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PRO75D MODBUS

DIN rail single phase two wire energy meter with MODBUS protocol

User manual

1.1 Safety instructions

Information for your own safety
This manual does not contain all of the safety measures for operation of the equipment (module, device), because special operating conditions, and local code requirements or regulations may necessitate further measures. However, it does contain information which must be read for your personal safety and to avoid material damages. This information is highlighted by a warning triangle and is represented as follows, depending on the degree of 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
Operation of the equipment (module, device) described in this manual may only be performed by qualified personnel. Qualified personnel in this manual means person who are authorized to commission, start up, ground and label devices, systems and circuits according to safety and Regulatory standards.

Use for the intended purpose
The equipment (device, module) may only be used for the application specified in the catalogue and the user manual, and only be connected with devices and components recommended and approved by Inepro.

Proper handling
The prerequisites for perfect, reliable operation of the product are proper transport, proper storage, installation and proper operation and maintenance. When operating electrical equipment, parts of this equipment automatically carry dangerous voltages. Improper handling can therefore result in serious injuries or material damage.

- ✧ Use only insulating tools.
- ✧ Do not connect while circuit is live (hot).
- ✧ Do not connect the meter to a 3 phase - 400VAC – network.
- ✧ Place the meter only in dry surroundings.
- ✧ Do not mount the meter in an explosive area or expose the meter to dust, mildew and insects.
- ✧ Make sure the 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 connecting clamps directly with metal, blank wire and your bare hands as you may get electrical shock.
- ✧ Make sure the protection cover is placed after installation.
- ✧ Installation, maintenance and reparation should only be done by qualified personnel.
- ✧ Never break the seals and open the front cover as this might influence the function of the meter, and will cause no warranty.
- ✧ Do not drop, or allow strong physical impact on the meter as the high precisely components inside may be damaged.

Disclaimer
We have checked the contents of this publication 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 contained in the information given. The data in this manual is checked regularly and the necessary corrections are included in subsequent editions. We are grateful for any improvements that you suggest.

Subject to technical modifications without notice.

1.2 Foreword

Thank you for purchasing the Inepro PRO75D DIN rail single phase two wire energy meter with modbus protocol. Output is LCD displayed based on kWh and the data can be transported by isolated RS485 . The meter is provided with a non-volatile memory system that ensures that the readings are not lost or altered when power off.

We have introduced a large scale 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 product please contact our sales department at sales@dmmetering.com

Although we produce the Inepro PRO75D meter according to EN 50470 and our quality inspection is very accurate there might always be a possibility that your product shows a fault or failure for which we do apologize. Under normal conditions your product should give you years of benefit and pleasure. In case there is a problem with the energy meter you should contact your dealer immediately. All energy meters are sealed with a special seal. Once this seal is broken there is no possibility to claim for warranty. Therefore NEVER open an energy meter or break the seal of the energy meter. The warranty time is 5 year, after installation, and only valid for construction faults.

1.3 Performance criteria:

Operating humidity	≤ 75%
Storage humidity	≤ 95%
Operating temperature	-10°C - +50°C
Storage temperature	-30°C - +70°C
International standard	IEC 62053-21
Accuracy class	1
Protection against penetration of dust and water	IP51
Insulating encased meter of protective class	II

1.4 Meter specifications:

Meter type	PRO75D (LCD display)
Nominal voltage (Un)	230V AC
Operational voltage	0.7 ~ 1.3Un
Insulation capabilities:	
- AC voltage withstand	2KV for 1 minute
- Impulse voltage withstand	6kV – 1.2μS waveform
Basic current (Ib)	1.5A/5A/10A
Maximum rated current (Imax)	6A/60A/100A
Operational current range	0.4% Ib- Imax
Over current withstand	30Imax for 0.01s
Operational frequency range	50 ~ 60Hz ±10%
Internal power consumption	≤2W / 10VA
Test output flash rate (RED LED)	1600imp/kWh
Pulse output rate (pins 5 & 6)	1600imp/kWh
reverse indicator (RED LED)	Current reverse
Consumption indicator (RED LED)	Flashing at load running
Communication indicator(GREEN LED)	Flashing at communication running
Data communication port	RS485 and far infrared
Data save	The data can be stored more than 20 years when power off

1.5 RS485 communication specifications:

Bus type	RS485
Protocol	MODBUS RTU with 16 bit CRC
baud rate	1200 (default)
	2400, 4800,9600,19200 (on request)
Address range	0-255 user settable
Bus Loading	256 meters per bus
Rage	1200m

1.6 Infrared communication specifications:

infrared wavelengths	900- 1000nm
baud rate	1200bps(default) 9600(optional)
communication distance	5m
communication angle	-15°~+15°

protocol	MODBUS RTU with 16 bit CRC

1.7 Basic errors:

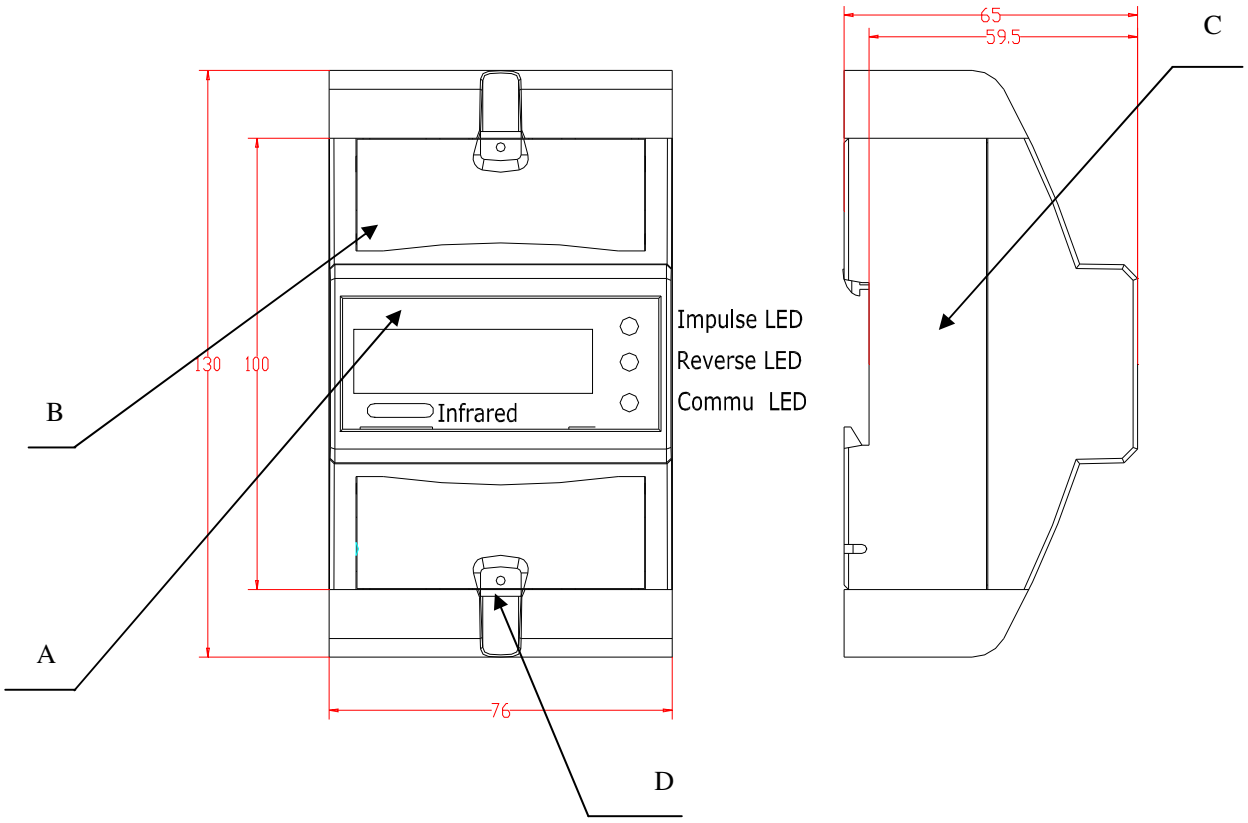
0.05Ib	Cosφ = 1	±1.5%
0.1Ib	Cosφ = 0.5L	±1.5%
	Cosφ = 0.8C	±1.5%
0.1Ib - Imax	Cosφ = 1	±1.0%
0.2Ib - Imax	Cosφ = 0.5L	±1.0%
	Cosφ = 0.8C	±1.0%

1.8 Description

A	Front panel
B	Cover
C	Base
D	Security hasp

Material

Front panel	PC inflammable retarding
Cover	ABS inflammable retarding
Base	ABS inflammable retarding



1.9 Dimensions

Height	130 mm
Width	76 mm

Depth	65 mm
Max diameter cable	11.5 mm (7.5mm with adaptor 1 and 4.9mm with adaptor 2)
Weight	0.2 Kg (net)

1.10 Installation

⚠ CAUTION

- Turn off all the power before working on it.
- Always use a properly rated voltage sensing device to confirm that power is off.

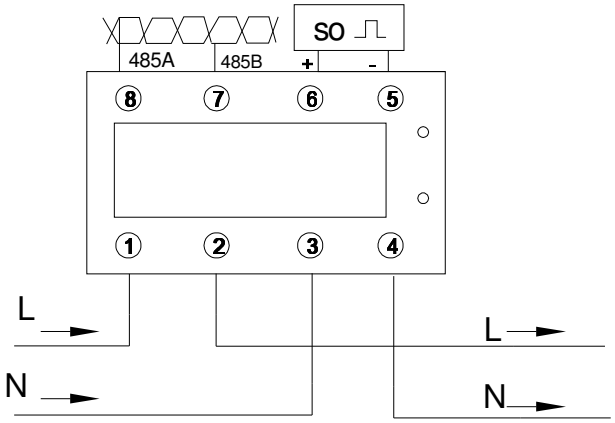
⚠ WARNING

- Installation should be performed by qualified personnel familiar with applicable codes and regulations.
- Use isolated tools to install the meter.
- Fuse or thermal cut-off or single-pole circuit breaker can't be fitted on the supply line and not the neutral line.
- Don't put your finger into the hole, because there is a screw inside.
- Please choose the available adapter which is supplied with the meter to suit the diameter of the cable.

- We recommend that the connecting wire which is used to connect the meter to the outside circuit should be sized according to local codes and regulations for the amp city of the circuit breaker or over current device used in the circuit.
- An external switch or a circuit-breaker should be installed on the inlet wire, which will be used as a disconnection device for the meter. And there it is recommended that the switch or circuit-breaker is near the meter so that it is more convenience for the operator. The switch or circuit-breaker should comply with the specifications of the building electrical design and all local regulations.
- An external fuse or thermal cut-off which will be used as a over-current protection device for the meter must be installed on the supply side wire, and it is recommended that the over-current protection device is near the meter so that it is more convenience for the operator. The over-current protection device should comply with the specifications of the buildings electrical design and all local regulations.
- This meter can be installed indoor directly, or in a meter box which is waterproof outdoor, subject to local codes and regulations.
- To prevent tampering, secure the meter with a padlock or a similar device.
- The meter has to be installed against a wall which is fire resistant.
- The meter has to be installed in a good ventilated and dry place.
- The meter has to be installed in a protection box when placed in dangerous or dusty environment.
- The meter can be installed and used after being tested and sealed with a letter press printing.
- The meter can be installed on a 35mm DIN rail or direct on a meter board with screws.
- The meter should be installed in an available height so that it is easy to read.
- When the meter is installed in an area with frequent surges due to e.q. thunderstorms, welding machines, inverters etc, protect the meter with Surge Protection Devices.

✧ After installation, the meter must be sealed to prevent tampering.

Connection of the wires should be done in accordance with the underneath connection diagram.



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

1.11 Operating

Consumption indication
There is a red LED which is used as indicating power consumption in the front panel of PRO75D. When the meter detect any consumption, the LED will flash. The more quickly the LED flashes, the more consumption there is. For this LED, the flash rate is indicated per kWh on the front panel

Reverse indication
There is a red LED which is used as indicating current reverse in the front panel

Communication indication
On the front panel of PRO75D is a COM. LED. When the data communicate between the far infrared port or RS485 port with outside equipment, the LED will blink.

Reading the meter
The PRO75D energy meter is equipped with a 5+2 LCD display. which is used for recording consumption and can't be reset to zero. The reading accuracy is 1/100 kWh. Another way to read out the meter is through RS485 and PC software or HHU(hand held unit)unit.

Pulse output
The PRO75D DIN rail energy meter is equipped with a pulse output which is fully separated from the inside circuit. That generates pulses in proportion to the measured energy for accuracy testing.

The pulse output is a polarity dependant, passive transistor output requiring an external voltage source for correct operation. For this external voltage source, the voltage (Ui) should is 5-27V DC, and the maximum input current (Imax) is 27mA DC. To connect the impulse output, connect 5-27V DC to connector 6 (anode), and the signal wire (S) to connector 5 (cathode). The meter pulses is indicated on the front panel.

Communication port
The PRO75D MODBUS is equipped with a far infrared port and a RS485 port. With this communication it is possible to program the meter's operation data or reading via these 2 ports. The protocol for communication conforms MODBUS RTU protocol.

Far infrared communication port
The far infrared communication port is on the left side of LCD screen. It is an infrared wireless communication port. The TP800 hand-held programmer can directly communicate the data between the meter and this port. The data transmission speed is 1200bps(default) 9600bps(option). The communication distance cannot be more than 5m.

Rs485 output
RS485 communication port is between the meter terminal 7 and 8.It is a synchronization wire port. If the meter is connected with terminal 7 and 8 to the PC , it can communicate with the meter directly.

1.12 Troubleshooting

⚠ CAUTION

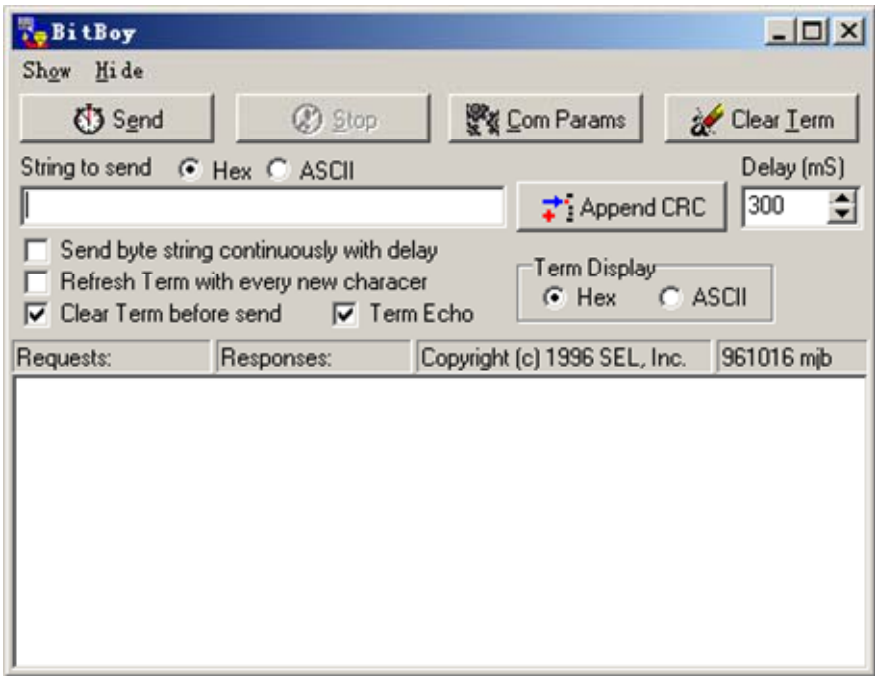
- During reparation and maintenance, do not touch the meter connecting clamps directly with your bare hands, with metal, blank wire or other material as you will have the chance of an electricity shock and a possible chance for health damage.
- Turn off and lock out all power supplying the energy meter and the equipment to which it is installed before opening the protection cover to prevent the hazard of an electric shock.

⚠ WARNING

- Maintenance or reparations should 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.

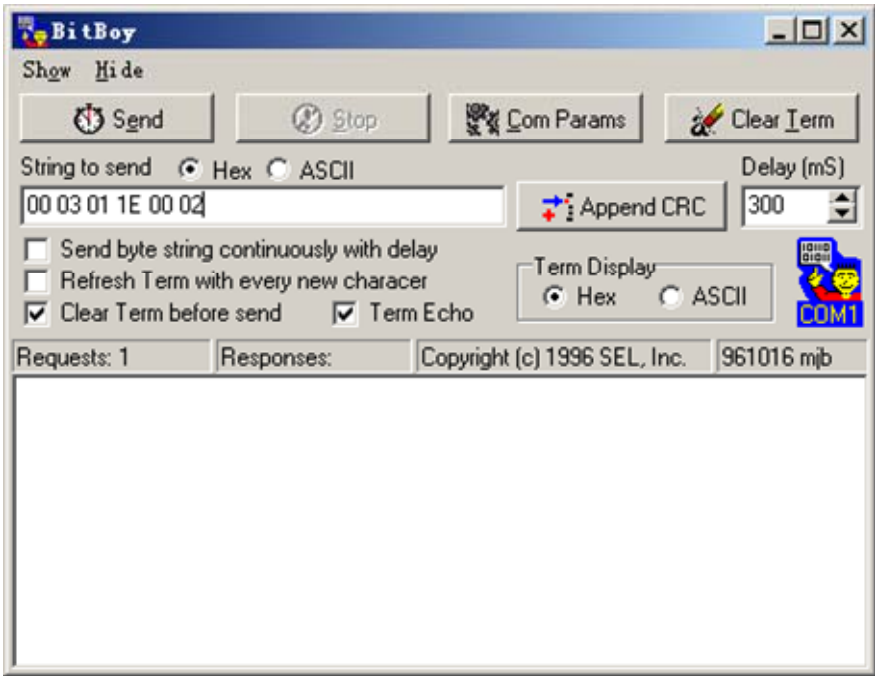
Problem	Check	Solution
No light for the consumption indicator (RED LED).	Is the load running ?	Only when load is running, this LED will flash.
	Is the operating power too low ?	If the operating power is too low, the spacing interval of the flashes will take some more time. This is why it seems that LED is not burning
	Maybe there is a fault in the inside circuit.	Please contact your technical support to replace this meter.
No light for the communication indicator(COM.LED)	Is there a power supply inside the meter?	Check that the power supply i
	Does any equipment outside communicate with the meter	Only when the communication between the meter's infrared port Or the RS485 port and the equipment outside, The LED will blink
	Maybe there is a fault in the inside circuit.	Please contact your technical support to replace this meter.
No communication of RS485 wire data with the meter	Is the meter ID correct?	Check and use the correct the Meter ID. After the meter finish the production, the Meter ID defaults to 0～67H ,69H～FFH .
	Is the communication distance too long?	Shorten the communication distance between the reading equipment outside and the meter. Keep sure it is not more than 1200m
	Is the connection wire to RS485 main wire too much	The equipment to connection with RS485 main wire is not more than 256pcs
	Is the RS485 port connection correct?	The correct connection is: the A signal wire of RS485 main wire to the meter terminal 8,the B signal wire of RS485 main wire to the meter terminal 7
	Maybe there is a fault in the inside circuit.	Please contact with technical support to replace this meter.

Problem	Check	Solution
No communication of the infrared wireless data with the meter	Is the meter ID correct?	Check and use the correct the Meter ID. After the meter finish the production, the Meter ID defaults to 0～67H ,69H～FFH .
	Is the communication distance too long?	Shorten the communication distance between the reading equipment outside and the meter. Keep sure it is not more than 5m
	Is the communication protocol correct?	Please contact the technical support department to get the meter communication protocol
	Is the connection Maybe there is a fault in the inside circuit.	Please contact with technical support to replace this meter.
The LCD energy register can't run.	Is the load running ?	Only when load is running, RED LED is burning continue, the LCD energy register will run.
	Is the operating power too low ?	If the operating power is too low, the spacing interval of the pulses will take some more time. This is why it seems like the LCD energy register can't run
	Maybe there is a fault in the inside circuit.	Please contact your technical support to replace this meter.
No pulse output.	Is DC power supply connected to the meter ?	Check the external voltage source (Ui) is 5-27V DC.
	Is the connecting correct ?	Check correct connecting: Connect 5-27V DC to connector 3 (anode), and the signal wire (S) to connector 2 (cathode).
	Maybe there is a fault in the inside circuit.	Please contact your technical support to replace this meter.
Pulse output rate wrong.	Maybe there is a fault in the inside circuit.	Please contact with technical support to replace this meter.



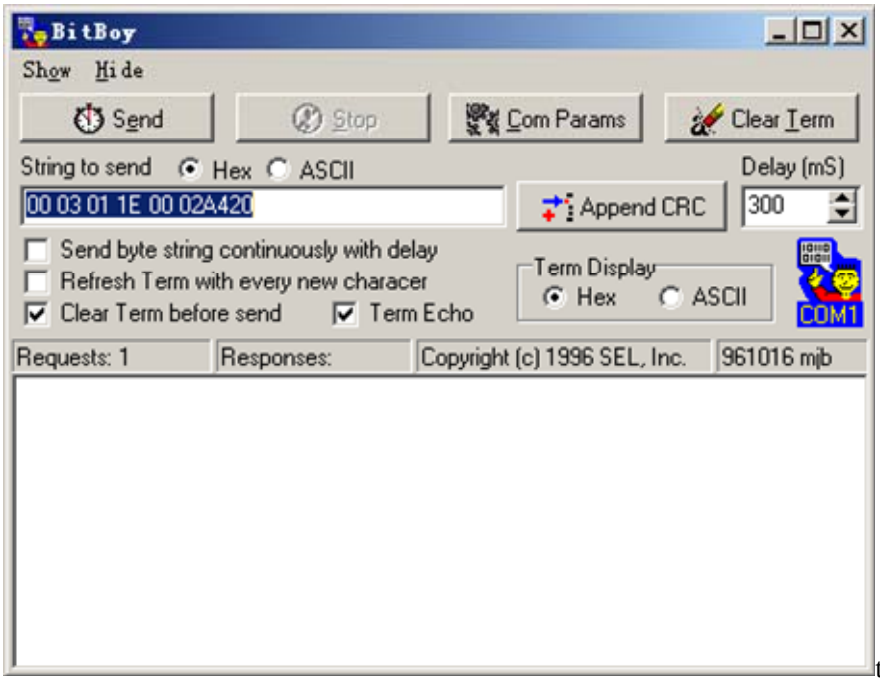
the default meter IP is 00

how to read the meter's used kWh?

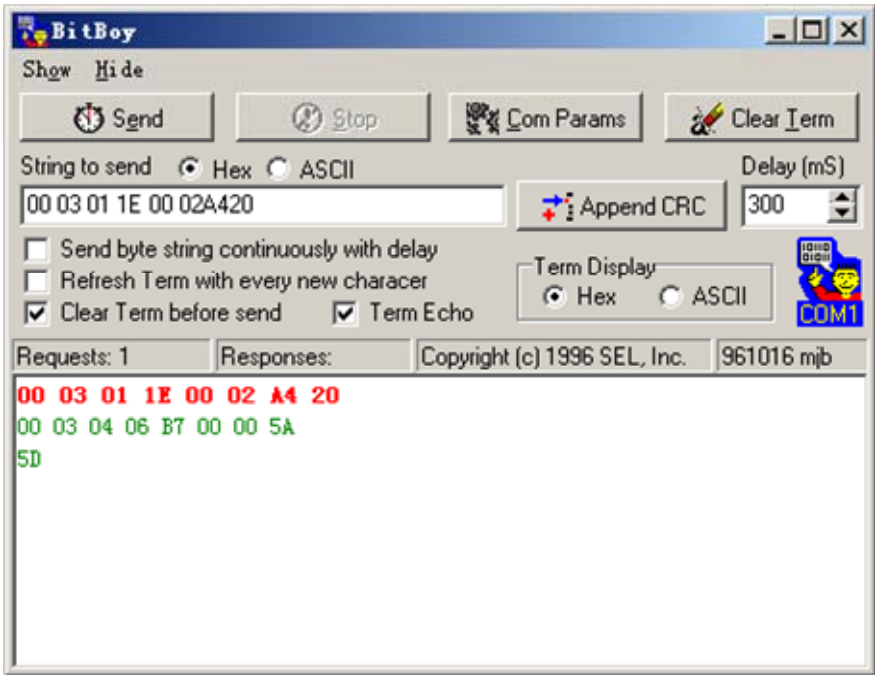


click Append CRC

you will see

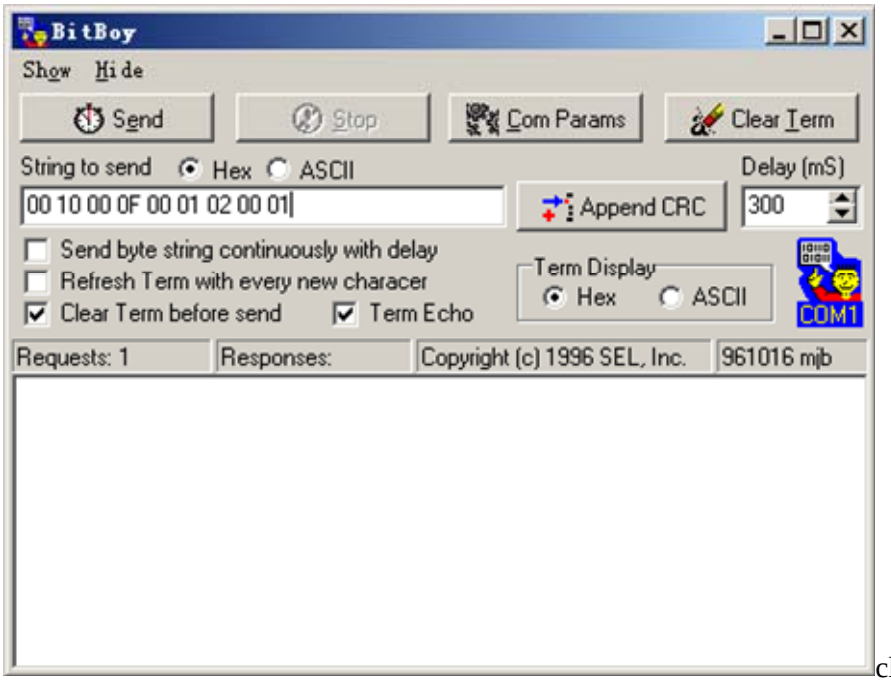


then click "send"

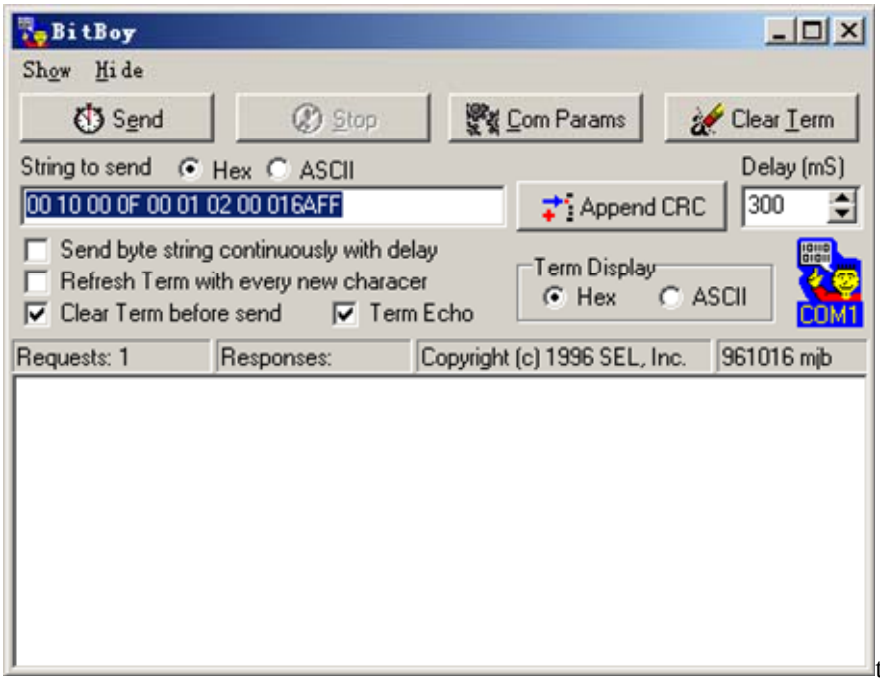


06 b7 refer to the used kWh. 06 b7 = 17.19kWh

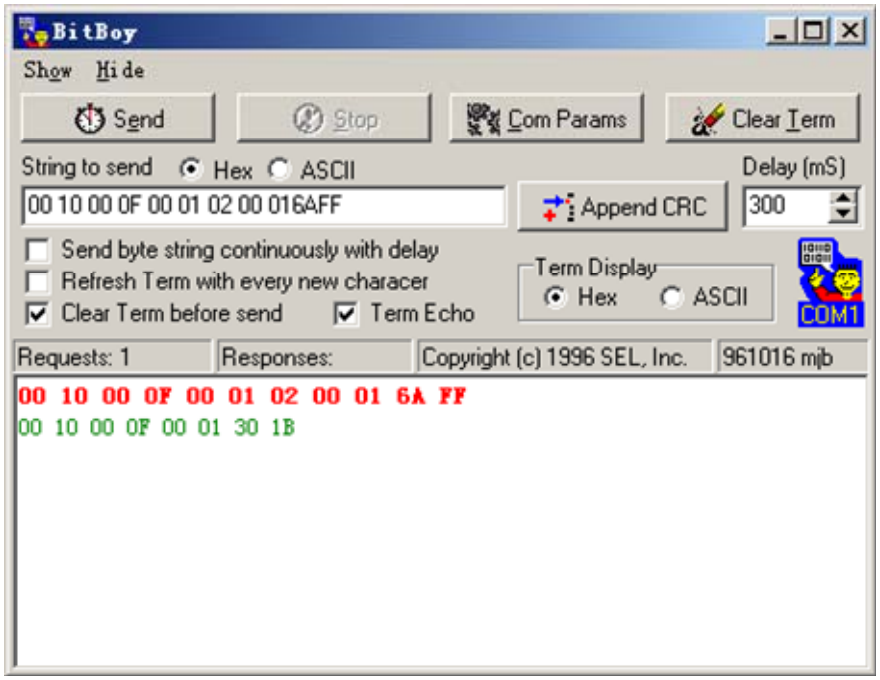
how to change the meter IP from 00 to 01?



click Append CRC

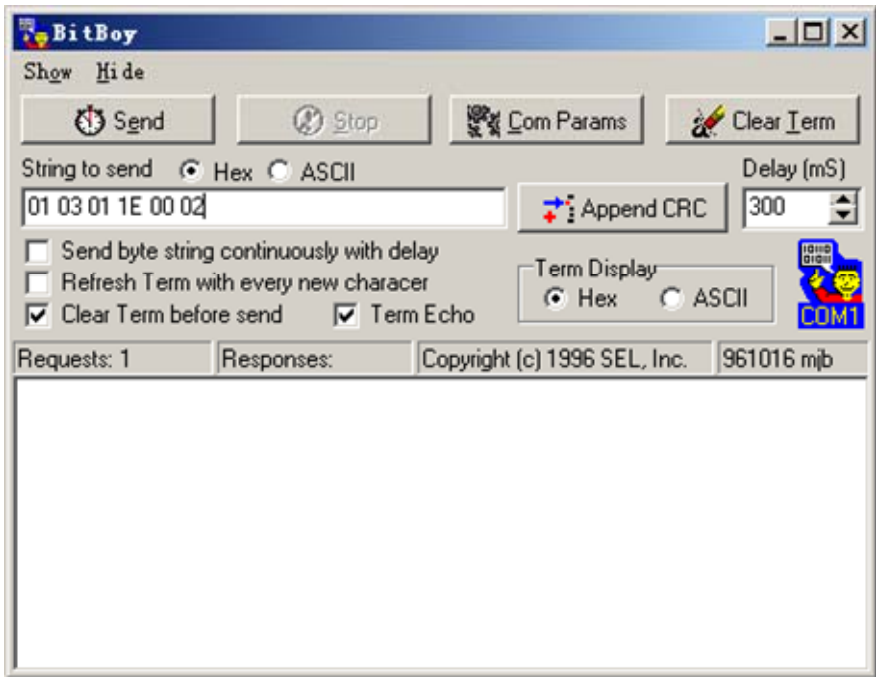


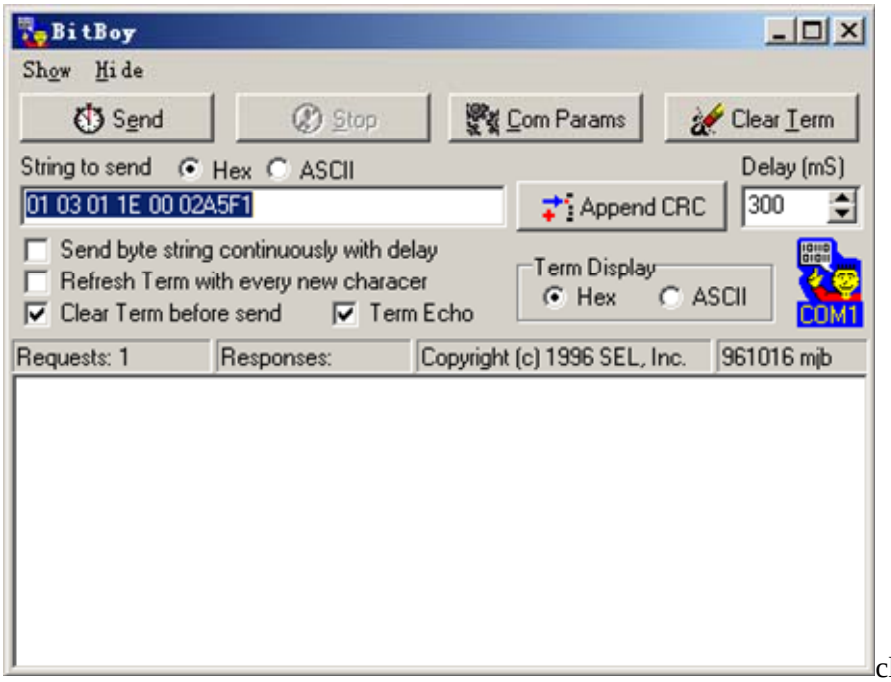
then click "send"



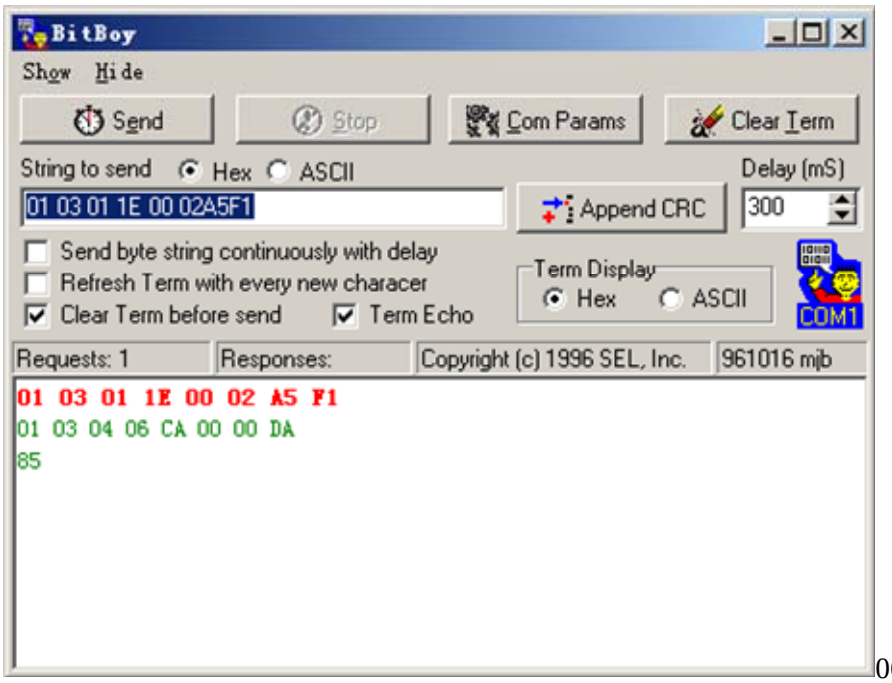
set sucessfully when you see the first digits is same to the original meter IP.

let's read meter 01's used kWh.



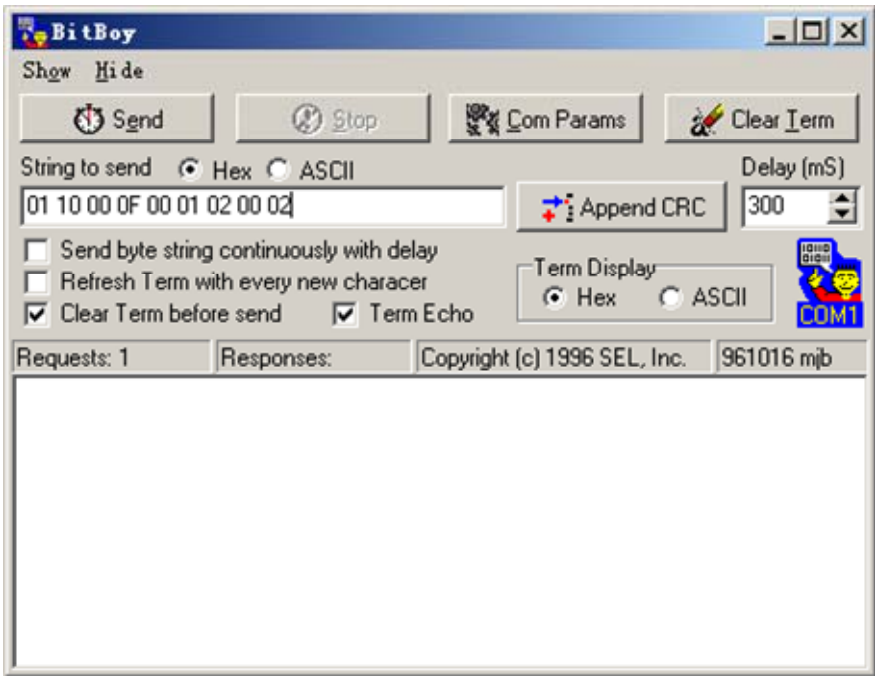


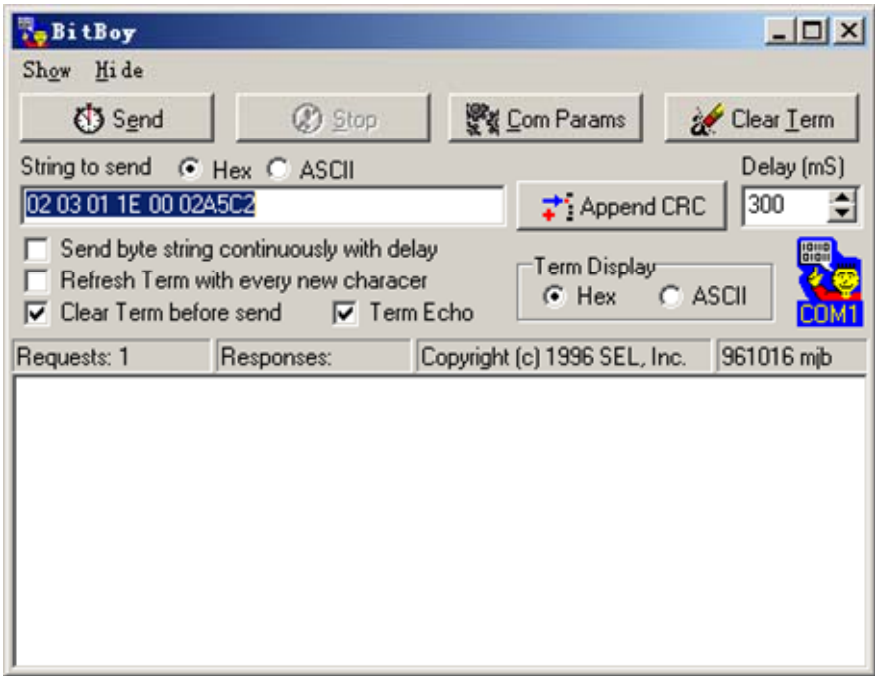
click "Send "

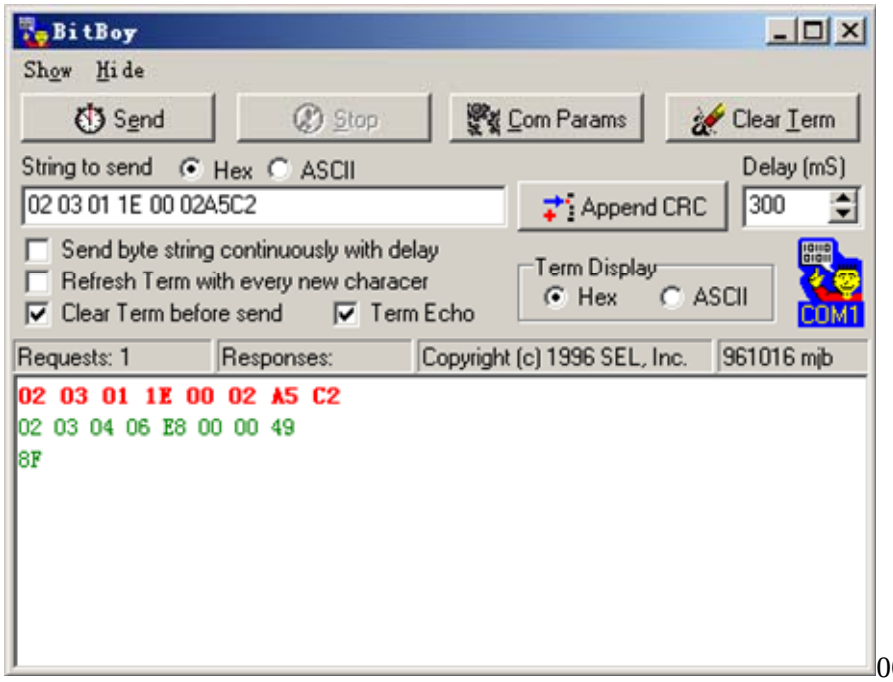


06 CA refer to the used kWh= 17.38

how to set meter IP 01 to 02


BitBoy
Show Hide
Send
Stop
Com Params
Clear Term
String to send
Hex
ASCII
Delay (mS)
01 10 00 0F 00 01 02 00 02
Append CRC
300
Send byte string continuously with delay
Refresh Term with every new character
Clear Term before send
Term Echo
Term Display
Hex
ASCII
COM1
Requests: 1
Responses:
Copyright (c) 1996 SEL, Inc.
961016 mjb


BitBoy
Show Hide
Send
Stop
Com Params
Clear Term
String to send
Hex
ASCII
Delay (mS)
02 03 01 1E 00 02A5C2
Append CRC
300
Send byte string continuously with delay
Refresh Term with every new character
Clear Term before send
Term Echo
Term Display
Hex
ASCII
COM1
Requests: 1
Responses:
Copyright (c) 1996 SEL, Inc.
961016 mjb



06 E8 refer to the used kWh = 17.68