

PM-213x-CAN

CAN Bus Quick Start User Guide

1. Introduction

1.1 Overview

The PM-213x-CAN series power meter built-in the CAN bus interface. Therefore, users can easily apply in any CAN applications via the PM-213x-CAN.

Hardware Structure

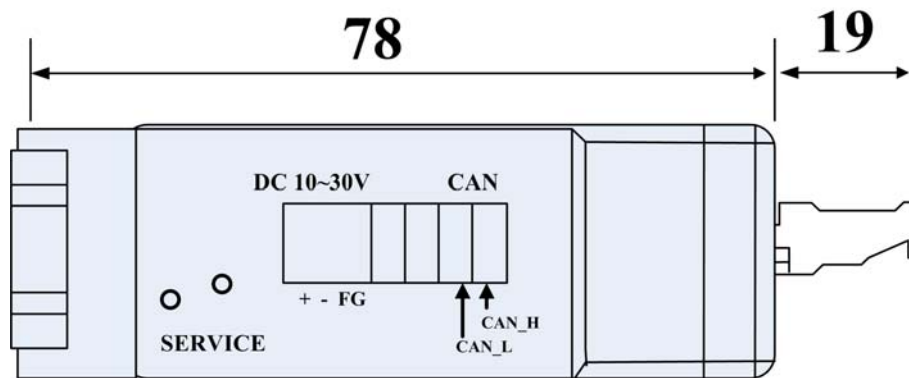
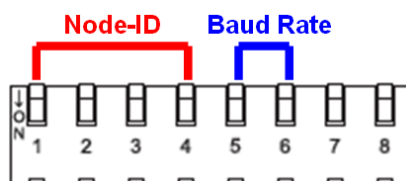


Figure 1-1 (Flank View)

2. DIP Switch of PM-213x-CAN

2.1 The Node-ID of CAN bus.



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

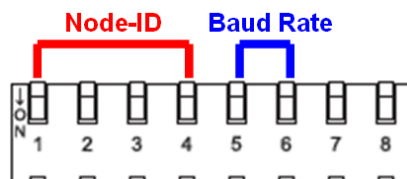
Node-ID and Dip-Switch 1 ~ 4.

Node-ID	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

Table 2-1

When those 4 pins DIP-Switch are all (ON), the actual Node-ID is the value which has been configured by command. The software Node-ID can be represent from 0 to 255(0xFF).

2.2 The baud rate of CAN bus



The Dip-Switch 5 and 6 represents the baud rate of the PM-213x-CAN.

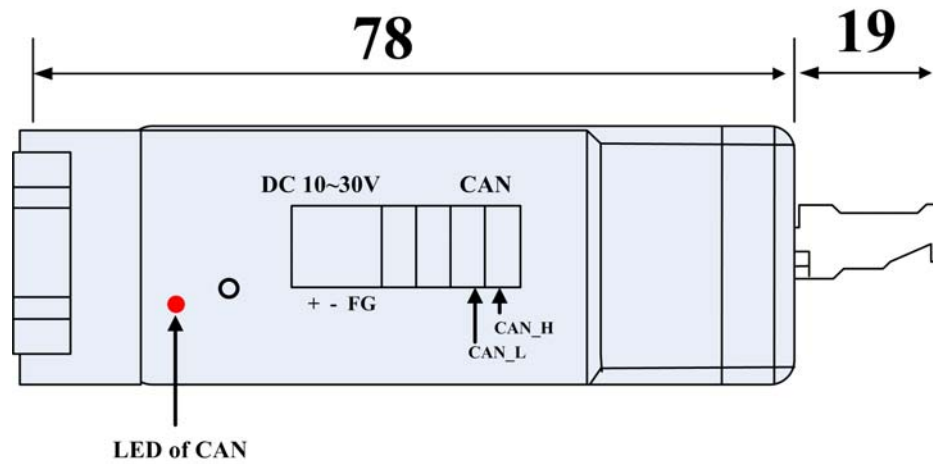
CAN baud rate and Dip-Switch 5~ 6.

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

Table 2-2

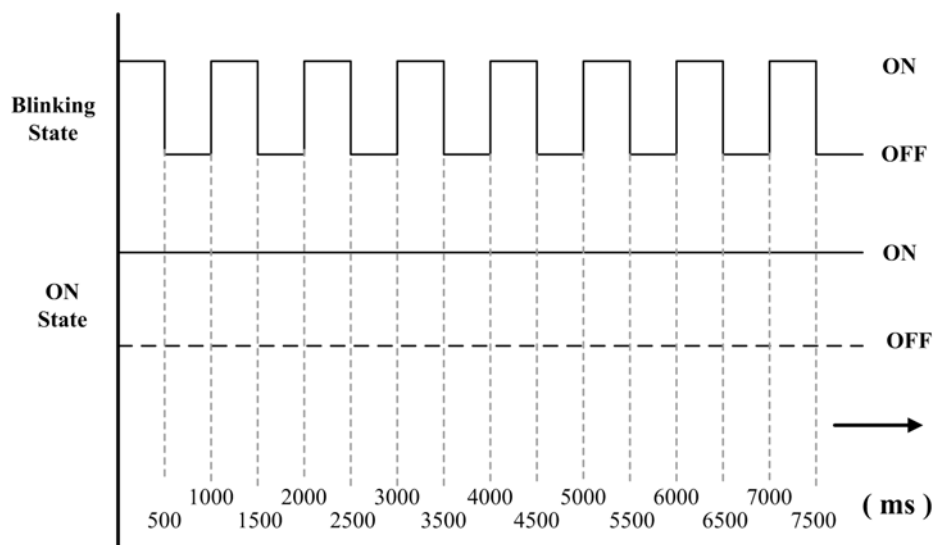
2.3 The LED state

‘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 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.

Table 2-3 CAN LED State



3. CAN Protocol

3.1 Specification

- Node-ID : 0 ~ 255.
- Baud Rate: 125k, 250k, 500k bps.
- Support Polling Mode and Auto Response Mode

Integer (2-bytes)

Data Low Word	Data Hi Word
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DWORD (4-bytes)

Data Low Word	Data Low Word	Data Hi Word	Data Hi Word
Hi byte	Low byte	Hi byte	Low byte

CAN-ID Definition (29-bits)

28 24	23 16	15 0
Function-ID(5-bits)	Node-ID(8-bits)	Value-ID(16-bit)

Function-ID Field Description

Function ID (5-bits)	Description
11000(0x18)	Read Data Request
00000(0x00)	Data Response
10000(0x10)	Get / Set Auto Response Parameters
11101(0x1D)	Read Firmware Version
11110(0x1E)	Set Software Node-ID

Node-ID Field Description

Node-ID (8-bits)	Description
0x00 ~ 0xFF (0 ~ 255)	Node-ID value (0 ~ 255)

Value-ID Field Description (Please refer to the Table 3-1)

Value-ID (16-bits)	Description
0x1100 ~ 0x1146	For corresponding data
0xFFFF	For parameter request command
0xEEEE	For parameter response data

3.2 Polling Mode

The user can use this command to acquisition information of PM-213x-CAN which are described in the Value-ID of Table3-1.

Request: (# represents the optional value. “NA” means “Not Available”)

29-bit CAN-ID (bit)			RTR	Data Len.	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
0x18	0x##	0x#####	1	0	NA							

Response: (# represents the optional value)

29-bit CAN-ID (bit)			RTR	Data Len.	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
0x00	0x##	0x#####	0	8/4	##	##	##	##	##	##	##	##

3.3 Auto Response Mode.

3.3.1 Set Auto Response Parameters.

The user can use this command to set parameter into PM-213x-CAN, and then it will return information according the ID-Flag and Cyclic-Time automatically.

Request: (# represents the optional value)

29-bit CAN-ID (bit)			RTR	Data Len.	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
0x10	0x##	0xFFFF	0	8	##	##	##	##	##	##	##	##

The CAN data value format definition

D0	D1	D2	D3	D4	D5	D6	D7
Enable Flag	Cyclic-Time LLSB	Cyclic-Time LSB	Cyclic-Time MSB	Cyclic-Time MMSB	ID-Flag	ID-Flag	ID-Flag

(1) The D0 means that the user could turn on/off the auto response function.

D0 → 0xFF = Enable , 0x00 = Disable ◦

(2) The D1 to D4 means how much time of the corresponding data would be sent out automatically.

D1 ~ D4 → Cyclic Time(100ms ~ 0xFFFFFFFF ms) ◦

(3) The D5 to D7 represents the selected/unselected flags of all No of Value-ID in Table 3-1. The users could set the corresponding bit to ONE (1) or ZERO (0) to select or unselect the Value-ID. The corresponding bit sets to ONE (1) means that the Value-ID is selected in this command. The corresponding bit sets to ZERO (0) means that the Value-ID is unselected in this command. Here shows the corresponding bits and No. of the Value-ID.

D5 ~ D7 (ID-Flag)

	D5	D6	D7
8-bit	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0	7 6 5 4 3 2 1 0
ID-Flag	01,02,03,04,05,06,07,08	09,10,11,12,13,14,15,16	17,18,19,20,--,--,--,--

Response: (# represents the optional value. “NA” means “Not Available”)

29-bit CAN-ID (bit)			RTR	Data Len.	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
0x10	0x##	0xEEEE	1	0	NA							

3.3.2 Get Auto Response Parameters.

The user can use this command to read the parameters of the auto response in the PM-213x-CAN.

Request: (# represents the optional value. “NA” means “Not Available”)

29-bit CAN-ID (bit)			RTR	Data Len.	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
0x10	0x##	0xFFFF	1	0	NA							

Response: (# represents the optional value)

29-bit CAN-ID (bit)			RTR	Data Len.	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
0x10	0x##	0xEEEE	0	8/4	##	##	##	##	##	##	##	##

The D0 ~ D7 format is same as the “Set Auto Response Parameters” in ch 3.3.1.

3.4 The Value-ID and Power Meter Data Table

The Value-ID and power meter data table is shown in Table 3-1.

The D0 to D7 represents the CAN message from Data 0 to Data 7

No.(ID-Flag)	Value-ID	Data-Length	D0 ~ D3	D4 ~ D7
1	0x1100	8	Volt(V_a)	Amp(I_a)
2	0x1104	8	kW(Kw_a)	kvar(kvar_a)
3	0x1108	8	kVA(Kva_a)	PF_a
4	0x110C	8	kWh_a	kVAh_a
5	0x1110	4	kvarh_a	
6	0x1112	8	Volt(V_b)	Amp(I_b)
7	0x1116	8	kW(Kw_b)	kvar(kvar_b)
8	0x111A	8	kVA(Kva_b)	PF_b
9	0x111E	8	kWh_b	kVAh_b
10	0x1122	4	kvarh_b	
11	0x1124	8	Volt(V_c)	Amp(I_c)
12	0x1128	8	kW(Kw_c)	kvar(kvar_c)
13	0x112C	8	kVA(Kva_c)	PF_c
14	0x1130	8	kWh_c	kVAh_c
15	0x1134	4	kvarh_c	
16	0x1136	8	Volt(V_d)	Amp(I_d)
17	0x113A	8	kW(Kw_d)	kvar(kvar_d)
18	0x113E	8	kVA(Kva_d)	PF_d
19	0x1142	8	kWh_d	kVAh_d
20	0x1146	4	kvarh_d	

Table 3-1

4. CAN Protocol Examples

4.1 Polling Example

Polling mode

If users want to read V_a and I_a information from PM-213x-CAN, they can set the CAN-ID = 0x18011100 to read the data.

For example, if the Node-ID of the PM-213x-CAN is 0x01, the command is as below:

29-bit CAN-ID (bit)			RTR	Data Length	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
28~24	23 ~16	15 ~ 0										
0x18	0x01	0x1100	1	0	NA							

Master → **Slave (PM-213x)**

29-bit CAN-ID (bit)			RTR	Data Length	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
28~24	23 ~16	15 ~ 0										
0x00	0x01	0x1100	0	8	E8	BA	42	DB	0C	1D	3F	10

Master ← **Slave (PM-213x)**

4.2 Set Auto Response Parameter Example

Set Auto Response Parameter

For Example, users need some PM-213x-CAN information to response every 1 second automatically. The PM-213x-CAN data are the Value-ID (0x1110, 0x1112, 0x1116, 0x111A, 0x112C, 0x1130, 0x1134, 0x1136).

For example, if the Node-ID of the PM-213x-CAN is 0x01, the command is as below:

29-bit CAN-ID (bit)			RTR	Data Length	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
28~24	23 ~16	15 ~ 0										
0x10	0x01	0xFFFF	0	8	FF	E8	03	00	00	0F	0F	00

Master → **Slave (PM-213x)**

29-bit CAN-ID (bit)			RTR	Data Length	8-byte Data (byte)							
Func. ID	Node-ID	Value ID			D0	D1	D2	D3	D4	D5	D6	D7
28~24	23 ~16	15 ~ 0										
0x10	0x01	0xEEEE	1	0	00	00	00	00	00	00	00	00

Master ← **Slave (PM-213x)**