

Operating instructions

Keep for reference

MI1C804-901-XX

MI1C804-902-XX

RoProxCon Hybrid

Contactless data and power transmission



Document ID: BA_en_RoProxcon_Hybrid_V1.0

Document Owner: S. Huber / IC-PMD-PLD-M2M
Document Author / Maintian: S. Huber / IC-PMD-PLD-M2M
Document classification: **public | public**
Date: 20.06.2024

Table of contents

1 Document history	1
2 Description.....	2
3 Parts overview	3
4 Technical data.....	4
5 About this document.....	5
5.1 Purpose of this document	5
5.2 Target group	5
5.3 Keep away from children.....	5
6 Safety instructions	6
6.1 Authorised personnel	6
6.2 Intended use	6
6.3 Warning against misuse.....	6
6.4 General safety instructions.....	7
6.5 Installation.....	8
6.6 Authorisations	8
6.7 Residual risks.....	8
6.8 FCC approval.....	8
6.9 IC approval.....	10
6.10 High frequency exposure	11
7 Device description.....	12
7.1 Type plate	12
7.2 How the device works	12
7.3 Packaging, transport and storage	13
8 Product description.....	14
8.1 Dimensions	14
8.1.1 MI1C804-90x-01	14
8.1.2 MI1C804-90x-02	15
8.2 Block diagram	15
8.3 Functional elements	16
8.4 Status LED.....	17
8.4.1 MI1C804-901-XX (Transmitter).....	17
8.4.2 MI1C804-902-XX (Receiver).....	17
8.5 DIP switch	18
9 Installation.....	19
9.1 Positioning	19
9.2 Assembly	20
10 Cable assignment MI1C804-90X-01	21
11 Pin assignment MI1C804-90X-02	21
12 Troubleshooting	22
13 Disposal of the appliance.....	23
14 Warranty conditions and product liability.....	24
15 EU Declaration of Conformity (simplified)	24

1 Document history

Date of revision: 22.05.2025

Revision date	Author	Correction	Remark
V1.0 / 20.06.2024	S. Huber		First edition

2 Description

RoProxCon Hybrid is a product for contactless data and energy transmission.

Data with a data rate of up to 1 Gbits/s (Ethernet) and power of up to 30 W can be transmitted across an air gap.

Transmission requires a transmitter and one or more receivers.

Energy is transferred from the transmitter to the receiver; data transmission is bi-directional.

A typical application is, for example, changing tools on robots. Contactless data and energy transmission means that there is no wear on connectors. Maintenance and downtimes can therefore be minimised.

The transmitter and receiver are available in two versions, with cable and M12 connector interface.

The main features of the system are described below:

- Contactless – eliminating wear and minimising maintenance
- Full duplex and real-time Ethernet transmission up to 1 Gbit/s
- Power transmission of up to 30 W in a compact housing
- Robust design for harsh environments
- Plug & Play - easy to use



After unpacking the appliance, please check that it is in good condition and that the scope of delivery is complete. Please notify us immediately if any item is missing or damaged. Please refer to the last page for customer service contact details.



Read the manual before using the product!

3 Parts overview

Type	Order number	Description of the
MI1C804-901-01	10157707	RoProxCon Hybrid transmitter with pre-assembled cable connection 2m
MI1C804-902-01	10157710	RoProxCon Hybrid receiver with pre-assembled cable connection 2m
MI1C804-901-02	10157711	RoProxCon hybrid transmitter with M12 plug-in interface (M12 A-coded power / M12 x-coded data)
MI1C804-902-02	10157713	RoProxCon hybrid receiver with M12 plug-in interface (M12 A-coded power / M12 x-coded data)

4 Technical data

Parameters	Value
Model	RoProxCon Hybrid
Switch-on time	≤ 2 s
Transmission distance	0 - 5 mm
Data transmission Frequency range	57 GHz - 64 GHz
Data transmission Max. Rx Power	7.8 dBm EIRP
Energy transfer Frequency range	200 - 220 kHz
Data transmission Operating mode	Full duplex
Data transmission Data rate	10 Mbit/s / 100 Mbit/s / 1 Gbit/s (configurable via DIP switch)
Supported protocols	EtherCAT, PROFINET, PROFINET IRT, Ethernet
Latency	< 1 μs (typical)
Supply voltage	24V (± 5%)
Max. Output current	≤ 1.25 A (typical)
Temperature (operation)	-20 to +40 °C
Temperature (in stock)	-40°C to +85°C
Humidity	Up to 95% rH
Insert height	Max. 2000 m
Maximum installation height	< 2m
IP protection class	IP67 (manufacturer's declaration)
Device protection class	III
Mounting type	Wall/device mounting
Assembly specifications	Depending on the energy transfer
Material	PBT (lid) / die-cast zinc (housing)
Status	About LED
Connection type	MI1C804-90x-01 Energy: Cable open end Data: RJ45 MI1C804-90x-02 Energy: M12 A-coded Data: M12 X-coded
Dimensions	60 x 105 x 38 (without cable)
Weight	450g
EMC classification	EN 55011 Group 2 Class A
Certificates	CE FCC/IC

5 About this document

5.1 Purpose of this document

This document provides comprehensive information regarding storage, transport, installation, commissioning, and disposal of the device. Please read this document carefully and keep it accessible at all times in the immediate vicinity of the appliance. This document serves as a reference guide. Read this document before handling the appliance. If, after reading this document, you require additional information, please contact customer service (see last page).

5.2 Target group

This document is intended for both laypersons and for trained specialist personnel authorised by the operator. Installation and commissioning must only be carried out by authorised specialist personnel.

5.3 Keep away from children



The device is not suitable for use in places where children may be present.

6 Safety instructions

Safe operation of the device is generally guaranteed if the instructions in this operating manual and on the device are observed. With the exception of the configuration of the DIP switch, the appliance must not be opened. Do not attempt to repair the appliance yourself. Return faulty appliances immediately to the customer service centre (see last page for address).

6.1 Authorised personnel

All operations described in these operating instructions may only be carried out by trained personnel authorised by the operator. These operating instructions must be read carefully before handling the appliance. Protective clothing appropriate to the circumstances must be worn when working on this appliance.

6.2 Intended use

The device described in these operating instructions is intended for contactless data and power transmission. Install the device only in suitable locations and ensure a good thermal connection.

When installing and operating the appliance, please observe the applicable regulations and safety guidelines as well as the generally recognised rules of technology.

6.3 Warning against misuse

If the appliance is used improperly or not as intended, application-specific hazards may occur. Always ensure that the appliance is used as intended. Your safety is at stake!



Attention: Risk of explosion! This appliance must not be operated in potentially explosive atmospheres in accordance with Directive 2014/34/EU (ATEX). Failure to observe this warning may result in ignition or explosion during operation or due to electrostatic charging.

6.4 General safety instructions



The device represents the current technical state of the art.

To avoid danger, use the appliance if it is in proper and undamaged condition. Protect the appliance from impacts and do not drop it.

Caution, risk of injury! Safe operation of the appliance is no longer possible if

- the housing is mechanically damaged,
- water or other liquids have entered the inside of the housing,
- smoke emanates from the inside of the housing.

The operator is responsible for ensuring that the appliance is in perfect condition. Take the appliance out of operation immediately if any of the damage described above has occurred and store it away from flammable materials. Contact your local customer service centre immediately (see last page).

Avoid continuous high or excessively low humidity (above 95% and below 40% relative humidity) and condensation. Protect the device from aggressive chemicals.

Any other use than that described in the operating instructions is prohibited. Unauthorised modifications or changes are prohibited. Any consequences resulting from modifications to the product or misuse are not covered by customer service or the product warranty. We expressly point out that product liability and warranty claims cannot be asserted if the appliance is not operated in accordance with the instructions described in this operating manual and the instructions on the appliance, or if it is operated contrary to its intended use!

The operator must ensure that the appliance is handled in accordance with the national safety regulations of the respective country throughout its entire service life. In order to avoid hazards, the safety markings on the appliance must be observed and their meaning explained in these operating instructions must have been studied.

Warning: This device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.



Caution, risk of explosion! Do not open the appliance in a potentially explosive atmosphere.

6.5 Installation

The product may only be connected to power sources of class ES1 in accordance with the EN/IEC 62368-1 standard

Ensure that the cabling is sufficient for the output and take into account the voltage drop caused by the connection cable.

The housing of the product can heat up during operation and remain heated even after switching off. Therefore, please ensure sufficient thermal connection of the housing, e.g., by mounting it on metal plates, heat sinks or comparable materials.



6.6 Authorisations

The appliance complies with the legal requirements of the applicable EU directives and therefore bears the CE mark. The relevant declaration of conformity can be found in chapter 15 and also on the Internet at <https://www.rosenberger.com/downloads/m2m>.

6.7 Residual risks



Despite the high development standards, unforeseeable or particularly intensive environmental influences can result in damage to the housing structure. You should therefore check the condition of the housing at regular intervals. If you notice cracks or fractures in the housing or cover, stop using the appliance immediately and contact customer service (see last page).

6.8 FCC approval

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

The device is classified as an intentional radiator and is intended for use in fixed installations or embedded applications in accordance with FCC guidelines.

To ensure compliance with FCC radiation exposure requirements, the device must be installed and operated with a minimum distance of 20 cm between the radiator (antenna) and any person.

The device must not be co-located or operated in conjunction with any other transmitter unless tested and authorized under a certified configuration.

This device generates, uses, and can radiate radio frequency energy for wireless power transmission and may cause harmful interference to radio communications. It

complies with the limits for an Industrial, Scientific, and Medical (ISM) device under Part 18 of the FCC Rules.

If this equipment causes interference to radio or television reception, the user should take one or more of the following corrective actions:

- Increase the distance between the equipment and the affected device
- Use shielded cables and/or ferrite cores
- Connect the equipment to a power outlet on a separate circuit
- Ensure proper grounding of the device
- Install power line filters if necessary
- Operate the device in a shielded environment if persistent interference occurs
- Consult the manufacturer or a qualified RF technician

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Device	Certificate
MI1C804-901-01	2BG4VRPCH
MI1C804-901-02	2BG4VRPCH
MI1C804-902-01	2BG4VRPCH
MI1C804-902-02	2BG4VRPCH

6.9 IC approval

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

- 1. This device may not cause interference.
- 2. This device must accept any interference, including interference that may cause undesired operation of the device.

L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes:

- 1. L’appareil ne doit pas produire de brouillage;
- 2. L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

Device	Certificate
MI1C804-901-01	33058-RPCH
MI1C804-901-02	33058-RPCH
MI1C804-902-01	33058-RPCH
MI1C804-902-02	33058-RPCH

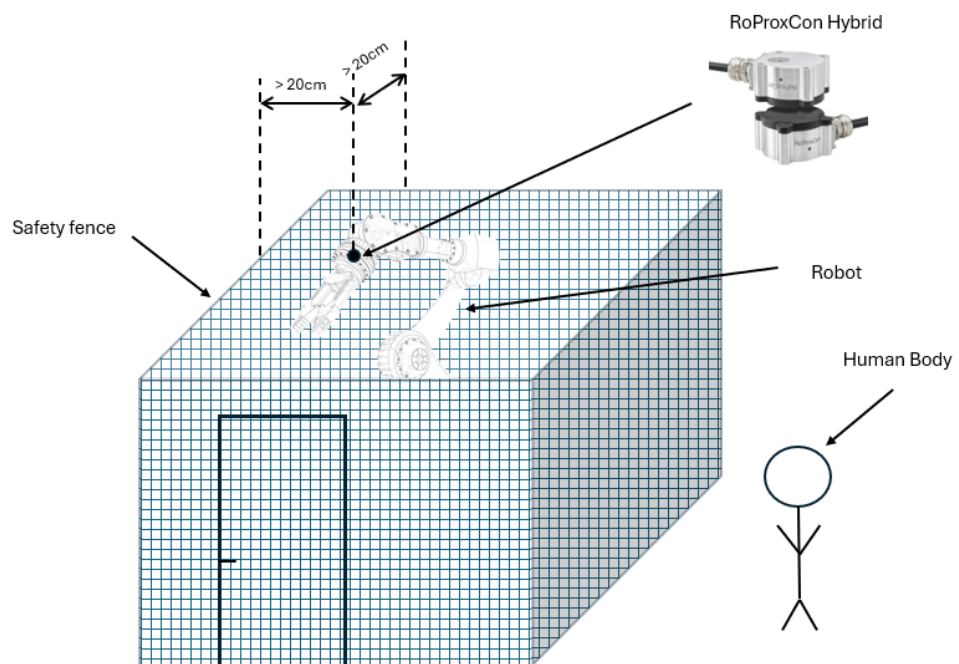
6.10 High frequency exposure



The device has been designed to comply with the legal requirements for the protection of persons against electromagnetic fields.

The device is designed to integrate it in e.g. automated manufacturing processes. Please see in the following figure a typical environment.

The machine e.g. a robot is inside a Safety fence that the distance of > 20 cm during operation can be ensured.



The minimum distance between the radiator and your body must be 20 cm.

7 Device description

7.1 Type plate

The label on the base of the housing shows the most important features regarding the manufacture and the intended use of the appliance.

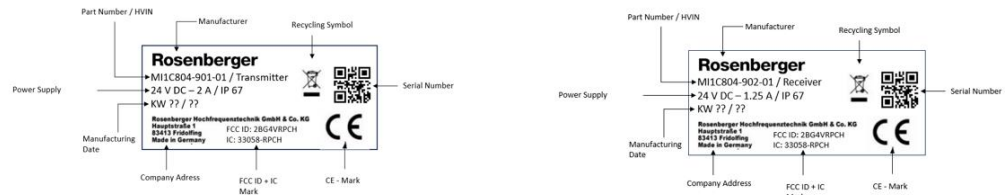


Illustration 1: Type plate

7.2 How the device works

Application area	RoProxCon Hybrid enables data and power transmission across an air gap during rotation.
Data transmission	Data transmission is based on a 60 GHz radio channel. Full-duplex transmission of Ethernet-based protocols up to 1 Gbit/s is possible thanks to the Ethernet Phy used.
Energy transfer	A transmitter and a receiver are required for power transmission of up to 30 watts. The transmitter checks cyclically whether a receiver is in the vicinity. Energy is only transmitted if a suitable receiver is detected within range.

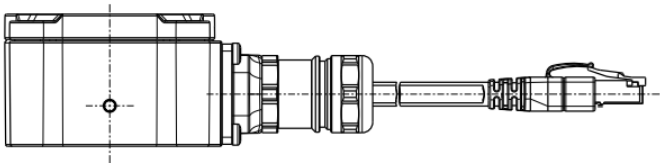
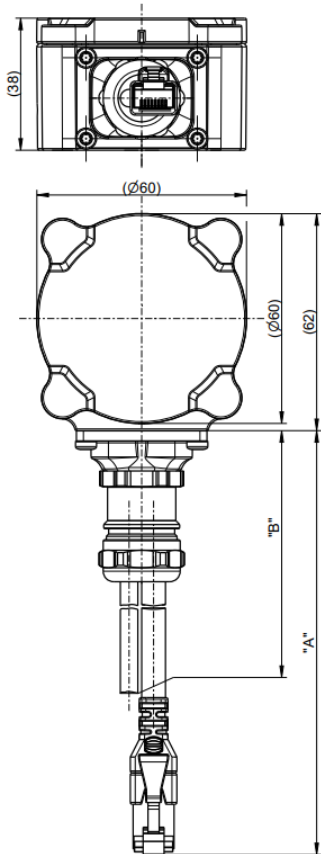
7.3 Packaging, transport and storage

Packaging	The device is packed in an environmentally friendly cardboard box to protect it from impact. The packaging is not waterproof. Protect the packaged device from water and excessive humidity until it is properly commissioned.
Transport	Check the parcel for damage and contact customer service if you notice any damage during transport.
Storage	Store the device in the packaging in which you received it. Protect the device from moisture and excessively humid air. Ensure that the device is protected from impacts and mechanical shocks. Do not store the device at temperatures exceeding -40°C to +75°C.

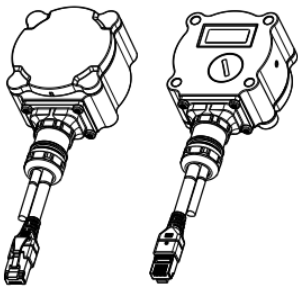
8 Product description

8.1 Dimensions

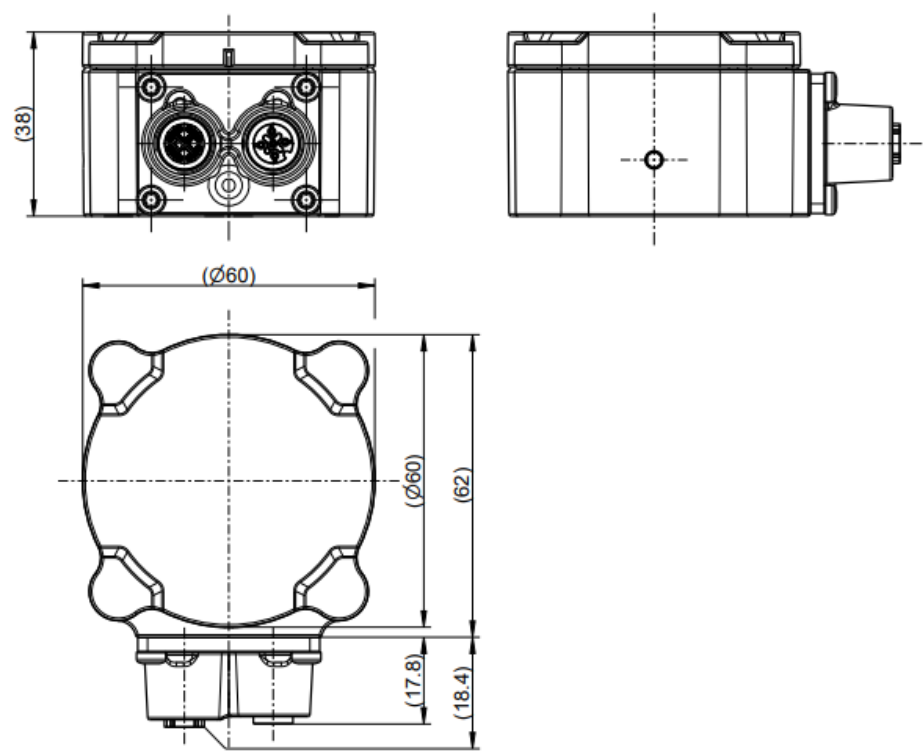
8.1.1 MI1C804-90x-01



Längentoleranzen / length tolerance					
Bereich Länge "A" und "B" (mm) Range length "A" and "B" (mm)	50 - 100	101 - 1000	1001 - 2000	2001 - 5000	> 5000
Toleranz für "A" (mm) Tolerance for "A" (mm)	± 20	± 20	±20	± 20	± 1%
Toleranz für "B" (mm) Tolerance for "B" (mm)	± 20	± 20	±20	± 20	± 1%



8.1.2 MI1C804-90x-02



8.2 Block diagram

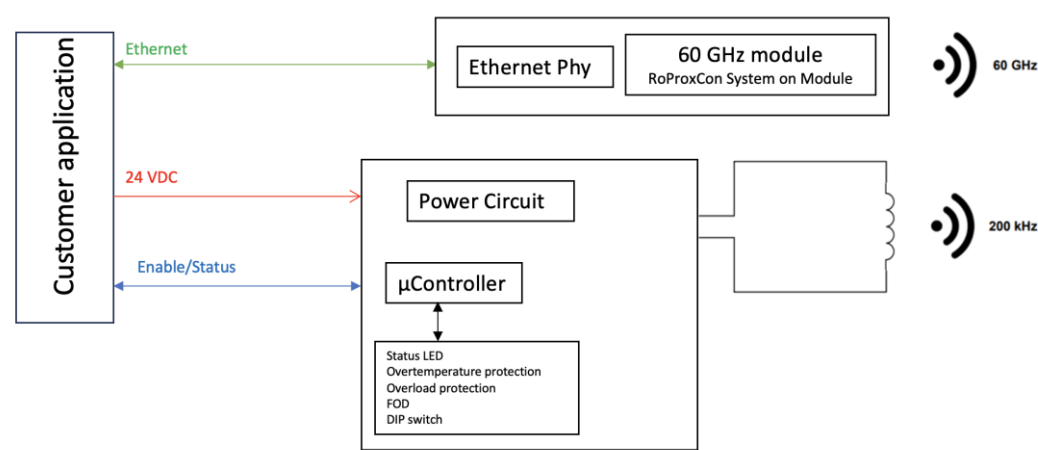


Illustration 2: Block diagram

8.3 Functional elements

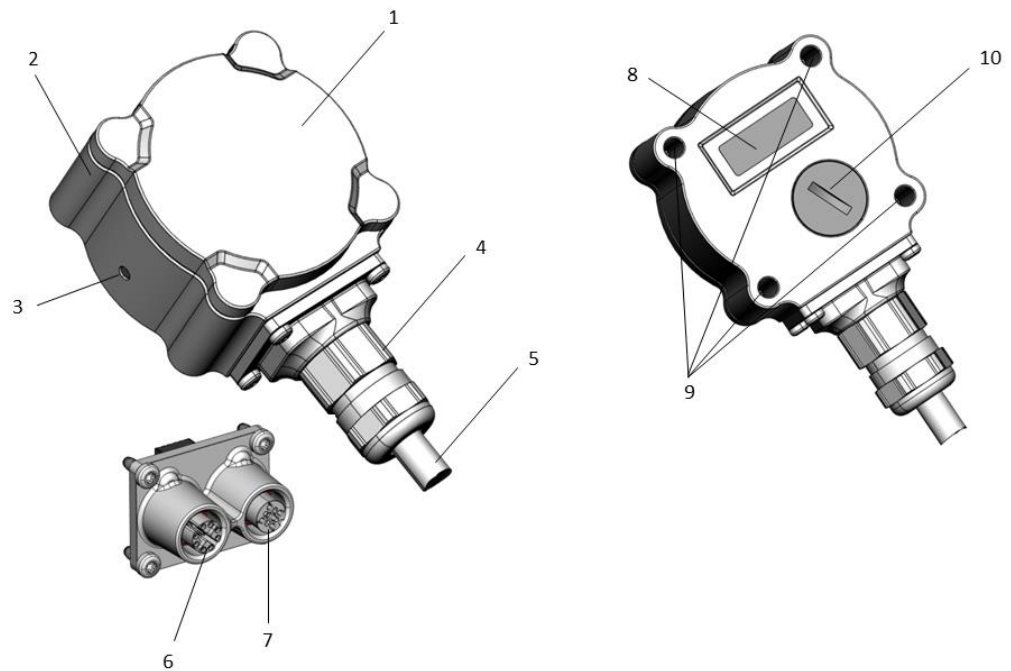


Illustration 3: Functional elements

- 1 Lid
- 2 Zinc die-cast housing
- 3 Status LED
- 4 Cable gland (variant MI1C804-90x-01)
- 5 Cable (variant MI1C804-90x-01)
- 6 M12 x-coded socket (variant MI1C804-90x-02)
- 7 M12 a-coded socket (variant MI1C804-90x-02)
- 8 Type plate
- 9 Mounting holes M6
- 10 Screw plug DIP switch

8.4 Status LED

The RoProxCon Hybrid has a status LED on the side of the housing that shows the current status of the device.

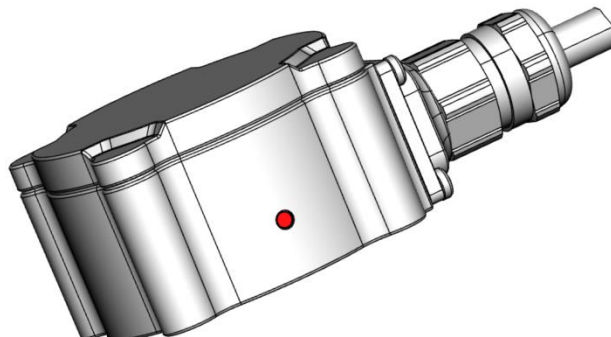


Illustration 4: Status LED Transmitter

8.4.1 MI1C804-901-XX (Transmitter)

No.	Blink code	Description
1		Device off
2		TX powered; no RX detected
3		Overload / Internal Error
4		Overtemperature
5		Power transmission active; no Error

Illustration 5: Status LED Transmitter

8.4.2 MI1C804-902-XX (Receiver)

No.	Blink code	Description
1		Device off
2		Overtemperature
3		Overload
4		Internal error
5		Power transmission active; no Error

Illustration 6: Status LED Receiver

8.5 DIP switch



ATTENTION!

Make sure that the device is out of operation before configuring the DIP switch.

Electrostatic discharges can damage the appliance. Please observe the specifications regarding electrostatic discharge (ESD).

In the initial state, the switch positions are set to "OFF" and the device is therefore configured for a data rate of 1 Gbit/s.

For a different configuration, ensure that the device is disconnected from any supply voltage and open the screw plug at the rear of the product.

In the next step, set the DIP switch to the desired configuration (see DIP switch configuration table)

Tighten the screw plug with 1Nm.

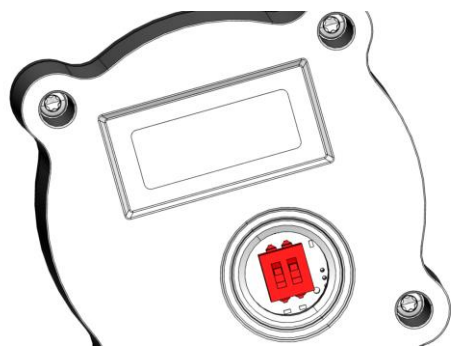


Illustration 7: DIP switch

Table 1: DIP switch configuration table

Switch position	Description
1 = Off; 2 = Off	1 Gbit/s (factory setting)
1 = On; 2 = Off	10 Mbit/s
1 = Off; 2 = On	100 Mbit/s
1 = On; 2 = On	Do not use

9 Installation

9.1 Positioning

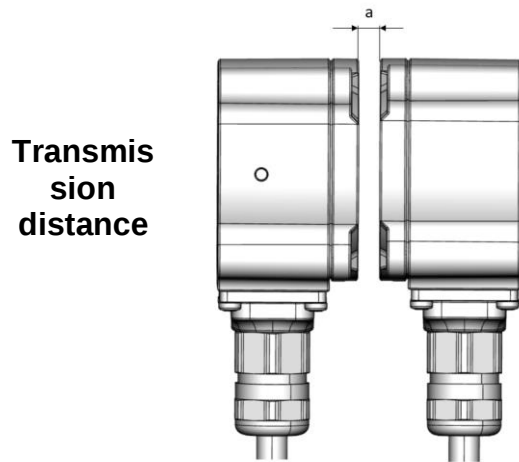


Illustration 8: Transmission distance

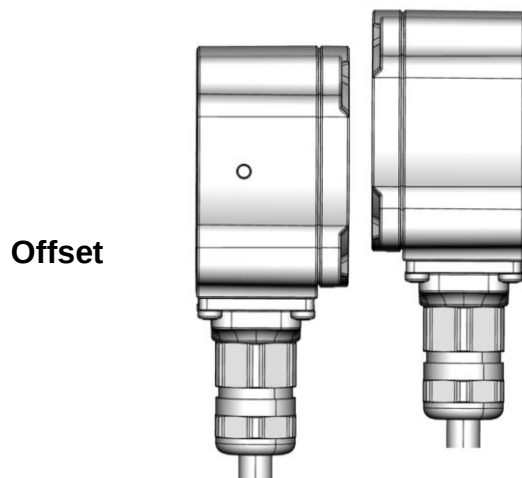


Illustration 9: Offset

The following conditions apply for data and power transmission:

- Distance up to 5 mm
- Offset up to +/- 2 mm

9.2 Assembly



Please follow the instructions in chapter 6.

Mount and install the devices only when they are switched off.

Ensure that the mounting surface is level.

Make sure that no metal objects can enter the air gap between the transmitter and receiver.

If the product is operated in an ambient temperature above 30 °C, a thermal connection of the housing ($R_{th} \leq 2 \text{ K/W}$) is required.

The RoProxCon Hybrid can be mounted using four M6 screws.

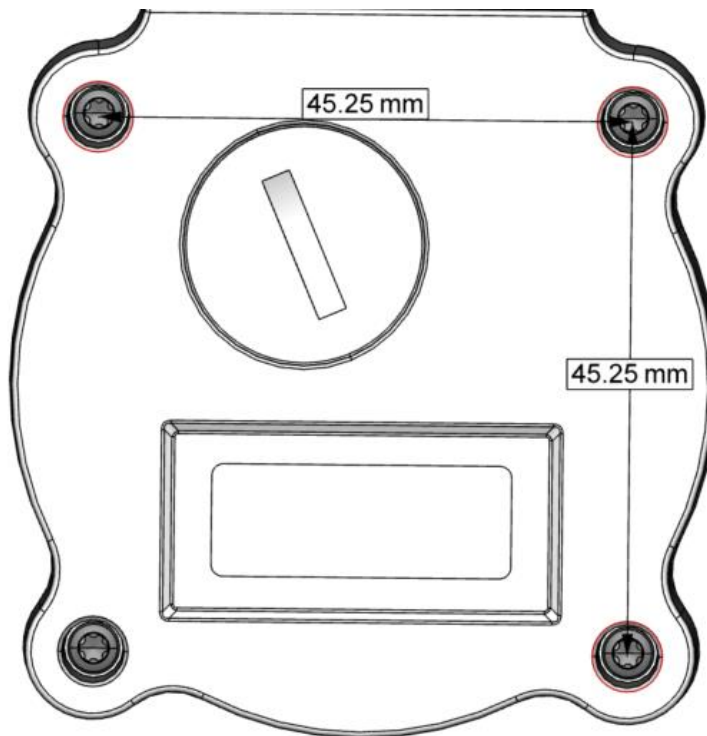


Illustration 10: Mounting hole spacing

10 Cable assignment MI1C804-90X-01

Transmission		Occupancy
Data	RJ45	Standard assignment for Ethernet
Energy	Brown	24 V
	Blue	GND
	White	Control signal Energy transmission (transmitter only) 24 V - Energy transfer activated 0 V - Energy transfer deactivated
	Black	Status signal Energy transmission (open drain, transmitter only): High - no energy transfer active Low - Energy transfer active

Table 2: Cable assignment MI1C804-90X-01

11 Pin assignment MI1C804-90X-02

Power transmission interface	Data transmission interface
2: Enable 1: 24 V 3: GND 5: NC 4: Status SW13.4 SW18	4: MDIB_N 5: MDID_P 3: MDIB_P 6: MDID_N 2: MDIA_N 7: MDIC_N 1: MDIA_P 8: MDIC_P SW13.4 SW18

Table 3: Interface assignment MI1C804-90X-02

12 Troubleshooting

If the device does not operate as expected, please check the status LED, see chapter 8.4.

Error image	The LED on the transmitter (MI1C804-901-XX) flashes green once and then goes out
Cause	No receiver (MI1C804-902-XX) was recognised
Measure	Move the receiver (MI1C804-902-XX) within range of the transmitter (≤ 5 mm)

Error image	The LED on the transmitter (MI1C804-901-XX) or receiver (MI1C804-902-XX) lights up red continuously
Cause	Excess temperature in the appliance
Measure	Disconnect the device from the power supply and check the thermal connection

Error image	The LED on the transmitter (MI1C804-901-XX) or receiver (MI1C804-902-XX) flashes red
Cause	Overload or internal error
Measure	Check whether the values of the power supply and the connected load are within the permissible limits and correct them if necessary. If the error persists, please contact customer service.

13 Disposal of the appliance



The appliance has been manufactured from high-quality materials and components that can be recycled and reused. Take the appliance components to the regional recycling centres.

In accordance with WEEE2 2012/19/EU and the ElektroG, the device must not be disposed of with normal household waste. The EU Directive WEEE 2002/96/EC was transposed into national law with the Electrical and Electronic Equipment Act (ElektroG).

Environmental information:

At the end of its service life, this product must not be disposed of with normal household waste, but must be taken to a collection centre for the recycling of electrical and electronic equipment. The materials are recyclable according to their labelling. By reusing, recycling or otherwise recovering old appliances, you are making an important contribution to protecting our environment. Please contact your local authority for details of the designated disposal centre.

14 Warranty conditions and product liability

- The contractual warranty conditions and product liability claims are void, even during the statutory warranty period, if the appliance is not operated in accordance with the instructions described in this operating manual and on the appliance.
- The contractual warranty conditions and product liability claims are void, even during the statutory warranty period, if the device is opened or operated improperly.
- Due to their limited service life, parts that are subject to particular wear and tear are excluded from the statutory warranty obligation. This includes housing parts, etc.

15 EU Declaration of Conformity (simplified)

This is to certify that Rosenberger Hochfrequenztechnik GmbH & Co. KG hereby asserts that the radio equipment types MI1C804-901-01, MI1C804-902-01, MI1C804-901-02, and MI1C804-902-02 are in compliance with Directives 2014/53/EU and 2011/65/EU. The full text of the EU Declaration of Conformity is accessible via the following internet address

<https://www.rosenberger.com/downloads/m2m>

All information regarding the scope of delivery, application, use, and operating conditions of the device is based on information available at the time of printing.

Specifications are subject to change without notice.

© Rosenberger 2024



Rosenberger

Manufacturer / Customer service

Rosenberger
Hochfrequenztechnik GmbH & Co KG
Hauptstrasse 1
83413 Fridolfing
Germany

Phone: +49 86 84 - 18 0
Fax: +49 86 84 - 18 1499
Mail: info@rosenberger.com
Web: www.rosenberger.de

Version: 2024-1.0

All rights reserved.

© Rosenberger 2024