suitable for connection of:

Solid conductor / fine-wire conductor	0,2...1,5mm2
Fine-wire conductor with ferrule	0,25...1,0mm2
Stripping length	8,5...9,5mm
Clamping area cable gland	5x 4,5...10mm

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

5.2. Terminal assignment



5.2.1. Auxiliary power supply

WARNING	Only suitable batteries may be used, otherwise this can lead to abnormal behavior, damage or destruction of the device and to the resulting dangers.

WARNING	The primary battery may not be charged. There is explosion or fire hazard.

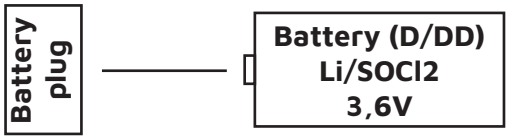
NOTE	For proper function, the device must only be operated or stored with a functioning, sufficiently charged battery. Long-term operation or storage without or with a depleted battery may result in data loss or damage to the device.

NOTE	Charging the rechargeable battery can be made: • internal devices by a connected suitable PV module or a connected direct voltage. • external devices by a suitable DC power supply.

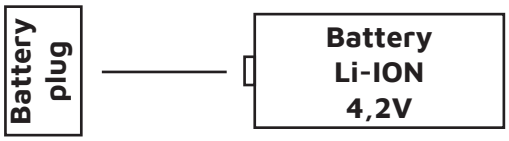
NOTE	The plug of the connection cable to the battery can be only pulled off after releasing the locking lever at the plug jack.

NOTE	When converting from battery to rechargeable battery supply, the three retaining clips must be removed and the battery retaining clip installed instead.

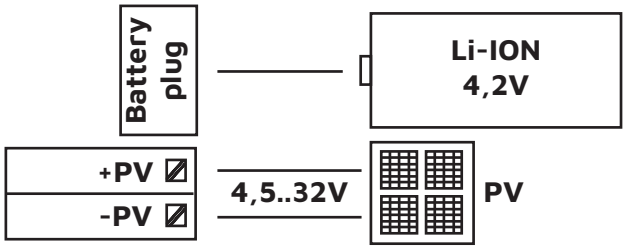
Battery
The battery is the only source of energy.
Requires replacement when battery is low.



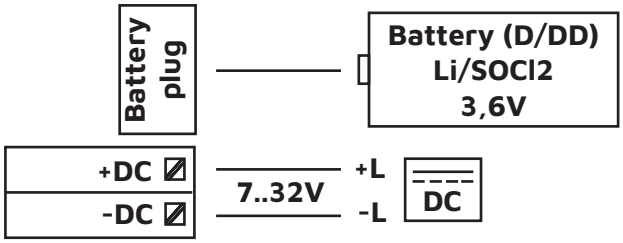
Li-ION rechargeable battery
The rechargeable battery is the only source of energy.
Recharging required when battery level is low.



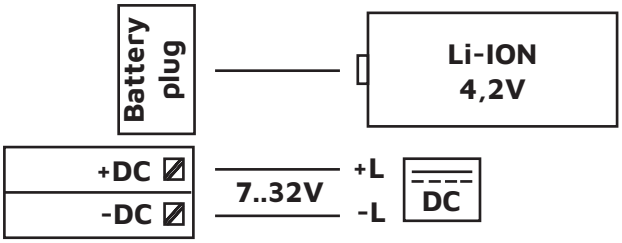
Li-ION rechargeable battery / PV module
The rechargeable battery is the main source of energy.
The rechargeable battery is recharged by the PV module.



DC supply / Battery
The DC supply is the main source of energy.
The battery takes over the energy supply if the DC supply fails. Battery replacement required when battery is low.



DC supply / Li-ION rechargeable battery
The DC supply is the main source of energy.
The rechargeable battery takes over the energy supply if the DC supply fails. The rechargeable battery is recharged via the DC supply.

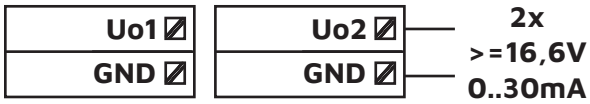


5.2.2. Transmitter power supply - Uo1/Uo2/Uo3/Uo4/Uo5

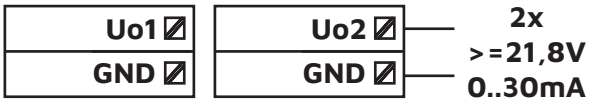
Note	The outputs Uo1...Uo4 are used for temporally limited sensor supply.

Note	The output Uo5 can be used either as a control output in the event of an alarm or as a permanently active output voltage, e.g. for the permanent supply of an external device.

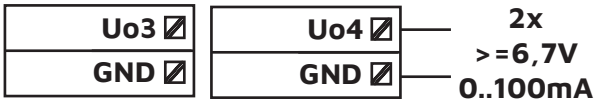
Uo1/Uo2 – Transmitter power supply 16,6V/30mA



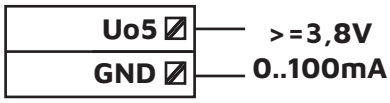
Uo1/Uo2 Ex – Transmitter power supply 21,8V/30mA



Uo3/Uo4 – Transmitter power supply 6,7V/100mA



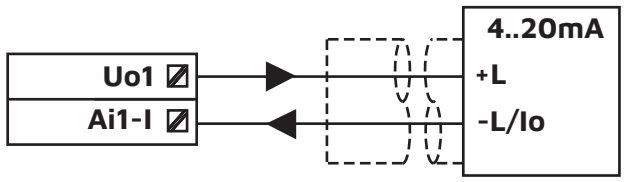
Uo5 – Transmitter power supply 3,8V/100mA



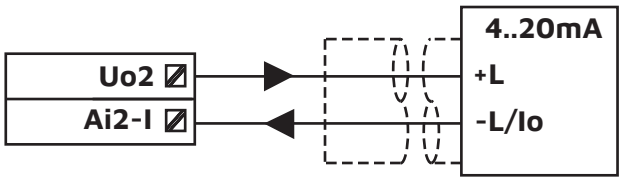
5.2.3. Measuring input analogue - Ai1/Ai2/Ai3

HINWEIS	The connection diagrams apply to standard sensors. By the user specific sensor configuration the use of the current saving sensor supplies Uo3/Uo4 is possible.

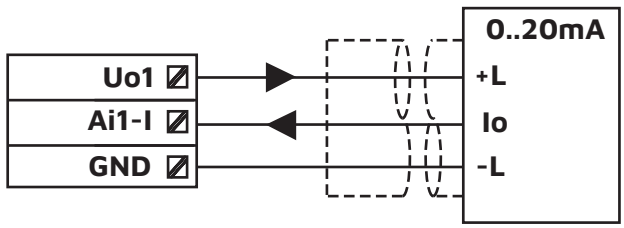
Ai1 – Current 4...20mA, 2-wire



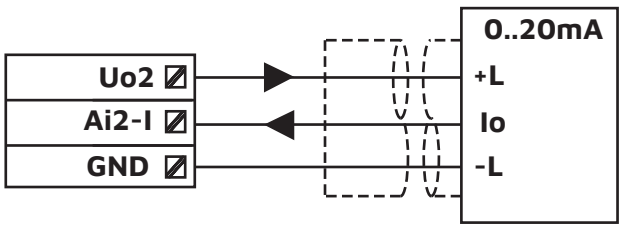
Ai2 – Current 4...20mA, 2-wire



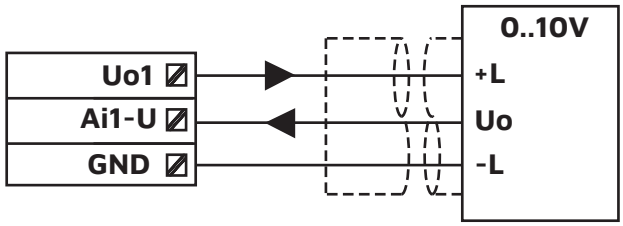
Ai1 – Current 0...20mA, 3-wire



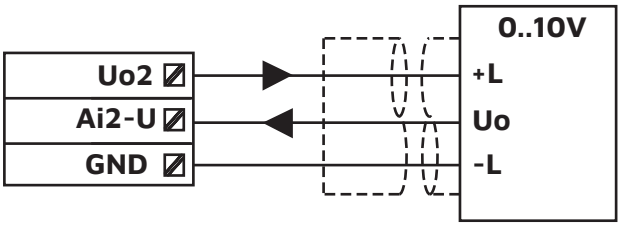
Ai2 – Current 0...20mA, 3-wire



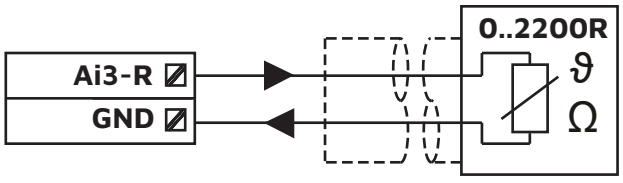
Ai1 – Voltage 0...10V, 3-wire



Ai2 – Voltage 0...10V, 3-wire



Ai3 – Resistance 0...2200V, 2-wire

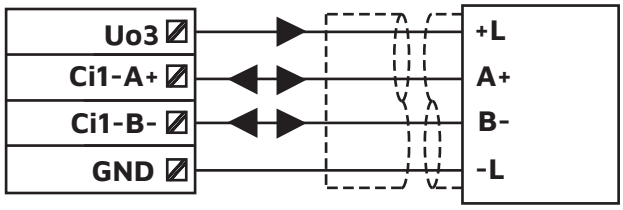


5.2.4. Communication input RS485 Modbus-RTU - Ci1/Ci2

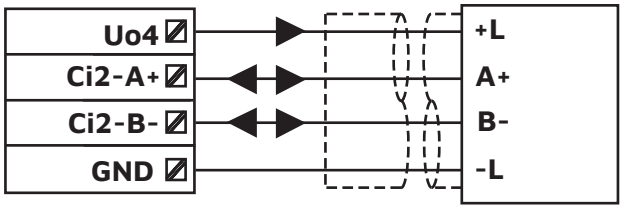
Note	The connection diagrams apply to standard sensors. By the user specific sensor configuration the use of the sensor supply with higher voltage Uo1/Uo2 is possible.

Note	The two communication inputs Ci1 and Ci2 are internally connected (terminals A+ and B-) and are operated alternately when two sensors are connected simultaneously. A terminating resistor RT = 180R is installed internally between A+ and B-.

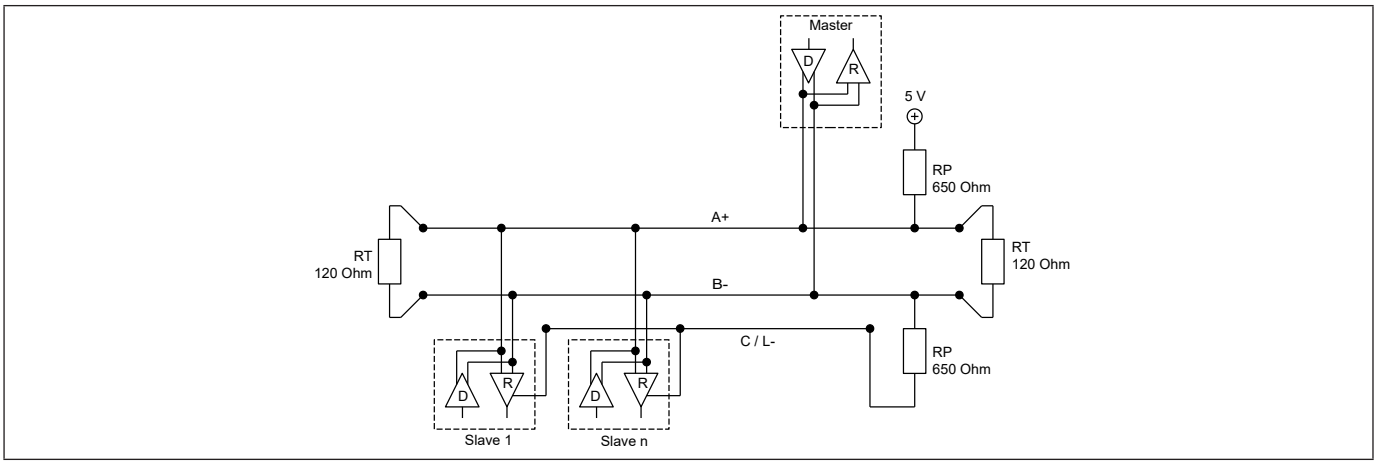
Ci1 – RS485 Modbus-RTU



Ci2 – RS485 Modbus-RTU



The Modbus protocol is a communication protocol, that base on a master/slave architecture.
All devices are connected by two data wires (A+ / B-) and by one COMMON-wire (C/L-).



An original RS485 allows the connection of 32 slaves within one segment. The device has a load of only 1/8 of the standard load (Rin ≥ 96 kΩ), thus up to 256 of the devices can be theoretically operated within one network segment. However the number is limited to 247 due to the Modbus address space.

The both termination resistors RT prevent reflections on the data wires. The optimum resistor value depends on the wave impedance of the used cable, but a value of 120 Ohm is a popular choice.

The polarisation network is necessary, to ensure suitable potentials, if none of the devices transmits and thus the wires A+ and B- are undefined (high impedance). The value for RP depends e.g. on bus load or the termination resistors. Recommended values are between 450 Ohm and 650 Ohm.
The use of a polarisation network is recommended, to ensure a stable network. Usually the polarisation resistors are implemented within the master device or they are connectible.

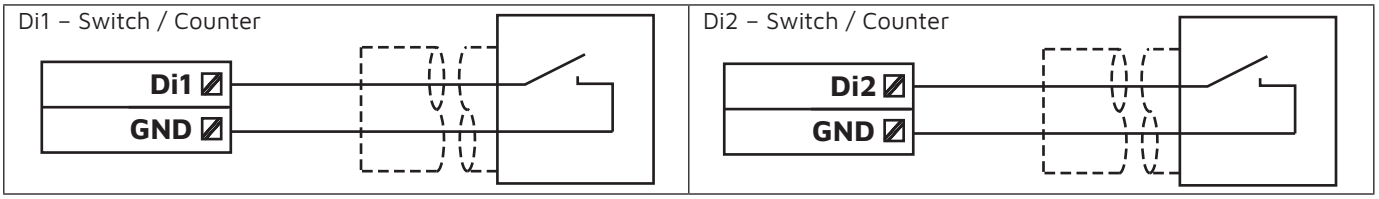
Connect the device at bus topology (line). A stub line must be avoided.

Use a cable 4-core acc. to the EIA485 recommendations:

Impedance	135...165Ω @ 3...20Mhz
Cable capacity	< 30pF/m
Cable diameter	> 0,64mm
Cable cross section	0,34 mm2 / AWG 22
Loop resistance	< 110Ω/km
Shielding	Braided shield /shield foil
Cable length	38400 Baud ≤ 1200m

5.2.5. Digital input switch / counter - Di1/Di2

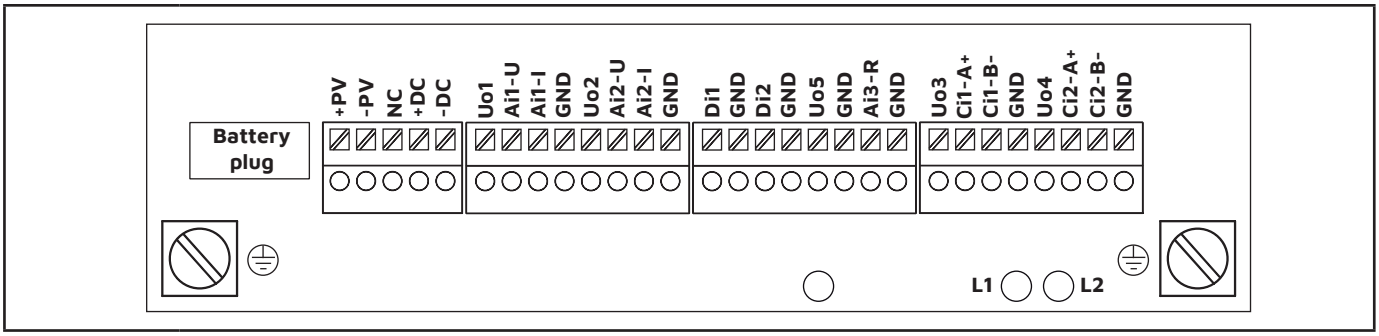
Note	The input can be configured as control input (e.g. a float switch) as well as impulse counter (e.g. a flow meter)



6. Operation

NOTE	Instructions for opening and closing the device - Section 4.4.

NOTE	The configuration of the device contributes significantly to the energy consumption of the device. An unfavourable configuration can reduce the runtime. The most important factors for the runtime of the device are: • Frequency of the mobile communication • Quality of the mobile network • Frequency of measuring value logging • Supply current of the sensors • On-time of the sensors



NOTE	An activated communication connection is signaled internally the device by cyclic flashing of Function-LED L1 (4a) and COM-LED L2 (4b - only option [01-S]). Function-LED (4a): • 100ms on / 100ms off: Data transmission • 500ms on / 500ms off: Connection Bluetooth® • 1000ms on / 1000ms off: Connected with portal COM-LED (4b): • 1800ms on / 200ms off: Connected to mobil network • 200ms on / 1800ms off: Searching mobile network • 125ms on / 125ms off: Data transmission

NOTE	In the case of a fail function, the device can be reset by an internal RESET pushbutton. The successful restart is signaled by a double flash of the Function-LED (4a).

6.1. Bluetooth®

NOTE	The operation device must be equipped with Bluetooth® 4.1 and higher, recommended is Bluetooth® 4.2 and higher.

NOTE	The operation is made per app ACS-SmartConnect, which must be loaded and installed from app stores. The password for the first access is the device serial number. Due to safety reasons the assignment of an own safe password is suggested.

6.2. Cellular communication

NOTE	To use the online portal, activation of the integrated SIM card is required.

NOTE	An embedded SIM card is installed at the factory and is permanently linked to the ACS WEB portal. If you want to use your own SIM card, it must be inserted into the SIM card holder (3) and activated using the app ACS-SmartConnect. By using your own SIM card, you lose the ability to transfer the data to the ACS WEB portal and thus also all the functionalities of the WEB portal. The collected measured values are then transferred to an FTP server to be provided by the user.

NOTE	At the initial dial-up of the device at a provider in a non-german foreign country, the initial registration at the regional mobile network is necessary. Dependent on the country and the provider this can while up to several minutes. To reduce the energy load for the battery, the action "connection test" at the menu item "service" must be run by the app ACS-SmartConnect.

7. Error diagnosis and Troubleshooting

The operator of the system is responsible for taking suitable measures to rectify faults.

In case of malfunction check:

Component / area	**Check**	**Troubleshooting**
Enclosure	Damage	Replace device or send in for repair
Pressure compensation opening	Pollution	Replace device or send in for repair
	Damage	Replace device or send in for repair
Battery	Low charge level	Replace battery / charge rechargeable battery
	Contact	Replace battery resp. connection cable
	Damage	Replace battery
Antennea	Contact	Replace antenna resp. send in for repair
	Damage	
Cable	Short circuit	Replace cable Send in the connected device for repair
	Wire break	
	Damage	
Supply voltage DC	Operating voltage available	Switch-on resp. repair operating voltage
		Check terminals resp. repair
	Operating voltage reverse connected	Reverse operation voltage connection
	Operating voltage too low	Adapt resp. repair
	Operating voltage too high	Send in the device for repair
	Connection cable damaged	Replace or repair cable

If the malfunction cannot be eliminated, please contact the manufacturer.

8. Maintenenance

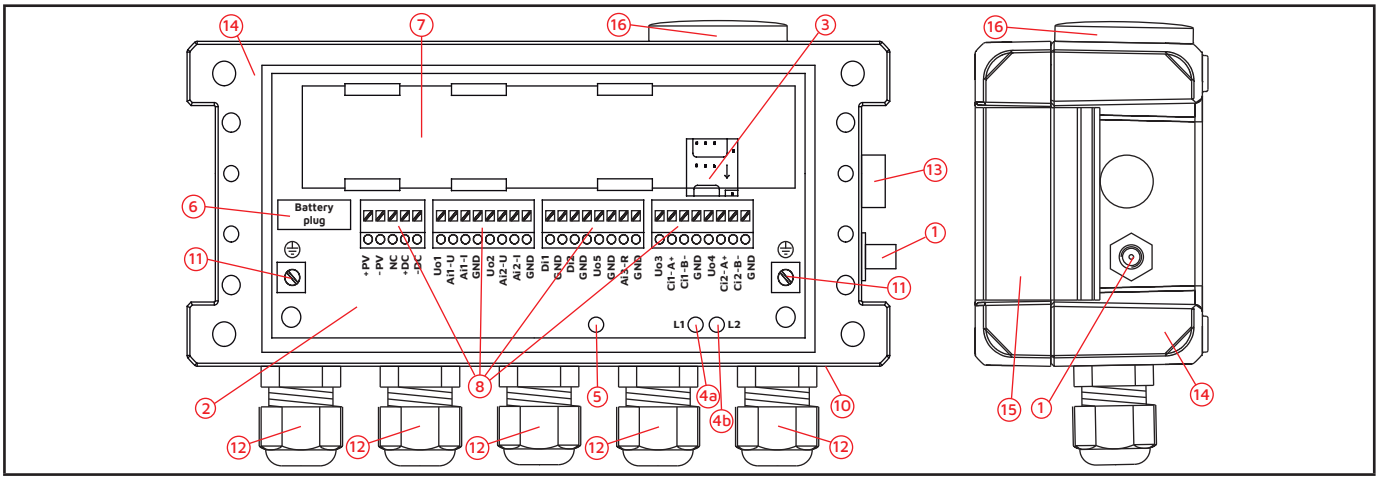
At appropriate use, the device is free of maintenance.

If energy consumption increases, it may be necessary to replace the battery used or to recharge the recharbeable battery externally. A rechargeable battery can also be recharged during operation using a connected PV module or DC direct voltage. This eliminates the need for external recharging.

8.1. Battery change

NOTE	Instructions for opening and closing the device - Section 4.4.

NOTE	For proper function, the device must only be operated or stored with a functioning, sufficiently charged battery. Long-term operation or storage without or with a depleted battery may result in data loss or damage to the device.



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

Remove the battery and also disconnect the cable from the battery.

Attach the cable to the new battery and insert the new battery into the battery clips (7).

Insert the plug of the battery connecting cable into the socket (6).

9. Repair

The device is not intended for repair by the user. A repair may only be carried out by the manufacturer.

9.1. Dismounting

Use suitable protective clothing, e.g. goggles, gloves.

WARNING	Let the device and the system cool down sufficiently fore dismounting it. There is a risk of hot surfaces as well as dangerous and hot media escaping.

WARNING	Dismount the device only when the system is pressureless. There is a risk of fast escaping media resp. pressure blow.

9.2. Return

Returns can only be accepted if the device has been equipped with a Decontamination declaration enclosed. The decontamination declaration is available at https://www.acs-controlsystem.com at the download area and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

9.3. Disposal

As required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), products of ACS are marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Such products may not be disposed of as unsorted municipal waste and can be returned to ACS for disposal.
The return follows the conditions stipulated in the General Terms and Conditions or as individually agreed by ACS.

10. Technical Data

Reference conditions	Ta = +15°C..+25°C (+59°F..+77°F) / pa = 860..1060kPa / r.F. = 45..75% ton = 240s / Battery 35Ah
Measurement deviation	EN/IEC 60770-1: Characteristic deviation – Limit value adjustment

10.1. Auxiliary power supply

Battery B1	Lithium / 3,6V-19Ah
BatteryB2	Lithium / 3,6V-35Ah
Battery rechargeable A1	LiION / 4,1V-20Ah
Supply voltage DC	7...32VDC / ≤ 350mA
PV module	4,5...32VDC / ≤ 2A

10.2. Inputs

10.2.1. Analogue - Current 0/4...20mA

Signal range Ai1/Ai2	0/4...20mA / FSI: 0...28mA / Ri 27R
Resolution	FSI 16 Bit
Characteristic deviation	≤ ±0,05% FSI
Temperature deviation	≤ ±0,1% FSI / 10K
Long term deviation	≤ ±0,05% FSI / year

10.2.2. Analogue - Voltage 0...10V

Signal range Ai1/Ai2	0...10V / FSI: 0...19V / Ri 1,2MR
Resolution	FSI 16 Bit
Characteristic deviation	≤ ±0,05% FSI
Temperature deviation	≤ ±0,1% FSI / 10K
Long term deviation	≤ ±0,05% FSI / year

10.2.3. Analogue - Resistance 0...2200R

Signal range Ai1/Ai2	0...2200R / FSI: 0...2200R / Io: 340µA
Resolution	FSI 16 Bit
Characteristic deviation	≤ ±0,05% FSI
Temperature deviation	≤ ±0,1% FSI / 10K
Long term deviation	≤ ±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	96kΩ
Termination resistor RT	180R integrated

10.2.5. Digital - Switch / Counter

Operating range Di1	≤ 20kOhm / ≤ 1kHz

10.2.6. Transmitter power supply Uo

Output voltage Uo1 / Uo2	16,6V ±0,3V (0mA) / 15,9V ±0,3V (30mA) / 0...30mA, max. 40mA
	Ex: 21,8V ±0,3V (0mA) / 11,8V ±0,3V (30mA) / 0...30mA, max. 40mA (Ri ≤ 306R)
Output voltage Uo3 / Uo4	6,7V ±0,2V (0mA) / 6,6V ±0,2V (100mA) / 0...100mA, max. 300mA
Output voltage Uo5	3,8V ±0,2V (0mA) / 3,0V ±0,2V (100mA) / 0...100mA, max. 220mA

10.3. Outputs

10.3.1. Interface - Bluetooth®

Standard	Bluetooth® 5.2
Spezification	2Mbit/s, Advertising Mode 2s
Transmit power	≤ 0,1W
Range	Outdoor max. 200m / Indoor max. 40m

10.3.2. Interface - Cellular 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
	850/900/1800/1900MHz
Priority	4G (LTE-M1 or LTE-NB2), fallback 2G (EGPRS)
Transmit power	4G ≤ 0,2W
	2G ≤ 2W
SIM	Internal SIM + external Micro-SIM
Antenna connector	Connector SMA / 50Ohm

10.4. Data logger

10.4.1. Memory

Type	Dataflash, nonvolatile
Memory size	8 MB
Memory content	≥ 800.000 measuring values

10.4.2. Time

Cycle accuracy	≤ ±4 seconds / month, internet time synchronization 1x/day
	≤ ±2 minutes / month, without internet time synchronization
Frequency base	Quartz

10.5. Environmental conditions

Ambient temperature Ta	-20...+60°C (-4°F...+140°F)
	[03-A1] rechargeable battery LiIon
	charge temperature 0...+45°C (+32°F...+113°F), internally limited
Protection level	IP65/IP67 (EN/IEC 60529)
Climatic classification	4K4H (EN/IEC 60721-3-4)
Shock classification	15g [11ms] (EN/IEC 60068-2-27)
Vibration classification	4g [10...2000 Hz] (EN/IEC 60068-2-6)
EM compatibility	Operation device class B / Industrial range (EN/IEC 61326)
Altitude above sea level	2000m above sea level
MTTF	258 years
Weight	[01-S] 1,2kg
	[01-X5] 2,8kg

10.6. Materials

not process wetted	Aluminum, PA, PUR, brass, nickel, silicone, NBR

11. Revision

Version	Changes
BA02.20/TI02.20	Original version
BA02.20/TI12.20	Technical data: • Auxiliary supply PV module 4,5...32V / ≤ 2A • Change channel labels I>>i / O>>o • Input analogue signal range 0/4...20mA / 0...10V Produkt code: • Electronic – input – M: 0...2200R
BA10.25	Integration BA/TI - full rework Change: • Option [04-4] - LTE Cat-1, EGPRS • Option [04-5] - LTE-M1, LTE-NB2, EGPRS Note on operation/storage without battery

CONTROL-SYSTEM

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