

## EMH metering

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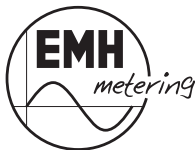
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# XC-RACK

## Digital 4-quadrant/combination meter

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## Scope of delivery

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 for your particular device.



More comprehensive information about the device is available in the product manual. Please also observe all the documents included with other components.

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## Target audience

These instructions are intended for technicians who are responsible for the installation, connection and servicing of the devices. The device may only be installed and started up by qualified electricians in accordance with the generally accepted technology standards and, where applicable, the definitive regulations governing the erection of communication equipment and terminal devices.

## Intended use

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

## Maintenance and warranty instructions

The device requires zero maintenance. It is not permitted to make any repairs in the event of any damage (e.g. due to transport, storage). If the device is opened, the warranty 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 information

### **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!

<b>Components</b>	<b>Waste collection and disposal</b>
Printed circuit boards	<b>Electronic waste:</b> Dispose of such waste in accordance with the local regulations.
LEDs, LC display	<b>Hazardous waste:</b> Dispose of such waste in accordance with the local regulations.
Metal parts	<b>Recyclable material:</b> Sort such material and send it for recycling.
Plastic parts	Send sorted plastic parts to a recycling plant (regranulation) or, where applicable, to a waste incineration plant (thermal energy generation).
Batteries	Take safety precautions against short circuits before disposing of the batteries. Dispose of the batteries in their original packaging or insulate the terminals. Do not dispose of batteries with the domestic waste; instead, observe the locally applicable waste and environmental protection standards.

## Basic safety instructions

Please adhere to the following basic safety instructions:

- Read 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 customary local 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 transport damage or other 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.
- Attach ferrules to flexible wires.
- 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, please see the enclosed document entitled “Notes on correctness of measurements for LZQJ-XC, DMTZ-XC and XC-RACK”.

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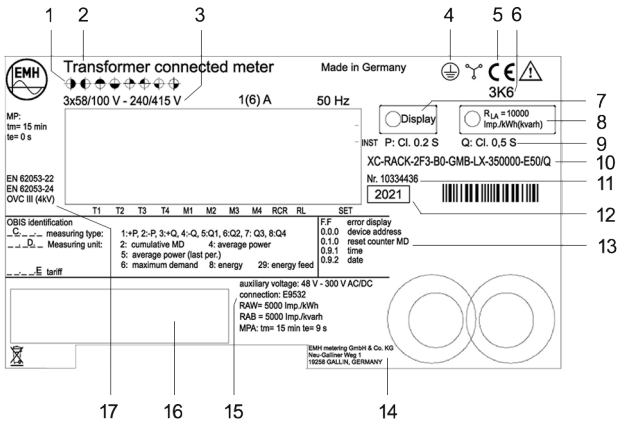
## Technical data

Voltage	4-conductor: 3 x 58/100 V, 3 x 230/400 V, 3 x 58/100 V – 240/415 V and others (see name plate) 3-conductor: 3 x 100 V and others (see name plate) 2-conductor: 100 V
Current	1 A, 1(2) A, 1(6) A, 5 A
Frequency	50 Hz, 16.7 Hz, 60Hz
Overvoltage category	OVC III (as per EN 62052-31)
Rated peak withstand voltage	4 kV (as per EN 62052-31)
Power consumption (per phase) (meter without data interfaces and without outputs)	Voltage circuit < 0.4 VA/< 0.2 W Voltage circuit without auxiliary voltage < 2.7 VA/< 1.6 W Current path < 0.008 VA Auxiliary voltage < 9 VA/< 4.8 W
Inputs S0	max. 1, max. 27 V DC, 27 mA (not potential-free)
Low voltage or system voltage	max. 8, 18...40 V DC max. 8, 58...240 V AC
Outputs Optocoupler MOSFET	max. 8, max. 250 V AC/DC, 100 mA (normally open contact)
Temperature range	Defined operating range: -25 °C...+55 °C Limit range for operation, storage and transport: -40 °C...+70 °C
Altitude	Operation up to 3,000 m
Humidity	Maximum 95%, non-condensing, as per EN 62052-11, EN 50740-1 and 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 50470-1, EN 62052-31).
Housing material	Aluminium alloy, polycarbonate, halogen-free
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 50470-1
Weight	Approx. 2.3 kg



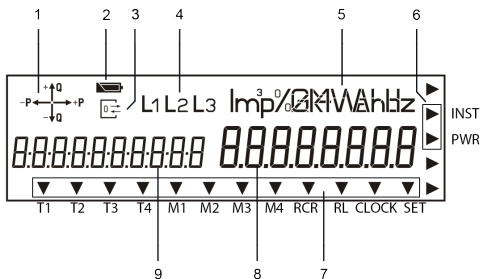
# Name plate



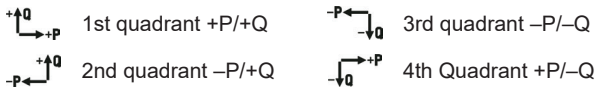
- 1 - Registered quadrants
- 2 - Type designation
- 3 - Voltage, current, frequency
- 4 - Safety and application information
- 5 - Conformity and certification marking
- 6 - Temperature class as per EN 60721-3-3
- 7 - Optical call sensor
- 8 - Test LED
- 9 - Accuracy class
- 10 - Type code
- 11 - Serial number
- 12 - Year of construction
- 13 - OBIS codes for the most important tabs
- 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 (supply/draw 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.:



- 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.

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- 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 on and off when the rotating field is wrong.
5. The **unit** shown matches the type of energy being measured or the measured value 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 tab.

**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 indexes are denoted on the name plate.

**M1 - M4** Tariff information for power. All activatable tariff indexes 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 on and off 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 the Set mode.

8. The **value area** displays the measured values.
9. The **OBIS code area** defines the measured values 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.

- 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 them again without being noticed.
- 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 immediate danger to the life or health of persons or cause any economic damage.
- To avoid any immediate hazards 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 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  $\leq 0.5 \text{ A}$  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.

## **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.

- Tighten the connection terminals to the corresponding torque as per EN 60999-1.

## **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 50470-1, EN 62052-31).



## **DANGER!**

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

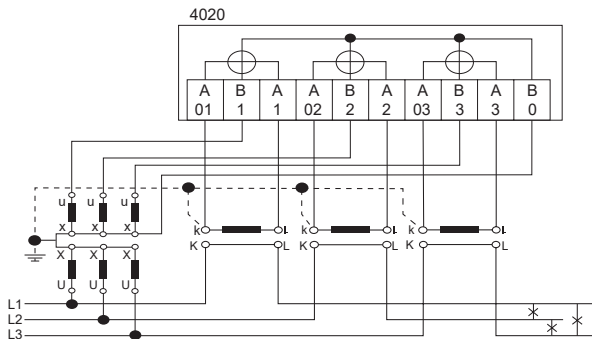
S0 inputs are not potential-free. Depending on the voltage version of the device, the S0 inputs are connected electronically internally with the measuring connections or with the auxiliary voltage and are therefore not potential-free.

- You must refer to the connection diagram.

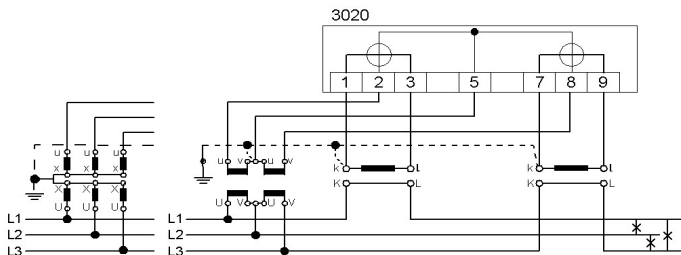
The valid connection diagram is located on the top of the meter as well as in the delivery documents.

Also refer to the chapter “Installation control tab C.86.0 (optional)” on page 18.

## Transformer connected meter for connection to current and voltage transformers in four-conductor systems



## Transformer connected meter for connection to current and voltage transformers in three-conductor systems (Aron circuit)



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

## Variants for meter connection

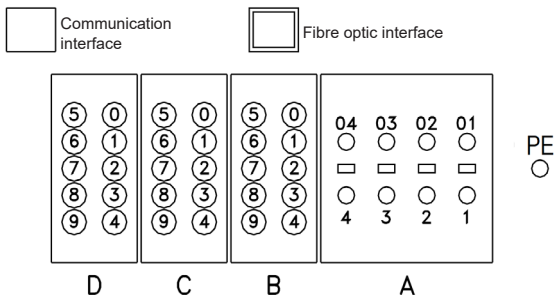
### **DANGER!**

**Danger to life due to 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



### **DANGER!**

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

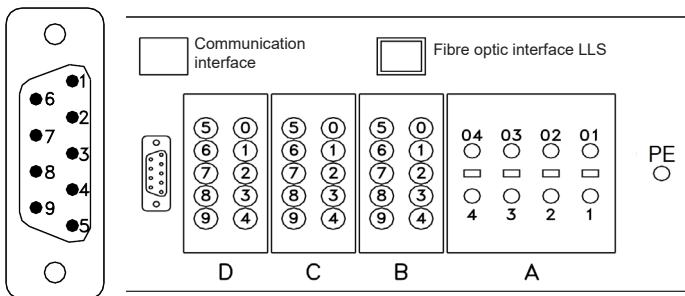
Contact	Meaning
D0	RS485 B+
D5	RS485 A-
D1	RS485 GND
D2	S0-
D7	S0+
D4	MPA+
D9	MPA-

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

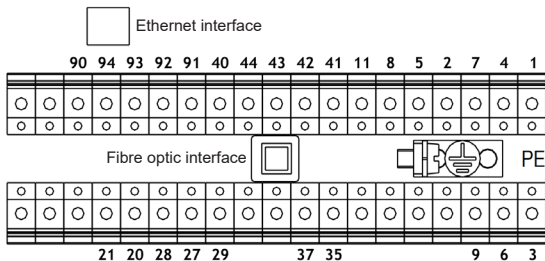
## b) Meter with sub-D connector



The Essaillec 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	GN D
3	RS485 B+
8	RS485 A-

## c) Meter with Phoenix screw-type terminals





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

## DANGER!

### **Risk of fatal injury from high voltage when power converters disconnected!**

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

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

## ATTENTION!

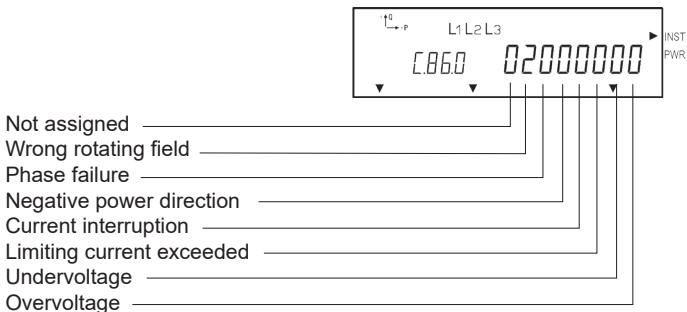
### **Application of excessive torque will damage the connection terminals!**

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

- Tighten the connection terminals with the corresponding torque as per DIN EN 60999 1.

## Installation control tab C.86.0 (optional)

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



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

Event	Value	Meaning
Limiting current exceeded ( $I > I_{max}$ )	1	Limiting current exceeded L1
	2	Limiting current exceeded L2
	4	Limiting current exceeded L3
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 tab F.F

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



## Deleting the error tab

The W5 write command "F.F()" is used to delete the error tab. This command can only be executed if the meter is in parametrisation mode. Once the command has been processed the parametrisation mode is switched off again.

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

## Abbreviations

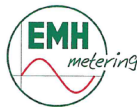
A	Active energy
+A	Positive active energy (customer obtains from utility company)
-A	Negative active energy (customer supplies to utility company)
Cl.	Accuracy class
COSEM	Companion Specification for Energy Metering
D0	Optical interface as per IEC 62056-21
DHCP	Dynamic Host Configuration Protocol (dynamic assignment of IP addresses)
DIN	Deutsches Institut für Normung e.V. (German Standardisation Institute)
DLMS	Device Language Message Specification
EEPROM	Electrical Erasable PROM
EMC	Electromagnetic compatibility
EN	European Norm
EVU	Utility company
FTP	File Transfer Protocol
GND	Reference potential (ground)
GPS	Global Positioning System
HDLC	High Level Data Link Control
HF	High Frequency
I	Current
IEC	International Electrotechnical Commission
IP	Ingress Protection
IPT	Internet Protocol Telemetry
ISO	International Standard Organisation
L1, L2, L3	External conductor
LC	Liquid Crystal
LED	Light Emitting Diode
LLS	Fibre optic interface
MID	Measurement Instruments Directive (EU)
N	Neutral conductor
OBIS	Object Identification System (code for identification of measurements/data)

OKK	Optical communication unit
OVC	Overvoltage category
P	Active power
+P	Positive active power (customer obtains from utility company)
-P	Negative active power (customer supplies to utility company)
PE	Protective Earth
PTB	Physikalisch-Technische Bundesanstalt (National Metrology Institute of Germany)
Q	Reactive power
+Q	Positive reactive power
-Q	Negative reactive power
R	Reactive energy
+R	Positive reactive energy
-R	Negative reactive energy
RAM	Random Access Memory
RJ	Registered Jack
RTC	Real Time Clock
S	Apparent power
+S	Positive apparent power
-S	Negative apparent power
S0	Interface as per IEC 62053-31
SMTP	Simple Mail Transfer Protocol
TCP	Transmission Control Protocol
THD	Total Harmonic Distortion
U	Voltage
USB	Universal Serial Bus
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V. (Association for Electrical, Electronic & Information Technologies)
VDEW	Verband der Elektrizitätswirtschaft e.V. (Association of the Electricity Industry)
ZVEI	Zentralverband Elektrotechnik- und Elektroindustrie (German Electrical and Electronic Manufacturers' Association)

# EU Declaration of Conformity

## EU-Konformitätserklärung

EU Declaration of Conformity



### Der Hersteller

The manufacturer

EMH metering GmbH & Co. KG  
Nau-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 angewendet:

The following harmonized standards were applied:

MID:	EMV (EMC):	RoHS:
EN 50470-1:2006	EN 62052-11:2003+A1:2017	EN IEC 63000:2018
EN 50470-3:2006	EN 62053-22:2003+A1:2017	
	EN 62053-23:2003+A1:2017	
	EN 62053-24:2015+A1:2017	
	EN 55032:2012/AC:2013	
	EN 55024:2010	

Ort, Datum: Gallin, 17 NOV 2020

Place, Date:

Dipl.-Ing. Norbert Malek

Geschäftsführer  
Managing director



The current EN Declaration of Conformity is available on the internet site [www.emh-metering.com](http://www.emh-metering.com) in the "Products" area for the meter's product description.



