User manual
4-Channel Data Logger

installed on DATAEAGLE 7020 V3

Valid from:

- **Firmware version: 01v045**
- **App. version: 24v000**
- **Server version: 54v00x**
- **Hardware version: 1.1**

CE

Rev.03

DATAEAGLE
INDUSTRIAL RADIO SYSTEMS

Chapter 1 Table of contents

Chapter 2 Declaration of conformity

2.1 DATAEAGLE 7020 V3

SCHILDKNECHT
SMART DATA COMMUNICATION

EU-Konformitätserklärung

EU Declaration of Conformity

Wir/ We: **Schildknecht AG**
Name des Anbieters / supplier's name

Anschrift: **Haugweg 26**
Address **71711 Murr**

erklären in alleiniger Verantwortung, dass das(die) Produkt(e)
declare under our sole responsibility that the product(s)

Bezeichnung, Typ oder Model, Bestellnummer
Name, type or model, ordernumber

DATAEAGLE 7020 V3 **17020_V3**

mit den Vorschriften folgender Europäischen Richtlinie(n) übereinstimmt:
complies with the requirements of the following European directive(s):

Die Übereinstimmung der bezeichneten Produkte mit den wesentlichen Anforderungen dieser Richtlinie(n) wurde geprüft durch Anwendung folgender harmonisierter Normen:
The compliance of the above products with the essential requirements of this directive(s) was proved by the application of the following harmonized standards:

EMC Directive (2014/30/EU)	EN61326-1	
LVD Directive (2014/53/EU)	EN61010-1	
RED Directive (2014/53/EU)	Safety & Health 3.1a	EN62311 EN62368-1+A11:2020 EN62368-1 EN62479
	EMC 3.1b	EN301489-1 V2.2.3 EN301489-52 V1.2.1 EN301489-1 V2.1.1 EN301489-17 V3.1.1
	Radio spectrum efficiency 3.2	EN301511 V12.5.1 EN301908-1 V15.2.1 EN301908-13 V13.2.1 EN300328 V2.2.2 EN300330 V2.1.1
	Cybersecurity Article 3.3d	EN18031-1
RoHS Directive (2015/863/EU)	Prevention 4.1 EN IEC63000	

Murr
Ort der Ausstellung
Place of issue

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Thomas Schildknecht
CEO

Chapter 3 Technical data

Voltage supply	Rechargeable battery: • DATAEAGLE 702x Akkupack V3 : 13,6 Ah, Li-Ion , integrated 2 kV overvoltage protection • PSU413D AP : 13,2 Ah, Li-Ion , integrated 2 kV overvoltage protection Battery: • PSU713 BP : 13 Ah Direct power supply: • PSU DC : 2 kV overvoltage protection and reverse voltage protection • PSU DC+ : 900 mAh, Li-Po , 2 kV overvoltage protection and reverse voltage protection Additional information is provided in "Technical details about the energy supply" on page 76.
Supply or charging voltage	12...32 VDC (max. 12 W)
Housing	Material: ABS / PC (housing/cover) Weight: 330 g (without power supply unit) Protection class: IP66 Dimensions (WHD): 86 x 175 x 64 mm (without antenna)
Operating temperature	-20...+60 °C
Air humidity	15...90 % RH non-condensing
Storage temperature	-30...+85 °C
Display	Three-colour LED for signalling the operating state
Operation	Solenoid switch for initiating Aloha transmission mode
Antenna connector	FME-M
Universal inputs	4 x analogue or digital Modes: • 0/4...20 mA: Resolution 6,3 µA, max. 23,96 mA, load 96 Ω • 0...2 V: Resolution 610 µV, max. 2,5 V, load 10k086 • 0...10 V: Resolution 7,97 mV, max. 32 V, load 4k7 • Digital: max. 32 V, low <0,99 V, high >2,31 V, load 10k086 • Day counter: min. pulse length 1 ms, load 10k086 • Interval counter: min. pulse length 1 ms, load 10k086 • Infinite counter: min. pulse length 1 ms, Bürde 10k086 Additional information is provided in "Technical details about the universal inputs" on page 72.

System time	Hardware real-time clock with its own buffer battery and automatic time synchronisation with the server. Additional information is provided in "Technical details about the system time" on page 81.
Internal sensors	Internal housing temperature • Measurement range: -20...+60 °C • Resolution: 0,1 °C Humidity in the housing • Measurement range: 0...100 % RH • Resolution: 0,1 % RH
External temperature sensor [1)]	1 x PT100/1000 (including auto detection) Additional information is provided in "Technical details about the PT100/1000 interface" on page 73.
Outputs	1 x switchable 3,3 V supply (max. 180 mA) Modes: • Ext. warmup time • Digital 1 x switchable and adjustable sensor supply: Output voltage (selected via configuration parameter): • 14,7 V at I_{out} = 50 mA • 23,4 V at I_{out} = 50 mA Modes: • Ext. warmup time • Digital 1 x isolated switch contact: • I_{max}: 130 mA • U_{max}: 32 V • R_{on}: 35 Ω • f_{max}: 1000 Hz Modes: • Ext. warmup time • Digital • Frequency: Adjustment range 1...1000 Hz, pulse duty factor 50 % • Pulse/min Additional information is provided in "Technical details about the outputs" on page 74.
Local radio interface [2)]	Low energy module

USB interface	1 x mini-B USB 2.0 slave for the connection to a PC. The DeviceConfig configuration program must be installed on the PC to enable communication with the 4-Channel Data Logger . Additional information is provided in "Technical details about the USB interface" on page 73.
Data memory	Internal flash memory for up to 34.944 measurement cycles Additional information is provided in "Functionality of the internal data memory" on page 39.
Data type	Infinite counter: s64 (64 Bit signed) Other measurement data: f32 (32 Bit floating point)
Data transmission	2G/M1/NB1 World • 2G GPRS 900 MHz / 1800 MHz • 2G GPRS 850 MHz / 1900 MHz • LTE B1, B2, B3, B4, B5, B8, B12, B13, B20, B25, B26, B28, B66, B85
SIM [3)]	The following options can be selected using the DeviceConfig configuration program: • Integrated SIM chip • SIM slot Additional information is provided in "Using the external SIM slot" on page 41

[1)] In order for the external temperature sensor to be used, the chargeable feature "Activation code temperature input (- upon request)" must be unlocked or order option "Feature activation temperature input (- upon request)" is required.

[2)] reserved for extensions

[3)] In order for the SIM slot to be used, the chargeable feature "Activation code VPN SIM (- upon request)" must be unlocked or order option "Feature activation VPN SIM (- upon request)" is required.

Chapter 4 General specifications

The information in this manual has been compiled with great care and to the best of our knowledge. The manufacturer, however, assumes no liability for any incorrect specifications that may be provided in this manual. The manufacturer is not responsible for direct, indirect, accidental or consequential damages which arise from errors or omissions in this manual even if advised of the possibility of such damages. In the interest of continuous product development, the manufacturer reserves the right to make improvements to this manual and the products described in it at any time and without prior notification or obligation.

> ***Note:*** *The specifications in this manual are valid as of the versions listed on the front page. Revised versions of this manual, as well as software and driver updates are available in the service area of the DATAEAGLE-Portal server.*

4.1 Translation

For deliveries to countries in the European Economic Area, the manual must be translated into the language of the respective country. If there are any discrepancies in the translated text, the original manual (German) must be referenced or the manufacturer contacted for clarification.

4.2 Copyright

4.3 General descriptive names

The use of general descriptive names, trade names, trademarks and the like in this manual does not entitle the reader to assume they may be used freely by everyone. They are often protected registered trademarks even if not marked as such.

4.4 Safety instructions

For the connection, commissioning and operation of the 4-Channel Data Logger , the following information and higher legal regulations of the country (e.g. VDE regulations), such as valid EX regulations as well as the applicable safety and accident prevention regulations for the respective application case must be observed.

Read this manual completely before unpacking, setting up or operating this device. Observe all hazard, danger and warning information. Non-observance can lead to serious injuries to the operator and/or damage to the device.

Ensure that the safety equipment of this measurement instrument is not impaired. Install and use the measurement system only in the manner and method described in this manual. Do not make any changes to the measurement system under any circumstances.

Important note: *The manufacturer's products that are designed for use outdoors include extensive protection against penetrating moisture and dust. If these products are connected to the power supply or sensors by cables with connectors rather than permanently installed cables, the susceptibility of the connector and socket to moisture and dust penetration is significantly higher. The operator is responsible for protecting the connector and socket against penetrating moisture and dust in a suitable way and complying with local safety regulations.*

4.4.1 Use of the hazard warnings

DANGER:
Indicates a potential or threatening hazardous situation that will result in death or serious injuries if not avoided.

WARNING:
Indicates a potential or threatening hazardous situation that can result in death or serious injuries if not avoided.

CAUTION:
Indicates a potential hazardous situation that can result in minor or moderate injuries or damage to this instrument.

Important note: *Indicates a situation that can result in damages to this instrument if it is not avoided. Information that must be particularly emphasised.*

Note: *Indicates a situation that does not result in any injury to persons.*

Note: *Information that supplements the specifications in the main text.*

4.4.2 Safety symbols on the device

	Devices marked with this symbol must be disposed of in accordance with the requirements of Directive 2012/19/EU on waste electrical and electronic equipment.
	This symbol on a device indicates the location of the earth connection.
	This symbol on a device indicates the location of a fuse or current limiting circuit.

4.4.3 General safety instructions

- This manual is intended to be used by qualified personnel (see "Personnel requirements" on page 28). Read this manual thoroughly before unpacking, setting up or operating the device..
- If you encounter difficulties in understanding the information contained in this manual (or parts thereof), please contact the manufacturer or authorised distributors (see "Contact information" on page 195).
- Keep this manual on hand so that you can refer to it whenever you need information.
- Before installation or commissioning, ensure that the device is in good condition. For this purpose, check for visible defects on all important components. Pay particular attention to fastenings, connections, cable connections, seals, moving parts (e.g. hinges or joints), battery packs, power supply units, etc., if present.
- If defects are found that jeopardise operational safety, all further work must be stopped immediately. This applies regardless of whether the defects are found before installation or commissioning, or during installation, commissioning or ongoing operation.
- Before carrying out maintenance and/or cleaning work, the device must be disconnected from the power supply.
- Do not attempt to repair the device yourself, either mechanically or electrically. In the event of damage, return the device to the manufacturer in its original packaging (see "Return" on page 50).
- The device must not be disposed of with household waste under any circumstances. Information on correct disposal can be found in the chapter "Removal & disposal" on page 171.

4.4.4 Specific safety instructions

WARNING:
Hazardous electric voltage can cause electric shock or burns. Always switch off all of the used power supplies for the device before installing it, completing any maintenance work or resolving any faults.

WARNING:
Ensure that the device is fully deactivated and cannot activate automatically when sending/returning it as air freight. Information on this is provided in chapter "Storage of the product" on page 26. If you have any unanswered questions, contact the manufacturer (see "Contact information" on page 195).

WARNING:
Never use this device in areas where the use of wireless equipment is prohibited. The device must not be used in hospitals and/or in the vicinity of medical equipment, such as heart pacemakers or hearing aids, as their functionality could be compromised by the mobile network modem contained in the device.

WARNING:
Never use this device in potentially explosive atmospheres and in the vicinity of highly combustible areas (fuel stations, storage areas for combustible material, chemical plants and detonation sites) or in the vicinity of flammable gases, vapours or dust.

4.4.5 Safety and preventative measures for handling devices with mobile network modems

The following safety and preventative measures must be observed during all phases of installation, operation, maintenance or repair of a mobile network modem. The manufacturer is not liable if the customer disregards these preventative measures.

CAUTION:
The mobile network connection must not be used in hazardous environments.

No guarantee of any kind, whether implicit or explicit, is given by the manufacturer and its suppliers for the use with high risk activities.

In addition to the following safety considerations, all directives of the country in which the device is installed must be complied with.

> ***Important note:*** *No liability shall be assumed at any time and under no circumstances for connections via a mobile network modem for which wireless signals and networks are utilized. The mobile network modem must be switched on and operated in an area where sufficient signal strength is present.*

4.4.5.1 Safety and precautionary measures for devices with mobile network modem

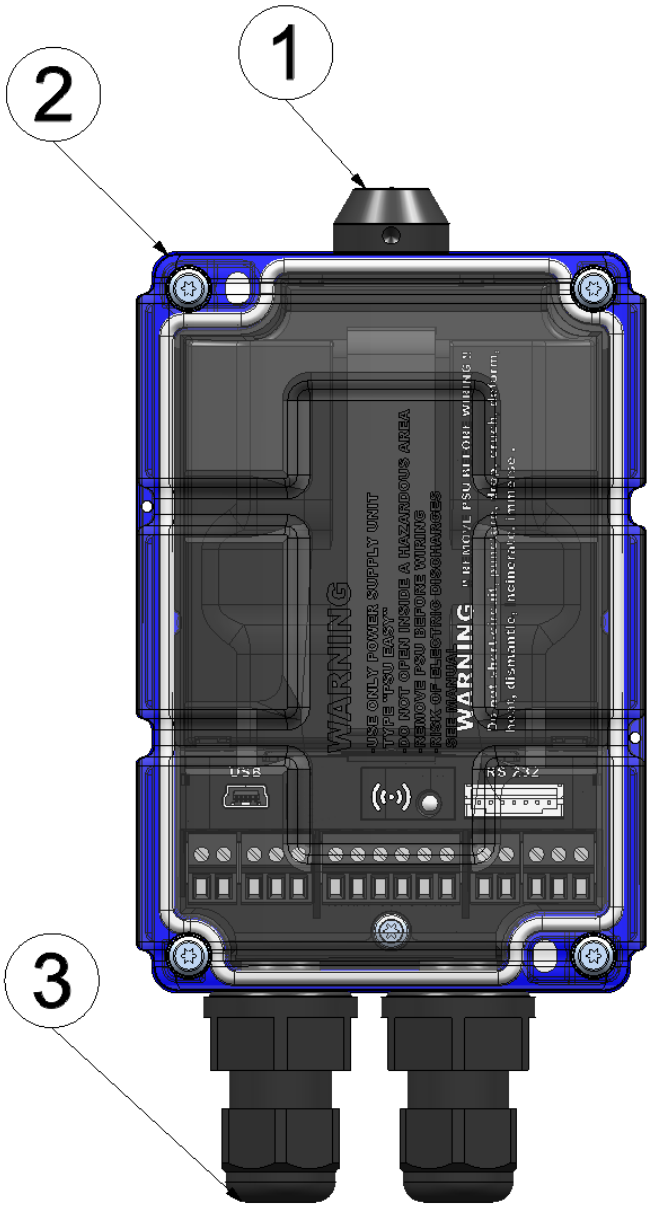
- This device must only be installed by a trained technician who applies the recognised installation practices for a radio frequency transmitter including the correct grounding of external antennas.
- The device must not be operated in hospitals and/or in the vicinity of medical equipment such as heart pacemakers or hearing aids.
- The device must not be operated in highly flammable areas such as petrol filling stations, fuel storage sites, chemical factories and explosion sites.
- The device must not be operated in the vicinity of flammable gases, vapours or dusts.
- The device must not be subjected to strong vibrations or impacts.
- The mobile network modem can cause interferences if it is located in the vicinity of television sets, radios or computers.
- Do not open the mobile network modem. Any modification to the device is prohibited and will result in the operating licence being revoked.
- The use of mobile network services (text messages/data communication/GPRS, etc.) may incur additional costs. The user is solely responsible for any resulting damages and costs.
- Do not install the device in any other way to the one described in the operating instructions. Improper use will invalidate the warranty.

4.4.5.2 Safety measures for installing the antenna

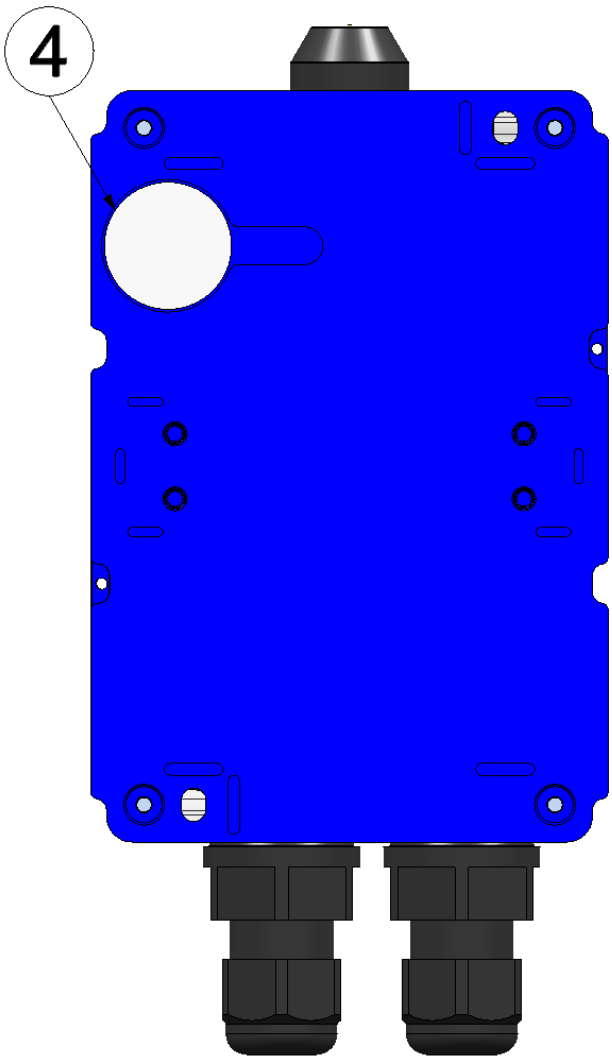
- Only use antennas that are recommended or supplied by the manufacturer.
- The antenna must be installed at a distance of at least 20 cm from individuals.
- The antenna must not must not protrude beyond the lightning-protected area of buildings and must be protected against lightning strikes.
- The voltage supply must be switched off before replacing the antenna.

4.5 Overview

Note: *As the 4-Channel Data Logger is split into several components when delivered, it must be assembled before use (see "Assembling the 4-Channel Data Logger " on page 52).*



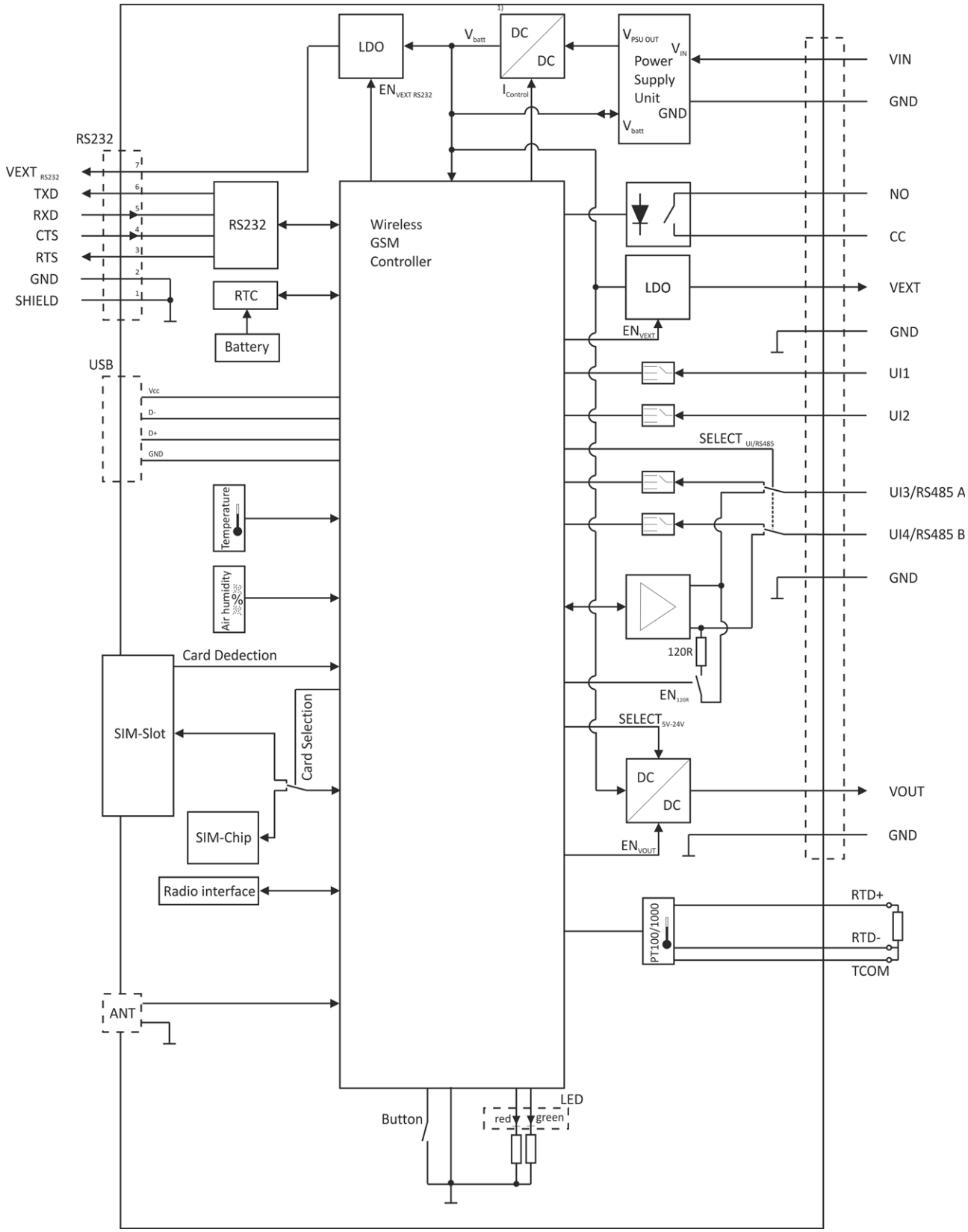
Front of the 4-Channel Data Logger
(view of a device after assembly)



Rear of the 4-Channel Data Logger
(view of a device after assembly)

1 Antenna connector	**3** Cable screw connection (cable diameter of 5-10 mm)
2 Housing cover	**4** Pressure compensation

4.5.1 Block diagram



Block diagram of the 4-Channel Data Logger

[1] It is a DC/DC converter with controllable output current. A power supply unit (e.g. DATAEAGLE 702x Akkupack V3) that is equipped with a rechargeable battery can thus be charged via the V_{Batt} in-/output.

Note: *Detailed block diagrams of the most common power supply units are provided in chapter "Technical details about the energy supply" on page 76.*

4.6 Limitations of use

The following chapters describe the limits within which use of the device is permitted. Reasonably foreseeable misuse is also listed and the use of the device in this way is explicitly excluded.

Note: *Any use of the device that is not specified in chapters "Intended use" on page 23, "Type of use" on page 23 and "Field of application" on page 23 is not permitted. This also applies if the device is used in a way that is not explicitly excluded as unauthorised in the chapter "Unauthorised use" on page 24. The manufacturer is not liable for any damage or consequential damage resulting from unauthorised use. The risk is borne solely by the operator.*

4.6.1 Intended use

The portable measurement instrument is used to collect, process and transfer analogue and digital signals. The device can operate without mains power. The measured and recorded data is stored on a non-volatile memory medium. This stored data can be sent via the mobile network to a central server for further processing. Therefore the device is equipped with an integrated SIM chip.The device is intended for operation within the limits specified in chapter "Technical data" on page 13 only.

Note: *This device is exclusively intended to be used for the purposes as described before. Any other use or use beyond what is specified or a modification of the device shall be deemed to be not for the intended purpose and is not permitted without the express written consent of the manufacturer. The manufacturer shall not be held liable for any damages that may result from such unauthorised use or modification. The operator alone bears the associated risk.*

Note: *The manufacturer is not liable for data loss of any kind.*

Note: *The integrated SIM chip provides a mobile communications connection to a variety of international service providers. In order to be able to utilise all functions of the device, you must ensure that the device is located in the service area of one of these service providers. A Managed Service contract with Schildknecht AG is required for use of the mobile data transmission (see www.schildknecht.ag). This includes the provisioning of the mobile communications connection via the network of the service provider included in the above-mentioned list.*

4.6.2 Type of use

Installation, commissioning and maintenance may only be completed by qualified personnel (see "Personnel requirements" on page 28). The device is only approved for use in areas without explosive atmospheres.

4.6.3 Field of application

It is only authorised for use in the industrial sector, business/commercial sector or in small businesses.

4.6.4 Unauthorised use

Note: *The following describes the types of use of the device that are not permitted. This is not a complete list, but rather a list of reasonably foreseeable misuse. Only the use specified in chapters "Intended use" on page 23, "Type of use" on page 23 and "Field of application" on page 23 is permitted. The manufacturer is not liable for any damage or consequential damage resulting from unauthorised use. The risk is borne solely by the operator.*

- The device must not be exposed to direct sunlight or direct weather influences (rain, snow, ...).
- The device must not be installed in locations that are permanently flooded.
- The device is not authorised for use in sewers.
- The device must not be mounted hanging from the connection cable.
- The device must not be operated with the lid open.
- The device must not be operated without antenna.
- When using antennas with a connection cable, neither the device nor the antenna may be suspended from the antenna cable.
- Only one cable may be fed through each of the cable glands.
- The cable glands must not be used in the field without the cable threaded through. If a cable gland is not used, it must be protected with a dummy plug.
- No traction may be exerted on the connection cables (sensors and supply). Straining clamps must be used to secure the cables in a suitable manner.

4.7 General product information

The composed system is a compact, portable measurement system for recording and transferring analogue and digital signals. It consists of a data logger with installed IoT application "4-Channel Data Logger". To simplify matters, the measurement system will be referred to as "4-Channel Data Logger " hereinafter. Depending on the power supply unit used, the 4-Channel Data Logger can also operate without mains power. The device is equipped with 4 universal inputs that can be operated in various analogue and digital modes. In addition, an interface for connecting a PT100 or PT1000 is available following the chargeable release (Activation code temperature input ,- upon request). The device automatically detects which of the two types is being used. The 4-Channel Data Logger is also equipped with internal sensors (internal housing temperature and air humidity in the housing), 2 switchable voltage outputs to supply the sensors and an isolated switch contact to directly control an actuator. The output voltage for one of the two switchable sensor supplies can be set to 14,7 V or 23,4 V via the input screen for configuring the output channels (see "Output channels" on page 105). The output voltage for the other switchable sensor supply is 3,3 V and cannot be changed. All output channels can be configured independently so that they can each be switched by the device itself prior to a measurement (to supply a sensor) or so that they can be switched wirelessly from a central location. The isolated switch contact can also be operated in different modes (frequency, PWM, pulse/min.). All of the input measurement data is temporarily saved to an internal data memory along with the output states and wirelessly transferred to a central location at a freely selected interval. The device is also configured via this connection. The device is equipped with an integrated SIM chip.

4.8 Device labelling

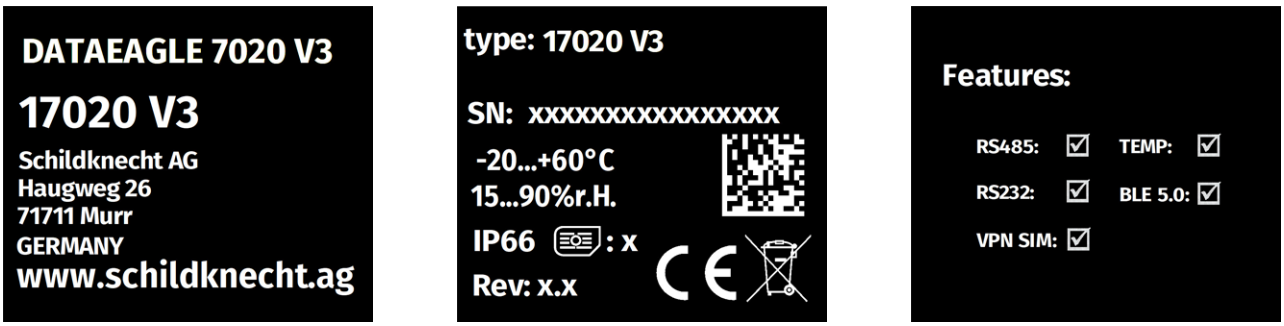
The specifications in this user manual apply exclusively to this "4-Channel Data Logger " measueremnent system that consists of the following components:

- IoT application "4-Channel Data Logger"
- DATAEAGLE 7020 V3

The type plates are located on the right side of the device and contain the following specifications:

- Type designation
- Item number
- Manufacturer's address
- Specification of the device family
- Serial number
- Environmental conditions during operation
- Degree of protection
- Country list profile of the SIM chip
- Hardware revision
- CE marking
- Chargeable features released at the time of delivery

The correct specification of the type designation and serial number is important for all queries and spare part orders. Only then can we process requests promptly and properly.



Type plates DATAEAGLE 7020 V3

Note: *This symbol indicates the country list profile of the SIM chip installed in the device.*

Note: *These operating instructions are part of the device and must be available to the user at all times. The safety instructions contained therein must be observed.*

WARNING:
It is strictly prohibited to disable the safety equipment or modify its mode of operation.

4.9 Installation of spare and wear parts

Be advised that spare and accessory parts that have not been supplied by the manufacturer have also not been inspected or approved by the manufacturer. The installation and/or use of such products can possibly have a negative impact on the specified constructional properties of the device. The manufacturer shall not be liable for any damages that arise from the use of non-original parts and non-original accessory parts.

4.10 Storage of the product

To safeguard the 4-Channel Data Logger , ensure that all relevant data was transferred to the DATAEAGLE-Portal server. If necessary, initiate a transmission directly on the device via the solenoid switch (see "Solenoid switch" on page 88) and then check again that all of the relevant data has been transferred. This particularly applies to the "Interval" connection type. If the "Interval & wakeup" connection type has been selected, you can also initiate the transmission via the DATAEAGLE-Portal server (see "Basic settings" on page 121). With the "Online" connection type, the determined measurement data is immediately transferred to the DATAEAGLE-Portal server. The data on the server is always up-to-date and the device can be switched off at any time.

4.10.1 Separate storage of the device and power supply unit (recommended)

Remove the power supply unit before disconnecting the cables and antenna. If possible, switch off the supply or charging voltage before disconnecting the cables from the V IN and GND terminals (see "Connecting the sensors, actuators and power supply" on page 67). Store the 4-Channel Data Logger and power supply unit in the original packaging.

The configuration and most recently determined data are retained. The system time also continues to run thanks to the hardware real-time clock equipped with its own buffer battery. This means that a valid time basis is available immediately following recommissioning (see "Technical details about the system time" on page 81).

4.10.2 Storage with inserted power supply unit

Activate the transport lock, by setting the "Operation mode" in the "Basic settings" configuration section (see "Basic settings" on page 121) to "transport". You may need to initiate a transmission again to ensure the changed configuration is transmitted to the device. Wait until the status LED goes out (see "Three colour status LED" on page 88), i.e. the connection to the server has been terminated. With the "online" connection type, the determined measurement data and changed "Operation mode" are immediately transmitted to the DATAEAGLE-Portal server. Then disconnect the device from the supply or charging voltage. If possible, switch off the supply or charging voltage before disconnecting the cables from the V IN and GND terminals (see "Connecting the sensors, actuators and power supply" on page 67). The remaining cables and antenna can then be removed. Store the 4-Channel Data Logger in its original packaging.

By activating the transport lock, the 4-Channel Data Logger is placed in a very energy-saving mode. However, it may still occur that the inserted power supply unit is fully discharged if the device is stored for very long periods. Although the configuration and the most recently determined data are always retained. The system time also continues to run thanks to the hardware real-time clock equipped with its own buffer battery. This means that a valid time basis is available immediately following recommissioning (see "Technical details about the system time" on page 81). The transport lock is deactivated again by re-initiating Aloha transmission mode (see "Aloha transmission mode" on page 40) and the 4-Channel Data Logger resumes operation according to the configuration.

4.11 Warranty

The device has been functionally tested before delivery. If it is used as intended (see "Intended use" on page 23) and the operating instructions, the applicable documents (see "Applicable documents " on page 83) and the safety notes and instructions contained therein, are observed, no functional restrictions are to be expected and perfect operation should be possible.

Note: *Please also note in this regard the next chapter "Disclaimer" on page 27.*

Note: Limitation of warranty

In the event of non-compliance with the safety instructions and instructions in this document, the manufacturer reserves the right to limit the warranty.

4.12 Disclaimer

The manufacturer assumes no liability

- for damages owing to **a change** of this document. The manufacturer reserves the right to change the contents of this document and this disclaimer at any time and without any notice.
- for damages to persons or objects resulting from **failure to comply** with applicable **regulations**. For connection, commissioning and operation of the devices/sensors all available information and higher local legal regulations (e.g. in Germany VDE regulations) such as applicable Ex regulations as well as safety requirements and regulations in order to avoid accidents shall be adhered to.
- for damages to persons or objects resulting from **improper use**. For safety and warranty reasons, all internal work on the instruments beyond from that involved in normal installation and connection, must be carried out only by qualified Schildknecht personnel or persons or companies authorised by Schildknecht .
- for damages to persons or objects resulting from the use of instruments in technically **imperfect** condition.
- for damages to persons or objects resulting from the use of instruments **not in accordance with the requirements**.
- for damages to persons or objects resulting from **failure to comply** with **safety information** contained within this instruction manual.
- for missing or incorrect measurement values or resulting consequential damages due to **improper installation** or **incorrect parameterisation/programming**.

4.13 Obligation of the operator

WARNING:
In the EEA (European Economic Area), the national implementation of the framework directive (89/391/EEC) as well as the associated specific directives and from these in particular, the directive (2009/104/EC) about the minimum safety and health requirements for use of work equipment by workers at work, each in their respective version are to be complied with.

The operator must obtain the local operating licence and the associated documents.

In addition, the operator must comply with the local legal requirements for

- the safety of the personnel (accident prevention measures),
- the safety of the equipment (protective equipment and maintenance),
- the product disposal (waste disposal law),
- the material disposal (waste disposal law),
- the cleaning (cleaning agents and disposal) and
- the environmental protection amendments.

Before commissioning, the operator must ensure that the installation and commissioning – provided these were performed by the operator himself – are in compliance with the local regulations.

4.14 Personnel requirements

Installation, commissioning and maintenance may only be completed by personnel who meet the following conditions:

- Qualified specialist personnel with the relevant training
- Authorised by the facility operator

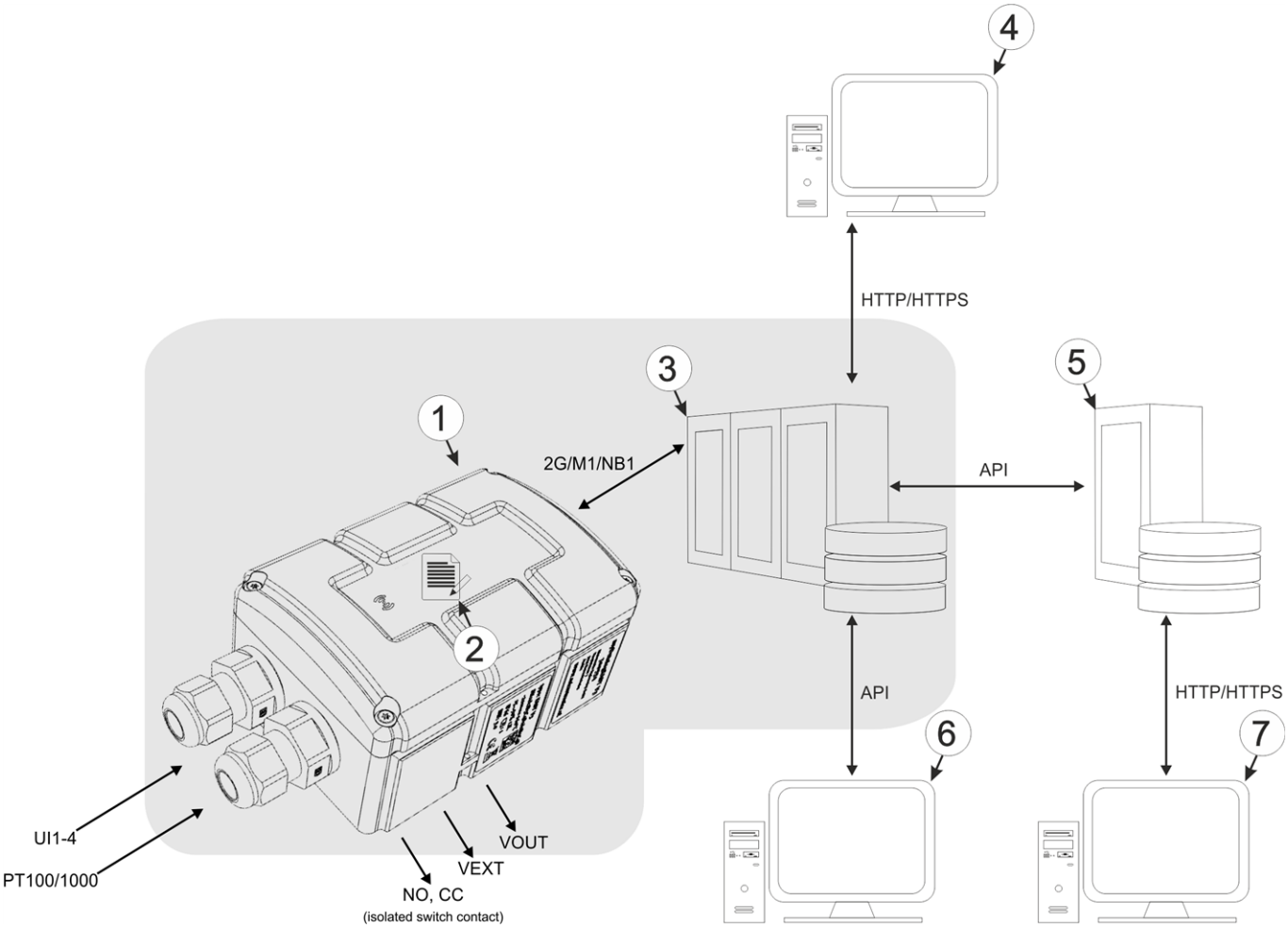
Note: Qualified personnel

In the context of these instructions and the warnings on the product itself, individuals responsible for the setup, installation, commissioning and operation of the product must have gained relevant qualifications relating to their activities, including, for example:

- *Training, instruction and authorisation to activate/deactivate, ground and label electric circuits and devices/systems in accordance with the standards of safety engineering.*
- *Training or instruction on the maintenance and use of suitable safety equipment in accordance with the standards of safety engineering.*
- *First aid training*

Chapter 5 Functional principle

In the graphic below, all of the components that are part of the "Habitat Schildknecht" are illustrated in grey. All of the other components must be provided/created by the customer.



Functional principle

1	DATAEAGLE 7020 V3 with integrated managed service SIM chip (including data transmission)
2	"4-Channel Data Logger IoT application"
3	DATAEAGLE-Portal server to which the data is transferred
4	Client that accesses the interface of the DATAEAGLE-Portal server via the web browser
5	Customer-specific server that provides clients with their own interface. The customer-specific server obtains the data via the API of the DATAEAGLE-Portal server (see "API" on page 163).
6	Client, on which a PC program is running, that obtains its data via the API of the DATAEAGLE-Portal server (see "API" on page 163)
7	Client that accesses the interface of the customer-specific server via the web browser

Functions and components provided by "Habitat Schildknecht" :

- DATAEAGLE 7020 V3 with installed IoT application "4-Channel Data Logger"

  Portable device with integrated memory and standardised industrial interfaces (UI1-4, PT100/1000, isolated switch contact) for connecting sensors and actuators to the DATAEAGLE-Portal server (2G/M1/NB1)

- Managed Service

  Managed Service is the basis for operating the devices and provides a wide range of services. Managed Service includes updates for device firmware, mobile data transmission on a global scale and free support - providing you with one contact person for the entire solution.

- DATAEAGLE-Portal server

  Database for saving the measurement data and configurations. Data is either accessed via the API (see "API" on page 163) or the web interface of the server.

Functions and components provided by the customer

- Sensors and actuators

  Sensors and actuators that include interfaces that are compatible with the specifications listed in the chapter "Specifications" (see "Technical data" on page 13).

- Customer-specific server with web interface for the clients (optional)

  It is therefore possible to create an individual web interface for the clients. Using this method, the data is read out of the DATAEAGLE-Portal server via the API (see "API" on page 163) by the customer-specific server.

5.1 Internal processing of the measurement values

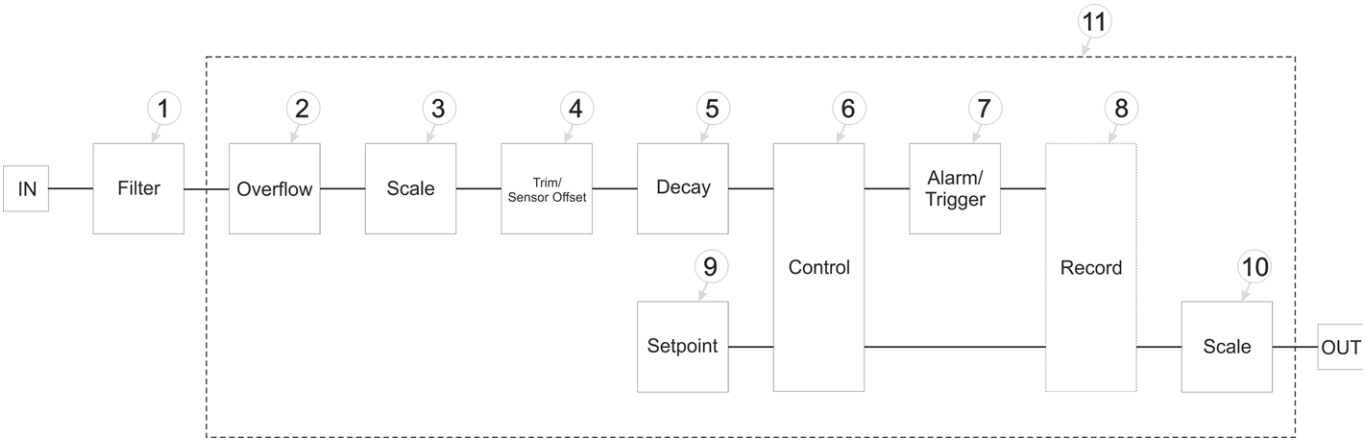


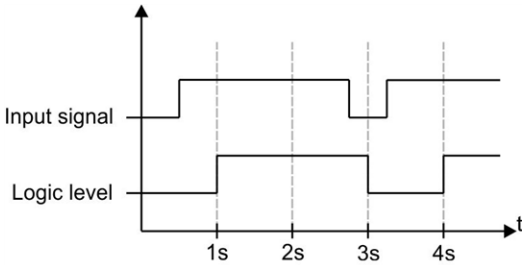
Diagram of the internal processing of the measurement values

1 Filter to compensate for brief signal fluctuations (see "Filter module" on page 32). The filter module is operated permanently.	**7** Monitoring of the alarm limits and trigger levels (see "Alarm/trigger module" on page 36)
2 Monitoring of the measurement range limits (see "Overflow module" on page 33)	**8** As the record interval and measurement cycle can be selected individually, the measurement values and setpoints are not recorded at the time of every measurement (see "Record module" on page 36).
3 Rescaling from the raw value to the measurement value (see "Scale module (inputs)" on page 33)	**9** Specification of the setpoints for the outputs (see "Setpoint module" on page 37)
4 Adds the values entered via the "Trim" and "Sensor offs." configuration parameters to the measurement value (see "Trim/sensor offset module" on page 34).	**10** Rescaling from the setpoint to the physical size for the output (see "Scale module (outputs)" on page 37)
5 Decay module to summarise several measurement values (see "Decay module" on page 34)	**11** This module chain is started at the time of every measurement and is completed once. For universal inputs that are operated in Digital mode, this module chain (with exception of the control module) is also executed at second intervals to be able to react to level changes as quickly as possible.
6 Determination of the setpoints, (see "Control module" on page 35)	

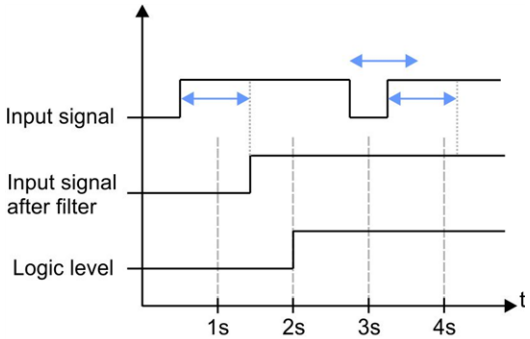
Note: *Additional explanation on universal inputs that are operated in Digital mode.*

Measurement channels -> Basis		*Mode*	*Digital*
Measurement channels ->Config.	⟷	*Filter time*	*800 ms*

Input signal	*Input signal at the universal input*
Input signal after filter	*Input signal taking the "filter time" into consideration*
Logic level	*The input signal at the universal input is analysed once per second.*



Filter module to compensate for brief signal fluctuations disabled ("filter time" = 0)



Filter module to compensate for brief signal fluctuations active ("filter time" not equal to 0)

Explanation: *To react to a level change at the universal inputs as quickly as possible, the module chain detailed in "Internal processing of the measurement values" on page 31 (with exception of the control module) for the relevant universal input is operated once per second in Digital operating mode. This ensures that alarms and triggers are detected asynchronously to the measurement cycle. The signal must be present for at least 1 second to definitely detect a pulse safely. Additionally, any brief faults can be eliminated with the help of the "filter time".*

5.1.1 Filter module

The filter module is designed to compensate for brief fluctuations to the input signal. This module is only available for the 4 universal inputs.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Measurement channels -> Config	Digital	Filter time	Time in [ms] during which the signal must remain constant to initiate a level change. Used to suppress brief faults (debouncing).
	Cnt.Inf.		
	Cnt.Day		
	Cnt.Intrvl.		
	4-20 mA	Filter time	Time in [ms] during which the analogue signal is averaged for signal smoothing. Used to suppress signal noise (also see "Output channels" on page 105).
	0-20 mA		
	0-2 V		
	0-10 V		

5.1.2 Overflow module

This module monitors the measurement range limits of the raw value. If a universal input was, for example, switched to "4-20mA" mode, a raw value of 2mA will violate the measurement range. The overflow module is only available for the 4 universal inputs in "4-20 mA", "0-20 mA", "0-2 V" und "0-10 V"channel modes.

The following table specifies the relevant parameters for the module:

Configuration section	Mode/Interface	Parameter	Explanation
Measurement channels - > Config	Digital	---	---
	Cnt.Inf.		
	Cnt.Day		
	Cnt.Intrvl.		
	4-20 mA	Overflow	Procedure in the event of measurement range violations
	0-20 mA		
	0-2 V		
	0-10 V		

5.1.3 Scale module (inputs)

This module rescales the raw value (e.g. mA) to the required measurement value (e.g. mm). The scale module is only available for the 4 universal inputs.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Measurement channels -> Basis	Digital	Invert	Inverts the input signal
	Cnt.Inf.	Impulse	Counted measurand of a pulse in the "Imp. unit"
	Cnt.Day	Impulse	Counted measurand of a pulse in the measurement unit
	Cnt.Intrvl.		
	4-20 mA 0-20 mA 0-2 V 0-10 V	0 %	Start of the measurement range in the measurement unit
		100 %	End of the measurement range in the measurement unit

5.1.4 Trim/sensor offset module

The installation height of the sensor can be taken into consideration with the help of this module. It also enables the zero point to be adjusted without having to change the value for the installation height again. The trim/sensor offset module is only available for the universal inputs in the analogue modes ("0...20mA", "4...20mA", "0-2V", "0-10V"). The "Trimming" parameter value and the "Sensor offset" parameter value are added to the output value of the scale module (see "Scale module (inputs)" on page 33). This means that a negative prefix must be set for the "Trimming" parameter (see "Additional explanation on the zero point adjustment and installation height of the sensor" on page 96) if the scaled measurement value should be reduced during the zero point adjustment.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Measurement channels -> Basic	Digital	---	---
	Cnt.Inf.		
	Cnt.Day		
	Cnt.Intrvl.		
	0-20mA 4-20mA 0-2V 0-10V	Trimming	is used to adjust the zero point
		Sensor offset	indicates the mounting height of the sensor

5.1.5 Decay module

The decay module is designed to summarise several measurement values. The average value over a required time frame or the minimum value within a required time frame can be determined, for example. The decay module is only available for the 4 universal inputs, with the exception of "Cnt.Inf." and "Cnt.Day" channel modes.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Measurement channels ->Config.	Digital	Decay	Temporal function in the measurement cycle
		Quantity	Number of measurement values taken into consideration during the decay (max. 64). In theses modes, a measurement value is created upon expiry of the measurement cycle and when the input signal level is changed. The changes to the inputs are monitored at one second intervals.
	Cnt.Inf.	---	---
	Cnt.Day		
	Cnt.Intrvl. 0-20 mA 4-20 mA 0-2 V 0-10 V	Decay	Temporal function in the measurement cycle
		Quantity	Number of measurement values taken into consideration during the decay (max. 64).

5.1.6 Control module

The control module determines the setpoints for the outputs.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Output channels	Off	---	---
	Ext. warmup time	Ext. warmup time	Indicates the amount of time that an output channel is switched on in "Ext warmup time" mode before the measurement
	Digital	---	---
	Freq		
	Pulse		
Measurement channels ->Trigger	Digital Cnt.Day Cnt.Intrvl. 4-20 mA 0-20 mA 0-2 V 0-10 V	OS	If this checkbox has been selected, the setpoint at the switchable sensor supply output VOUT is controlled by the trigger function. The setpoint entered via the interface is ignored in that case.
		O3	If this checkbox has been selected, the setpoint at the switchable sensor supply output VEXT is controlled by the trigger function. The setpoint entered via the interface is ignored in that case.
		OD	Output in mode "digital": If this checkbox has been selected, the setpoint at the isolated switch contact (NO, CC) is controlled by the trigger function. The setpoint entered via the interface is ignored in that case. Output in mode "Freq" or "Impulse": If this checkbox has been selected, the output of the frequency or the impulses/min at the isolated switch contact (NO, CC) is only released when trigger is active. When trigger is not active, the output channel is set to "off (contact open)".
	Cnt.Inf.	---	---
Internal channels -> Trigger	---	OS	See explanation for parameter "OS" for "measurement channels -> trigger"
		O3	See explanation for parameter "O3" for "measurement channels -> trigger"
		OD	See explanation for parameter "OD" for "measurement channels -> trigger"

5.1.7 Alarm/trigger module

This module monitors the alarm limits and trigger levels and creates an entry in the alarm list if necessary. The alarm/trigger module is available for inputs (universal inputs and internal channels).

All of the parameters of the "Alarms" and "Trigger" tabs of the "Measurement channels" (see "Measurement channels" on page 93) and "Internal channels" (see "Internal channels" on page 112) configuration sections are relevant to this module.

5.1.8 Record module

The record module records the measurement values. As the record interval and measurement cycle can be selected individually, a record is not saved at the time of every measurement. Depending on the triggers set by the alarm/trigger module, the record interval is modified, the transmission cycle is changed, the transmission is initiated or a new measurement is triggered, if necessary.

The following tables specify the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Measurement channels -> Trigger	Digital Cnt.Day Cnt.Intrvl. 0-20 mA 4-20 mA 0-2 V 0-10 V	RI	Execute recording immediately
		XM	Initiate transmission
		ON	Activate online mode
		RA	The alternative record interval should be used.
		QX	The alternative transmission cycle should be used.
	Cnt.Inf.	---	---
Internal channels -> Trigger	---	RI	Execute recording immediately
		XM	Initiate transmission
		ON	Activate online mode
		RA	The alternative record interval should be used.
		QX	The alternative transmission cycle should be used.

Configuration section	Parameter	Explanation
Basic settings	Record interval	Time between measurement data recordings
	Alternative record interval	Time between measurement data recordings, if an alternative record interval should be used because of a trigger being initiated

5.1.9 Setpoint module

This module uses the setpoints for the outputs entered via the configuration interface of the DATAEAGLE-Portal server.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Output channels -> Basis	Off	---	--
	Ext. warmup time[1)]		
	Digital	Setpoint	Setpoint (on/off) that should be issued
	Freq	Setpoint	The setpoint multiplied by the factor equals the frequency in Hertz. The result of the multiplication must not exceed 1000 Hz.
	Pulse	Setpoint	The setpoint multiplied by the factor equals the pulse/min. The result of the multiplication must not exceed 320 pulses/min.

1) In "Ext. warmup time" mode, the output is actuated by the device itself to activate the sensor supply for the measurement (see "Output channels" on page 105).

5.1.10 Scale module (outputs)

This module rescales the setpoint (e.g. mm) into the desired physical size (e.g. frequency) for the output.

The following table specifies the relevant parameters for the module:

Configuration section	Mode	Parameter	Explanation
Output channels	Off	---	---
	Ext. warmup time[1)]		
	Digital	Invert	Inverts the level issued on the device
		Voltage[2)]	Selection of the output voltage
	Freq[3)]	Factor	The setpoint multiplied by the factor equals the frequency in Hertz. The result of the multiplication must not exceed 1000 Hz.
	Pulse[3)]	Factor	The setpoint multiplied by the factor equals the pulse/min. The result of the multiplication must not exceed 320 pulses/min.

1) In "Ext. warmup time" mode, the output is actuated by the device itself to activate the sensor supply for the measurement (see "Output channels" on page 105).

2) Selection of the output voltage is only possible for the switchable sensor supply VOUT.

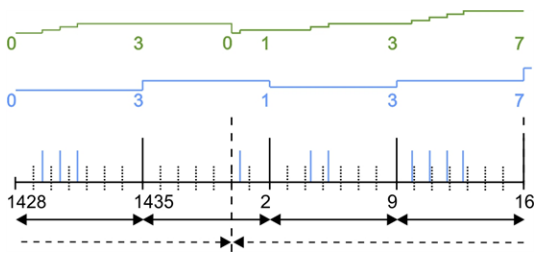
3) These modes are only available for the isolated switch contact (NO, CC).

5.2 Day change

If an input is operated in Cnt.Day mode, all of the pulses up to the day changing time at midnight based on the time zone selected using the "Time zone" parameter are added up. This parameter is located in the "Basic settings" configuration section (see "Basic settings" on page 121). The current counter reading is calculated at the time of every measurement. The counter reading is recorded in the record interval that generates a rising gradient in the measurement value graphics on the DATAEAGLE-Portal server. The highest value of the day equates to the value that was determined during the last record before the day change. At the time of the day change, the temporary memory, in which the counter reading is added up, is set to the difference between the current and last recorded value. This means that if pulses have been detected since the last record before the day change, the measurement value graphic for the new day does not start with 0 but with the calculated counter reading that is dependent on the number of detected pulses. The measurement value graphic for the new day does not start with 0 even if pulses are detected between the day change and first record. The counter reading calculated during the measurement cycle (green line in the following figures) is also required if an unscheduled record should be completed following initiation of a trigger (e.g. by a digital input).

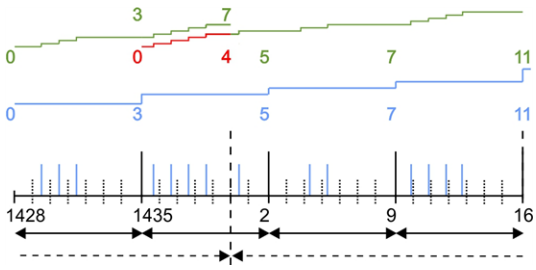
Note: *Additional explanation on the day change*

	◄- - - - - - - - ►	*Day changing time (cannot be changed)*	*Midnight*	*Number of pulses between last record and day change*	*Red line*
"Basic settings" configuration section	◄ · · · · · · · · ►	*Measurement cycle*	*1 min.*	*Calculated counter reading*	*Green line*
	◄——►	*Record interval*	*7 min.*	*Recorded counter reading*	*Blue line*



No new pulses between last record and day change

The counter (green line) is set to 0 when the day changes. A single pulse is detected before the first record. The measurement value graphic (blue line) therefore starts with 1.



New pulses between last record and day change

The counter is set to 4 at the time of the day change so that the pulses detected since the last record are taken into consideration in the first record of the day. Another pulse was also detected before the first record. The measurement value graphic therefore starts with 5.

5.3 Functionality of the internal data memory

Structure	Circular buffer
Total size	34.944 measurement cycles
Number of sectors	8
Sector size	4368 measurement cycles

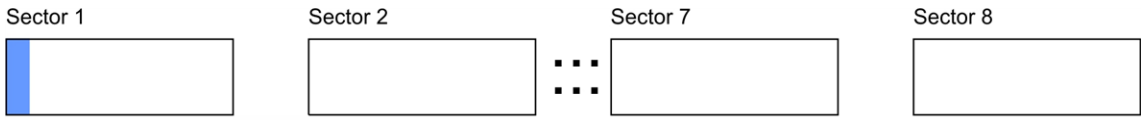
The internal data memory of the 4-Channel Data Logger is designed as a circular buffer with 8 sectors. If the maximum number of data records (34.944) is achieved, the sector with the oldest data is deleted fully before new data can be saved in this sector again. This means that the internal data memory at the very least contains the measurement values of the last 30.576 cycles, however at most the measurement values of the last 34.944 cycles.

For this reason, it is recommended to coordinate the transmission cycle and record interval in such a way that a maximum of 30.576 measurement cycles have to be recorded between two transmissions. Note, that if the measurement cycle is shorter than the record interval, the record interval still has to be used for the calculation. In this case, the reason for this is that although the measurement is completed in the measurement cycle, the determined data is saved in the data memory in the record interval. If it can be expected that individual transmissions fail due to poor network coverage or an alternative record interval is activated via the trigger, this must also be taken into consideration when calculating the measurement cycles that are to be saved.

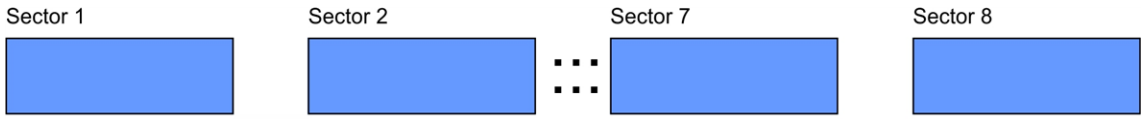
Note:

Additional explanation regarding the functionality of the circular buffer

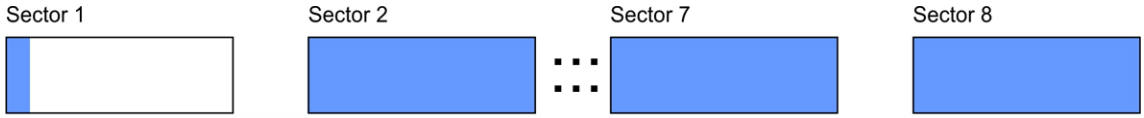
Data memory after the first measurement cycle:



Data memory after 34.944 measurement cycles:



Data memory after 34.944 +1 measurement cycles:



5.4 Procedure in case of connection aborts

If the connection is terminated, another attempt to establish a connection is made after 2 min. for all connections, except for "online" mode. The connection is attempted up to 2 times.

5.4.1 Connection abort in "online" mode

An immediate connection attempt is made if the connection is lost in "online" mode. If it is not possible to establish a connection, a standard retry sequence with 2 further attempts after a2 min. delay follows.

If the connection could still not be established, 10 connection attempts are made, each followed by the standard retry sequence with 2 further attempts after a2 min. delay. After a 60 min. delay, the sequence of 10 connection attempts is repeated until the connection has been established.

5.5 Aloha transmission mode

Aloha transmission mode is a special connection mode whereby the 4-Channel Data Logger establishes a connection to the DATAEAGLE-Portal server for a period of time configured via the "Basic settings" configuration section (see "Online time" in chapter "Basic settings" on page 121). In addition, for the duration of Aloha transmission mode all outputs that are operated in " Ext warmup time" mode are switched on. Thus connected sensors are supplied during Aloha transmission mode and determination of valid sensor readings is ensured.

There are two options for triggering Aloha transmission mode:

- Directly on the device using the solenoid switch (see "Solenoid switch" on page 88). During this process, the geographical position of the device is also determined and the server assignment is checked. However, the position is only determined via mobile network cell location.
- Via the DATAEAGLE-Portal server if the "Interval & wakeup" connection type has been selected (see "Basic settings" on page 121).

A speech bubble in the list of sites (see "User manual for DATAEAGLE-Portal-Server " - upon request) with the title "Aloha" indicates that a device is in Aloha transmission mode.

Clicking on the speech bubble with the "Aloha" title opens the Aloha data window (see "User manual for DATAEAGLE-Portal-Server " - upon request). It contains the internal measurement values, with the exception of "rH", "Load" and "Runtime" and the measurement values of the 4 universal inputs and the external temperature sensor. The measurement values for the last thirty minutes are always shown in the Aloha data window, which means that data from a previous Aloha transmission may be included. The Aloha data is generated every three seconds independently of the normal measurement value and is thus not saved with the standard measurement data.

If a measurement dataset is recorded during Aloha transmission mode, it is immediately transmitted to the DATAEAGLE-Portal server and saved in the standard measurement data.

5.6 Automatic selection of the mobile network

The mobile network to which the device should register must be selected, as the 4-Channel Data Logger is equipped with a SIM chip that provides a mobile connection via a variety of international service providers. This is completed automatically by the device.

5.7 Determining the strength of the mobile network signal

The internal update rate of the strength of the mobile network signal is dependent on the type of connection that can be selected via the relevant parameter in the "Basic settings" configuration section (see "Basic settings" on page 121):

- Interval: Updated during connection establishment
- Interval & Wakeup: Updated every 30 seconds
- Online: Updated every 5 seconds

Note that the value of the mobile network signal strength is only read by the system during the measurement cycle and is added to the measurement data.

5.8 Determining the position data

An internal flag is set each time the position cycle expires thus ensuring that the GSM position data will also be determined the next time a connection is established. The position cycle can be selected via the relevant parameter in the "Basic settings" configuration section (see "Basic settings" on page 121). If set to 0, the GSM position data is generated every time a connection is established.

5.9 Automatic switching between mobile network technologies

The DATAEAGLE 7020 V3 is equipped with a modem supporting the mobile network technologies "LTE-M", "NB-IoT" and "2G". The modem automatically selects the most suitable mobile network technology for the respective situation.

5.10 Using the external SIM slot

> ***Important note:*** *The chargeable "Activation code VPN SIM (- upon request)" feature must be released to be able to use the external SIM slot.*

The following two conditions must be met to activate communication via the external SIM card:

- The SIM card must be inserted in the external SIM slot (see "Inserting/replacing the SIM card" on page 57)
- The APN settings (APN, username and password) and the PIN code (if required by the SIM card) for the inserted SIM card must be transferred to the 4-Channel Data Logger using the DeviceConfig configuration program (see ""GSM" tab" on page 146).

In the current implementation, using an external SIM card will not increase availability. This means that in the event of any communication problems relating to the external SIM card, the firmware will not automatically switch to the internal SIM chip. This cost-oriented approach helps to prevent any resulting charges for using the internal SIM chip as soon as the external SIM card has been activated.

To reactivate the internal SIM chip, it will not suffice to remove the external SIM card from the SIM slot. The APN settings must also be deleted from the 4-Channel Data Logger using the DeviceConfig configuration program.

The following table specifies under which conditions the external SIM card or internal SIM chip is used. The parameters are checked each time the modem is activated."---" indicates a state where it is not possible to establish a connection.

External SIM slot released	External SIM card inserted	Correct APN setting saved in the device	SIM used
0	0	0	internal
0	0	1	---
0	1	0	---
0	1	1	---
1	0	0	internal
1	0	1	---
1	1	0	---
1	1	1	external

5.11 Determining the State of Charge (SoC)

An approximation method is used to determine the current state of charge (SoC). The SoC is determined based on a nominal value for the maximum usable capacity, taking into account the current energy consumption. However, the actual available capacity and performance are influenced by the ambient temperature, self-discharge, the thickness of the passivation layer and the discharge profile (current curve over time). These influences can only be taken into account to a limited extent. As a result, the battery or rechargeable battery may be depleted before the displayed SoC reaches 0. The same applies to the remaining device service life, as this is calculated based on the current SoC. However, experience shows that despite the influences of temperature, self-discharge, passivation and discharge profile, which are difficult to take into account, the approximation method provides reliable SoC values in over 95% of cases, so that the remaining device service life can also generally be considered reliable.

5.12 Factors affecting the device service life

The factors listed below affect the energy consumption of the device and thus directly affect its service life. They also determine the discharge profile. As described in chapter "Determining the State of Charge (SoC) " on page 42, the actual available capacity of the battery or rechargeable battery is influenced by factors such as the discharge profile, which means that these factors also indirectly affect the service life of the device.

- Mobile network signal strength
- Transmission technology used
- Transmission and measurement cycle
- Connection type
- Aloha transmission mode
- Frequency of warnings, alarms and triggers
- Energy consumption of the sensors connected to the data logger
- Duration of initial setup

The following subchapters explain the causes of increased energy consumption and describe possible countermeasures and recommendations for counteraction.

5.12.1 Weak mobile network signal

In areas with weak mobile network signal

- the modem automatically increases the transmission power.
- establishing the connection takes longer, as for example the network search takes longer.
- the connection time increases as the transmission rate may need to be decreased.
- connection aborts may occur, which lead to retries (see "Procedure in case of connection aborts" on page 39).

The following measures can be taken to reduce the resulting increase in energy consumption:

- Optimise the antenna position, for example by using antenna extensions.
- Use of antennas with higher gain or suitable directional characteristics.

5.12.2 Transmission technology

The mobile communications technologies currently in use differ in terms of their energy requirements. As a rule, newer mobile communications technologies require less energy than their predecessors. Based on the implementation chosen by Schildknecht and considering experience values, the following order with decreasing energy requirements applies: 2G, 3G, 4G, NB-IoT, LTE-M. This may differ from the order listed in other documents.

The 4-Channel Data Logger is equipped with a modem that supports multiple mobile network technologies. The modem automatically selects the most suitable mobile communications technology for the respective situation; this cannot be influenced by the user.

5.12.3 Transmission and measurement cycle

Establishing a connection and transferring data are among the most energy-consuming processes. Measurements are also considerably energy-intensive. Unless a separate measurement interval has been configured, measurements are carried out at the record interval. To reduce energy consumption, both the transfer and record intervals should be set as long as possible.

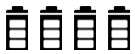
If it is only necessary to carry out measurements more frequently and/or transfer data to the server at shorter intervals under certain circumstances, it is advisable to use triggers instead of generally using a shorter record and/or transmission interval. Triggers can be used to switch to the "alternative record interval" and/or the "alternative transmission interval" based on the current value of a measurement channel. This optimises energy consumption, as the shorter intervals are only activated when necessary.

5.12.4 Connection type

The connection type chosen has a considerable influence on the energy consumption and therefore on the service life of the device. "Interval" mode has the lowest energy consumption. In "Interval & wakeup" mode, consumption increases by a factor of approximately 20. "Online" mode, in turn, increases energy consumption by a factor of approximately 10 compared to "Interval & Wakeup" mode. The varying energy requirements are due to the operating mode of the mobile communications modem. In "Interval" mode, the modem is switched off between transmissions. Transmission can only be initiated by the device. In "Interval & wakeup" mode, the modem is registered in the mobile network but does not maintain an active connection to the server. However, transmission can also be requested by the server. In "online" mode, there is an active

connection to the server. New data records or configuration changes via the server interface are transferred immediately. This means that the connection type also has a direct influence on the response time. The required data volume is also determined by the connection type.

Note: *Additional explanation about the connection types*

Connection type	*Energy consumption*	*Data volumes*	*Response time*
online			
Interval & wakeup			
Interval			

In order to select the appropriate connection type, the requirements for "response time", "data volume" and "energy consumption" should be considered carefully. To use the energy-saving "interval" mode and still achieve a short response time, "warnings", "alarms" or "triggers" can be used. Threshold values can be defined for individual measurement channels, which, when exceeded or not reached, trigger an immediate transmission or switch the connection type to "online" mode.

5.12.5 Aloha transmission mode

In "Aloha" transmission mode, an active connection to the server is maintained for a configurable period of time. For the duration of "Aloha" mode, all outputs that are operated in "Ext. warm-up time" mode are also switched on. This supplies the connected sensors and ensures that valid sensor measurements are determined. Regardless of the measurement and recording interval, measurements are generated every 3 seconds and transmitted to the server. This results in an increased energy consumption. The "Aloha" mode should therefore only be activated when necessary (e.g. for setting up the sensors during commissioning). To optimise energy consumption, it is recommended to end the "Aloha" mode prematurely by clicking on the cross in the speech bubble labelled "Aloha" as soon as all necessary data has been transmitted.

5.12.6 Warnings, alarms and triggers

Threshold values can be stored for measurement channels, which trigger a warning or alarm if they fall below or exceed these values. When a warning or alarm occurs or is withdrawn, an immediate transmission follows. Since transmissions are among the most energy-intensive operations, the threshold values for warnings and alarms should be chosen with care.

For measurement channels, threshold values can also be stored for triggers. Unlike warnings and alarms, triggers allow you to specify which actions are triggered when the threshold is exceeded. Some actions (e.g. "Activate online mode" or "Trigger transmission") significantly increase energy consumption. Therefore, the threshold values for the triggers and the actions to be triggered should be chosen with care. This applies in particular to the two actions "Use alternative transmission interval" and 2Use alternative record interval", which can be used to shorten the corresponding interval as long as the trigger is active. They can therefore be used to influence the intervals for the most energy-intensive processes (transmission and measurement/recording). In order to minimise energy consumption even when the trigger is active, the alternative intervals should therefore be set as long as possible.

5.12.7 Energy consumption of the sensors

Sensors can be connected directly to the 4-Channel Data Logger without an additional power source. In this case, the available power is shared between the 4-Channel Data Logger and the sensors. To save energy, the sensor supply is not permanently active, but is only switched on for a certain period of time before each measurement. This period is configurable and serves as a waiting time until the sensor delivers a stable measurement value. To keep additional energy consumption as low as possible, it is recommended to use sensors with the following characteristics:

- Own power supply
- Short warmup time (i.e. short time difference between switching on and the first stable measurement value)
- Rapid measurement
- Low energy consumption during initialisation and measurement

5.12.8 Commissioning

During commissioning, several connections are usually triggered, the measurement or recording interval is shortened, or Aloha mode (see "Aloha transmission mode" on page 40) is activated several times. If the device has been in storage for a long time, a software update may also be necessary. All these operations are highly energy-intensive and should therefore be carried out with care. Aloha mode can be terminated prematurely, for example, by clicking on the cross in the speech bubble labelled "Aloha" if all the necessary data has already been transmitted. The device can be briefly put into operation in the office to check whether a software update is necessary. Since the mobile network in the office usually has better signal quality and stability than at the installation site, software updates are usually loaded faster and without interruptions or retries. For the same reason, it is also recommended to create the site in the office and define the basic configuration. When commissioning in the office, the device can also be powered externally, which conserves the internal energy source.

Chapter 6 Storage, delivery and transport

6.1 Inspection of incoming deliveries

Check the shipment immediately upon receipt to ensure it is complete and intact. Immediately report any discovered transport damages to the delivering carrier. Also notify Schildknecht AGin writing about this without delay. Report any incompleteness of the delivery to the responsible representative or directly to the company headquarters of the manufacturer within two weeks (see "Contact information" on page 195).

> ***Note:*** *Any claims received thereafter will not be accepted.*

6.2 Scope of delivery

> ***Note:*** *The power supply unit required for operation and the antenna are not part of the standard scope of delivery and must be ordered separately.*

The standard scope of delivery of the DATAEAGLE 7020 V3 (17020 V3) includes:

- DATAEAGLE 7020 V3 Base unit with preinstalled IoT application "4-Channel Data Logger"
- 2 x cable screw connections (cable diameter of 5-10 mm)
- 2 x blind plugs
- 2 x 2-pin connector plugs
- 2 x 3-pin connector plugs
- 1 x 6-pin connector plug
- Housing cover
- 4 x Delta PT M3.5x25 Torx 15
- myDatanet Tool Pen (- upon request)
- MDN Magnet (upon request)

Additional accessories such as assembly sets, antennas, power supply units, charger, etc., depending on the order. Please check these against the delivery slip.

6.3 Storage

The following storage conditions must be observed:

4-Channel Data Logger	Storage temperature	-30...+85 °C
	Humidity	15...90 % RH
PSU713 BP (- upon request)	Operating temperature	-20...+50 °C
	Storage temperature	+20...+25 °C
DATAEAGLE 702x Akkupack V3 (17109 V3)	Operating temperature	-20...+60 °C
	Charging temperature	-20...+60 °C
	Storage temperature	0... +30 °C
PSU413D AP (- upon request)	Operating temperature	-20...+60 °C
	Charging temperature	0...+40 °C
	Storage temperature	0...+35 °C
PSU DC (- upon request)	Operating temperature	-20...+60 °C
	Storage temperature	0... +35 °C

Note: *The table above only contains the storage conditions for the energy sources used most frequently for the 4-Channel Data Logger . Please consult the appropriate factsheet for information about the storage conditions of other power supply units.*

Note: *If a Li-Ion rechargeable battery is to be stored for a longer period, it is recommended to ensure that the charge level is 40 % to 60 % of the maximum charge.*

Important note: *Remove the power supply unit from the 4-Channel Data Logger prior to storage.*

Store the measurement technology so that it is protected against corrosive or organic solvent vapours, radioactive emissions as well as strong electromagnetic radiation.

6.4 Transport

Protect the 4-Channel Data Logger against heavy shocks, bumps, impacts or vibrations. The original packaging must always be used for transport.

6.4.1 Transporting power supply units

WARNING:
With the exception of the PSU DC (- upon request), the power supply units required to operate the 4-Channel Data Logger are classified as hazardous goods due to the installed rechargeable batteries or battery packs for which the following conditions must be observed during transport.

The guidelines that must be observed when transporting hazardous goods are dependent on the selected transport route and are designed as follows:

- Transport by road: ADR Directive
- Transport by air: IATA guideline
- Transport by rail: RID guideline
- Transport by ship: IMDG guideline

The following parties must observe these guidelines:

- Shipping and packaging company
- Haulage contractors
- Air carriers and ground handling service providers (only if the IATA guideline is applied)
- Security personnel (particularly if the IATA guideline is applied)

When it comes to transporting hazardous goods, the most important tasks of the shipping and packaging company are:

- Classification / identification
- Packaging
- Marking and labelling (e.g. transport stickers)
- Documentation (e.g. ADR transport documents or Dangerous Goods Declaration)

The energy stores of the power supply unit are lithium batteries. The following points must therefore be observed in conjunction with transporting lithium batteries:

- Type of lithium battery
  - Lithium ion battery
  - Lithium metal battery
- Battery energy content
  - If the energy content is within the "exempt" level, this will make the transportation process easier.
  - If the energy content is above the "exempt" level, the battery is classed as a "complete" hazardous material in accordance with the relevant guideline.
- Scope of the delivered package
  - Battery packed individually
  - Battery packed with or in the equipment

Other matters that must be taken into consideration during transport preparation and processing:

- Net weight per package
- Involved air carrier (only if the IATA guideline is applied)
- Destination country (only if the IATA guideline is applied)

> ***Important note:*** *All of these points must be observed when compiling each delivery (including the interdependencies).*

The "shipping and packaging company" can refer to the information provided in the following table to classify the power supply units and subsequently determine which transport guideline to apply.

Title of the PSU	Order number	Type of lithium battery	Energy [Wh]	Lithium content [g]	UN number
DATAEAGLE 702x Akkupack V3	17109 V3	Lithium ions	50,32 Wh		UN3480
PSU413D AP	- upon request	Lithium ions	48,84 Wh		UN3480
PSU713 BP	- upon request	Lithium metal		6,6 g	UN3090
PSU DC+	- upon request	Lithium ions	3,33 Wh		UN3480

6.5 Return

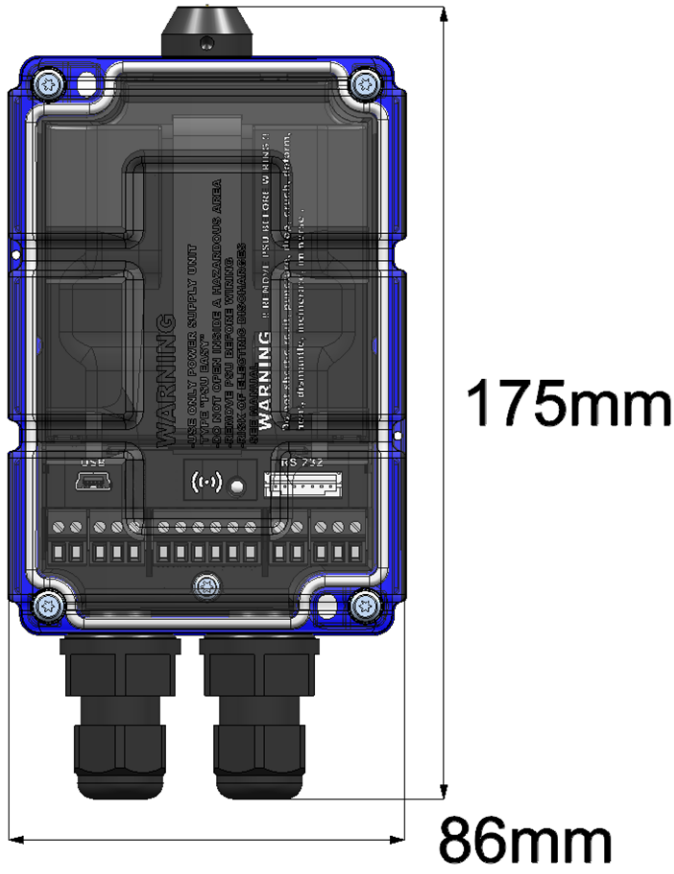
Every return must be accompanied by a fully field-out return form. This return form is available in the service area of the DATAEAGLE-Portal server. An RMA number is mandatory for any returns and can be obtained from the Support & Service Centre (see "Contact information" on page 195). The return shipment of the 4-Channel Data Logger must occur in the original packaging and with freight and insurance paid to Schildknecht AG (see "Contact information" on page 195). Insufficiently cleared return shipments will otherwise not be accepted!

> ***Note:*** *Ensure that the 4-Channel Data Logger is packed carefully and securely. Damage incurred during transport is not covered by the warranty and may be subject to a charge.*

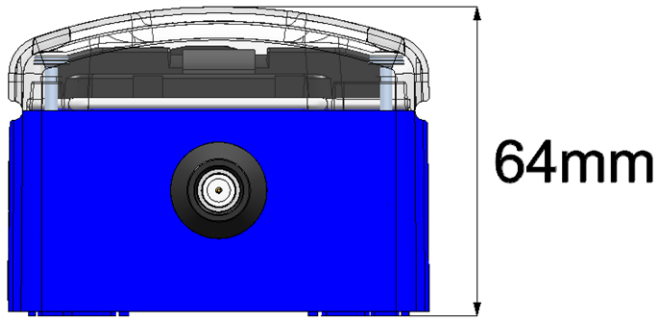
Chapter 7 Installation

Important note: *To prevent any damage to the device, the work described in this section of the instructions must only be performed by qualified personnel.*

7.1 Dimensions



Dimensions: width and height
(view of a device after assembly)



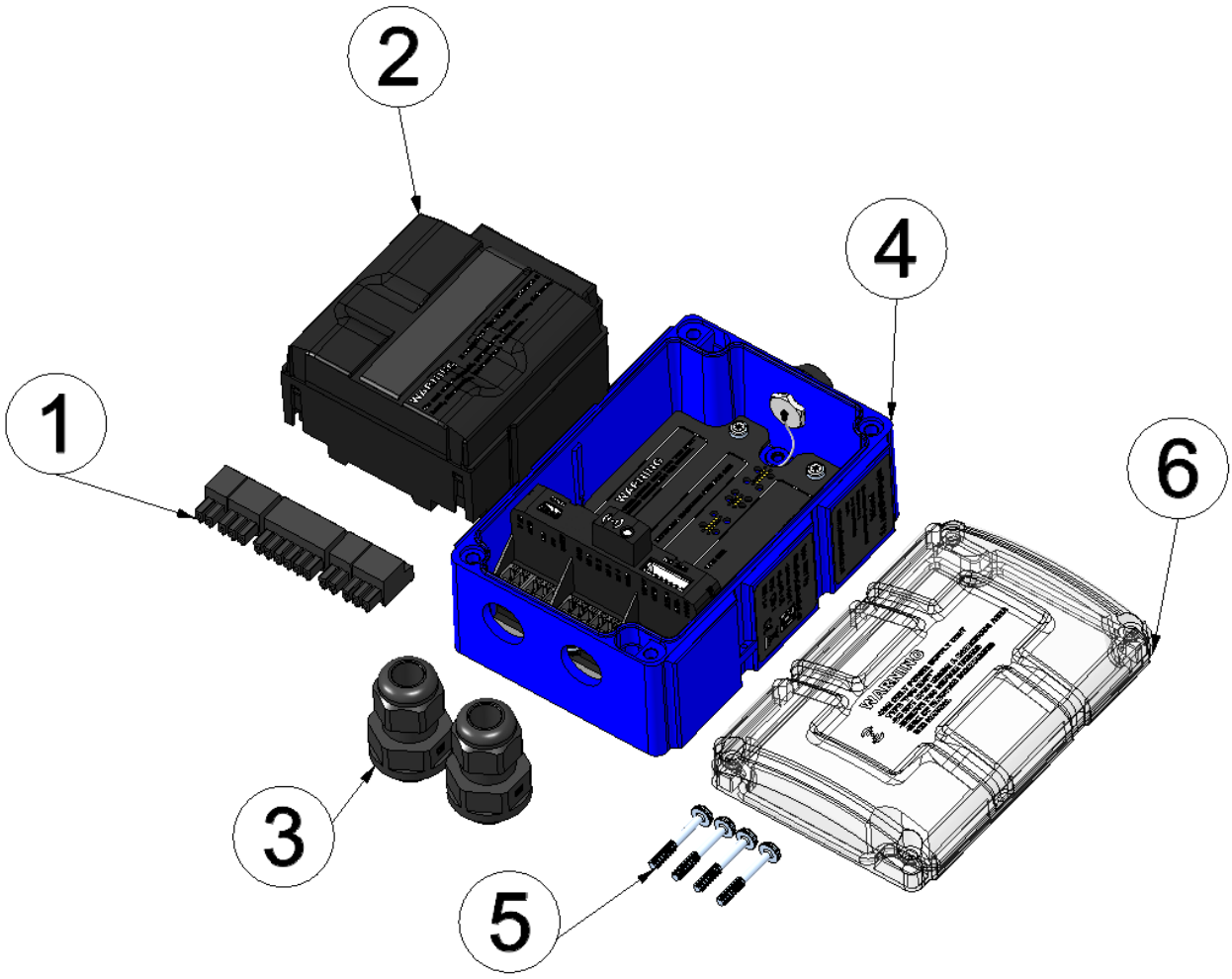
Dimensions: depth
(view of a device after assembly)

7.2 Assembling the 4-Channel Data Logger

Important note:

- *All wiring work must be performed in the de-energised state.*
- *Ensure installation is completed correctly.*
- *Improper handling can cause injuries and/or damage to the instruments.*
- *The 4-Channel Data Logger must not be operated in the field with the lid open.*
- *To ensure the housing is properly sealed, each of the cable screw connections must only hold a single cable.*

The 4-Channel Data Logger is split into several components when delivered and must therefore be assembled before use.



Components of the 4-Channel Data Logger

1	Connector plug (2x 2-pin, 2x 3-pin, 1x 6-pin)	**4**	4-Channel Data Logger base unit
2	Power supply unit (not included in scope of delivery)	**5**	4x Delta PT M3,5x25 Torx 15
3	2x cable screw connections (cable diameter of 5-10 mm)	**6**	Housing cover

1. Check that the content of the pack is complete.

The following step is only necessary if you want to use a customer-specific SIM card.

2. Insert the SIM card in the SIM slot as described in chapter "Inserting/replacing the SIM card" on page 57. Obviously, the first steps to open the housing and remove the power supply unit are not necessary.

   Note: *The chargeable feature "Activation code VPN SIM (- upon request)" must be released to be able to use the SIM slot.*

3. Turn the locking nut of the cable screw connection clockwise (left-hand thread) to the stop to increase the distance between the locking nut and engagement hook and thus make it easier to insert the cable screw connection into the hole in the 4-Channel Data Logger base unit. The engagement hook is not symmetrical. One of the lugs on the engagement hook is longer.

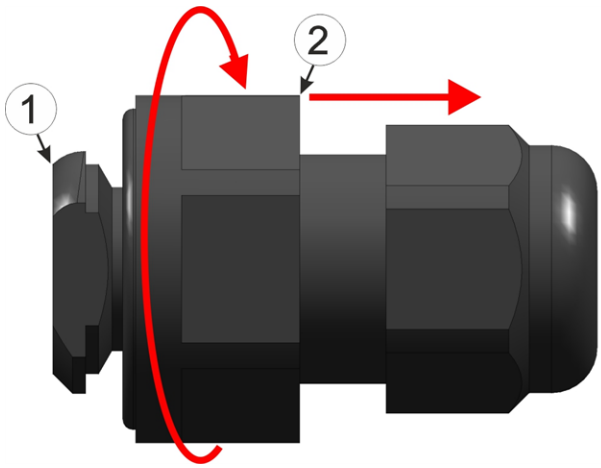


Fig. 1 - preparing the cable screw connection

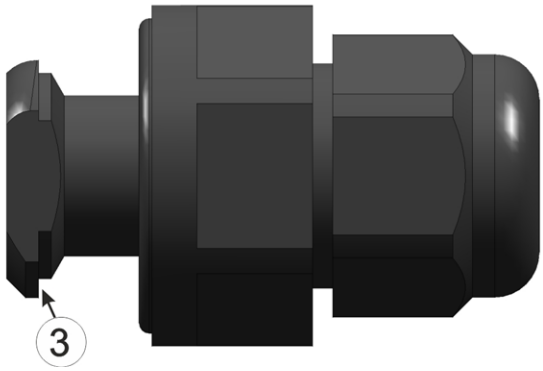
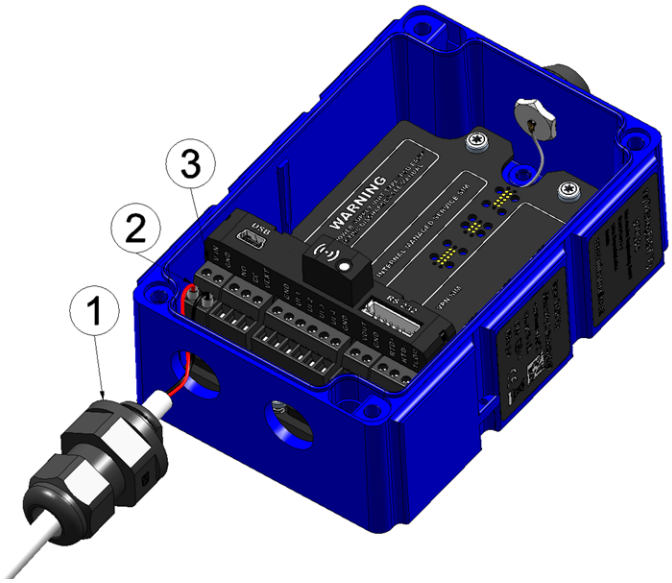


Fig. 2 - preparing the cable screw connection

1 Engagement hook	**3** Longer lug on the engagement hook
2 Locking nut	

4. First of all thread the connection cables of your sensors, actuators and, if necessary, the supply or charging voltage through one of the cable screw connections in accordance with the following figure, and then through one of the holes in the 4-Channel Data Logger base unit. Then connect the cables to the connector plugs as described in chapter "Connecting the sensors, actuators and power supply" on page 67. Depending on how flexible the cables are, it may be advantageous to connect them to the connector plugs before the connector plugs are inserted in to the 4-Channel Data Logger base unit.

   Important note: *Only a single cable must be threaded through the cable screw connections to ensure the seal of the housing is not jeopardised.*



Threading the connection cables in

1 Cable screw connection (cable diameter of 5-10 mm)	**3** Connector plug (2x 2-pin, 2x 3-pin, 1x 6-pin)
2 Connection cable of a sensor, actuator or the supply or charging voltage	

5. In accordance with the following figures, thread the engagement hook with the side that has the longer lug first (see "Fig. 2 - preparing the cable screw connection" on page 53) through the hole in the 4-Channel Data Logger base unit. The cables that have already been threaded in are not illustrated in this figure in the interests of clarity.

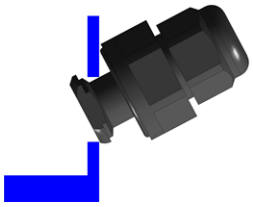


Fig. 1 - threading in the cable screw connection

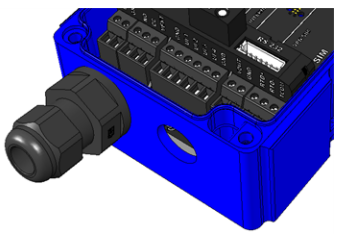


Fig. 2 - threading in the cable screw connection

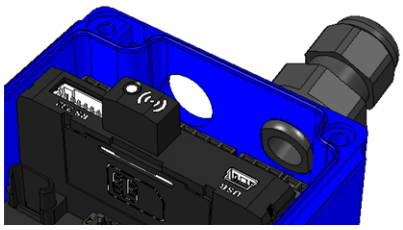


Fig. 3 - threading in the cable screw connection

6. Tighten the locking nut by turning it counterclockwise (left-hand thread).

   Important note: *Ensure that the seal is clean and intact before tightening. Remove any impurities and/or dirt. The manufacturer shall not be liable for any damage to the device caused by leaky or faulty seals.*

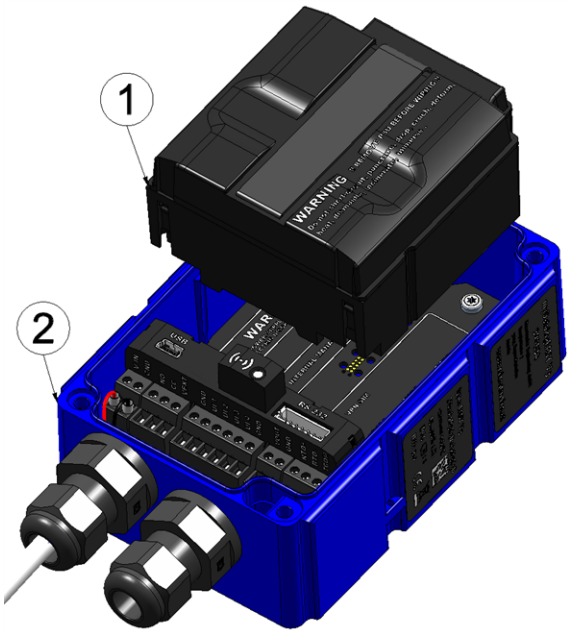
7. Check that the seal for the cable screw connection is positioned correctly on all sides and that no foreign materials have been trapped between the housing, seal and locking nut.

   Important note: *The manufacturer is not liable for any damage that is caused by seals that are not positioned correctly.*

8. Connect the antenna (see "Connecting the mobile network antenna" on page 72). The antenna is not included in the scope of delivery and must be ordered separately.

9. Insert the power supply unit. The power supply unit is designed in such a way that it cannot be inserted incorrectly.

   Note: *Note that all power supply units with an integrated and rechargeable energy store are delivered with a maximum charge of 30% in accordance with applicable transport regulations and must therefore be fully charged before being used for the first time (see "Charging the power supply unit" on page 167).*



Inserting the power supply unit

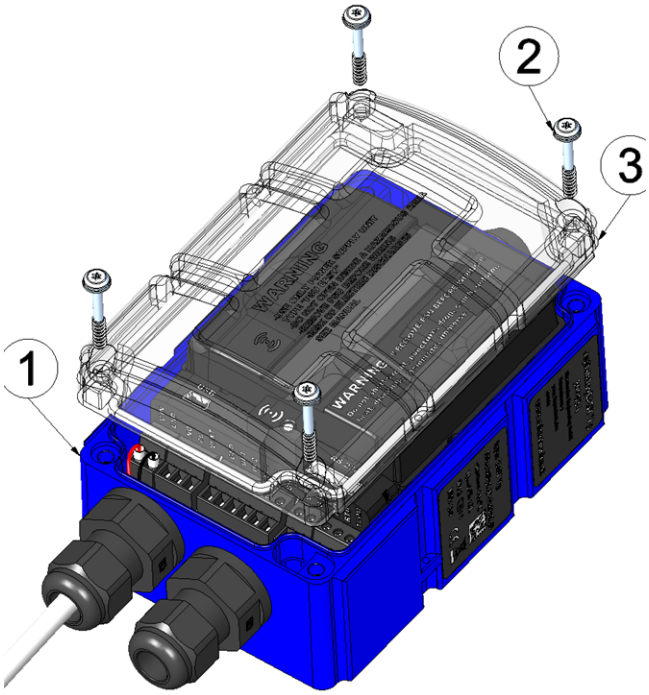
1 Power supply unit	**2** 4-Channel Data Logger base unit

The following step is not mandatory.

10. Check whether the connection to the DATAEAGLE-Portal server has worked correctly (see "Testing communication with the device" on page 85).

11. Close the housing cover. The best option is to tighten the four screws crosswise (torque 0,5 Nm; At the first screw 0,7 Nm because the threads have to be shaped into the base part first.) so that the housing cover is positioned evenly.

    Important note: *Ensure that the seals are clean and intact before closing the housing cover. Remove any impurities and/or dirt. The manufacturer shall not be liable for any damage to the device caused by leaky or faulty seals.*

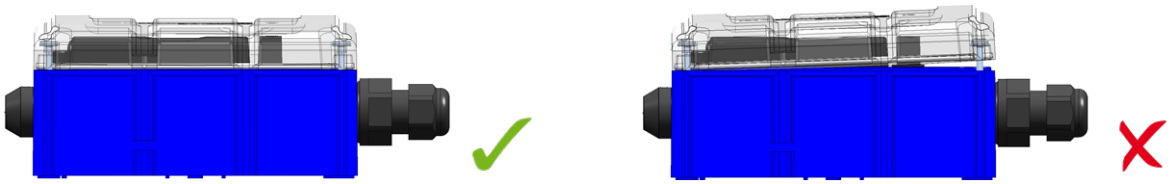


Closing the housing cover

1 4-Channel Data Logger base unit	**3** Housing cover
2 Delta PT M3,5x25 Torx 15	

12. Check that the housing cover is positioned correctly on all sides and that no foreign materials have been trapped between the housing and housing cover.

    Important note: *The manufacturer is not liable for any damage that is caused by housing covers that are not closed correctly.*



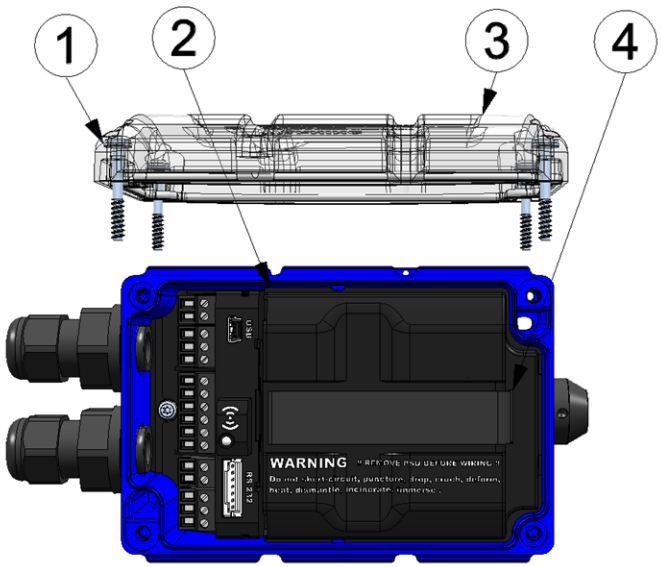
The following step is only necessary if you are using an external supply or charging voltage.

13. Now switch on the external supply or charging voltage.

    Note: *If you are using a power supply unit without an integrated energy store, the external supply or charging voltage must be switched on before the optional step during which the connection to the server is tested.*

7.3 Inserting/replacing the SIM card

Note: *The chargeable feature "Activation code VPN SIM (- upon request)" must be released to be able to use the SIM slot.*



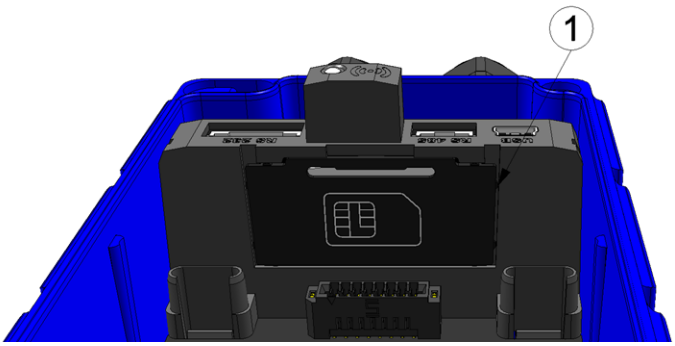
Opening the 4-Channel Data Logger

1	Delta PT M3,5x25 Torx 15Hexagon socket screw M6x30	**3**	Housing cover
2	Power supply unit	**4**	Strap to remove the power supply unit

1. Remove the four screws that secure the housing cover. Now open the 4-Channel Data Logger .

   Important note: *In the event of adverse weather conditions including rain or in a location where water can penetrate from above, suitable measures must be implemented to protect the device from penetrating moisture when the housing cover is open.*

2. Remove the power supply unit from the 4-Channel Data Logger . Use the strap provided to remove the power supply unit.
3. Remove the SIM slot cover.



Opening the SIM slot cover

1	SIM slot cover		

4. Insert the SIM as illustrated in Figure B on the circuit board of the 4-Channel Data Logger .

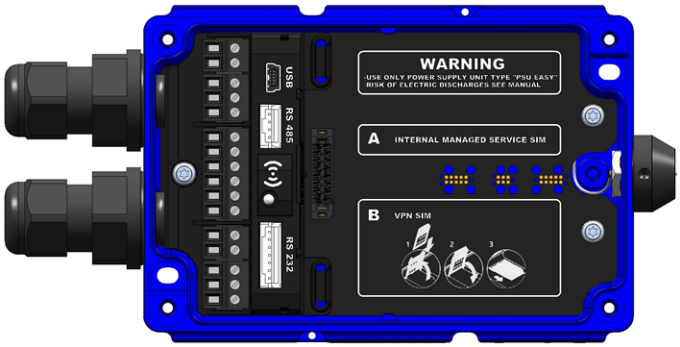


Figure on the circuit board of the 4-Channel Data Logger

The following step is only necessary if you want to test the connection to the DATAEAGLE-Portal server afterwards.

5. Connect the antenna (see "Connecting the mobile network antenna" on page 72). The antenna is not included in the scope of delivery and must be ordered separately.
6. Reinsert the cover of the SIM slot and the power supply unit.

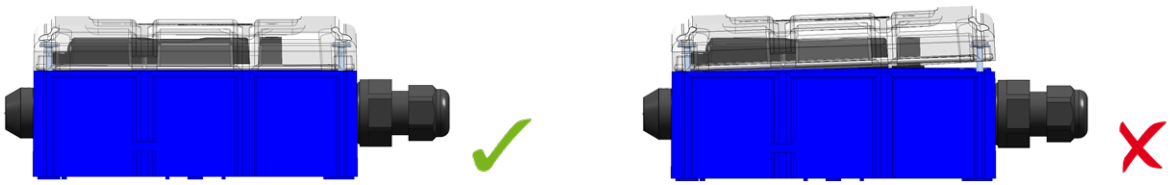
The following step is not mandatory.

7. Check whether the connection to the DATAEAGLE-Portal server has worked correctly (see "Testing communication with the device" on page 85).
8. Close the housing cover. The best option is to tighten the four screws crosswise (torque: 0,5 Nm; At the first screw 0,7 Nm because the threads have to be shaped into the base part first.) so that the housing cover is positioned evenly.

   Important note: *Ensure that the seals are clean and intact before closing the housing cover. Remove any impurities and/or dirt. The manufacturer shall not be liable for any damage to the device caused by leaky or faulty seals.*

9. Check that the housing cover is positioned correctly on all sides and that no foreign materials have been trapped between the housing and housing cover.

   Important note: *The manufacturer is not liable for any damage that is caused by housing covers that are not closed correctly.*



7.4 Installing the 4-Channel Data Logger

Important note:

- *Ensure installation is completed correctly.*
- *Comply with existing legal and/or operational directives.*
- *Improper handling can cause injuries and/or damage to the devices.*
- *The 4-Channel Data Logger must not be operated in the field with the lid open.*
- *The pressure compensation must be protected against contamination.*
- *The 4-Channel Data Logger is not approved for use in sewers.*
- *The 4-Channel Data Logger is not suitable for outdoor use.*

Note: *It is recommended that all metal mounting fixtures be properly earthed.*

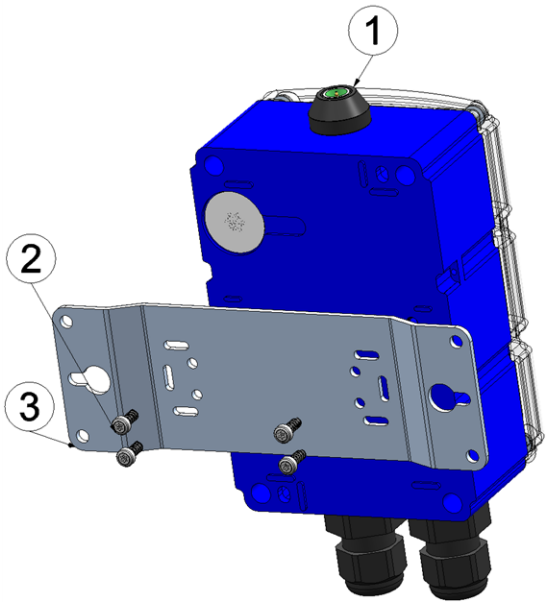
The installation site must be selected according to specific criteria. The following conditions must be avoided in any case:

- Direct sunlight
- Direct weather exposure (rain, snow, etc.)
- Objects that radiate intense heat (maximum ambient temperature: -20...+60 °C)
- Objects with a strong electromagnetic field (frequency converter or similar)
- Corrosive chemicals or gases
- Mechanical impacts
- Direct installation on paths or roads
- Vibrations
- Radioactive emissions

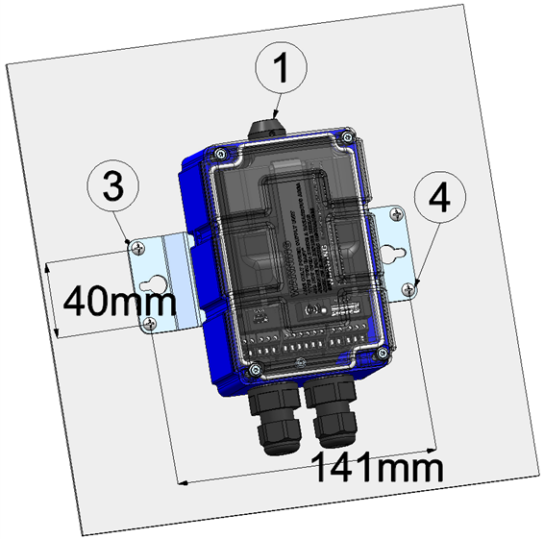
Note: *Leave sufficient space at the upper end to install the antenna. The space required depends on the antenna used. Approx. 15 cm of space must be left beneath the device for the cable connections. Further information regarding the installation dimensions can be found in the relevant sub-chapter.*

7.4.1 Wall mounting

For wall mounting the optional "DATAEAGLE 702x/703x Universal bracket (17105)" equipment is required.



Step 1 of the wall mounting



Step 2 of the wall mounting

1 4-Channel Data Logger	**3** Assembly loop (included in the delivery scope of 17105)
2 Delta PT M3,5x8 Torx 15 (included in the delivery scope of 17105)	**4** Raised head tapping screw 3,5x32 (included in the delivery scope of 17105)

1. First attach the assembly loop (3) using the screws (2) included in the "DATAEAGLE 702x/703x Universal bracket (17105)" equipment set to the 4-Channel Data Logger (see "Step 1 of the wall mounting" on page 60).
2. Drilling the holes for mounting:

   If you want to use the tapping screws (4) included in the equipment set to secure the assembly loop (3) to the wall, drill four 6-mm holes in the wall using the drill template as a guide in accordance with the dimensions in the diagram "Step 2 of the wall mounting" on page 60.

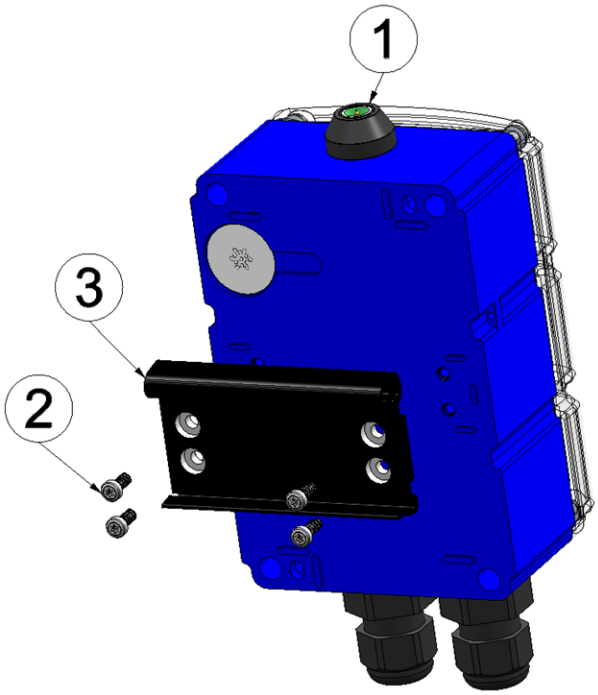
   If you want to use your own fastening screws you can use the drill guide provided in the equipment set to determine the position of the holes. The diameters are then determined by the screws that are being used and any wall plugs that may be required.
3. Securing the 4-Channel Data Logger to the wall:

   If you want to use the tapping screws (4) included in the equipment set, first of all insert the supplied wall plugs into each of the four drill holes before screwing the 4-Channel Data Logger with the attached assembly loop (3) to the wall (see "Step 2 of the wall mounting" on page 60).

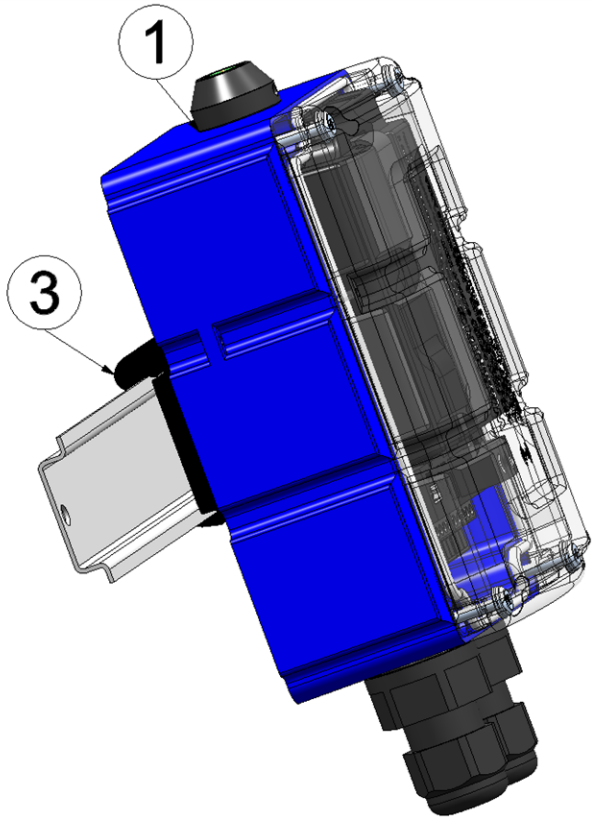
   If you are using your own screws, you must also insert the wall plugs into the holes before mounting the 4-Channel Data Logger with the attached assembly loop (3) to the wall (see "Step 2 of the wall mounting" on page 60).

7.4.2 Top-hat rail assembly

The optional "DATAEAGLE 702x/703x DIN rail mounting kit (17102)" equipment is required for the top-hat rail assembly.



Step 1 of the top-hat rail assembly



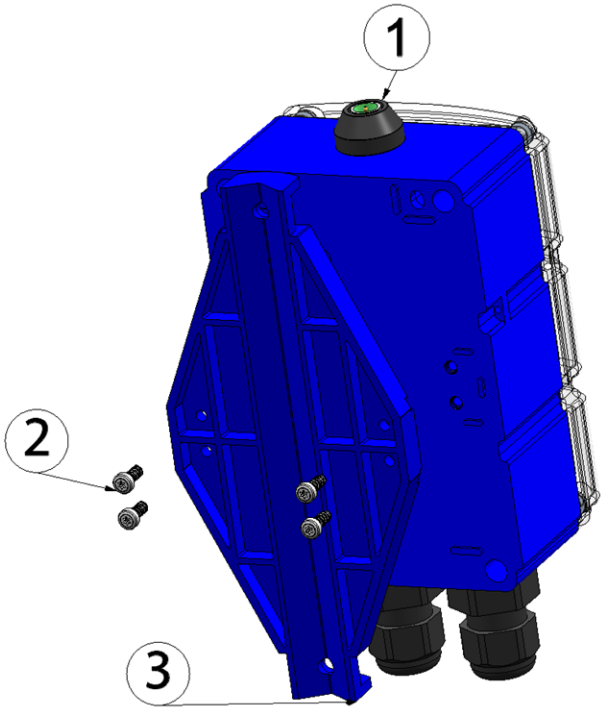
Step 2 of the top-hat rail assembly

1 4-Channel Data Logger	**3** Assembly loop (included in the scope of delivery of 17102)
2 Delta PT M3.5x8 Torx 15 (included in the scope of delivery of 17102)	

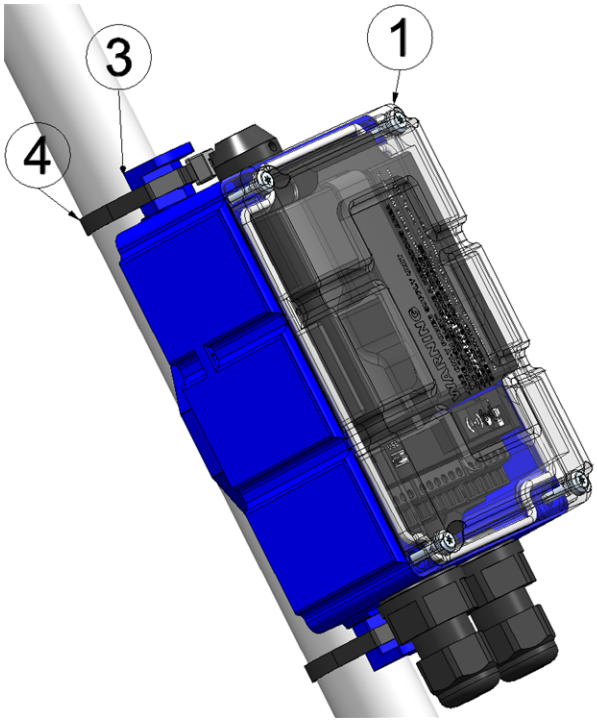
1. First attach the assembly loop (3) using the screws (2) included in the "DATAEAGLE 702x/703x DIN rail mounting kit (17102)" equipment set to the 4-Channel Data Logger (see "Step 1 of the top-hat rail assembly " on page 61).
2. Place the assembly loop (3) onto the top edge of the top-hat rail. When turned slightly around the horizontal axis of the 4-Channel Data Logger with the assembly loop (3) attached, the assembly loop (3) engages on the top-hat rail (see "Step 2 of the top-hat rail assembly" on page 61).

7.4.3 Pipe assembly

The optional "DATAEAGLE 702x/703x Pipe mounting kit (17106)" equipment is required for the pipe assembly.



Step 1 of the pipe assembly



Step 2 of the pipe assembly

1 4-Channel Data Logger	**3** Assembly loop (included in the scope of delivery of 17106)
2 Delta PT M3.5x8 Torx 15 (included in the scope of delivery of 17106)	**4** Cable binder (included in the scope of delivery of 17106)

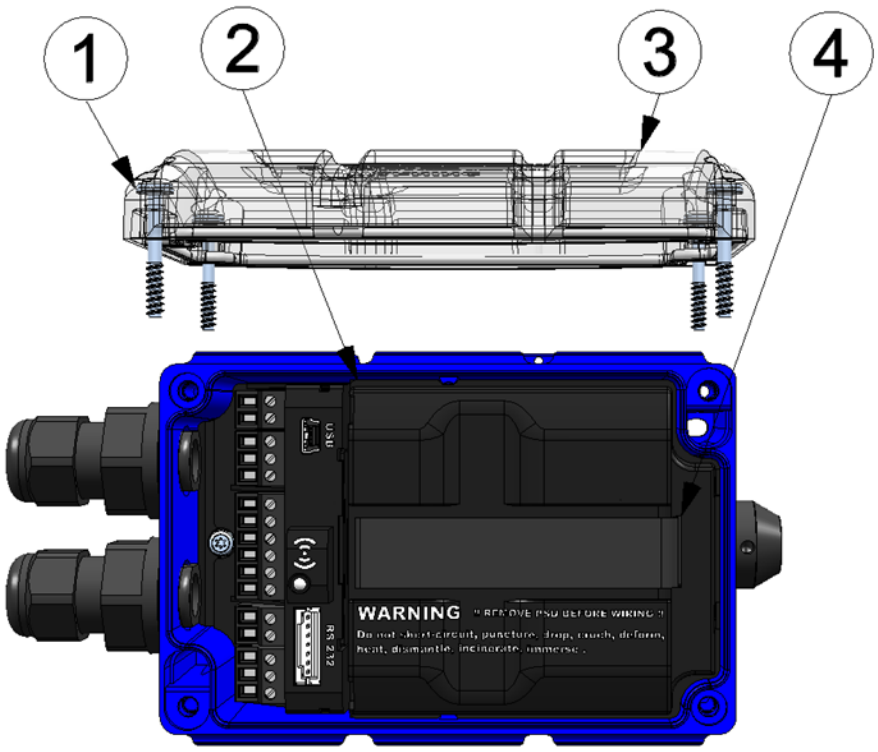
1. First attach the assembly loop (3) using the screws (2) included in the "DATAEAGLE 702x/703x Pipe mounting kit (17106)" equipment set to the 4-Channel Data Logger (see "Step 1 of the pipe assembly " on page 62).
2. Position the 4-Channel Data Logger with the attached assembly loop (3) on the pipe and use the supplied cable binders (4) to secure the 4-Channel Data Logger (see "Step 2 of the pipe assembly" on page 62).

7.5 Safety instructions for cabling

> ***Important note:*** *To avoid any damage, always switch off the voltage supply to the device when performing electrical connections.*

When connections are made to the 4-Channel Data Logger , the following warnings and information must be observed, in addition to the warnings and information found in the individual chapters on the installation. Further safety information is included in "Safety instructions" on page 17.

Remove the power supply unit from the device before completing any wiring work.



Removing the power supply unit

1 Delta PT M3,5x25 Torx 15	**3** Housing cover
2 Power supply unit	**4** Strap to remove the power supply unit

7.5.1 Information on preventing electrostatic discharges (ESD)

Important note: *Maintenance procedures that do not require the device to be connected to the power supply should only be performed once the device has been disconnected from the mains power supply to minimise hazards and ESD risks.*

The sensitive electronic components inside the device can be damaged by static electricity, which can impair the device performance or even cause the device to fail. The manufacturer recommends the following steps to prevent any damage to the device caused by electrostatic discharges:

- Discharge any static electricity present on your body before handling the electronic components of the device (such as circuit boards and components attached thereto). To do this, you can touch a grounded metallic surface such as the housing frame of a device or a metal pipe.
- Avoid any unnecessary movements to prevent the build-up of static charges.
- Use antistatic containers or packaging to transport components that are sensitive to static.
- Wear an antistatic wristband that is grounded via a cable to discharge your body and keep it free of static electricity.
- Only touch components that are sensitive to electric charges in an antistatic working area. If possible, use antistatic mats and work pads.

7.6 Electrical installation

Important note: *Only qualified personnel should undertake the installation described in this chapter of the operating instructions to avoid any damage to the device.*

7.6.1 Supply concepts

The following table gives an overview of the possible supply concepts including the respective advantages and disadvantages:

Supply concept	Advantages	Disadvantages
Supply by primary battery	• Minimal installation effort • No energy source required at the installation site	• Requires a cyclic replacement of the power supply unit
Supply by PV module	• Self-sufficient operation • No energy source required at the installation site	• Due to the energy supply using a PV module, there is a dependency on insolation
Mains operation (230 V AC)	• No cyclic passing by the measurement site needed • No dependency on insolation	• Energy source required at the installation site • External power supply unit required • High installation effort
DC power supply (12...32 VDC)	• No cyclic passing by the measurement site needed • No dependecy on insolation	• Energy source required at the installation site • High installation effort

7.6.1.1 Powered by primary battery

This supply concept is distinguished by the least installation effort. It is limited to installing the device (see "Installing the 4-Channel Data Logger " on page 59). The disadvantage is that the power supply unit equipped with a primary battery has to be cyclically (depending on the transmission and measurement interval) changed.

The following components are required to implement the supply concept:

- PSU713 BP (- upon request)

7.6.1.2 Powered by PV module

This supply concept enables a self-sustaining operation of the 4-Channel Data Logger . I.e. no energy source has to be available at the installation site.

The following components are required to implement the the supply concept:

- PV module
  - PV module 30W (- upon request recommended)
  - PV module 10W (- upon request)
- Power Supply Unit with integrated rechargeable battery
  - DATAEAGLE 702x Akkupack V3 (17109 V3 recommended)
  - PSU413D AP (- upon request)

The PV module 10W (- upon request) is significantly more compact than the PV module 30W (- upon request), but also offers correspondingly lower performance. It is suitable for installation locations with consistently high solar radiation and for measurement sites with low average energy consumption. This means measurement sites with infrequent transmissions, long measuring intervals and sensors with low power consumption. For all other situations, we recommend using the PV module 30W .

Contrary to the PSU413D AP (- upon request), the DATAEAGLE 702x Akkupack V3 (17109 V3) can also be charged at temperatures below 0°C and is therefore also suitable for installation locations where periods of frost are to be expected. Detailed information on both power supply units is provided in chapter "Technical details about the energy supply" on page 76.

7.6.1.3 Powered by mains adapter

This supply concept is particlularly suitable if an energy source (230 V AC volltage) is already available at the installation site.

The following components are required to implement the supply concept:

- Power supply 24V 0,63A for top-hat rail mounting (- upon request)
- Power Supply Unit with integrated protective circuit
  - PSU DC+ (- upon request recommended)
  - PSU DC (- upon request)

Both the PSU DC+ (- upon request) and the PSU DC (- upon request) feature an integrated protective circuit to prevent interference and fluctuations in the supply voltage, making them particularly suitable for use in control cabinets and industrial environments. The PSU DC+ is additionally equipped with a backup battery that allows short-term power failures to be bridged and, if necessary, a failure message to be sent. Detailed information on the two power supply units is provided in chapter "Technical details about the energy supply" on page 76.

7.6.1.4 Powered by DC voltage

This supply concept is particlularly suitable if an energy source is already available at the installation site and provides a voltage in the range of 12...32 VDC . Voltages in this range can be connected directly to the 4-Channel Data Logger .

The following components are required to implement the supply concept:

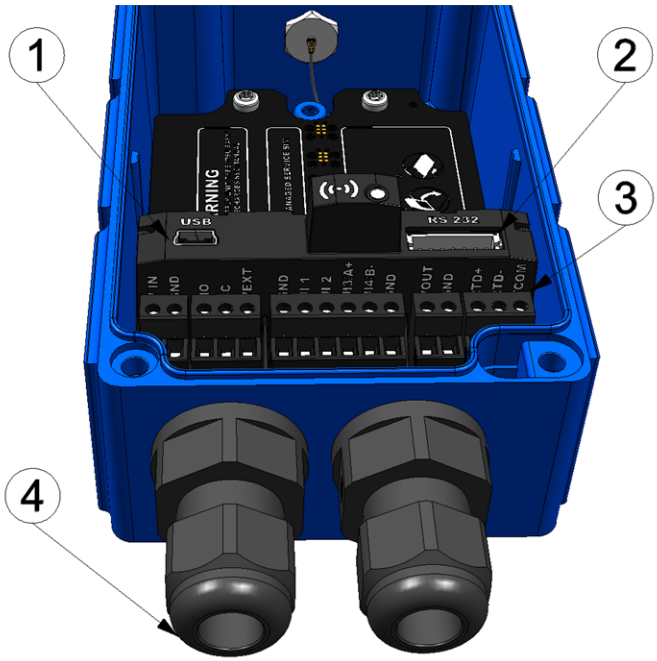
- Power Supply Unit with integrated protective circuit
  - PSU DC+ (- upon request recommended)
  - PSU DC (- upon request)

Both the PSU DC+ (- upon request) and the PSU DC (- upon request) feature an integrated protective circuit to prevent interference and fluctuations in the supply voltage, making them particularly suitable for use in control cabinets and industrial environments. The PSU DC+ is additionally equipped with a backup battery that allows short-term power failures to be bridged and, if necessary, a failure message to be sent. Detailed information on the two power supply units is provided in chapter "Technical details about the energy supply" on page 76.

7.6.2 Connecting the sensors, actuators and power supply

Important note:

- *All wiring work must be performed in the de-energised state.*
- *Ensure installation is completed correctly.*
- *Comply with existing legal and/or operational directives.*
- *Improper handling can cause injuries and/or damage to the instruments!*
- *Run all data and power cables so that they do not pose a trip hazard and ensure that cables do not have any sharp bends!*
- *Data and current cables must not exceed a length of 30m!*
- *The 4-Channel Data Logger must not be operated in the field with the lid open!*
- *The 4-Channel Data Logger cannot be operated without a power supply unit.*
- *To ensure the housing is properly sealed, each of the 2 cable screw connections must only hold a single cable.*



Connection of the sensors and power supply (view without power supply unit)

1 Mini-B USB (only for debug and script update)	**3** Main terminal block (split into 2x 2-pin, 2x 3-pin, 1x 6-pin)
2 Extension interface	**4** Cable screw connection (cable diameter of 5-10 mm)

Assignment of the main terminal block

V IN	External supply or charging voltage
GND	Ground (external supply or charging voltage)
NO	Isolated switch contact
CC	
VEXT	Switchable sensor supply (3,3 V)
GND	Ground
UI 1	Universal input 1
UI 2	Universal input 2
UI3/A+	Universal input 3
UI 4/B-	Universal input 4
GND	Ground
VOUT	switchable sensor supply (14,7 V bzw. 23,4 V)
GND	Ground
RTD+	 Clamps for the external temperature sensor (two or three wires)
RTD-	
TCOM	

The following table contains the conditions to be observed when connecting cables to the terminals of the 4-Channel Data Logger :

Nominal cross-section	1,5 mm²
Cross-section for solid wire	0,14...1,5 mm²
Cross-section for stranded wire	0,14...1,5 mm²
Length to be stripped	9 mm
Torque	0,22...0,25 Nm

Note: *The first two steps are only necessary if the device is already in operation and the wiring needs to be modified.*

1. Remove the four screws that secure the housing cover. Now open the 4-Channel Data Logger .

   Important note: *In the event of adverse weather conditions including rain or in a location where water can penetrate from above, suitable measures must be implemented to protect the device from penetrating moisture when the housing cover is open.*

2. Remove the power supply unit from the 4-Channel Data Logger . Use the strap provided to remove the power supply unit.
3. Then connect your sensors and actuators with the universal inputs and the outputs. Ensure that no current is present when establishing the connection. If you would like to use an external supply or charging voltage, you should connect the corresponding cables with the V IN and GND terminals in the de-energised state.

   Important note: *Only a single cable must be threaded through the cable screw connections to ensure the seal of the housing is not jeopardised.*

4. Tighten the cable screw connections to secure the cables.
5. Affix blind plugs to all of the cable screw connections that are not required.

   Important note: *All unused cable screw connections on the 4-Channel Data Logger must be sealed watertightly using the blind plugs supplied. Otherwise the degree of protection for the entire device is not guaranteed and the manufacturer's warranty is void.*

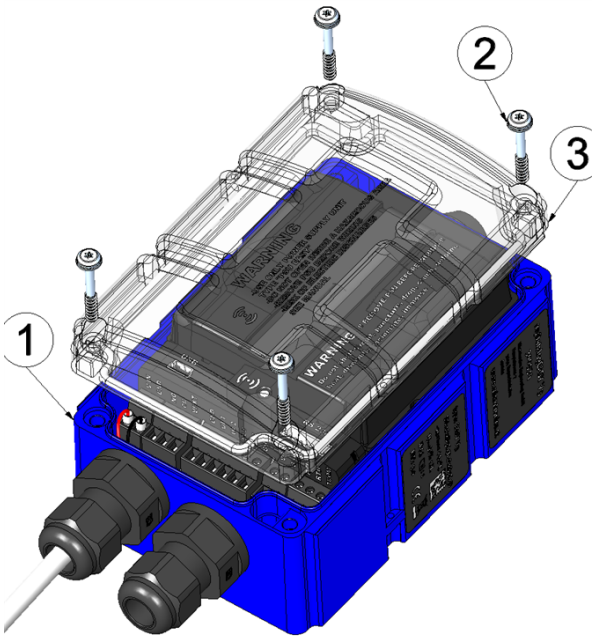
6. Connect the antenna (see "Connecting the mobile network antenna" on page 72). The antenna is not included in the scope of delivery and must be ordered separately.
7. Insert the power supply unit.

The following step is not mandatory.

8. Check whether the connection to the DATAEAGLE-Portal has worked correctly (see "Testing communication with the device" on page 85).

9. Close the housing cover. The best option is to tighten the four screws crosswise (torque 0,5 Nm; At the first screw 0,7 Nm because the threads have to be shaped into the base part first.) so that the housing cover is positioned evenly.

   Important note: *Ensure that the seals are clean and intact before closing the housing cover. Remove any impurities and/or dirt. The manufacturer shall not be liable for any damage to the device caused by leaky or faulty seals.*

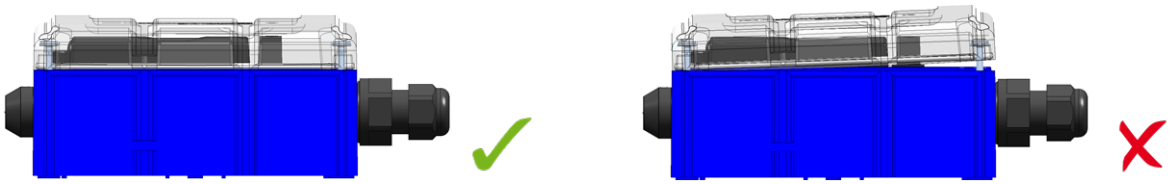


Closing the housing cover

1 4-Channel Data Logger base unit	**3** Housing cover
2 Delta PT M3,5x25 Torx 15	

10. Check that the housing cover is positioned correctly on all sides and that no foreign materials have been trapped between the housing and housing cover.

    Important note: *The manufacturer is not liable for any damage that is caused by housing covers that are not closed correctly.*

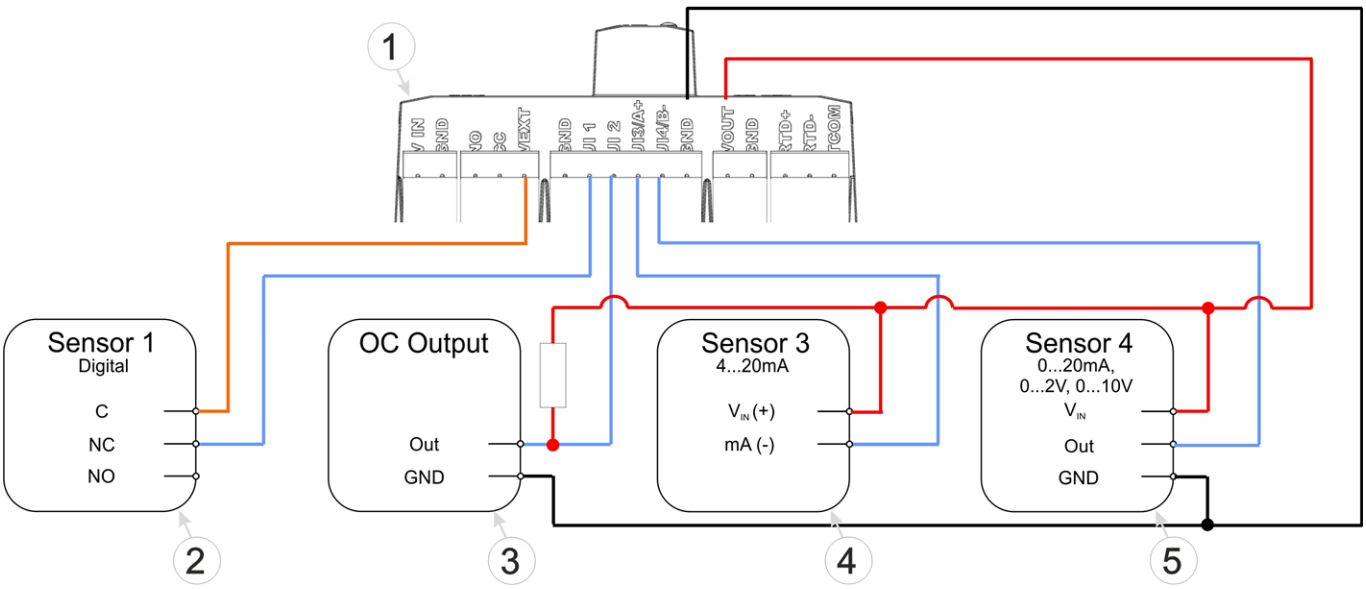


The following step is only necessary if you are using an external supply or charging voltage.

11. Now switch on the external supply or charging voltage.

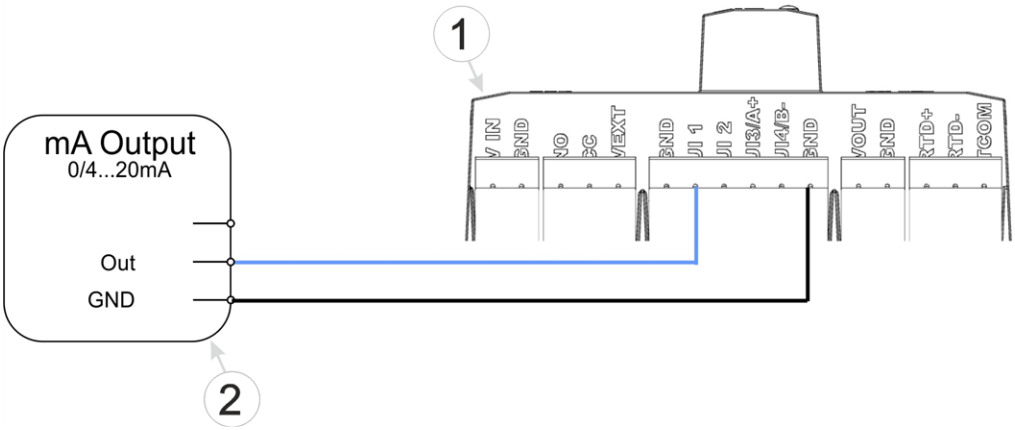
    Note: *If you are using a power supply unit without an integrated energy store, the external supply or charging voltage must be switched on before the optional step during which the connection to the server is tested.*

7.6.2.1 Connection examples



Connection examples (digital, open collector output, 0/4…20mA, 0…2/10V)

1	Main terminal block of the 4-Channel Data Logger	**4**	2-wire mA sensor
2	Isolated relay contact	**5**	3-wire mA sensor or 3-wire U-sensor
3	Sensor with open collector output		



Connection examples (active mA output)

1	Main terminal block of the 4-Channel Data Logger	**2**	Active mA output, transducer or isolation transformer

Note: *The "Cnt.Day" and "Cnt.Intrvl." operating modes require a permanent supply of the sensors. One of the two switchable sensor supplies must be permanently active for this purpose. The use of VEXT is recommended for this purpose (see sensor 1 in the connection example above). The power consumption per input when the switch contact is closed can be up to 384 µA due to the load of 10k086 .*

Note: *Since the universal inputs of the device are not galvanically isolated, it is not possible to add the 4-Channel Data Logger to an existing 4-20mA current loop (e.g. between sensor and SPS). Use a suitable isolation transformer in this case.*

7.6.3 Connecting the mobile network antenna

Important note:

- *To ensure the correct functionality, only use antennas that are supplied by the manufacturer.*
- *When using extension cables, the total length of the cable connection to the antenna must not exceed 30 m.*

The standard antenna (Omni antenna GSM multiband 2 dB , 17116) is directly attached to the antenna connector (see "Overview" on page 21) of the 4-Channel Data Logger . In the event of a low radio signal strength, you can use the Dome antenna multi band FME-F 3m (- upon request).

If the distance between the antenna position and the 4-Channel Data Logger is too great, you can use a 5 m Extension cable for antenna FME-F/FME-M 5m (- upon request).

1. Ensure that the 4-Channel Data Logger is de-energised.
2. If you need an antenna extension, connect it to the antenna first.
3. Connect the antenna extension or antenna directly to the antenna connector of the 4-Channel Data Logger (see "Overview" on page 21).

   Important note: *Do not apply too much force when tightening the antenna. Do not use any tools to tighten the antenna or antenna extension; only tighten it manually.*
4. Switch the power supply of the 4-Channel Data Logger back on.

The following step is not mandatory.

5. Check whether the connection to the DATAEAGLE-Portal server has worked correctly (see "Testing communication with the device" on page 85).

7.6.4 Technical details about the universal inputs

Note: *The universal inputs are not galvanically isolated.*

7.6.4.1 0/4 to 20mA mode

Note: *Above 23,96 mA, the relevant input becomes highly resistive (safety shutdown to prevent damage to the universal input).*

Resolution	6,3 µA
I_{max}	23,96 mA
Load	96 Ω

7.6.4.2 0 to 2V mode

Resolution	610 µV
U_{max}	2,5 V
Load	10k086

7.6.4.3 0 to 10V mode

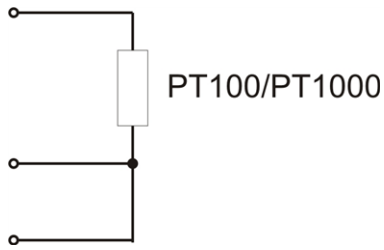
Resolution	7,97 mV
U_{max}	32 V
Load	4k7

7.6.4.4 Standard digital modes (digital, infinite counter, day counter, interval counter)

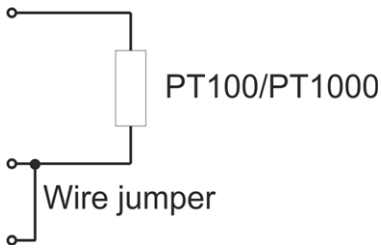
General	U_{max}	32 V
	Low	<0,99 V
	High	>2,31 V
	Load	10k086
Infinite, day and interval counter	Minimum pulse length	1 ms

7.6.5 Technical details about the PT100/1000 interface

The interface for the external temperature sensor automatically detects whether a PT100 or PT1000 is being used. It is also possible to use three- or two-wire sensors. An additional link is required on two-wire sensors (see "PT100/PT1000 2-wire" on page 73).



PT100/PT1000 3-wire



PT100/PT1000 2-wire

7.6.6 Technical details about the USB interface

The connection to a PC is established via the USB slave interface. It is only designated for the communication with the DeviceConfig configuration program. A detailed description of the DeviceConfig configuration program is provided in chapter "DeviceConfig " on page 139. The DeviceConfig configuration program can be downloaded free of charge from the following website:

https://www.schildknechtag.com/products/download-2/

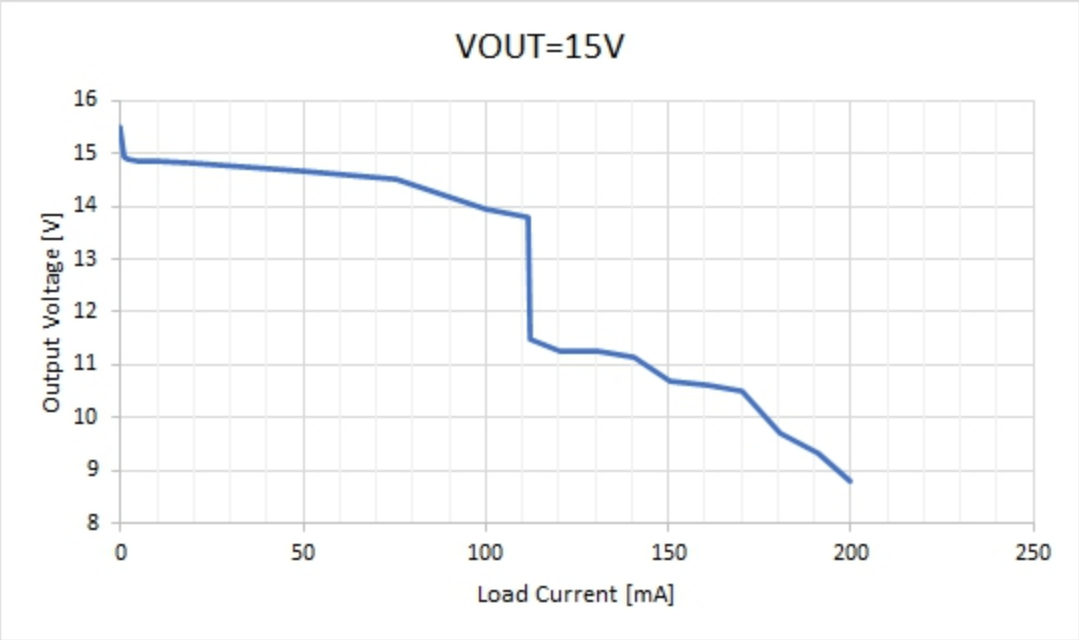
Important note: *If the antenna of the device is earthed or connected to the ground potential of another object (e.g. installation on a control cabinet), remove the antennas before you connect the device with the USB interface of a PC. Otherwise, this can cause a potential displacement between the ground of the antenna and the ground of the PC, which could damage the USB interface of the device.*

7.6.7 Technical details about the outputs

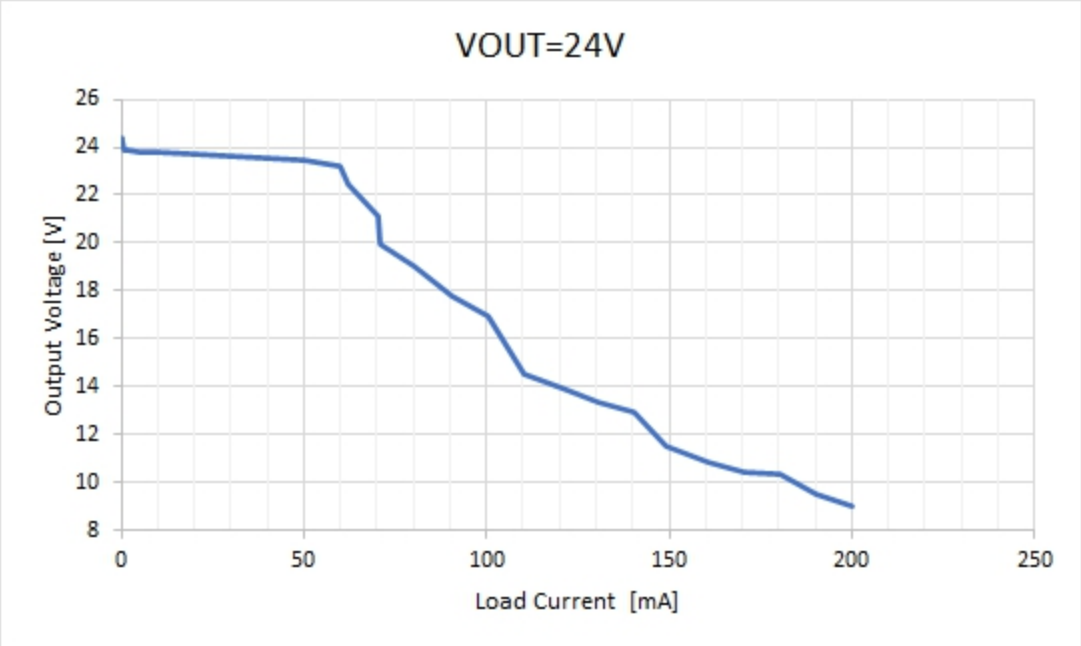
7.6.7.1 Switchable sensor supply VOUT

Note: *The switchable sensor supply output is short-circuit-proof.*

The output voltage at VOUT can be set to 14,7 V or 23,4 V via the "Voltage" parameter located in the input screen for configuring the output channels (see "Output channels" on page 105).



Output voltage characteristics subject to the load current for VOUT = 15V



Output voltage characteristics subject to the load current for VOUT = 24V

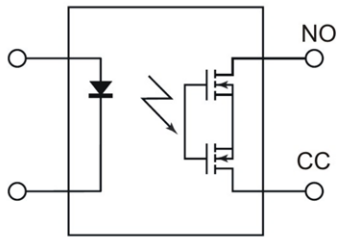
7.6.7.2 Switchable sensor supply VEXT

Note: *The switchable sensor supply output is short-circuit-proof.*

U_{out}	3,3 V
I_{max}	180 mA

7.6.7.3 Isolated switch contact (NO, CC)

Important note: *The user must ensure that the current on the isolated switch contact does not exceed 130 mA .*



Equivalent circuit diagram for the isolated switch contact

I_{max}	130 mA
U_{max}	32 V
R_{on}	35 Ω
f_{max}	1000 Hz

7.6.8 Technical details about energy management

The device will work until 3,4 V as intended, if the 4-Channel Data Logger is operated without an external supply or charging voltage (V IN). The modem is deactivated from this threshold and the "UV MODEM LOCKOUT" log entry is entered in the device log. This means that the connection is disconnected if the device is in "online" mode or is logged in to the mobile network ("Interval & wakeup" mode). Once this threshold has been reached, a connection establishment cannot be triggered manually via the solenoid switch (see "Solenoid switch" on page 88) or automatically via the system. The remaining functions are not affected by this.

Only once the internal supply voltage falls below 2,9 V , does the 4-Channel Data Logger switch to energy saving mode in which only the charge control is active. In this case, the charge control tries to charge the rechargeable battery up to 3,8 V . The "UV_LOCKOUT" log entry is also entered in the device log when activating energy saving mode. The rechargeable battery of the power supply unit can be recharged again if the device is in energy saving mode and an external supply or charging voltage (V IN) is connected. Otherwise the 4-Channel Data Logger remains in this energy saving mode until the rechargeable battery is completely discharged.

Energy saving mode is terminated and all of the functions except for the communication with the DATAEAGLE-Portal server are resumed, once the rechargeable battery voltage exceeds 3,2 V when recharging. The modem continues to remain inactive until the rechargeable battery voltage exceeds 3,5 V . Only then can a mobile network connection be established again and the device resumes normal operation.

When an external supply or charging voltage (V IN) is used, the charge control ensures that the rechargeable battery of the power supply unit is charged. The following operating states are possible:

- Active energy saving mode :

  The charge control tries to charge the rechargeable battery to 3,8 V or to maintain the voltage at this level.

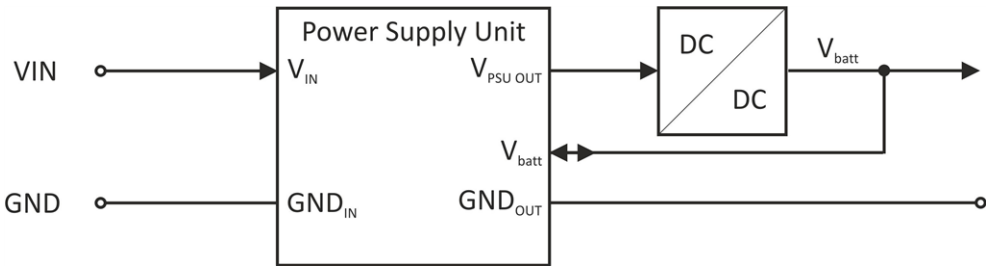
- Active mode:

  The functionality of the charge control can be selected via the "Charging mode" parameter. This is located in the "Basic settings" configuration section (see "Basic settings" on page 121). There are three options available:

  - Off: Charge control deactivated
  - Normal: The charge control is activated and the rechargeable battery is charged to the maximum voltage if the state of charge of the rechargeable battery for the power supply unit falls below 50%. The charge control is then deactivated again. This is designed to optimise the service life of the rechargeable battery.
  - Solar: The rechargeable battery of the power supply unit is charged to the maximum voltage if the supply or charging voltage V IN exceeds 16 V . The charge control then remains deactivated for 12 hours unless the state of charge of the rechargeable battery for the power supply unit drops below 95%. This charge strategy is recommended if a solar field is used to charge the rechargeable battery.

The charge control reads out any additional information that is required, such as the maximum voltage and ambient temperature at which charging is permitted, directly from the memory of the power supply unit. In both charge strategies, recharging is only completed if the ambient temperature does not exceed the permissible range of the charging temperature. The permissible charging temperature is specified in the factsheet for the relevant power supply unit.

7.6.9 Technical details about the energy supply



Schematic diagram of the energy supply

V IN	12...32 VDC
Power consumption (without sensors)	typ. <1 mW [1)] max. 12 W
Reverse voltage protection	No [2)]

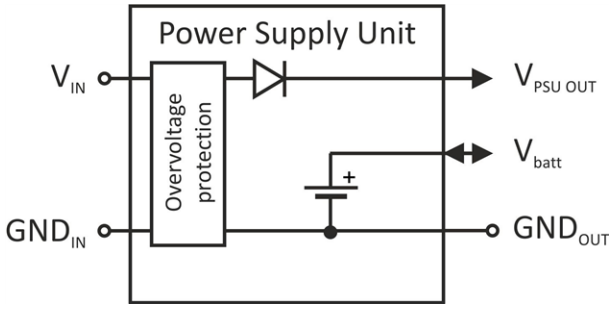
[1)] applies to continuous operation if the possibly available rechargeable battery of the power supply unit is fully charged

[2)] The reverse voltage protection is part of the protective circuit in the power supply units.

Regardless of whether an external supply or charging voltage is provided (e.g. by a power supply unit), a power supply unit must always be installed in the device. Depending on the type, the power supply unit contains a rechargeable battery (DATAEAGLE 702x Akkupack V3 , PSU413D AP), a battery (PSU713 BP), or only a protective circuit (PSU DC). An external supply or charging voltage is not required if the power supply unit is equipped with a battery.

7.6.9.1 DATAEAGLE 702x Akkupack V3 (17109 V3)

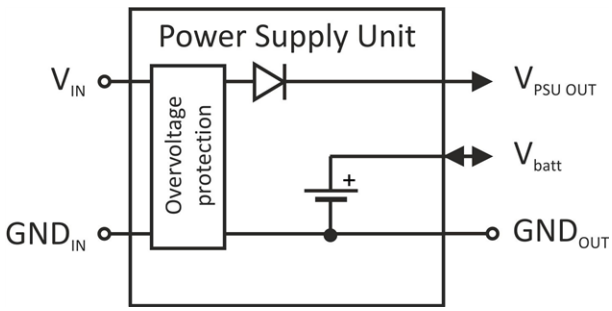
V IN	Optional
Protective circuit (V IN)	2 kV overvoltage protection Reverse voltage protection
Capacity	13,6 Ah 50,32 Wh
Type	Li-Ion
Rechargeable	Yes
Nominal voltage of the rechargeable battery	3,75 V
Operating temperature	-20...+60 °C
Charging temperature	-20...+60 °C
Storage temperature	0... +30 °C



Block diagram of the DATAEAGLE 702x Akkupack V3

7.6.9.2 PSU413D AP (- upon request)

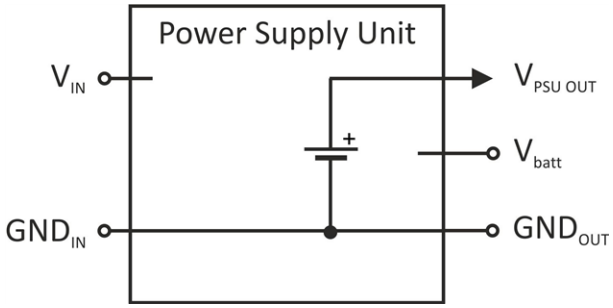
V IN	Optional
Protective circuit (V IN)	2 kV overvoltage protection Reverse voltage protection
Capacity	13,2 Ah 48,84 Wh
Type	Li-Ion
Rechargeable	Yes
Nominal voltage of the rechargeable battery	3,7 V
Operating temperature	-20...+60 °C
Charging temperature	0...+40 °C
Storage temperature	0...+35 °C



Block diagram of the PSU413D AP

7.6.9.3 PSU713 BP (- upon request)

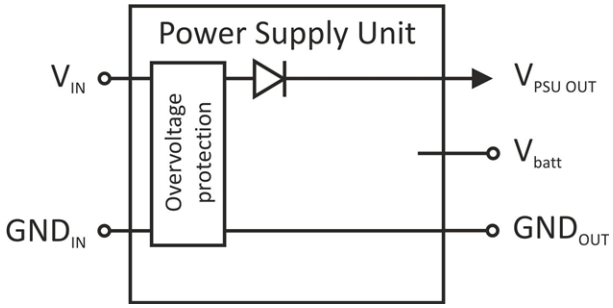
V IN	Not required
Protective circuit (V IN)	---
Capacity	13 Ah 93,6 Wh
Type	Li-SOCl2
Rechargeable	No
Nominal voltage	7,2 V
Operating temperature	-20...+50 °C
Charging temperature	---
Storage temperature	+20...+25 °C



Block diagram of the PSU713 BP

7.6.9.4 PSU DC (- upon request)

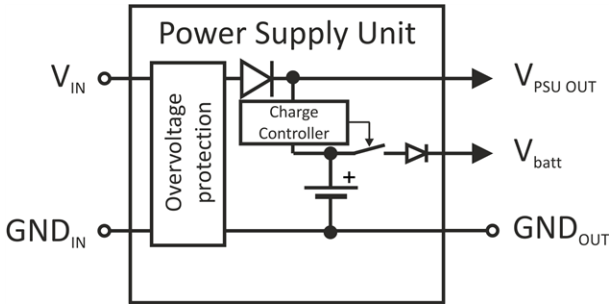
V IN	Required
Protective circuit (V IN)	2 kV overvoltage protection Reverse voltage protection
Capacity	---
Type	---
Rechargeable	no
Nominal voltage	---
Operating temperature	-20...+60 °C
Charging temperature	---
Storage temperature	0... +35 °C



Block diagram of the PSU DC

7.6.9.5 PSU DC+ (- upon request)

V IN	Required
Protective circuit (V IN)	2 kV overvoltage protection Reverse voltage protection
Capacity	900 mAh 3,33 Wh
Type	Li-Po
Rechargeable	yes
Nominal voltage	3,7 V
Operating temperature	-20...+60 °C
Charging temperature	0...+40 °C
Storage temperature	0... +35 °C



Block diagram of the PSU DC+

7.6.10 Technical details about detecting the failure of the supply voltage

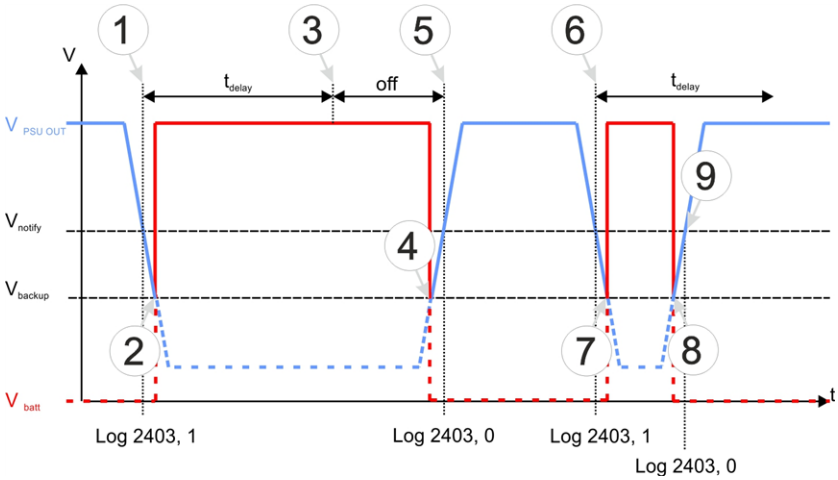
Power supply units with an integrated rechargeable buffer battery (PSU DC+) enable a message to be issued in the event of a supply voltage failure. However, generation of an alarm must be activated via the relevant parameter in the "Basic settings" configuration section (see "Basic settings" on page 121).

As soon as the supply voltage fails and subsequently the output voltage of the power supply unit $V_{PSU\ OUT}$ (see "Block diagram" on page 22) falls below 9 V , this initiates the malfunction message to be issued, as long as a time delay for issuing the malfunction message has not been entered via the "Delay for power off alarm" parameter in the "Basic settings" configuration section (see "Basic settings" on page 121). The fact that the value has fallen below the threshold is definitely entered in the device log with the "MODULE INFO (403), 1" log entry. If the output voltage of the power supply unit continues to fall, the power supply is switched to the rechargeable buffer battery. This second threshold on the PSU DC+ is dependent on the state of charge of the rechargeable buffer battery (7 V when fully charged, 6 V when practically discharged). If a time delay has been configured, the 4-Channel Data Logger continues to operate normally until the time delay has elapsed. If during the time delay, the output voltage of the power supply unit once again rises above the threshold (6 V to 7 V on the PSU DC+) that is dependent on the state of charge of the rechargeable buffer battery, then the rechargeable buffer battery switches back to the supply via the output voltage of the power supply unit. If the output voltage of the power supply unit increases further and also exceeds 9 V , this is entered in the device log with the "MODULE INFO (403), 0" log entry. If the output voltage of the power supply unit is below 9 V when the time delay elapses then issuing of the malfunction message is initiated.

The device establishes a connection to the server to issue a malfunction message. Any outstanding data is also transmitted to the server during this process. The outputs are then deactivated and all operations with the exception of monitoring the output voltage of the power supply unit and the cyclical transmission are shut down. No measurement data is determined in this state.

If it was switched to the rechargeable buffer battery it is only possible to establish a connection with the sever as long as the internal supply voltage V_{batt} (see "Block diagram" on page 22) is above 3,4 V . The modem is deactivated from this threshold and the "UV MODEM LOCKOUT" log entry is entered in the device log. This means that the connection is disconnected if the device is in "online" mode or is logged in to the mobile network ("Interval & wakeup" mode). Once this threshold has been reached, a connection establishment cannot be triggered manually via the button (see "Solenoid switch" on page 88) or automatically via the system. If the internal supply voltage falls below 2,9 V , the 4-Channel Data Logger switches to energy saving mode. The "UV LOCKOUT" log entry is also entered in the device log during this process. This state is maintained until the rechargeable buffer battery is fully discharged or the output voltage of the power supply unit rises above 9 V again. The 4-Channel Data Logger resumes normal operation above 9 V . A hardware-based controller in the power supply unit ensures that the rechargeable buffer battery is charged as soon as the supply voltage is available again.

$V_{PSU\ OUT}$	Output voltage of the power supply unit
V_{notify}	Threshold at which the malfunction message is issued: 9 V
V_{backup}	Threshold for switching to supply via the rechargeable buffer battery: PSU DC+ : 6 V to 7 V (depending on the state of charge of the rechargeable buffer battery)
t_{delay}	Time delay for issuing the malfunction message – is configured via the "Delay for power off alarm" parameter located in the "Basic settings" configuration section (see "Basic settings" on page 121).
V_{batt}	Voltage of the rechargeable buffer battery



Supply of the 4-Channel Data Logger

1	• The "MODULE INFO (403), 1" log entry is created.
2	• The power supply is switched to the rechargeable buffer battery. • The device continues to work normally.
3	• The time delay for issuing the malfunction message has elapsed. • The malfunction message is issued. The outputs are deactivated and all operations with the exception of monitoring the output voltage of the power supply unit and the cyclical transmission are shut down.
4	• The device switches from the rechargeable buffer battery to the supply via the output voltage of the power supply unit.
5	• The 4-Channel Data Logger resumes normal operation again. • The "MODULE INFO (403), 0" log entry is created.
6	• The "MODULE INFO (403), 1" log entry is created.
7	• The power supply is switched to the rechargeable buffer battery. • The device continues to work normally.
8	• The device switches from the rechargeable buffer battery to the supply via the output voltage of the power supply unit.
9	• The output voltage of the power supply unit once again exceeds the threshold for issuing the malfunction message. • The time delay for issuing the malfunction message has not elapsed yet. • The "MODULE INFO (403), 0" log entry is created. • NO malfunction message is issued.

7.6.11 Technical details about the system time

The 4-Channel Data Logger is equipped with a hardware real-time clock that has its own buffer battery with an expected service life of >10 years. The system time continues to run even if the power supply unit is removed. This means that following recommissioning, valid time stamps for the measurement and log data can be generated immediately. Additionally, the system time is synchronised with the server each time a connection to the DATAEAGLE-Portal server is established.

Chapter 8 Initial Start-Up

8.1 User information

Before you connect the 4-Channel Data Logger and place it into operation, you must observe and comply with the following user information!

This manual contains all information that is required for using the device.

Is intended for technically qualified personnel who have the relevant knowledge and experience in the area of measurement technology.

Read this manual carefully and completely in order to ensure the proper functioning of the 4-Channel Data Logger

Contact Schildknecht AG(see "Contact information" on page 195) if anything is unclear or if you encounter difficulties with regard to installation, connection or configuration.

8.2 Applicable documents

In addition to this operating instructions, additional instructions or technical descriptions may be required for the installation, commissioning and operation of the entire system.

These instructions are enclosed to the respective additional devices or sensors or are available for download on the Schildknecht website.

8.3 General principles

The entire measurement system may only be placed into operation after completion and inspection of the installation. Study the manual thoroughly before placing into operation to prevent faulty or incorrect configuration.

Utilise the manual to familiarise yourself with the operation of the 4-Channel Data Logger and the input screens of the DATAEAGLE-Portal server before you begin with the configuration.

8.4 Commissioning the system

> ***Note:*** *It is recommended that the 4-Channel Data Logger is first placed into operation in the office before mounting the device permanently at the place of use. During this process, you should create a site for the later operation on the DATAEAGLE-Portal server (see "Creating the site" on page 159) and determine a site configuration (see "Site configuration" on page 93). Take the opportunity to get to know the functions of the device in a stable environment. You can also use suitable test signals to simulate the sensors to establish the optimum configuration of the 4-Channel Data Logger prior to its actual first use. This reduces the amount of time required for on-site installation to a minimum.*

The following work should be completed in the office before you go to the future location of the device:

1. If necessary, create a customer on the DATAEAGLE-Portalserver (see "User manual for DATAEAGLE-Portal-Server " - upon request).

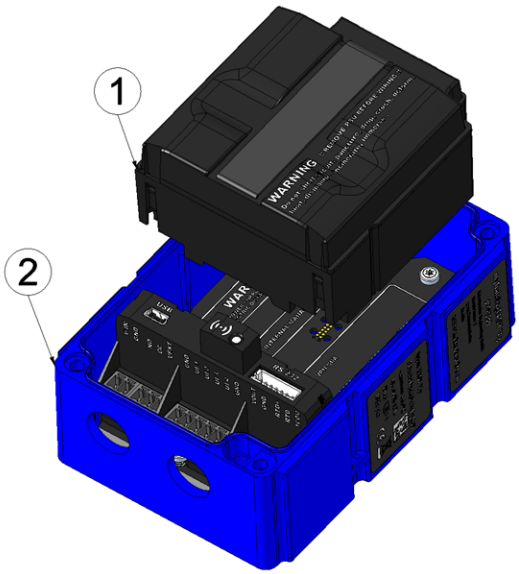
2. Within the selected customer, create a new site/application for operation on the DATAEAGLE-Portal server based on the "4-Channel Data Logger" application (see "Creating the site" on page 159).
3. Configure the created site/application according to your requirements (see "Site configuration" on page 93).
4. Connect the antenna (see "Connecting the mobile network antenna" on page 72). The antenna is not included in the scope of delivery and must be ordered separately.
5. Establish a connection so that the configuration of site is transferred to the 4-Channel Data Logger . Insert the power supply unit for this purpose. It is designed in such a way that it cannot be inserted incorrectly. Details on this are provided in the chapter "Assembling the 4-Channel Data Logger " on page 52. The status LED should then start to flicker (see "Three colour status LED" on page 88), indicating that a connection is being established. If this is not the case, the transport lock may have been activated on the device. In this case, initiate Aloha transmission mode (see "Aloha transmission mode" on page 40).

   Note: *If the 4-Channel Data Logger was in transport mode, the transport lock is deactivated by the initiation of Aloha transmission mode and the device starts to operate in accordance with the configuration.*

   Note: *Note that all power supply units with an integrated and rechargeable energy store are delivered with a maximum charge of 30% in accordance with applicable transport regulations and must therefore be fully charged before being used for the first time (see "Charging the power supply unit" on page 167).*

   Note: *If you are using a power supply unit without an integrated energy store, the external supply or charging voltage must be connected before inserting the power supply unit. Details on this are provided in the chapter "Connecting the sensors, actuators and power supply" on page 67.*

   Note: *You can also skip this step, as Aloha transmission mode must also be initiated during the installation on site, which transfers the configuration to the 4-Channel Data Logger at the same time.*



Inserting the power supply unit

1 Power supply unit	**2** Base unit

6. Use the corresponding strap to remove the power supply unit from the 4-Channel Data Logger and then, if used, disconnect the cabling for the supply or charging voltage from the device when in a de-energised state, if possible.
7. Remove the antenna again.

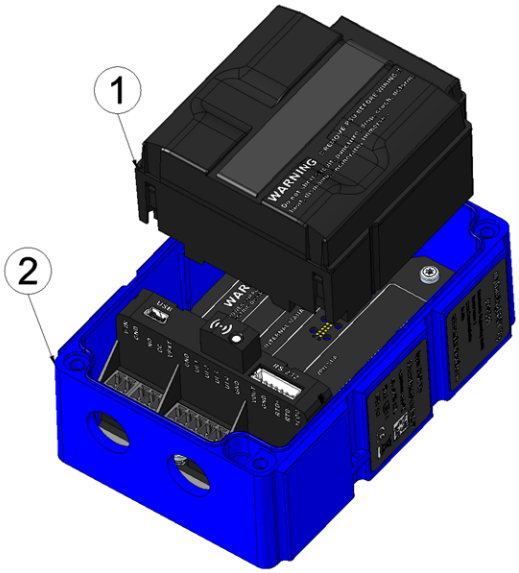
The following work is completed directly at the location of the device:

8. Complete all of the steps detailed in the chapter "Assembling the 4-Channel Data Logger " on page 52.
9. Check whether the connection to the DATAEAGLE-Portal server has worked correctly (see "Testing communication with the device" on page 85).

8.5 Testing communication with the device

1. Create a new site/application based on the "4-Channel Data Logger" application for operation on the DATAEAGLE-Portalserver (see "Creating the site" on page 159).
2. Configure the created site/application according to your requirements (see "Site configuration" on page 93).
3. Connect the antenna (see "Connecting the mobile network antenna" on page 72). The antenna is not included in the scope of delivery and must be ordered separately.
4. Insert the power supply unit. It is designed in such a way that it cannot be inserted incorrectly.

   Note: *If you are using a power supply unit without an integrated energy store, the external supply or charging voltage must be connected before inserting the power supply unit. Details on this are provided in the chapter "Connecting the sensors, actuators and power supply" on page 67.*



Inserting the power supply unit

1 Power supply unit	**2** Base unit

5. Initiate Aloha transmission mode (see "Aloha transmission mode" on page 40) so that the configuration of the site is transmitted to the 4-Channel Data Logger .

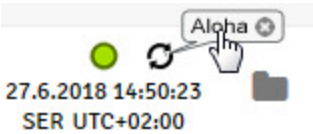
6. Wait until it is indicated in the list of measurement instruments that the device is in Aloha transmission mode. This is indicated by a speech bubble with the "Aloha" inscription.

The following steps are only necessary, if you simultaneously want to test the measurement value acquisition and data transmission.

7. Stop Aloha transmission mode by clicking the cross in the speech bubble with the "Aloha" inscription or wait for the duration of Aloha transmission mode. This period can be set in the basic settings (see "Basic settings" on page 121) of the site settings. The default setting is 10 minutes.
8. Complete all of the steps detailed in the chapter "Assembling the 4-Channel Data Logger " on page 52. This includes connecting the sensors.

   Important note: *All wiring work must be performed in the de-energised state.*

9. Check the incoming data in the Aloha data window of the DATAEAGLE-Portal server, which can be accessed by clicking on the speech bubble with the "Aloha" inscription (see "User manual for DATAEAGLE-Portal-Server " - upon request). Particular attention must be paid to the "GSM" and "SOC" measurement values. "SOC" specifies the state of charge of the energy source integrated in the power supply unit.



Note: *Additional explanation about evaluating the "Signal strength of the mobile network":*

"Mobile signal strength"	
>-64 dBm	
-64 to -73 dBm	
-74 to -83 dBm	
-84 to -93 dBm	
-94 to -107 dBm	
<= -108 dBm	

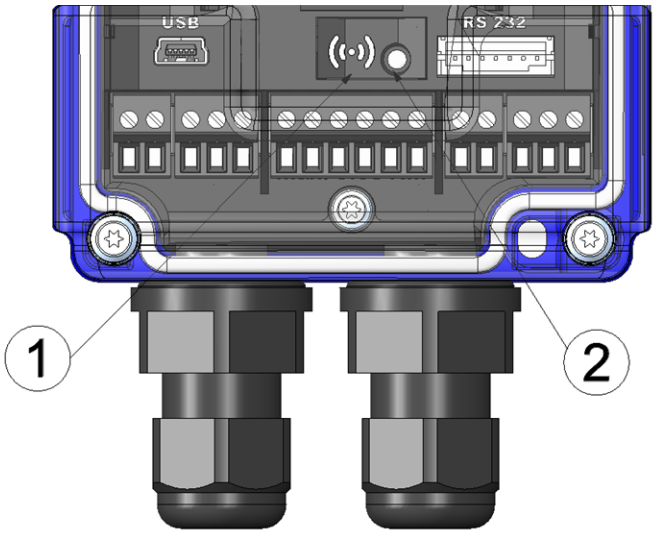
Chapter 9 User interfaces

The configuration of the 4-Channel Data Logger is carried out via the web interface on the DATAEAGLE-Portal server (see "User interface on the DATAEAGLE-Portalserver" on page 90), which your responsible sales partner will provide to you.

9.1 User interface on the 4-Channel Data Logger

9.1.1 Operating elements

The operating elements of the 4-Channel Data Logger can still be operated when the housing is closed.

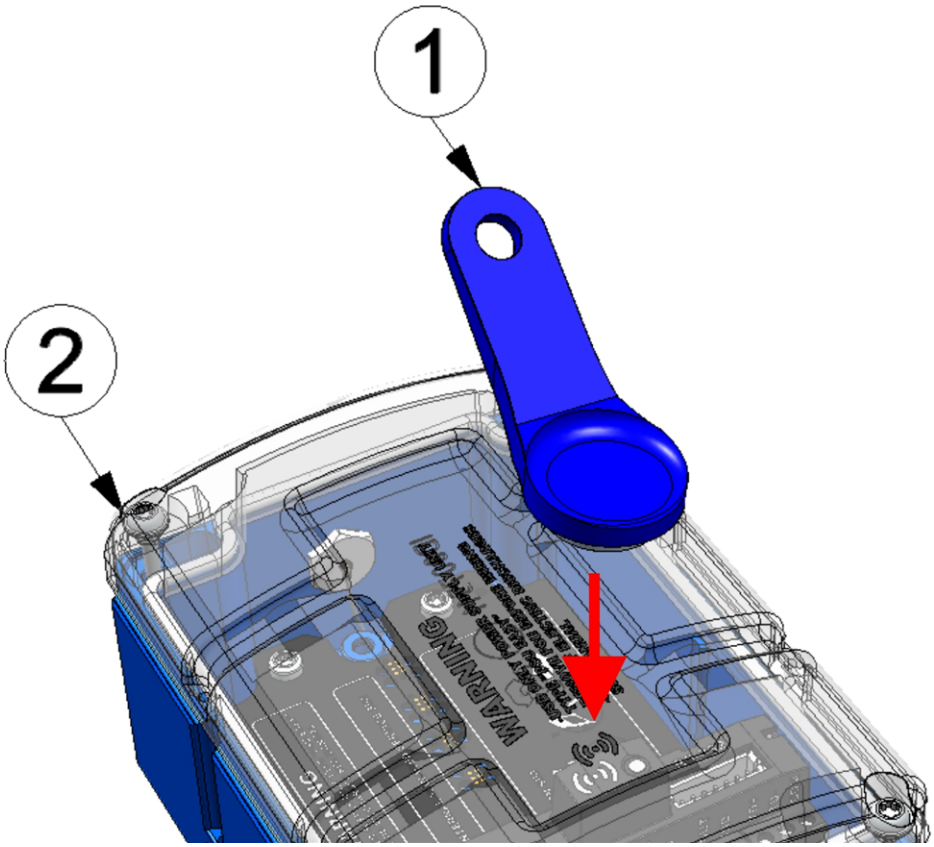


Operating elements

1 Solenoid switch	**2** Three-colour LED

9.1.1.1 Solenoid switch

The MDN Magnet (upon request) is required to operate the solenoid switch.



Operating the solenoid switch

1 MDN Magnet (upon request)	**2** 4-Channel Data Logger

The Solenoid switch can be used to initiate Aloha transmission mode or to instruct the device to immediately issue the error/status code.

User action	Device response	Operation after releasing the button
Press and hold for less than three seconds	Status LED illuminates green.	Error/status code is issued (see "Three colour status LED" on page 88)
Press and hold for three seconds	Status LED changes from green to orange.	Aloha transmission mode (see "Aloha transmission mode" on page 40)

9.1.1.2 Three colour status LED

The status LED is used both to display the error/status codes and to indicate the current operating state. If the Aloha transmission mode was activated or the power supply was provided (PowerOn), the status LED shows the current operating state for ten minutes. During these ten minutes, the error/status codes are transmitted every three seconds as long as there is no mobile network connection.

Error/status codes

Blink code	Colour	Description	Solution/cause
0x	---	Transport lock (transmission OFF, measurement OFF)	If the Aloha transmission mode is initiated via the button, the 4-Channel Data Logger resumes operation in accordance with the configuration (transmission ON, measurement ON).
1x	Green	Last connection OK	---
2x	Red	Last transmission faulty	• Try again later • internal supply voltage has fallen below 3,4 V (i.e. modem has been deactivated)
7x	Red	Network block/no matching provider	• Improve position of the antenna • Check whether the device is located in the coverage area of a service provider that is supported by the integrated SIM chip • Deallocate the netlock (see "User manual for DATAEAGLE-DeviceConfig " - upon request)
8x	Red	No mobile network	• Try again later • Improve position of the antenna
9x	Red	incorrect PIN/1 attempt remaining	• No PIN code was specified. • The specified PIN code is not correct. • One remaining attempt to enter the PIN code before the SIM card is locked Insert the SIM card into a mobile telephone and verify the correct PIN code. You may need to unlock the SIM card with the PUK code.
10x	Red	No mobile network connection	Improve position of the antenna
11x	Red	No server available	• Check whether port 51241 is released on the DATAEAGLE-Portal server • Try again later
12x	Red	Faulty SIM chip	Contact support

Operating states

Status LED	Colour	Description
Flickering	Green	Establishing connection
Lights up	Green	Mobile network connection established or button actuated
Off	---	Normal measuring operation according to configuration until the next transmission

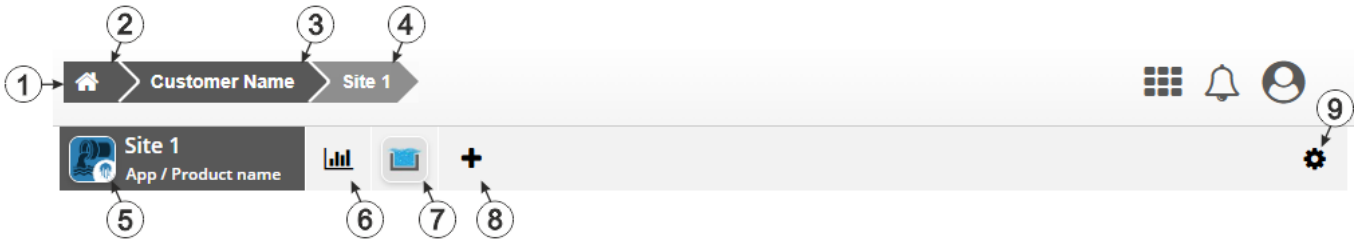
9.2 User interface on the DATAEAGLE-Portalserver

> ***Note:*** *Depending on the respective user level, some of the configuration fields mentioned in the following sub-chapters may be hidden. In this case, please contact the administrator of the DATAEAGLE-Portalserver.*

Configuration of the 4-Channel Data Logger is done via the web interface on the DATAEAGLE-Portalserver. It is essentially divided into configuration of the site and configuration of the device. The corresponding input screens are opened via the list of sites / applications in the "Sites / Applications" area (see ""Sites / Applications" area at customer level" on page 158). The title bar displayed at the top of the input screen is always the same, regardless of whether

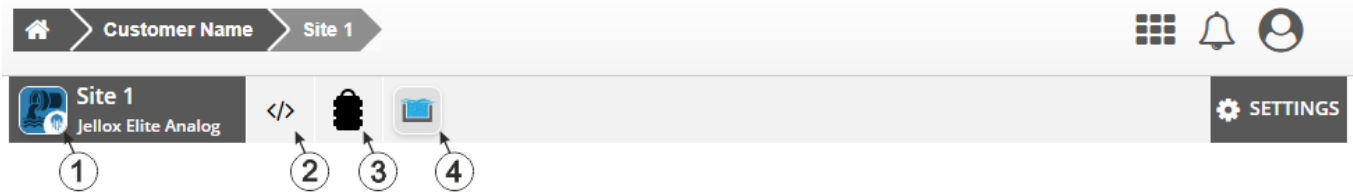
- the specific input screen for configuring the site (click on the name of the site or on the icon),
- the default input screen for configuring the site (click on the pencil symbol),
- the input screen for configuring the device (click on the serial number) or
- the report template for displaying the measurement data (click on the symbol for displaying the measurement data) has been opened.

The title bar can be used to switch between the input screens of the site which are connected to the configuration of the site, without having to return to the list of sites first. Furthermore add-ons can be added to the site via the "+" symbol. Add-ons can be used to extend the functional scope of a site. The application-specific or generic input screens can be opened via the title bar. To switch between the buttons displaying the application specific or the generic input screens in the title bar, you can use the cogwheel symbol.



Title bar displaying the buttons to open the application specific input screens

1	Breadcrumb navigation; shows the path via which the current input screen was called up.
2	Closes the current input screen and returns to the main level (This segment is only available if you are authorised to manage multiple customers.) Depending how the customer displayed after the house symbol was reached, one of the following areas of the main level is opened: • Customers • Sites / Applications • Devices
3	Displays the name of the customer that is currently open. By clicking on the segment, the currently open input screen is closed and you return to the overview of the customers. Depending on the input screen that has been opened, one of the following areas of the customers level will then be displayed: • Sites / Applications • Devices
4	Depending on the input screen that is currently open, one of the following elements may be displayed: • Name of the site • Name of the report • Serial number of the device
5	Opens the specific input screen for configuring the site (see "Specific input screen for configuring the site" on page 93)
6	Opens the report template for displaying the measurement data
7	Opens the specific input screen for configuring an add-on that has been added to the site Multiple add-ons can be added to a site. A dedicated button is added to the title bar for each add-on.
8	Opens the wizard for adding new add-ons to the site that is currently open
9	Cogwheel symbol for selecting whether the buttons to open the application specific input screens or the buttons to open the generic input screens are displayed in the title bar.

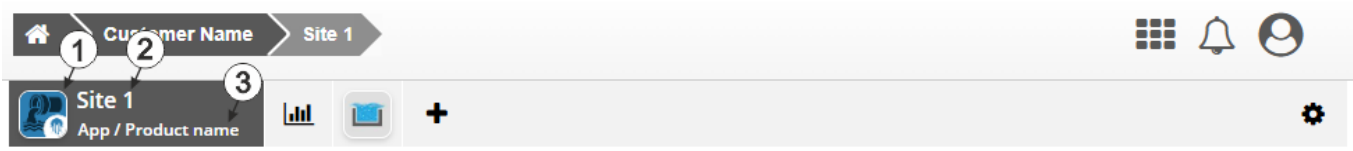


Title bar displaying the buttons to open the generic input screens

1	Opens the default input screen for configuring the site (see "Default input screen for configuring the site" on page 124)
2	Opens the default input screen for configuring the site in development mode (see "Default input screen for configuring the site in development mode" on page 134)
3	Opens the input screen for configuring the device connected to the site (see "Device configuration" on page 135)
4	Opens the default input screen for configuring the add-on

Buttons of the title bar in more detail

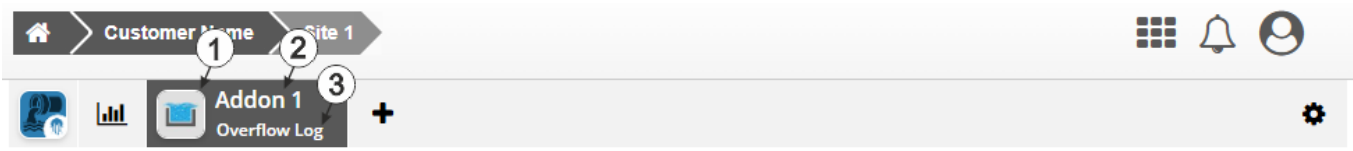
When clicking on the icon, the relevant button is expanded and shows additional information next to the Icon. The following screen shot shows the expanded button for opening the application specific input screen for configuring the site. The expanded button for opening the default input screen for configuring the site contains the same information.



Button to open the input screen for configuring the site in detail

1	Icon of the IoT application based on which the site has been created
2	Name of the site
3	Name of the IoT application based on which the site has been created or product name as indicated on the type plate (if stored in the device)

The following screen shot shows the expanded button for opening the application specific input screen for configuring the add-on. The expanded button for opening the default input screen for configuring the add-on contains the same information.



Button to open the input screen for configuring the add-on in detail

1	Icon of the add-on that has been added to the site
2	Freely selectable name for the add-on that has been added (Allows to distinguish the add-ons in case several of the same type are added to a site)
3	Name of the add-on defined by the add-on developer

9.2.1 Site configuration

Click on the name of the site in the list of sites to open the specific input screen for configuring the site. Clicking on the symbol to edit the site will take you to the default input screen for configuring the site (see "User manual for DATAEAGLE-Portal-Server " - upon request).

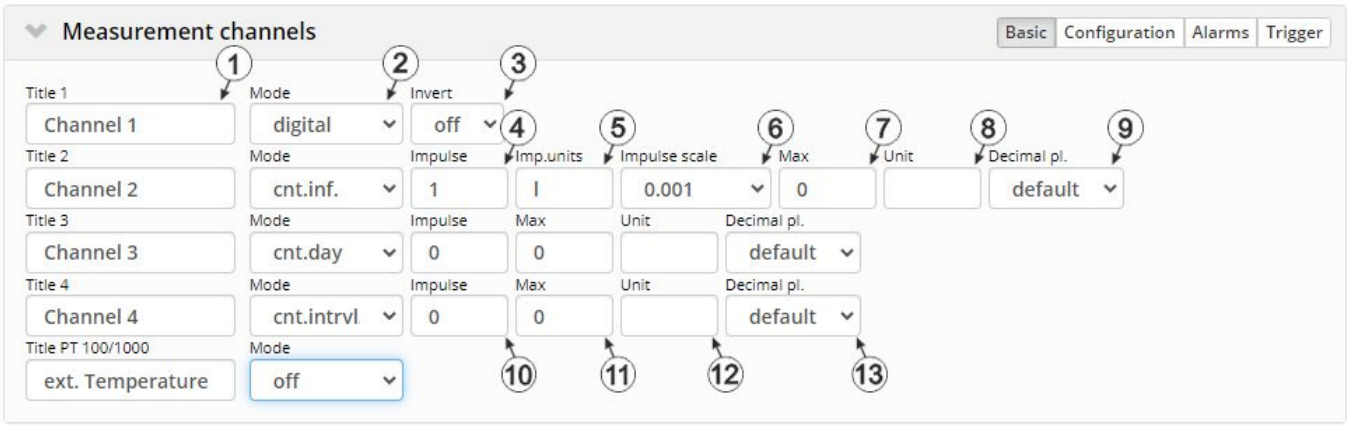
9.2.1.1 Specific input screen for configuring the site

You can access the specific input mask for configuring the site by clicking on the name of the site in the list of sites. The configuration sections contained therein are specific to the IoT application on which the site was created and are explained in detail below.

9.2.1.1.1 Measurement channels

Configuration section to configure the settings for the 4 universal inputs and the external temperature sensor. The basic settings are configured in the "Basic" tab. The advanced configuration of the measurement channel is done via the "config" tab, whereas the available caonfiguration parameters depend on the "mode" selected in the "Basic" tab. The "Alarms" tab is used to set alarm thresholds and the "trigger" tab to determine the trigger thresholds as well as the actions to be performed in case the trigger conditions are met.

9.2.1.1.1.1 Basic



"Measurement channels" configuration section, "Basic" tab (digital mode & counter modes)

1	Freely selectable channel title for the universal inputs Freely selectable channel title for the external temperature sensor	
2	Basic settings for the measurement channel	
	off	Measurement channel deactivated
	on	Measurement channel activated (only for external temperature sensor)
	xxx	Analogue and digital modes (only for the universal inputs, see following table)

Mode "digital"

3	Inverts the input signal

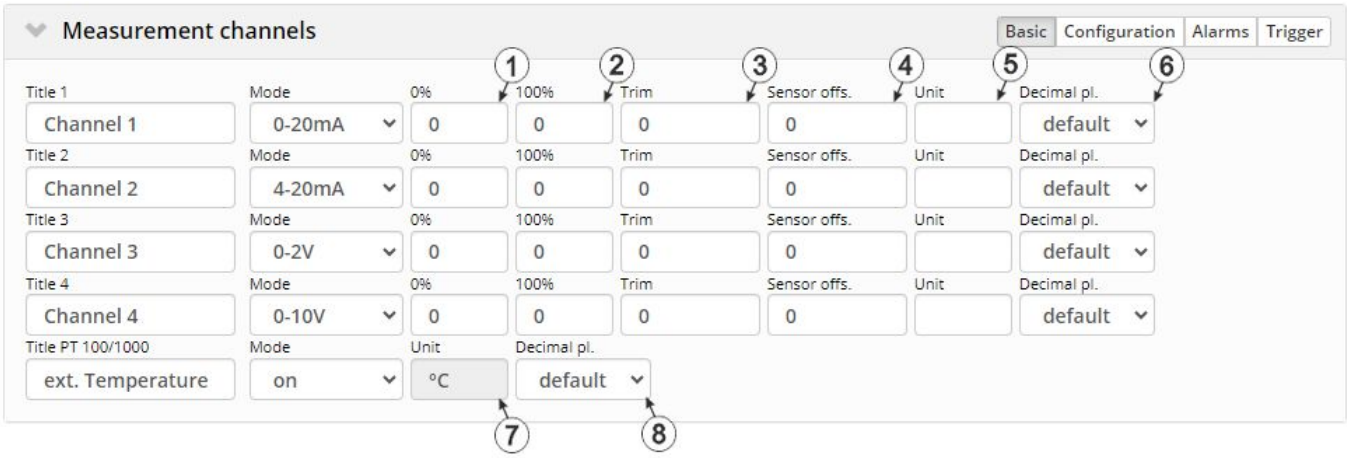
Mode "cnt.inf." - This mode is only available for universal inputs 1 and 2.

4	Counted measurand of a pulse in the "Imp. unit"
5	String, that specifies the measurement unit the impulses are delivered in
6	Factor with which the metered measurand of a pulse is multiplied to convert the "Imp. unit" to the "Unit" that is used by all of the display elements of the server (see "Additional information on configuring a infinite counter:" on page 95)
7	defines the upper end of the scale of the pointer instruments
8	String that is used as a measurement unit by all of the server display elements [0-8 characters]
9	Number of decimal places that are used by all of the server display elements

Modes "cnt.day [1)]" and "cnt.intrvl."

10	Counted measurand of a pulse in the measurement unit
11	defines the upper end of the scale of the pointer instruments
12	String that is used as a measurement unit by all of the server display elements [0-8 characters]
13	Number of decimal places that are used by all of the server display elements

[1)] The day counter is reset to the time zone selected via the "time zone" parameter in the "basic settings" configuration section (see "Basic settings" on page 121) at 00:00 hours.



"Measurement channels" configuration section, "Basic" tab (analogue modes)

Modes "0-20mA", "4-20mA", "0-2V" and "0-10V"

1	Start of the measurement range in the measurement unit
2	End of the measurement range in the measurement unit
3	is used to adjust the zero point(see "Additional explanation on the zero point adjustment and installation height of the sensor" on page 96)
4	indicates the mounting height of the sensor
5	String that is used as a measurement unit by all of the server display elements [0-8 characters]
6	Number of decimal places that are used by all of the server display elements

ext. temperature sensor

7	String that is used as measurement unit from all display elements of the server
8	Number of decimal places that are used by all of the server display elements

Note:

Additional information on configuring a infinite counter:

Assumption: *The meter provides one pulse per 5 l. The meter reading should be displayed in [m³] on the server interface*

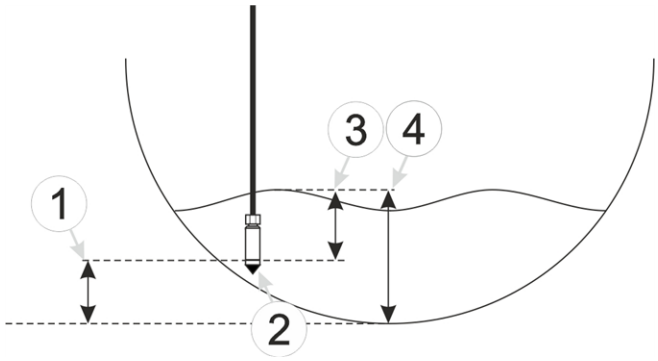
Required configuration

Parameter	***Value***
Impulse	*5*
Imp.unit	*l*
Impulse scale	*0.001*
Unit	*m³*

Note:

Additional explanation on the zero point adjustment and installation height of the sensor

Assumption: *Measurement range of the 4-20 mA pressure sensor 0-5 m*



Installation situation of the pressure sensor

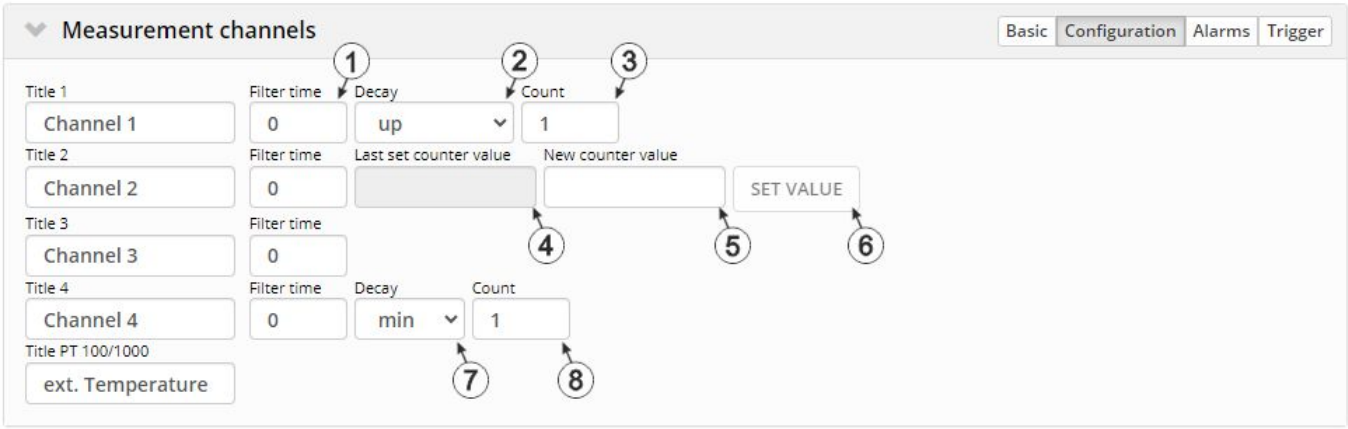
1 *Installation height: 15 cm*	**3** *Output value of the sensor: 6 cm*
2 *Pressure sensor*	**4** *Measured fill level: 20 cm*

Required configuration

Parameter	*Value*
Mode	*4-20 mA*
0 %	*0*
100 %	*5*
Trim	*-0.01*
Sensor offset	*0.15*
Unit	*m*

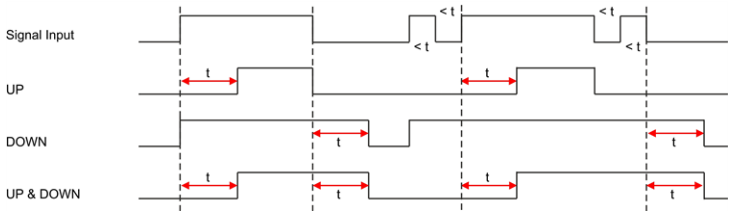
Explanation: *When comparing the measured fill level with the output value of the sensor taking the installation height into consideration, it was determined that the value was 1 cm too high. As the "Trim" and "Sensor offset." parameters are added to the scaled measurement value, this error can be balanced out by setting the "Trim" parameter value to -0.01 m.*

9.2.1.1.1.2 Configuration



"Measurement channels" configuration section, "Configuration" tab (digital mode & counter modes)

Mode "digital"

1	Time in [ms] during which the signal must remain constant to initiate a level change. Used to suppress brief faults (debouncing).	
2	Temporal function in the measurement cycle	
	off	Decay deactivated
	up	At least x consecutive measurement values must be "High" for "High" to be recorded.
	down	At least x consecutive measurement values must be "Low" for "Low" to be recorded.
	up&down	At least x consecutive measurement values must be "High" for "High" to be recorded. At least x consecutive measurement values must be "Low" for "Low" to be recorded.
		
3	Number of measurement values taken into consideration during the decay (max. 64). In theses modes, a measurement value is created upon expiry of the measurement cycle and when the input signal level is changed. The changes to the inputs are monitored at one second intervals.	

Mode "cnt.inf."

1	Time in [ms] during which the signal must remain constant to initiate a level change. Used to suppress brief faults (debouncing).
4	Value to which the counter was set during the last change via the "Set value" button. Designed to check whether the device has correctly accepted the required counter reading.
5	Field for entering the new counter reading
6	Button for accepting the new counter reading. This button can only be operated if the device is in online mode or Aloha mode is active.

Mode "cnt.day"

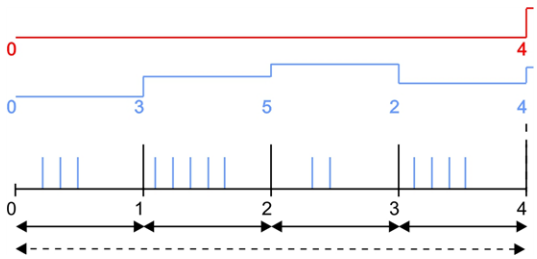
1	Time in [ms] during which the signal must remain constant to initiate a level change. Used to suppress brief faults (debouncing).

Mode "cnt.intrvl."

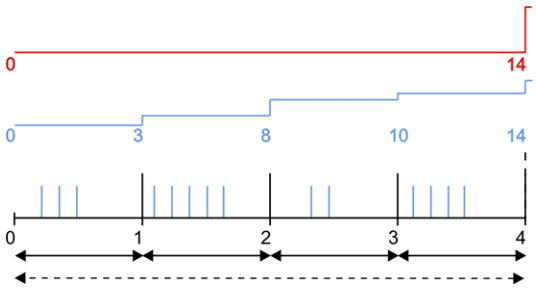
1	Time in [ms] during which the signal must remain constant to initiate a level change. Used to suppress brief faults (debouncing).	
7	Temporal function in the measurement cycle	
	off	Decay deactivated
	min	The minimum of the last x measurement values is recorded.
	max	The maximum of the last x measurement values is recorded.
	avg	The arithmetic mean of the last x measurement values is recorded.
	med	The median of the last x measurement values is recorded.
	rms	The root mean square of the last x measurement values is recorded.
	sum	The pulses are added up and are not reset every time a measurement value is generated but only after the measurement value has been recorded. This mode is thus recommended if the record interval is longer than the measurement cycle.
8	Number of measurement values taken into consideration during the decay (max. 64). This configuration parameter is not available if "sum" mode was selected for the decay.	

Note: *Additional explanation regarding the difference between "Cnt.Day" and "Cnt.Intrvl."*

Basic setting	◄- - - - - - - - ►	*Record interval*	*4 min.*	*Recorded value*	*red line*
	◄———►	*Measurement cycle*	*1 min.*	*Measurement value*	*blue line*

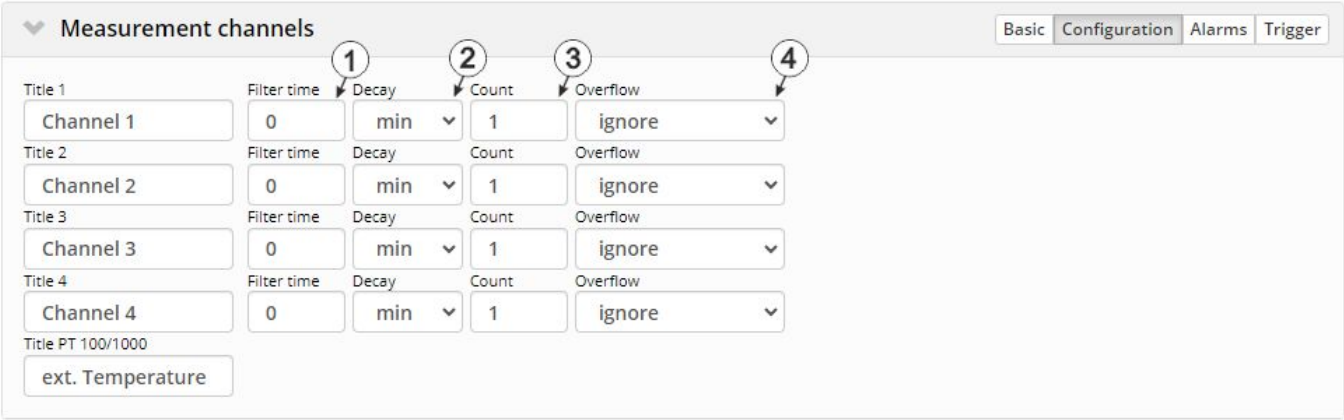


"Cnt.Intrvl." mode: The pulses are added up and reset every time a measurement value is generated.



"Cnt.Day" mode: All of the pulses up to the reset time are added up.

Note on "Cnt.Intrvl." mode: *If the record interval is longer than the measurement cycle, by default only the number of pulses registered the last time the measurement value was generated is recorded. If all pulses within a record interval should be collected and recorded, "sum" mode must be selected for the decay.*

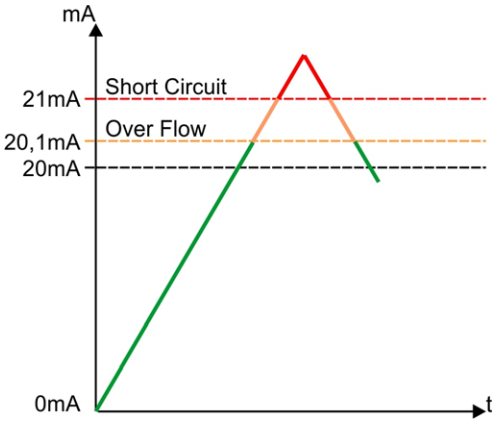


"Measurement channels" configuration section, "Configuration" (analogue modes)

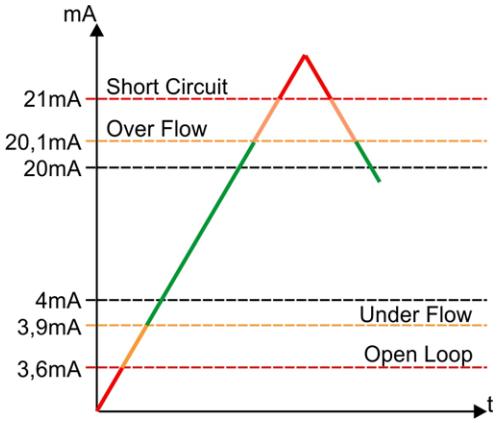
Modes "0-20mA", "4-20mA", "0-2V" and "0-10V"

1	Time in [ms] during which the analogue signal is averaged for signal smoothing. Used to suppress signal noise (also see "Output channels" on page 105).	
2	Temporal function in the measurement cycle	
	off	Decay deactivated
	min	The minimum of the last x measurement values is recorded.
	max	The maximum of the last x measurement values is recorded.
	avg	The arithmetic mean of the last x measurement values is recorded.
	med	The median of the last x measurement values is recorded.
	rms	The root mean square of the last x measurement values is recorded.
3	Number of measurement values taken into consideration during the decay (max. 64).	
4	Procedure in the event of measurement range violations	
	Ignore	The measurement value is calculated beyond the range limits.
	Silent cutoff	The measurement value is truncated at the range limits.
	NAMUR borders	Mode "0-20mA": • The error value "OF" (overflow) is issued if the measurement value is between 20.1 mA and 21 mA. • If the measurement value is above 21 mA, the error value "SC" (short circuit) is issued. Mode "4-20mA": • The error value "OL" (open loop) is issued, if the measurement value is below 3.6mA. • The error value "UF" (underflow) is issued if the measurement value is between 3.6mA and 3.9mA. • The error value "OF" (overflow) is issued if the measurement value is between 20.1 mA and 21 mA. • If the measurement value is above 21 mA, the error value "SC" (short circuit) is issued. Mode "0-2V": • The error value "OF" (overflow) is issued, if the measurement value is above 2.01 V. Mode "0-10V": • The error value "OF" (overflow) is issued, if the measurement value is above 10.05 V.

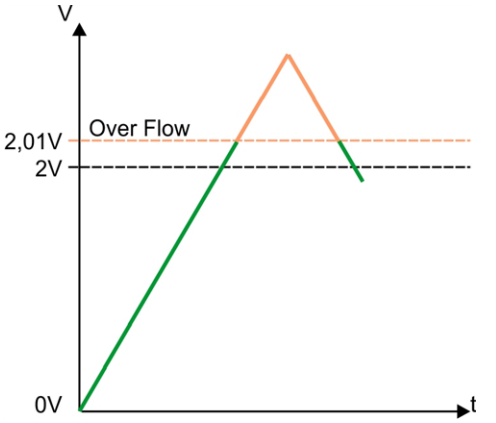
Note: *Additional explanation regarding the "NAMUR borders" overflow mode*



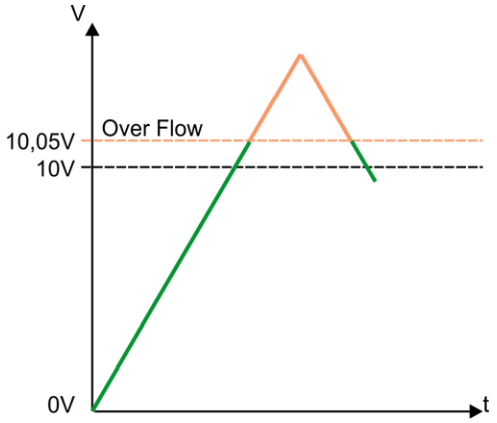
Mode "0-20mA"



Mode "4-20mA"



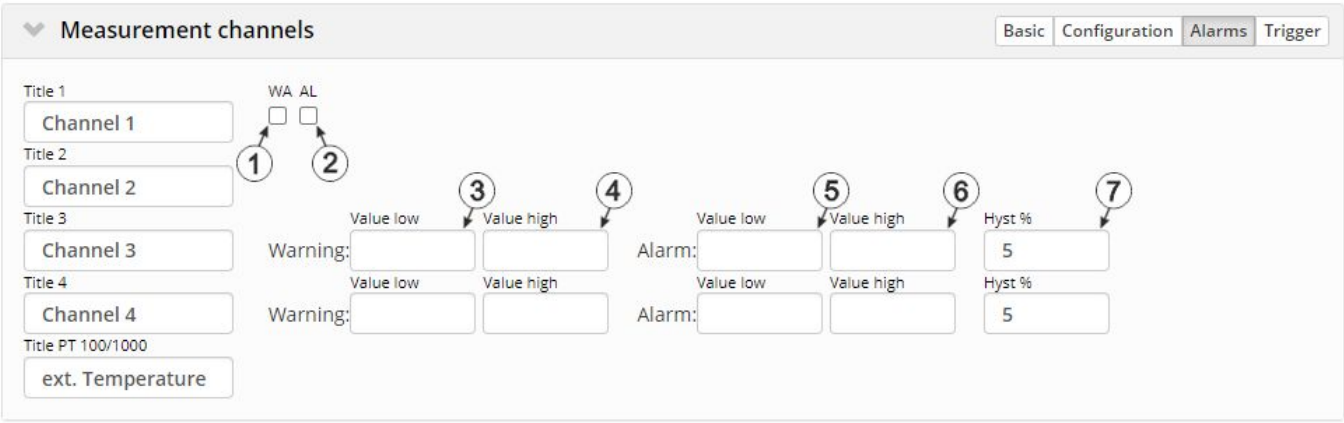
Mode "0-2V"



Mode "0-10V"

9.2.1.1.1.3 Alarms

> ***Note:*** *In the event of a warning or an alarm, an entry is always created in the alarm list and an immediate transmission is initiated. If the warning or the alarm is cancelled again, an immediate transmission follows.*



"Measurement channels" configuration section, "Alarms" tab

Mode "digital"

1	A "high" at the universal input triggers a "warning".
2	A "high" at the universal input triggers an "alarm".

Mode "cnt.inf."

-	The alarms are not available for universal inputs that are operated in cnt.inf. mode.

All other modes (incl. "ext. temperature sensor")

3	A warning is triggered, if the measurement value drops to or below this value.
4	A warning is triggered, if the measurement value meets or exceeds this value.
5	An alarm is triggered, if the measurement value drops to or below this value.
6	An alarm is triggered, if the measurement value meets or exceeds this value.
7	Hysteresis for all-clear in event of alarm/warning (e.g. Hyst=5 %, alarm or warning at 100 -> all-clear at 95)

9.2.1.1.1.4 Trigger

If an universal input is operated in digital mode, there are two different types of triggers:

- Event trigger (RI, XM)

  In contrast to the level triggers, the relevant operation (e.g. record immediately) is only executed once when the trigger event occurs. With the help of the "Edge" configuration parameter, it is specified whether the rising, falling or both edges initiate the trigger event.

- Level trigger (ON, RA, OS, O3, OD, QX)

  A "high" at the universal input initiates the trigger. A "low" at the universal input resets the trigger. The relevant operation (e.g. use alternative record interval) is executed as long as the trigger is active. The option selected via the "Edge" configuration parameter is not relevant to the level trigger. If it is necessary for the trigger to be initiated by a "low" at the universal input and for it to be reset by a "high", the input signal must then be inverted using the "Invert" configuration parameter located in the "Basis" tab.

These two types of triggers are also differentiated in other universal input modes with the exception of "cnt.inf." mode:

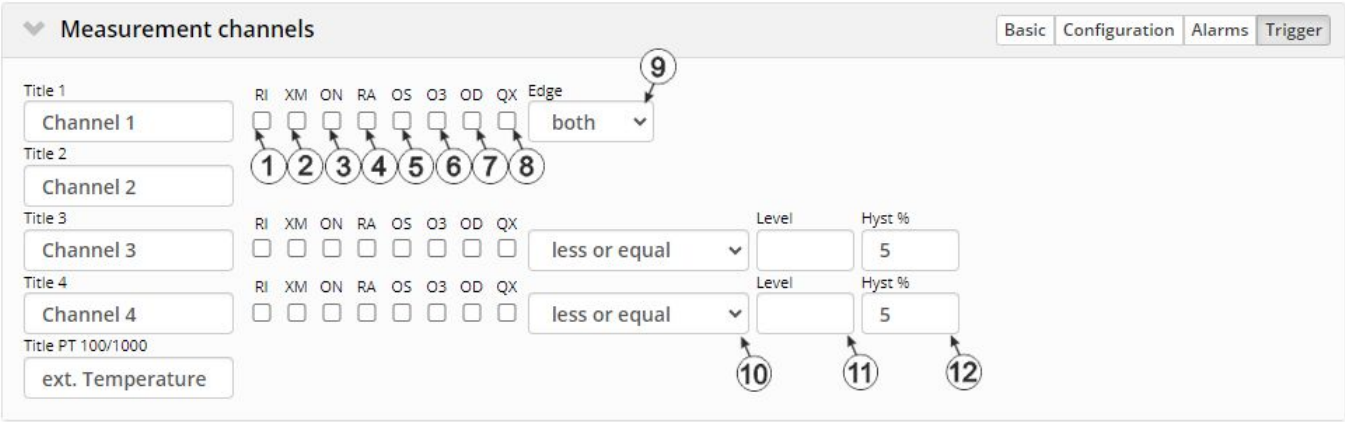
- Event trigger (RI, XM)

  The relevant operation (e.g. initiate transmission) is only executed once when the trigger event occurs.

- Level trigger (ON, RA, OS, O3, OD, QX)

  The relevant operation (e.g. activate online mode) is executed as long as the trigger is active.

The triggers are not available for universal inputs that are operated in "cnt.inf." mode.



"Measurement channels" configuration section, "Trigger" tab

	Event trigger:
1	Execute recording immediately
2	Initiate transmission
	Level trigger:
3	Activate online mode
4	The alternative record interval should be used.
5	If this checkbox has been selected, the setpoint at the switchable sensor supply output VOUT is controlled by the trigger function. The setpoint entered via the interface is ignored in that case. The output channel is normally set to "off (Low)" and switches to "on (High)" if trigger is active. However, if "invert" is active for the output channel, the procedure just described is reversed. The selected output voltage is taken into account in any case. See "Example for explaining the release of the setpoint at the output via the trigger (output in "digital" mode)" on page 109.
6	If this checkbox has been selected, the setpoint at the switchable sensor supply output VEXT is controlled by the trigger function. The setpoint entered via the interface is ignored in that case. The output channel is normally set to "off (Low)" and switches to "on (High)" if trigger is active. However, if "invert" is active for the output channel, the procedure just described is reversed.
7	Output in mode "digital": If this checkbox has been selected, the setpoint at the isolated switch contact (NO, CC) is controlled by the trigger function. The setpoint entered via the interface is ignored in that case.The output channel is normally set to "off (contact open)" and switches to "on (contact closed)" if trigger is active. However, if "invert" is active for the output channel, the procedure just described is reversed. Output in mode "Freq" or "Impulse": If this checkbox has been selected, the output of the frequency or the impulses/min at the isolated switch contact (NO, CC) is only released when trigger is active. When trigger is not active, the output channel is set to "off (contact open)".
8	The alternative transmission cycle should be used.

Mode "digital"

9	Event trigger: Selection of the edge at which the trigger should be initiated Level trigger: not relevant. The trigger is active as long as the measurement value is "High".	
	rising	The rising edge initiates the trigger.
	falling	The falling edge initiates the trigger.
	both	Both edges initiate the trigger.

Mode "cnt.inf."

-	The triggers are not available for universal inputs that are operated in cnt.inf. mode.

ext. temperature sensor

-	The triggers are not available for the external temperature sensor.

All other modes

10	Selection if the corresponding action is to be performed upon exceeding or falling below the value entered in the "level" field	
	greater or equal	Event trigger: The trigger is initiated if the measurement value meets or exceeds this value. Level trigger: The trigger is active as long as the measurement value is higher than the level or equal to the level.
	less or equal	Event trigger: The trigger is initiated if the measurement value drops to or falls below this value. Level trigger: The trigger is active as long as the measurement value is lower than the level or equal to the level.
11	Levels for initiating the trigger. The hysteresis is used to determine the level to reset the trigger.	
12	Hysteresis for revoking the trigger (e.g. hyst=5 %, level = greater or equal, trigger at 100 -> all-clear at 95)	

Note: *If one of the "OS", "O3" or "OD" checkboxes has been selected on several measurement channels (this also applies to internal measurement channels), the setpoint output for the corresponding output channel is released as soon as the trigger is active on one of the measurement channels, i.e. it is an "or" conjunction.*

9.2.1.1.2 Output channels

Configuration section to configure the settings for the 2 switchable voltage outputs (supply of sensors) and the isolated switch contact (control of an actuator).

"Output channels" configuration section, mode "Ext. warmup time"

1	Indicates the amount of time that an output channel is switched on in "Ext warmup time" mode before the measurement
2	freely selectable designation for the output channel "switchable sensor supply (VOUT)"
3	freely selectable designation for the output channel "switchable 3,3 V supply (VEXT)"
4	freely selectable designation for the output channel "isolated switch contact (NO, CC)"
5	Basic setting for the output channel

Note: *Note that the power consumption increases significantly when "Freq" mode is activated. When using a rechargeable battery pack (e.g. DATAEAGLE 702x Akkupack V3) or battery pack (e.g. PSU713 BP) , the running time to be reached might thus be reduced to 1/6.*

Off	Output channel deactivated
Ext. warmup time	The output channel is switched on "Ext. warmup time" seconds prior to the measurement. If the value is "0", the output channel is not switched on at all.The output channel is also turned on during Aloha transmission mode to ensure the determination of valid sensor readings.
Digital	Digital output
GPS [1)]	Reserved for extensions
Freq [2)]	Frequency output
Pulse [2)]	Pulse output (pulse/min.)

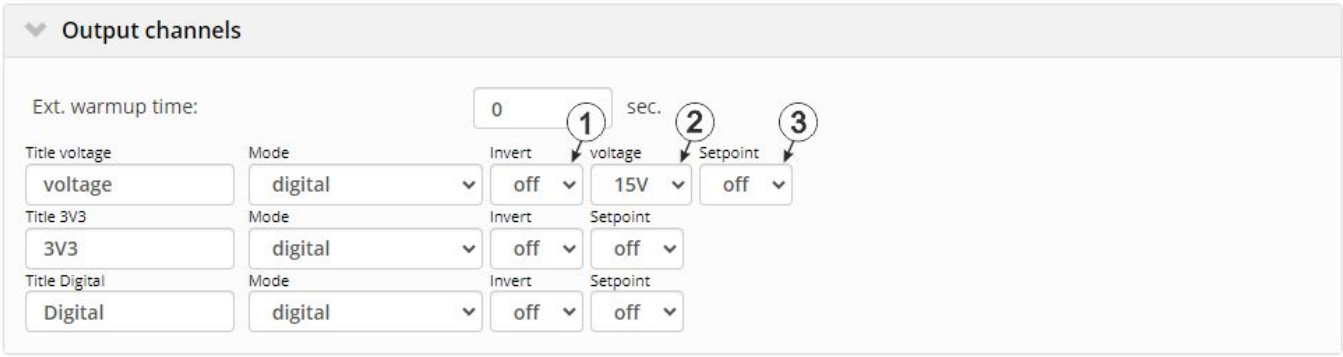
Mode "Ext. warmup time"

6	Selection of the output voltage [3)]

[1)] This mode is only available for switchable sensor supply output VEXT.

[2)] These modes are only available for the isolated switch contact (NO, CC).

[3)] Selection of the output voltage is only possible for the switchable sensor supply VOUT.

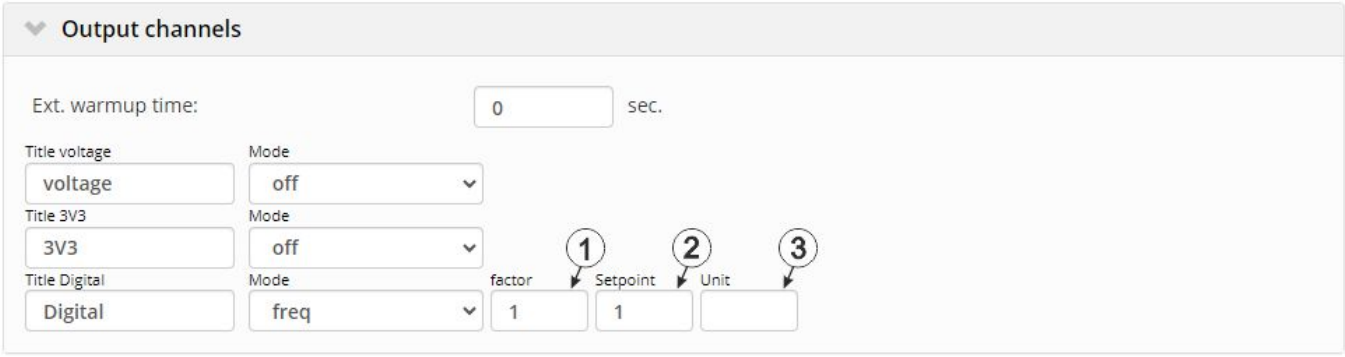


"Output channels" configuration section, "Digital" mode

Mode "Digital"

1	Inverts the level issued on the device
2	Selection of the output voltage [1)]
3	Setpoint (on/off) that should be issued ***Note:*** *If one of the checkboxes "OS", "O3" or "OD" is selected in the "Trigger" tab of the configuration sections "Measurement channels" or "Internal channels", the "setpoint" entered here is ignored for the corresponding output channel.*

[1)] Selection of the output voltage is only possible for the switchable sensor supply VOUT.



"Output channels" configuration section, "Freq" or "Pulse" mode

"Freq" mode[1)]

1	The setpoint multiplied by the factor equals the frequency in Hertz. The result of the multiplication must not exceed 1000 Hz.
2	The setpoint multiplied by the factor equals the frequency in Hertz. The result of the multiplication must not exceed 1000 Hz.
3	String that is used as a measurement unit by all of the server display elements [0-8 characters]

"Pulse" mode [1)]

1	The setpoint multiplied by the factor equals the pulse/min. The result of the multiplication must not exceed 320 pulses/min.
2	The setpoint multiplied by the factor equals the pulse/min. The result of the multiplication must not exceed 320 pulses/min.
3	String that is used as a measurement unit by all of the server display elements [0-8 characters]

[1)] These modes are only available for the isolated switch contact (NO, CC).

Note:

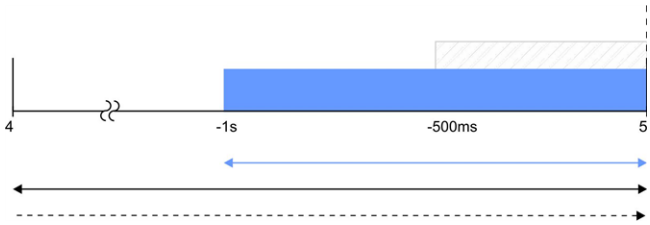
Additional explanation on "Digital" mode

Invert	***Setpoint***		***Output on the device***
Off	*Off*	=	*Off (low)*
Off	*On*	=	*On (high)*
On	*Off*	=	*On (high)*
On	*On*	=	*Off (low)*

Note:

Example to explain the filter time in conjunction with the Ext. warmup time

Basic setting		*Record interval*	*5min.*
		Measurement cycle	*1min.*
Output channels		*Ext. warmup time*	*1sec.*
Measurement channels ->Config.		*Filter time*	*500ms*
Output on the device		*Sensor supply*	



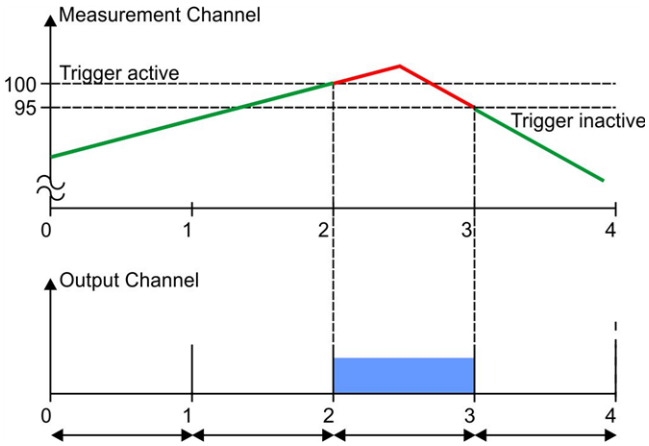
Explanation: *The sensor supply is always activated 1sec before expiry of the measurement cycle. The filter time starts 500ms before expiry of the measurement cycle, which ensures that a valid value is available at the time of a measurement. However, this also means that the filter time must be taken into consideration when selecting the Ext. warmup time. In the current example, the sensor connected to the input must at the latest supply stable values 500ms following activation of the sensor supply. Otherwise, invalid values would be taken into consideration while averaging during the filter time resulting in the measurement value being distorted.*

Note:

Example for explaining the release of the setpoint at the output via the trigger (output in "digital" mode)

Basic settings	⟷	*Measurement cycle*	*1min.*
Measurement channels -> Trigger		*OS*	*Selected*
		Threshold	*Greater or equal 100*
		Hyst %	*5*
Output channels		*Mode*	*Digital*
		Invert	*Off*
		Setpoint	*On*

Trigger not active		*Green line*
Trigger active		*Red line*
Output on the device		*Sensor supply*



Initial situation:*One of the measurement channels should be used to determine the switching state at the output channel depending on the measurement value using the trigger. If one of the checkboxes "OS" (switchable sensor supply VOUT), "O3" (switchable 3,3 V supply VEXT) or "OD" (isolated switch contact) in the "Trigger" tab of the "Measurement channels" configuration section (see "Measurement channels" on page 93) is selected for one of the measurement channels, the output of the setpoint for the corresponding output channel is set to "off (Low)".*

Explanation: *The output on the device is set to "off (Low)" up to the time of 2, as the measurement value on the measurement channel is below the trigger level. The trigger is active from the time of 2, which sets the ouput to "on (High)". At the time of 3, the output channel is ultimately set to "off (Low)" again as the measurement value falls below the "Level - hyst" value (100-5=95).*

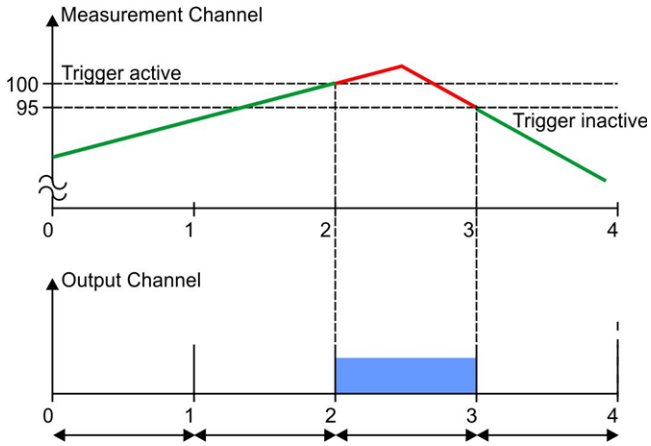
Additional specification: *If one of the checkboxes ("OS", "O3" or "OD") is selcected, the "setpoint" entered via the interface is ignored for the corresponding output channel. However, the parameter "invert" is taken into account. If "invert" is active for the output channel, the switching states at the output are exactly reversed compared to the example above (i.e. the output channel is set to "on (High)" with inactive trigger). For the ouput channel "switchable sensor supply (VOUT)", the parameter "Voltage" (i.e. the selection of the output voltage) is also considered.*

Note:

Example for explaining the release of the setpoint at the output via the trigger (output in "Freq" or "Pulse" mode)

Basic settings	⟷	*Measurement cycle*	*1 min.*
Measurement channels -> Trigger		*OD*	*Selected*
		Threshold	*Greater or equal 100*
		Hyst %	*5*
Output channels		*Mode*	*Freq*
		Factor	*5*
		Setpoint	*10*

Trigger not active		*Green line*
Trigger active		*Red line*
Output on the device		*Isolated switch contact*



Initial situation: *To begin with, the output channel "isolated switch contact (NO, CC)" is configured so that the desired frequency is output at the isolated switch contact of the device. For this purpose, the mode "Freq" is selected and the frequency is defined via the parameters "Factor" and "Setpoint" (the setpoint multiplied by the factor gives the frequency in Hertz). Subsequently, one of the measurement channels is to be used to release the frequency output depending on the measurement value using the triggers. If the "OD" (isolated switch contact) checkbox is selected in the "Trigger" tab of the "Measurement channels" configuration section (see "Measurement channels" on page 93) for one of the measurement channels, the output of the frequency for the isolated switch contact is blocked at the time of the next measurement, provided the trigger for this measurement channel is not active. The switch contact is open and remains in this state.*

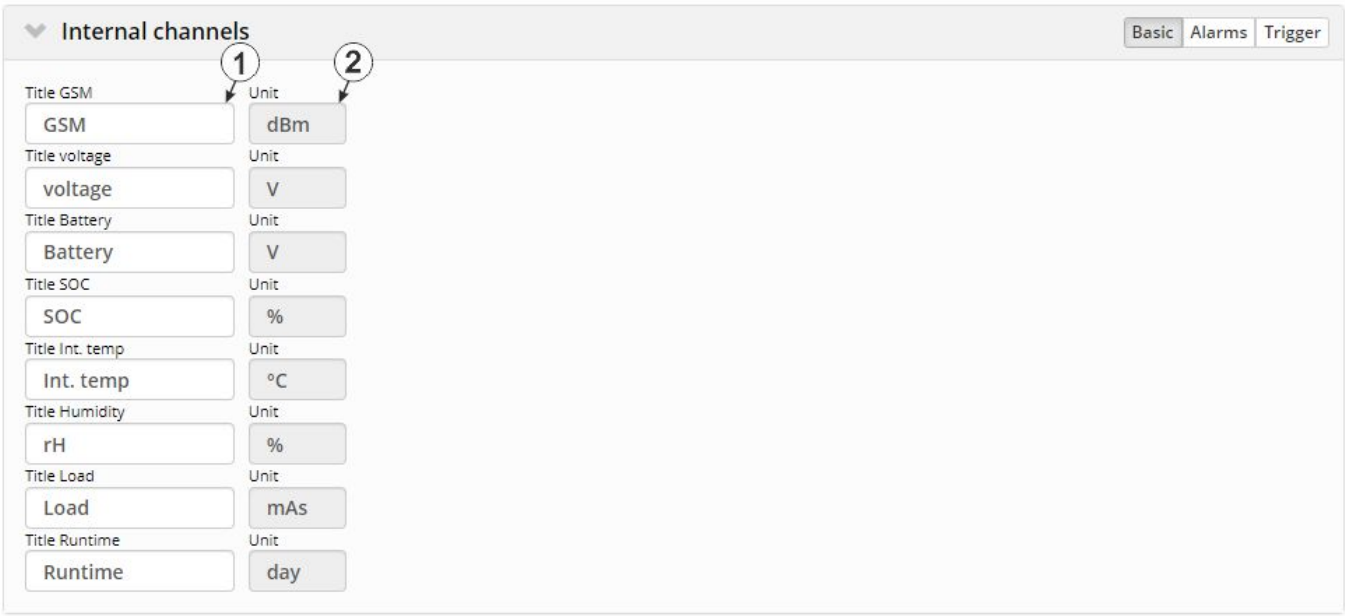
Explanation: *The isolated switch contact is inactive up to the time of 2, as the measurement value on the measurement channel is below the trigger level. The trigger is active from the time of 2, which releases the ouput of the frequency at the output. The switch contact is continuously opened and closed at the set frequency. At time 3, the frequency output is ultimately disabled again as the measurement value falls below the "Threshold - Hyst" value (100-5=95). The switch contact is open and remains in this state.*

Additional specification: *If the "isolated switch contact (NO, CC)" output channel is operated in "Pulse" mode, the behaviour is similar to that described above. In this case, the "Factor" and "Setpoint" parameters are used to specify how many pulses per minute are to be output. Between times 2 and 3, instead of a frequency pulses are output via opening and closing the switch contact in this mode.*

9.2.1.1.3 Internal channels

Configuration section to configure the settings for the internal channels (e.g. mobile network signal strength or state of charge). The designation of the individual channels can be determined via the "Basic" tab. The "Alarms" tab is used to enter the alarm thresholds and the via the "Trigger" tab the trigger thresholds and the actions to be performed if the trigger conditions are met are determined.

9.2.1.1.3.1 Basic



"Internal channels" configuration section, "Basic" tab

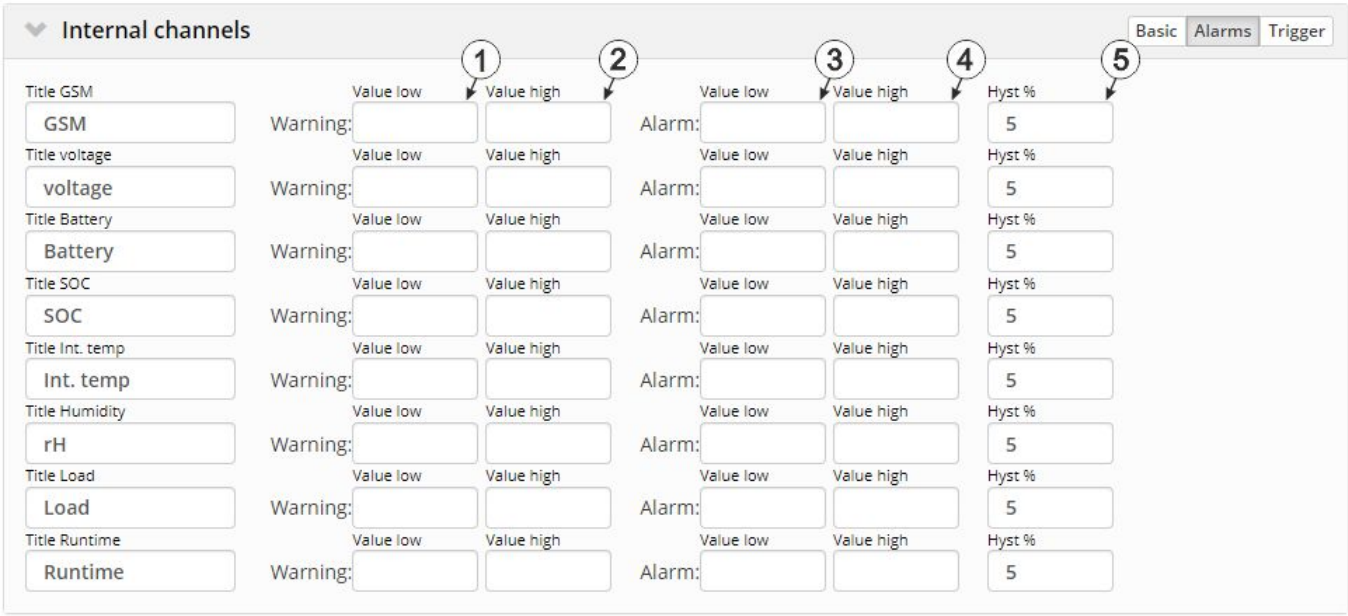
1	Freely selectable channel title for:	
	GSM	the mobile network signal strength
	voltage	the external supply or charging voltage (V IN)
	battery	the internal battery or rechargeable battery voltage
	SOC	the State of Charge of the internal battery or internal rechargeable battery[1)]
	int. temp	the internal device temperature
	rH	the humidity in the housing
	Load	the energy consumption between two records
	Runtime	the expected remaining operating time of the instrument while maintaining the configuration[2)]
2	String that is used as measurement unit from all display elements of the server	

[1)] To find out why, in rare cases, the battery may be depleted before the SoC reaches 0, please refer to the chapter "Determining the State of Charge (SoC) " on page 42

[2)] To find out how you can optimise device runtime, see the chapter "Factors affecting the device service life" on page 42

9.2.1.1.3.2 Alarms

> ***Note:*** *In the event of a warning or an alarm, an entry is always created in the alarm list and an immediate transmission is initiated. If the warning or the alarm is cancelled again, an immediate transmission follows.*



"Internal channels" configuration section, "Alarms" tab

1	A warning is triggered, if the measurement value drops to or below this value.
2	A warning is triggered, if the measurement value meets or exceeds this value.
3	An alarm is triggered, if the measurement value drops to or below this value.
4	An alarm is triggered, if the measurement value meets or exceeds this value.
5	Hysteresis for all-clear in event of alarm/warning (e.g. Hyst=5 %, alarm or warning at 100 -> all-clear at 95)

9.2.1.1.3.3 Trigger

The following two type of triggers are differentiated:

- Event trigger (RI, XM)

  The relevant operation (e.g. initiate transmission) is only executed once when the trigger event occurs.

- Level trigger (ON, RA, OS, O3, OD, QX)

  The relevant operation (e.g. activate online mode) is executed as long as the trigger is active.

"Internal channels" configuration section, "Trigger" tab

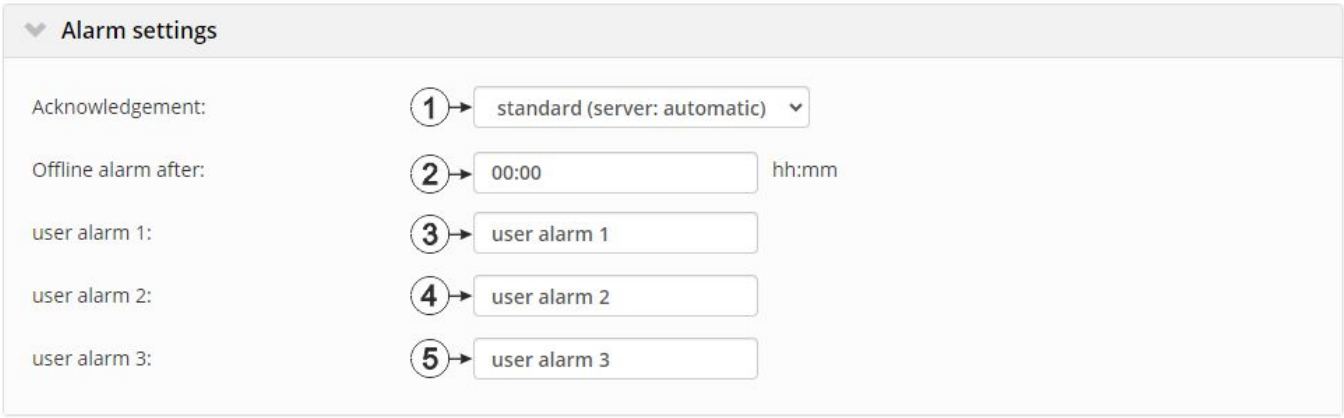
	Event trigger:
1	Execute recording immediately
2	Initiate transmission
	Level trigger:
3	Activate online mode
4	The alternative record interval should be used.
5	If this checkbox has been selected, the setpoint at the switchable sensor supply output VOUT is controlled by the trigger function. The setpoint entered via the interface is ignored in that case. The output channel is normally set to "off (Low)" and switches to "on (High)" if trigger is active. However, if "invert" is active for the output channel, the procedure just described is reversed. The selected output voltage is taken into account in any case. See "Example for explaining the release of the setpoint at the output via the trigger (output in "digital" mode)" on page 109.
6	If this checkbox has been selected, the setpoint at the switchable sensor supply output VEXT is controlled by the trigger function. The setpoint entered via the interface is ignored in that case. The output channel is normally set to "off (Low)" and switches to "on (High)" if trigger is active. However, if "invert" is active for the output channel, the procedure just described is reversed.
7	Output in mode "digital": If this checkbox has been selected, the setpoint at the isolated switch contact (NO, CC) is controlled by the trigger function. The setpoint entered via the interface is ignored in that case.The output channel is normally set to "off (contact open)" and switches to "on (contact closed)" if trigger is active. However, if "invert" is active for the output channel, the procedure just described is reversed. Output in mode "Freq" or "Impulse": If this checkbox has been selected, the output of the frequency or the impulses/min at the isolated switch contact (NO, CC) is only released when trigger is active. When trigger is not active, the output channel is set to "off (contact open)".
8	The alternative transmission cycle should be used.

	General:	
9	Selection if the corresponding action is to be performed upon exceeding or falling below the value entered in the "level" field	
	Greater or equal	Event trigger: The trigger is initiated if the measurement value meets or exceeds this value. Level trigger: The trigger is active as long as the measurement value is higher than the level or equal to the level.
	Less or equal	Event trigger: The trigger is initiated if the measurement value drops to or falls below this value. Level trigger: The trigger is active as long as the measurement value is lower than the level or equal to the level.
10	Levels for initiating the trigger. The hysteresis is used to determine the level to reset the trigger.	
11	Hysteresis for revoking the trigger (e.g. hyst=5 %, level = greater or equal, trigger at 100 -> all-clear at 95)	

Note: *If one of the "OS", "O3" or "OD" checkboxes has been selected on several measurement channels (this also applies to internal measurement channels), the setpoint output for the corresponding output channel is released as soon as the trigger is active on one of the measurement channels, i.e. it is an "or" conjunction.*

9.2.1.1.4 Alarm settings

Configuration section to determine how to aknowledge alarms and after how much time an "Offline alarm" should be triggered if the device does not report to the server for a longer period of time.



"Alarm settings" configuration section

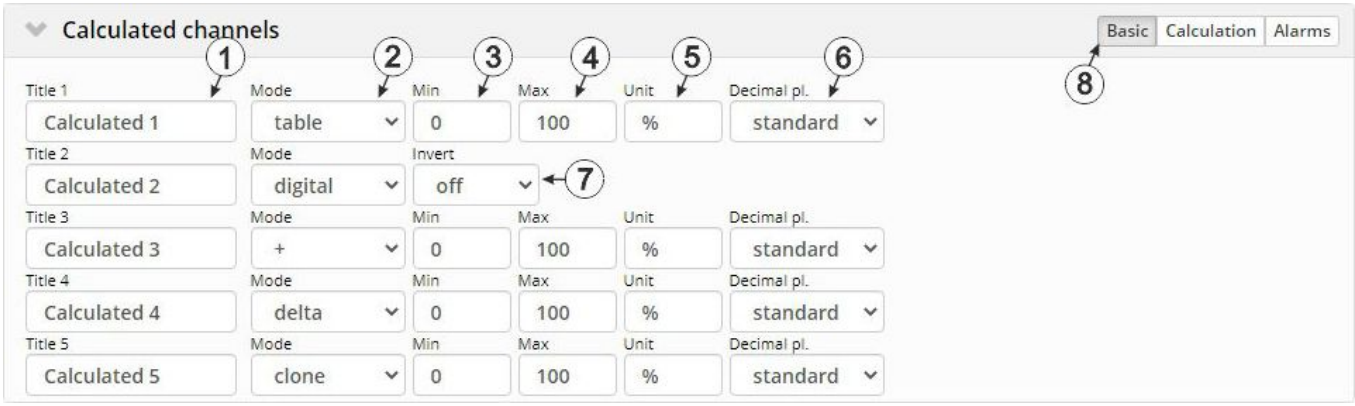
1	Selection of how alarms should be acknowledged	
	Standard	The global server setting is used to determine whether alarms must be acknowledged automatically or manually (see "User manual for DATAEAGLE-Portal-Server " - upon request).
	automatic	Alarms are acknowledged automatically as soon as all of the messages have been sent. If SMS that have a tariff with a delivery confirmation function have also been sent, acknowledgement is provided after delivery confirmation.
	manual	Alarms must be acknowledged by the user.
2	alarm in the event that the device does not report for longer than the set time (00:00 alarm deactivated).	
3	Freely selectable title for user-defined alarm 1. If the user-defined alarm 1 is triggered by a device connected to the site, the server will use this text to signal the alarm. The same applies to user-defined alarm 2 and 3.	
4	Freely selectable title for user-defined alarm 2	
5	Freely selectable title for user-defined alarm 3	

9.2.1.1.5 Calculated channels

In the "Basic" tab, the basic settings are configured and in the "Calculation" tab the advanced configurations are set, whereas the parameters to configure depend on the "mode" selected in the "Basic" tab.

> ***Note:*** *The values of the calculated channels are directly calculated for every data output (display on the server or download from the server). They are not saved in the server database.*

9.2.1.1.5.1 Basic

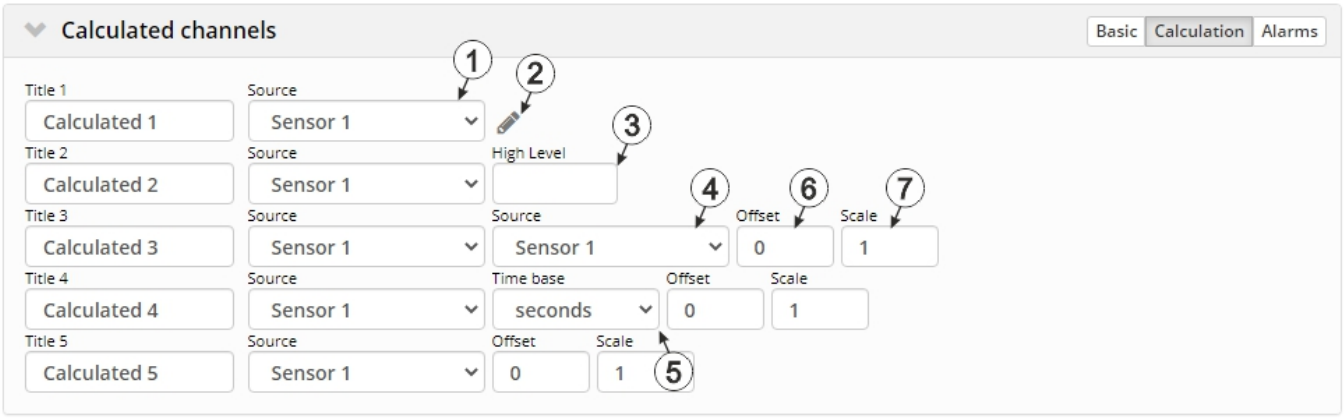


"Calculated channels" configuration section, "Basic" tab

1	Freely selectable channel title for the calculated channels [0-16 characters]	
2	Possible calculation modes for the calculated channels	
	Off	Calculated channel deactivated
	Table	Determines the value for the calculated channel by searching for the row corresponding to the value of a measurement channel in the reference point table. Such a row is made up of the "Measurement channel value" and "Output value for calculated channel" pair of values. Linear interpolation is carried out between the table rows; linear extrapolation is used for values outside the defined table.
	Digital	Converts an analogue value into a digital value. The threshold from which an analogue value is interpreted as "high" can be selected via the "High level" parameter in the "Calculation" tab. In addition the determined digital value can be inverted via the "Invert" parameter.
	+, -, x, /	Links the values of two measurement channels using a mathematic operation (addition, subtraction, multiplication or division)
	Delta	Determines the difference between two measurement values and divides the result by the time difference between the time stamps of the measurement values. The time unit (value/sec., value/min., ...) for the result can be selected via the "Time basis" parameter located in the "Calculation" tab. It is thus possible to convert counter readings (m^3) of the source into a flow rate (m^3/min.) (see "Additional explanation: Delta mode" on page 130).
	clone	Creates a clone of a measurement channel. This ensures it is possible to rename channels, to select different ends of the scale for the pointer instruments, to determine a new string as a measurement unit and to adjust the number of decimal places. The measurement values (numerical value without unit) correspond exactly to those of the source.
3	Defines the lower scale end of the pointer instruments	
4	Defines the upper scale end of the pointer instruments in reports	
5	String that is used as a measurement unit by all of the server display elements [0-16 characters]. It has no direct influence on the values	
6	Number of decimal places that are used by all of the server display elements	

7	Inverts the input signal (only for calculated channels in "Digital" mode)
8	Buttons to switch between the individual tabs of the configuration section

9.2.1.1.5.2 Calculation



"Calculated channels" configuration section, "Calculation" tab

"Table" calculation mode

1	Selection of the channel from which the input data is used
2	Opens the screen for entering the reference point table (the table rows are interpolated linearly, values outside of the defined table are extrapolated linearly.)

"Digital" calculation mode

1	Selection of the channel from which the input data is used
3	Signal recognition level

Calculation mode "+", "-", "x" or "/"

1	Selection of the channel from which the input data is used
4	Selection of the second channel from which the input data is used
6	Offset that is added following multiplication with the "Factor" parameter
7	Factor with which the result of the mathematical operation (+, -, x, /) is multiplied. The "Offset" parameter is then added.

"Delta" calculation mode

1	Selection of the channel from which the input data is used
5	Specifies the desired time unit (value/sec., value/min., ...) for the result
6	Offset that is added following multiplication with the "Factor" parameter. The result is converted in to the desired time unit before multiplication with the "Factor" parameter.
7	Factor with which the result is multiplied once it has been converted into the desired time unit. The "Offset" parameter is then added.

"Clone" calculation mode

1	Selection of the channel from which the input data is used
6	Offset that is added following multiplication with the "Factor" parameter
7	Factor with which the value of the measurement channel to be cloned is multiplied. The "Offset" parameter is then added.

Note:

Additional explanation: Delta mode

Assumption: *The source channel contains the counter reading of an infinite counter in m^3. The calculated channel 1 should contain the flow rate in m^3/s and calculated channel 2 should contain the flow rate in l/h.*

Required configuration

Parameter	*Value channel 1*	*Value channel 2*
Basis -> mode	*Delta*	*Delta*
Basis -> unit	*m^3/s*	*l/h*
Calculation -> time basis	*Seconds*	*Hours*
Calculation -> offset	*0*	*0*
Calculation -> factor	*1*	*1000*

Source		*Calculated channel 1*	*Calculated channel 2*
Date/time	*Infinite counter [m^3]*	*Flow rate [m^3/s]*	*Flow rate [l/h]*
26.03.2013 12:50	*900*	*0 [1)]*	*0 [1)]*
26.03.2013 12:51	*960*	*1*	*3,600,000*
26.03.2013 12:52	*990*	*0.5*	*1,800,000*
26.03.2013 12:53	*1005*	*0.25*	*900,000*
26.03.2013 12:54	*1065*	*1*	*3,600,000*

[1)] Calculation not possible as there is no measurement value before 12:50.

Explanation: *No values can be determined for the measurement at 12:50 for the calculated channels as there is no previous value and the difference between the counter readings cannot be determined. For the measurement at 12:51, the difference to the counter reading is 60 m^3 and the time difference is 60 sec.*

Result = { (value difference / time difference [sec.]) * time basis [sec] * factor } + offset

The result for calculated channel 1 (time basis "Seconds", offset "0" and factor "1") is calculated as follows:

Channel 1 = { (60 m^3 / 60 sec.) * 1 * 1 } + 0 = 1 m^3/s

The result for calculated channel 2 (time basis "Hours", offset "0" and factor "1000") is calculated as follows:

Channel 2 = { (60 m^3 / 60 sec.) * 3600 * 1000 } + 0 = 3,600,000 l/h

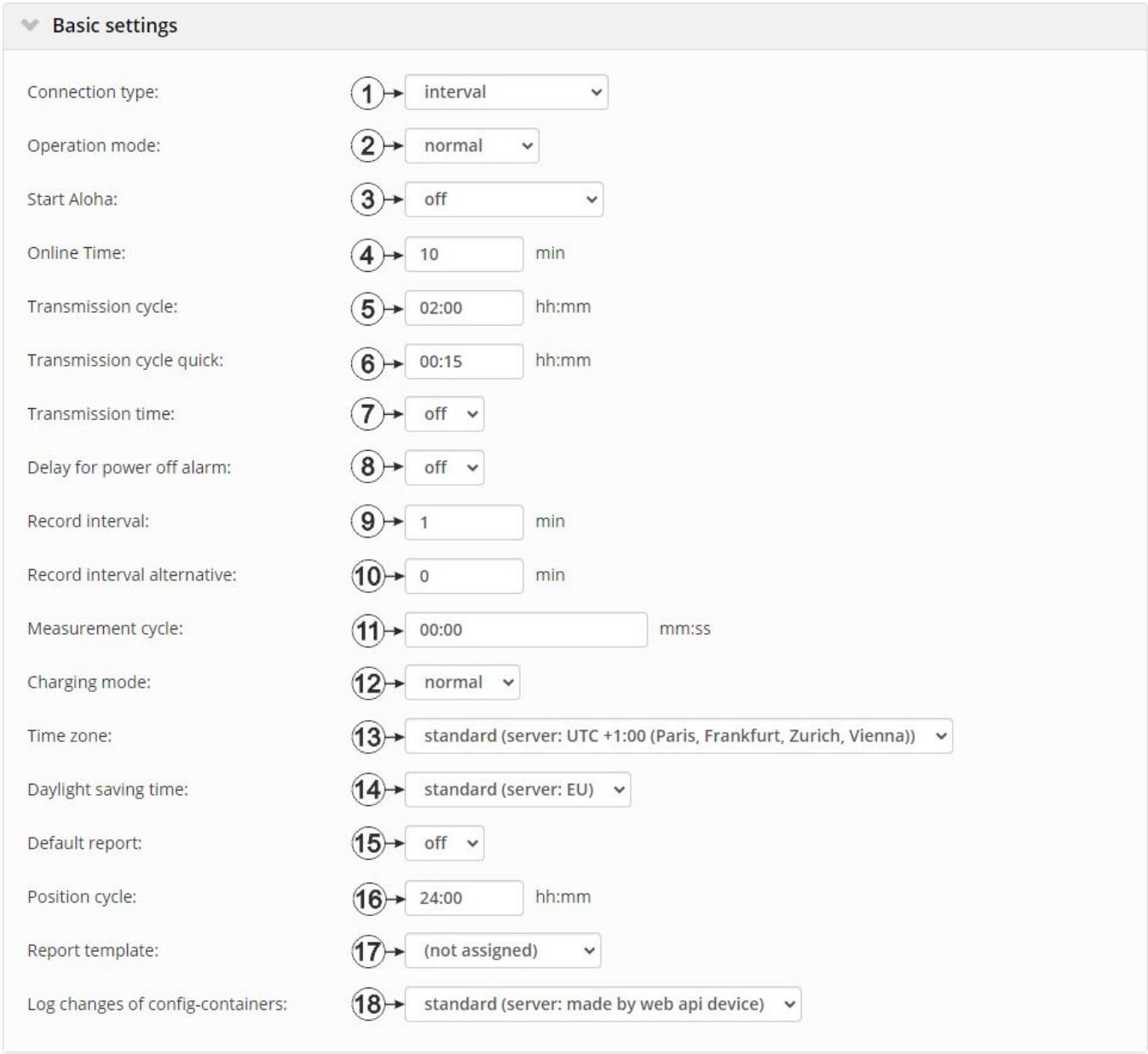
9.2.1.1.5.3 Alarms

Note: *The evaluation of the alarm thresholds for calculated channels can only occur if the device has transferred the measurement data to the DATAEAGLE-Portalserver.*

"Calculated channels" configuration section, "Alarms" tab

1	An alarm is triggered, if the measurement value drops to or below this value.
2	An alarm is triggered, if the measurement value meets or exceeds this value.
3	Hysteresis for all-clear in event of alarm/warning (e.g. Hyst = 5 %, alarm at 100 -> all-clear at 95)

9.2.1.1.6 Basic settings



"Basic settings" configuration section

1	Selection of the connection type	
	Interval	The device connects in the transmission cycle.
	Interval & wakeup	The device connects to the server in the transmission cycle and can be placed into Aloha transmission mode via the server. 
	online	The device does not disconnect the connection and continuously transmits the measurement data. However, every 7 days, the connection is temporarily interrupted in order to verify the server assignment.

2	Selection of the operating mode	
	normal	Operation in accordance with the configuration
	transport	Transport lock activated. This means that all of the operations (measurement, recording, transmission, etc.) are stopped to minimise energy consumption during transport or storage.
3	Selection of how the device should react to a wakeup via the server interface (i.e. upon receipt of a wakeup SMS)	
	Off	Only a standard connection is established.
	Once	An Aloha transmission is executed once immediately after the standard connection is established. This parameter is then set to "Off" by the device.
	On	During the next connection, the device switches to test mode for the time specified via the "Online time" parameter. An Aloha transmission is also triggered immediately after the standard connection is established.
4	Duration of the Aloha connection	
5	Time between transmissions	
6	Time between the transmissions, if a alternative transmission cycle should be used because of a trigger being initiated	
7	Selection of whether a connection to the server should be established every day at a firmly defined time	
	Off	No additional transmissions
	On	The adjacent option can be used to determine the time at which the device establishes a connection to the server regardless of the transmission cycle. If an additional transmission has been initiated, the internal meter of the device, that determines the time of the transmission, is reset. This means that the next transmission is completed exactly after the time specified via the "transmission cycle" parameter.
8	Selection of whether an alarm should be triggered in the event of a supply voltage failure	
	Off	No alarm generated in the event of a supply voltage failure
	On	A relevant alarm is only triggered if the supply voltage has failed for longer than the time configured here. This prevents alarms from being triggered in the event of brief supply voltage failures. However, an entry is always added to the device log.If the time is set to 0, an alarm is generated every time the supply voltage fails.
9	Time between measurement data recordings	
10	Time between measurement data recordings, if an alternative record interval should be used because of a trigger being initiated	
11	Time between measurements (00:00 same as record interval)	

12	Selection of the charging mode	
	Off	Charge control deactivated
	Normal	The charge control is activated and the rechargeable battery is charged to the maximum voltage if the state of charge of the rechargeable battery for the power supply unit falls below 50%. The charge control is then deactivated again. This is designed to optimise the service life of the rechargeable battery.
	Solar	The rechargeable battery of the power supply unit is charged to the maximum voltage if the supply or charging voltage V IN exceeds 16 V The charge control then remains deactivated for 12 hours unless the state of charge of the rechargeable battery for the power supply unit drops below 95%. This charge strategy is recommended if a solar field is used to charge the rechargeable battery.
13	Regional settings (not relevant for raw measurement data as this is stored in UTC)	
14	Configuration for automatic time adjustment (only displayed if a time zone other than "Standard" has been selected)	
	Standard	The configuration for the time adjustment is adopted by the global server setting (see "User manual for DATAEAGLE-Portal-Server " - upon request).
	Off	Automatic time adjustment deactivated
	USA	Predefined setting for the American area
	EU	Predefined setting for the European area
15	Selection of the report that is loaded by clicking on the device link in the maps	
	Off	The default graphic is loaded.
	"Name of a report"	The selected report is loaded.
16	Position update interval (00:00 positioning is completed with every connection)	
17	Selection of whether the default graphic or a report template to display the data is used when clicking on the symbol to display the measurement data located in the site/application list. Only the report templates in which the site/application type of the first wild card is compatible with the site/application that is currently being edited are displayed in the dropdown list.	
	(not assigned)	The default graphic is used to display the measurement data.
	"Name of a report template"	Name of the report template used to display the measurement data
18	Selection of which changes to the configurations should be logged	
	web api	Changes that were implemented via the server interface or REST-API are logged.
	web device api	Changes that were implemented via the server interface, by the device itself or the REST-API are logged.

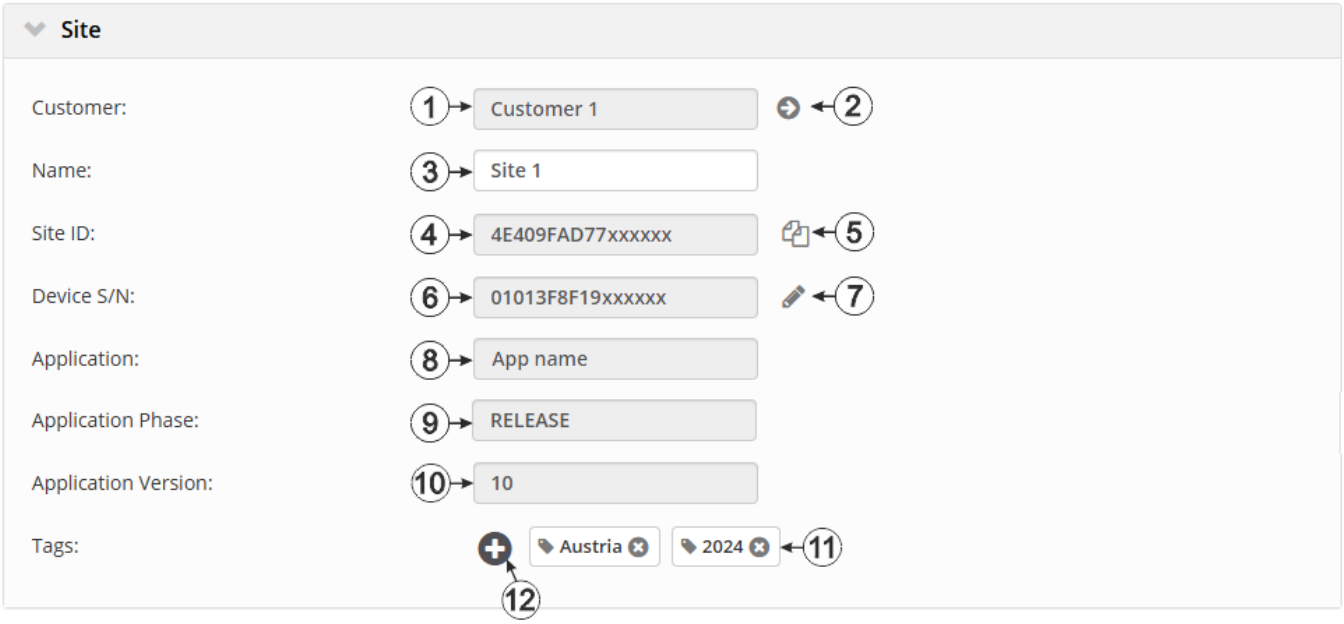
Note: *Additional explanation about the connection types*

Connection type	*Energy consumption*	*Data volumes*	*Response time*
online			
Interval & wakeup			
Interval			

9.2.1.2 Default input screen for configuring the site

The default input mask for configuring the site is opened by clicking on the pencil icon in the list of sites. The configuration sections contained therein are identical for all rapidM2M -based devices and are explained in detail below.

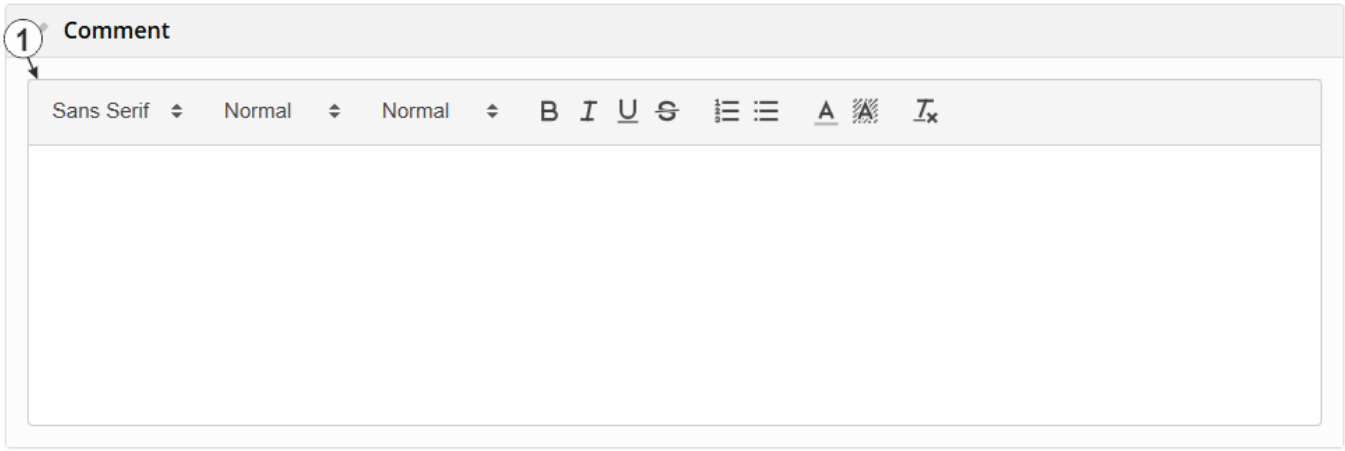
9.2.1.2.1 Site



Confiuration section "Site"

1	Specifies to which customer the site is assigned	
2	Assign site to another customer	
3	Site designation (not relevant for the device or data assignment) [2-50 characters]	
4	Unique ID of the site. It is required to access the site via REST API or OPC UA.	
5	Copies the unique ID of the site to the clipboard	
6	Serial number of the device that is linked to the site (device assignment!)	
7	Opens the input screen to edit the link. It can be used to assign another device or generally cancel the assignment (i.e. the site is then no longer linked to any device) The measurement data is assigned to the site and not to the linked device. If a device is replaced, all data (measurement values and configurations) are retained. The site is only assigned a different device by changing the serial number. From this moment on, the site receives the measurement data from the newly assigned device.	
8	Name of the IoT application based on which the site was created	
9	Release process phase of the currently used version of the IoT application	
	RELEASE	The version is released for all customers.
	RC	All internal tests have been successfully completed. However, the version is only released for selected test customers.
10	Version number of the IoT application that is currently installed on the site. If the version number of the site is not the same as the version number of the device logic installed on the device then the version number of the device logic installed on the device is displayed in addition to the version number of the site.	
11	List of tags already assigned to the site. The assignment can be cancelled by clicking on the cross next to the name of the tag.	
12	Opens the input screen for assigning tags	

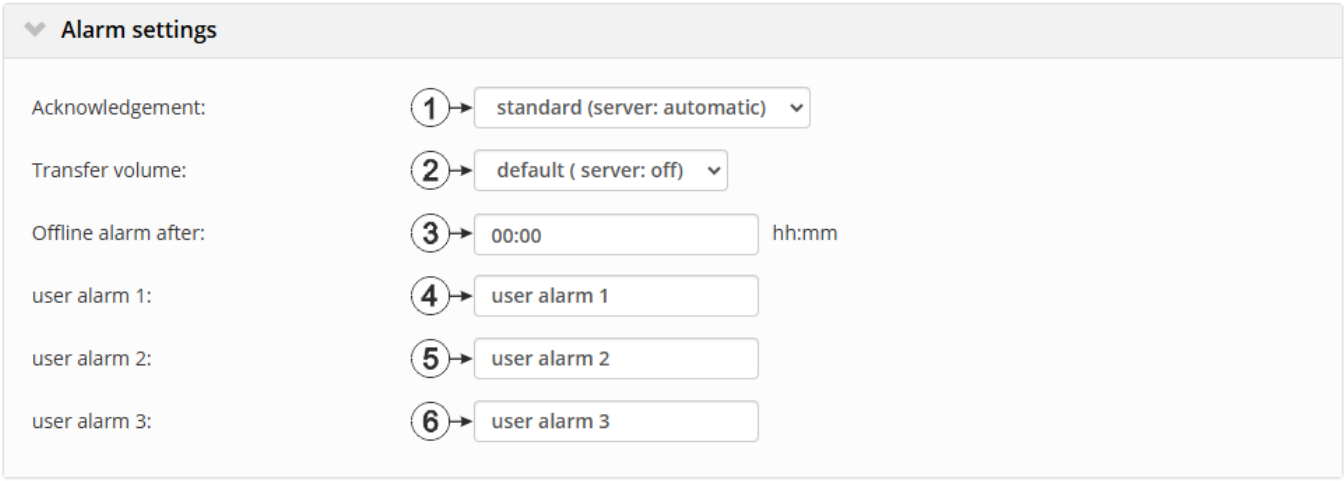
9.2.1.2.2 Comments



Configuration section "Comments"

1	Free comment field (is also displayed below the device type in the site/application list)

9.2.1.2.3 Alarm settings



Configuration section "Alarms"

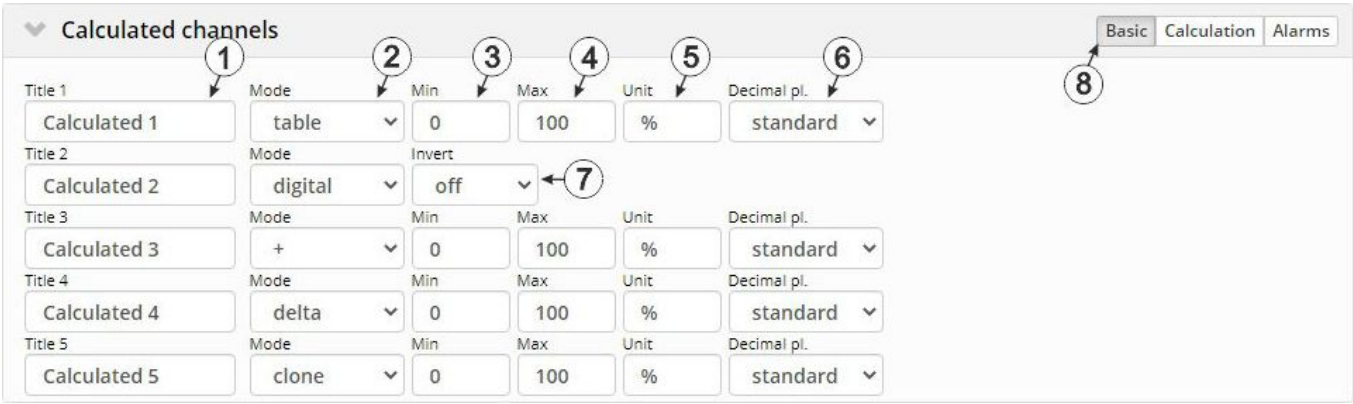
1	Selection of how the alarms should be aknowledged	
	Standard	The global server setting is used to determine whether alarms must be acknowledged automatically or manually
	automatic	Alarms are acknowledged automatically as soon as all of the messages have been sent. If SMS that have a tariff with a delivery confirmation function have also been sent, acknowledgement is provided after delivery confirmation.
	manual	Alarms must be acknowledged by the user.
2	Selection of how the alarm for the transfer volume should be handled	
	Standard	The setting for the transfer volume alarm is taken from the global server settings
	off	The transfer volume alarm is deactivated.
	individuell	The level at which the transfer volume alarm should be triggered can be entered in the adjacent field in KiB.
3	alarm in the event that the device does not report for longer than the set time (00:00 alarm deactivated).	
4	Freely selectable title for user-defined alarm 1. If the user-defined alarm 1 is triggered by a device connected to the site, the server will use this text to signal the alarm. The same applies to user-defined alarm 2 and 3.	
5	Freely selectable title for user-defined alarm 2	
6	Freely selectable title for user-defined alarm 3	

9.2.1.2.4 Calculated channels

In the "Basic" tab, the basic settings are configured and in the "Calculation" tab the advanced configurations are set, whereas the parameters to configure depend on the "mode" selected in the "Basic" tab.

> ***Note:*** *The values of the calculated channels are directly calculated for every data output (display on the server or download from the server). They are not saved in the server database.*

9.2.1.2.4.1 Basic

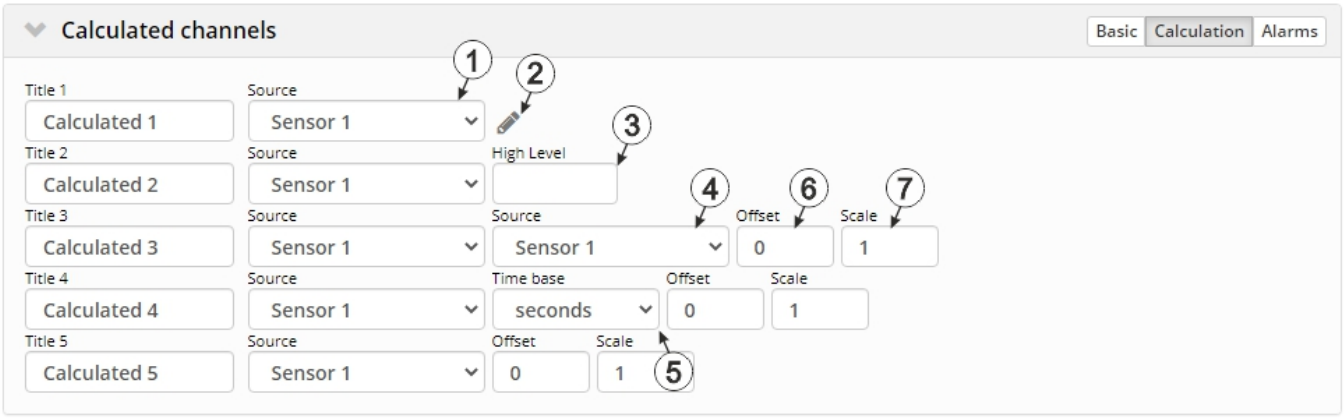


"Calculated channels" configuration section, "Basic" tab

1	Freely selectable channel title for the calculated channels [0-16 characters]	
2	Possible calculation modes for the calculated channels	
	Off	Calculated channel deactivated
	Table	Determines the value for the calculated channel by searching for the row corresponding to the value of a measurement channel in the reference point table. Such a row is made up of the "Measurement channel value" and "Output value for calculated channel" pair of values. Linear interpolation is carried out between the table rows; linear extrapolation is used for values outside the defined table.
	Digital	Converts an analogue value into a digital value. The threshold from which an analogue value is interpreted as "high" can be selected via the "High level" parameter in the "Calculation" tab. In addition the determined digital value can be inverted via the "Invert" parameter.
	+, -, x, /	Links the values of two measurement channels using a mathematic operation (addition, subtraction, multiplication or division)
	Delta	Determines the difference between two measurement values and divides the result by the time difference between the time stamps of the measurement values. The time unit (value/sec., value/min., ...) for the result can be selected via the "Time basis" parameter located in the "Calculation" tab. It is thus possible to convert counter readings (m^3) of the source into a flow rate (m^3/min.) (see "Additional explanation: Delta mode" on page 130).
	clone	Creates a clone of a measurement channel. This ensures it is possible to rename channels, to select different ends of the scale for the pointer instruments, to determine a new string as a measurement unit and to adjust the number of decimal places. The measurement values (numerical value without unit) correspond exactly to those of the source.
3	Defines the lower scale end of the pointer instruments	
4	Defines the upper scale end of the pointer instruments in reports	
5	String that is used as a measurement unit by all of the server display elements [0-16 characters]. It has no direct influence on the values	
6	Number of decimal places that are used by all of the server display elements	

7	Inverts the input signal (only for calculated channels in "Digital" mode)
8	Buttons to switch between the individual tabs of the configuration section

9.2.1.2.4.2 Calculation



"Calculated channels" configuration section, "Calculation" tab

"Table" calculation mode

1	Selection of the channel from which the input data is used
2	Opens the screen for entering the reference point table (the table rows are interpolated linearly, values outside of the defined table are extrapolated linearly.)

"Digital" calculation mode

1	Selection of the channel from which the input data is used
3	Signal recognition level

Calculation mode "+", "-", "x" or "/"

1	Selection of the channel from which the input data is used
4	Selection of the second channel from which the input data is used
6	Offset that is added following multiplication with the "Factor" parameter
7	Factor with which the result of the mathematical operation (+, -, x, /) is multiplied. The "Offset" parameter is then added.

"Delta" calculation mode

1	Selection of the channel from which the input data is used
5	Specifies the desired time unit (value/sec., value/min., ...) for the result
6	Offset that is added following multiplication with the "Factor" parameter. The result is converted in to the desired time unit before multiplication with the "Factor" parameter.
7	Factor with which the result is multiplied once it has been converted into the desired time unit. The "Offset" parameter is then added.

"Clone" calculation mode

1	Selection of the channel from which the input data is used
6	Offset that is added following multiplication with the "Factor" parameter
7	Factor with which the value of the measurement channel to be cloned is multiplied. The "Offset" parameter is then added.

Note:

Additional explanation: Delta mode

Assumption: *The source channel contains the counter reading of an infinite counter in m^3. The calculated channel 1 should contain the flow rate in m^3/s and calculated channel 2 should contain the flow rate in l/h.*

Required configuration

Parameter	***Value channel 1***	***Value channel 2***
Basis -> mode	*Delta*	*Delta*
Basis -> unit	*m^3/s*	*l/h*
Calculation -> time basis	*Seconds*	*Hours*
Calculation -> offset	*0*	*0*
Calculation -> factor	*1*	*1000*

Source		***Calculated channel 1***	***Calculated channel 2***
Date/time	***Infinite counter [m^3]***	***Flow rate [m^3/s]***	***Flow rate [l/h]***
26.03.2013 12:50	*900*	*0 [1)]*	*0 [1)]*
26.03.2013 12:51	*960*	*1*	*3,600,000*
26.03.2013 12:52	*990*	*0.5*	*1,800,000*
26.03.2013 12:53	*1005*	*0.25*	*900,000*
26.03.2013 12:54	*1065*	*1*	*3,600,000*

[1)] Calculation not possible as there is no measurement value before 12:50.

Explanation: *No values can be determined for the measurement at 12:50 for the calculated channels as there is no previous value and the difference between the counter readings cannot be determined. For the measurement at 12:51, the difference to the counter reading is 60 m^3 and the time difference is 60 sec.*

Result = { (value difference / time difference [sec.]) * time basis [sec] * factor } + offset

The result for calculated channel 1 (time basis "Seconds", offset "0" and factor "1") is calculated as follows:

Channel 1 = { (60 m^3 / 60 sec.) * 1 * 1 } + 0 = 1 m^3/s

The result for calculated channel 2 (time basis "Hours", offset "0" and factor "1000") is calculated as follows:

Channel 2 = { (60 m^3 / 60 sec.) * 3600 * 1000 } + 0 = 3,600,000 l/h

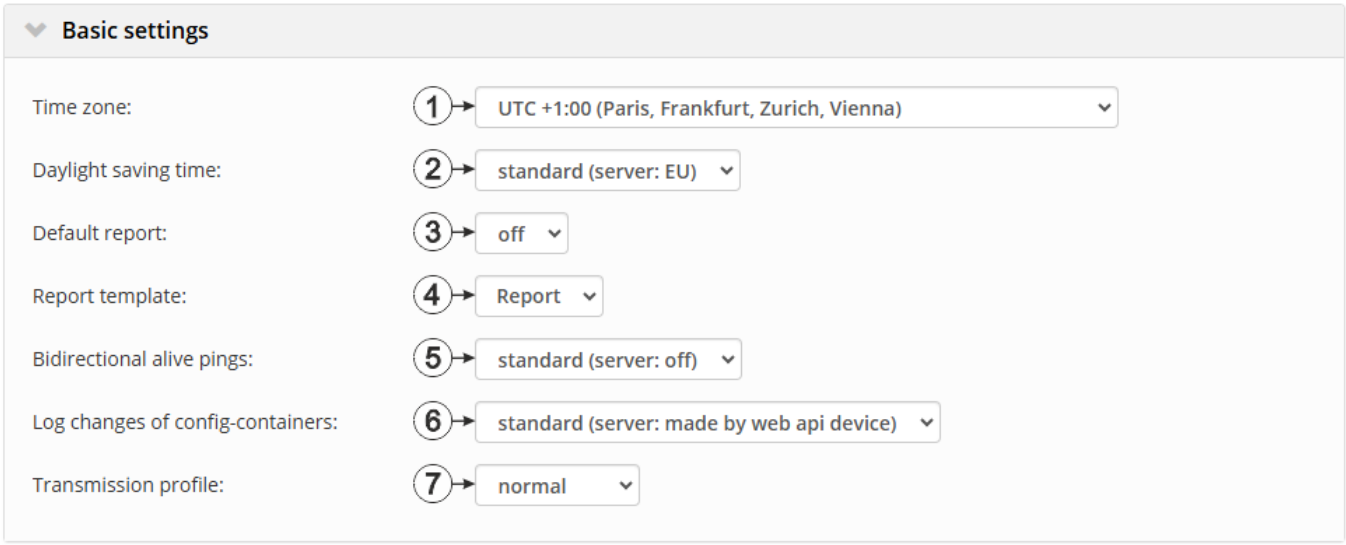
9.2.1.2.4.3 Alarms

Note: *The evaluation of the alarm thresholds for calculated channels can only occur if the device has transferred the measurement data to the DATAEAGLE-Portalserver.*

"Calculated channels" configuration section, "Alarms" tab

1	An alarm is triggered, if the measurement value drops to or below this value.
2	An alarm is triggered, if the measurement value meets or exceeds this value.
3	Hysteresis for all-clear in event of alarm/warning (e.g. Hyst = 5 %, alarm at 100 -> all-clear at 95)

9.2.1.2.5 Basic settings



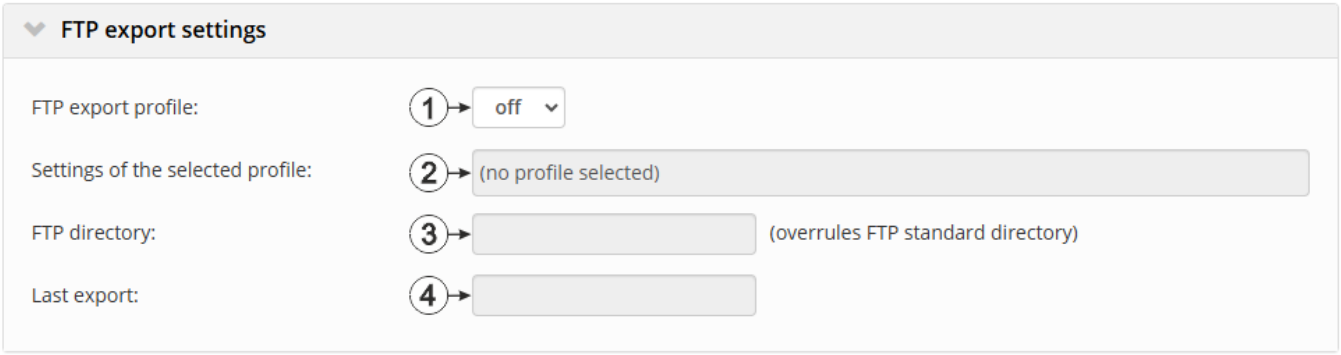
Configuration section "Basic settings"

1	Regional settings (not relevant for raw measurement data as this is stored in UTC)	
2	Configuration for automatic time adjustment (only displayed if a time zone other than "Standard" has been selected)	
	Standard	The configuration for the time adjustment is adopted by the global server setting.
	Off	Automatic time adjustment deactivated
	USA	Predefined setting for the American area
	EU	Predefined setting for the European area
3	Selection of the report that is loaded by clicking on the device link in the maps	
	Off	No report is loaded.
	"Name of a report"	The selected report is loaded.
4	Selection of the report template used to display the data when clicking on the symbol to display the measurement data, which is located in the list of sites/applications. Only the report templates in which the site/application type of the first wild card is compatible with the site/application that is currently being edited are displayed in the dropdown list. The symbol to display the measurement data is only displayed in the list of sites/applications if a report template has been selected.	
	(not assigned)	The symbol to display the measurement data is not displayed in the list of sites/applications.
	"Name of a report template"	Name of the report template used to display the measurement data

5	Using "Bidirectional alive ping", both the device and the server can easily recognise whether the online connection is still active.	
	standard	The configuration for the bidirectional alive ping is adopted from the global server settings
	off	"Bidirectional alive ping" is deactivated
	on	"Bidirectional alive ping" is activated. I.e. the server responds correspondingly to each keep alive ping of the device.
6	Selection of which changes to the configurations should be logged	
	web api	Changes that were implemented via the server interface or REST-API are logged.
	web device api	Changes that were implemented via the server interface, by the device itself or the REST-API are logged.
7	The site can be customised to specific requirements (energy consumption, error diagnosis, connection stability) via the transmission profiles. In addition to operations carried out purely by the server (e.g. requesting the device log during synchronisation), the setting also affects procedures stored in the device firmware (e.g. retry behaviour in the event of connection interruptions). The procedures in the firmware that are affected by the selected transmission profile depend on the device type and the respective firmware version.	
	Normal	Operation by default
	ECO	Low energy consumption, low data volume
	Diagnosis	Extended logging for troubleshooting
	Adaptive	Stable connection even at the expense of energy consumption

9.2.1.2.6 FTP export settings

Note: *This configuration section is only visible if the "FTP Agent Extended" licence for the DATAEAGLE-Portal server has been enabled.*



Configuration section "FTP-export settings"

1	Selection of the profile that is used for the measurement data transmission to the FTP server.	
	off	FTP export deactivated
	"Name of an FTP export profile"	List with the FTP export profiles that were created on the DATAEAGLE-Portal server (for creating an FTP export profile, see "User manual for DATAEAGLE-Portal-Server " - upon request).
2	Shows an overview of the most important parameters of the selected FTP export profile	
3	Makes overwriting the standard directory of the selected FTP export profile possible [0-100 characters]	
4	Time stamp of the last FTP export	

9.2.1.3 Default input screen for configuring the site in development mode

This input screen can only be accessed via the "settings" submenu of the title bar of the input screen for configuring the site. Furthermore it is not available for all user levels. The functionality of the contained configuration sections "Site", "Comment", "Alarms", "Calculated channels", "Basic settings" and "FTP-Export settings" corresponds to the functionality of the default input screen for configuring the site (see "Default input screen for configuring the site" on page 124). The difference is that additional configuration sections are displayed between the "Comment" and "Alarm" configuration sections, which can be used to edit the application-specific parameters directly without using the specific input screen for configuring the site. The name and number of configuration sections and the parameters they contain depend on the respective IoT application.

Note: *Direct editing of the application-specific parameters via this input screen is not recommended, as there may be dependencies between the parameters depending on the IoT application. This could result in invalid configurations, which could make the application unstable or lead to unexpected behaviour.*

9.2.2 Device configuration

Note: *Several of the configuration fields in the following sub chapters may possibly be hidden depending on the respective user level. In this case, contact the DATAEAGLE-Portal server administrator.*

You can reach the input screen for configuring the device by clicking on the serial number in the list of sites/applications (see "User manual for DATAEAGLE-Portal-Server " - upon request) or by clicking on the device name in the device name list (see "User manual for DATAEAGLE-Portal-Server " - upon request).

9.2.2.1 Comments

Comments

Free comment field (is also displayed below the site name in the site/application list)

9.2.2.2 Measurement instrument

Customer	Name of the customer to whom the measurement instrument is assigned	
Tags	List of the tags that are already assigned to the measurement instrument. This assignment can be cancelled by clicking on the cross next to the title of the tag. The input screen for assigning the tags is opened by clicking on the plus symbol. This enables existing tags to be assigned and new tags to be created.	
Serial number	Serial number of the instrument	
Device class	The instrument class of the site and instrument must match for an instrument to be able to be connected to a site. Once the instrument has been created via the server interface, the instrument class can only be changed up until the first connection of the instrument to the server. If an instrument class, that does not match the actual class of the instrument, is selected when the instrument is created it is automatically corrected during the first connection.	
Lifecycle state:	Phase of the lifecycle the device is currently in In order to meet the requirements of RED Article 3.3 regarding cybersecurity of radio equipment, the device must at least be in the "provisioned" phase. The device can be moved to this state using the "Provision" button. To ensure compliance, the function of the local interfaces is restricted from this phase onwards. The button is only displayed if the device is in the " " (not set) or "preprovisioned" phase. Devices that were delivered prior to the enforcement of RED Article 3.3 on 1 August 2025 are not automatically transitioned to the "provisioned" phase.	
	not supported	Display of life cycle phases is not supported
	" "	Lifecycle state not set
	preprovisioned	Device ready for handover to partner (firmware installed)
	provisioned	Device ready for handover to end customer (firmware and application installed)
	claimed	Device assigned to a server
	fielded	Device assigned to a server and linked to a site
	decomissioned	Device was defective and was decommissioned

Lifecycle flags:	Lifecycle flags that are currently set The lifecycle flags that will be transferred to the device during the next synchronisation are displayed to the left of the arrow symbol. A plus sign in front of the name indicates that the lifecycle flag will be set. A minus sign indicates that it will be deleted. The arrow symbol is only displayed if the state of at least one lifecycle flag is to be changed. The pencil icon opens the input window for setting or deleting lifecycle flags.	
Telephone number	Telephone number of the SIM card. The control SMS messages (e.g. wakeup) are sent to this number. Format: +49123456789	
Instrument flags	Additional information regarding the instrument class (for internal use)	
Firmware version	Current software version installed on the measurement controller	
Last connection	In each case, the last time stamp of the affected operation	
Last wakeup		
Last disconnection		
Last transmission error		
Last Aloha connection		
Wakeup SMS count	Number of wakeup SMS sent to this device since the last connection. This counter is reset at/during each successfully established connection.	
Device Logic sync	Productive	If the Device Logic installed on the device and saved on the server do not match, the Device Logic saved on the server is loaded in to the device.
	Development (sync)	The Device Logic on the device and server are synchronised. The one with the latest time stamp is transferred to the other one.
	Development (no sync)	The Device Logic on the device and server are not synchronised.
Firmware update	Off	Firmware update is deactivated.
	On	As soon as a new version of the selected firmware type is available, this is installed immediately.
	Even if tag is missing	Firmware is also transferred to the device if the device has not transmitted the current firmware version to the server (NOT RECOMMENDED!).
	Allow downgrade	Facilitates the installation of an older firmware version than the one on the device (NOT RECOMMENDED!)
	Once	Performs a single firmware update. If no new firmware is available or the firmware was installed successfully, the firmware update is automatically switched to "OFF".
	Ignore	The firmware update is deactivated and no information is provided about available firmware updates.

Firmware type	Released	Only firmware versions that have successfully undergone internal and field testing are installed (this practically eliminates malfunctions).
	Release candidate	Only firmware versions that have successfully undergone internal testing are installed (malfunctions cannot be excluded).
	Beta release	Even firmware versions that have not successfully undergone all of the internal tests are installed (malfunctions may occur).
Identification	String specifying the hardware platform implemented in the device and the corresponding hardware version (i.e. the rapidM2M module identification).	
Prod. rev.	Product rev. of the 4-Channel Data Logger	
Article Id	Product ID, which consists of the type key specified on the type plate and the product specification stored in the device	
Article revision	Product revision of the 4-Channel Data Logger	
Article name	Product name as specified on the type plate of the device	

9.2.2.3 GPRS

SIM tariff
Selected SIM tariff

9.2.2.4 Features

Features
List of activated chargeable features.

9.2.3 Additional measurement channels

There are no direct configuration options available on the DATAEAGLE-Portal server for the additional measurement channels. They are only available following activation of an optional module or special mode.

9.2.3.1 Counter readings of the infinite counters

Both of these measurement values are generated and saved together with the remaining measurement data. However, they are set to NaN provided that "Cnt.Inf." mode was not activated for the relevant measurement channel (see "Measurement channels" on page 93). If "Cnt.Inf." mode is active, the measurement value contains the current counter reading of the infinite counter. In return, the measurement channel that is assigned to the relevant universal input as standard is set to NaN.

Switching the measurement channels is necessary as the data type of the standard measurement channels is f32 (32 Bit floating point) and thus does not cover the necessary value range or provide the necessary level of accuracy. However, the two measurement values detailed in this chapter are s64 (64 Bit signed) types and are thus perfectly suitable for saving infinite counter readings. It must be noted counter readings are always saved internally as whole numbers. This means that if a floating-point number is specified for the "Pulse" parameter, the server moves the comma accordingly and transmits an integer multiplication factor to the 4-Channel Data Logger . This does not affect the visualisation and download of the data as the DATAEAGLE-Portal server takes the movement of the comma into consideration before displaying/issuing the number.

All of the necessary settings for both of the measurement channels are implemented by the "Measurement channels" configuration section (see "Measurement channels" on page 93). This also applies to title of the measurement channel. Although the "Cnt.Inf." label is added on so that it can be differentiated from the relevant measurement channel assigned to the universal input as standard.

<Title of the universal input 1> Cnt.Inf.
Current counter reading of the infinite counter that is assigned to universal input 1

<Title of the universal input 2> Cnt.Inf.
Current counter reading of the infinite counter that is linked to universal input 2

Note:

Additional explanation on calculating the counter reading for an infinite counter:

Assumption: *The counter returns one pulse per 5l. The counter reading should be displayed in [m³] on the server interface. Eight pulses were registered by the universal input. The previous counter reading was 0.03m³.*

Configuration

Parameter	*Value*
Pulse	*5*
Pulse unit	*l*
Pulse factor	*0.001*
Unit	*m³*

Counter reading [m³] = previous counter reading + { (registered pulses * pulse [l]) * pulse factor }

Counter reading [m³] = 0.03 + { (8 * 5) * 0.001 } = 0.07

Chapter 10 DeviceConfig

10.1 General

The DeviceConfig configuration program can be downloaded free of charge from the following website:

https://www.schildknechtag.com/products/download-2/

The tool is used for configuration, maintenance, fault analysis and synchronisation purposes. It is compatible with all "Habitat Schildknecht" devices equipped with a USB interface or local radio interface. For devices equipped with a mobile network modem, the function of the local interface (USB and local radio interface) may be restricted depending on the current lifecycle state. Some of the functions described below may therefore not be fully available.

The requirements regarding configuration and maintenance vary depending on the type of device. To ensure simple and intuitive operation, the user interface of the DeviceConfig therefore automatically adjusts to the relevant device that is connected. In addition to the standard functions, the tool also supports device-specific processes (e.g. calibration, zero point adjustment).

The DeviceConfig enables you to complete the following tasks:

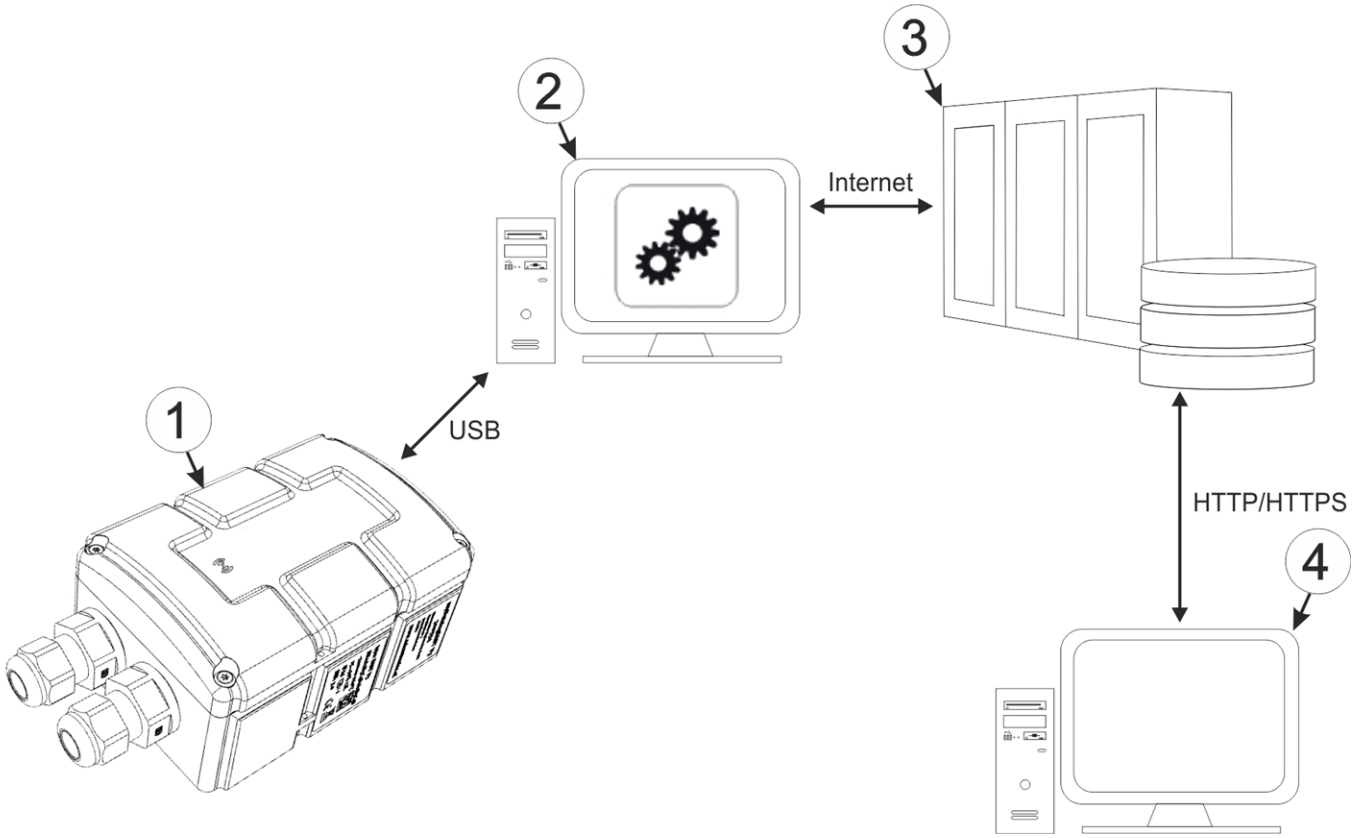
- Synchronisation of measurement data and configuration between device and server (specifically for devices without mobile network modem)
- Basic configuration of the device (e.g. measurement and transmission cycle)
- Read out and analysis of the device log
- Calibration, trimming and zero point adjustment (special knowledge and password required)
- Update the firmware (only if the lifecycle state is set to " " (not set) or "preprovisioned")

10.2 Prerequisites

Interfaces	1x USB
Operating system	Windows 10 Windows 11
Internet connection	Recommended
Required disk space	approx. 50 MB

10.3 Functional principle

The following description specifically refers to the use of the configuration program DeviceConfig in conjunction with the 4-Channel Data Logger .



Functional principle

1	4-Channel Data Logger	**3**	DATAEAGLE-Portal server
2	PC with the DeviceConfig configuration program installed	**4**	Client that accesses the interface of the DATAEAGLE-Portal server via the web browser

Important note: *The USB interface is a service interface that can only be accessed after opening the housing. The manufacturer shall not be liable for any damage to the device, for example, caused by the ingress of water attributed to the fact that the housing was openedThe manufacturer shall not be liable for any damage to the device, for example, caused by the ingress of water attributed to the fact that the housing was opened.*

The configuration program DeviceConfig communicates directly with the 4-Channel Data Logger via a USB connection. The functions provided with the DeviceConfig configuration program include:

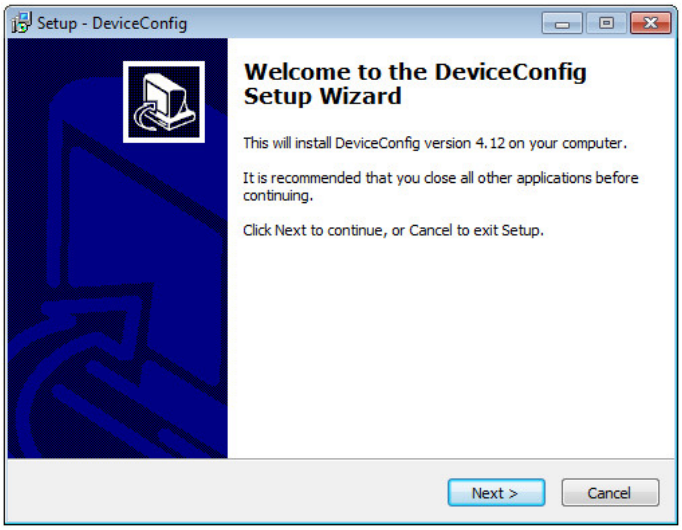
- Switching between the integrated SIM chip and the external SIM card (see ""GSM" tab" on page 146)
- Read out and analysis of the device log (see ""Log" tab" on page 148)
- Update the firmware(see ""Firmware" tab" on page 150)
- Entering the activation code in order to unlock chargeable features (see ""Features" tab" on page 151)

10.4 Installation

The following chapter describes the installation process in Windows 7.

1. Execute the *"InstDeviceConfig.exe"* file to start the installation process.

   Note: *Only connect the device or USB BLE-Adapter (- upon request) to your PC once the installation process has completed as the required drivers are only installed during this process.*

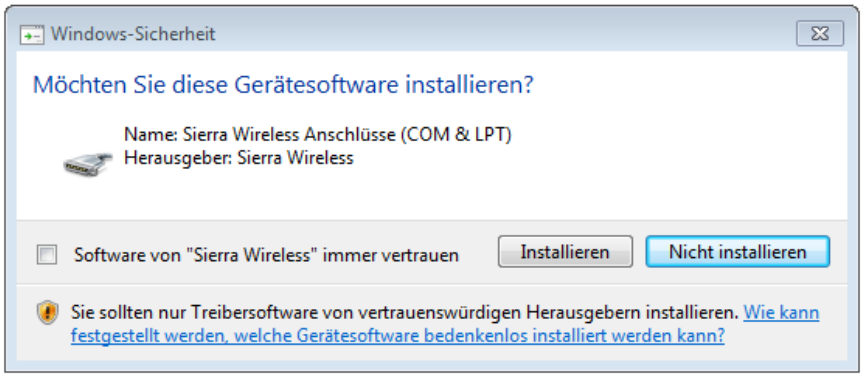


DeviceConfig setup wizard

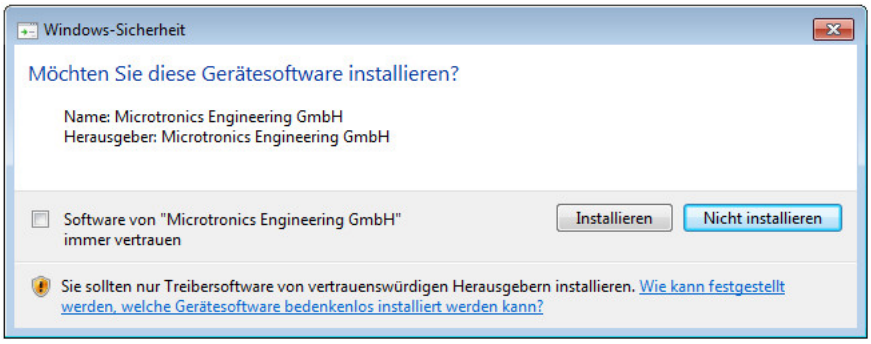
2. Follow the instructions of the setup wizard until the following screen is displayed. The following drivers must be installed to ensure correct operation.

Installation of the USB drivers for the devices

Installation of the drivers for the USB BLE-Adapter

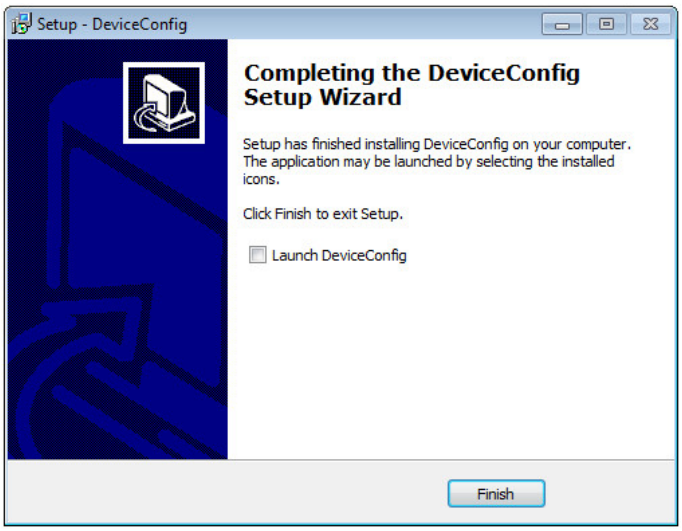


Installation of the USB drivers for the devices on a M1 basis



Installation of the USB drivers for the devices on a M2/M3 basis

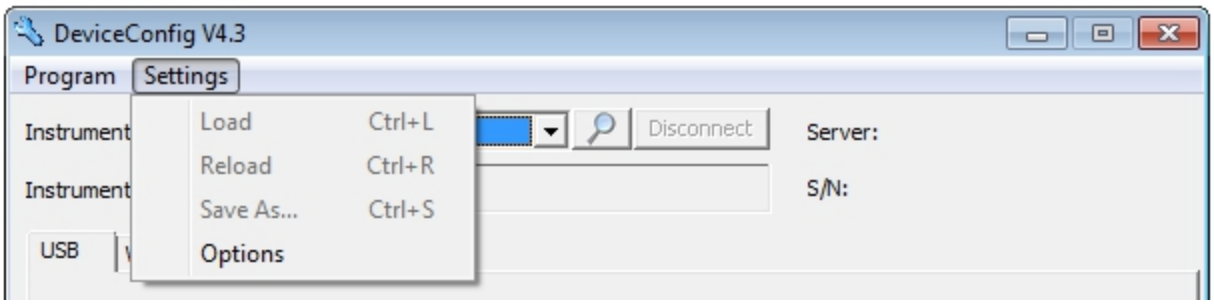
3. Once the following screen is displayed, close the installation process by clicking on the *"Finish"* button.



Complete the setup

10.5 Menu of the DeviceConfig

10.5.1 Settings

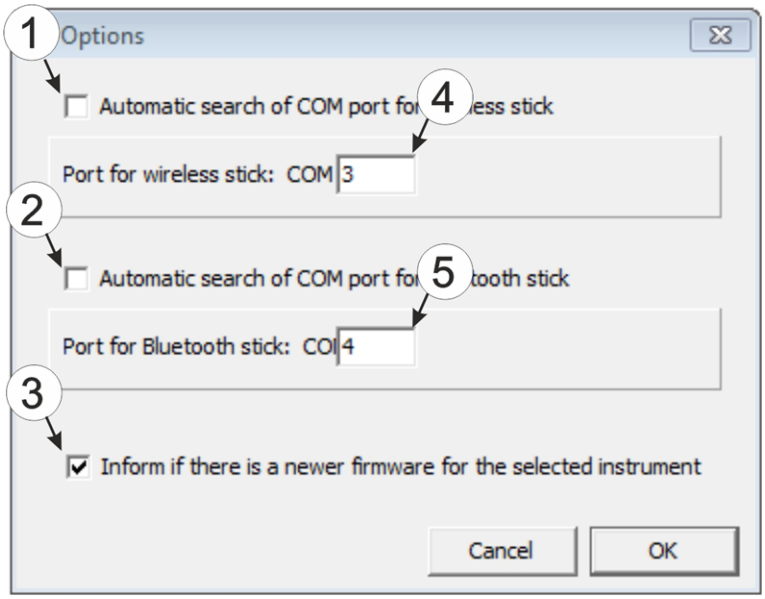


"Settings" menu item

10.5.1.1 Options

The settings for the COM ports to which the USB radio transmitter (- upon request) or the USB BLE-Adapter (- upon request) are connected can be specified and the automatic search for the available firmware versions can be activated or deactivated via the "Settings -> Options" menu item.

The USB radio transmitter (- upon request) is required for "Habitat Schildknecht" devices that are connected to the PC via a wireless M-bus, while the USB BLE-Adapter (- upon request) is required for devices that are connected to the PC via local radio connection. Information on whether your device supports one of these connection methods is provided in the user manual for the respective device.

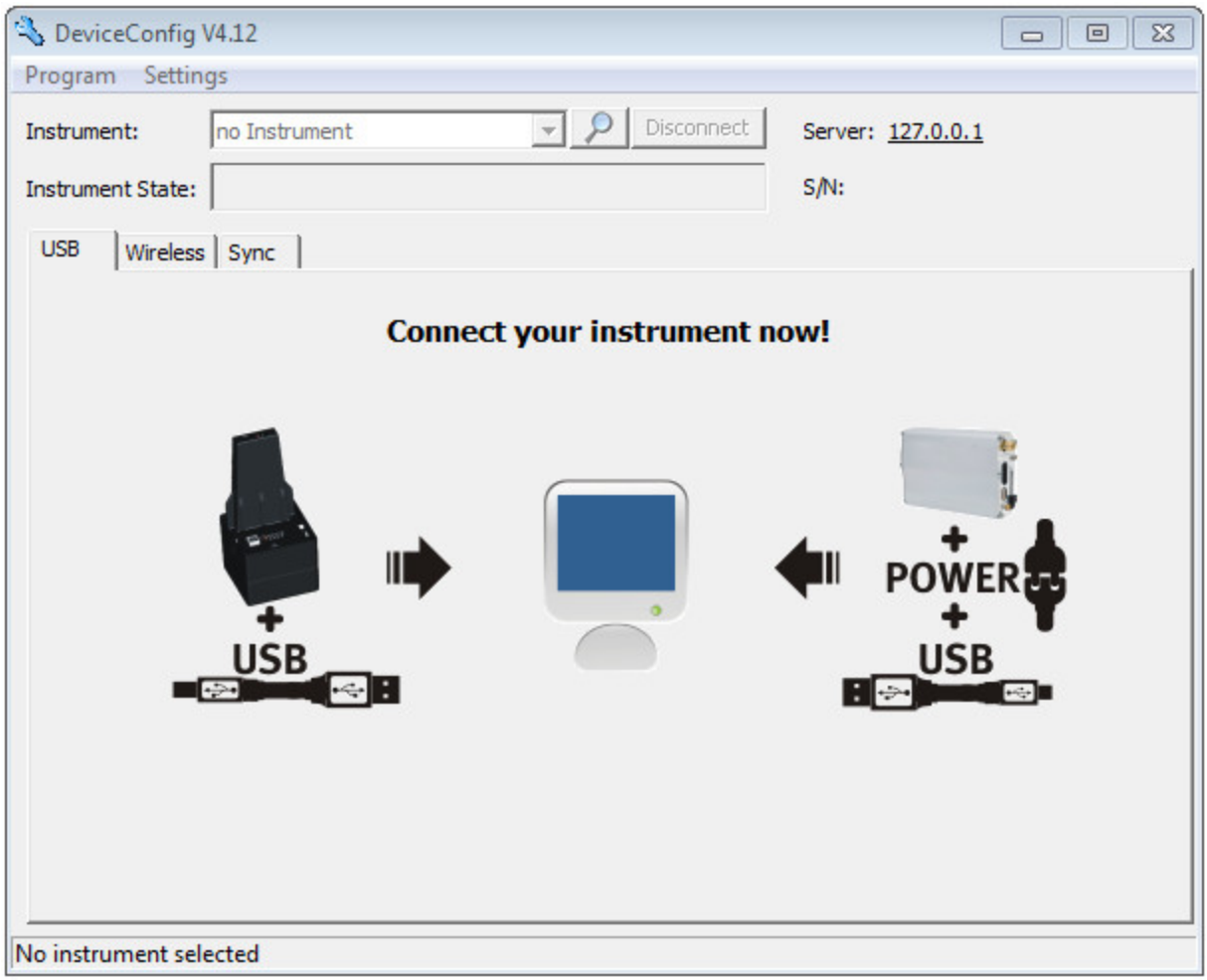


"Settings -> Options" menu item

1	Activates/deactivates the automatic search for the USB radio transmitter (- upon request) on all of the available COM ports	**4**	COM port that is connected with the USB radio transmitter (- upon request) (only visible when the automatic search is deactivated)
2	Activates/deactivates the automatic search for the USB BLE-Adapter (- upon request) on all of the available COM ports	**5**	COM port that is connected with the USB BLE-Adapter (- upon request) (only visible when the automatic search is deactivated)
3	Activates/deactivates the automatic search for available firmware versions		

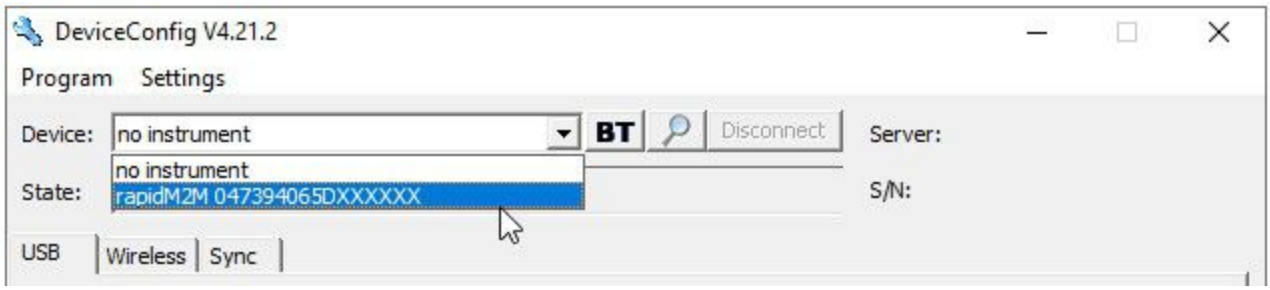
10.6 Connecting a Device via USB

1. Start the DeviceConfig configuration program.



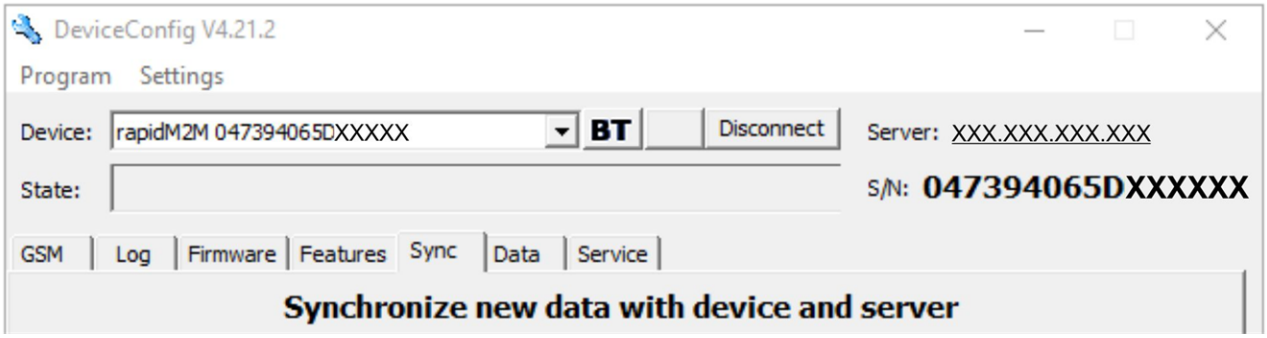
DeviceConfig

2. Connect the 4-Channel Data Logger to the PC using a USB cable.
3. Select your device based on the serial number from the list of devices found.



List of devices found

4. Wait until the DeviceConfig has received the configuration of the device. Depending on the device, additional tabs may be displayed.

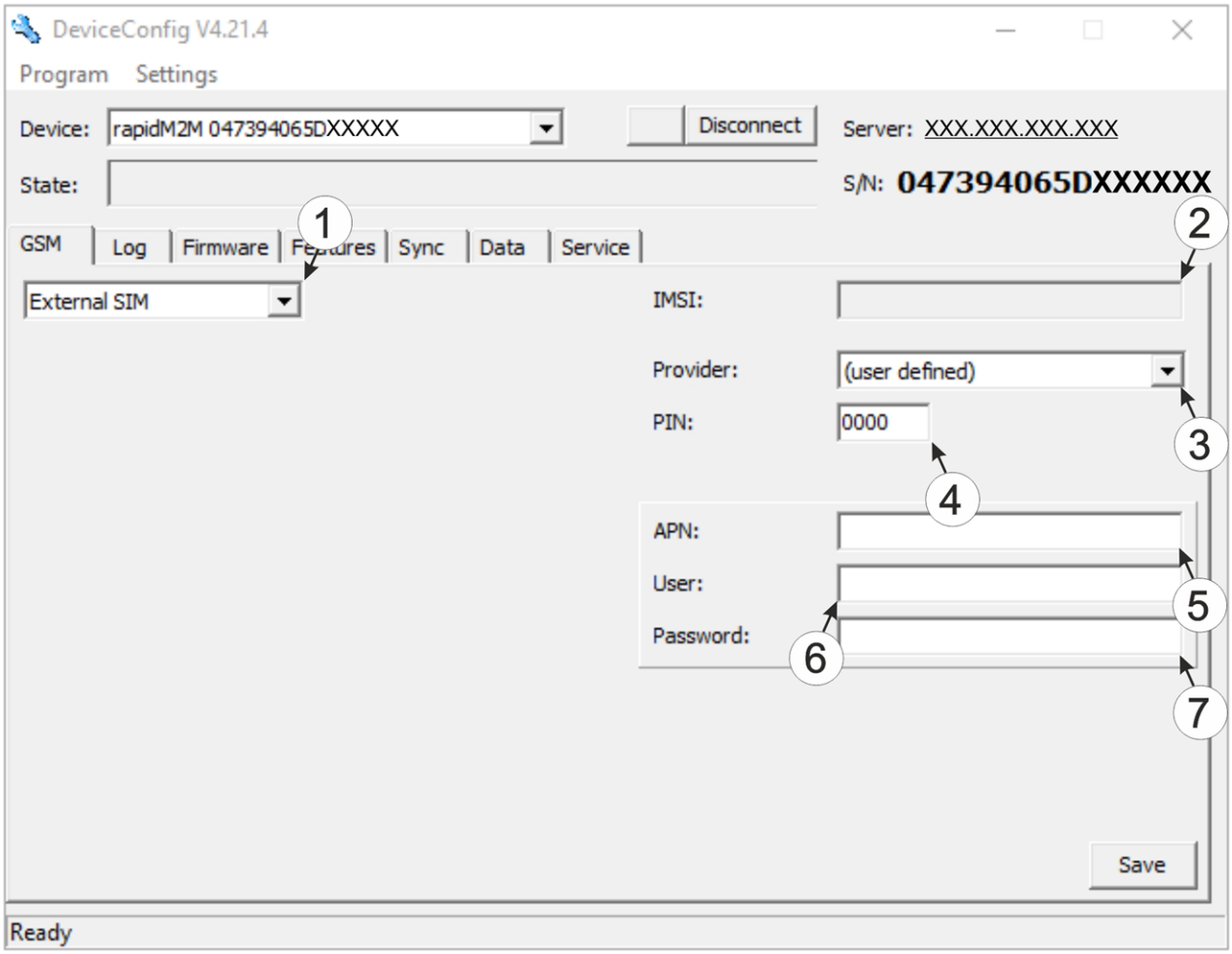


"Sync" tab when actively connected to the 4-Channel Data Logger

10.7 "GSM" tab

This tab provides the option of switching between the integrated SIM chip and an external SIM card inserted in the SIM slot. If the external SIM card has been selected then the APN settings (APN, username and password) and the PIN code (if required by the SIM card) can be entered via this tab and transferred to the 4-Channel Data Logger . Here it is possible to either enter the APN settings manually or to select one of the providers from the drop-down list and thus to use the settings stored for the provider in the DeviceConfig .

> ***Note:*** *The manufacturer assumes no liability for the correctness of the APN settings deposited in the DeviceConfig (APN, username and passwort). In case of doubt please contact the provider of your external SIM card and enter the APN settings (APN, username and passwort) manually via the corresponding fields.*

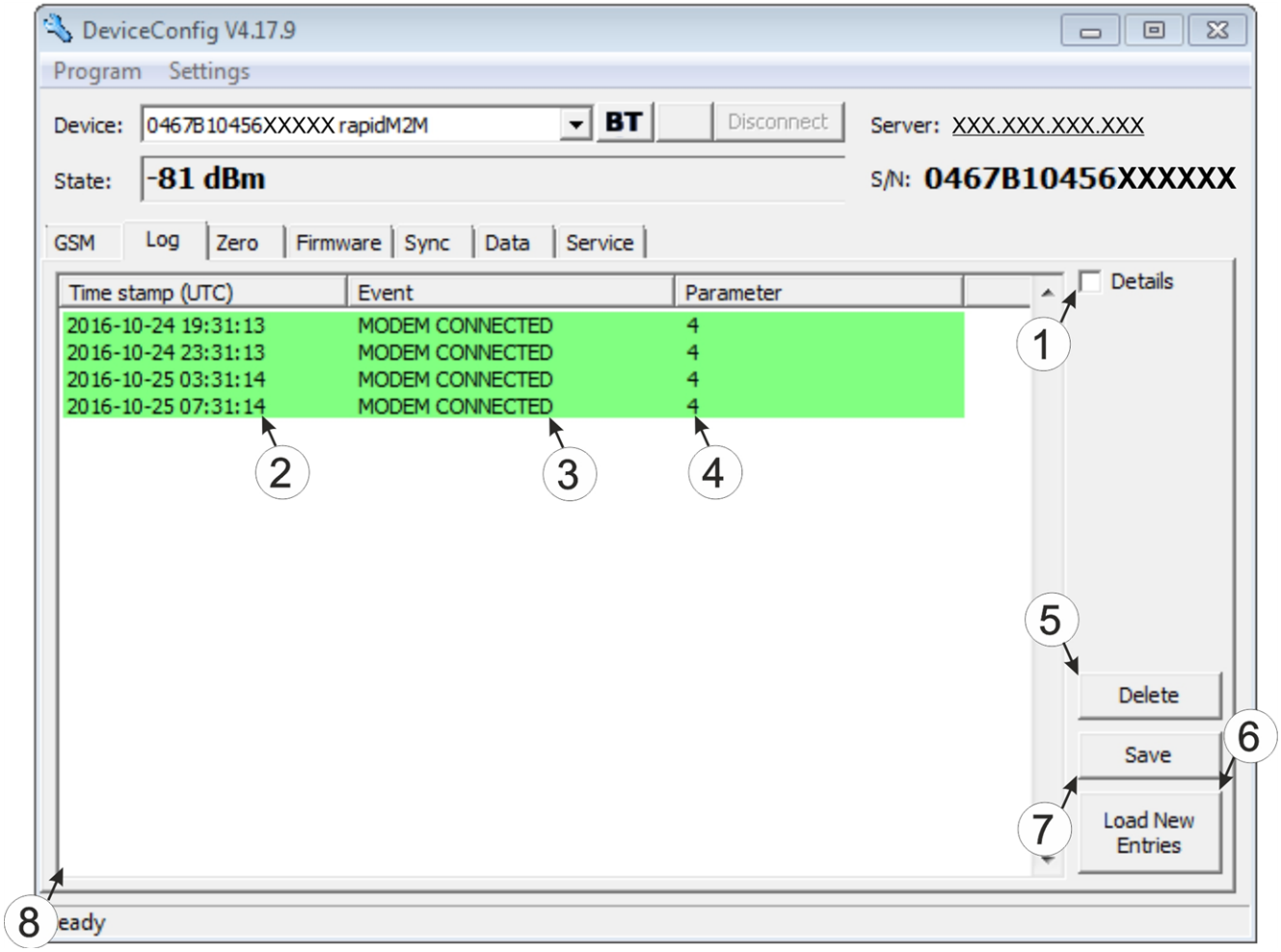


"GSM" tab

1	Drop-down list for selecting whether the internal SIM chip or the external SIM card should be used ***Note:*** *If "Internal SIM" has been selected then all other selection fields are hidden.*
2	IMSI of the external SIM card inserted in the SIM slot
3	Drop-down list for selecting the provider from which the external SIM card has been delivered ***Note:*** *The input fields for "APN", "user" and "password" for manual input of the APN settings are only displayed if the "(user defined)" entry has been selected in this drop-down list.*
4	PIN code
5	Access point (APN) that should be used for the connection
6	User name for dial-up via the access point
7	Password for dial-up via the access point

10.8 "Log" tab

This tab is designed to manage log entries. It enables the entries to be loaded from the 4-Channel Data Logger , to be saved as a *.tsv file and entries to be deleted from the memory of the 4-Channel Data Logger .

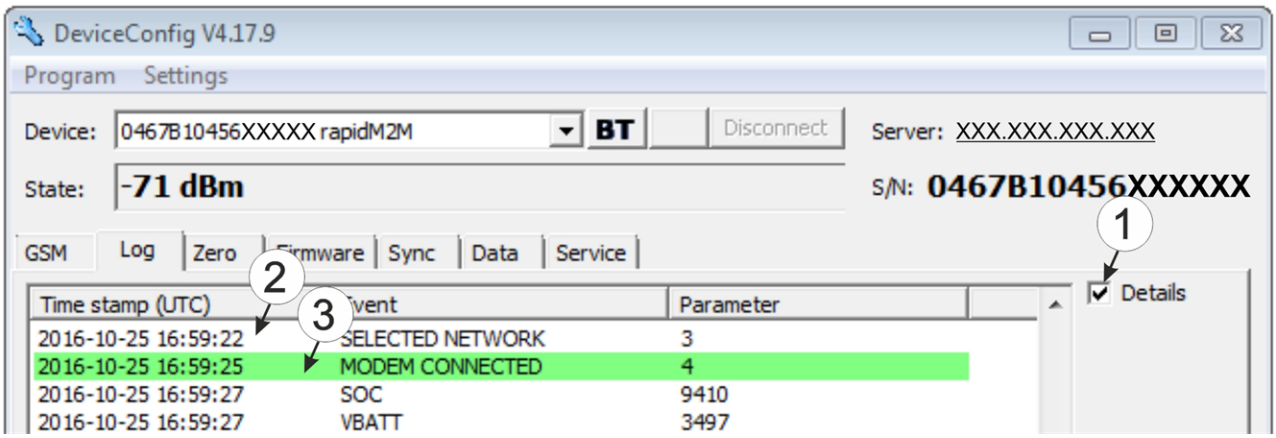


"Log" tab

1	Activates the detailed display of the log entries	**5**	Deletes the log entries from the memory of the device
2	Time stamp of the log entry	**6**	Loads the log entries from the device
3	Log entry	**7**	Saves the loaded log entries as a tsv file
4	Parameter of the log entry	**8**	Window to display the loaded log entries

The coloured highlighting indicates how crucial the log entry is. The white, informative log entries are only displayed when the detailed display of the log entries is activated (see ""Log" tab with detailed view activated" on page 149).

Colour	Evaluation
White	Information regarding the current operating state
Green	
Light blue	
Blue	
Purple	
Grey	
Yellow	Uncritical error
Red	Critical error



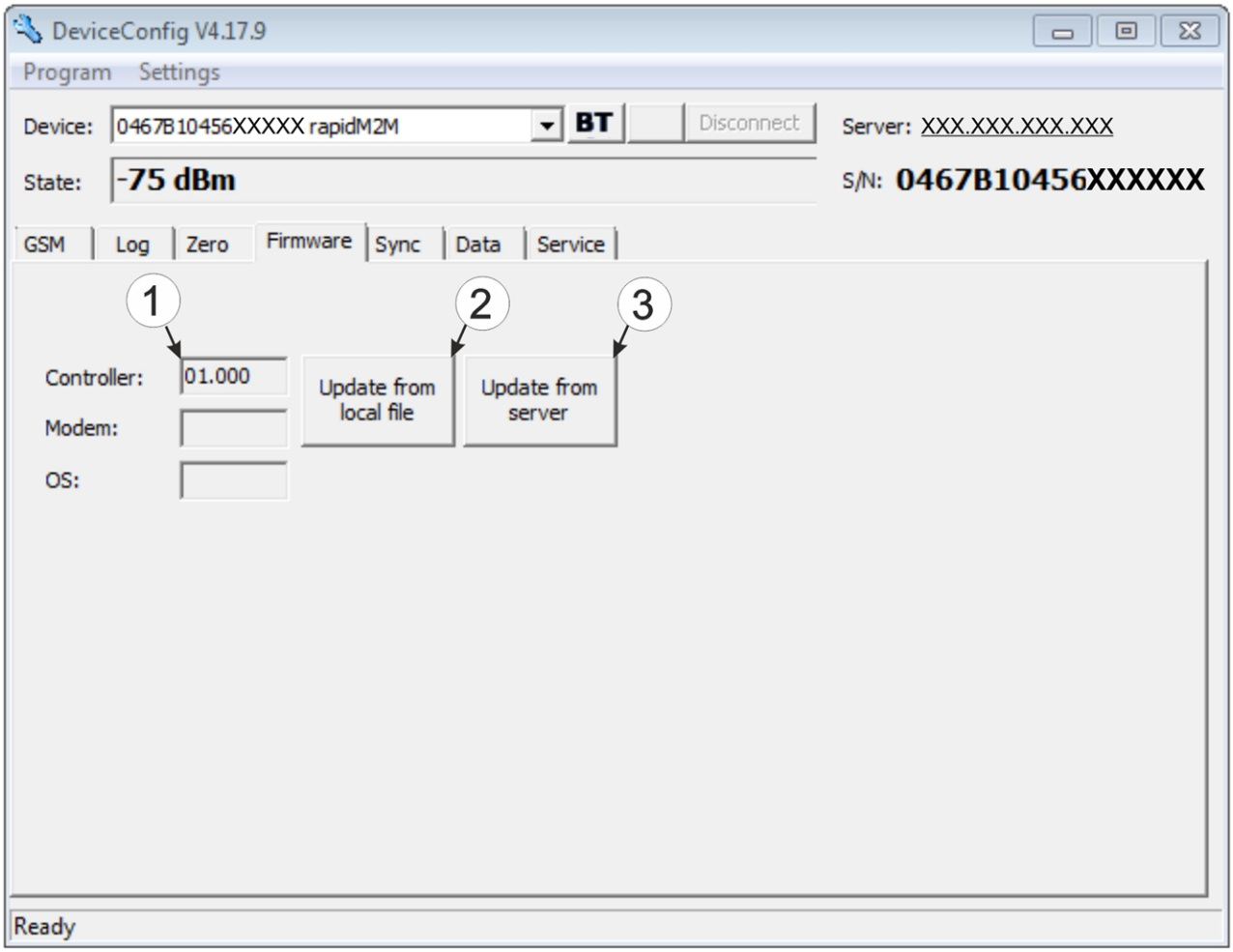
"Log" tab with detailed view activated

1 Activates the detailed display of the log entries	**3** Log entry that is always displayed
2 Informative log entry that is only visible if the detailed display is activated	

10.9 "Firmware" tab

This tab enables firmware to be installed directly via the USB interface or the local radio interface. There are two available ways to update the firmware:

- Using a previously downloaded firmware package
- By directly loading from the DATAEAGLE-Portal server

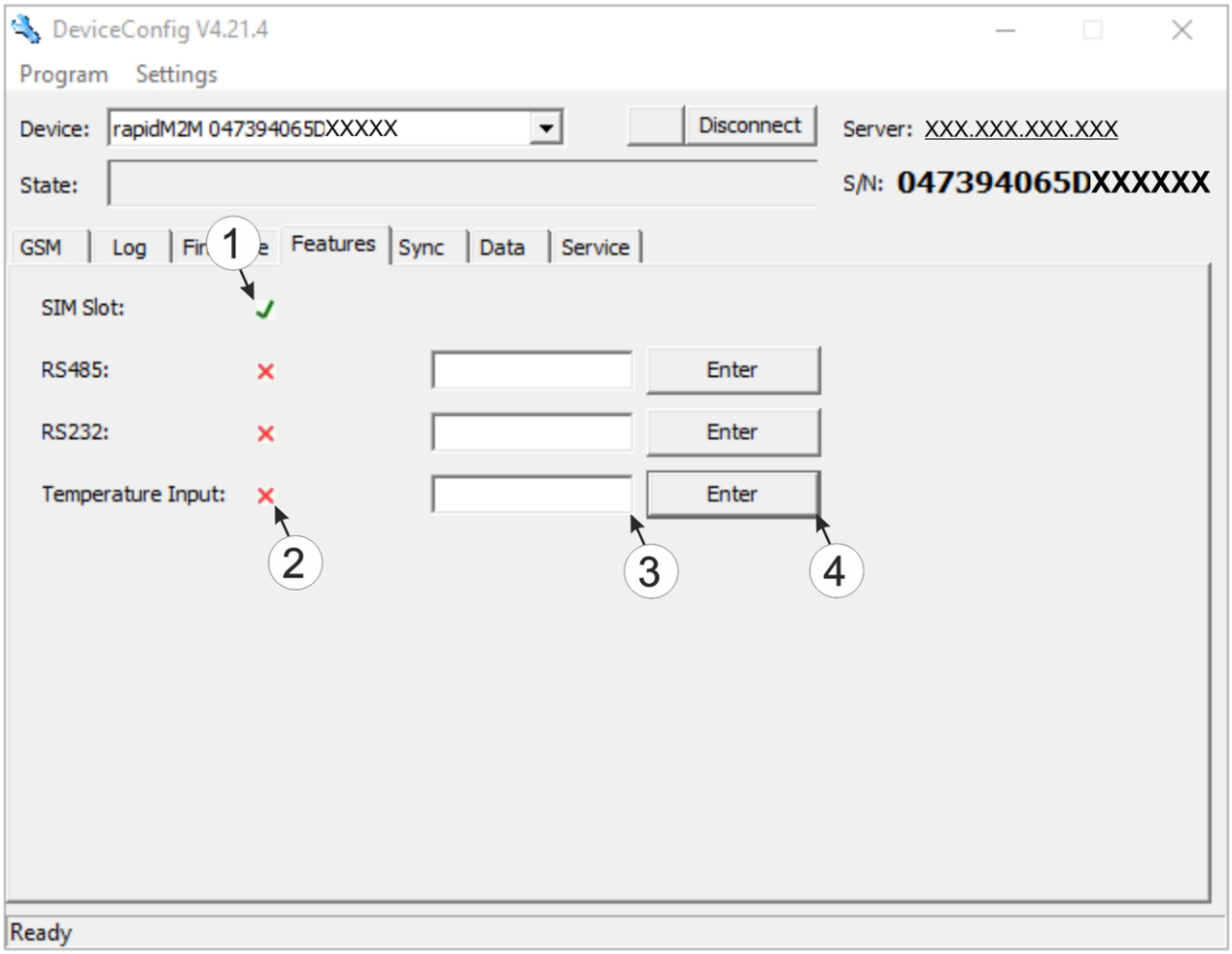


"Firmware" tab

1 Currently installed software version	**3** The firmware is loaded directly from the server and installed on the device.
2 Button to install a previously downloaded firmware package	

10.10 "Features" tab

This tab provides the option of unlocking chargeable features by entering the activation code. It also offers an overview of the additional features that can be activated and which of these have already been activated.



"Features" tab

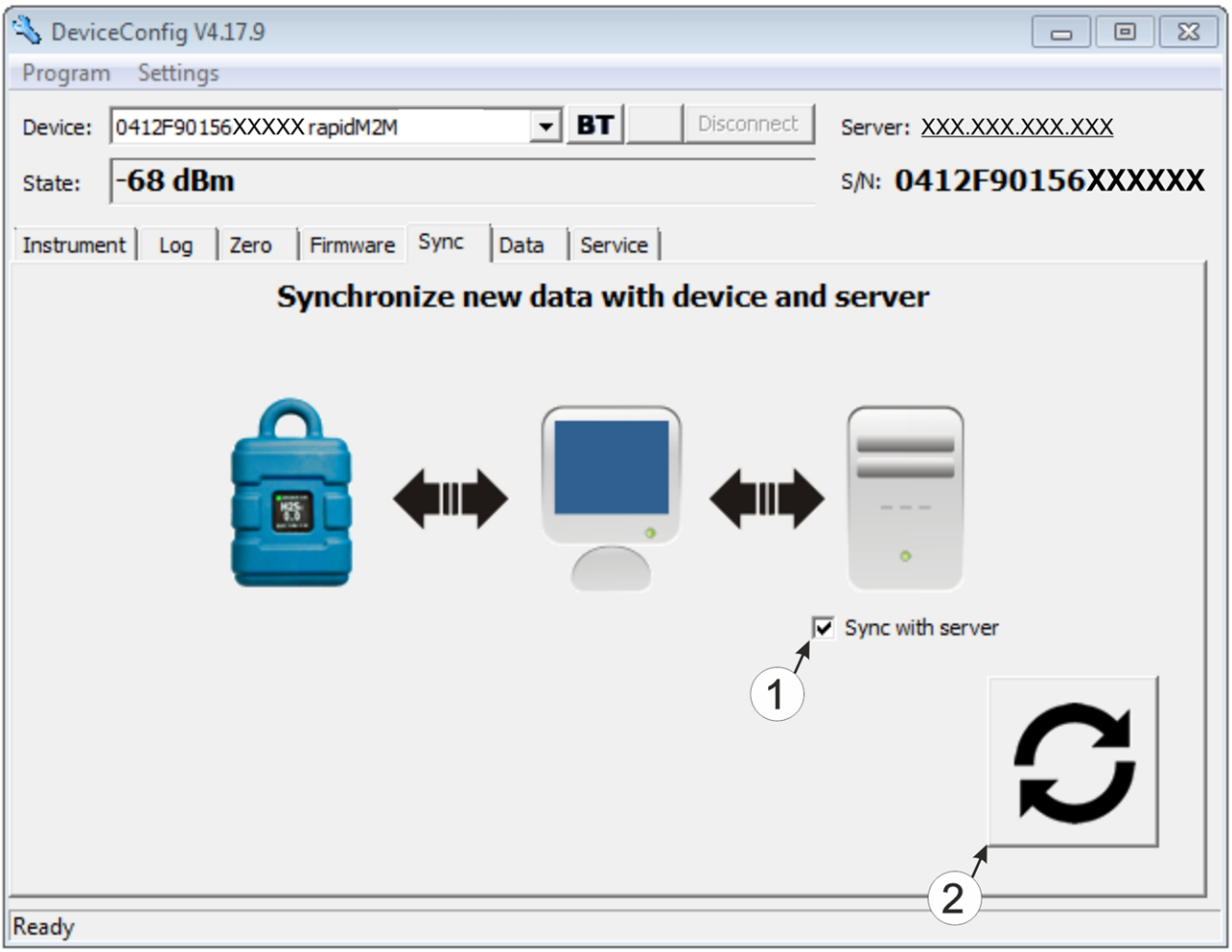
1 Feature has already been unlocked	**3** Input field for the activation code
2 Feature is not unlocked.	**4** Button for confirming the activation code and unlocking the feature

10.11 "Sync" tab

This area is designed to synchronise measurement data and configurations between 4-Channel Data Logger , DeviceConfig and DATAEAGLE-Portal server. The "Sync" tab is also available if there is no connection (USB or local radio) to a device.

10.11.1 Existing connection to the 4-Channel Data Logger

If there is an existing connection to the 4-Channel Data Logger , there is an option to only synchronise the measurement data and configurations with the DeviceConfig configuration program for local processing or to transfer them to the DATAEAGLE-Portal server. In the event that your PC is not connected to the Internet when reading out the data, you can initially synchronise the measurement data and configurations of the 4-Channel Data Logger with the DeviceConfig configuration program. As soon as your PC establishes a connection to the Internet, for example when you return to the office, you can then complete the synchronisations between the DeviceConfig and DATAEAGLE-Portal server (see "No connection to a device" on page 153).

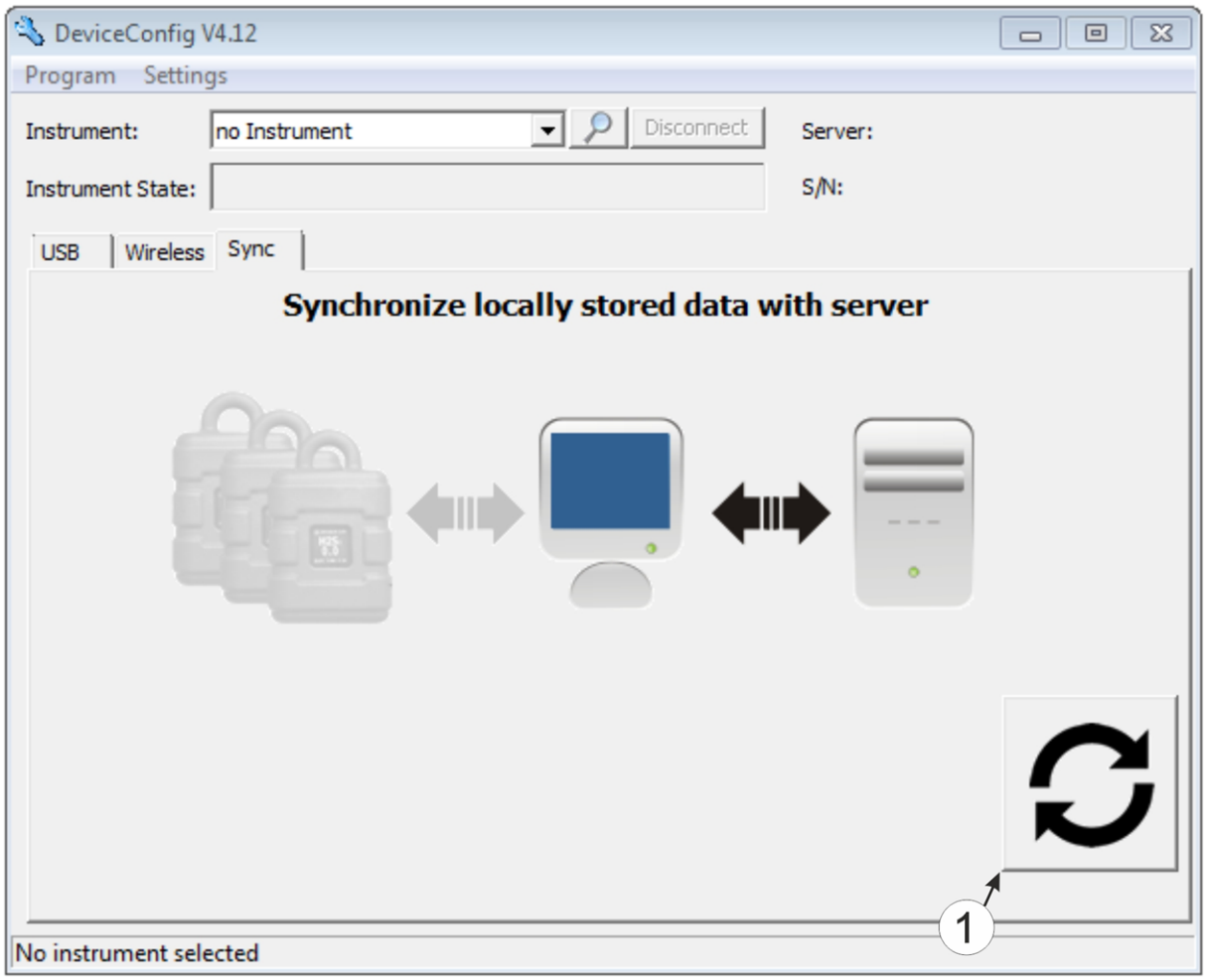


"Sync" tab when connected to the 4-Channel Data Logger

1	Checkbox to determine whether the measurement data and configurations should also be synchronised with the server when clicking on the Sync button. ***Note:*** *This checkbox is only displayed if your PC is already connected to the Internet.*
2	Button to trigger synchronisation

10.11.2 No connection to a device

This option can be used to complete the synchronisation retrospectively, if no connection to the Internet was possible while reading out the measurement data and configurations from the 4-Channel Data Logger .



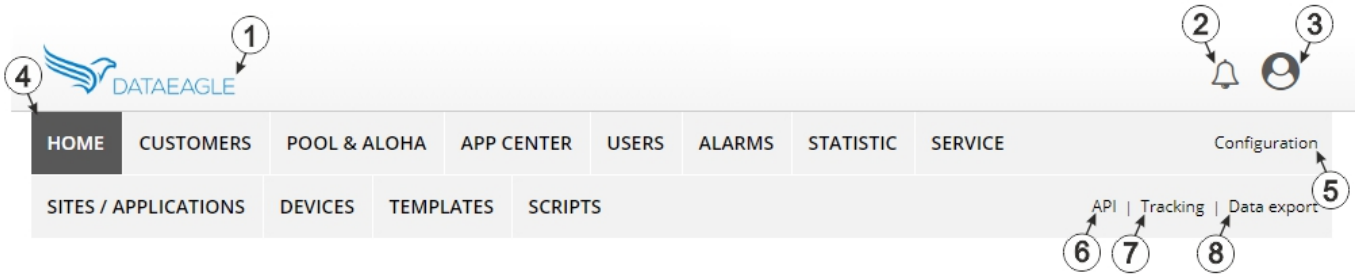
"Sync" tab without connection to a device

1	Button to trigger synchronisation During this process, the measurement data and configurations for all of the devices that the DeviceConfig configuration program has saved locally are synchronised with the DATAEAGLE-Portal server.

Chapter 11 DATAEAGLE-Portalserver

Note: *All of the screenshots show version 54v00x of the DATAEAGLE-Portalserver using the standard colour scheme. Newer versions may include minor changes to the appearance of the server.*

11.1 Overview



Overview of the DATAEAGLE-Portalserver

1	Freely selectable logo	**5**	Opens the screen to input the global settings for the server
2	Opens the window in which the notifications created by the system and intended for the currently logged-in user are summarized	**6**	Opens the rapidM2M Playground
3	Displays the menu for adjusting the user settings and for logging out the currently active user	**7**	Switches to the "Data exports" area to configure the data export. This tab is only visible if at least the licence for one export variant is available.
4	Tabs to switch between the individual server areas	**8**	Opens the input screen to upload a XML file. This tab is only visible if the licence for the XML import is available.

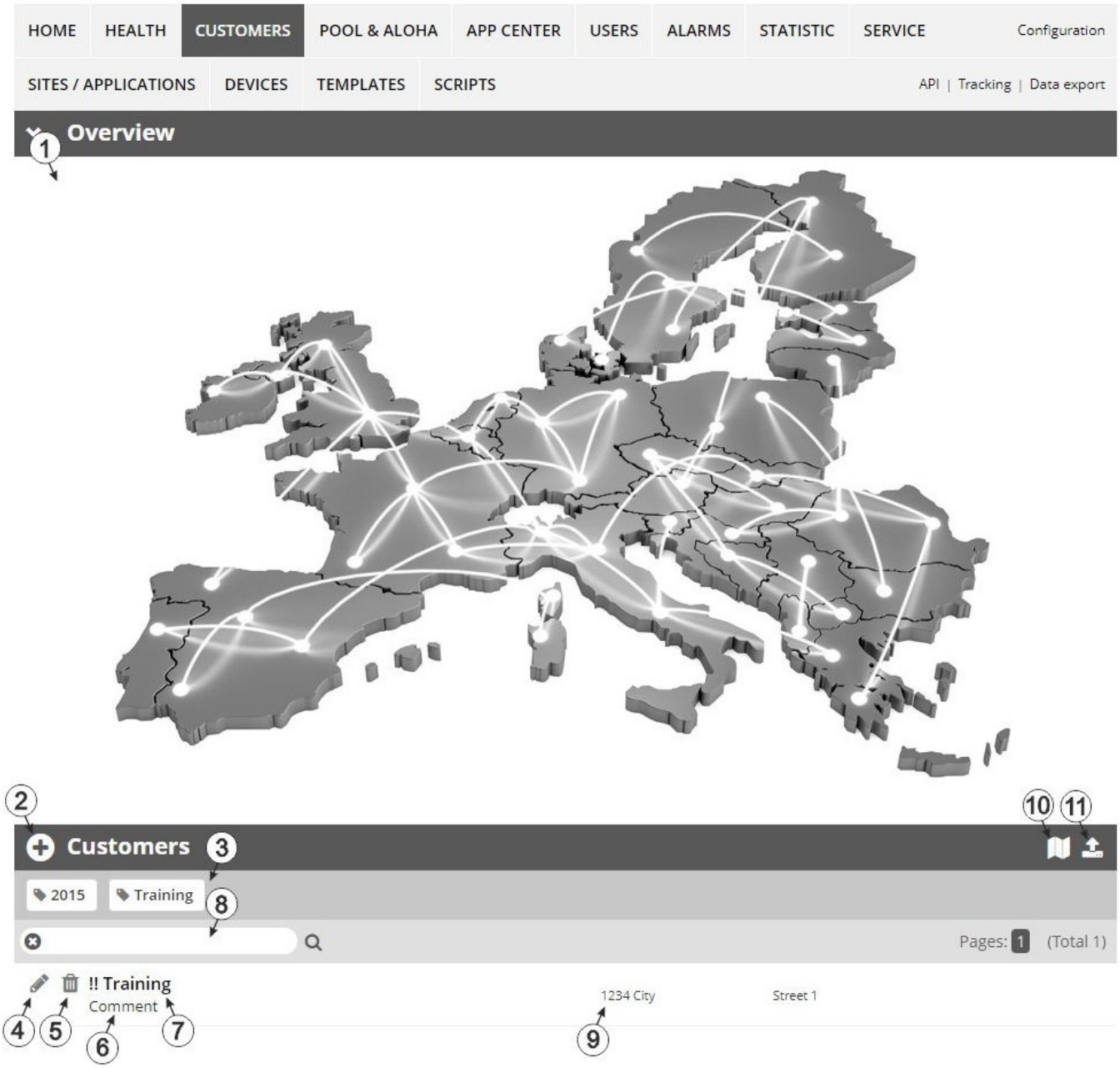
11.1.1 Explanation of the symbols


Adds a new entry to the current list (reports, sites, users, etc.).


Deletes the adjacent element (report, site, user, etc.) from the list.


Calls up the input screen to edit the adjacent element (report, site, user, etc.).

11.2 "Customer" area

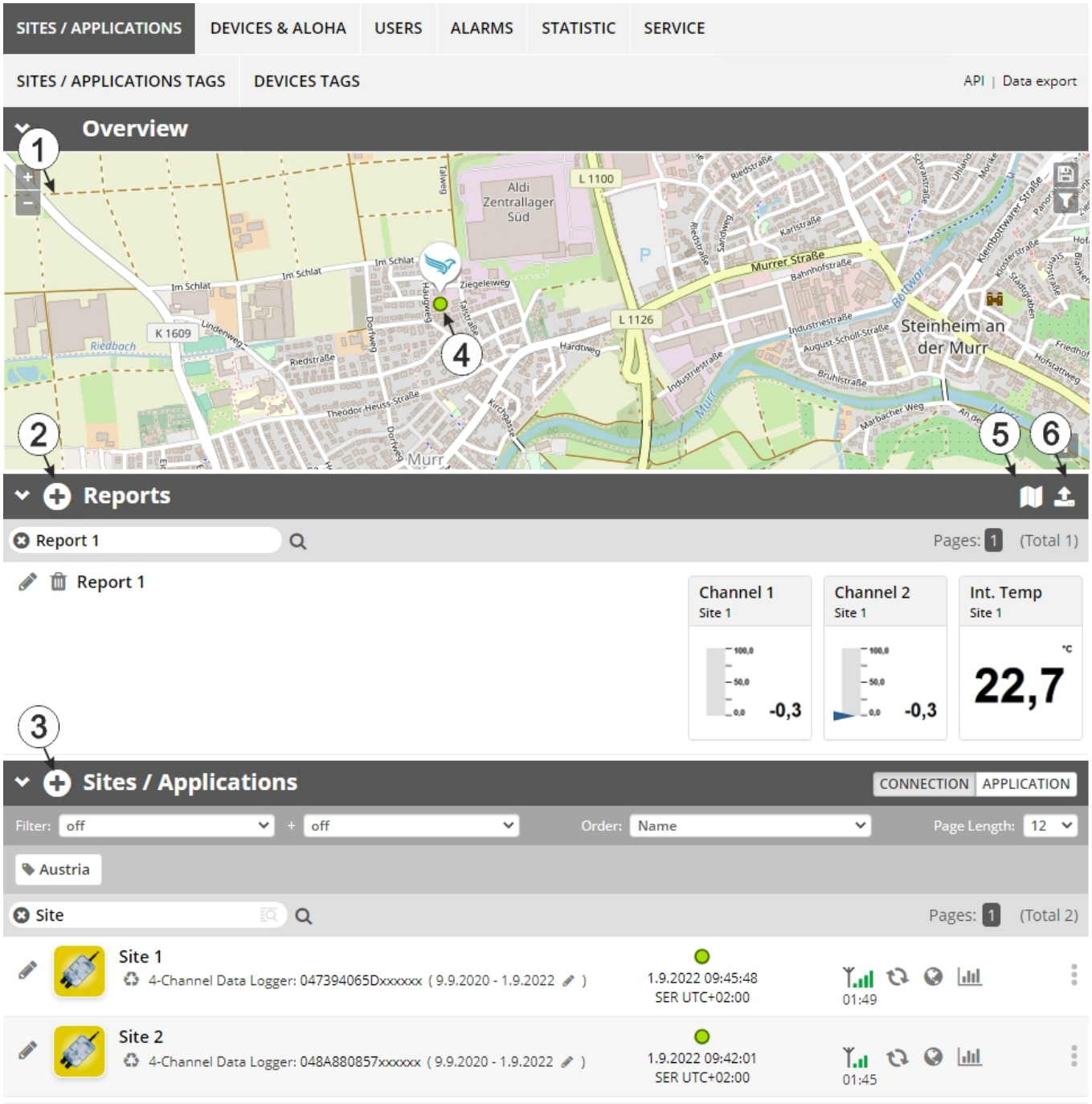


Overview of the "Customer" area

1	Area where an image file can be displayed as a "Map" and/or the OpenStreetMaps map can be displayed The sites can be manually placed on the image file used as a "map". In the OpenStreetMaps map, the sites are only displayed once GPS coordinates have been assigned to the site.
2	Adds a new customer

3	List of tags that are assigned to at least one of the customers displayed in the list of customers. If the list of customers was limited by the search field or selection of a tag, this is taken into consideration when creating the list of tags. A cross is added to the end of the list of tags as soon as the list of customers is limited by the selection of a tag. Clicking on this cross will reset the selection of all tags and the restriction is cancelled. By clicking on one of the tags with the left mouse button only those customers who have been assigned the corresponding tag are displayed in the list of customers and the selected tag is highlighted in colour. By clicking on one of the tags with the right mouse button all of the customers who have been assigned the corresponding tag are hidden, the selected tag is highlighted in colour and the title of the tag is crossed out. Clicking the same mouse button again will remove the restriction.
4	Opens the input screen for configuring the customer
5	Deletes the customer
6	Comment that can be entered in the configuration of the customer
7	If a default report was defined, the default report is accessed by clicking on the name of the customer. Otherwise the "Sites / Applications" area at customer level is opened by clicking on the name of the customer (see ""Sites / Applications" area at customer level" on page 158 or "Reports" on page 159).
8	Search field to filter the customer list
9	Customer's address that can be entered via the input screen for configuring the customer
10	Symbol via which a OpenStreetMaps map, on which the sites are displayed, can be loaded. (see "Map view" on page 159)
11	Symbol via which an image file can be loaded on to the server as an "Overview map" To remove the "Map" again, open the upload dialogue again and click on "Submit" without selecting an image file beforehand.

11.3 "Sites / Applications" area at customer level



Overview of the "Sites / Applications" area at customer level

1	Area where an image file can be displayed as a "Map" and/or the OpenStreetMaps map can be displayed The sites can be manually placed on the image file used as a "map". In the OpenStreetMaps map, the sites are only displayed once GPS coordinates have been assigned to the site.

2	List of reports (see "Reports" on page 159)
3	List of sites/applications (see "Site" on page 125)
4	Symbol that represents a site on the "Map"
5	Symbol via which a OpenStreetMaps map, on which the sites are displayed, can be loaded. (see "Map view" on page 159)
6	Symbol via which an image file can be loaded on to the server as a "Map" To remove the "Map" again, open the upload dialogue again and click on "Submit" without selecting an image file beforehand.

11.3.1 Reports

The reports provide a variety of options to display graphs of the data on the web interface of the DATAEAGLE-Portalserver or to download the data from the DATAEAGLE-Portalserver. Detailed instructions on creating and handling the reports is provided in User manual for DATAEAGLE-Portal-Server (- upon request).

11.3.2 Map view

The map view provides an overview of the geographic position of the sites. Detailed instructions on operating and configuring map view are provided in User manual for DATAEAGLE-Portal-Server (- upon request).

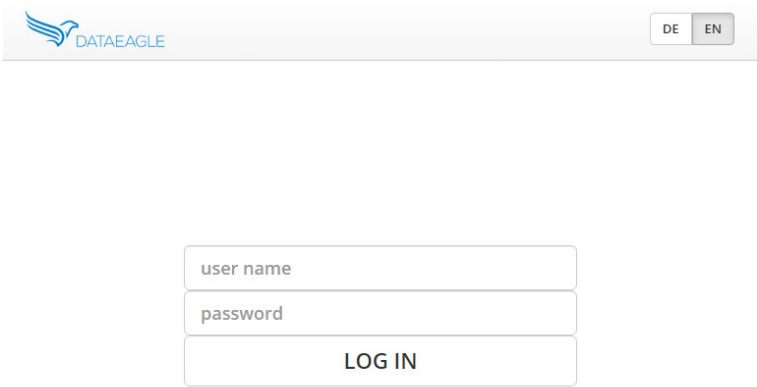
11.4 Recommended procedure

11.4.1 Creating the site

> ***Note:*** *Some of the fields mentioned in the following chapters may be hidden depending on the respective user level. In this case, please contact the administrator of the DATAEAGLE-Portalserver.*

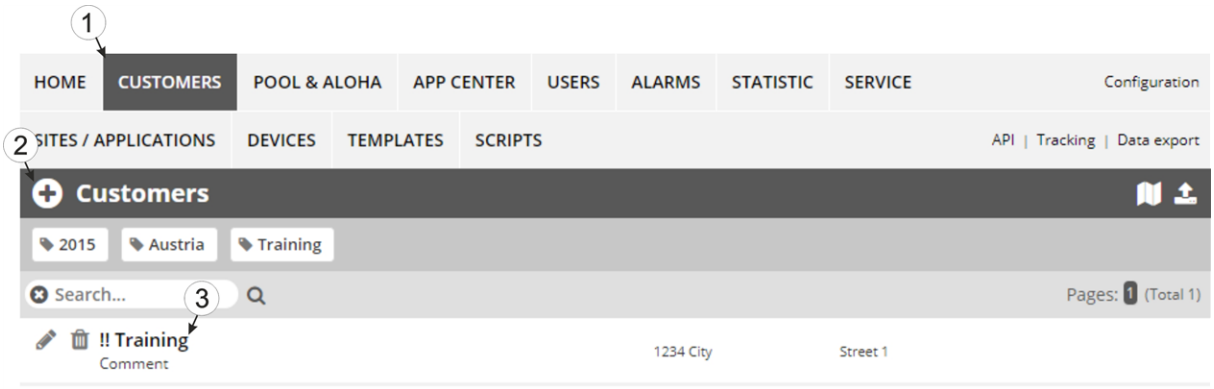
Detailed instructions on creating a new site are provided in User manual for DATAEAGLE-Portal-Server (- upon request).

1. Log in via the web interface on the DATAEAGLE-Portalserver. You will receive the web address from your responsible sales partner.



Login form of the DATAEAGLE-Portalserver

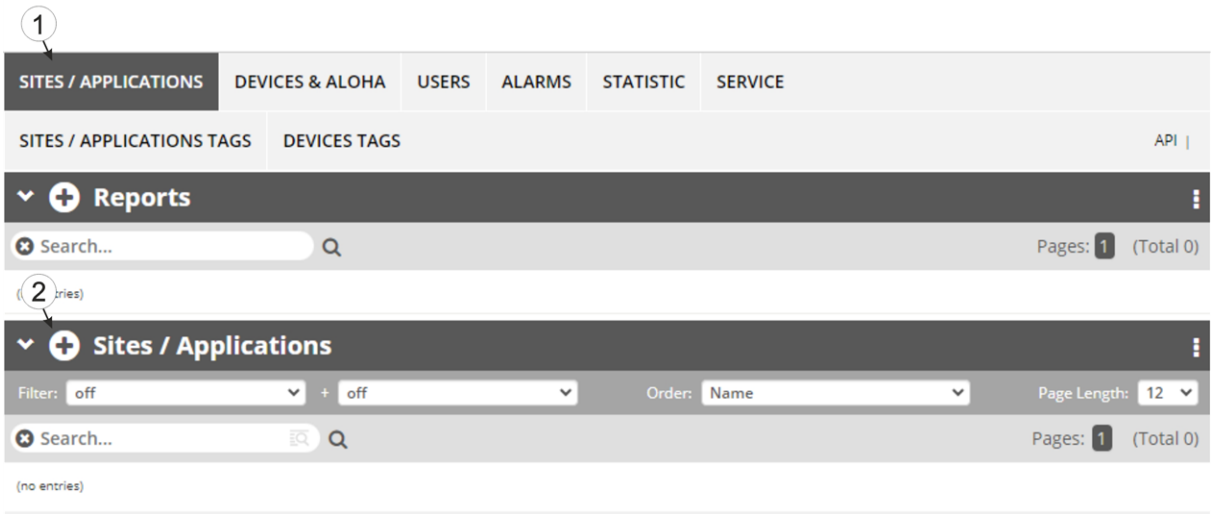
2. Click on the "Customer" menu item of the DATAEAGLE-Portalserver to call up the list of available customers. Select an existing customer or create a new customer.



Selecting the customer

1 Menu item to call up the list of customers	**3** List of available customers
2 Creating a new customer	

3. Click on the "Sites / Applications" menu item of the DATAEAGLE-Portal server to call up the list of existing sites / applications. Then open the wizard for creating a new site by clickeng the "Add new site / application" symbol.

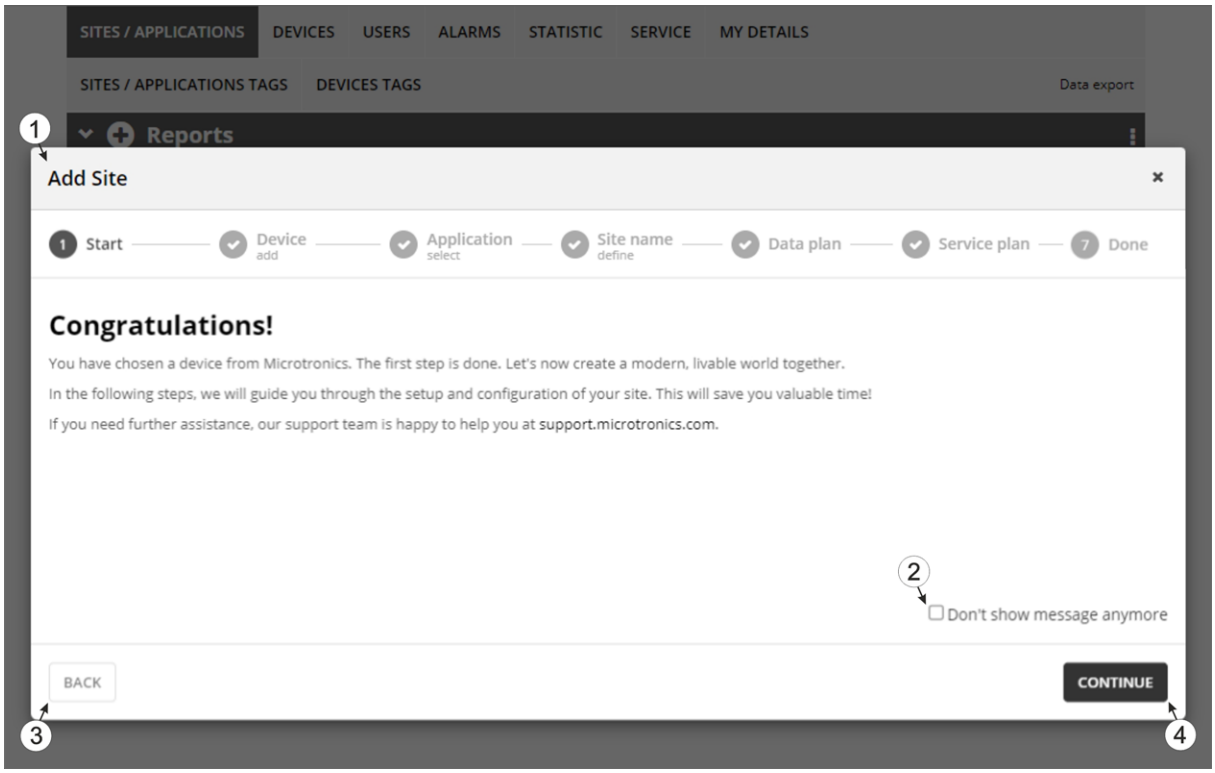


Opening the wizard for creating a site

1 Menu item to call up the list of existing sites / applications	**2** "Add new site / application" symbol

4. Follow the instructions of the wizard until you can see the button "create site". By clicking the button "back" you can always return to the previous step and modify the your chosen settings.

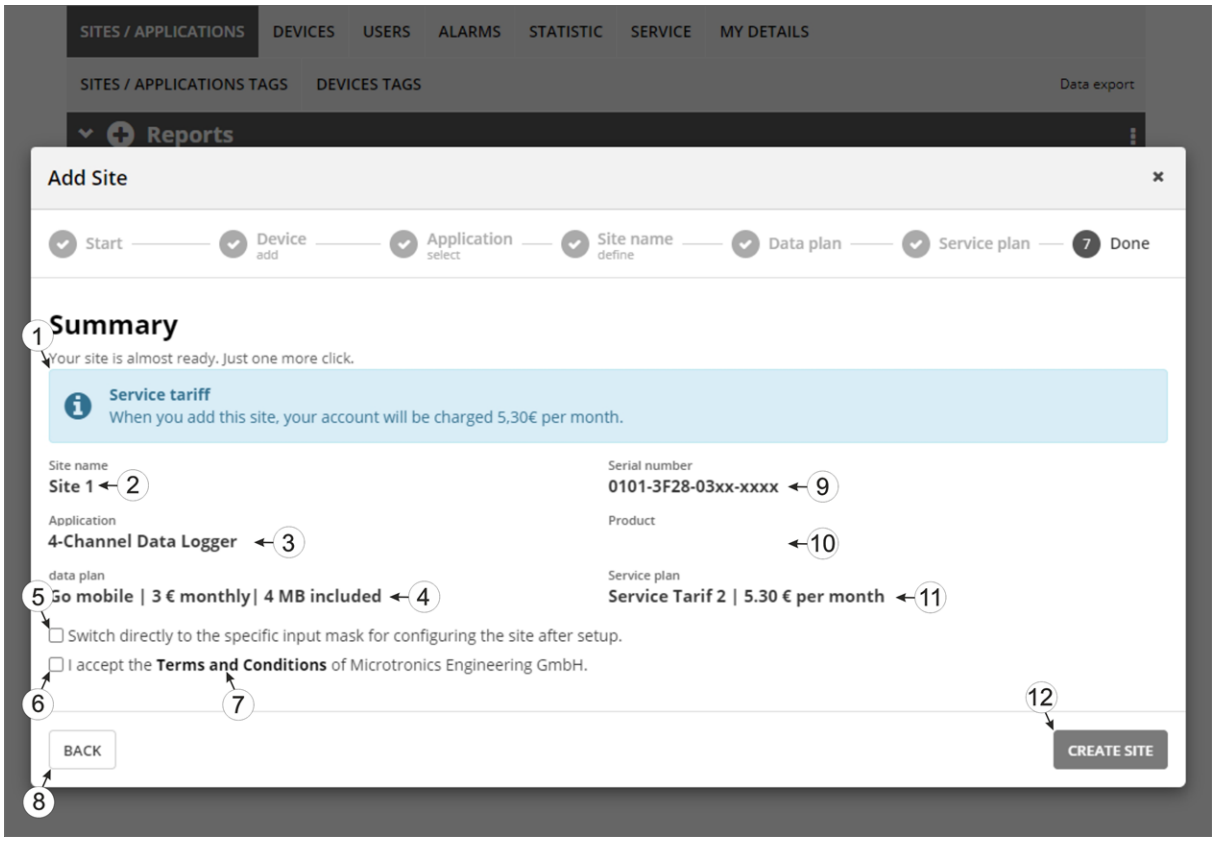
   Note: *Depending on the functions activated on the DATAEAGLE-Portalserver, some of the steps in the following illustration may not be required and are therefore not displayed.*



Create site using the wizard

1	Wizard for creating a new site	**3**	"Back" button (return to previous step of wizard)
2	Do not display welcome message again next time the wizard is run	**4**	"Continue" button (continue to next step of wizard)

5. Verify the information in the summary, read the general terms and conditions and tick the checkbox to accept the general terms and conditions. Then click on the "Create site" button to finalise the process.



Completing site creation

1	This amount is debited from the customer's account for this site immediately upon creation and subsequently on a monthly basis. (Only displayed if the account module or the billing module is activated on the server)
2	Name defined for the site, which is then also displayed in the list of sites
3	Application selected
4	Data plan selected (Only displayed if the account module is activated on the server)
5	Checked: After clicking "create site", the specific input mask for configuring the site is opened. Not checked: After clicking "create site", you return to the list of sites.
6	Checkbox to accept the general terms and conditions
7	Link to the general terms and conditions
8	"Back" button (Allows for modifying the chosen settings)
9	Serial number of the device connected to the site
10	Product name as specified on the type plate of the device (Only displayed if the information is stored in the device)
11	Service plan selected (Only displayed, if the billing module is activated on the server)
12	"Create site" button

Chapter 12 API

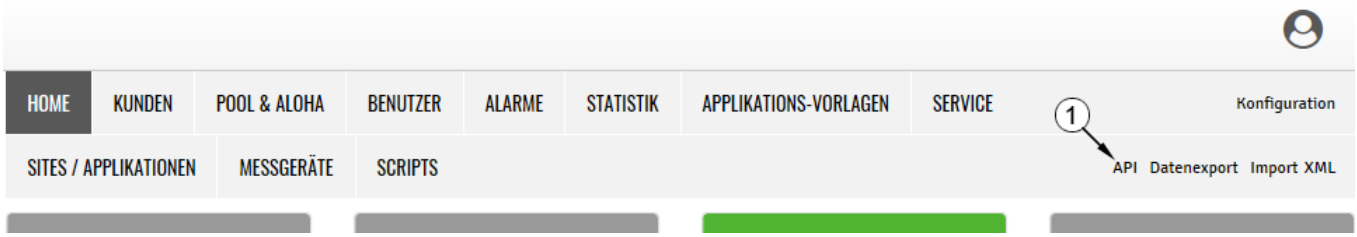
Important note: *The relevant licences are required on the DATAEAGLE-Portal server to use the API (Application Programming Interface). For future information contact your responsible sales partner.*

12.1 Backend API

The API is provided to export data from and import data to the DATAEAGLE-Portal server. However, this is not just limited to the pure measurement data but includes all of the data provided by DATAEAGLE-Portal server (e.g. configurations). It is therefore possible for the customer to completely dispense with the interface of the DATAEAGLE-Portal server and to create his own user interface. A specially developed PC program or web interface can, for example, be used for this purpose.

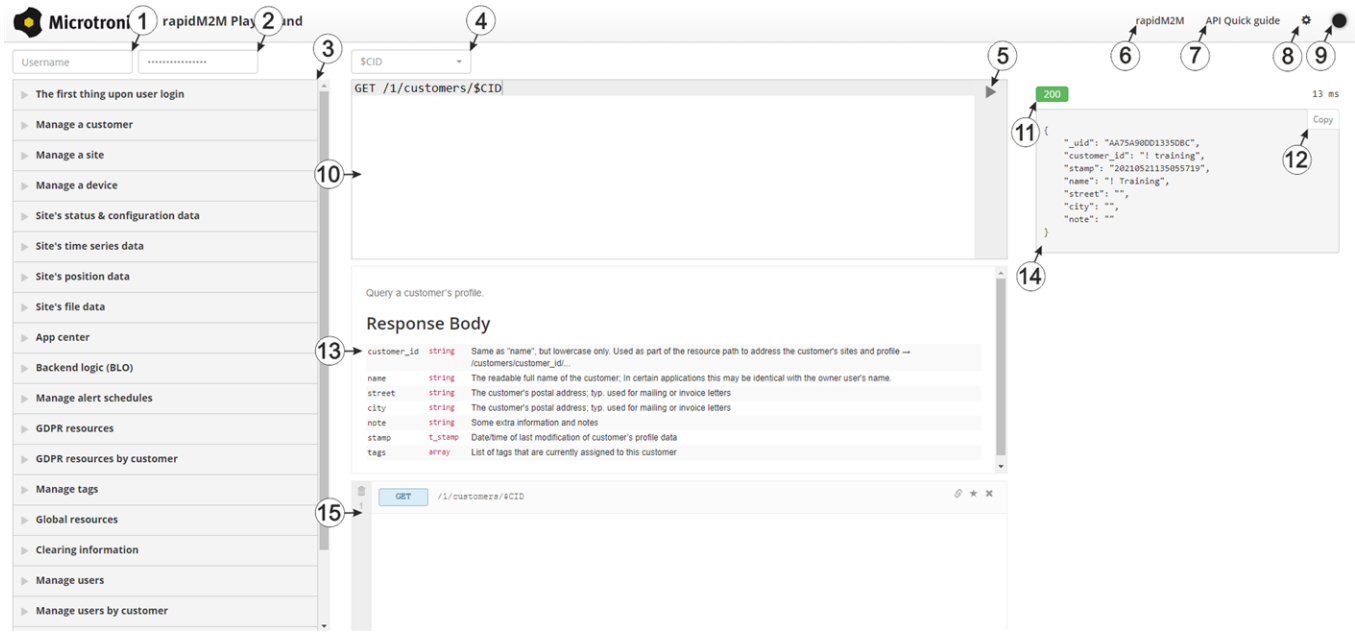
12.2 rapidM2M Playground

The rapidM2M Playground enables you to familiarise yourself with the API of the DATAEAGLE-Portalserver and to test the provided functions. One click on the "API" button will take you to rapidM2M Playground .



1	Opens the rapidM2M Playground

12.2.1 Overview



rapidM2M Playground

1	Input field for the user name
2	Input field for the password
3	List of the available HTTP commands. The HTTP commands are grouped according to their fields of application.
4	Depending on the selected HTTP command, the drop down lists for selecting the customer, user and site that should replace the corresponding wild cards ("$CID"...customer , "$UID"...user, "$SID"...site) in the resource path of the HTTP command are displayed.
5	Button to execute the HTTP command
6	Opens the website "http://rapidm2m.com/" that includes additional information for developers
7	Opens the quick guide for the API
8	Button for displaying the menu that contains the global settings
9	Button to change the colour scheme of the rapidM2M Playground
10	Window displaying the selected HTTP command
11	Response code sent by the DATAEAGLE-Portal server as an answer to the HTTP command
12	Copies the JSON object generated as a response to the HTTP command on to the clipboard
13	Window displaying the documentation for the selected HTTP command. Depending on the selected command, this includes a description of the action being executed, information that must be observed and a description of the request body and response body.
14	Window displaying the JSON object that is generated as a response to the HTTP command
15	Window displaying the last executed HTTP commands

Chapter 13 Maintenance

Important note: *To prevent any damage to the device, the work described in this section of the instructions must only be performed by qualified personnel.*

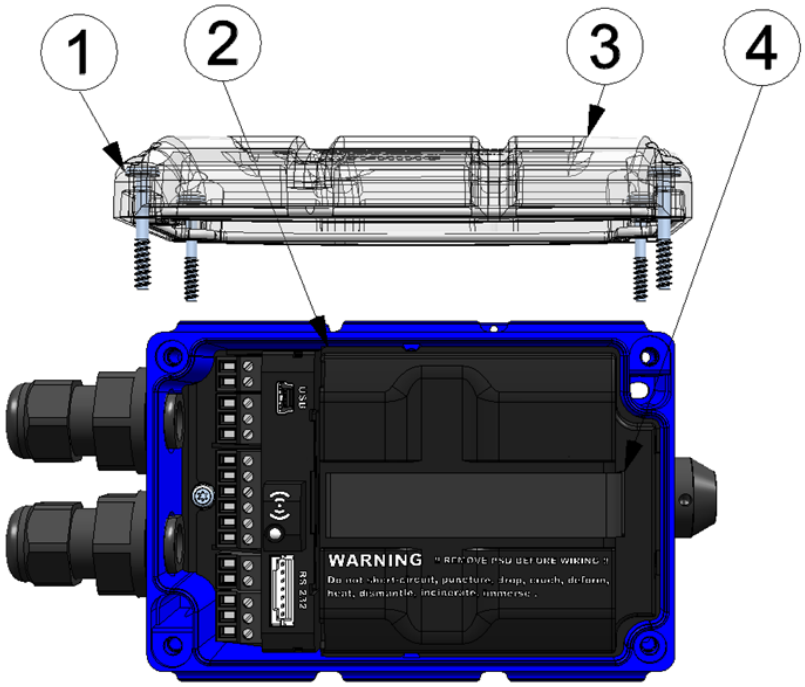
The device must be deenergised before any maintenance, cleaning and/or repair work.

13.1 General maintenance

- Regularly check the 4-Channel Data Logger for mechanical damage.
- Check all of the connections for leaks or corrosion on a regular basis.
- Check all of the cables for mechanical damage at regular intervals.
- Clean the 4-Channel Data Logger with a soft, moist cloth. Use a mild cleaning agent, if necessary.

13.2 Replacing the power supply unit

Important note: *A dry location must be used to replace the power supply unit. If this is not possible, protect the opened device against penetrating moisture using suitable means.*



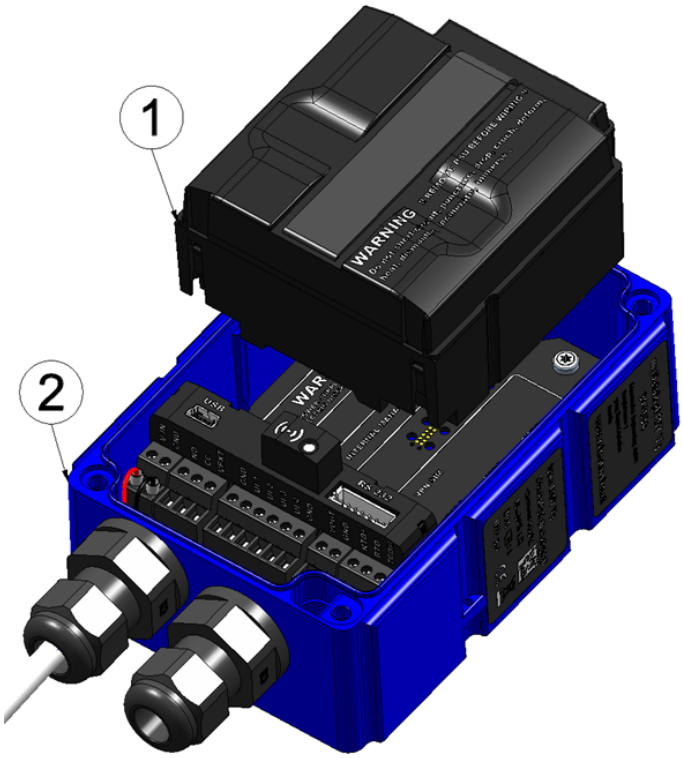
Opening the 4-Channel Data Logger

1	Delta PT M3,5x25 Torx 15	**3**	Housing cover
2	Power supply unit	**4**	Strap to remove the power supply unit

1. Ensure that all of the relevant data was transferred to the DATAEAGLE-Portal server. If necessary, initiate a transmission via the solenoid switch (see "Solenoid switch" on page 88) and then check again that all of the relevant data has been transferred.

2. If you are using an external supply or charging voltage, disconnect this from the device before opening the housing cover.
3. Remove the four screws that secure the housing cover. Now open the 4-Channel Data Logger .
4. Remove the power supply unit from the 4-Channel Data Logger and replace the existing power supply unit with a new one. Use the strap provided to remove the power supply unit.

   Note: *Ensure that power supply units, especially ones with integrated energy store (rechargeable battery or battery), are disposed of in line with environmental requirements. Power supply units with depleted rechargeable battery or battery can be returned to the manufacturer or handed in at suitable collection points.*



Removing the power supply unit

1 Power supply unit	**2** 4-Channel Data Logger base unit

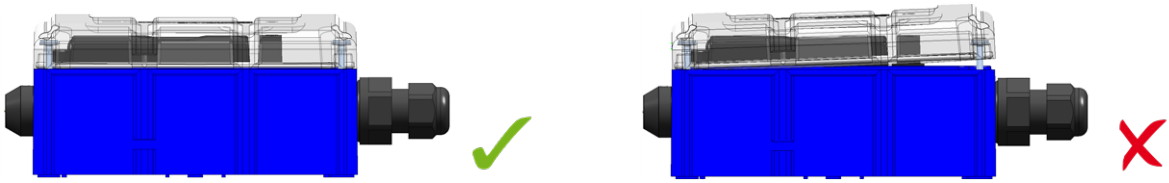
The following step is not mandatory.

5. Check whether the connection to the DATAEAGLE-Portal functions correctly (see "Testing communication with the device" on page 85).
6. Close the housing cover. The best option is to tighten the four screws crosswise (torque: 0,5 Nm; At the first screw 0,7 Nm because the threads have to be shaped into the base part first.) so that the housing cover is positioned evenly.

   Important note: *Ensure that the seals are clean and intact before closing the housing cover. Remove any impurities and/or dirt. The manufacturer shall not be liable for any damage to the device caused by leaky or faulty seals.*

7. Check that the housing cover is positioned correctly on all sides and that no foreign materials have been trapped between the housing and housing cover.

   Important note: *The manufacturer is not liable for any damage that is caused by housing covers that are not closed correctly.*



The following step is only necessary if you are using an external supply or charging voltage.

8. Now switch on the external supply or charging voltage.

   Note: *If you are using a power supply unit without an integrated energy store, the external supply or charging voltage must be switched on before the optional step during which the connection to the server is tested.*

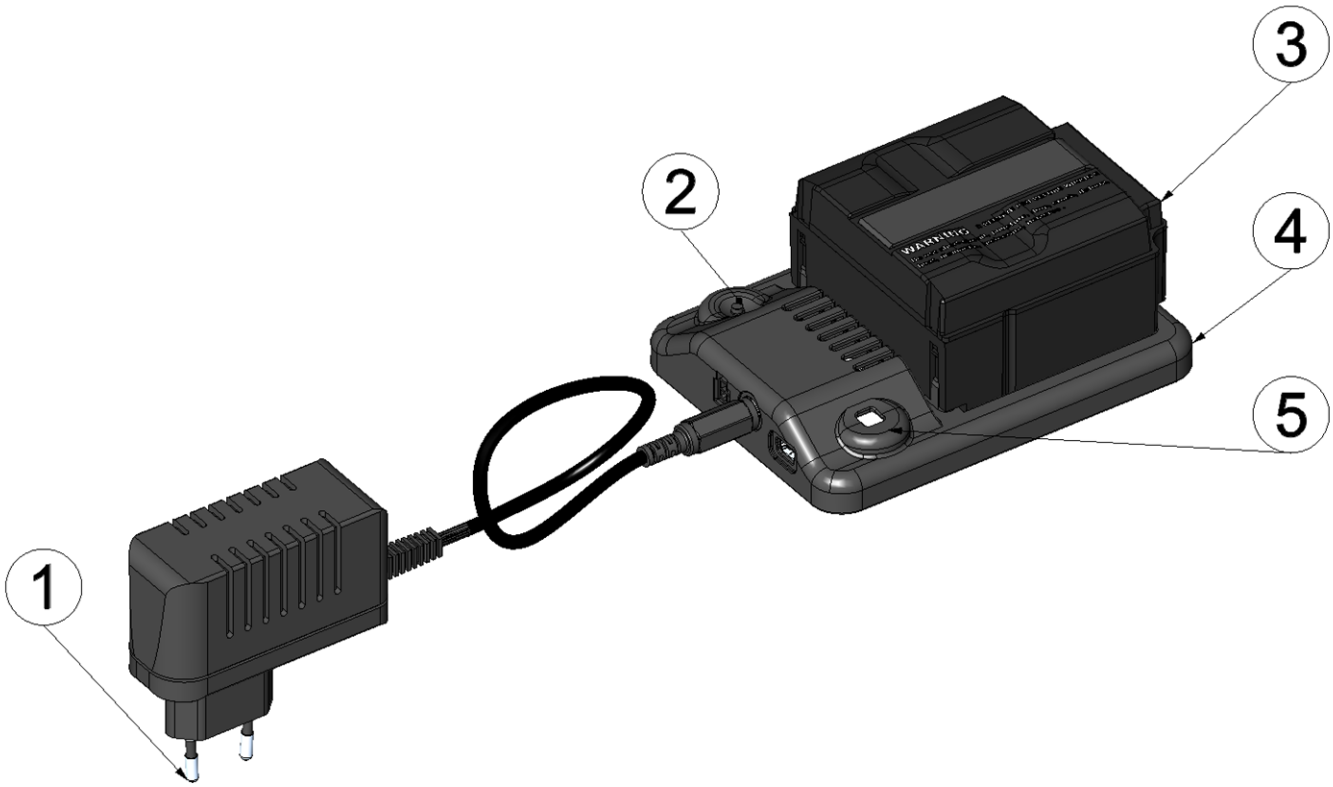
13.2.1 Charging the power supply unit

All power supply units with an integrated and rechargeable energy store are delivered with a maximum charge of 30% in accordance with applicable transport regulations. If you use an external charging voltage (V IN) during operation, the power supply unit is constantly charged by the charge controller integrated in the 4-Channel Data Logger .

If no external charging voltage (V IN) is available during operation, the power supply unit must be fully charged before initial use.

For instructions on removing the rechargeable battery, see "Replacing the power supply unit" on page 165.

Important note: *Only use the PSU Charger (- upon request) to charge the power supply units. The charger specifications must be observed. The use of other chargers can destroy the power supply unit, for example, causing the cells to leak or an explosion, etc.*



Charger with power supply unit

1 Plug-in power supply (included in the scope of delivery of - upon request)	**4** PSU Charger (- upon request)
2 Button (reserved for extension)	**5** Status LED of the PSU Charger **Possible states of the status LED:** off: no PSU inserted Flashing green: PSU is being charged Green: Charging completed Flashing red 1x every 5 seconds: PSU does not contain a rechargeable energy store Flashing red 2x every 5 seconds: PSU damaged Flashing red 3x every 5 seconds: Supply voltage of the charger is too low
3 Power supply unit e.g. DATAEAGLE 702x Akkupack V3 (17109 V3)	

The charging process starts as soon as the power supply unit is inserted in the charger. If the status LED on the charger flashes red once every 5 seconds, the power supply unit inserted in the charger does not contain a rechargeable energy store. If the status LED flashes red three times every 5 seconds, the supply voltage of the charger is too low. In this case, check the cable connection between the plug-in power supply and the PSU Charger and check whether the plug-in power supply is correctly connected to an electric socket. If the status LED flashes green, a normal charging process is in progress. The charging process is complete when the status LED turns green.

If the status LED flashes red twice every 5 seconds, the power supply unit is faulty. Possible reasons for this include a broken cable, short circuit or defective cells. In this case, the used power supply unit must be replaced with a new one.

> ***Note:*** *Rechargeable batteries are wear parts that lose capacity over time. The capacity is also reduced at high or low ambient temperatures and under intensive use.*

> ***Note:*** *Ensure that power supply units, especially ones with integrated energy store (rechargeable battery or battery), are disposed of in line with environmental requirements. Power supply units with depleted rechargeable battery or battery can be returned to the manufacturer or handed in at suitable collection points.*

13.3 Power supply units with integrated energy store

While power supply units with integrated batteries (e.g. PSU713 BP) are intended for single use and must be disposed of accordingly after depletion, power supply units with integrated rechargeable batteries (e.g. DATAEAGLE 702x Akkupack V3) can be recharged and used again and again. However, the service life of rechargeable batteries is not indefinite. In addition to regular servicing and maintenance, its service life is also dependent on the frequency of use and the operating and storage conditions.

Chapter 14 Removal & disposal

Material separation only by qualified personnel!

- Be careful when disassembling the device, you may injure yourself.
- Take the separated components to the appropriate recycling.

Incorrect disposal can cause environmental hazards.

Dispose of the device components and packaging material in accordance with the locally valid environmental regulations for electronic products (e.g. according to European waste code 16 02 14).

1. Disconnect any charging voltage that has been used.
2. Remove the power supply unit with the integrated energy storage (rechargeable or non-rechargeable battery) and dispose of it separately.
3. Disconnect any connected cables using a suitable tool.

Logo of the EU WEEE Directive

This symbol indicates that the requirements of Directive 2012/19/EU regarding the scrap disposal of waste from electric and electronic equipment must be observed. Schildknecht AG supports and promotes recycling and environmentally friendly, separate collection/disposal of waste from electric and electronic equipment in order to protect the environment and human health. Observe the local laws and regulations on disposal of electronic waste at all times.

The Schildknecht AG is registered with the EAR, therefore public collection and return points in Germany can be used for disposal.

The device contains a lithium button cell that has been soldered on. It must be removed before disposal or the disposal service must be informed that batteries are still located in the device.

The device includes a battery or rechargeable battery (lithium) that must be disposed of separately.

The product can be returned to Schildknecht AG in case of disposal (see "Contact information" on page 195). This also applies to the original packaging and any batteries or rechargeable batteries. Devices contaminated with hazardous substances will not be taken back for repair or disposal.

Chapter 15 Troubleshooting and repair

15.1 General problems

Problem	Cause/solution
Device does not respond (status LED always off).	• Check the cable connections (see "Connecting the sensors, actuators and power supply" on page 67) • The capacity of the energy store in the power supply unit is depleted.
Communication problems	• Load the device log from the 4-Channel Data Logger using the DeviceConfig (see ""Log" tab" on page 148). A list of all the possible error codes is included in the chapter "Log entries and error codes" (see "Log entries and error codes" on page 175). • The capacity of the energy store in the power supply unit is virtually depleted.
The connection via the external SIM card is not working.	• The chargeable feature "Activation code VPN SIM (- upon request)" has not been released. • Check whether the external SIM card has been inserted correctly (see "Inserting/replacing the SIM card" on page 57). • Check whether the configuration data (PIN, APN, username and password) have been set correctly via the DeviceConfig (see ""GSM" tab" on page 146). • Check whether the PIN code (if required by the SIM card) has been set correctly by the DeviceConfig .
Not all or no data is available on the server.	• The connection was aborted during the transmission, which is indicated by a time-out entry in the connection list (see "User manual for DATAEAGLE-Portal-Server " - upon request). Solution: Initiate a transmission or wait for the next cyclical transfer. • The assignment of the device and site is not correct (see "Site" on page 125).
Data at universal input is not plausible.	• Check the cable connections (see "Connecting the sensors, actuators and power supply" on page 67) • Check whether the output signal from the sensor that you are using is compatible with the electrical characteristics of the universal inputs (see "Technical details about the universal inputs" on page 72). • Check whether the universal input configuration matches the sensor output signal (see "Measurement channels" on page 93). • Check the filter settings of the universal input (see "Measurement channels" on page 93). • Check whether the Ext. warmup time has been selected for the sensor that you are using.
The measurement values of the external temperature sensor are not plausible.	• The chargeable feature "Activation code temperature input (- upon request)" has not been released. • Check the cable connections (see "Connecting the sensors, actuators and power supply" on page 67)

Problem	Cause/solution
The alarm state of a measurement channel was not identified.	• Increase the measurement cycle
The alarm state was not transmitted although the data is present.	• Check the alarm settings of the measurement channel • The connection was aborted during the transmission, which is indicated by a time-out entry in the connection list (see "User manual for DATAEAGLE-Portal-Server " - upon request). Solution: Initiate an Aloha transmission or wait for the next cyclical transmission.
The alarm message was not sent although the alarm was signalled.	• Check the settings of the alarm schedule (see "User manual for DATAEAGLE-Portal-Server " - upon request) • Check the address data of the alarm schedule (see "User manual for DATAEAGLE-Portal-Server " - upon request)
Isolated switch contact is not working.	• Disruption to the voltage that is conducted via the relays

15.2 Log entries and error codes

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1000	POWER ON	0	---	Restart following a power failure
		4	---	Watchdog reset (e.g. because of an exception)
		6	---	Reset was initiated by the device itself (e.g. in event of firmware update)
		##	--	Restart for another reason. There may be a hardware problem if the "POWER ON" log entry with a parameter code that is not equal to 0 or 6 is contained in the device log several times. Contact the manufacturer in this case (see "Contact information" on page 195).
1030	UV LOCKOUT	---	---	The device switches to energy saving mode and terminates all of the operations as the rechargeable battery or battery voltage is too low. Only the charge controller, if present, remains active.
1031	UV RECOVER	---	---	The rechargeable battery or battery voltage once again suffices to guarantee reliable operation. This is either achieved by replacing the rechargeable battery or battery pack or by ensuring that the charge controller has charged the battery sufficiently. The device resumes normal operation in accordance with the configuration.
1034	CONTROLLER UPDATE	##	---	Controller firmware update was completed successfully This entry is always duplicated in the device log. In the first entry, the parameter specifies the major version number (e.g. 3 for 03v011), while in the second entry it specifies the minor version number (e.g. 11 for 03v011).
1035	EXCEPTION	##	---	An internal system error was detected that caused the device to restart. The parameter specifies the type of system error. Contact the manufacturer if the device log contains this error with the same parameter code several times (see "Contact information" on page 195).
1036	EXCEPTION ADDR 1	##	---	This log entry may be shown in the device log together with the log entry "EXCEPTION" in the event of an internal system error. The parameter provides additional information for analysing the cause of the system error.

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1037	EXCEPTION ADDR 2	##	---	This log entry may be shown in the device log together with the log entry "EXCEPTION" in the event of an internal system error. The parameter provides additional information for analysing the cause of the system error.
1038	UV MODEM LOCKOUT	---	---	The device deactivates the modem because the rechargeable battery or battery voltage is too low. A connection cannot be established now.
1039	UV MODEM RECOVER	---	---	The rechargeable battery or battery voltage once again suffices to guarantee a stable connection. This is either achieved by replacing the rechargeable battery or battery pack or by ensuring that the charge control has charged the battery sufficiently.
1046	CONTROLLER UPDATE ERROR	##	---	Error updating the firmware of the controller
		0	CRC	The CRC of the firmware pack couldn't be verified
		1	SIGNATURE	The signature of the firmware pack couldn't be verified
		2	TLV	The data structure of the firmware pack is invalid
		3	FW INFO	The firmware pack is not suitable for this device
		4	MIN VERSION	The version of the firmware package is below the minimum version stored in the firmware currently installed on the device.
1126	MODEM COPS MODE	---	---	The modem has changed the mode for the operator selection. Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1161	LOG REFORMATFILE	##	---	Errors in file system have been resolved. This can result in data being lost (data and/or log entries). The parameter contains more information on the problem. Contact the manufacturer if the device log contains this error with the same parameter code several times (see "Contact information" on page 195).
1192	FUTURE TIMESTAMP	##	---	Internal error Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1194	RTC TIME SET BY DLO	---	---	The system time has been set manually via the device logic.

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1195	RTC TIME SET BY SERVER	---	---	A manually set system time has been overwritten during the sync with the server with the time received from the server.
1196	RTC TIME INVALID	---	---	When starting the module, it was recognised that the system time is invalid.
1200	MODEM ERROR			Modem error (see "Modem error" on page 182)
1201	MODEM NOT FOUND	---		Internal error Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1202	MODEM CMME ERROR	##	---	The mobile network modem indicates a +CME error. The parameter specifies the type of error.
1203	SELECTED NETWORK	##	---	A new mobile network was selected. The parameter specifies the MCC (Mobile Country Code) and the MNC (Mobile Network Code) of the selected mobile network.
1207	GSM NETWORK REGISTRATION	0	NOT REGISTERED	Not registered, modem is currently not looking for any new operators to register
		1	HOME	Registered, home network
		2	SEARCHING	Not registered, but the modem is currently looking for a new operator with which it can register
		3	DENIED	Registration denied
		4	UNKNOWN	Unknown (e.g. outside the GERAN/UTRAN/E-UTRAN cover)
		5	ROAMING	Registered, roaming
1208	GPRS NETWORK REGISTRATION	0	NOT REGISTERED	Not registered, modem is currently not looking for any new operators to register
		1	HOME	Registered, home network
		2	SEARCHING	Not registered, but the modem is currently looking for a new operator with which it can register
		3	DENIED	Registration denied
		4	UNKNOWN	Unknown (e.g. outside the GERAN/UTRAN/E-UTRAN cover)
		5	ROAMING	Registered, roaming
1212	ERROR MODEM IRREGULAR OFF	##	---	Indicates a faulty connection. The parameter includes a counter that indicates how many consecutive connections have not worked.

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1219	LTE NETWORK REGISTRATION	0	NOT REGISTERED	Not registered, modem is currently not looking for any new operators to register
		1	HOME	Registered, home network
		2	SEARCHING	Not registered, but the modem is currently looking for a new operator with which it can register
		3	DENIED	Registration denied
		4	UNKNOWN	Unknown (e.g. outside the GERAN/UTRAN/E-UTRAN cover)
		5	ROAMING	Registered, roaming
1227	WC NWREG PAUSED	0	---	A corresponding log entry is generated again for each change of state of the network registration.
		1	---	The limit for the log entries for the changes of state of the network registrations has been reached. From this point onward, a maximum of one log entry per hour is generated.
1228	EMM REJECT CAUSE	##	---	Device has been rejected by the network. The parameter indicates the reason for the rejection.
1252	MODEM TO CON	##	---	Timeout while a connection is being established. The parameter specifies the reason for the timeout. Contact the manufacturer if the device log contains this error with the same parameter code several times (see "Contact information" on page 195).
1255	MODEM TO EVAL	---	---	Timeout evaluating the connection quality
1281	ZLIB STREAMPROCESS ERR	##	---	Internal error Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1282	ZLIB STREAMFINISH ERR	##	---	Internal error Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1284	BYTE STUFF PENDING	---	---	internal error Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1300	USB CONNECTED	---	---	USB connection to a PC established.
1310	USB DISCONNECTED	---	---	USB connection was disconnected.

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1335	LOG_SHT2X_ STATE	0	SHT2X SENSOR OK	The internal temperature and air humidity sensor is returning valid values again
		1	SHT2X RH ERROR	A communication error occured when reading the air humidity value from the internal temperature and air humidity sensor.
		2	SHT2X TEMP ERROR	A communication error occured when reading the temperature value from the internal temperature and air humidity sensor.
		3	SHT2X RH+TEMP ERROR	A communication error occured when reading the measurement value from the internal temperature and air humidity sensor.
		4	SHT2X PLAUSIBILITY ERROR	The values received from the internal temperature and air humidity sensor are not plausible (rH <0% rH or >100% rH or temperature <-40°C or >125°C)
1336	SHT2X COM ERR	---	---	Communication with the internal temperature and air humidity sensor is not possible (sensor not present or faulty)
1337	SHT2X COM ERR1	---	---	Starting the internal temperature measurement failed
1338	SHT2X COM ERR2	---	---	Starting the internal air humidity measurement failed
1339	SHT2X TEMP RAW	##	---	Temperature raw value (register value from the internal temperature and air humidity sensor) if a plausibility error (SHT2X PLAUSIBILITY ERROR) was detected
1340	SHT2X RH RAW	##	---	Air humidity raw value (register value from the internal temperature and air humidity sensor) if a plausibility error (SHT2X PLAUSIBILITY ERROR) was detected
1601	SIM_STATE	0	NONE	SIM state was changed to "NONE" (initial state).
		1	PRODUCTION	SIM state was changed to "PRODUCTION" (a new device is in stock).
		2	HOT	SIM state was changed to "HOT" (valid contract).
		3	COLD	SIM state was changed to "COLD" (end of contract or fair use policy violated).
		4	DISCARDED	SIM state was changed to "DISCARDED" (device has been decommissioned).

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1602	EXTERNAL SIM	-2	NOT ALLOWED	Establishing the connection via the external SIM card is not permissible • No APN settings (APN, username and password) saved in the device • Use of the external SIM slot is not released
		-1	NOT FOUND	The external SIM card is not present or could not be accessed.
		0	OK	The external SIM card could be accessed when establishing the connection. However, this log entry does not indicate whether the connection itself was established successfully.
1620	TRANSMISSION PROFILE	##	---	Transmission profile has been changed.
		0	NORMAL	Operation by default has been activated.
		1	ECO	Operation with low energy and data consumption has been activated.
		2	DIAGNOSTIC	Extended logging for troubleshooting has been activated.
		3	ADAPTIVE	Adaptive operation has been activated. It enables stable data transmission, even at the expense of energy consumption.
1630	NEW LIFECYCLE STATE	##	---	The Lifecycle state has been changed.
		0	PREPROVISIONED	Device ready for handover to partner (firmware installed)
		10	PROVISIONED	Device ready for handover to end customer (firmware and application installed)
		20	CLAIMED	Device assigned to a server
		30	FIELDED	Device assigned to a server and linked to a site
		100	DECOMMISIONED	Device was defective and was decommissioned
1631	NEW LIFECYCLE FLAGS	##	---	One of the Lifecycle flags has been set or deleted. This entry always appears twice in the device log. In the first entry, the parameter indicates the current status of the application-specific lifecycle flags, while in the second entry it indicates the status of the system-specific lifecycle flags.

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1910	ACCU 0 E2PROM ERROR	0	---	Rechargeable battery not available
		1	---	Invalid length of the data structure in the EEPROM of the rechargeable battery
		2	---	No charging profile available in the EEPROM (only with Li-ion rechargeable batteries)
		3	---	Error when reading the SoC-value
		4	---	Error when writing the SoC-value
		5	---	The charging profiles of the rechargeable batteries inserted do not match (only with devices that support the simultaneous use of multiple rechargeable batteries)
		6	---	• Permissible charging time exceeded • When restarting the device, it was recognised that the rechargeable battery currently in use has already exceeded the permissible charging time once. The battery is probably defective and should be checked by the manufacturer.
1950	CHARGE START	---		Charging has been started.
1951	CHARGE STOP	0		Charging has been stopped.
		1		The maximum permissible charging time has been exceeded. Charging has been stopped for safety reasons.
1960	SOC	##		State of charge in [0.00 %]
1961	VBATT	##		Internal battery or rechargeable battery voltage in [mV]
1962	VIN	##		External supply or charging voltage in [mV]
1963	IACCU	##		Charging or discharging current in [mA]
1964	TEMP	##		Temperature in [0.00°C]
1965	RH	##		Air humidity in [0.0 %]
2000 - 2199	MODULE ERR	##	---	Module-specific critical error (see "Module-specific critical errors" on page 184)
2200 - 2399	MODULE WARNING	##	---	Reserved for extensions

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
2400 - 2599	MODULE INFO	##	---	Module-specific information about the current operating state (see "Module-specific information regarding the current operating state" on page 184)
2600 - 2799	MODULE DEBUG	##	---	Reserved for extensions
3000 - 3099	SCRIPT ERROR	##	--	Internal system error Contact the manufacturer if the device log contains this error with the same parameter code several times (see "Contact information" on page 195).

15.2.1 Modem error

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
External SIM card				
1200	SIM PIN NO ATTEMPT	-999	---	The PIN code transferred to the system is not correct. Another input attempt is not made to ensure the SIM card is not locked.
1200	SIM ERROR	-998	---	Error when accessing the external SIM card • SIM card not recognised. • Use of the external SIM slot is not released
GPRS error				
1200	BEARER GPRS FAILED	-988	---	GPRS setup error • Try to improve the position of the antenna. • Check whether the device is in the coverage area.
1200	BAND SEL FAILED	-969	---	A network could not be found on the GSM900/1800 or on the GSM850/1900 band. • Try to improve the position of the antenna. • Check whether the device is in the coverage area.
External SIM card				
1200	SIM PIN WRONG	-968	---	The PIN code transferred to the system is not correct.
	SIM NO PIN	-967	---	No PIN code was transferred to the system. However, the SIM card requires a PIN code to be entered.

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1200	NETLOCK ERROR	-966		Error when selecting the network. Check whether the device is in the coverage area. External SIM card: Contact the provider that supplied the SIM card.
TCP channel error				
1200	CHANNEL ABORTED	-965	---	An attempt is being made to write to/read a TCP client that is no longer available. Try again later
	TCP DNS FAILURE	-958	---	The name could not be resolved in an IP address. Internal error
	CHANNEL REFUSED	-955	---	The TCP connection has been refused by the server. Try again later
	CHANNEL HOST UNREACHABLE	-954	---	No route to the host. Try again later
	CHANNEL NETWORK UNREACHABLE	-953	---	No network available Try again later
	CHANNEL PIPE BROKEN	-952	---	TCP connection interrupted Try again later
	CHANNEL TIMEOUT	-951	---	Timeout (DNS request, TCP connection, ping response, etc.) Try again later
1200	MODEM POSITION UPDATE ERROR	-943	---	Timeout during determination of the GSM position data
1200	MODEM NETINFO STALL	-941	---	Error detected during online connection Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).
1200	MODEM RESETLOOP	-940	---	Restart loop on modem detected. Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
1200	MODEM UNDERVOLTAGE	-939	---	Undervoltage on the modem detected. The power supply should be checked.
1200	MODEM OVERHEAT	-938	---	Overheating of the modem detected.

15.2.2 Module-specific critical errors

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
2002	MODULE ERROR (002)	0	---	There was a memory overflow in one of the two infinite counters.
2003	MODULE ERROR (003)	0	---	Internal error Contact the manufacturer if the device log includes this error several times (see "Contact information" on page 195).

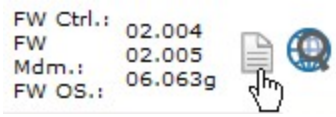
15.2.3 Module-specific information regarding the current operating state

Log entry		Parameter		Description
Code	Plain text	Code	Plain text	
2400	MODULE INFO (2400)	1	---	Additional connection establishment initiated independently of the transmission cycle
2402	MODULE INFO (2402)	##	---	Operating mode changed The parameter specifies the new operating mode (1 = normal, 2 = Aloha, 3 = transport mode, 4 = production mode).
2403	MODULE INFO (2403)	0	---	The power supply was switched back to supply voltage.
		1	---	The power supply was switched to the rechargeable buffer battery.

15.3 Evaluating the device log

15.3.1 Evaluating the device log on the DATAEAGLE-Portalserver

The last 300 log entries on the DATAEAGLE-Portal server can be called up via the button shown below that is located in the measurement device list. As the log entries are sent to the server in the transmission cycle in the same way as the measurement data, only the log entries up to the last server connection are available.



The manual for the server ("User manual for DATAEAGLE-Portal-Server " - upon request) includes a detailed description of the evaluation of the device log on the DATAEAGLE-Portal server.

15.3.2 Evaluating the device log using DeviceConfig

The DeviceConfig program can be used to read all of the stored log entries, including those that have not yet been transferred to the DATAEAGLE-Portal server, directly from the 4-Channel Data Logger via the USB interface.

A more detailed description about the evaluation of the device log using DeviceConfig is included in chapter ""Log" tab" on page 148.

Chapter 16 Document history

Rev.	Date	Changes
01	13.11.2023	**First version**
02 (1/3)	13.05.2025 (1/3)	**Chapter "Declaration of conformity" on page 11** *Declaration of conformity updated* **Chapter "Technical data" on page 13** *PSU AC removed from the list of option for direct supply* **Chapter "Limitations of use" on page 23** *Chapter added* **Chapter "Intended use" on page 23** *Link to the list of countries and regions in which the integrated SIM chip can be used has been removed.* **Chapter "Device labelling" on page 25** *Link to the list of countries and regions in which the integrated SIM chip can be used has been removed.* **Chapter "Disclaimer" on page 27** *Note added indicating that no liability is assumed for missing or incorrect measurement values due to incorrect parameterisation/programming.* **Chapter "Control module" on page 35** *Explanation adapted to account for the fact that when using triggers "OS", "O3" and "OD", the setpoint entered via the interface is ignored and the output is controlled directly via the trigger function. This only applies if the corresponding output is operated in "digital" mode. However, if the output is operated in "Freq" or "Pulses" mode, the output of the frequency or pulses/min. selected via "factor" and "setpoint" is enabled when the trigger is active and disabled when the trigger is inactive.* **Chapter "Automatic selection of the mobile network" on page 41** *Link to the list of countries and regions in which the integrated SIM chip can be used has been removed.* **Chapter "Automatic switching between mobile network technologies" on page 41** *Chapter added* **Chapter "Transporting power supply units" on page 48** *"PSU AC" removed from the table containing the information for the applicable transport guide line* **Chapter "Installing the 4-Channel Data Logger " on page 59** *Note added indicating that the 4-Channel Data Logger is not suitable for outdoor use.* **Chapter "Connecting the mobile network antenna" on page 72** *Note added indicating that when using extension cables, the total length of the cable connection to the antenna must not exceed 30 m.* **Chapter "Switchable sensor supply VEXT" on page 75** *Note removed indicating that the switchable sensor supply VEXT is not available for the sensor supply if an extension module is used.*

Rev.	Date	Changes
02 (2/3)	13.05.2025 (2/3)	**Chapter "Technical details about the energy supply" on page 76** *"PSU AC" removed from the list of available power supply units* **Chapter "Technical details about detecting the failure of the supply voltage" on page 79** *Information about the "PSU AC" in the explanation removed* **Chapter "Solenoid switch" on page 88** *Illustration added that shows how the solenoid switch of the 4-Channel Data Logger is operated using the MDN Magnet .* **Chapter "Three colour status LED" on page 88** *Link to the list of countries and regions in which the integrated SIM chip can be used has been removed.* **Chapter "User interface on the DATAEAGLE-Portalserver" on page 90** *Note added indicating that some configuration fields may be hidden depending on the respective user level.* *Explanation of the title bar displayed at the top of the input screens added.* **Chapter "Measurement channels" on page 93** *Note added indicating that a transmission is triggered both when a warning or alarm occurs and when a warning or alarm is cancelled.* *Explanation adapted to account for the fact that when using triggers "OS", "O3" and "OD", the setpoint entered via the interface is ignored and the output is controlled directly via the trigger function. This only applies if the corresponding output is operated in "digital" mode. However, if the output is operated in "Freq" or "Pulses" mode, the output of the frequency or pulses/min. selected via "factor" and "setpoint" is enabled when the trigger is active and disabled when the trigger is inactive.* **Chapter "Output channels" on page 105** *Note added indicating that when using the triggers "OS", "O3" and "OD", the setpoint is ignored, if the relevant output is operated in "digital" mode.* *Example explaining the determination of the switching state at the output using a triggerrevised in that the output is controlled directly via the trigger function. The trigger function therefore does not control the release of the control value entered via the user interface, as previously described.* *Example added which explains the release of the setpoint at the output using trigger in case the ouput is operated in "Freq" or "Impulse" mode.* **Chapter "Internal channels" on page 112** *Note added indicating that a transmission is triggered both when a warning or alarm occurs and when a warning or alarm is cancelled.* *Explanation adapted to account for the fact that when using triggers "OS", "O3" and "OD", the setpoint entered via the interface is ignored and the output is controlled directly via the trigger function. This only applies if the corresponding output is operated in "digital" mode. However, if the output is operated in "Freq" or "Pulses" mode, the output of the frequency or pulses/min. selected via "factor" and "setpoint" is enabled when the trigger is active and disabled when the trigger is inactive.* **Chapter "Calculated channels" on page 116** *Example added to explain the "Delta" mode.*

Rev.	Date	Changes
02 (3/3)	13.05.2025 (3/3)	**Chapter "Default input screen for configuring the site" on page 124** *Screenshots of the user interface of the DATAEAGLE-Portalserver added* **Chapter "Basic settings" on page 132** *Explanation of the parameter for activating the "bidirectional alive ping" added.* *Explanation of the parameter for selecting the transmission profile added. The transmission profiles can be used to customise the site to specific requirements (energy consumption, fault diagnosis, connection stability).* **Chapter "Default input screen for configuring the site in development mode" on page 134** *Chapter added* **Chapter "Features" on page 137** *Chapter added* **Chapter "DeviceConfig " on page 139** *Windows XP, Windows Vista, Windows 7 and Windows 8 removed from the list of supported operating systems.* *Windows 11 added to the list of supported operating systems.* **Chapter "Creating the site" on page 159** *Explanation and illustrations adapted to account for the new wizard for creating new sites. The wizard replaces the previous procedure and supports the customer to correctly set up sites..* *Screenshots for creating new sites adapted* **Chapter "Removal & disposal" on page 171** *Notes added regarding material separation.* **Chapter "Log entries and error codes" on page 175** *Explanation of the error codes "RTC TIME SET BY DLO", "RTC TIME SET BY SERVER", "RTC TIME INVALID", "WC NWREG PAUSED", "EMM REJECT CAUSE" and "MODEM TO EVAL" added.* *Explanation of the log entries "TRANSMISSION PROFILE", "CHARGE START", "CHARGE STOP", "SOC", "VBATT" and "VIN" added.* **Chapter "Modem error" on page 182** *Link to the list of countries and regions in which the integrated SIM chip can be used has been removed.* **Chapter "Module-specific critical errors" on page 184** *Explanation of the error codes related to the GNSS receiver that is no longer available removed.* *"PSU AC" removed from the list of available Power Supply Units* **Chapter "Glossary" on page 193** *Link to the list of countries and regions in which the integrated SIM chip can be used has been removed.*

Rev.	Date	Changes
03 (1/2)	21.11.2025 (1/2)	**Chapter "Declaration of conformity" on page 11** *Declaration of conformity updated* **Chapter "Safety instructions" on page 17** *Note added that modifications to the device must not be made under any circumstances.* *Explanation of safety symbols on the device added* **Chapter "General safety instructions" on page 19** *Chapter added* **Chapter "Specific safety instructions" on page 19** *Chapter added* **Chapter "Determining the State of Charge (SoC) " on page 42** *Chapter added* **Chapter "Factors affecting the device service life" on page 42** *Chapter added* **Chapter "Return" on page 50** *Chapter revised* **Chapter "Installing the 4-Channel Data Logger " on page 59** *Note added indicating that it is recommended that all metal mounting fixtures be properly earthed.* **Chapter "Supply concepts" on page 64** *Chapter added* **Chapter "Connecting the sensors, actuators and power supply" on page 67** *Table added which indicates the permissible conductor cross-section and torques for the terminals.* **Chapter "Testing communication with the device" on page 85** *Link and QR code referring to the How-To-Video "Triggering the Aloha transmission mode" now refer to a video with a more detailled explanation.* **Chapter "User interface on the DATAEAGLE-Portalserver" on page 90** *Link and QR code added referring to the How-To-Video "How to use the new title bar"* **Chapter "Specific input screen for configuring the site" on page 93** *Note added explaining how to open the specific input screen for configuring the site and that the configuration sections contained therein are specific to the IoT application on which the site is based.* **Chapter "Measurement channels" on page 93** *Figure "Installation situation of the pressure sensor" in the additional explanation on the zero point adjustment updated* **Chapter "Internal channels" on page 112** *Footnote added which refers to the explanation of why, in rare cases, the battery may already be depleted before the SoC reaches 0.* *Footnote added which refers to the explanation on how to optimise the runtime of the devices.*

Rev.	Date	Changes
03 (2/2)	21.11.2025 (2/2)	**Chapter "Default input screen for configuring the site" on page 124** *Note added explaining how to open the standard input screen for configuring the site and that the configuration sections contained therein are identical for all rapidM2M -based devices.* **Chapter "Site" on page 125** *Additional information added on how measurement data is handled in the event of a device replacement.* *Explanation of the "Application Phase" field added. It indicates the phase of the release process that the currently used version of the IoT application is in.* **Chapter "Measurement instrument" on page 135** *Explanation of the "Lifecycle state" and "Lifecycle flags" fields added. The "Lifecycle state" field shows the lifecycle phase the device is currently in. The "Lifecycle flags" show the lifecycle flags that are currently set.* *Explanation of the Server "Article Id", "Article Revision" and "Article Name" fields added. They show the product ID, the product revision of the application and the product name as indicated on the type plate respectively.* **Chapter "Log entries and error codes" on page 175** *Explanation of the error codes "EXCEPTION ADDR 1" and "EXCEPTION ADDR 2" added.* *Explanation of the log entries "NEW LIFECYCLE STATE", "NEW LIFECYCLE FLAGS", "IACCU", "TEMP" and "RH" added.* **Chapter "Modem error" on page 182** *Missing error code added to the "Log entry - Code" column.*

Chapter 17 Glossary

Aloha

Connection mode that is specially designed for commissioning. The device maintains a connection to the server for a configurable amount of time and takes a measurement every 3 seconds. During this process, only the internal measurement values (mobile signal strength, voltages, etc.) and the values from the universal inputs (if available) are generated. The determined measurement values are not saved but are just sent to the server for display purposes.

App centre

Area of the DATAEAGLE-Portal server for the installation and management of the IoT apps. The app models that serve as a basis for the IoT apps are obtained via the rapidM2M Store . When installing an IoT app on the DATAEAGLE-Portalserver the default settings defined when developing the app models are initially applied. These default settings can then be adjusted. Any number of IoT apps can be created based on a single app model by setting the appropriate default settings.

App model

An app model is developed in the rapidM2M Studio and forms the basis for creating IoT apps. It essentially contains the executable program files (device logic, backend logic, portal view, etc.) from which an IoT is created by adding the default settings. Distribution to the individual DATAEAGLE-Portal servers is carried out via the rapidM2M Store . The available app models are displayed in the app centre of the respective DATAEAGLE-Portal server.

Footprint

The manufacturer's devices are equipped with subscriber identity modules (SIM) ex-works for the purpose of mobile data transmission. The footprint describes those countries and regions where a mobile connection is available.

Device logic

The device logic is the intelligence installed on the device that determines the local functionality of the device. The device logic is part of the app model and is created in a C-like scripting language built on "PAWN".

Hardware ID string

Specifies the hardware platform installed in the device and its hardware version (e.g. rapidM2M M2 HW1.4). The part of the hardware ID string, that specifies the hardware version, is only increased if changes relevant to the rapidM2M firmware have been made to the hardware platform. When developing an app model, it can be specified on which hardware platform the app model can be installed and which version of the hardware platform is required as a minimum. The hardware ID string is displayed in the TESTbed of the rapidM2M Studio or in the "Identification" field of the input screen for configuring the device.

IoT app

IoT apps form the basis for creating sites. They consist of an app model and corresponding default settings that are applied as default values for the site when the site is created. The app centre can be used to create any number of IoT apps based on a single app model by setting the appropriate default settings. This makes sense if several use cases need to be covered by a single app model and they each require a different default site configuration (e.g. if a data logger with different external sensors is to be sold as a package).

NaN value

The "Habitat Schildknecht" uses special encoding to display different error statuses in the measurement values, for example. By setting a measurement value to "NaN", it is clearly marked as invalid and is thus not used for any further calculations. In the measurement value graphs, a measurement value that has been set to "NaN" is indicated by an interruption in the graph. When downloading the data, a measurement value set to "NaN" is indicated by an empty data field.

Product revision

Specifies the revision of the product. The revision is increased every time the product is modified (i.e. electronic system, mechanics, etc.) and is marked on the type plate of the product.

rapidM2M Store

Is responsible for distributing the app models to the individual DATAEAGLE-Portal servers. When installing and updating IoT apps the DATAEAGLE-Portal server access the app models provided in the rapidM2M Store . The developer of the respective app model defines which DATAEAGLE-Portal servers are allowed to access an app model via the rapidM2M Studio .

rapidM2M timestamp

Depending on the required accuracy, one of two special encodings can be used for the time stamp in rapidM2M. If the accuracy requirements are moderate, the "stamp32" data type (seconds since 1999-12-31 00:00:00 UTC) can be used. If a higher accuracy is required, the "stamp40" data type (1/256 seconds since 1999-12-31 00:00:00 UTC) can be used. Converting the "stamp32" data type into the UNIX timestamp (seconds since 1970-01-01 00:00:00 UTC) can be achieved by adding 946598400.

Chapter 18 Contact information

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