

EMH metering

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XC-RACK

Digital 4-quadrant/combi meter

EN Instructions for use

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Scope of delivery and storage / transport

Please check the contents of the packing box are complete before starting with the installation and start-up procedure.

- 1 XC-RACK device
- 1 Instructions for use

If the contents are incomplete or damaged, please contact your supplier.

Store, use and transport the device in such a way that it is protected against moisture, dirt and damage.

Important information

These instructions for use are part of the documentation.

These instructions list all the different device versions. Some of the features described herein may not be applicable to your particular device.

Please see the product manual for more comprehensive information about the device. Please also observe all the documents included with other components.

In order to improve the readability of this document, the masculine form is used to refer to individuals of any gender identity.

Target group

These instructions are intended for technicians who are responsible for the installation, connection and servicing of the devices.

The device must be installed and put into operation only by qualified electricians in accordance with generally accepted rules of technology and the regulations, which are relevant for the installation of telecommunications equipment and end devices.



After installation and start-up of the meter, make sure that the instructions for use are available to the energy customer.

Intended use

The meter is intended to be used solely for the measurement of electrical energy in inside spaces, and it must not be operated outside the specified technical data (see name plate).

Make sure that the meter is suitable for the intended application.

Maintenance and warranty instructions

The device requires zero maintenance. It is not permitted to make any repairs independently in the event of any damage (e.g. due to transport or storage).

If the device is opened, the warranty and the Declaration of Conformity will be rendered null and void. The same applies where a defect is caused by external factors (e.g. lightning, water, fire, extreme temperatures and weather conditions), or by improper or careless use or handling.

The seals may only be broken by authorised personnel.

Care and disposal instructions



DANGER

Risk of fatal injury in case of contact with live parts!

Before the housing of the meter is cleaned, all conductors that the meter is connected to must be de-energised.

Use a dry cloth to clean the device housing. Do not use any chemical cleaning agents!



The symbol showing a crossed-out waste bin on electrical and electronic devices indicates that the device in question must be disposed of separately from unsorted domestic waste after decommissioning.

Additional disposal instructions are available on the manufacturer's website.

Basic safety instructions

Please adhere to the following basic safety instructions:

- Read all the enclosed instructions and information.
- Observe the warnings on the device and in the documents.
- Always be aware of safety issues and hazards when working on the device.
- The applicable occupational health and safety regulations for electrical installations must be observed during assembly, installation and removal of the device.
- Make sure that the installation and operating location of the device meets the specifications in the technical data.
- Before assembly, check the devices for any externally visible damage.
- Only use the device if it is in a technically flawless state, and solely in line with its intended use.
- The connection cables used to connect a meter must be selected to match the maximum load of the meter and the installation environment in terms of type, cross-section, voltage and temperature.
- Fit suitable cable end sleeves on multi-stranded, fine-stranded or ultra-fine-stranded connecting lines.
- Observe the maintenance and warranty instructions.
- If the mains power fails and then returns, there is no need to do anything to the meter.

Notes on correctness of measurements



For the notes on correctness of measurements applicable to this meter in Germany, please see the document provided, entitled “Messrichtigkeitshinweise für den LZQJ-XC, DMTZ-XC and XC-RACK”.

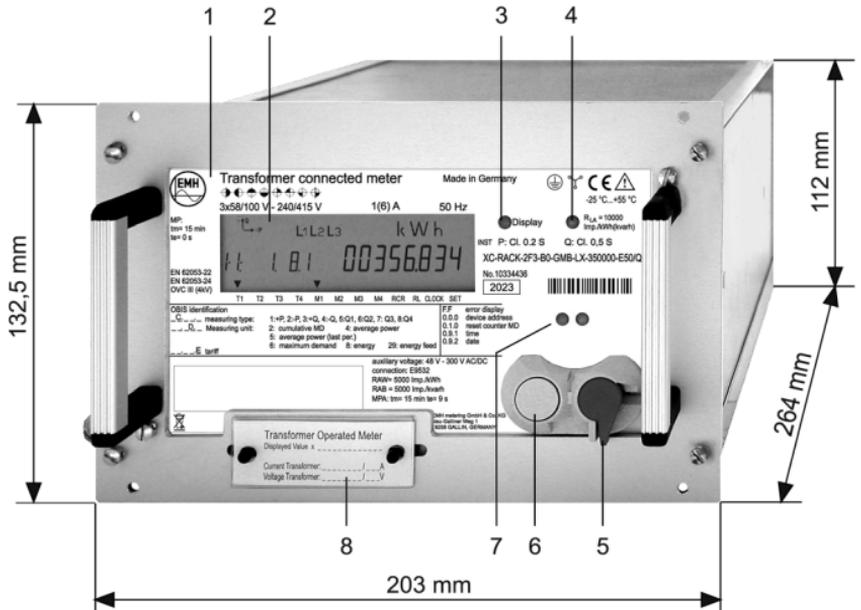
Technical data

| | |
|-----------------------------|---|
| Voltage, current, frequency | See name plate |
| Accuracy | |
| Active energy | Cl. 0.2S or Cl. 0.5S (Cl. C as per EN 50470-3) (type-specific) |
| Reactive energy | Cl. 0.5S* or Cl. 1S (type-specific) |

| | |
|--|--|
| Overvoltage category | OVC III (as per EN 62052-31) |
| Rated peak withstand voltage | 4 kV (as per EN 62052-31) |
| Input S0 Low voltage or system voltage | max. 1, max. 27 V DC, 27 mA max. 8, 18...40 V DC max. 8, 58...240 V AC |
| Output Opto-MOSFET | max. 8, max. 250 V AC/DC, 100 mA (normally open contact) |
| Power consumption (per phase) (meter without data interfaces and without outputs) | Voltage circuit < 0.4 VA / < 0.2 W Voltage circuit < 2.7 VA / < 1.6 W without auxiliary voltage Current path < 0.008 VA Auxiliary voltage < 9 VA / < 4.8 W |
| Temperature range | Defined operating range: -25 °C...+55 °C Limit range for operation, storage and transport: -40 °C...+70 °C |
| Altitude | Up to 3,000 m |
| Humidity | Maximum 95%, non-condensing, as per EN IEC 62052-11, EN 60068-2-30 |
| Protection class | I |
| Degree of protection Housing Installation environment | IP30 The device may only be used in 19-inch racks in switch cabinets with a degree of protection of IP51 (or higher). This ensures protection against penetration by dust and water as specified by the relevant standards (EN IEC 62052-11, EN 62052-31). |
| Environmental conditions | Mechanical: M1 according to the Measuring Instruments Directive (2014/32/EU) Electromagnetic: E2 according to the Measuring Instruments Directive (2014/32/EU) Intended operating location: Interior as per EN IEC 62052-11 |
| Weight | Approx. 2.3 kg |

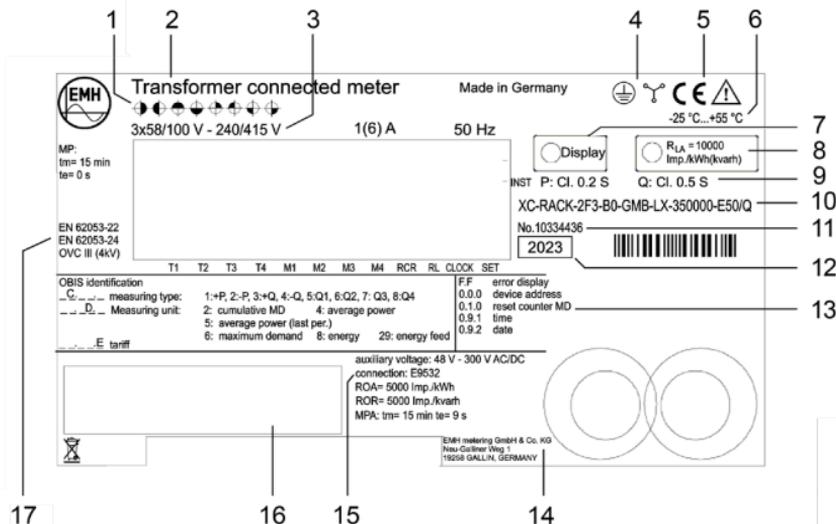
* as per EN 62053-24:2015+A1:2017

Housing, display and control elements



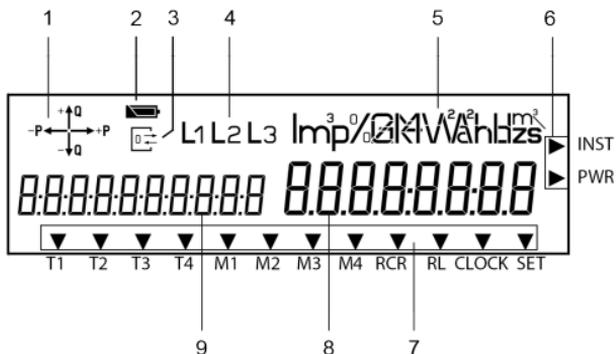
- 1 - Name plate
- 2 - Display
- 3 - Optical call sensor
- 4 - Test LED (permanently on = no energy consumption or incorrect current direction)
- 5 - Reset button (sealable)
- 6 - Call-up button
- 7 - Optical data interface (DO) with recess for the readout unit
- 8 - Transformer plate (sealable)

Name plate



- 1 - Registered quadrants
- 2 - Type designation
- 3 - Voltage, current, frequency
- 4 - Safety and application information
- 5 - Conformity and certification marking
- 6 - Operating temperature
- 7 - Optical call sensor
- 8 - Test LED
- 9 - Accuracy class
- 10 - Type code
- 11 - Serial number
- 12 - Year of construction
- 13 - OBIS codes for the most important registers
- 14 - Manufacturer's address
- 15 - Circuit number
- 16 - Space for ownership labelling
- 17 - Product standard, overvoltage category, rated peak withstand voltage

Display



- The **operation display** shows the energy direction that is currently being measured by the meter (export/import of active power, inductive/capacitive reactive power). If a load current is flowing, the energy direction arrow indicates which quadrant is being used for the measurement, e.g.:



1st quadrant +P/+Q



3rd quadrant -P/+Q



2nd quadrant -P/-Q



4th quadrant +P/-Q

- The **battery status indicator** shows the residual capacity of the power reserve of the real time clock. The following displays are possible:



= Full voltage, real time clock is buffered during an absence of voltage.



= Discharged, real time clock can no longer be buffered.



The battery status display appears only for devices with a battery-buffered real time clock.

- The **communication display** lights up permanently when one of the data interfaces (optical or electrical) is communicating with the meter. The communication display flashes when parametrisation mode is active.
On an XC-Rack with an LMN interface, this display lights up at irregular intervals as internal communications take place to provide the data for collection by an SMGW.

4. The **phase display** indicates when individual phase voltages are applied. All 3 symbols flash when the rotating field is wrong.
5. The **unit** shown matches the type of energy being measured or the measurement being displayed.
6. The **additional cursor field** displays the operating states for the meter. The arrows indicate whether an installation error was registered or if the power threshold was exceeded.

INST The cursor is active if an entry has been registered in the installation error control register.

PWR The cursor is active if the defined power threshold in the meter was exceeded.

7. The **standard cursor field** displays the operating states for the meter. The arrows indicate which tariff and maximum meter are active, and how the meter is being controlled (clock or ripple control receiver).

T1 - T4 Tariff information for energy. All activatable tariff registers are denoted on the name plate.

M1 - M4 Tariff information for power. All activatable tariff registers are denoted on the name plate.

RCR The cursor flashes on and off when the internal ripple control receiver is active and ready to receive. The corresponding cursor is permanently active when the internal ripple control receiver receives a telegram.

RL The cursor flashes as long as a resetting lock is active.

CLOCK The cursor is active when the internal device clock actuates the tariff meter.

SET The corresponding cursor is active when the meter is in Set mode.

8. The **value area** displays the measurements.
9. The **OBIS code area** defines the measurements according to the OBIS key. The display is able to display the long OBIS key.

Installation and start-up



DANGER

Risk of fatal injury in case of contact with live parts!

During installation or when replacing the meter, the wires connected to the meter must be de-energised.

- The installer bears responsibility for coordinating the rated values and parameters of the supply-side overcurrent protection devices with the maximum rated currents of the meter.
- Remove the corresponding pre-fuses, on the mains side and on the creation side in case of a two-sided feed. Store them in a secure location to ensure that no one else can insert the pre-fuses again without being noticed.
- Make sure that all connected devices (e.g. control and monitoring systems) are switched off.
- If you use selective automatic circuit breakers for system disconnection, secure them to prevent them from being switched on again without being noticed.
- Before the installation of a meter, make sure that the consequences of disconnecting the electrical system will not result in danger to the life or health of persons or cause any economic damage.
- To avoid any danger or damage, take appropriate measures to prevent malfunctions before disconnection of the system.
- Use the specified screw-type terminals only for installation and connection of the meter.

DANGER

Risk of fatal injury in case of contact with live parts!

In older versions up to and including those manufactured in 2023, S0 inputs are not potential-free. Depending on the voltage version of the device, the S0 inputs are connected electronically internally with the measuring connections or with the auxiliary voltage and are therefore not potential-free.

The S0 inputs manufactured from 2024 are designed to be potential-free.

You must refer to the connection diagram.

DANGER

Risk of fatal injury due to arcing and electric shock!

The inputs and outputs for the additional terminal, including the external power supply inputs, are not fuse-protected in the meter.

- The inputs/external power supply inputs must be fuse-protected with a pre-fuse of ≤ 0.5 A in accordance with the applicable technical regulations.
- The outputs must be fuse-protected as per the current specification on the meter name plate in accordance with the applicable technical regulations.

DANGER

Risk of fatal injury from high voltage when current transformers disconnected!

In transformer connected meters, the high voltage generated on a disconnected current transformer can cause fatal injuries, and will destroy the current transformer.

Before disconnecting the current paths, short-circuit the secondary circuits of the current transformer at its testing terminals.

Mounting and connecting the meter

The device may only be used in 19-inch racks in switch cabinets with a degree of protection of IP51 (or higher). This ensures protection against

penetration by dust and water as specified by the relevant standards (EN IEC 62052-11, EN 62052-31).

DANGER

Risk of fatal injury in case of contact with live parts!

Fuse-protect transformer connected meters in the voltage circuit with a pre-fuse of ≤ 6 A in accordance with the applicable technical regulations.

ATTENTION

Application of excessive torque will damage the connection terminals!

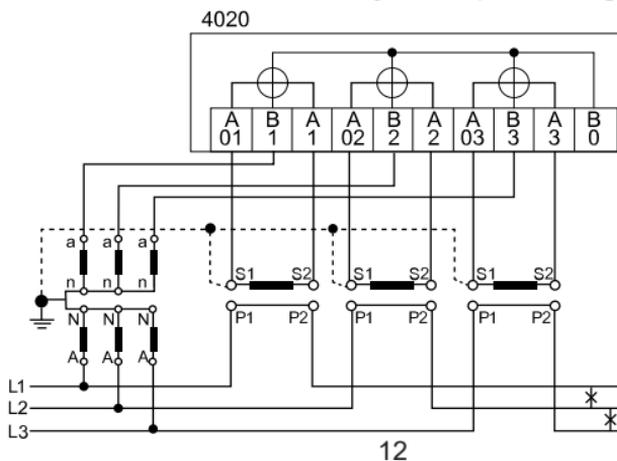
The appropriate torque is dependent on the type of connection line involved and its maximum current.

- Make sure that the screws of the connection terminals are undamaged and smooth-running before starting the screwing process.
- Tighten the connection terminals to the corresponding torque as per EN 60999-1.

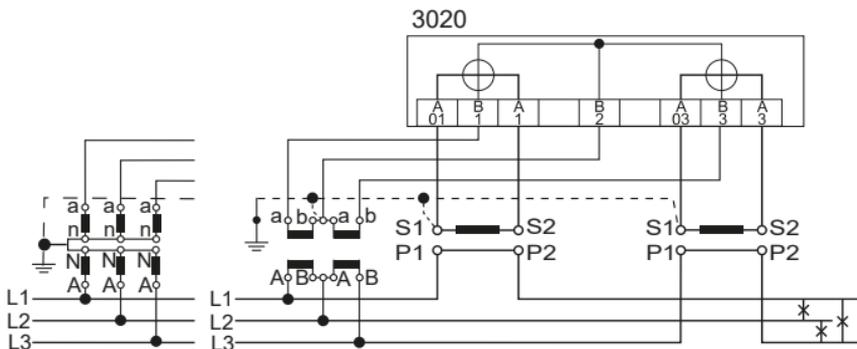
The valid connection diagram is located on the top of the meter as well as in the delivery documents.

Also refer to the chapter "Installation control register C.86.0 (optional)" on page 17.

Transformer connected meter for connection to current and voltage transformers in three-wire systems (measuring set type M2)



Transformer connected meter for connection to current and volt- age transformers in three-wire systems (Aron circuit, M7^{*)} left and M8 right)



*) The connection of the current transformers for M7 and M8 is identical.

The connections of the meter are on the back of the meter.

Variants for connection of the meter



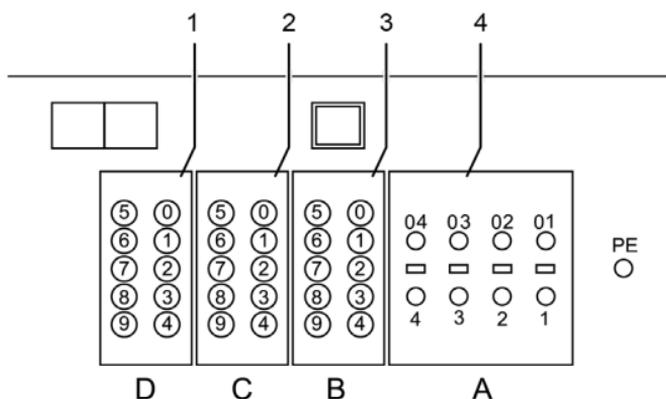
DANGER

Risk of fatal injury from excess voltages on the terminals of the current paths!

The voltages on the terminals of the current paths must not be higher than the rated voltages of the voltage circuits and not be higher than 300 V towards N. Excess voltages can lead to fires or electric shock.

Use the meter only with suitable current transformers to avoid exceeding the voltage limits. If necessary, the secondary side of the transformers must be earthed.

a) Meter with Essailec connection system



- 1 - Plug-in contacts for additional functions
- 2 - Plug-in contacts for additional functions
- 3 - Plug-in contacts for measuring voltage and auxiliary voltage
- 4 - Plug-in contacts for measuring current



DANGER

Risk of fatal injury in case of contact with live parts!

During installation of the Essailec connection system, it must be ensured that the PE connection (protective conductor) is connected first when the meter is plugged in, and that it is only removed during unplugging after the voltage connections have been disconnected.



With the Essailec connection system, the current paths are automatically short-circuited when the meter is pulled out of the plug-in unit frame. Therefore it is not necessary to short-circuit the current transformers beforehand.

The assignment of the Essailec connection system in the 19-inch installation frame must be made according to the circuit diagram of the meter. The contact assignment is variable and can be defined customer-specifically.

Example:

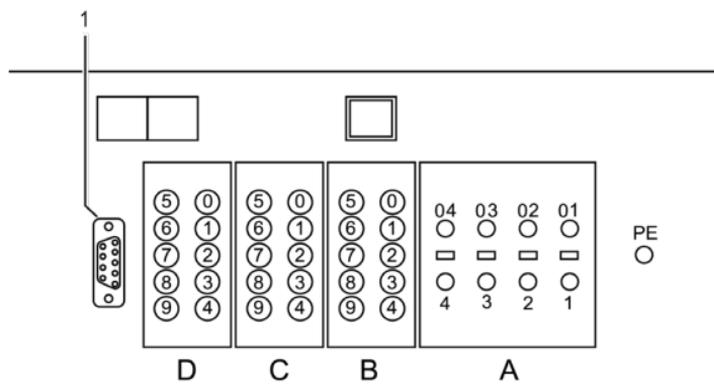
| Contact | Meaning |
|---------|-----------|
| D0 | RS485 B+ |
| D5 | RS485 A- |
| D1 | RS485 GND |
| D2 | S0- |
| D7 | S0+ |
| D4 | MPA+ |
| D9 | MPA- |

| Contact | Meaning |
|---------|-----------|
| C0 | A+ GND |
| C1 | A+ pulses |
| C3 | R+ pulses |
| C4 | R+ GND |
| C5 | A- pulses |
| C6 | A- GND |
| C8 | R- pulses |
| C9 | R- GND |

| Contact | Meaning |
|---------|-------------------|
| B0 | N = Neutral |
| B1 | Voltage phase 1 |
| B2 | Voltage phase 2 |
| B3 | Voltage phase 3 |
| B5 | Auxiliary voltage |
| B6 | Auxiliary voltage |

| Contact | Meaning |
|----------|-----------------|
| A1 - A01 | Current phase 1 |
| A2 - A02 | Current phase 2 |
| A3 - A03 | Current phase 3 |

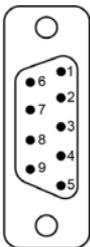
b) Meter with sub-D connector



1 - Sub-D9 connector: RS485 communication interface

The Essailec contact assignment is variable and can be defined customer-specifically as shown in the previous example.

The pin assignment of the sub-D connector is predetermined and cannot be modified:



| Contact | Meaning |
|---------|----------|
| 5 | GND |
| 3 | RS485 B+ |
| 8 | RS485 A- |

c) Meter with Phoenix screw-type terminals

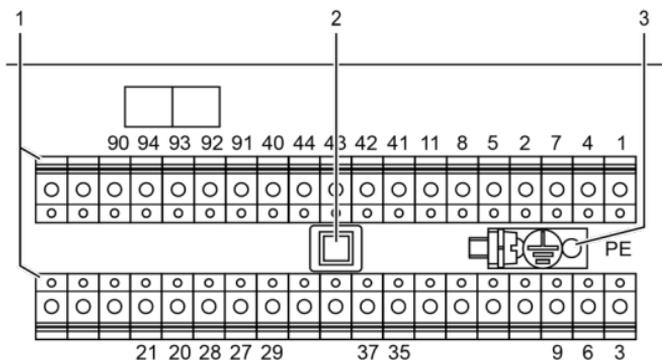
The cables are connected directly to the specified screw-type terminals. The torque is min. 0.6 Nm and max. 0.8 Nm.



DANGER

Risk of fatal injury in case of contact with live parts!

During installation, it must be ensured that the PE connection (protective conductor) is connected correctly.



- 1 - Connection terminals
- 2 - Fibre optic interface
- 3 - PE connection

The contact assignment is variable and can be defined customer-specifically.

Example:

| Contact | Meaning |
|---------|--------------------|
| 1 | Current phase 1 In |
| 4 | Current phase 2 In |
| 7 | Current phase 3 In |
| 2 | Voltage phase 1 |
| 5 | Voltage phase 2 |
| 8 | Voltage phase 3 |
| 11 | N = Neutral |
| 40 | GND pulses |
| 41 | A+ pulses |
| 42 | A- pulses |
| 43 | R+ pulses |
| 44 | R- pulses |

| Contact | Meaning |
|---------|---------------------|
| 3 | Current phase 1 Out |
| 6 | Current phase 2 Out |
| 9 | Current phase 3 Out |
| 20 | S0+ |
| 21 | S0- |
| 27 | RS485 A- |
| 28 | RS485 B+ |
| 29 | RS485 GND |
| 37 | MPA+ |
| 35 | MPA- |
| 90 | GND pulse inputs |
| 91 | Pulse input 1 |
| 92 | Pulse input 2 |
| 93 | Pulse input 3 |
| 94 | Pulse input 4 |

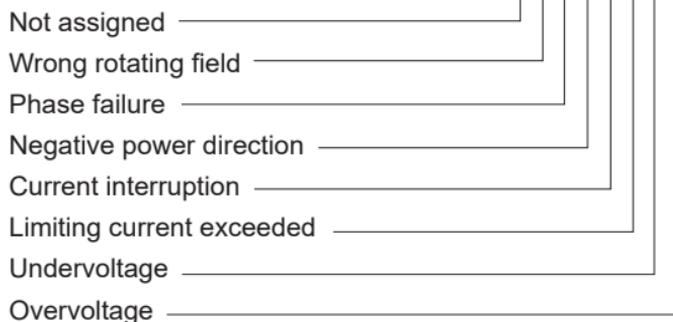
Installation control register C.86.0 (optional)

Installation errors are saved in the installation control register C.86.0. The register is displayed as standard on the alternating display on the display or output with the call-up list.

The installation control register has 32 error flags that are represented by an 8-digit HEX number. If the meter was installed without errors, the register contains the value "00000000".



C.86.0 (0 0 0 0 0 0 0)



| Event | Value | Meaning |
|--|-------|--------------------------------------|
| Wrong rotating field | 1 | Failure of neutral conductor |
| | 2 | Wrong rotating field |
| | 4 | Current imbalance, e.g. 30% |
| | 8 | Voltage imbalance, e.g. 18% |
| Phase failure | 1 | Phase failure L1 |
| | 2 | Phase failure L2 |
| | 4 | Phase failure L3 |
| | 8 | Failure of the external power supply |
| Negative power direction | 1 | Negative power direction L1 (P) |
| | 2 | Negative power direction L2 (P) |
| | 4 | Negative power direction L3 (P) |
| Current interruption | 1 | Current interruption L1 |
| | 2 | Current interruption L2 |
| | 4 | Current interruption L3 |
| Limiting current exceeded ($I > I_{max}$) | 1 | Limiting current exceeded L1 |
| | 2 | Limiting current exceeded L2 |
| | 4 | Limiting current exceeded L3 |

| Event | Value | Meaning |
|---------------------------|-------|-----------------|
| Undervoltage (U < 80%) | 1 | Undervoltage L1 |
| | 2 | Undervoltage L2 |
| | 4 | Undervoltage L3 |
| Overvoltage (U > 115%) | 1 | Overvoltage L1 |
| | 2 | Overvoltage L2 |
| | 4 | Overvoltage L3 |

Error register F.F

The meter has 32 error flags that are represented by an 8-digit HEX number. This register records the function errors of the meter. The output of the error register is performed via the display and one of the read-out lists.

In the event of an error (the display is not equal to 00000000), the meter data must no longer be used for billing purposes.



For more information about the error register, please see the product manual.



In the event of an error, please contact the manufacturer.

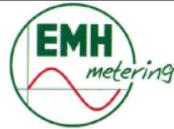
Abbreviations

| | |
|------------|--|
| Cl. | Accuracy class |
| D0 | Optical interface as per IEC 62056-21 |
| DIN | Deutsches Institut für Normung e.V. (German Standardisation Institute) |
| EN | European Norm |
| EVU | Utility company |
| I | Current |
| IEC | International Electrotechnical Commission |
| IP | Ingress Protection |
| IR | Infrared |
| L1, L2, L3 | External conductor |
| LC | Liquid Crystal |
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| N | Neutral conductor |
| OBIS | Object Identification System (code for identification of measurements/data) |
| OVC | Overvoltage category |
| P | Active power |
| +P | Positive active power (customer obtains from utility company) |
| -P | Negative active power (customer exports to utility company) |
| PTB | Physikalisch-Technische Bundesanstalt (National Metrology Institute of Germany) |
| Q | Reactive power |
| +Q | Positive reactive power |
| -Q | Negative reactive power |
| RTC | Real Time Clock |
| S0 | Interface as per IEC 62053-31 |
| SH | Selective main line protection |
| TAB | Technical connection specifications |
| U | Voltage |
| UC | Utilisation category |
| VDEW | Verband der Elektrizitätswirtschaft e.V. (Association of the Electricity Industry) |

EU Declaration of Conformity

EU-Konformitätserklärung

EU Declaration of Conformity



Der Hersteller

The manufacturer

EMH metering GmbH & Co. KG
Neu-Galliner Weg 1
19258 Gallin
GERMANY

erklärt hiermit in alleiniger Verantwortung, dass folgendes Produkt

declares under his sole responsibility that the following product

Produktbezeichnung: Elektrizitätszähler
Product designation: Electricity meter
Typenbezeichnung: XC-Rack-...
Type designation:

übereinstimmt mit den grundlegenden Anforderungen folgender EU-Richtlinien:

conforms to the essential requirements of the following EU directives:

| | | |
|------------|---|---------------------------------|
| 2014/32/EU | Messgeräte (MID) | EU Amtsblatt L 96 |
| 2014/32/EU | Measuring instruments (MID) | Official Journal of the EU L96 |
| 2014/30/EU | Elektromagnetische Verträglichkeit (EMV) | EU Amtsblatt L 96 |
| 2014/30/EU | Electromagnetic compatibility (EMC) | Official Journal of the EU L96 |
| 2011/65/EU | Beschränkung der Verwendung bestimmter gefährlicher Stoffe (RoHS) | EU Amtsblatt L 174 |
| 2011/65/EU | Restriction of the use of certain hazardous substances (RoHS) | Official Journal of the EU L174 |

Im Rahmen der MID wurde die Konformität des Baumusters (Modul B) festgestellt und

Within the MID the conformity of the type (annex B) was attested and

die Konformitätsbewertung wurde nach Modul D durch den Hersteller vorgenommen:

the conformity assessment was performed by manufacturer according to annex D:

| | Modul B (annex B) | Modul D (annex D) |
|--|-------------------|-------------------|
| Benannte Stelle (Name/Nummer): Notified body (name/number): | NMi/0122 | PTB/0102 |
| Zertifikats-Nummer: Certificate number: | T10068 | DE-M-AQ-PTB026 |

Es wurden die folgenden harmonisierten Normen und weitere technische Spezifikationen angewendet:

The following harmonized standards and other technical specifications were applied:

| MID: | EMV (EMC): | RoHS: |
|-----------------|------------------------------|-------------------|
| EN 50470-1:2006 | EN IEC 62053-21:2021+A1:2021 | EN IEC 63000:2018 |
| EN 50470-3:2006 | EN IEC 62053-22:2021+A1:2021 | |
| | EN IEC 62053-23:2021+A1:2021 | |
| | EN IEC 62053-24:2021+A1:2021 | |
| | EN 62053-24:2015+A1:2017 | |
| | EN 55032:2015+A11:2020 | |

Ort, Datum: Gallin, 02 JAN 2025
Place, Date:


Dipl.-Ing. Oliver Lütker
CTO (Chief Technology Officer)



You will find the current EU Declaration of Conformity on the internet site www.emh-metering.com in the "Products & Solutions" area in the product description for the meter.

As declarations of conformity may change based on applicable standards, we suggest saving the declaration of conformity that was available at the time of delivery.

