PRO75D 100A MODBUS MID

DIN rail single phase two wire energy meter

User manual

Version 1.24

DMMetering®

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 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.
- 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.

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.

Registered trademarks
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2 Foreword

Thank you for purchasing this energy meter. Inepro has a wide product range of devices. We have introduced a large number of energy meters on the market suitable for 110V AC to 400V AC (50 or 60Hz). Besides the normal energy meters we also developed our own pre-paid meters with chip card, chip card re-loaders and a complete PC management control system. For more information on other products please contact our sales department at sales@ineprometering.com or visit our website at www.ineprometering.com.

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 apologize. 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. Most of 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 warranty period is 3 years after production, and only valid for production faults.

3 MID certificate

CERTIFICATE

EC-Type examination certificate 6335-10

Manufacturer	:	Inepro Metering BV		
Contact person	:	D. van der Vaart		
Address	:	P.O. Box 92		
	:	2450 AB, Leimuiden		
Country	:	The Netherlands		
Instrument	:	Electronic single-phase two-wire energy meter Direct connected		
Mark - Type	:	PRO-75A	PRO-75D	PRO-75D MODBUS
Register	:	Mechanical	LCD	LCD
Accuracy Class	:	1 / B		
Measurement range	:	230 V 10(100) A 50 or 60 Hz 1600 imp./kWh		
Temperature range	:	-10..40 °C		
Use	:	Indoor		
Protection Class	:	II		
Environmental class	:	M1, E2		
Registry method	:	bidirectional method with always positive register: the meter always counts the energy of the measuring point as received energy, irrespective of the real energy direction.		

The energy meter meets the requirements of Directive 2004/22/EC of the European parliament and the council of 31 March 2004 on measuring instruments.

Certification was based on compliance with the following harmonised standards:

EN 50470-1 (2006)	:	Electricity metering equipment (a.c.)-part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
EN 50470-3 (2006)	:	Electricity metering equipment (a.c.)-part 3: Particular requirements - Static meters for active energy (class indexes A, B and C)
Valid until	:	June 11, 2020

The results are recorded in the following annex: test report 70965037-TDT 6335-10.

KEMA Quality B.V.
Arnhem, June 11, 2010

ir. A.P.M. Baars
Certification manager
Notified body number 0344

ir. P.J.J.G. Nabuurs
Managing Director

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T +31 (0)26 3 56 2215 F +31 (0)26 4 42 6211 C&M@kema.com www.kema.com trade register Arnhem 09080262

Experience you can trust.

4 CE certificate

We,

Inepro Metering BV

Pondweg 7
2153 PK Nieuw-Vennep
The Netherlands

declare under our sole responsibility that the products:

PRO75A
PRO75D
PRO75D MODBUS

Single phase DIN rail Watt Hour Meter

to which this declaration relates in conformity with the following European harmonized and published standards at date of this declaration:

IEC EN 50470

Following the provisions of the Directives (if applicable):

☑ 2004/22/EC

These conclusions are based on the test reports done by KEMA with report numbers : 6335-10 with Notified Body number 0344

Nieuw-Vennep, 2010, June 11

Place and date of issue

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*

Declaration of Conformity

We

Inepro Metering BV

Of

Inepro Metering BV
Pondweg 7
2153 PK Nieuw Vennep
The Netherlands

Ensure and declare that the apparatus:

PRO-75A, PRO-75D, PRO-75D Modbus

With the measurement range

230V, 10(100)A, 50 or 60Hz, 1600imp/kWh

are in conformity with the type as described in the

EC-type examination certificate 6335-10

and satisfy the appropriate requirements of the Directive 2004/22/EC.

June 11, 2010

Daan van der Vaart

5 Performance criteria

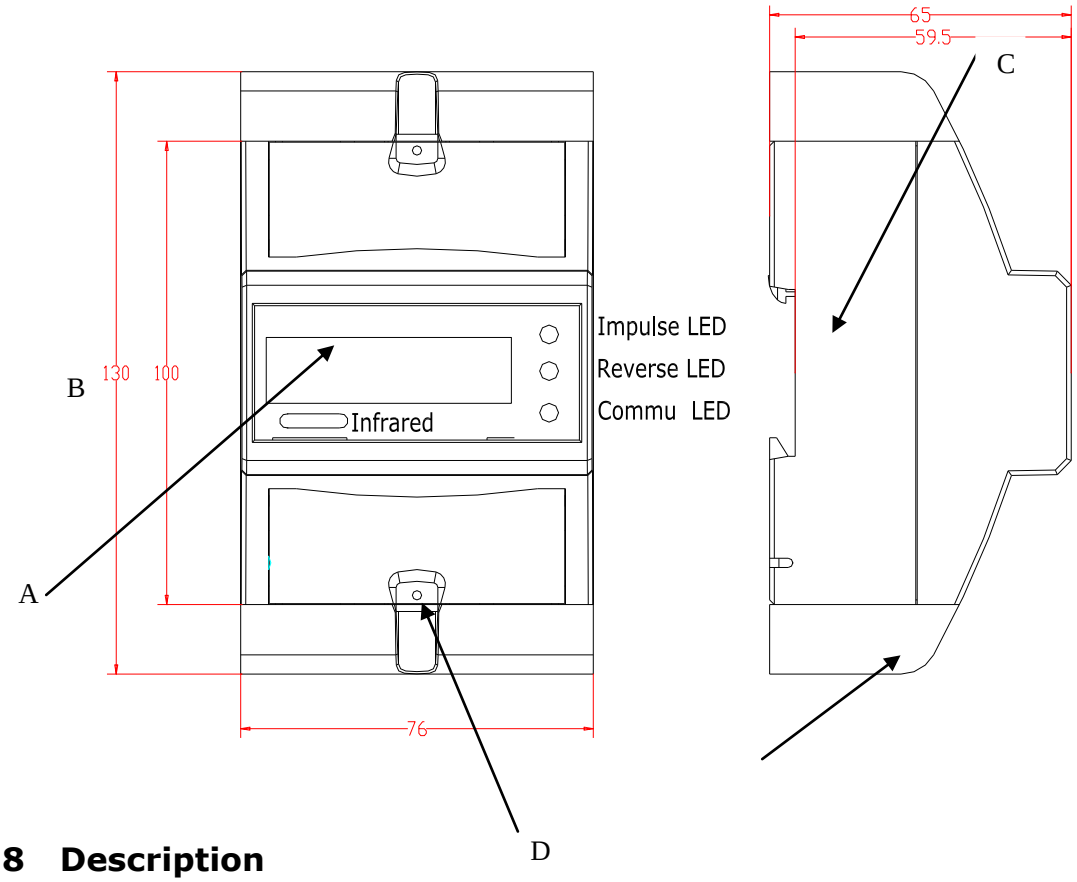
Operating humidity	≤ 75%
Storage humidity	≤ 95%
Operating temperature	-10°C - +40°C
Storage temperature	-30°C - +70°C
International standard	EN50470-1 and EN50470-3
Accuracy class	1
Protection against penetration of dust and water	IP51
Insulating encased meter of protective class	II

6 Specifications

Meter type	PRO75D 100A MODBUS MID
Nominal voltage (Un)	230/400 AC
Operational voltage	161 - 299V AC
Insulation capabilities:	
- AC voltage withstand	4KV for 1 minute
- Impulse voltage withstand	6KV – 1.2µS waveform
Basic current (Ib)	10A
Maximum rated current (Imax)	100A
Operational current range	0.4% Ib- Imax
Over current withstand	30Imax for 0.01s
Operational frequency range	50Hz or 60 Hz ±10%
Internal power consumption	≤2W /Phase -≤10VA/Phase
Test output flash rate	1600imp/kWh
Pulse output rate	1600imp/kWh
Data save	The data can be stored for more than 10 years without power

7 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%



8 Description

A	Front panel
B	Cover
C	Case
D	Security wire slot

Material

Front panel	PC flame resistant plastic
Cover	ABS flame resistant plastic
Base	ABS flame resistant plastic

9 Dimensions

Height	130 mm
Height without protection cover	100 mm
Width	76 mm
Depth	65 mm
Size of the connection clamps	10 x 8 mm
Weight	0.2 Kg (net)

10 RS485 communication specifications

Bus type	RS485
Baud rate	1200（default), 2400, 4800, 9600
Range	1000m
Protocol	MODBUS RTU with 16 bit CRC
Address range	0-255 user settable
Maximum bus load	64 meters per bus segment

11 Far Infrared communication specifications

Infrared wavelengths	900- 1000nm
baud rate	1200bps
Communication distance	5m
Communication angle	-15°~+15°
Protocol	Modbus

12 Installation

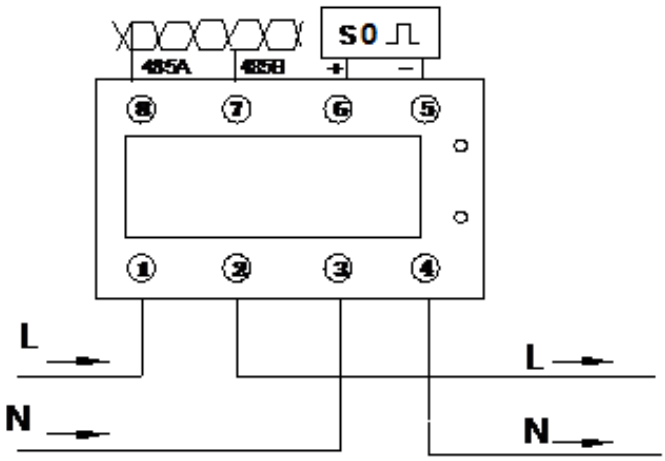

CAUTION

- 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 or onto a panel with screws.
- 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
- Connection of the wires should be done in accordance with the connection diagram as shown below:



1 and 2	Phase line IN/OUT
3 and 4	Neutral line IN/OUT
5 and 6	Test pulse output contact
7 and 8	RS485 communication contact RS485B-/RS485A +

13 Operation

13.1 Consumption indication

There is a red LED (with the text 1600imp/kWh under it) on the front panel which displays power consumption measured by the meter. When power is consumed, the LED will flash. The faster the LED flashes, the more power is consumed. For this meter, the LED flashes 1600 times per kWh.

13.2 Reverse indication

A red LED (with the text Reverse under it) will lighten when the meter load current flow is running in reverse direction.

13.3 Communication indication

On the front panel of the meter, there is a COM LED. When data is communicated via the infrared or RS485 port between the meter and an external device, this green LED will blink.

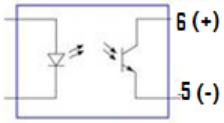
13.4 Reading the meter

The meter has an 7 digit LCD which has 5.2 decimals, this means it can display 2 digits after the dot. The energy meter is equipped with a 5+2 digit LCD which is used to record consumption and can't be reset to zero. The display has 5 digits before and 2 decimal after the dot on the display. The reading accuracy is 1/100 kWh. For this meter, the LED will flash 1600 times per kWh. The meter can also be read via either RS485 or infrared via a handheld unit.

13.5 Pulse output

The energy meter is equipped with a pulse output which is optically isolated from the inside circuit. The meter generates pulses in proportion to the measured energy

consumption for the purpose of remote reading and accuracy testing. The pulse output is a polarity dependent, open collector transistor requiring an external voltage source for correct operation. For this external voltage source, the voltage (Ui) should be 5-27V DC, and the maximum input current (Imax) is 27mA DC. To connect the impulse output, connect 5-27V DC to connector 6 (collector), and the signal wire (S) to connector 5 (emitter).



5-= emitter
6+= collector

=light bundle from the LED

13.6 RS485 output

The meter has a isolated RS485 port on connection 8 and 7. To communicate with a computer, computer software and an RS485 adapter is required. The transmission speed is 1200 baud (default) but can be increased to 2400, 4800, 9600 baud.

Note: PC software is available at request. Please see the technical support section of this manual for more information.

13.7 Communication port

The meter is equipped with a far infrared port and an RS485 port, it is possible to program the settings of the meter data or read the meter via these 2 ports. The communication protocol conforms to Modbus.

13.8 Far infrared communication port

The far infrared communication port is under on the left bottom side of LCD screen. The TP800 hand-held programmer can directly communicate with this meter via infrared. The communication distance can't be more than 5m.

Note on using Modbus (R485) and Infrared signals simultaneously is only possible if a 1200 baudrate of the R485 has been set, see section 14.

14 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 consumption LED is not flashing (PULSE LED).	There is no load connected to the meter.	Connect a load to the meter.
	The load on the line is very low.	Check with an Ohm-meter if the load value is very low.
	There is a fault inside the meter.	If the checks above don't solve the problem, please contact technical support for a meter replacement.
Infrared communication not working.	The meter ID is not correct	Check and use the correct the meter ID. The default meter ID is 0.
	The distance between the receiver and the Infrared transmitter is too long.	Make sure the distance between the transmitter and the receiver is no more than 5 meter. Also check if the receiver is in the direct sight of the infrared interface.
	The communication protocol used is wrong.	Please contact technical support to get the meter communication protocol.
	The meter is set at another baudrate than 1200bps using the (RS485) communication port.	Please set the baudrate to the default 1200 bps (see section 10)
	Maybe there is a fault inside the meter.	Please contact technical support for a meter replacement.

Problem	Possible cause	Check/solution
The register doesn't count.	There is almost no load connected to the meter	Check if the consumption LED is flashing. 160 flashes of the LED at 1600 pulses per kWh equals 0.1kWh.
	Maybe there is a fault inside the meter.	Please contact technical support for a meter replacement.
No pulse output.	The pulse output is not supplied with DC power.	Check the external voltage source (Ui) is 5-27V DC with a voltage meter
	The pulse output is not connected correctly.	Check if the connection is correct: the 5-27V DC should be connected to the collector connection (pin 6+) and the signal wire (S) to the emitter connection (pin 5-).
	Maybe there is a fault inside the meter.	Please contact technical support for a meter replacement.
The pulse output rate is wrong.	Maybe there is a fault inside the meter.	Please contact technical support for a meter replacement.
RS485 communication is not working.	The meter ID is incorrect	Check and use the correct meter ID. The default meter ID is 0.
	The RS485 wire is too long to properly communicate with the meter.	Make sure that the length of wire in the RS485 is no more than 1000 meters.
	There are too many devices connected to the same RS485 bus	Check that there are no more than 64 devices or the maximum amount supported by your receiver connected to the same bus
	The cables are not correctly connected to the RS485 port	The correct connection is RS485 wire A (D+) to terminal 8, RS485 wire B (D-) to terminal 7.
	The polarity of the cables is wrong	Swap the MODBUS communication wires if you are not sure if the wires are correctly connected
	Maybe there is a fault inside the meter.	Please contact technical support for a meter replacement.

15 Technical support

For questions about one of our products please contact:

- Your local Inepro Metering distributor
- Email: support@ineprometering.com

www.ineprometering.com