

User manual – PRO380-Eichrecht



PRO380-Eichrecht

User manual | Version 1.45

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Index

INDEX	2
1 SAFETY INSTRUCTIONS	3
2 FOREWORD	5
3 CERTIFICATES	6
4 SPECIFICATIONS	7
4.1 SPECIFICATIONS	7
4.2 PERFORMANCE CRITERIA	7
4.3 TORQUE SPEC.	7
4.4 BASIC ERRORS	8
4.5 RS485 COMMUNICATION SPECIFICATIONS	8
4.6 DIMENSIONS	8
4.7 CONNECTION DIAGRAM	9
4.8 NAMEPLATE PRINTING	9
4.9 SEALING OF THE METER	10
4.10 MEASUREMENT CORRECTNESS NOTE	11
5 INSTALLATION	13
6 OPERATION	14
6.1 DISPLAY INFORMATION	14
6.2 STARTUP SCREENS	14
7 COMBINATION CODE	15
8 TROUBLESHOOTING	17
8.1 ERROR/DIAGNOSTIC DISPLAY	17
9 MODBUS RS485	18
9.1 REGISTER MAP	18
9.2 LCD DISPLAY MODBUS ERROR CODES	24
9.3 AVAILABLE CHARACTERS ON LCD	24
10 PRO380-EICHRECHT CONFIGURATOR	25
10.1 CONNECTION PROPERTIES	26
10.2 ACTIONS	26
10.3 LOGBOOK	30

1 Safety instructions

Information for your own safety

This manual does not contain all of the safety measures for operation of this meter because special operating conditions, local code requirements or local regulations may necessitate further measures. However, it does contain information which must be adhered to for your own personal safety and to avoid material damage. This information is highlighted by a warning triangle with an exclamation mark or a lightning bolt depending on the degree of actual or potential danger:



Warning: This means that failure to observe the instruction can result in death, serious injury or considerable material damage.



Caution: This means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

Qualified personnel

Installation and operation of the device described in this manual may only be performed by qualified personnel. Only people that are authorised to install, connect and use this device, who have the proper knowledge about labelling and grounding electrical equipment and circuits and can do so in accordance with local (safety) regulations, are considered qualified personnel in this manual.

Use for the intended purpose

This device may only be used for the application cases specified in the catalogue and the user manual and only in connection with devices and components recommended and approved by **inepro Metering B.V.**

Proper handling

The prerequisites for perfect, reliable operation of the product are proper transport, storage, installation and connection, as well as proper operation and maintenance. During its operation certain parts of the meter might carry dangerous voltages.

- Only use insulated tools suitable for the voltages this meter is used for.
- Do not connect while the circuit is connected to a power or current source.
- Only place the meter in a dry environment.
- The meter is intended to be installed in a Mechanical Environment 'M1', with Shock and Vibrations of low significance and Electromagnetic Environment 'E2', as per 2014/32/EC Directive. The meter is intended for indoor use. The meter shall be installed inside a suitable IP rated enclosure, in accordance with local codes and regulations.
- Do not mount the meter in an explosive area or exposed to dust, mildew and/or insects.
- Make sure the used wires are suitable for the maximum current of this meter.
- Make sure the AC wires are connected correctly before activating the current/voltage to the meter.
- Do not touch the meter's connection clamps directly with your bare hands, with metal, blank wire or other conducting material as you will risk an electric shock that could cause possible injury, serious injury or death.
- Make sure the protection covers are replaced after installation.
- Maintenance and repair of the meter should only be carried out by qualified personnel.
- Never break any seals (if present on this meter) to open the front cover as this might influence the functionality or accuracy of the meter, and will void all warranty.
- Do not drop, or allow physical impact to the meter as there are high precision components inside that may break and affect the meter measurement negatively.
- All clamps should be properly tightened.

- Make sure the wires fit properly in the connection clamps.
- If the wires are too thin it will cause a bad contact which can spark causing damage to the meter and its surroundings.
- If the product has become wet we advise to send back the product and let the manufacturer evaluate the product to see if it is still safe to use or not. Do not install products that have been wet.
- If the product has been dropped from more than 1 meter high on a concrete floor and no obvious damage is visual we advise to send back the product and let the manufacturer evaluate the product to see if it is still safe to use or not.
- Do not install products that have fallen from >1M height on concrete surfaces
- Do not install in explosive atmospheres.
- Do not clean the meter with water or other liquids. If desired, the meter can be scrubbed clean with a rag. If there are still residues of dirt that you would like to have removed, please contact your supplier.

Exclusion of liability

We have checked the contents of this manual and every effort has been made to ensure that the descriptions are as accurate as possible. However, deviations from the description cannot be completely ruled out, so that no liability can be accepted for any errors or omissions in the information given. The data in this manual are checked regularly and the necessary corrections will be included in subsequent editions. If you have any suggestions, please do not hesitate to contact us.

Subject to technical modifications without notice.

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2 Foreword

Thank you for purchasing this energy meter. **inepro** Metering has a wide product range of devices. We have introduced a large number of energy meters on the market suitable for AC and DC. For more information on other products please contact our sales department at sales@ineprometering.com or visit our website at www.ineprometering.com.

This meter is approved as an active energy meter measurement instrument according to MID, MesseV and the Safety Standard. Also the software updates according to MessEG MessEv including Logbook as well as the cryptographic transmission of measurement data (as a OCMF) has been scope of the certification.

Although we produce this device according to international standards and our quality inspection is very accurate it's still possible that this device shows a defect or failure for which we do apologise. Under normal conditions your product should give you years of trouble-free operation. In case there is a problem with the energy meter you should contact your distributor immediately. Our energy meters are sealed with a special seal. Once this seal is broken there is no possibility to claim any warranty. Therefore, NEVER open an energy meter or break the seal of the device. The limited warranty is 5 years after production date.

3 Certificates



EU-Baumusterprüfbescheinigung
EU-type examination certificate

gemäß: Anhang II Modul B der Richtlinie 2014/32/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 (ABl. L 096 S. 149)
In accordance with: Annex II Module B of Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014

Nr. / No.: DE CSA 24 B 006 MI-003, Revision 0

Ausgestellt für / Issued to:
Inepro Metering BV
Pondweg 7, 2153PK Nieuw-Vennep
Netherlands

Geräteart: Elektricitätszähler für Wirkverbrauch
Type: Active electrical energy meter

Produktfamilie: PRO380
Product: 0340-DZT

Typenbezeichnung: PRO380-MID40, 0340-DZT-MID40
Type Code: PRO380-Eichrecht, 0340-DZT-Eichrecht

Objektbeschreibung: Drehstrom- und Wechselstromzähler
2L-, und 4L-Anschluss direkt / LCD-Display
three and single phase watt hour meter
Properties: 2W-, and 4W-connection direct / LCD-display

Auftrags Nr.: 80184045-00 Rev_0
Order No.:
gültig bis: 03.10.2034
valid until:

Notifizierte Stelle
Named authority
Registrierungsnummer
Registration Number
1948

Prüfgrundlagen: EN 50470-1: 2006+A1:2018
Testing requirements: EN 50470-3: 2006+A1:2018

Rechtsbezug: Richtlinie 2014/32/EU des Europäischen Parlaments und des Rates vom 26.2.2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Messgeräten auf dem Markt (Abi. L 96 S. 149), umgesetzt durch die Verordnung über das Inverkehrbringen und die Bereitstellung von Messgeräten auf dem Markt sowie ihre Verwendung und Eichung, veröffentlicht in BGBl I 2014 Nr. 58 S. 2010.
Legal reference: Directive 2014/32/EU of the European Parliament and the European Council from 26.2.2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (Abi. L 96 S. 149), implemented with the "Mess- und Eichverordnung" from 11.12.2014 (BGBl. I 2014 Nr. 58 S. 2010).

Datum / date: 04.10.2024


Thomas Weise
Leiter der Zertifizierungsstelle


Deutsche
Akreditierungsstelle
D-20 13559-05 40

EU-Baumusterprüfbescheinigungen ohne Unterschrift haben keine Gültigkeit. Dieses Zertifikat und Anlagen dürfen nur unverändert weiterverbreitet werden. Auszüge bedürfen der Genehmigung der CSA Group Bayern GmbH.
EU-type examination certificates without signature are not valid. This certificate and its appendix are allowed to dispatch only without any changes. The use of extracts needs the authorization of CSA Group Bayern GmbH.

CSA Group Bayern GmbH is Notified Body in accordance with Directive 2014/32/EU
File: CSA_B_F50_15_Rev13_0



Baumusterprüfbescheinigung
type examination certificate

gemäß: Anlage 4 Modul B der Mess- und Eichverordnung vom 11.12.2014
In accordance with: Annex 4 Module B of the Measures and Verification Ordinance dated 11.12.2014

Nr. / No.: DE CSA 24 B 013 M, Revision 1

Ausgestellt für:
Issued to:
Inepro Metering BV
Pondweg 7, 2153PK Nieuw-Vennep
Netherlands

Geräteart: 6.6 ZE: integriert angeordnete
Type: Zusatzeinrichtung für Elektricitätsmessgeräte

Typenbezeichnung: PRO380-Eichrecht
Type Code: 0340-DZT-Eichrecht

Objektbeschreibung: Drehstromzähler
4L-Anschluss direkt / LCD-Display
Three phase watt hour meter
Properties: 4W-connection direct / LCD-display

Auftrags Nr.: 80184051-00 Rev_1
Order No.:
gültig bis: 03.10.2034
valid until:

Notifizierte Stelle
Named authority
Registrierungsnummer
Registration Number
1948

Prüfgrundlagen: PTB-A20.1 / PTB-A50.7
Testing requirements:

Rechtsbezug: Mess- und Eichgesetz vom 31. Juli 2013
Legal reference: Verordnung über das Inverkehrbringen und die Bereitstellung von Messgeräten auf dem Markt, Veröffentlicht in BGBl am 11.12.2014

Datum / date: 29.10.2024


Thomas Weise
Leiter der Zertifizierungsstelle


Deutsche
Akreditierungsstelle
D-20 13559-05 40

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Type examination certificates without signature are not valid. This certificate and its appendix are allowed to dispatch only without any changes. The use of extracts needs the authorization of CSA Group Bayern GmbH.

CSA Group Bayern GmbH is Notified Body in accordance with MessEV/MessEG
File: CSA_B_F50_41_Rev5_0



Declaration of Conformity

MID

Manufacturer:
inepro Metering B.V.
Pondweg 7
2153 PK Nieuw-Vennep
The Netherlands

Ensure and declare under our sole responsibility that the products:
PRO380-Eichrecht
Static Active Electrical Energy Meter
230/400V, 5(40)A, 50Hz, 10.000/kWh (direct)

Is in conformity with the type as described in the EU-TEC:
DE CSA 24 B 006 MI-003

References to the standards or normative documents used in relation to which this declaration is declared:
2014/32/EU

Testing requirements:
EN 50470-1: 2006+A1:2018
EN 50470-3: 2006+A1:2018

The following legal provisions were applied:
Directive 2014/32EU of the European Parliament and the European Council from 26.2.2014 on the harmonization of the laws of the Member States relating to the making available on the market of measuring instruments, together with Annex I - Essential Requirements and Annex V - Active Electrical Energy Meters (MI-003)

The approved body CSA Group, NB number 1948, performed type approval and issued the Module D certificate:
DE CSA 24 D 01

Signed for and on behalf of
inepro Metering B.V.
Nieuw-Vennep, The Netherlands, 2025-06-26
D. van Elk
Manager R&D



MessEV

Manufacturer:
inepro Metering B.V.
Pondweg 7
2153 PK Nieuw-Vennep
The Netherlands

Ensure and declare under our sole responsibility that the products:
PRO380-Eichrecht
Static Active Electrical Energy Meter
230/400V, 5(40)A, 50Hz, 10.000/kWh (direct)

Is in conformity with the type as described in the EU-TEC:
DE CSA 24 B 013 M

References to the standards or normative documents used in relation to which this declaration is declared:
PTB-A20.1 / PTB-A50.7

The following legal provisions apply:
§6 of the Measurement and Verification Act of 25.07.2013 (BGBl. I p. 2722) in the version currently in force in conjunction with §7 of the Measurement and Verification Ordinance of 11.12.2014 (BGBl. I p. 2010) in the current version

For the devices, the following technical specifications are used:
- PTB-Anforderungen an Elektrizitätszähler [PTB-A 20.1] vom Dezember 2003
- PTB-Anforderungen an elektronische und softwaregesteuerte, Messgeräte und Zusatzeinrichtungen für Elektrizität, Gas, Wasser und Wärme [PTB-A 50.7] vom April 2002

The approved body CSA Group, NB number 1948, performed type approval and issued the Module D certificate:
DE CSA 24 D 01

Signed for and on behalf of
inepro Metering B.V.
Nieuw-Vennep, The Netherlands, 2025-06-26
D. van Elk
Manager R&D



4 Specifications

4.1 Specifications

Product name	PRO380-Eichrecht
Direct connected	Yes
Casing	PC flame resistant plastic
Flammability class	VO
Voltage Un	3x230/400V (AC)
Maximum current (Imax)	40A
Minimum current (Imin)	0.25A
Reference current	5A
Grid frequency	50Hz
LED constant	10,000imp/kWh
Display	LCD, segment (6+3)
Backlight	White backlight
Refresh rate instantaneous values	Modbus configurable: 50ms, 100ms, 300ms & 600ms LCD interval: 1000ms
Reference to standard	EN62052-31
Rated impulse voltage	6kV R1
Internal power consumption	<2W per phase / <10VA per phase

4.2 Performance criteria

Operation humidity	≤ 75%
Storage humidity	≤ 95%
Accuracy class active energy (EN50470-3)	B
Accuracy class active energy (EN62053-21)	1
Accuracy class reactive energy (EN62053-23)	2
Utilization category	UC1
IP class	The meter needs to be installed in an IP51 approved enclosure
Protective class	II
Installation mode	DIN rail
Connection	Screw clamp
Communication	RS485 Modbus RTU
Operating temperature	-40°C - +70°C
Storage temperature	-40°C - +70°C

4.3 Torque spec.

Phase wire terminal:

Min. wire size flex core	(mm ²)	-	2.5
Max. wire size flex core	(mm ²)	-	2.5
Min. wire size solid core	(mm ²)	-	25
Max. wire size solid core	(mm ²)	-	35
Torque	(N.m.)	-	2.3

Neutral wire terminal:

Min. wire size flex core	(mm ²)	-	2.5
Max. wire size flex core	(mm ²)	-	2.5
Min. wire size solid core	(mm ²)	-	25
Max. wire size solid core	(mm ²)	-	35
Torque	(N.m.)	-	2.3

Auxiliary wire terminal:

Min. wire size flex core	(mm ²)	-	0.5
Max. wire size flex core	(mm ²)	-	0.5
Min. wire size solid core	(mm ²)	-	1.5
Max. wire size solid core	(mm ²)	-	2.5
Torque	(N.m.)	-	0.2

4.4 Basic errors

0.02 In	±1.5 %
0.05 In -Imax	±1.0 %

4.5 RS485 communication specifications

Bus Type	RS485
Protocol	MODBUS RTU with 16 bit CRC
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity	EVEN, NONE, ODD
Address range	0-247 user settable
Maximum bus load	31 meters per bus*
Range	≤1000m

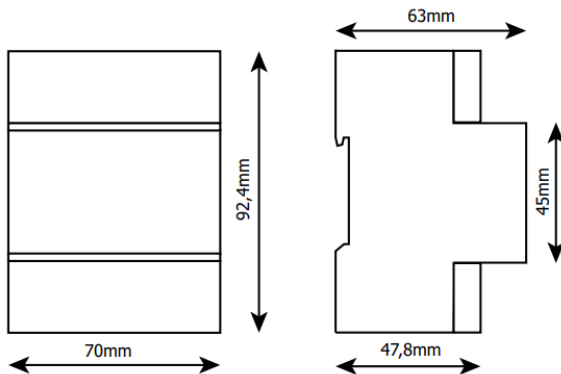
*Note that the maximum number of meters is dependent on the converter, Baud rate (the higher the Baud rate, the smaller the number of meters which can be used) and the circumstances under which the meters are installed.

Default settings

Modbus address	001
Baud rate	9600
Parity	EVEN

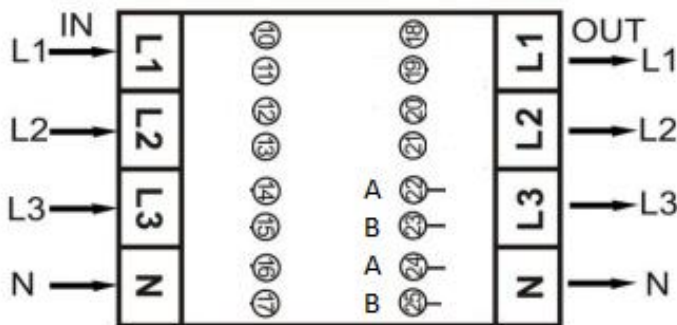
4.6 Dimensions

Height	92.4	mm
Width	70	mm
Depth	63	mm
Weight	0.39	kg
Max. diameter power connection clamps	25	mm ²
	35	mm ²



4.7 Connection diagram

PRO380-Eichrecht Direct connected – 3P4W



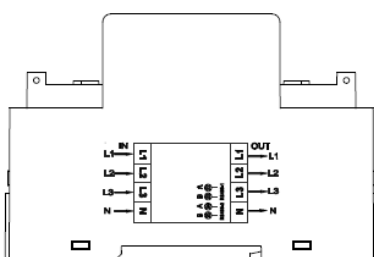
L1 (in) Phase 1 input	-	L1 (out) Phase 1 output
L2 (in) Phase 2 input	-	L2 (out) Phase 2 output
L3 (in) Phase 3 input	-	L3 (out) Phase 3 output
N (in) Neutral input	-	N (out) neutral output

22/23 RS485-1 A/B	-	Modbus communication contact (Primary)
24/25 RS485-2 A/B	-	Modbus communication contact (Secondary, read-only)

4.8 Nameplate printing

The meter has 3 nameplate parts

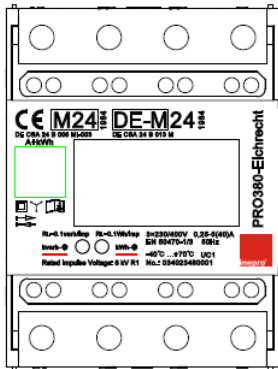
Part 1



Connection diagram

Subject to change without notice

Part 2



MID certificate number
MessEV certificate number
CE and Metrology marking
Product name
Temperature range, frequency, voltage and current range
QR code
Serial number

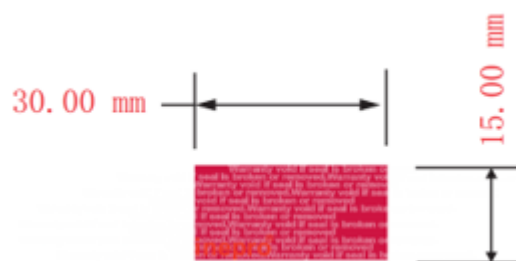
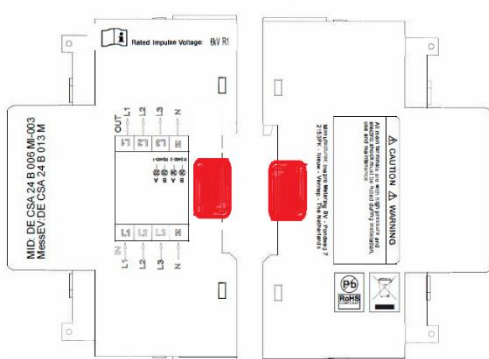
Part 3



Address manufacturer

4.9 Sealing of the meter

The meter has 2 seals to close the casing.



Subject to change without notice

4.10 Measurement correctness note

Requirements for the user within the meaning of §23 of the Measurement and Verification Ordinance

The Measurement and Verification Ordinance obliges those who are users of a measuring instrument within the meaning of the calibration law to measure and to handle measuring instruments in such a way that the correctness of the measurement is guaranteed.

Users within the meaning of the calibration law, taking into account the regulation of market roles by the Metering Point Operation Act, are:

Meter users:

Meter users are the metering point operators within the meaning of the Metering Point Operation Act.

Measured value users:

Measured value users are those who, within the meaning of the Metering Point Operation Act, carry out measurements and pass on measured values to authorised third parties, as well as carry out billing for grid use and energy supply.

The task of measuring instrument users is to provide the users of measured values with the opportunity to inform themselves about the requirements explained below.

Transparency of use

The metered value user must make the calculation of the invoiced work and, if applicable, performance values transparent to the electricity customers for whom the devices are used. "Making transparent" means using information to create the conditions for electricity customers to be able to understand the origin of the bill items in the electricity bill with the help of displays of the devices they use in accordance with calibration law. In particular, information must also be provided on the following:

- Which of the values displayed by the devices may be used for billing purposes at all,
- That values that are not displayed cannot be used for billing purposes and that displayed values that are the results of functions that are not relevant under calibration law are of a purely informative nature and cannot be used for billing purposes either.

Incidentally, the measuring devices must be used in such a way that the measurement results relevant to billing and the error messages can also be read by electricity customers.

In addition, an exception applies in the case of use in a charging facility. Here, not all data relevant to calibration law is shown on the display of the meter. The data not displayed on the meter must be cryptologically secured in accordance with PTB requirements 50.7, main part, Appendix 1 and Appendix 2 and a remote display must be provided for this purpose.

Use of communication interfaces

The signed data telegrams relevant to calibration law are sent via the bidirectional RS485 data interface.

Measurement results that may not be used for billing purposes

Measured values other than those specified in the type examination certificate may not be used for billing purposes.

Logbook function

The meters always have a calibration logbook that records changes to the firmware relevant to calibration law and can only be deleted in violation of a manufacturer's access protection.

Entitlement to invoice verification software program for measured value users and customers (display software)

This requirement is fulfilled if display software approved by the competent notified body for module B is used for reading and signature verification. This display software is provided by the manufacturer of the charging device that complies with calibration law. The display software thus performs tasks relevant to calibration law.

The electricity customer must be informed of the entitlement to this software by the manufacturer of the charging device that complies with calibration law with the meters mentioned and installed here.

Reason: The software implements functions that are implemented in conventional meters in the device and perform tasks relevant to calibration law. In particular, these are the verification of the integrity and authenticity of read measured value data sets.

Transmission

The user of the measured values or a third party commissioned by him actively makes the measured values determined with the meters available to the authorised end consumer.

To prove the complete recording and provision of measured value data sets for billing purposes, a data record format, which is described in the accompanying documents, is provided.

The meters output the measured data set in the OCMF (Open Charge Metering Format) data format.

In the case of end consumers who do not have access to a suitable remote display device with the display software, the meters cannot be used for a billing method in accordance with PTB-A 50.7, 3.1.1.3 B).

5 Installation



Caution

- Turn off and if possible lock all sources supplying the energy meter and the equipment that is connected to it before working on it.
- Always use a properly rated voltage sensing device to confirm that power is off.



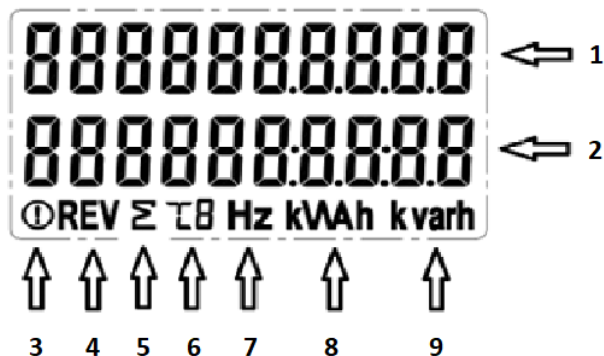
Warning

- The installation should be performed by qualified personnel familiar with applicable codes and regulations.
- Use insulated tools to install the device.
- A fuse, thermal cut-off or single-pole circuit breaker should be fitted on the supply line and not on the neutral line.
- The connecting wire, connecting the device to the outside circuit, should be sized in accordance with local regulations for the maximum amount of the current breaker or other overcurrent protection devices used in the circuit.
- An external switch or a circuit-breaker should be installed on the supply wires, which will be used to disconnect the meter and the device supplying energy. It is recommended that this switch or circuit-breaker is placed near the meter because that is more convenient for the operator. The switch or circuit-breaker should comply with the specifications of the building's electrical design and all local regulations.
- An external fuse or thermal cut-off used as an overcurrent protection device for the meter must be installed on the supply side wires. It's recommended that this protection device is also placed near the meter for the convenience of the operator. The overcurrent protection device should comply with the specifications of the building's electrical design and all local regulations.
- This meter can be installed indoor, or outdoor enclosed in a meter box which is sufficiently protected, in accordance with local codes and regulations.
- To prevent tampering, an enclosure with a lock or a similar device can be used.
- The meter has to be installed against a fire resistant wall.
- The meter has to be installed in a well-ventilated and dry place.
- The meter has to be installed in a protective box if the meter is exposed to dust or other contaminants.
- The meter can be installed and used after being tested and can be sealed afterwards.
- The device can be installed on a 35mm DIN rail.
- The meter should be installed on a location where the meter can be read easily.
- In case the meter is installed in an area with frequent surges for example due to thunderstorms, welding machines, inverters etc., the meter is required to be protected with a Surge Protection Device.
- The device should be sealed immediately after installing it in order to prevent tampering.
- Make sure that after wiring the auxiliary terminals the insulation between the RS485 and live circuits remains sufficient (rated impulse voltage: 6kV R1).

6 Operation

6.1 Display information

The energy meter has a LCD display with following layout.



- 1= Measurement quantity
- 2= Measurement value
- 3= When visible, readings are not MID relevant
- 4= Reverse indicator, when visible, display value represents reverse energy direction
- 5= Summation sign, when visible, display value represents total energy
- 6= Tariff/fase indication
- 7= Hz unit display
- 8= kWh/kW/VA/V/A unit display
- 9= kvarh/kvar unit display

6.2 Startup screens



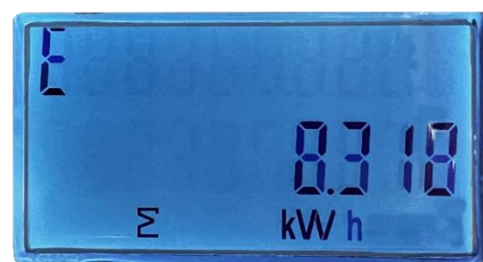
C = Com firmware version



= Not MID relevant



F = Mid firmware version



E = Active energy



= summation sign

kWh = Unit

7 Combination code

The meter allows you to display the total energy (usage) shown on the display in accordance to different calculation methods.

The calculation method is configured in the 'Combination code' Modbus register (0x400f).

Available options:

1. Combination code 1 = Forward only



Total active energy



Forward active energy



Reverse active energy



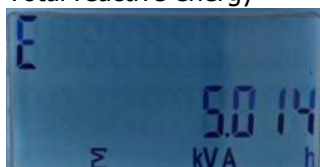
Total reactive energy



Forward reactive energy



Reverse reactive energy



Total apparent energy

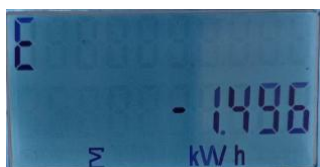


Forward apparent energy



Reverse apparent energy

2. Combination code 2 = Reverse only



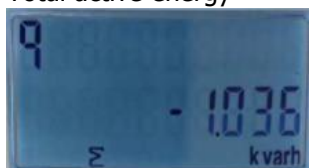
Total active energy



Forward active energy



Reverse active energy



Total reactive energy



Forward reactive energy



Reverse reactive energy



Total apparent energy



Forward apparent energy



Reverse apparent energy

3. Combination code 3 = Forward + Reverse



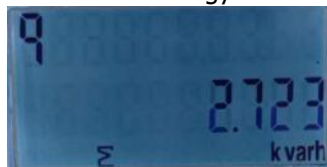
Total active energy



Forward active energy



Reverse active energy



Total reactive energy



Forward reactive energy



Reverse reactive energy



Total apparent energy



Forward apparent energy



Reverse apparent energy

4. Combination code 4 = Forward – Reverse



Total active energy



Forward active energy



Reverse active energy



Total reactive energy



Forward reactive energy



Reverse reactive energy



Total apparent energy



Forward apparent energy



Reverse apparent energy

8 Troubleshooting

	Caution
- During repair and maintenance, do not touch the meter connecting clamps directly with your bare hands, with metal, blank wire or other conducting material as that will cause an electric shock and possibly cause injury, serious injury or even death. - Turn off and if possible lock all sources supplying the energy meter and the equipment that is connected to it before opening the protection cover and working on it. - Turn off and lock all power supply to the energy meter and the equipment to which it is installed before opening the protection cover to prevent the hazard of electric shock.	
	Warning
- Maintenance or repair should only be performed by qualified personnel familiar with applicable codes and regulations. - Use insulated tools to maintain or repair the meter. - Make sure the protection cover is in place after maintenance or repair. - The case is sealed, failure to observe this instruction can result in damage to the meter	

Problem	Possible cause	Check/solution
The red consumption LED is not flashing (PULSE LED).	There is no load connected to the meter. The load on the line is very low.	Connect a load to the meter. Check with an Ohm-meter if the load value is very low.
The register doesn't count.	There is almost no load connected to the meter.	Check if the red consumption LED is flashing.
If none of the above works, please contact technical support		

8.1 Error/Diagnostic display

For questions about one of our products please contact:

- Your local **inepro** Metering distributor
- Email: support@ineprometering.com
- Website: www.ineprometering.com

9 Modbus RS485

9.1 Register map

0x4XXX = status, info, settings

0x5XXX = instant values

0x6XXXX = energy values

Holding register address (hex)	number of registers	description	read/write	type	details
0x4000	2	Serial number	R	packed BCD	last 8 digits of the device serial number, e.g. 24011234
0x4003	1	Modbus ID	R/W	INT16	Modbus RTU device address (1-247)
0x4002	1	Meter code	R	INT16	TODO
0x4004	1	Baud Rate	R/W	INT16	3=1200, 4=2400, 5=4800, 6=9600, 7=19200, 8=38400, 9=57600, 10=115200
0x4005	2	Protocol Version	R	FLOAT32	COM software version (e.g. 1.0)
0x4007	2	Software Version	R	FLOAT32	MID software version (e.g. 1.0)
0x4009	2	Hardware Version	R	FLOAT32	Hardware version (e.g. 1.0)
0x400b	1	Meter amps	R	INT16	Imax (e.g. 40A)
0x400c	1	CT ratio	R	INT16	not used
0x400d	2	S0 output rate	R	FLOAT32	not used
0x400f	1	Combination code	R/W	INT16	
0x4010	1	LCD cycle time	R/W	INT16	
0x4011	1	Parity setting	R/W	INT16	1=EVEN, 2=NONE, 3=ODD
0x4012	1	Phase direction	R	ASCII	1F / 1R
0x4013	1	Phase direction	R	ASCII	2F / 2R
0x4014	1	Phase direction	R	ASCII	3F / 3R
0x4015	1	Error code	R	INT16	error bitfield, 0x0200 = provisioning data error, 0x0100 = firmware CRC error,
					0x0008 = measurement hardware error, 0x0080 = production not marked completed,
					0x0010 = meter failed to calibrate successfully, 0x0004 = EEPROM data corruption
					, 0x0002 = EEPROM communication error, 0x0001 = MID firmware CRC error

0x4016	1	Power on off counter	R/W	INT16	Power cycle counter, write 0 to clear
0x4017	1	Total 4Q	R	INT16	power quadrant (1-4)
0x4018	1	L1 4Q	R	INT16	power quadrant (1-4)
0x4019	1	L2 4Q	R	INT16	power quadrant (1-4)
0x401a	1	L3 4Q	R	INT16	power quadrant (1-4)
0x401b	2	Checksum	R	INT32	Part F (a.k.a. MID) software checksum
0x401d	2	Active status word	R	INT32	not used
0x401f	2	CT ratio	R	INT32	not used
0x4023	2	Checksum 2	R	INT32	Part C (a.k.a. COM) software checksum
0x4025	1	Product id	R	packed BCD	first 4 digits of serialnumber (i.e. 0340)
0x4026	1	Energy Data Type	R/W	INT16	datatype of energy counter registers (0x6000-0x6fff) 0=FLOAT32, 1=INT32
0x4080	1	Measurement update check	R	INT16	0=busy, 1=measurement data ready
0x4081	1	Measurement update wait	R	INT16	blocking read, 0=failure, 1=measurement data ready
0x4082	1	Phase order error status	R	INT16	0=OK, 1=invalid phase order
0x4083	1	3-wire detection status	R	INT16	connection type detection status: 0 = 3P4W, 1=3P3W

0x4135	2	LCD cycle fields	R/W	INT32	bitfield, enabling a number of predefined LCD messages
0x4137	8	LCD custom fields	R/W	INT16[8]	configuring/enabling custom LCD messages
0x414f	10	LCD custom ascii field 1	R/W	ascii	custom ascii LCD message
0x4159	10	LCD custom ascii field 2	R/W	ascii	custom ascii LCD message
0x4170	1	Measurement interval	R/W	INT16	0=600ms, 1=300ms, 2=100ms, 3=50ms
0x4171	1	Backlight level	R/W	INT16	0..100
0x4172	1	Power factor sign mode	R/W	INT16	0=IEC, 1=IEEE, 2=positive
0x4173	1	MID Firmware Updates	R/W	INT16	0=allowed, 1=disabled
0x4174	1	COM Firmware Updates	R/W	INT16	0=allowed, 1=disabled

0x4175	1	Peak power interval	R/W	INT16	peak detection interval in minutes, 0=disabled, 1-60=interval during
					which peak power consumption is calculated
0x47fd	1	Sample channel, write to start	R/W	INT16	0=Ua, 1=Ia, 2=Ub, 3=Ib, 4=Uc, 5=Ic, 6=RFU, 7=Ua+Ia, 8=Ub+Ib, 9=Uc+Ic, 10=Ua+Ub+Uc, 11=Ia+Ib+Ic
0x47fe	1	Sample data status	R	INT16	0=busy, 1=sample data ready
0x47ff	1	Sample data wait	R	INT16	blocking read, 0=failure, 1=sample data ready
0x4800	1024	Sample data	R	INT16[1024]	sample data, 16bits per sample

0x5000	2	Voltage	R	FLOAT32	V
0x5002	2	Voltage L1	R	FLOAT32	V
0x5004	2	Voltage L2	R	FLOAT32	V
0x5006	2	Voltage L3	R	FLOAT32	V
0x5008	2	Grid Frequency	R	FLOAT32	Hz
0x500a	2	Current	R	FLOAT32	A
0x500c	2	Current L1	R	FLOAT32	A
0x500e	2	Current L2	R	FLOAT32	A
0x5010	2	Current L3	R	FLOAT32	A
0x5012	2	Total Active Power	R	FLOAT32	W
0x5014	2	Active Power L1	R	FLOAT32	W
0x5016	2	Active Power L2	R	FLOAT32	W
0x5018	2	Active Power L3	R	FLOAT32	W
0x501a	2	Total reactive power	R	FLOAT32	var
0x501c	2	L1 reactive power	R	FLOAT32	var
0x501e	2	L2 reactive power	R	FLOAT32	var
0x5020	2	L3 reactive power	R	FLOAT32	var
0x5022	2	Total Apparent Power	R	FLOAT32	VA
0x5024	2	L1 Apparent Power	R	FLOAT32	VA
0x5026	2	L2 Apparent Power	R	FLOAT32	VA
0x5028	2	L3 Apparent Power	R	FLOAT32	VA
0x502a	2	Power Factor	R	FLOAT32	cos PHI
0x502c	2	L1 Power Factor	R	FLOAT32	cos PHI
0x502e	2	L2 Power Factor	R	FLOAT32	cos PHI
0x5030	2	L3 Power Factor	R	FLOAT32	cos PHI

0x5032	2	L1-L2 Voltage	R	FLOAT32	V
0x5034	2	L1-L3 Voltage	R	FLOAT32	V
0x5036	2	L2-L3 Voltage	R	FLOAT32	V

0x5038	2	LL Average Voltage	R	FLOAT32	V
0x503a	2	Neutral Current	R	FLOAT32	A
0x503c	2	Temperature	R	FLOAT32	degrees Celcius
0x503e	2	L1 Voltage THD	R	FLOAT32	percentage
0x5040	2	L2 Voltage THD	R	FLOAT32	percentage
0x5042	2	L3 Voltage THD	R	FLOAT32	percentage
0x5044	2	L1 Current THD	R	FLOAT32	percentage
0x5046	2	L2 Current THD	R	FLOAT32	percentage
0x5048	2	L3 Current THD	R	FLOAT32	percentage
0x5060	2	Forward Active Power Peak	R/W	FLOAT32	writing zero clears power peak
0x5062	2	Reverse Active Power Peak	R/W	FLOAT32	writing zero clears power peak
0x5064	2	Previous Forward Active Power Peak	R	FLOAT32	previously cleared power peak value
0x5066	2	Previous Forward Active Power Peak	R	FLOAT32	previously cleared power peak value
0x5080	2	Minutes above 70 degrees	R	INT32	minutes
0x5082	2	Minutes above max current	R	INT32	minutes
0x6000	2	Total Active Energy	R	INT32	Wh
0x6002	2	T1 Total Active Energy	R	INT32	Wh
0x6004	2	T2 Total Active Energy	R	INT32	Wh
0x6006	2	L1 Total Active Energy	R	INT32	Wh
0x6008	2	L2 Total Active Energy	R	INT32	Wh
0x600a	2	L3 Total Active Energy	R	INT32	Wh
0x600c	2	Forward Active Energy	R	INT32	Wh
0x600e	2	T1 Forward Active Energy	R	INT32	Wh
0x6010	2	T2 Forward Active Energy	R	INT32	Wh
0x6012	2	L1 Forward Active Energy	R	INT32	Wh
0x6014	2	L2 Forward Active Energy	R	INT32	Wh
0x6016	2	L3 Forward Active Energy	R	INT32	Wh
0x6018	2	Reverse Active Energy	R	INT32	Wh

0x601a	2	T1 Reverse Active Energy	R	INT32	Wh
0x601c	2	T2 Reverse Active Energy	R	INT32	Wh
0x601e	2	L1 Reverse Active Energy	R	INT32	Wh
0x6020	2	L2 Reverse Active Energy	R	INT32	Wh
0x6022	2	L3 Reverse Active Energy	R	INT32	Wh
0x6024	2	Total Reactive Energy	R	INT32	var
0x6026	2	T1 Total Reactive Energy	R	INT32	var
0x6028	2	T2 Total Reactive Energy	R	INT32	var
0x602a	2	L1 Total Reactive Energy	R	INT32	var
0x602c	2	L2 Total Reactive Energy	R	INT32	var
0x602e	2	L3 Total Reactive Energy	R	INT32	var
0x6030	2	Forward Reactive Energy	R	INT32	var
0x6032	2	T1 Forward Reactive Energy	R	INT32	var
0x6034	2	T2 Forward Reactive Energy	R	INT32	var
0x6036	2	L1 Forward Reactive Energy	R	INT32	var
0x6038	2	L2 Forward Reactive Energy	R	INT32	var
0x603a	2	L3 Forward Reactive Energy	R	INT32	var
0x603c	2	Reverse Reactive Energy	R	INT32	var
0x603e	2	T1 Reverse Reactive Energy	R	INT32	var
0x6040	2	T2 Reverse Reactive Energy	R	INT32	var
0x6042	2	L1 Reverse Reactive Energy	R	INT32	var
0x6044	2	L2 Reverse Reactive Energy	R	INT32	var
0x6046	2	L3 Reverse Reactive Energy	R	INT32	var
0x6048	1	Tariff	R/W	INT16	0=T1, 1=T2
0x6049	2	Resettable day counter	R/W	INT32	Wh, writing 0 clears day counter
0x6063	2	Reactive Energy Q1 (total)	R	INT32	varh
0x6065	2	Reactive Energy Q1 (T1)	R	INT32	varh

0x6067	2	Reactive Energy Q1 (T2)	R	INT32	varh
0x606d	2	Reactive Energy Q2 (total)	R	INT32	varh
0x606f	2	Reactive Energy Q2 (T1)	R	INT32	varh
0x6071	2	Reactive Energy Q2 (T2)	R	INT32	varh
0x6077	2	Reactive Energy Q3 (total)	R	INT32	varh
0x6079	2	Reactive Energy Q3 (T1)	R	INT32	varh
0x607b	2	Reactive Energy Q3 (T2)	R	INT32	varh
0x6081	2	Reactive Energy Q4 (total)	R	INT32	varh
0x6083	2	Reactive Energy Q4 (T1)	R	INT32	varh
0x6085	2	Reactive Energy Q4 (T2)	R	INT32	varh
0x6091	2	Reactive Energy Q1 (L1)	R	INT32	varh
0x6093	2	Reactive Energy Q1 (L2)	R	INT32	varh
0x6095	2	Reactive Energy Q1 (L3)	R	INT32	varh
0x6097	2	Reactive Energy Q2 (L1)	R	INT32	varh
0x6099	2	Reactive Energy Q2 (L2)	R	INT32	varh
0x609b	2	Reactive Energy Q2 (L3)	R	INT32	varh
0x609d	2	Reactive Energy Q3 (L1)	R	INT32	varh
0x609f	2	Reactive Energy Q3 (L2)	R	INT32	varh
0x60a1	2	Reactive Energy Q3 (L3)	R	INT32	varh
0x60a3	2	Reactive Energy Q4 (L1)	R	INT32	varh
0x60a5	2	Reactive Energy Q4 (L2)	R	INT32	varh
0x60a7	2	Reactive Energy Q4 (L3)	R	INT32	varh
0x60a9	2	Total Apparent Energy	R	INT32	VAh
0x60ab	2	T1 Total Apparent Energy	R	INT32	VAh
0x60ad	2	T2 Total Apparent Energy	R	INT32	VAh
0x60af	2	L1 Total Apparent Energy	R	INT32	VAh
0x6101	2	L2 Total Apparent Energy	R	INT32	VAh

0x6103	2	L3 Total Apparent Energy	R	INT32	VAh
0x6105	2	Forward Apparent Energy	R	INT32	VAh
0x6107	2	T1 Forward Apparent Energy	R	INT32	VAh
0x6109	2	T2 Forward Apparent Energy	R	INT32	VAh
0x610b	2	L1 Forward Apparent Energy	R	INT32	VAh
0x610d	2	L2 Forward Apparent Energy	R	INT32	VAh
0x610f	2	L3 Forward Apparent Energy	R	INT32	VAh
0x6111	2	Reverse Apparent Energy	R	INT32	VAh
0x6113	2	T1 Reverse Apparent Energy	R	INT32	VAh
0x6115	2	T2 Reverse Apparent Energy	R	INT32	VAh
0x6117	2	L1 Reverse Apparent Energy	R	INT32	VAh
0x6119	2	L2 Reverse Apparent Energy	R	INT32	VAh
0x611b	2	L3 Reverse Apparent Energy	R	INT32	VAh
0x6200	2	Previous day counter	R	INT32	Wh, previously cleared day counter value

9.2 LCD display Modbus error codes

0400 = Communication Firmware Error

0200 = provisioning data error

0100 = Com firmware CRC error

0080 = production not marked completed

0010 = meter failed to calibrate successfully

0008 = measurement hardware error

0004 = EEPROM data corruption

0002 = EEPROM communication error

0001 = MID firmware CRC error

The error code is a hexadecimal representation of a bitfield value, combinations of errors might occur.

Example: Error code 0101=0100 Com firmware CRC error + 0001 = MID firmware CRC error.

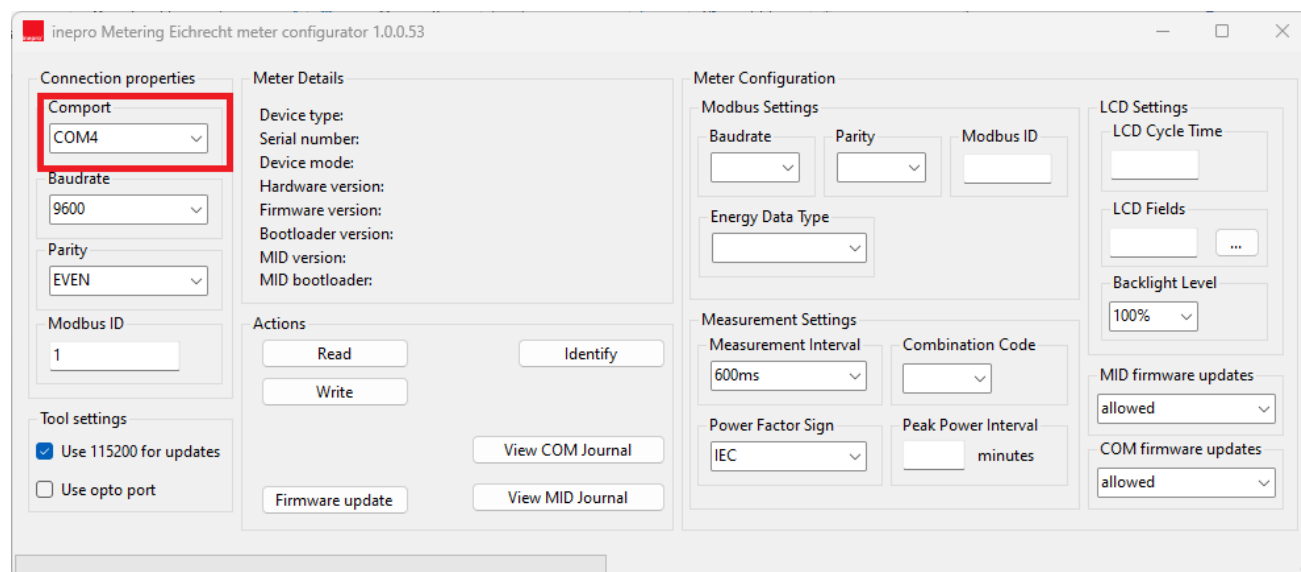
Or: 000C = 0008 (measurement hardware error) + 0004 (EEPROM data corruption).

9.3 Available characters on LCD

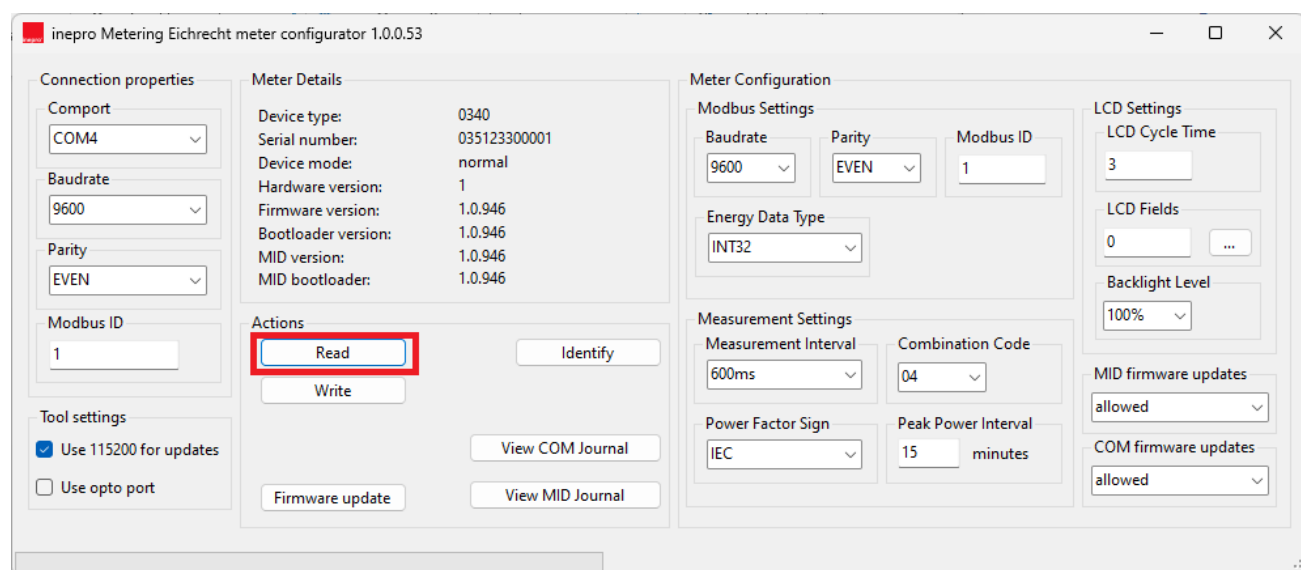
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f, g, h, i, l, n, o, p, q, r, s, t, y, z, A, C, E, H, I, LO

10 PRO380-Eichrecht configurator

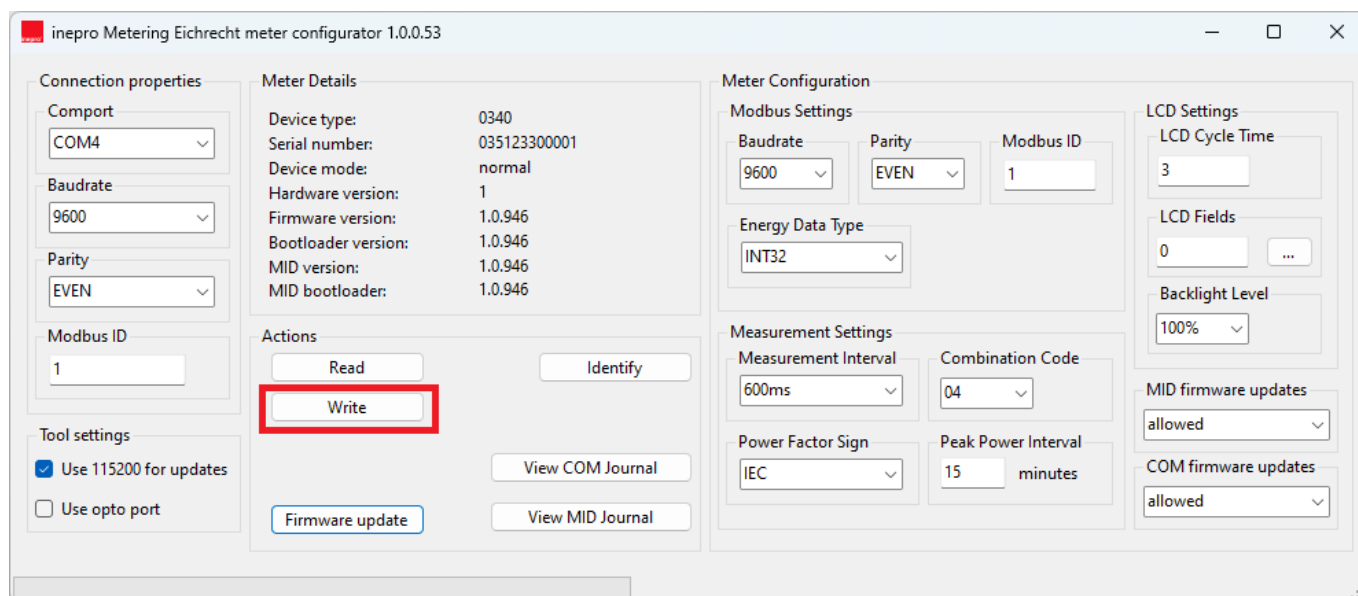
Start the configurator tool (EichrechtMeterConfig.exe), and select the comport where the RS485 USB adapter is connected:



Connect the RS485 A/B lines to the meter terminals 22, 23 (labelled RS485-1). Now press 'Read'.



When the connection properties are correct, the 'Meter Details' will show various details about the connected meter, and the 'Meter Configuration' fields will show the current values of the various configuration settings of the connected meter. After having made modifications to the settings, press 'Write' to store the modified setting values in the connected meter:



NOTE: after modifying the Modbus Settings (Baud rate/Parity/Modbus ID) of the connected meter, make sure to adjust the Connection properties to match the new settings.

10.1 Connection properties

Comport

The comport to which the RS485 adapter to the meter is connected.

Baud rate

The Baud rate of the RS485 communication with the meter.

Parity

The Parity of the RS485 communication with the connected meter.

Modbus ID

The Modbus RTU device address of the connected meter.

Tool settings

Use 115200 for updates

When enabled, the tool will temporarily switch to 115200 during firmware updates, to speed up the firmware update process.

Use opto port

When enabled, the tool assumes it is connected via the opto port (instead of RS485), so it will use fixed communication settings (4800bps, EVEN parity, Modbus id 1).

10.2 Actions

Read

Read settings and information from the connected meter.

Write

Write modified settings to the connected meter.

Identify

Request the connected meter to identify itself (by blinking the LCD backlight).

Firmware update

Update the firmware of the connected meter.

View COM Journal

Show the journal of firmware updates of part C.

View MID Journal

Show the journal of firmware updates of part F.

Meter configuration

Modbus settings, Baud rate

The Baud rate used for RS485 Modbus RTU communication. Default 9600, highest Baud rate 115200.

Modbus settings, Parity

The Parity used for RS485 Modbus RTU communication. Default EVEN, other options NONE/ODD.

Modbus settings, Modbus ID

The Modbus RTU device address, default 1, valid values 1-247

Modbus settings, Energy Data type

The data type of energy values available on the Modbus registers. Default INT32, big endian 32bit integer values (using 2 holding registers per value). Unit is 1Wh. Alternative: FLOAT32, (float ABCD), using 2 holding registers per value, unit 1kWh. The FLOAT32 has an accuracy of 6 full digits, when the value exceeds the accuracy, decimals will be dropped. INT32 has an accuracy of 9 full digits.

Measurement settings, Measurement interval

The internal update interval of measurements (RMS/instant values as well as energy accumulation). Default 300ms. Options: 600, 300, 100, 50ms. The faster settings (100/50ms) will show less accurate RMS/instant values, because there will be less internal averaging of measurement samples. The energy accumulation is still equally accurate.

Measurement Settings, Combination Code

The 'Combination code' setting is used to combine forward and reverse counters into a total counter. Either within one phase (e.g. L1 total), or for the combination of phases (L1+L2+L3 total).

Forward and Reverse energy counter values are always positive.

These counters measure energy flow in a single direction, there are no negative values.

Therefore the LCD and the Modbus registers will report positive values for forward and reverse energy counters, for all 'Combination code' settings.

The 'Combination code' is applied to all energy counters: Active, Reactive and Apparent.

'Combination code' does not affect total power calculations (e.g. total L1+L2+L3 power), only energy counter values.

The Combination Code can have the following values:

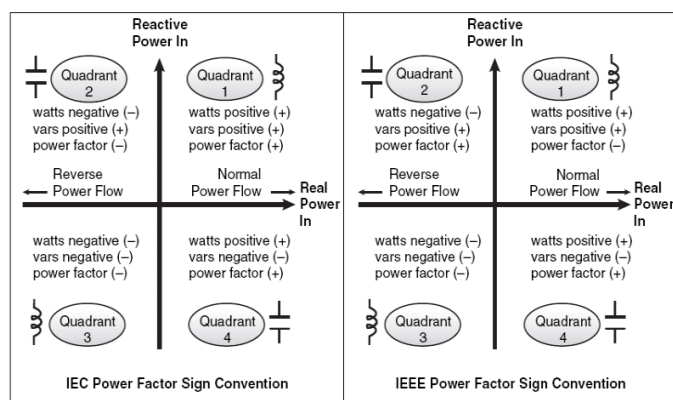
1. Forward only: negative energy flow is ignored in the total counters.
2. Reverse only: forward energy flow is ignored in the total counters.
3. Forward + reverse: total counters are the sum of absolute value of forward and reverse energy flows.
4. Forward - reverse: total counters are the sum of the (absolute value of) forward flow minus the (absolute value of) reverse flow of energy.

Measurement settings, power factor sign

Power factor sign convention differs between IEC/IEEE

IEC uses negative sign for inductive loads

IEEE uses negative sign for negative active power direction



The Power factor sign setting provides three options:

1. IEC
2. IEEE
3. Positive (PF is positive in all quadrants)

Measurement settings, Peak power interval

The meter has peak power counters which keeps record of the highest (active) power peak in both positive and negative direction. The interval during which the peaks are calculated can be configured with the Peak Power Interval setting. Default 15 minutes.

LCD settings, LCD cycle time

This setting defines the minimum display time duration of individual LCD messages, in seconds. It is a minimum, because MID relevant messages are always displayed for at least 5 seconds.

Default: 3 seconds.

Note: The meter supports temperatures as low as -40°C, but at lower temperatures the meter will have a reduced update time.

When multiple LCD screens are configured, please choose an LCD cycle time which is longer than the update time of the LCD at the expected minimum environment temperature.

We advise to use a cycle time of at least 5 seconds for temperatures below -20°C, and at least 10 seconds for temperatures below -30°C.

LCD settings, LCD fields

This setting value is a bitfield of various predefined standard counter and measurement values. Apart from this bitfield, several custom lcd messages can be configured. Press the '...' button to open a configuration dialog:

The 'Standard Fields' correspond to bits in the bitfield value, the 'Custom Fields' can be configured for individual phases, individual tariffs, individual directions, or combinations thereof.

For example, these settings configure an LCD message which displays the reactive energy for phase L3, in tariff 2, quadrant 4:

Or the Voltage THD for phase L1 (tariff/direction are ignored in this case):

LCD settings, backlight level

Configures the LCD backlight intensity level, as a percentage. Default 100%.

MID firmware updates

Configures whether or not updates for firmware part 'F' (MID legally relevant) are allowed. Once disabled, this setting cannot be enabled again.

COM firmware updates

Configures whether or not updates for firmware part 'C' (communication/crypto) are allowed. Once disabled, this setting cannot be enabled again.

10.3 Logbook

Firmware update journals and the structure of its entries

id	timestamp	time status	update status	software type	hardware	software version	software crc	update origin	imported active energy (Wh)	exported active energy (Wh)
1	5-7-2024 18:18	unsynced	success	MID firmware	340	1.0.1060	8384CEB8	RS485 (default)	0	0
2	11-7-2024 09:25	synced	success	MID firmware	340	1.0.1058	D5EE6DC6	RS485 (default)	5481	128
3	11-7-2024 09:27	synced	success	MID firmware	340	1.0.1060	8384CEB8	RS485 (default)	5482	128

Both software part F as well as software part C keep a software update event log, containing the following fields:

- Timestamp (32 bits unsigned)

This field records the UTC time in seconds since 1-1-1970

- Software type (16 bits)

This field records the type identifier of the software being installed, this should match the currently installed software type

- Software version (MAJOR, MINOR, REVISION, 3x 16bits)
- Software CRC (32 bits)
- Hardware type (16 bits)

This field records the type identifier of the hardware for which the software is intended, this should match the type identifier of the meter hardware (hardcoded in the software)

- Origin (16 bits)

This field records the origin of the software update data (i.e. main RS485 port, alternative RS485 port, opto port)

- Time status (8 bits)

This field records the current sync status of the meter RTC ('S' = synced, 'U' = unsynced)

- Update result status (8 bits)

This field records the result of the software update attempt:

- FIRMWAREJOURNAL_UPDATE_STATUS_SUCCESS 0
- FIRMWAREJOURNAL_UPDATE_STATUS_INVALID_HARDWARE 1
- FIRMWAREJOURNAL_UPDATE_STATUS_INVALID_SOFTWARE 2
- FIRMWAREJOURNAL_UPDATE_STATUS_INVALID_SIGNATURE 3
- FIRMWAREJOURNAL_UPDATE_STATUS_INVALID_TIME 4
- FIRMWAREJOURNAL_UPDATE_STATUS_INVALID_DATA 5
- FIRMWAREJOURNAL_UPDATE_STATUS_INVALID_KEY 6
- FIRMWAREJOURNAL_UPDATE_STATUS_UPDATE_LIMIT_REACHED 7
- FIRMWAREJOURNAL_UPDATE_STATUS_STORAGE_ERROR 8
- FIRMWAREJOURNAL_UPDATE_STATUS_COMMUNICATION_ERROR 9
- FIRMWAREJOURNAL_UPDATE_STATUS_INHIBITED 10
- FIRMWAREJOURNAL_UPDATE_STATUS_REMOTE_ERROR 0x80 /* this is a flag, can be combined with one of the other status values */
- Active energy imported (OBIS 1.8.0) counter value in Wh
- Active energy exported (OBIS 2.8.0) counter value in Wh
- Log entry crc (32 bits)