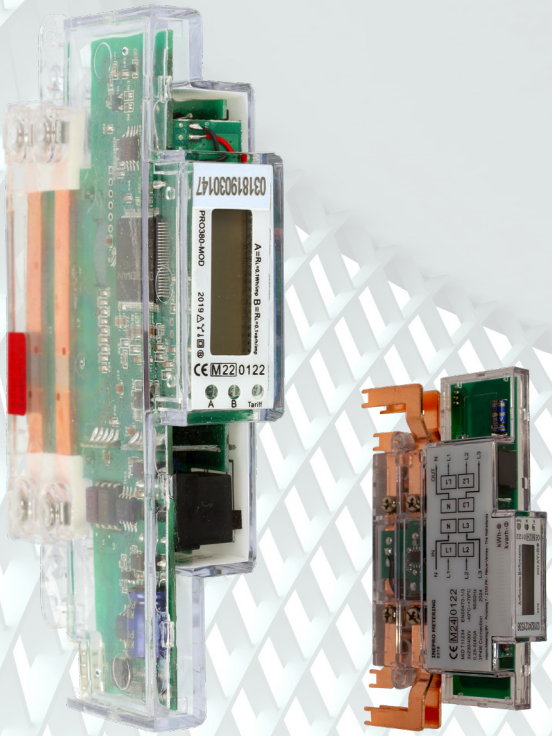
inepro®



PRO380-Compact/V/DIN

PRO380-Compact/V/DIN

User manual

Version: 0.04

1 Index

2 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 authorized to install, connect and use this device, who have the proper knowledge about labeling 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 catalog 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 cover is placed 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 terminals should be properly tightened.
- Make sure the wires fit properly in the connection terminals.
- If the wires are too thin it will cause a bad contact which can spark causing damage to the meter and its surroundings.

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.

Copyright

3 Foreword

Thank you for purchasing this energy meter. **inepro** offers a wide range of devices. We have introduced numerous energy meters to the market, designed for use with 110V AC to 400V AC (50 or 60Hz) and up to 1000V/1500A DC. For more information on other products, please contact our sales department at sales@inepro metering.com or visit our website at www.inepro metering.com.

While we manufacture this device according to international standards and conduct rigorous quality inspections, it is still possible that a defect or malfunction may occur, for which we apologize. Under normal conditions, your product should provide years of reliable operation. Should you experience an issue with the energy meter, please contact your distributor immediately.

Most of our energy meters are secured with a special seal. Once this seal is broken, warranty claims cannot be honored. Therefore, please NEVER open the energy meter or break the device seal. The limited warranty covers a period of 3 years from the production date, applicable only to production faults.

4 Certificates

inepro®

We,
inepro Metering BV

Address;
Pondweg 7
2153 PK, Nieuw-Vennep, The Netherlands

Declare under our sole responsibility that the product;
0318

Static Active Electrical Energy Meter, With the measurement range of;
Three phase Watt Hour meter

To which this declaration relates, is in conformity with the following European harmonized and published standards at date of this declaration;
EN 50470-1:2006
EN 50470-3:2006

CLC/TR 50579

Following the provisions of the Directives (If applicable);
2014/32/EU (MID)

Place and date of issue
Nieuw-Vennep, 14-08-2023

Name of responsible for CE-Marking
D. van der Vaart

This declaration of Conformity is suitable to the European Standard EN 45014 *General Criteria for Supplier's Declaration of Conformity*. The basis for the criteria has been found in international documentation, particularly in

ISO / IEC, Guide 22, 1982, *Information on manufacturer's Declaration of Conformity with standards or other technical specifications*

NMi

EU-type examination certificate

Number **T11234** revision 3
Project number 3652538
Page 1 of 1

Issued by	NMi Certin B.V., designated and notified by the Netherlands to perform tasks with respect to conformity assessment procedures mentioned in article 17 of Directive 2014/32/EU, after having established that the measuring instrument meets the applicable requirements of Directive 2014/32/EU, to:
Manufacturer	Inepro Metering BV Pondweg 7 2153 PK Nieuw Vennep The Netherlands
Measuring instrument	A static **Active Electrical Energy Meter** Type : 0318 Manufacturer's mark or name : Inepro Reference voltage : 3x230/400 V Reference current : 5 A Destined for the measurement of : electrical energy, in a - three-phase four-wire network - single-phase two-wire network Accuracy class : A or B Environment classes : M1 / E2 Temperature range : -40 °C / +70 °C Further properties are described in the annexes: – Description T11234 revision 3; – Documentation folder T11234-3.
Valid until	28 May 2028
Remark	This revision replaces the earlier versions, including its documentation folder.
Issuing Authority	**NMi Certin B.V., Notified Body number 0122** 4 April 2023 Certification Board

NMi Certin B.V.
Thijsseweg 11
2629 JA Delft
The Netherlands
T +31 88 636 2332
certin@nmi.nl
www.nmi.nl

5 Specifications

Casing	PC flame resistant plastic
Flammability rate:	UL-94 V0
Voltage:	230/400V AC
Maximum rated current (Imax)	45A (cable thickness 6mm²) 25A (cable thickness 2.5mm²)
Operational frequency range	50 or 60Hz ±2%
Test output flash rate (RED LED)	10,000 imp/kWh
LCD scroll time:	10s
Backlight:	ON/OFF
Calculation method:	Forward + Reverse
Data store	The data can be stored for more than 10 years without power

The meter shall not be used with 2 phases loaded with import energy while 1 phase is loaded with export energy

5.1 Performance criteria

Operating humidity:	≤ 75%
Storage humidity:	≤ 95%
International standard:	EN50470-1/3**********
Active energy accuracy class:	≤25A = Class 1 or B >25A = Class 2 or A
Reactive energy accuracy class:	2
Protection against penetration: of dust and water:	IP20, IP51 reached by mounting the meter in an IP51 cabinet
Insulating encased meter of: protective class:	II
Operating temperature range:	-40°C ... +70°C
Storage temperature range:	-40°C ... +70°C

5.2 Basic errors

0.05Ib	Cosφ = 1	±1.5%
0.1Ib	Cosφ = 0.5L	±1.5%
	Cosφ= 0.8C	±1.5%
0.1Ib - Imax	Cosφ = 1	±1.0%
0.2Ib - Imax	Cosφ = 0.5L	±1.0%
	Cosφ = 0.8C	±1.0%

ERR 80	EEPROM cannot initialize
ERR 0d	Energy data check error. Difference in value of energy (integer kWh) between LCD (main storage in EEPROM) and backup part of EEPROM Hardware related problem.
ERR 1d	Energy data check error. Difference in value of energy (integer and decimal kWh) between LCD (main storage in EEPROM) and backup part of EEPROM Can be hardware or software problem.
ERR 0F	Cannot read data from the EEPROM
ERR 0C	Energy data check error. Difference in value of energy (integer kWh) between LCD (main storage in EEPROM) and backup part of EEPROM Software related problem.

5.3 RS485 communication specifications

Bus type	RS485
Protocol	Modbus RTU with 16 bit CRC
Baud rate	1200, 2400, 4800, 9600
Address range	1 ... 247 user settable
Maximum bus load	60 meters per bus*
Range	1000m*

*Please note that the maximum number of meters depends on the converter, baud rate (higher baud rates reduce the maximum number of meters that can be used), and the specific conditions under which the meters are installed.

5.4 RS485 communication default settings

Modbus ID	001
Parity	EVEN
Baudrate	9600

5.5 Dimensions

Lenght	119.95 mm
Width	65 mm
Height	21.50 mm
Weight	0.120 kg (net)

5.6 Wire Connection

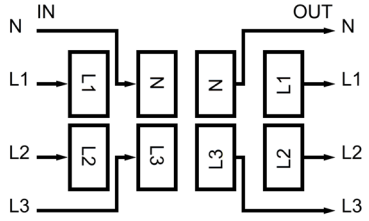
The maximum rated current depends on the thickness of the cable used. Ensure that the correct cable thickness is selected to maintain safety and optimal performance.

Maximum rated current (Imax)

-25A	stranded wire with Klauke 6304 insulated solderless terminals	(min. cable thickness 2.5mm²)
-45A	stranded wire with Klauke 6504 insulated solderless terminals	(min. cable thickness 6mm²)

5.7 Connection diagram

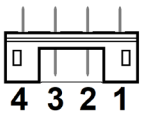
L1 (IN)	Phase 1 input	-	L1 (OUT)	Phase 1 output
L2 (IN)	Phase 2 input	-	L2 (OUT)	Phase 2 output
L3 (IN)	Phase 3 input	-	L3 (OUT)	Phase 3 output
N (IN)	Neutral input	-	N (OUT)	Neutral output



3Phase/4wire

Terminal screw torque(L1/L2/L3/N): 0.3 N.m.

1 & 2 Modbus communication contact
3 & 4 External tariff input



1- Tariff
2- Tariff
3- Modbus B
4- Modbus A

6 Installation

Caution

- Before working on the energy meter and any connected equipment, turn off and, if possible, lock all sources supplying power to them.
- 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

General

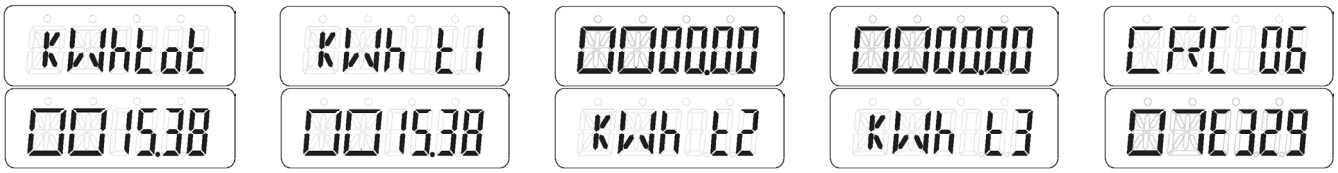
- The connecting wire from the device to the external circuit should be sized according to local regulations, matching the maximum current of the breaker or other overcurrent protection devices in the circuit.
- Install an external switch or circuit breaker on the supply wires to disconnect the meter and the energy-supplying device. It is recommended to place this switch or circuit breaker near the meter for operator convenience. The switch or circuit breaker must comply with the building's electrical specifications and local regulations.
- An external fuse or thermal cut-off used for overcurrent protection must be installed on the supply side wires, ideally near the meter for ease of access. This overcurrent protection device should meet building specifications and local regulations.
- This meter can be installed indoors or outdoors in a properly enclosed and protected meter box, according to local codes and regulations.
- To prevent tampering, use an enclosure with a lock or a similar security feature.
- The meter must be installed against a fire-resistant wall.
- The installation location must be well-ventilated and dry.
- If the meter is exposed to dust or contaminants, it should be installed within a protective box.
- The meter can be installed and used after testing and may be sealed afterward.
- Install the meter in a location where it can be easily read.
- If installed in an area with frequent surges (e.g., from thunderstorms, welding machines, or inverters), the meter should be protected with a Surge Protection Device.
- Seal the device immediately after installation to prevent tampering.

7 Operation

7.1 Scrolling pages

The PRO380-COMPACT switches LCD pages every 10 seconds. The cycle time can be adjusted with modbus.

1. Total active energy (kWh)
2. T1 active energy (kWh T1)
3. T2 active energy (kWh T2)
4. T3 active energy (kWh T3)
5. CRC (0607E329)



7.2 Tariff

The default tariff is 1. The tariff can be set to T1, T2 & T3 by Modbus and 12V signal input.

Modbus

When writing the Tariff status via Modbus, an external 12V si is not required.

12V Supply

A constant 12V signal is necessary to maintain activation of T2 or T3. The 12V signal overrules the modbus tariff setting.

On the meter there's a LED which indicates with tarrif is active;

T1- LED off
T2- LED on
T3- LED blinking

Tariff	1	2
T1	-	-
T2	N	12V
T3	12V	N

8 Troubleshooting

For questions about one of our products please contact:

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

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.

Appendix - Modbus

A1.1 Communicating via the Modbus output

The PRO380-COMPACT meter is equipped with a Modbus port. In order to read out the meter registers, first install and configure the required PC software.

Connect the PC to the meter using an RS485 level converter, with the cable connected to terminals 3 and 4. The default communication address of the meter is set to 01.

The PRO380-COMPACT model supports Modbus communication with the following default settings:

-Baud rate: 9600
-Data bits: 8
-Parity: Even
-Stop bit: 1

The baud rate can be modified to values of 9600, 4800, 2400, 1200, 600, or 300. Parity can be adjusted to even, odd and none; however, the data bits and stop bit settings cannot be changed.

When testing the meter with a serial converter (RS485), note that, due to such a partial Modbus infrastructure implementation, an additional resistor (120 ohms, 0.25 watts) must be placed across A and B on the meter side.

For details on the registers used in the meter and data interpretation, please refer to the Modbus register map on the pages below

A1.2 Modbus register map - Read

Register	Content	Function	R/W	Length	Data Type	Unit
4000	Serial number	03	Read	2	signed	-
4002	Meter code	03	Read	1	signed	-
4003	Meter ID (Modbus)	03/06	R/W	1	signed	-
4004	Baud Rate	03/06	R/W	1	signed	-
4005	Protocol Version	03	Read	2	Float - (ABCD)	-
4007	Software Version	03	Read	2	Float - (ABCD)	-
4009	Hardware Version	03	Read	2	Float - (ABCD)	-
400B	Meter Amps	03	Read	2	signed	A
4010	LCD cycle time	03/06	R/W	2	signed	-
4011	Parity setting	03/06	R/W	1	signed	-
4012	Phase direction	03	Read	3	signed	-
4016	Power on off counter	03/06	R/W	1	HEX	-
4017	Total Q4	03	Read	1	signed	-
4018	L1 Q4	03	Read	1	signed	-
4019	L2 Q4	03	Read	1	signed	-
401A	L3 Q4	03	Read	1	signed	-
401B	Checksum	03	Read	2	HEX	-
401D	Active status word	03	Read	2	HEX	-
4021	Backlight	03/06	R/W	1	signed	-

Registe	Content	Function	R/W	Length	Data Type	Unit
5002	L1 Voltage	03	Read	2	Float - (ABCD)	V
5004	L2 Voltage	03	Read	2	Float - (ABCD)	V
5006	L3 Voltage	03	Read	2	Float - (ABCD)	V
5008	Grid Frequency	03	Read	2	Float - (ABCD)	Hz
500C	L1 Current	03	Read	2	Float - (ABCD)	A
500E	L2 Current	03	Read	2	Float - (ABCD)	A
5010	L3 Current	03	Read	2	Float - (ABCD)	A

Register	Content	Function	R/W	Length	Data Type	Unit
5012	Total Active Power	03	Read	2	Float - (ABCD)	kW
5014	L1 Active Power	03	Read	2	Float - (ABCD)	kW
5016	L2 Active Power	03	Read	2	Float - (ABCD)	kW
5018	L3 Active Power	03	Read	2	Float - (ABCD)	kW
501A	Total reactive power	03	Read	2	Float - (ABCD)	kVA
501C	L1 reactive power	03	Read	2	Float - (ABCD)	kVA
501E	L2 reactive power	03	Read	2	Float - (ABCD)	kVA
5020	L3 reactive power	03	Read	2	Float - (ABCD)	kVA
5022	Total Apparent Power	03	Read	2	Float - (ABCD)	KVA
5024	L1 Apparent Power	03	Read	2	Float - (ABCD)	KVA
5026	L2 Apparent Power	03	Read	2	Float - (ABCD)	KVA
5028	L3 Apparent Power	03	Read	2	Float - (ABCD)	KVA
502A	Power Factor	03	Read	2	Float - (ABCD)	-
502C	L1 Power Factor	03	Read	2	Float - (ABCD)	-
502E	L2 Power Factor	03	Read	2	Float - (ABCD)	-
5030	L3 Power Factor	03	Read	2	Float - (ABCD)	-

Register	Content	Function	R/W	Length	Data Type	Unit
6000	Total Active Energy	03	Read	2	Float - (ABCD)	kWh
6002	T1 Total Active Energy	03	Read	2	Float - (ABCD)	kWh
6004	T2 Total Active Energy	03	Read	2	Float - (ABCD)	kWh
6006	L1 Total Active Energy	03	Read	2	Float - (ABCD)	kWh
6008	L2 Total Active Energy	03	Read	2	Float - (ABCD)	kWh
600A	L3 Total Active Energy	03	Read	2	Float - (ABCD)	kWh
600C	Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
600E	T1 Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
6010	T2 Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
6012	L1 Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
6014	L2 Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
6016	L3 Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
6018	Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
601A	T1 Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
601C	T2 Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
601E	L1 Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
6020	L2 Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
6022	L3 Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
6024	Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6026	T1 Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6028	T2 Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh
602A	L1 Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh
602C	L2 Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh

Register	Content	Function	R/W	Length	Data Type	Unit
602E	L3 Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6030	Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6032	T1 Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6034	T2 Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6036	L1 Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6038	L2 Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
603A	L3 Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
603C	Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh
603E	T1 Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6040	T2 Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6042	L1 Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6044	L2 Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6046	L3 Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6048	Tariff	03/06	R/W	1	Float - (ABCD)	kWh
604C	T3 Total Active Energy	03	Read	2	Float - (ABCD)	kWh
604E	T3 Forward Active Energy	03	Read	2	Float - (ABCD)	kWh
6050	T3 Reverse Active Energy	03	Read	2	Float - (ABCD)	kWh
6052	T3 Total Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6054	T3 Forward Reactive Energy	03	Read	2	Float - (ABCD)	kWh
6056	T3 Reverse Reactive Energy	03	Read	2	Float - (ABCD)	kWh

Write

Register	Content	Function	Length	Unit		
4003	Modbus ID	06	0001	(01-147) 01= Default - 00=Broadcast		
Command:	01 06 4003 **000A** (new ID: 10)					
4004	Baudrate	06	0001	300 (012C) - 600 (0258) - 1200 (04B0)- 2400 (0960)- 9600 (2580)		
Command:	01 06 4004 **2580** (new Baudrate: 9600)					
4010	LCD cycle time	06	0001	1	Sec	HEX
Command:	01 06 4010 **0025** (new cylce time = 25sec)			01-30		
4011	Parity setting	06	0001	1	-	signed
Command:	01 06 4011 **0002** (new parity: none)			01: even / 02: none / 03: odd		
4016	Power down counter	06	0001	1	-	signed
Command:	01 06 4016 0000			Reset to 0		
4021	Backlight	06	0001	1	-	HEX
Command:	01 06 4021 **0002**			Set backlight off 01 = ON – 02 = OFF		
6048	Tarrif	06	0001	1	-	signed
Command:	01 06 6048 **0002** (new tariff = 02)			01: T1 / 02: T2 / 03: T3		