
Operating manual

D041-1Z00131ZB05

Valid from:

- **Firmware version:** 02v000
- **Server version:** ---
- **Hardware version:** ---



Chapter 1 Table of contents

Cover	1
Chapter 1 Table of contents	3
Chapter 2 Declaration of conformity	7
Chapter 3 Specifications	9
Chapter 4 General specifications	11
4.1 Translation	11
4.2 Copyright	11
4.3 General descriptive names	11
4.4 Safety instructions	11
4.4.1 Use of the hazard warnings	12
4.4.2 Safety symbols on the device	12
4.4.3 General safety instructions	13
4.4.4 Specific safety instructions	13
4.4.5 Safety and preventative measures for handling devices with mobile network modems	13
4.4.5.1 Safety and precautionary measures for devices with mobile network modem	14
4.5 Overview	15
4.5.1 Cable glands on the bottom	15
4.5.2 Cable glands on the rear	16
4.5.3 Block diagram	17
4.6 Limitations of use	18
4.6.1 Intended use	18
4.6.2 Type of use	18
4.6.3 Field of application	19
4.6.4 Unauthorised use	19
4.7 General product information	19
4.8 Device labelling	20
4.9 Installation of spare and wear parts	20
4.10 Storage of the product	21
4.11 Warranty	21
4.12 Disclaimer	22
4.13 Obligation of the operator	22

4.14 Personnel requirements	23
Chapter 5 Storage, delivery and transport	25
5.1 Inspection of incoming deliveries	25
5.2 Storage	25
5.3 Transport	25
Chapter 6 Installation	27
6.1 Dimensions	27
6.1.1 Cable glands on the bottom	27
6.1.2 Cable glands on the rear	28
6.2 Preparing the D041-1Z00131ZB05	29
6.3 Installing the D041-1Z00131ZB05	30
6.3.1 Wall mounting	31
6.3.2 Installation on a bridge	32
6.4 Safety instructions for the cabling	34
6.4.1 Information on preventing electrostatic discharges (ESD)	34
6.5 Electrical installation	34
6.5.1 Connecting the sensors	34
6.5.2 Technical details about the universal inputs	36
6.5.2.1 0/4 to 20mA mode	36
6.5.2.2 0 to 2V mode	36
6.5.2.3 0 to 10V mode	36
6.5.2.4 Standard digital modes (PWM, frequency, digital, counter)	37
6.5.3 Technical details about the RS485 interface	37
6.5.4 Technical details about the outputs	38
6.5.4.1 Switchable sensor supply VOUT	38
6.5.5 Technical details about the energy management	40
6.5.6 Technical details about the energy supply	41
6.5.7 Technical details about the system time	41
Chapter 7 Operating elements	43
7.1 Solenoid switch	43
Chapter 8 Maintenance	45
8.1 General maintenance	45

8.2 Replacing the rechargeable buffer battery	45
8.3 Charging the rechargeable buffer battery	45
8.4 Services	45
Chapter 9 Repair & return	47
Chapter 10 Removal & disposal	49
Chapter 11 Contact information	51

Chapter 2 Declaration of conformity

EU-Konformitätserklärung EU Declaration of Conformity / Déclaration de conformité UE

Type: D041-1200131ZB05
Type code :
Type:



Hersteller: Microtronics Engineering GmbH
Manufacturer: Hauptstrasse 7
Fabricant: A-3244 Ruprechtshofen

Das bezeichnete Produkt stimmt mit den folgenden Europäischen Richtlinien überein. The designated product is in conformity with the following european directives. Le produit décrit est conforme aux directives européennes suivantes.			
		Europäische Norm	
(2014/30/EU)	EMC Directive		
		EN61326-1	
(2014/35/EU)	LVD Directive		
		EN61010-1	
(2014/53/EU)	RED Directive		
	Safety & Health 3.1a	EN62368-1 EN62368-1+A11:2017 EN62311	
	EMC 3.1b	EN301489-1 V2.2.3 EN301489-52 V1.2.1 EN301489-1 V2.1.1 EN301489-17 V3.2.4	
	Radio spectrum efficiency 3.2	EN301511 V12.5.1 EN301908-1 V15.2.1 EN301908-13 V13.2.1 EN300328 V2.2.2	
	Cybersecurity 3.3	EN18031-1	
(2015/863/EU)	RoHS Directive		
	Prevention 4.1	EN IEC 63000	
		Europäische Norm	

Klaus Potzmader

Klaus Potzmader, Director Product
Unterschrift
name and signature of authorised person
Nom et signature de la personne autorisée

Stefan Pfeffer

Stefan Pfeffer, Managing Director Finance
Unterschrift
name and signature of authorised person
Nom et signature de la personne autorisée

Martin Mayer

Martin Mayer, General Managing Director
Unterschrift
name and signature of authorised person
Nom et signature de la personne autorisée

Ruprechtshofen, den 17.02.2026
Ort und Datum der Ausstellung
Place and date of issue
Lieu et date d'établissement

Chapter 3 Specifications

Voltage supply	Integrated 14 W PV module and integrated rechargeable buffer battery
Rechargeable buffer battery	Li-Ion rechargeable battery with a usable capacity of 17 Ah
Housing	Material: Aluminum / ESD glass (Housing / window for PV module) Weight: 11,7 kg (incl. rechargeable buffer battery) Degree of protection: IP68 (24 h at an immersion depth of 1 m) Dimensions (WHD): 310 x 500 x 81 mm (incl. antenna, without cable glands)
Operating temperature	-30...+58 °C
Air humidity	15...90 % RH non-condensing
Max. operating altitude	≤ 2000 m
Contamination level	PD2
Storage and transport temperature	-30...+60 °C
Display	LED in the terminal compartment
Operation	Solenoid switch in the terminal compartment
Antenna connector	Fixed low profile antenna
Universal inputs ¹⁾	2 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 • PWM: 1...99 %, max. 100 Hz, min. pulse length 1 ms, load 10k086 • Frequency: 1...1000 Hz, 10k086 • Digital: max. 32 V, low <0,99 V, high >2,31 V, load 10k086 • Counter: min. pulse length 1 ms, load 10k086 Additional information is provided in "Technical details about the universal inputs" on page 36.
System time	Hardware real-time clock with its own buffer battery (service life >10 years) and automatic time synchronisation with the server Additional information is provided in "Technical details about the system time" on page 41.

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
Serial interface	1 x RS485 (2-wire) • Baud rate: 600-115200 • Stop bits: 1, 2 • Parity: N, E, O • Data bits: 7, 8 • Load resistance: off, 120 Ω Additional information is provided in "Technical details about the RS485 interface" on page 37.
Outputs	1 x switchable and adjustable sensor supply (5...24 V) • 5 V_{nominal}: 4,75 V at I_{out} = 50 mA • 12 V_{nominal}: 11,7 V at I_{out} = 50 mA • 15 V_{nominal}: 14,7 V at I_{out} = 50 mA • 24 V_{nominal}: 23,4 V at I_{out} = 50 mA Additional information is provided in "Switchable sensor supply VOUT" on page 38.
Local radio interface ¹⁾	Low energy module
Data memory	3 MB internal flash memory
Data transmission	Local radio connection:¹⁾ Range: up to 20 m ²⁾ 2G/M1/NB1 modem 2G: 2G GPRS 900 MHz / 1800 MHz 2G GPRS 850 MHz / 1900 MHz M1/NB1: LTE B1, B2, B3, B4, B5, B8, B12, B13, B20, B25, B26, B28, B66, B85
SIM	Integrated SIM chip

¹⁾ This functions is not fully available on all devices that are based on the "D041-1Z00131ZB05" hardware platform. Please refer to the relevant user manual to find out whether the feature is available and to what extent.

²⁾ Depending on ambient and structural conditions

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.

Tip: The specifications in this manual are valid as of the versions listed on the front page. Revised versions of this manual are available via the manufacturer's website (see "Contact information" on page 51).

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

The copying and distribution of this document as well as the utilisation and communication of its contents to others without express authorisation is prohibited. Contraventions are liable to compensation. All rights reserved.

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 D041-1Z00131ZB05, the following information and higher legal regulations of the country (e.g. ÖVE), 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: 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 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.



Attention: 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: 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.

Tip: 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 23). 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 51).
- 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.
- 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 "Repair & return" on page 47).
- 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 49.

4.4.4 Specific safety instructions



Attention: 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 21. If you have any unanswered questions, contact the manufacturer (see "Contact information" on page 51).



Attention: 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.



Attention: 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: 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.

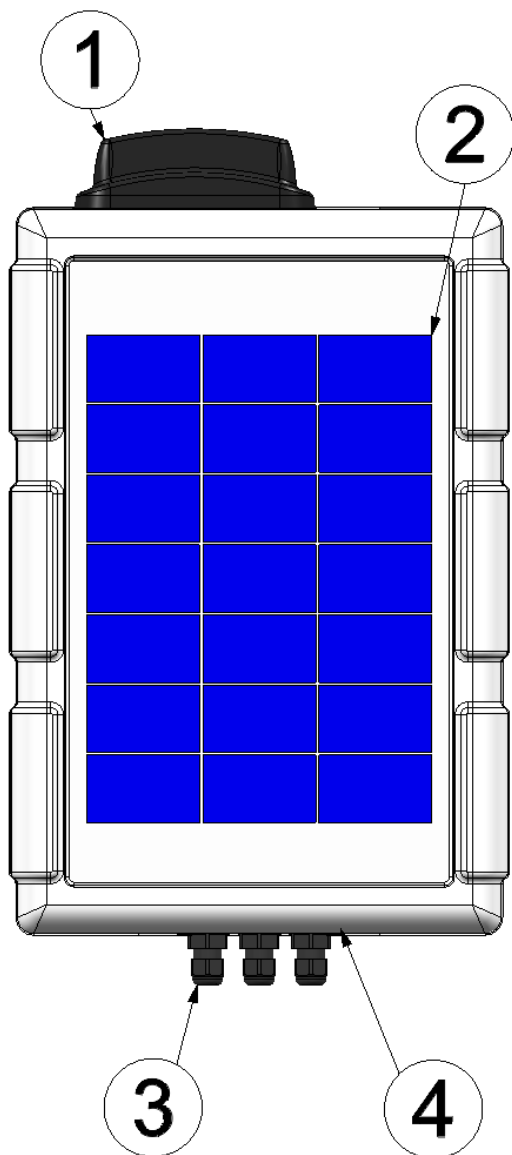
4.4.5.1 Safety and precautionary measures for devices with mobile network modem

- 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.

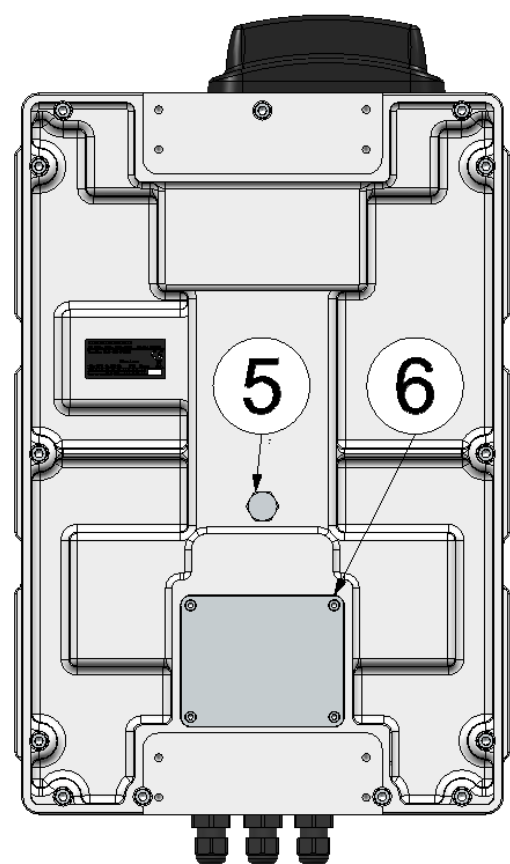
4.5 Overview

Note: When delivered, the two terminal compartment covers without openings for the cable glands are fitted. One of the covers must be replaced before use. For instructions on how to fit the cable glands into the terminal compartment covers featuring the openings and how to replace the terminal compartment covers, please refer to the chapter "Preparing the D041-1Z00131ZB05 " on page 29.

4.5.1 Cable glands on the bottom



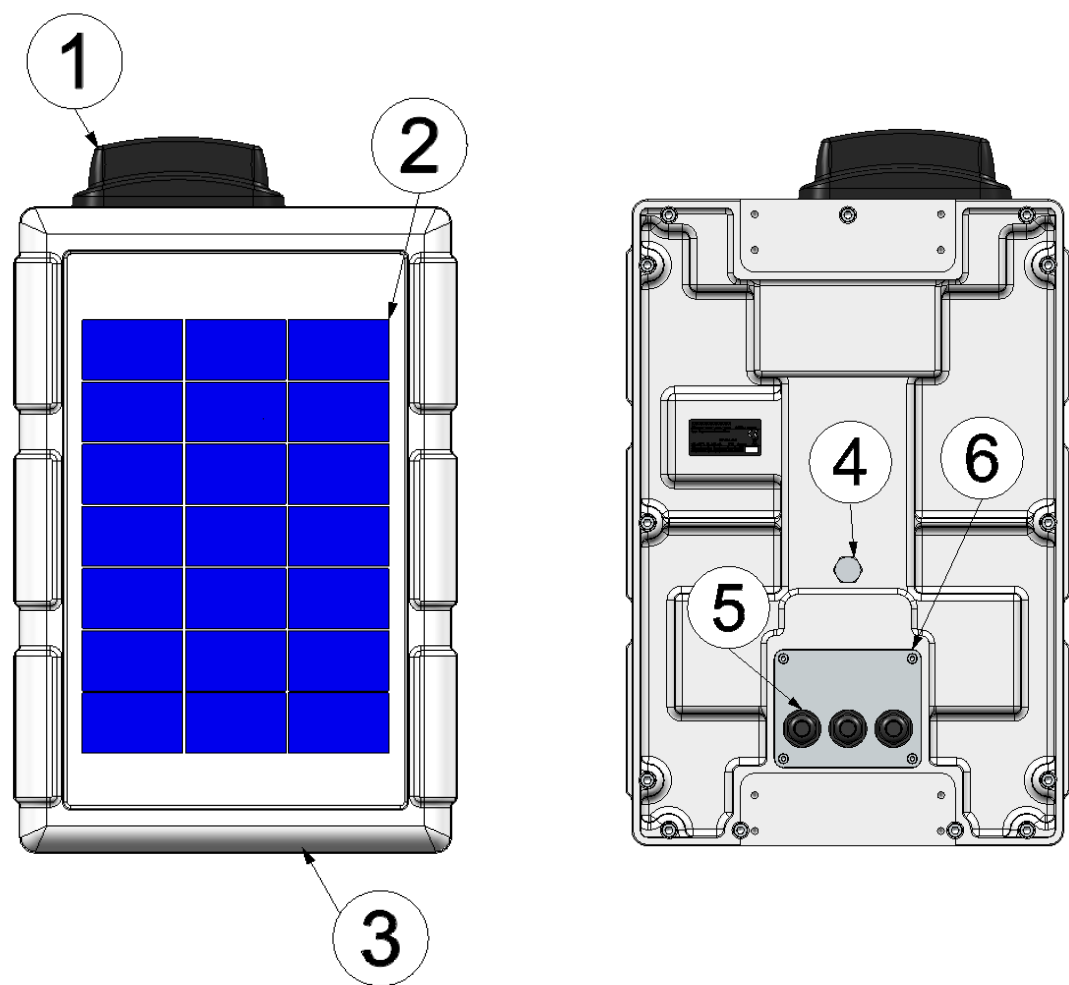
Front of the D041-1Z00131ZB05



Rear of the D041-1Z00131ZB05

1 Antenna	4 Terminal compartment cover on the bottom
2 PV module	5 Pressure compensation
3 Cable gland (5 -10 mm cable diameter)	6 Terminal compartment cover on the rear

4.5.2 Cable glands on the rear

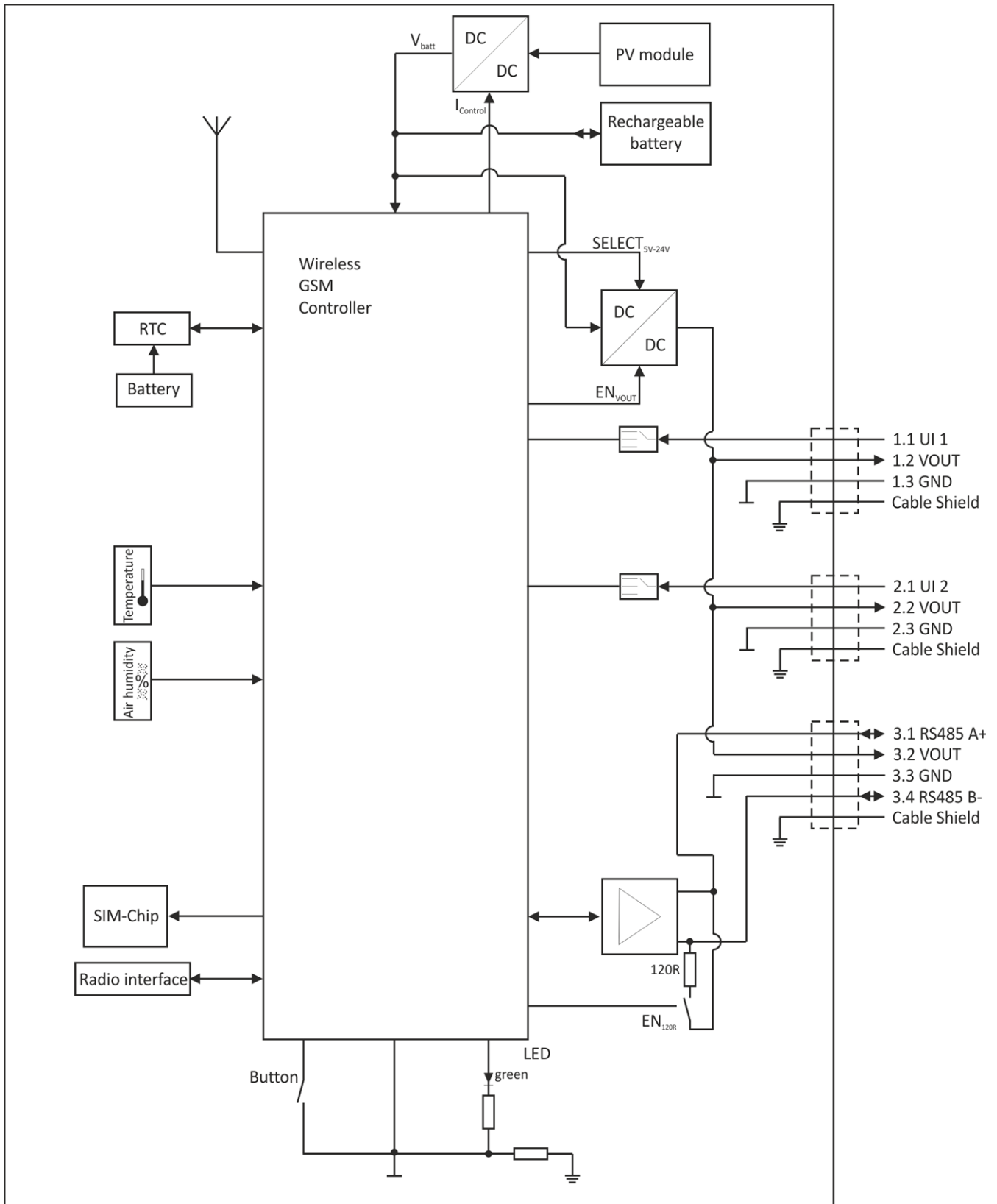


Front of the D041-1Z00131ZB05

Rear of the D041-1Z00131ZB05

1 Antenna	4 Pressure compensation
2 PV module	5 Cable gland (5 -10 mm cable diameter)
3 Terminal compartment cover on the bottom	6 Terminal compartment cover on the rear

4.5.3 Block diagram



Block diagram of the D041-1Z00131ZB05

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 18, "Type of use" on page 18 and "Field of application" on page 19 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 19. 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 stationary, self-sufficient measurement device designed for outdoor use. It is used to determine, process and transmit measurement data collected via various industrial interfaces or provided by remote sensor modules. The device operates without mains power. The measured and recorded data is stored on a non-volatile storage medium. This saved data can be read out locally via radio connection or automatically transmitted to a central server for further processing via the mobile network. The device is equipped with an integrated SIM chip for this purpose. To read out the data via local radio connection and simultaneously forward it to a central server, the smartphonen app provided by the manufacturer can be used. The device is intended exclusively for operation within the limits specified in chapter "Specifications" on page 9.

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 Microtronics Engineering GmbH is required for use of the mobile data transmission (see www.microtronics.com/managedservice). 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 23). The device is only approved for use in areas without an explosive atmosphere.

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 18, "Type of use" on page 18 and "Field of application" on page 19 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.*

- Do not place or stack any objects on the PV module. Uneven exertion of force may cause damage to the glass cover.
- The device should never be set down with the PV module facing downwards. However, during the installation of the sensor cables, it is permissible to set it down briefly with the PV module facing downwards. In this case, ensure that the surface on which it is placed is level and free of small or sharp objects (e.g. stones) to prevent damage to the PV module.
- The device must not be lifted or carried by the antenna. The antenna is not designed to withstand mechanical stress.
- The device must not be lifted or carried by the cable glands. The cable glands are not designed to withstand mechanical stress.
- The device must not be installed in locations that are permanently flooded.
- The device is not authorised for use in closed ducts.
- The device must not be mounted hanging from the connection cable.
- The device must not be operated with the terminal compartment covers open.
- 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 in use, it must be protected using a blind plug.
- Stranded wires must not be connected to the connection terminals of the device without crimped wire end sleeves.
- Only a single cable may be inserted into a connection terminal. However, two stranded cables may be combined using a twin wire end sleeve and connected together to the connection terminal.
- No traction may be exerted on the sensor cables. Straining clamps must be used to secure the cables in a suitable manner.

4.7 General product information

The device is a stationary, self-sufficient device designed for outdoor use. It is used for determining, processing and transferring measurement data. Thanks to the combination of a PV module with rechargeable buffer battery, the D041-1Z00131ZB05 works entirely without mains power. The following interfaces are available for recording measurement data:

- 2 universal inputs that can be operated in various analogue and digital modes
- An RS485 interface
- A local interface for connecting remote sensor modules

The D041-1Z00131ZB05 is also equipped with internal sensors (internal housing temperature and air humidity in the housing) and a switchable voltage output, with an adjustable output voltage range of 5...24 V to supply the sensors.

The determined measurement data is recorded in the internal 3 MB data memory and can be read out locally via radio connection or automatically transferred to a central myDatenet server using the mobile network connection. The D041-1Z00131ZB05 is equipped with an integrated SIM chip for this purpose. To

read out the data via local radio connection and simultaneously forward it to a central myDatenet server, the smartphonen app "OnSite Companion" can be used.

***Tip:** Not all of the functions described here are available on all devices that are based on the "D041-1Z00131ZB05 " hardware platform. Please refer to the relevant user manual to see which functions are available.*

4.8 Device labelling

The specifications in this manual apply exclusively to the D041-1Z00131ZB05 device type. The type plate is located on the rear of the device and contains the following specifications:

- Product designation
- Serial number
- Item number
- Type key
- Environmental conditions during operation
- Week and year of production
- Degree of protection
- Product revision
- CE marking
- Logo for the EU WEEE Directive
- Name and address of the manufacturer



Type plate D041-1Z00131ZB05

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

***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.*



***Attention:** 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 store the D041-1Z00131ZB05, ensure that all relevant data was transferred to the myDatenet server. Then deactivate the device. If necessary, initiate a transmission directly on the device or wait until the next scheduled data transmission for all of the data to be sent to the myDatenet server. Once the mobile network connection has been terminated, the sensor cables can be removed. Store the D041-1Z00131ZB05 in the original packaging.

Important: *When storing the D041-1Z00131ZB05, ensure that theMDN Magnet is not positioned in the vicinity of the solenoid switch as this could accidentally trigger transmissions.*

When deactivated, the D041-1Z00131ZB05 is in an ultra energy-saving mode. However, it may still occur that the integrated rechargeable buffer battery is fully discharged if the device is stored in the dark for very long periods. The configuration and the most recently determined data are retained in any case.

Tip: *For information on how to deactivate the device, how to trigger a transmission and how to recognise that the mobile network connection has been terminated, please refer to the manual for the respective device.*

4.11 Warranty

The device has been functionally tested before delivery. If it is used as intended (see "Intended use" on page 18) and the operating instructions, the applicable documents and the safety notes and instructions contained therein, are observed, no functional restrictions are to be expected and perfect operation should be possible.

Tip: *Please also note in this regard the next chapter "Disclaimer" on page 22.*

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 Austria ÖVE guidelines) 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 Microtronics personnel or persons or companies authorised by Microtronics .
- 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



Attention: 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

Tip: 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 Storage, delivery and transport

5.1 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 Microtronics Engineering GmbH in 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 51).

Note: Any claims received thereafter will not be accepted.

5.2 Storage

The following storage conditions must be observed:

D041-1Z00131ZB05	Storage temperature	-30...+60 °C
	Humidity	15...90 % RH

Note: The rechargeable buffer battery remains in the D041-1Z00131ZB05 during storage.

Note: If the D041-1Z00131ZB05 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.

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

5.3 Transport

Protect the D041-1Z00131ZB05 against heavy shocks, bumps, impacts or vibrations. The original packaging must always be used for transport.



Attention: The D041-1Z00131ZB05 is classified as hazardous goods due to the installed rechargeable buffer battery 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 D041-1Z00131ZB05 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: 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 D041-1Z00131ZB05 and subsequently determine which transport guideline applies.

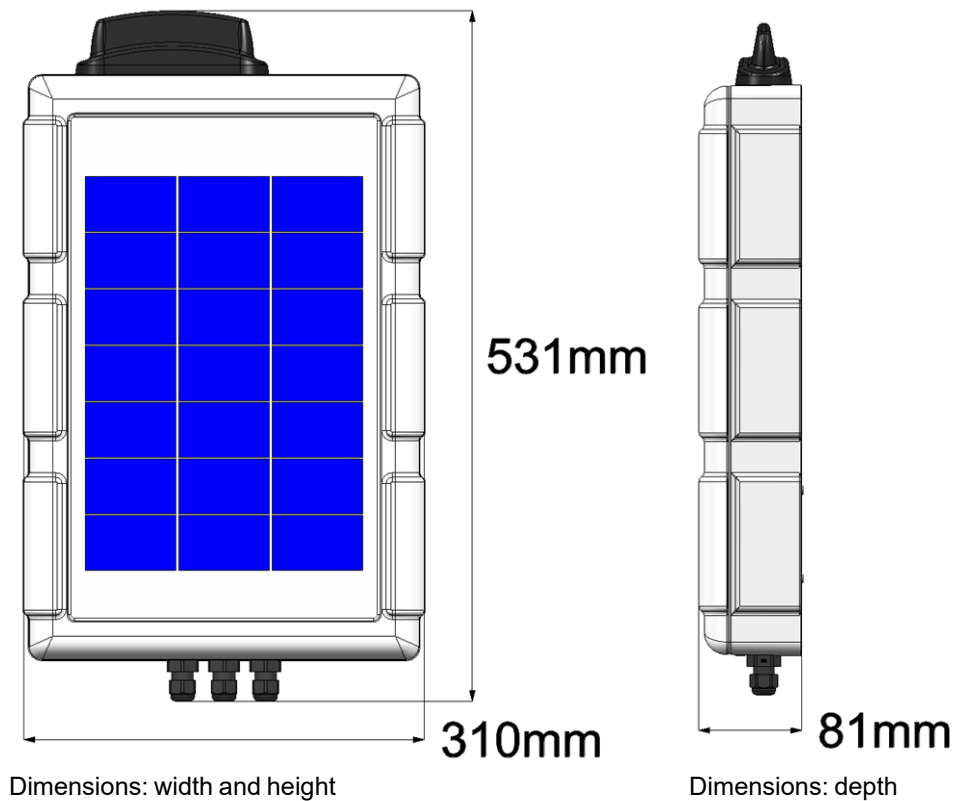
Type key	Type of lithium battery	Energy [Wh]	UN number
D041-1Z00131ZB05	Lithium ions	62,05 Wh	UN3481

Chapter 6 Installation

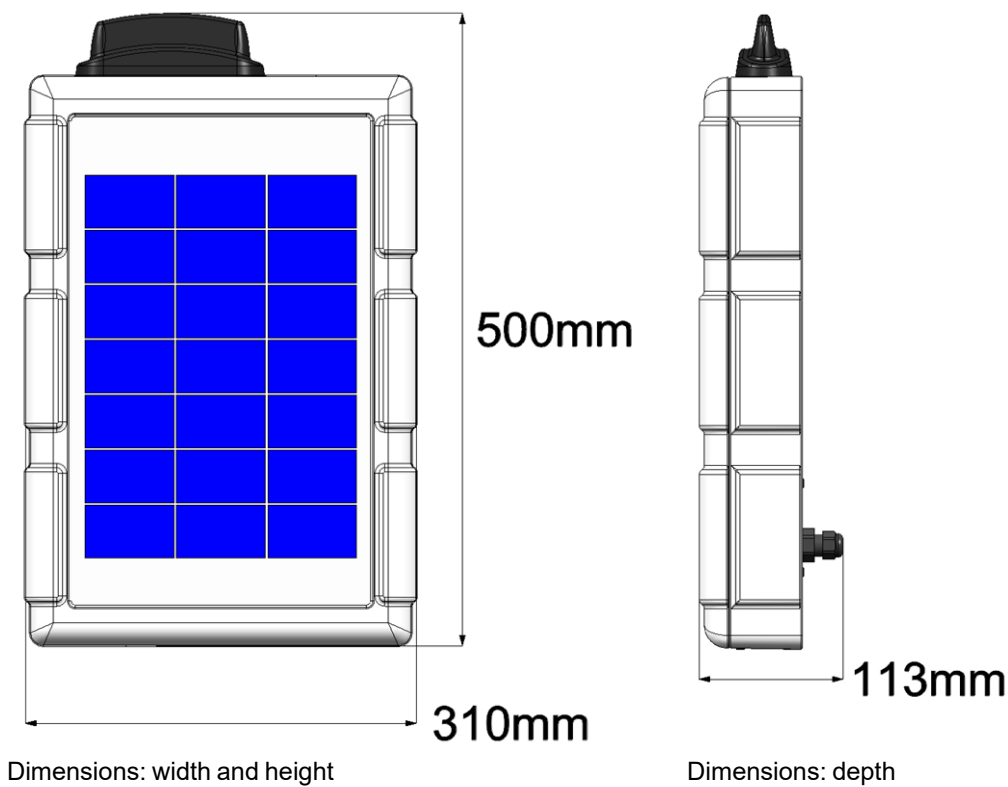
Important: To prevent any damage to the device, the work described in this section of the instructions must only be performed by qualified personnel.

6.1 Dimensions

6.1.1 Cable glands on the bottom



6.1.2 Cable glands on the rear

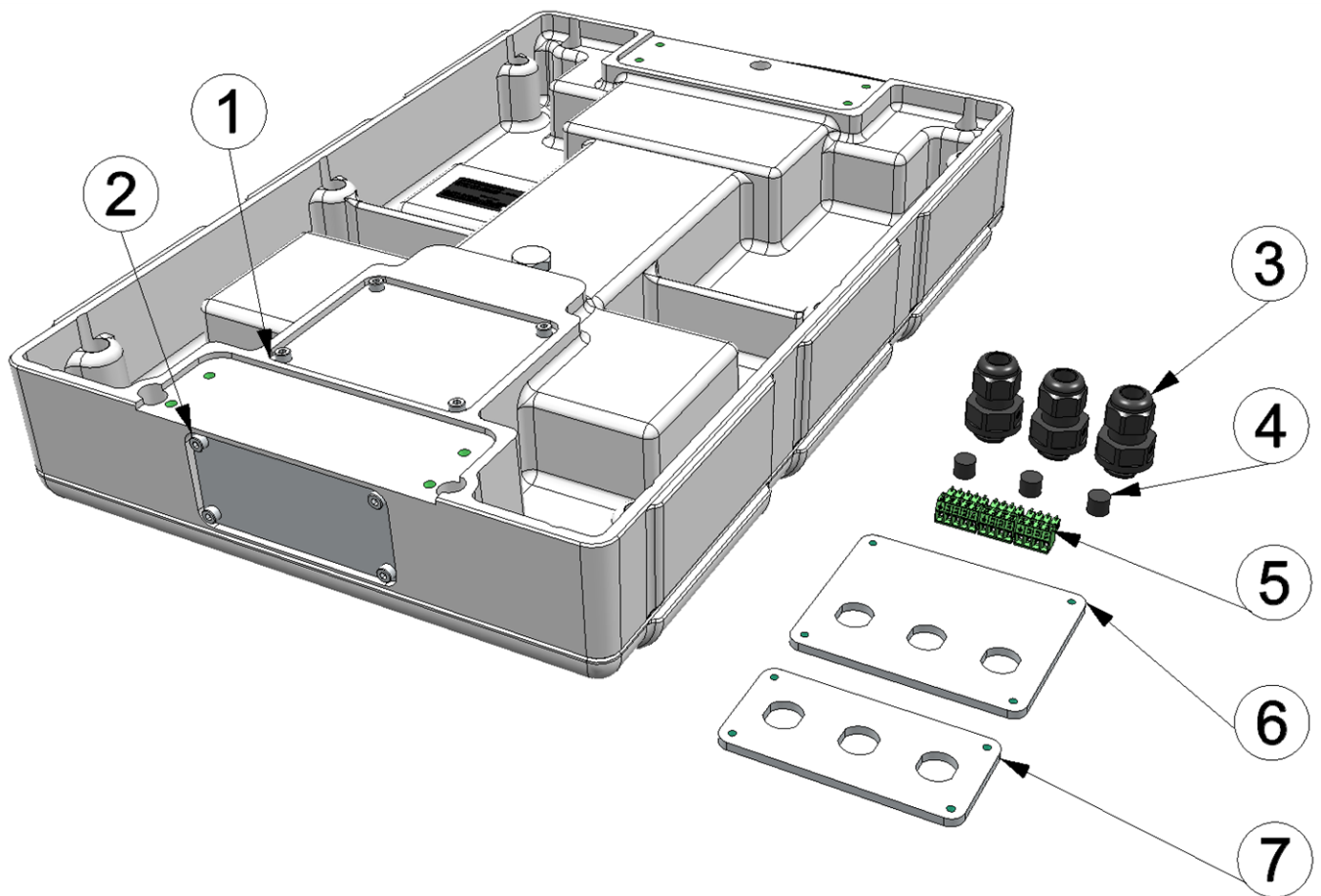


6.2 Preparing the D041-1Z00131ZB05

Important:

- *Improper handling can cause injuries and/or damage to the instruments!*
- *The D041-1Z00131ZB05 must not be operated with the terminal compartment covers open!*
- *Ensure that the seals are clean and intact. Remove any impurities and/or dirt.*

Upon delivery, the D041-1Z00131ZB05 is fitted with two terminal compartment covers that do not have openings for the cable glands. Depending on whether the sensor cables are to be installed on the bottom or on the rear, the relevant terminal compartment cover must be replaced with a terminal compartment cover featuring openings for the cable glands. However, the cable glands must be inserted into the openings in the terminal compartment cover beforehand.



D041-1Z00131ZB05 upon delivery

1 Rear terminal compartment cover without openings	5 Connector strip (2x 4pin, 1x 5pin)
2 Bottom terminal compartment cover without openings	6 Rear terminal compartment cover with openings
3 3x Cable gland (5 -10 mm cable diameter)	7 Bottom terminal compartment cover with openings
4 3x blind plugs	

6.3 Installing the D041-1Z00131ZB05

Important:

- *Ensure installation is completed correctly.*
- *Comply with existing legal and/or operational directives.*
- *Improper handling can cause injuries and/or damage to the instruments.*
- *The D041-1Z00131ZB05 must not be operated in the field with the terminal compartment covers open.*
- *The pressure compensation must be protected from contamination.*
- *The D041-1Z00131ZB05 is not authorised for use in closed ducts.*
- *To ensure the housing is properly sealed, each of the cable glands must only hold a single cable.*

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

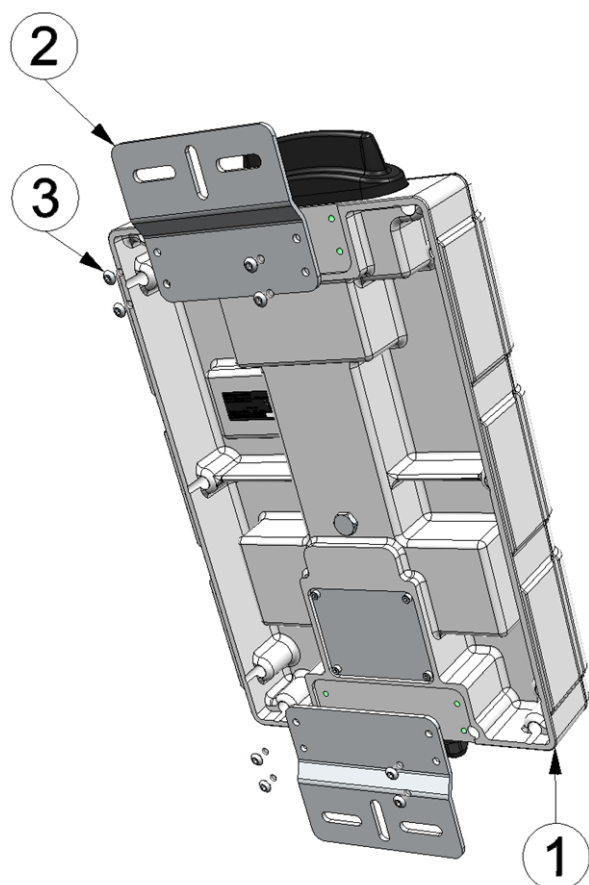
The installation site must be selected according to specific criteria. The following conditions must be avoided in any case:

- Objects that radiate intense heat (maximum ambient temperature: -30...+58 °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

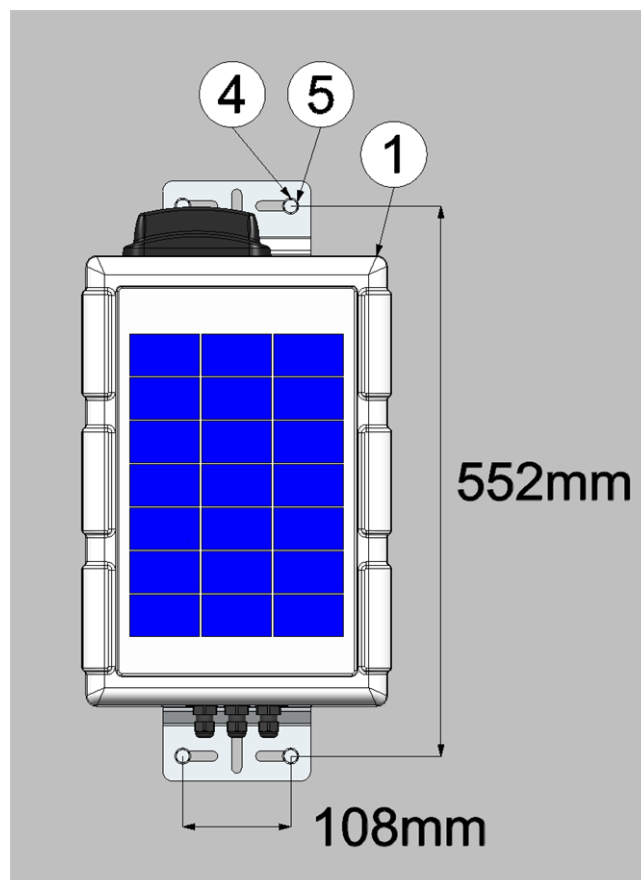
Tip: *If the cable glands are fitted to the terminal compartment cover on the bottom, approx. 15 cm of space must be left beneath the device for the cable connections. If the cable glands are fitted to the terminal compartment cover on the rear, approx. 15 cm of space must be left behind the device for the cable connections. Further information regarding the installation dimensions can be found in the relevant sub-chapter.*

6.3.1 Wall mounting

The optional "Wall mounting set (400443)" equipment is required for wall mounting.



Wall mounting - step 1



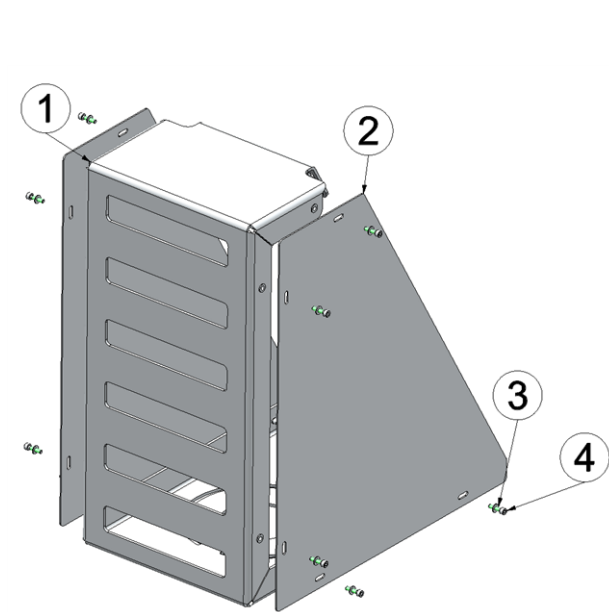
Wall mounting - step 2

1 D041-1Z00131ZB05	4 8.4 lining disc (included in the scope of delivery of 400443)
2 Assembly loop (included in the scope of delivery of 400443)	5 8x80 SW 13 hexagon bolt (included in the scope of delivery of 400443)
3 M6x12 imbus HX4 rounded head screw (included in the scope of delivery of 400443)	

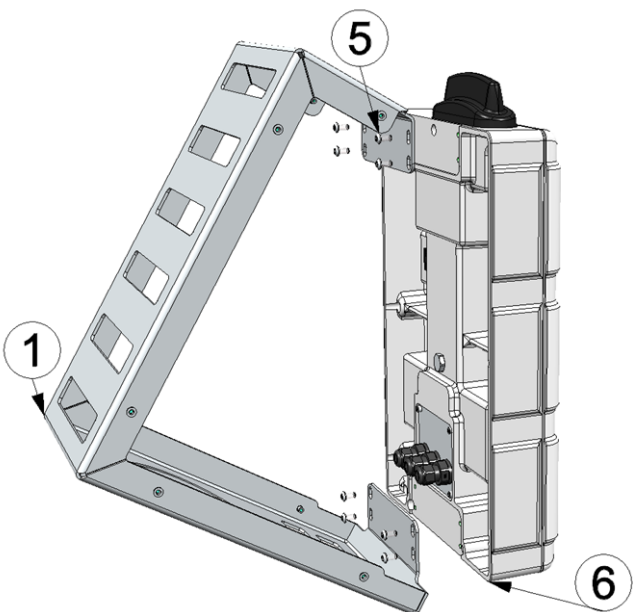
6.3.2 Installation on a bridge

Note: Seek approval from the responsible authority before installing on public facilities such as bridges.

The optional "Mounting bracket (400444)" accessories are required for assembly on a bridge.

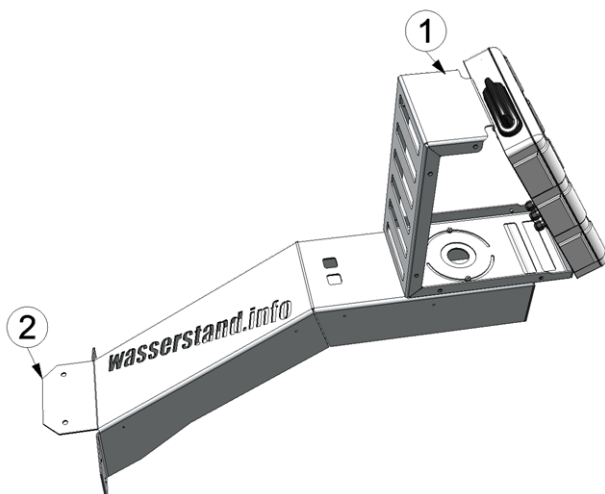


Installation on a bridge - step 1

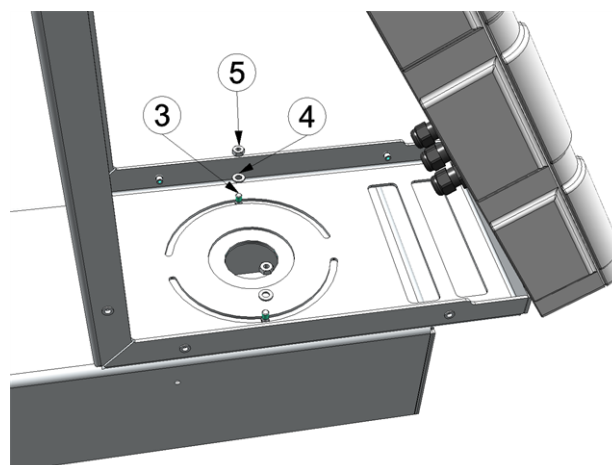


Installation on a bridge - step 2

1 Retaining bracket for D041-1Z00131ZB05 (included in the scope of delivery of 400444)	4 M4x10 hex socket screw (included in the scope of delivery of 400444)
2 Side panel (included in the scope of delivery of 400444)	5 M6x12 imbus HX4 rounded head screw (included in the scope of delivery of 400444)
3 Washer 4,3 (included in the scope of delivery of 400444)	6 D041-1Z00131ZB05

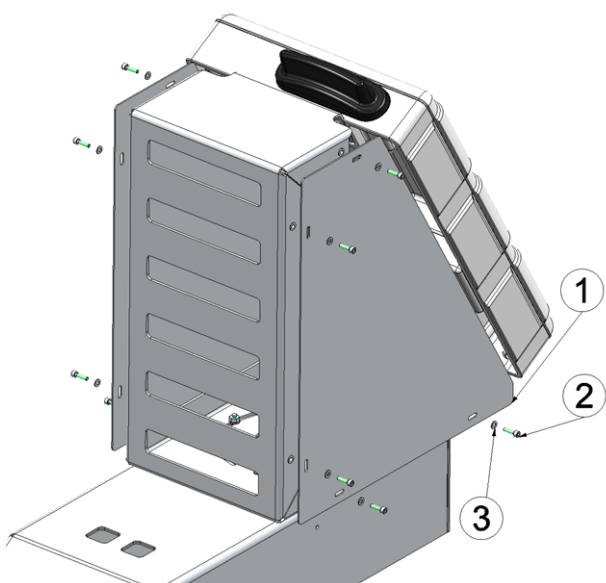


Assembly on a bridge - step 3

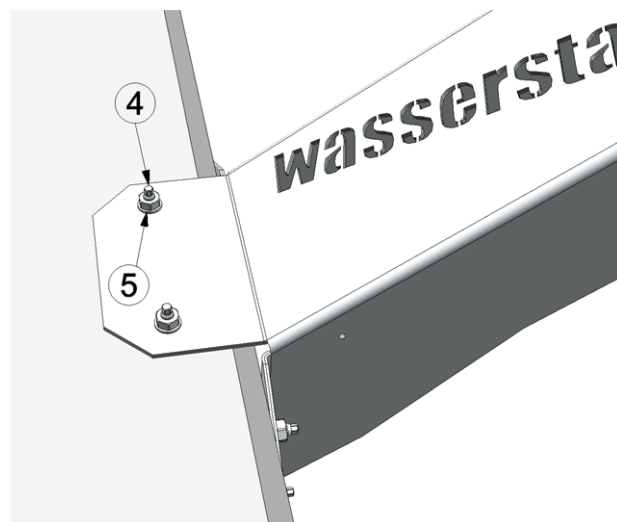


Assembly on a bridge - step 4

1 Retaining bracket with D041-1Z00131ZB05 (included in the scope of delivery of 400444)	4 6.4 lining disc (included in the scope of delivery of 400444)
2 Console mount (included in the scope of delivery of 400444)	5 M6 hexagonal nut (included in the scope of delivery of 400444)
3 M6x16 truss-head screw (included in the scope of delivery of 400444)	



Installation on a bridge - step 5



Installation on a bridge - step 6

1 Side panel (included in the scope of delivery of 400444)	4 M10x130 armature bar (included in the scope of delivery of 400444)
2 M4x10 hex socket screw (included in the scope of delivery of 400444)	5 M10 hexagonal nut (included in the scope of delivery of 400444)
3 Washer 4,3 (included in the scope of delivery of 400444)	

6.4 Safety instructions for the cabling

When connections are made to the D041-1Z00131ZB05 , 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 11.

6.4.1 Information on preventing electrostatic discharges (ESD)

Important: *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.

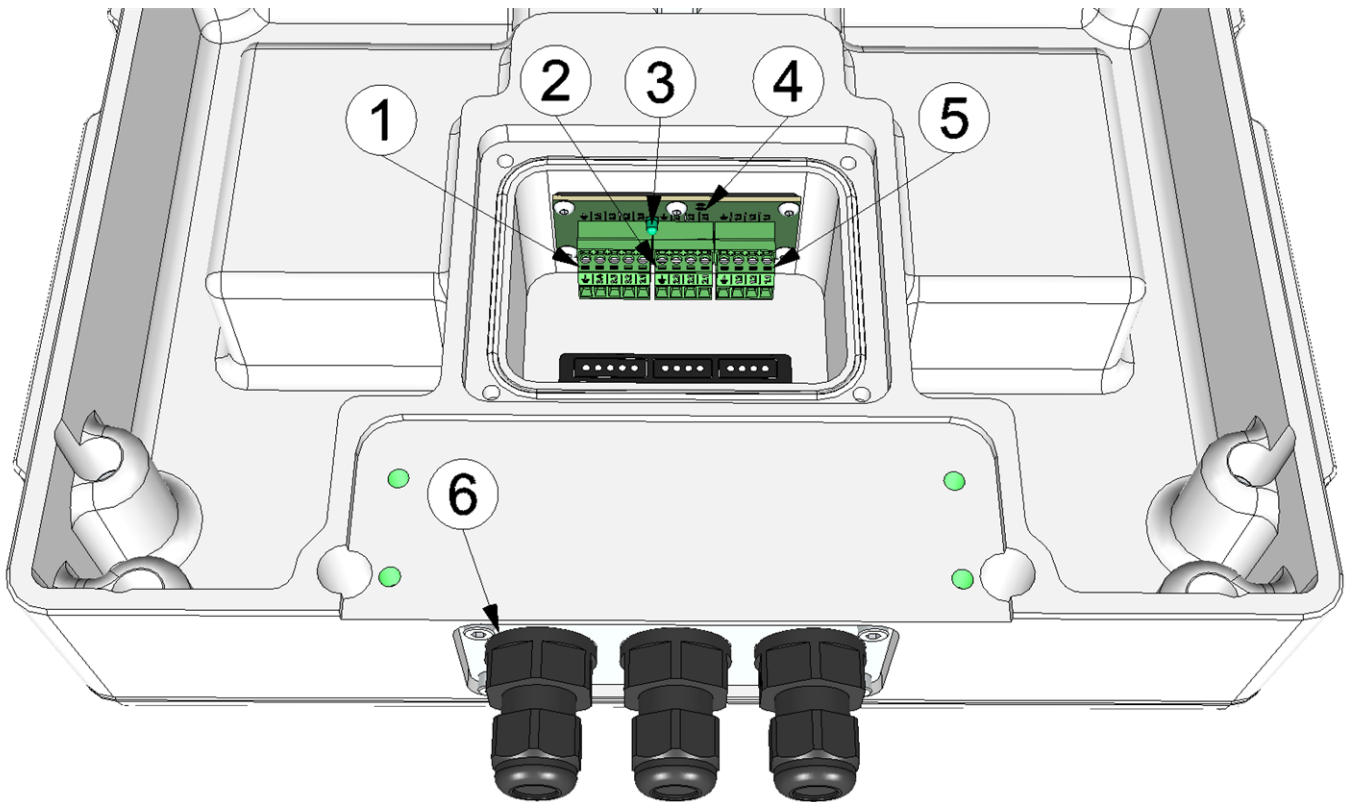
6.5 Electrical installation

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

6.5.1 Connecting the sensors

Important:

- *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.*
- *Current and data cables must not exceed a length of 30 m.*
- *The D041-1Z00131ZB05 must not be operated in the field with the terminal compartment covers open.*
- *To ensure the housing is properly sealed, each of the three cable screw connections must only hold a single cable.*



Connection of the sensors (displayed option: cable glands on the bottom)

1	Terminal block RS485	4	Solenoid switch
2	Terminal block UI 2	5	Terminal block UI 1
3	Status LED	6	Cable gland (5 -10 mm cable diameter)

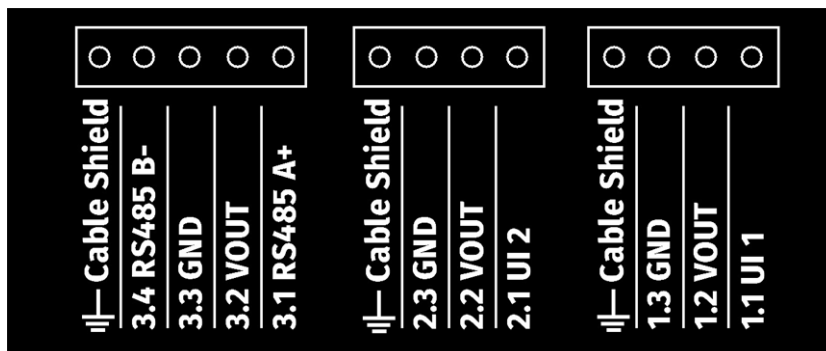


Diagram of the terminal strip

Assignment of terminal block RS485

	Cable Shield	Shielding of the sensor cable
3.4	RS485 B-	RS485 B (inverting)
3.3	GND	Ground
3.2	VOUT	Switchable and adjustable sensor supply (5...24 V)
3.1	RS485 A+	RS485 A (non-inverting)

Assignment of terminal block UI 2

	Cable Shield	Shielding of the sensor cable
2.3	GND	Ground
2.2	VOOUT	Switchable and adjustable sensor supply (5...24 V)
2.1	UI 2	Universal input 2

Assignment of terminal block UI 1

	Cable Shield	Shielding of the sensor cable
1.3	GND	Ground
1.2	VOOUT	Switchable and adjustable sensor supply (5...24 V)
1.1	UI 1	Universal input 1

6.5.2 Technical details about the universal inputs

Tip: The universal inputs are not galvanically isolated.

6.5.2.1 0/4 to 20mA mode

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

Resolution	6,3 μ A
I _{max}	23,96 mA
Load	96 Ω

6.5.2.2 0 to 2V mode

Resolution	610 μ V
U _{max}	2,5 V
Load	10k086

6.5.2.3 0 to 10V mode

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

6.5.2.4 Standard digital modes (PWM, frequency, digital, counter)

General	$U_{\max}$	32 V
	Low	<0,99 V
	High	>2,31 V
	Load	10k086
PWM	Measurement range	1...99 %
	$f_{\max}$	100 Hz
	Minimum pulse length	1 ms
Frequency	Measurement range	1...1000 Hz
Counter	Minimum pulse length	1 ms

6.5.3 Technical details about the RS485 interface

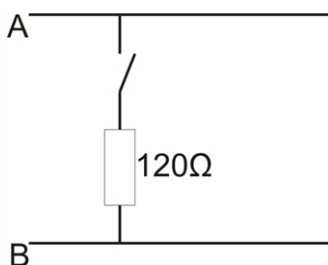
Note:

- The RS485 interface corresponds to standard EIA-485.

The RS485 interface of the D041-1Z00131ZB05 includes an input common mode range that covers the full area specified for RS485 (-7 V...+12 V). Higher voltages damage the interface. Differential signals of more than +/-200 mV within the specified input common mode range are detected correctly. In send mode, the output signal is in the range of 1,5...3,3 V.

Baud rate	600-115200
Stop bits	1, 2
Parity	N, E, O
Data bits	7, 8
Load resistance	Off 120 Ω

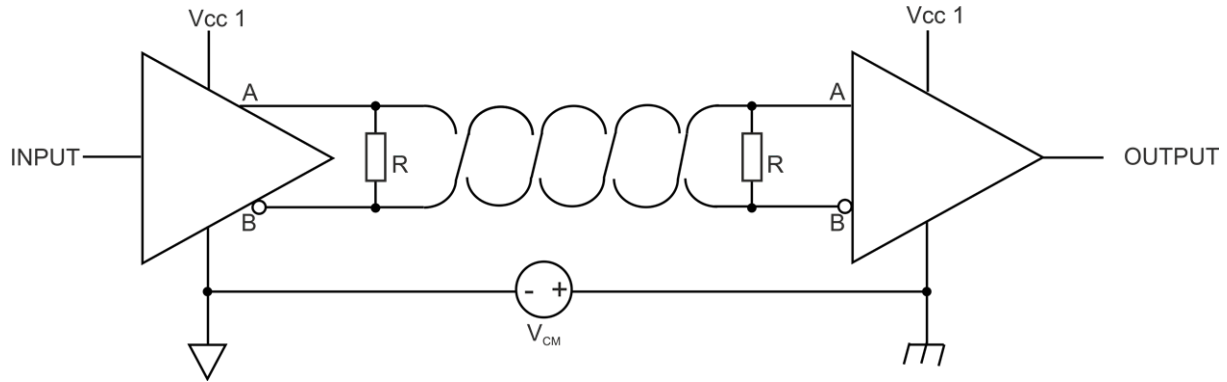
The 120 Ω load resistance between RS485 A and B can be activated using the software.



Schematic diagram of the switchable load resistance

The RS485 interface has no clamp resistances (pull up to RS485 A and pull down to RS485 B). Both connections of the RS485 interface are equipped with voltage and current limitations. The voltage limitation circuit ensures that in receive mode (i.e. inactive output driver), both data lines (RS485 A and RS485 B) are pulled to ground, provided that a connected Modbus server does not actively specify the voltage levels. This can be done by the output driver of the Modbus server or by clamp resistors built into the Modbus server.

Tip: Additional explanation regarding the connection of two RS485 bus participants



Schematic diagram: Connection of two RS485 bus participants

A problem occurs if there is no connection between the GND potentials of the sender and recipient. A common mode voltage (V_{CM}) occurs in this case. The GND potential difference must not exceed max. ± 7 V. Higher voltages will damage the interface. Temporary overvoltages (ESD, EFT and surge) are, however, absorbed by protective circuits.

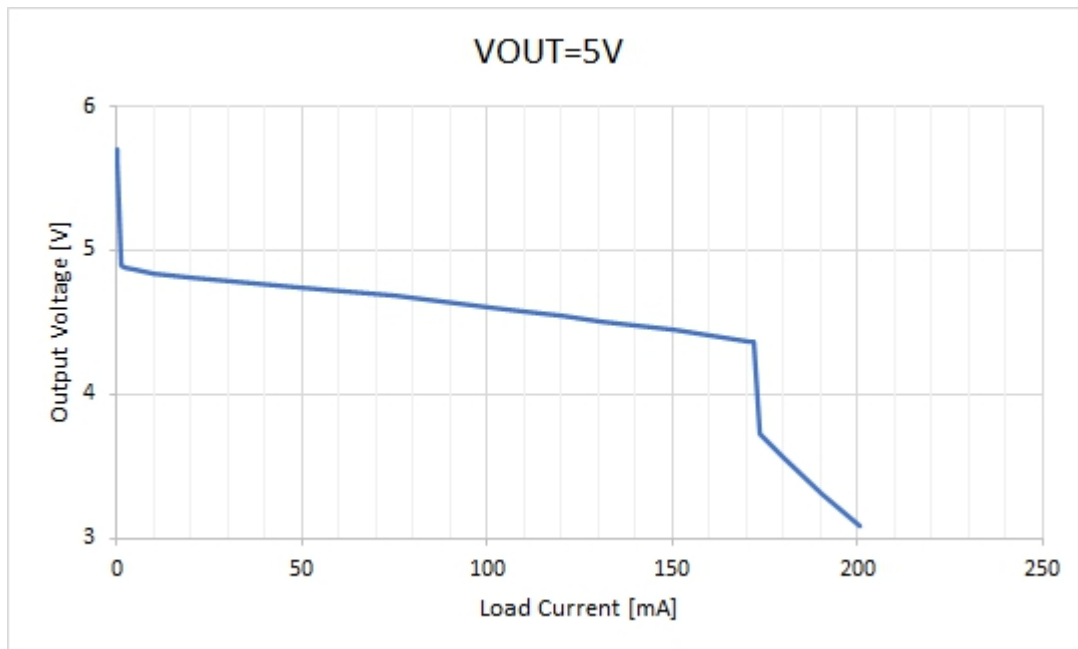
Note: The common mode input voltage range of -7 V... $+12$ V specified for the RS485 is determined from the max. permissible GND potential difference (± 7 V) and the max. permissible output voltage range of 0 ... 5 V for RS485.

6.5.4 Technical details about the outputs

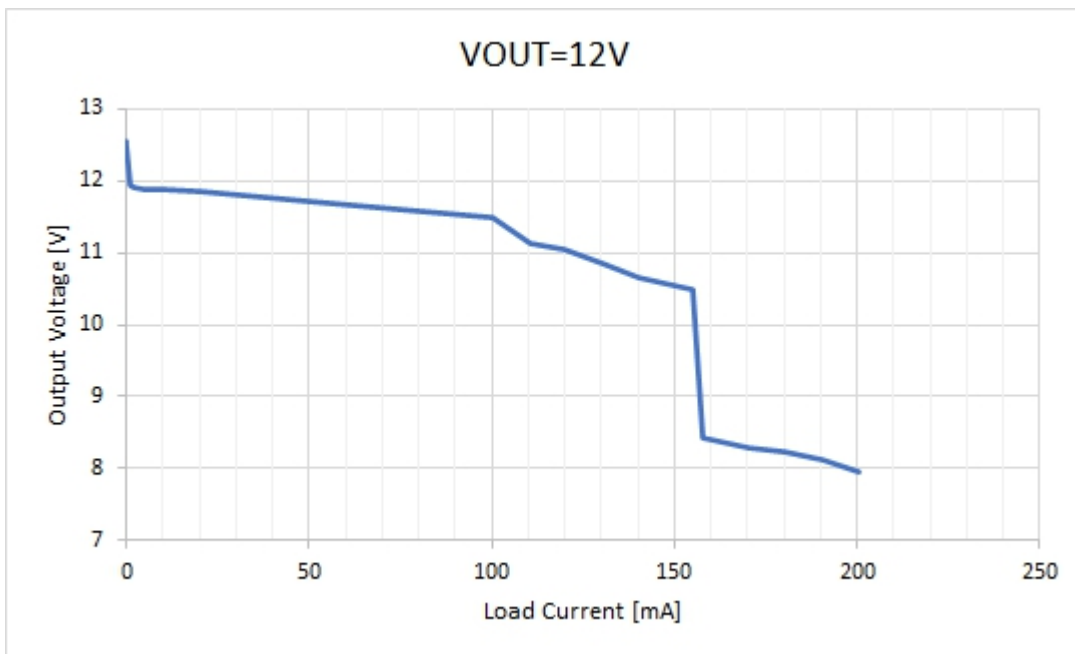
6.5.4.1 Switchable sensor supply VOUT

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

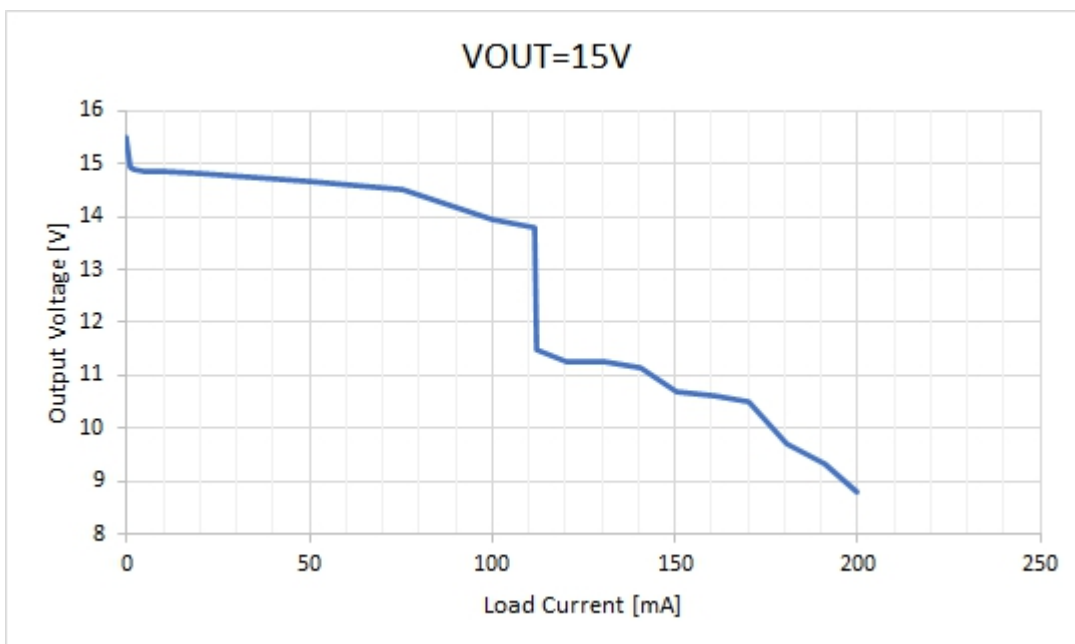
The output voltage can be varied in the range of 5 ... 24 V using the software.



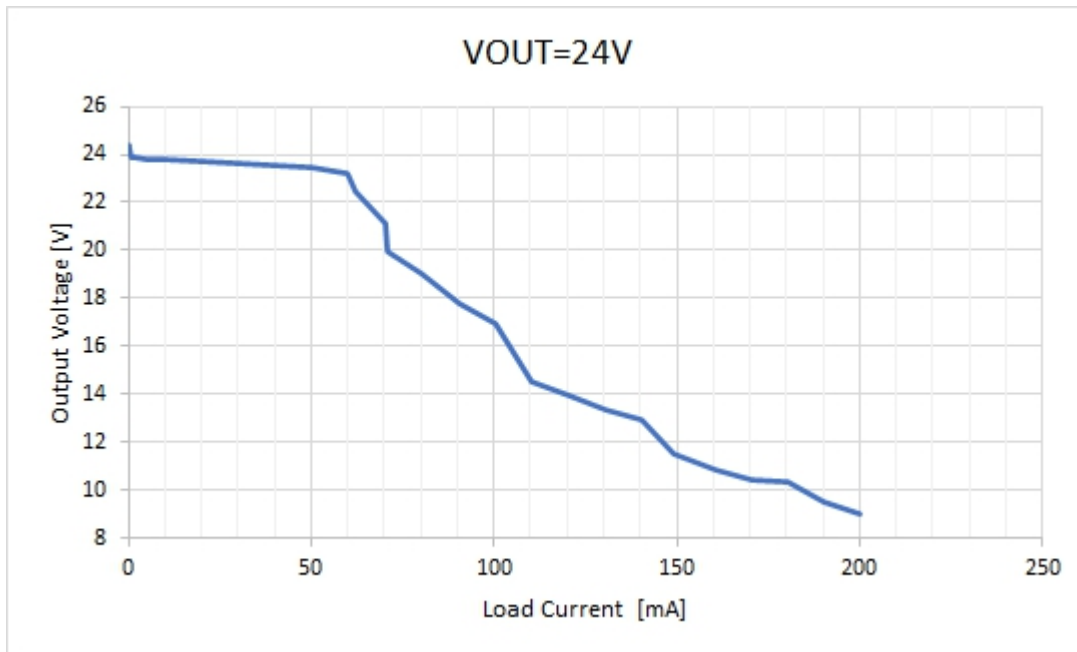
Output voltage characteristics subject to the load current for VOUT = 5V



Output voltage characteristics subject to the load current for VOUT = 12V



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



Output voltage characteristics subject to the load current for $V_{OUT} = 24V$

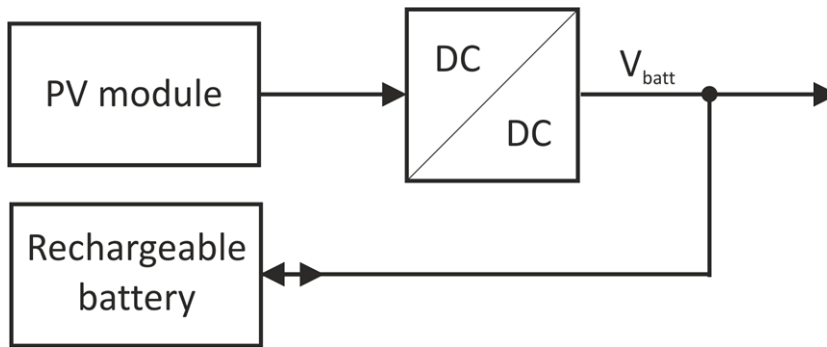
6.5.5 Technical details about the energy management

The charge controller aims to maintain the supply voltage at a constant of 3,8 V , as long as sufficient energy is provided by the PV module. If the PV module is unable to generate energy (e.g. at night or during storage), the D041-1Z00131ZB05 operates normally down to 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. Once this threshold has been reached, a connection establishment cannot be triggered manually nor automatically via the system. The remaining functions are not affected by this.

Only once the internal supply voltage falls below 2,9 V , the device logic is no longer executed and the D041-1Z00131ZB05 switches to the energy saving mode in which only the charge control is active. In this case, the charge control tries to charge the rechargeable battery to 3,8 V . The "UV LOCKOUT" log entry is also entered in the device log when activating energy saving mode. If sufficient energy is generated again by the PV module (e.g. dawn or positioning the device in the sunlight), the rechargeable buffer battery can be recharged again. Otherwise, the D041-1Z00131ZB05 will remain in this power-saving mode until the rechargeable battery is deeply discharged.

Energy saving mode is terminated and the execution of the device logic is reactivated 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.

6.5.6 Technical details about the energy supply



Schematic diagram of the energy supply

PV module	15 V / 14 W
Rechargeable buffer battery (Li-Ion)	17 Ah
Ext. charging port	No

Thanks to the combination of a PV module with rechargeable buffer battery, the D041-1Z00131ZB05 works entirely without mains power. The rechargeable buffer battery can only be charged by the PV module. There is no external charging port. If the D041-1Z00131ZB05 has switched to energy saving mode (internal supply voltage has fallen below 2,9 V), the rechargeable buffer battery can be recharged by positioning the D041-1Z00131ZB05 in the sunlight. Further details are provided in chapter "Technical details about the energy management " on page 40.

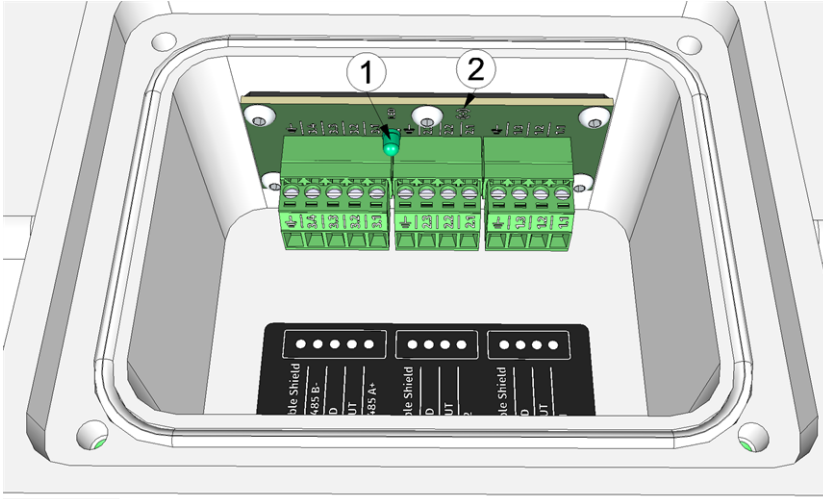
6.5.7 Technical details about the system time

The D041-1Z00131ZB05 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 integrated rechargeable buffer battery is depleted and if no energy is provided by the PV module. 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 myDatenet server is established.

Chapter 7 Operating elements

The operating elements of the D041-1Z00131ZB05 can only be accessed when the terminal compartment cover is open.

Important: 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 terminal compartment cover is open.



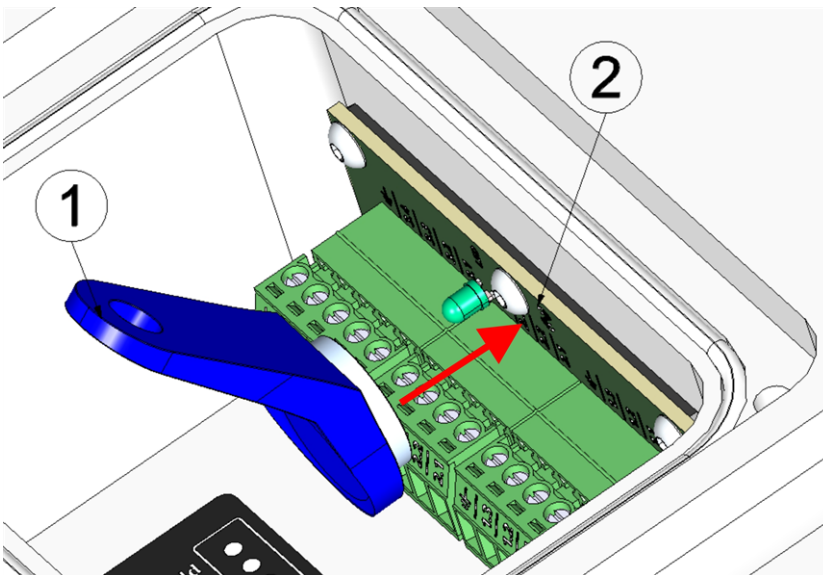
Operating elements that are accessible when the terminal compartment cover on the rear is open

1 Status LED

2 Solenoid switch

7.1 Solenoid switch

The MDN Magnet (206.803) is required to operate the solenoid switch.



Operating the solenoid switch

1 MDN Magnet (206.803)

2 Solenoid switch

Chapter 8 Maintenance

Important: 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.

8.1 General maintenance

- Regularly check the D041-1Z00131ZB05 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 D041-1Z00131ZB05 with a soft, moist cloth. Use a mild cleaning agent, if necessary.

8.2 Replacing the rechargeable buffer battery

The internal rechargeable buffer battery is continuously charged by the PV module and, under normal operating conditions, should never be completely discharged. The voltage that the charge controller attempts to maintain has been selected to ensure that the rechargeable buffer battery achieves the longest possible service life. However, the service life of the buffer battery is also influenced by operating and storage conditions and is not unlimited. If there is any suspicion that the rechargeable buffer battery is defective, the D041-1Z00131ZB05 must be returned in its original packaging to the manufacturer (see "Contact information" on page 51) or a certified service partner (see "Repair & return" on page 47 and "Transport" on page 25). The rechargeable buffer battery may only be replaced by the manufacturer or a certified service partner.

8.3 Charging the rechargeable buffer battery

The D041-1Z00131ZB05 is delivered with the rechargeable buffer battery charged to a maximum of 30 % in accordance with applicable transport regulations. During operation, the buffer battery is continuously charged by the PV module. To ensure the device starts with as large an energy buffer as possible, it is recommended that the rechargeable buffer battery be recharged before initial commissioning. As the D041-1Z00131ZB05 does not have an external charging port, it must be exposed to direct sunlight for approximately 8 h for this purpose.

8.4 Services

Microtronics Engineering GmbH offers the following maintenance services for the D041-1Z00131ZB05 :

Description	Order number
Inspection fee	206.395
Cleaning flat	206.355
Software Update	206.555

Chapter 9 Repair & return

Microtronics products are manufactured using quality-assured processes. The Microtronics Engineering GmbH production site is ISO 90001 certified. All products are tested and/or calibrated before being shipped to the customer. This ensures that Microtronics Engineering GmbH products perform to their full capacity upon delivery.

Despite Microtronics Engineering GmbH's most rigorous quality assurance measures, malfunctions may occur as well within as outside the warranty period. In some cases, however, it is not necessary to return the product. Some issues can be resolved remotely by the Support & Service Centre (e.g. via OTA firmware update). If your device shows unexpected behaviour or malfunctions, please proceed as follows:

1. Contact the support & service center (support.microtronics.com)

In the Microtronics Help Center, select the category "Technical support (device)" to create a ticket. Please describe the problem in as much detail as possible to help our staff diagnose the issue. One of our staff members will then contact you and attempt to resolve the problem remotely with you.

2. Wait for the completed RMA form you will receive in response

If it was not possible to resolve the problem remotely, you will receive a completed RMA form that you must enclose with the return shipment. At the bottom of the form, you will also find more detailed information on how to return the product.

3. Return the D041-1Z00131ZB05

Do not dispatch the device until you have received the RMA form and the RMA number noted on it. Microtronics will not reject shipments that arrive without a clearly indicated RMA number or without the enclosed RMA form. However, processing will take significantly longer in such cases.

If you return the D041-1Z00131ZB05 for repair under warranty or outside of warranty, check with your national customs/tax authorities for applicable regulations, procedures and necessary documentation for tax-free return of products. Special customs tariff numbers are usually available to confirm that the item is being returned for repair and has no commercial value.

The customs invoice/shipping documents should clearly state: "Goods being returned to manufacturer for repair – No commercial value". It is mandatory that any returned goods are accompanied by a commercial invoice on headed paper. Microtronics reserves the right to charge the customer for time spent rectifying incorrect customs documents.

Note: *Ensure that the D041-1Z00131ZB05 is packed carefully and securely. Damage incurred during transport is not covered by the warranty and may be subject to a charge.*

Chapter 10 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 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. Microtronics Engineering GmbH 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.

Microtronics Engineering GmbH releases goods brought onto the market in Austria from the obligations via ERA, which means that collection points that cooperate with ERA Elektro Recycling Austria GmbH (<https://www.era-gmbh.at/>) can be used for disposal in Austria.

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.

Chapter 11 Contact information

Support & Service:

Microtronics Engineering GmbH
Hauptstrasse 7
3244 Ruprechtshofen
Austria, Europe
Tel. +43 (0)2756 7718023
support@microtronics.com
www.microtronics.com

Microtronics Engineering GmbH (Headquarters)

Hauptstrasse 7
3244 Ruprechtshofen
Austria, Europe
Tel. +43 (0)2756 77180
Fax. +43 (0)2756 7718033
office@microtronics.com
www.microtronics.com



Certified by TÜV AUSTRIA: EN ISO 9001:2015, EN ISO 14001:2015, ISO/IEC 27001:2013, EN ISO 50001:2011 for myDatenet | TÜV SÜD: ATEX Directive 2014/34/EU

© Microtronics Engineering GmbH. All rights reserved. Photos: Microtronics, shutterstock.com