

# PM-213x Quick Start Guide Ver. 1.6

## 1. PM-213x introduction

ICP DAS offers PM-213X family in a full range of Single-phase and Three-phase compact power meters for power monitoring. The products offer a rich feature set combined with easy-to-integrate communications. With its high accuracy (1%, PF=1), the PM213x series products can be applied both on low voltage primary side and/or medium/high voltage secondary side and enable the users to obtain in real time the reliable and accurate energy consumption readings from the monitored equipments while in operation. These compact size and cost effective Power Meters are equipped with revolutionary wired clip-on CT (various types support input current up to 200A) and standard Modbus communication RS-485 protocol for easy deployment. It works with input voltages ranging 10V ~ 500V, supporting a wide range of applications.

### 1.1. Caution & Warning



The meter contains hazardous voltages, and should never be disassembled. Failing to follow this practice will result in serious injury or death. Any work on or near energized meters, meter sockets, or other metering equipment could induce a danger of electrical shock. It is strongly recommended that all work should be performed only by qualified industrial electricians and metering specialist. ICP DAS assumes no responsibility if your electrical installer does not follow the appropriate national and local electrical codes.

ICP DAS assumes no liability for any damage resulting from the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, not for any infringements of patents or other rights of third parties resulting from its use.

### 1.2. Product Warranty & Customer Support

ICP DAS warrants all products free from defects in material and workmanship for a period of one year from the date of shipping. During the warranty period, we will, at our position, either repair or replace any product that proves to be defective. To report any defect, please contact : **+886-3- 597-3366** or [service@icpdas.com](mailto:service@icpdas.com).

#### 1.2.1. Limitation of Warranty

This warranty does not apply to defects resulting from unauthorized modification, misuse, or use for reason other than electrical power monitoring. The supplied meter is not a user-serviceable product.

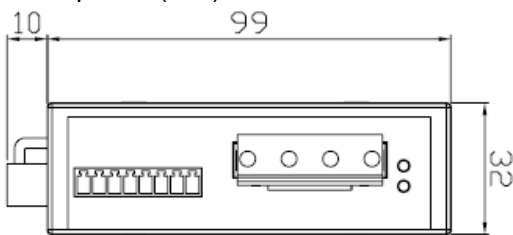
## 2. Installation

Please use the soft dry clothes to clean the instrument.

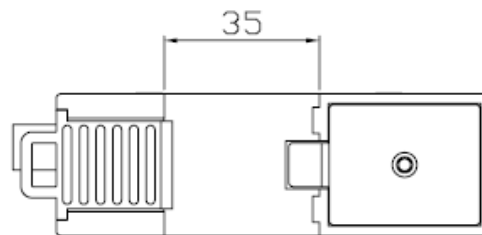
Please do not use any chemical or detergent or volatile solvents to clean the instrument, in order to avoid any possibility of the cover damage.

### 2.1. Dimension and Latch

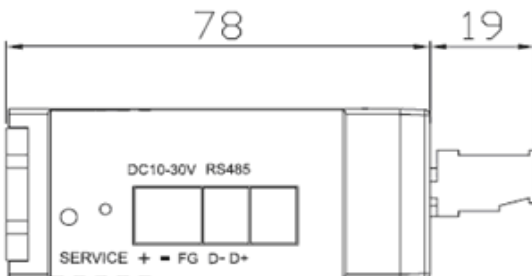
- Top view (mm)



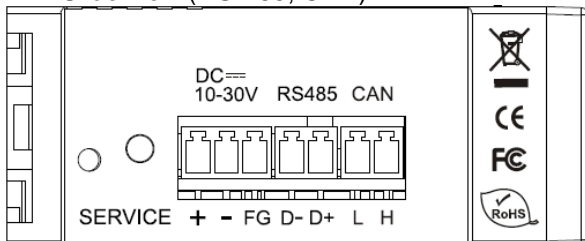
- Position of latch



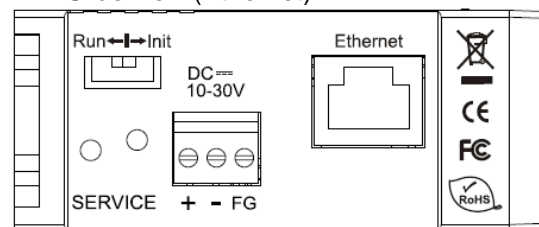
- Slide view



- Slide view (RS-485, CAN)



- Slide view (Ethernet)



- Dimension: 99mm ( length ) × 32mm ( wide ) × 78mm ( high )
- Products come with external split type clip-on CT's. Disconnect the CT's or use other CT's is highly prohibited.
- Please read this operation manual carefully before using.
- Please re-confirm the measure position.
- Reconfirm the RST(ABC) phase sequence of the power system.
- PM-213x series can be installed as rail mounting mode or embedded, no need to drill a hole or screw to fix it (rail mounting width can up to the length of 35 mm).
- Meter auxiliary power for PM-213x series is DC +10V ~+30V.

## 2.2. Voltage Input

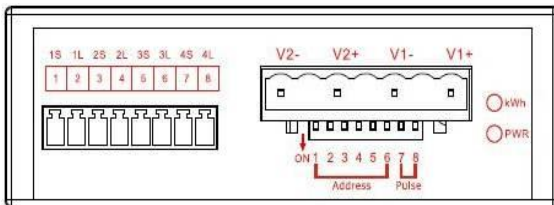
1. PM-2134 series: Input Voltage up to 300V,  
PM-2133 series: Input Voltage up to 500V.  
For any higher Input Voltage large than 500V, please add the PT(power transformer), and Change PT RATIO setup.
2. Confirm the RST (ABC) phase sequence.

## 2.3. Current Input

1. The external CT's are fragile, please handle with care.
2. The current input of PM213x series is in mA range. Only the ex-factory attached CT's can be used. The other CT's, for example, from panel will damage the instrument due to its large current (around 5A)
3. When more than one smart meters (PM-213x series) are installed, please do not disconnect the CT with its original meter and mix use with each other. Since each set of smart meter (PM213x series) and its attached split type clip-on CT are calibrated set by set. The mix use may cause wrong measurements.
4. To install CT's correctly, please ensure the CT lines sequences is right before clip the CT's onto the power cable of the monitoring equipment. (Detail will be found in next section)
5. **When measuring the current, the secondary circuit of a CT should never be opened when a load is passing through its primary. Make sure you always open the CT clip to detach the CT before removing the terminal lines. Otherwise, it will cause severe injury.**
6. Please handle with extra care, especially when the operation space of CT's is limited.
7. The current direction must follow K-L marked on CT's.
8. Please select the right size CT's for different size of monitoring equipment cables:  
power cable diameter <math>\Phi 10</math> use 60A CT ,  $\Phi 10\sim\Phi 16</math> use 100A CT ,  $\Phi 16\sim\Phi 24</math> use 200A CT .$$
9. The maximum current value can not exceed the CT rating.
10. For the consideration of accuracy, 3CT solution is highly recommended for the use in 3P3W compared with 2CT solution.

## 2.4. Connection

- PM-2134

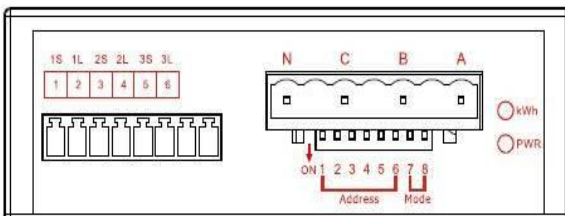


Please firstly check the current input terminal, and then in the white black, white black, white black, white black wired sequences (1S 1L 2S 2L 3S 3L 4S 4L). Then connect the CT's, and close the CT clip. Make sure the arrow direction sign on CT's follows current flow direction (K→L)

**Note: it must be in the same direction.**

Connect the voltage input terminal. For PM-2134, connect V2- V2+ and V1- V1+ .

- PM-2133



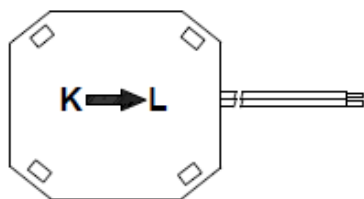
Please firstly check the current input terminal, and then in white black, white black, white black wire sequences (1S 1L 2S 2L 3S 3L). Then connect the CT's, and close the CT clip. Make sure the arrow direction sign on CT's follows current flow direction (K→L)

**Note: it must be in the same direction.**

Connect the voltage input terminal N C B A. for PM-2133, in the three phase order as follows on N C B A.

**Attention please!! For 3P3W, connect in N C A phase sequence, do not connect phase B (Check the diagram).**

## 2.5. CT's installation steps



Bottom view



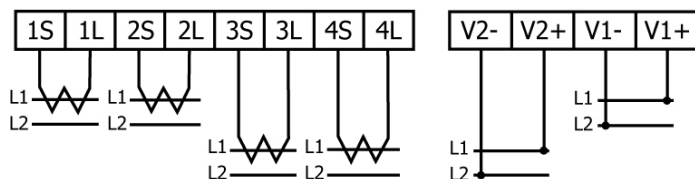
- At the bottom of the CT, there is a “K→L” mark.
- Open the CT clip.



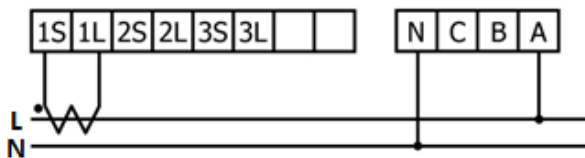
- Make sure the power current direction follow the “K→L” mark on the CT and then close the CT clip.
- Installation steps finished.

## 2.6. Wiring

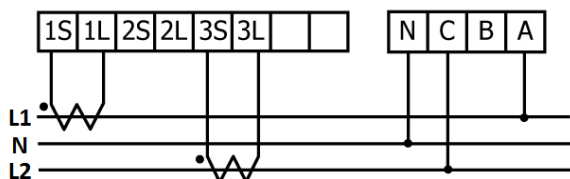
- 1P4W (PM-2134)



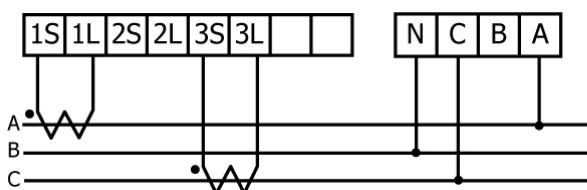
- 1P2W-1CT (PM-2133)



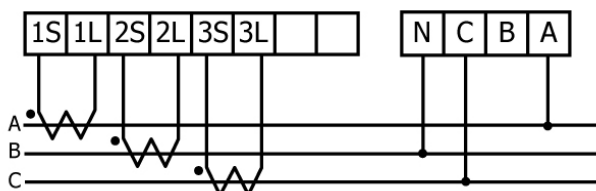
- 1P3W-2CT (PM-2133)



- 3P3W-2CT (PM-2133)



- 3P3W-3CT (PM-2133)

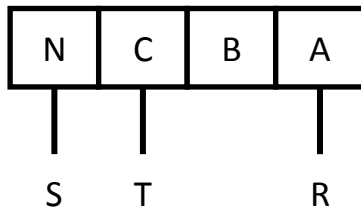




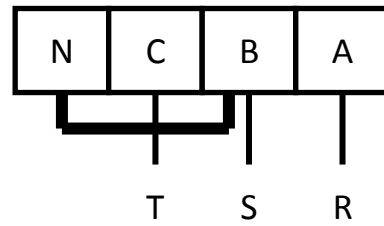
**Caution!**

If 3P3W/2CT & 3P3W/3CT, connect only "A N C" for the voltage input terminal , replace B with N

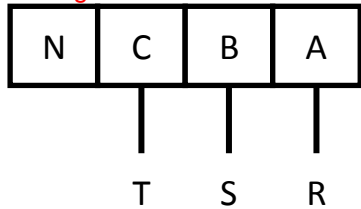
Correct :



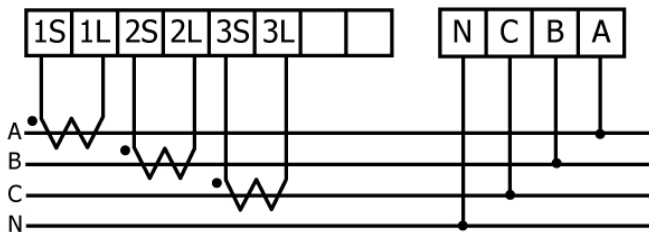
Correct :



Wrong :



- 3P4W-3CT(PM-2133)



### 3. Communication

#### 3.1. RS-485 setting

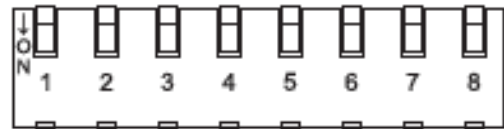
- Default setting for RS-485: **19200, n, 8, 1**
- DIP switch is used for Modbus address setting, default is 1, i.e. all OFF

**For example:** Modbus address is 10 · find the table of DIP switch 1-6 is

**ON, OFF, OFF, ON, OFF, OFF**

- SW1 – SW6 setting

Setting Modbus-RTU address for communication (1-64 )



Modbus Address	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
1	OFF	OFF	OFF	OFF	OFF	OFF
2	ON	OFF	OFF	OFF	OFF	OFF
3	OFF	ON	OFF	OFF	OFF	OFF
4	ON	ON	OFF	OFF	OFF	OFF
5	OFF	OFF	ON	OFF	OFF	OFF
6	ON	OFF	ON	OFF	OFF	OFF
7	OFF	ON	ON	OFF	OFF	OFF
8	ON	ON	ON	OFF	OFF	OFF
9	OFF	OFF	OFF	ON	OFF	OFF
10	ON	OFF	OFF	ON	OFF	OFF
11	OFF	ON	OFF	ON	OFF	OFF
12	ON	ON	OFF	ON	OFF	OFF
13	OFF	OFF	ON	ON	OFF	OFF
14	ON	OFF	ON	ON	OFF	OFF
15	OFF	ON	ON	ON	OFF	OFF
16	ON	ON	ON	ON	OFF	OFF
17	OFF	OFF	OFF	OFF	ON	OFF
18	ON	OFF	OFF	OFF	ON	OFF

19	OFF	ON	OFF	OFF	ON	OFF
20	ON	ON	OFF	OFF	ON	OFF
21	OFF	OFF	ON	OFF	ON	OFF
22	ON	OFF	ON	OFF	ON	OFF
23	OFF	ON	ON	OFF	ON	OFF
24	ON	ON	ON	OFF	ON	OFF
25	OFF	OFF	OFF	ON	ON	OFF
26	ON	OFF	OFF	ON	ON	OFF
27	OFF	ON	OFF	ON	ON	OFF
28	ON	ON	OFF	ON	ON	OFF
29	OFF	OFF	ON	ON	ON	OFF
30	ON	OFF	ON	ON	ON	OFF
31	OFF	ON	ON	ON	ON	OFF
32	ON	ON	ON	ON	ON	OFF
33	OFF	OFF	OFF	OFF	OFF	ON
34	ON	OFF	OFF	OFF	OFF	ON
35	OFF	ON	OFF	OFF	OFF	ON
36	ON	ON	OFF	OFF	OFF	ON
37	OFF	OFF	ON	OFF	OFF	ON
38	ON	OFF	ON	OFF	OFF	ON
39	OFF	ON	ON	OFF	OFF	ON
40	ON	ON	ON	OFF	OFF	ON
41	OFF	OFF	OFF	ON	OFF	ON
42	ON	OFF	OFF	ON	OFF	ON
43	OFF	ON	OFF	ON	OFF	ON
44	ON	ON	OFF	ON	OFF	ON
45	OFF	OFF	ON	ON	OFF	ON
46	ON	OFF	ON	ON	OFF	ON
47	OFF	ON	ON	ON	OFF	ON
48	ON	ON	ON	ON	OFF	ON
49	OFF	OFF	OFF	OFF	ON	ON
50	ON	OFF	OFF	OFF	ON	ON
51	OFF	ON	OFF	OFF	ON	ON
52	ON	ON	OFF	OFF	ON	ON
53	OFF	OFF	ON	OFF	ON	ON
54	ON	OFF	ON	OFF	ON	ON
55	OFF	ON	ON	OFF	ON	ON
56	ON	ON	ON	OFF	ON	ON
57	OFF	OFF	OFF	ON	ON	ON
58	ON	OFF	OFF	ON	ON	ON
59	OFF	ON	OFF	ON	ON	ON
60	ON	ON	OFF	ON	ON	ON
61	OFF	OFF	ON	ON	ON	ON
62	ON	OFF	ON	ON	ON	ON
63	OFF	ON	ON	ON	ON	ON
64	ON	ON	ON	ON	ON	ON

● SW7 – SW8 setting

PM-2134 : Select Wh pulse output

Wh pulse output	SW 7	SW 8
Wh1	OFF	OFF
Wh2	ON	OFF
Wh3	OFF	ON
Wh4	ON	ON

- PM-2133 : Select the different wiring mode  
(Please select the AUTO, if 1P2W or 1P3W are used)

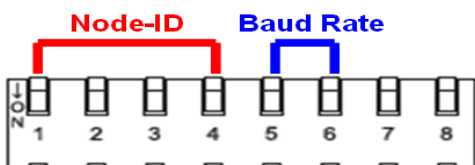
Wiring	SW 7	SW 8
Auto	OFF	OFF
3P3W and 2CT	ON	OFF
3P3W and 3CT	OFF	ON
3P4W	ON	ON

### 3.2. Ethernet setting

- Ethernet default settings:

IP Address	192.168.255.1
Subnet mask	255.255.0.0
Gateway	192.168.0.1

### 3.3. CAN bus setting



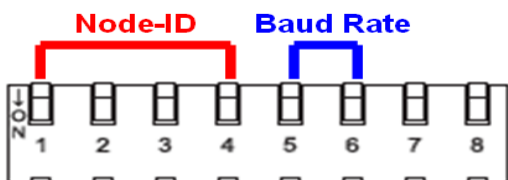
There are hardware Node-ID and software Node-ID in the PM-213x-CAN. The hardware Node-ID can be represented by DIP-Switch binary value with the first 4 pins. The relationship between the Node-ID and the DIP-Switch status is shown below.

- Node-ID and DIP-Switch 1 ~ 4

Address	1	2	3	4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
Software Node-ID	ON	ON	ON	ON

The range of Software Node-ID is 0 to 255(0xFF) and the default value is 255.

- The Baud Rate of CAN bus



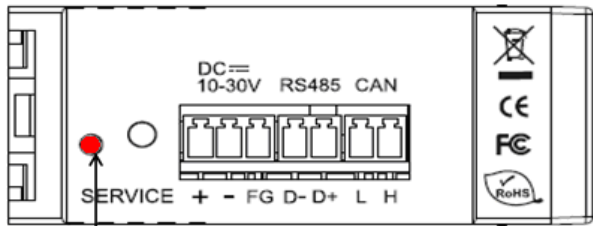
The DIP switch from pin 5 to pin 6 represents the CAN bus baud rate of the PM-213x-CAN. The mapping table is shown as below. The default baud rate value is 125K, and the corresponding DIP switch value from pin 5 to pin 6 is (OFF) (OFF).

- CAN bus baud rate and DIP switch 5 ~ 6

CAN baud-rate	5	6
125 k (Default)	OFF	OFF
250 k	ON	OFF
500 k	OFF	ON
Initial Mode	ON	ON

The "Initial Mode" is used to change the software Node-ID. At that moment, the meter could accept the command of changing software Node-ID by CAN bus with 500 kbps. The users cannot read other power meter data in the "Initial Mode". Please change the correct baud rate to make the power meter into the "Normal Mode".

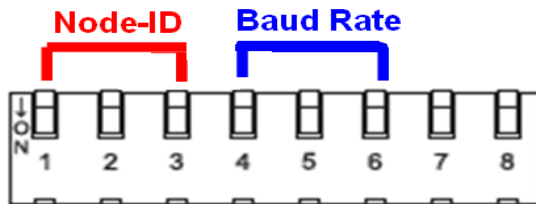
● **The LED State of CAN bus**



“LED of CAN” is an indicator LED of CAN bus in the PM-213x-CAN. It shows whether the CAN communication is normal or incorrect. The following figure shows the LED.

LED state	Description
Blinking state	The PM-213x-CAN communication is normal.
ON state	The PM-213x-CAN communication is error. The LED will be ON when the CAN bus occurs the following state. 1. The CAN controller transfer into Bus-off state. 2. The baud rate is incorrect. 3. The Rx or Tx error counter within CAN controller is not zero.

**3.4. CANopen setting**



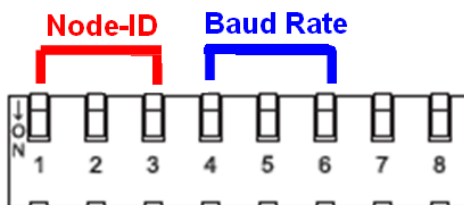
There are hardware Node-ID and software Node-ID in the PM-213x-CPS. The hardware Node-ID can be represented by DIP-Switch with the first 3 pins. The relationship between the Node-ID and the DIP-Switch status is shown below.

● **Node-ID and DIP-Switch 1 ~ 3**

Address	1	2	3
Software Node ID	OFF	OFF	OFF
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF
4	OFF	OFF	ON
5	ON	OFF	ON
6	OFF	ON	ON
7	ON	ON	ON

The range of Software Node-ID is 8 to 127(0x7F) and the default value is 8.

● **The baud rate of CAN bus**

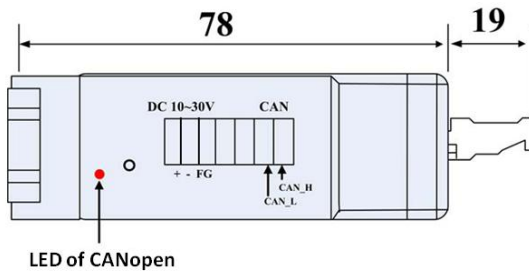


The DIP-Switch 4~6 represents the baud rate of the PM-213x-CPS.

● **CAN baud rate and DIP-Switch 4~ 6**

CAN baud rate	4	5	6
10 k	OFF	OFF	OFF
20 k	ON	OFF	OFF
50 k	OFF	ON	OFF
125 k (Default)	ON	ON	OFF
250 k	OFF	OFF	ON
500 k	ON	OFF	ON
800K	OFF	ON	ON
1000kbps	ON	ON	ON

● **The LED state**



LED of CANopen” is an indicator LED of CANopen state in the PM-213x-CPS. It shows whether the CANopen operation state is. The following figure shows the LED.

No.	Signal	State	Description
1	No Light	Non-operation	Malfunction or Power Supply/Connection not ready
2	Single Flash	Stopped	The device is in Stopped state
3	Blinking	Pre-operation	The device is in the pre-operation state
4	Continuing Light	Operation	The device is in the operational state

