1 CAN Protocol Specification

About this chapter

Megmeet rectifier modules support CAN (Controller Area Network) communication protocol. The monitoring unit supports functions of control, configuration and query etc. via the CAN bus.

CAN bus with the extended frame format CAN2.0B (Can Specification2.0 Part B) is adopted.

All the data are sent in the order of high- low byte.

The communication baud rate is 125kbps.

The frame format of CAN2.0B is as below:

frame start delimiter	**arbitration field**					**control field**		**data field**	**check code**	**frame end delimiter**
SOF	ID	SRR	IDE	ID	RTR	reserved	data length	data	CRC	EOF
/	11 bits	/	/	18 bits	/	/	/	8 bytes	/	/

Controllable parts used in practical use:

ID domain：29 bits	**data domain: 8 bytes**
frame identifier	data

1.1 ID Domain

The message format of ID domain is defined as follows:

ID domain																											
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
protocol number (6 bits)						sub-node address (7 bits)							Command ID & message ID (8 bits)								M/S	reserved bit, 1 must be filled in						CNT

Details are as below:

Protocol No. (6 bits)

0x21: communication protocol number between the rectifier and the monitoring unit

Sub-node address (7 bits)

It defines the sub-node address in frame transmission. When the master node serves as the sender, it means the address of the targeted slave node; conversely, it means the address of the slave node itself.

0x00: it represents the broadcast address, meaning all the sub-nodes with the same protocol number shall receive and approach this frame.

Command ID & Information ID (8 bits)

They're used to identify information of the communication frame.

0x80：Control command ID

0x81：Configuration command ID

0x82：Query command ID

0x40：All real-time data query

0x50：Inherent information query

M/S（1 bit）

It's used to identify where the communication frame come.

0x0：It means sending from the sub-node.

0x1：It means sending from the primary node.

CNT（1 bit）

It's used to determine whether there's subsequent frame data.

0x0: it means the last part of the data.

0x1: it means the next data is included.

In the case that only one frame needs to be transmitted, CNT=0x0.

1.2 Data Domain

The message format of data domain is defined as follows:

data domain		
error type	signal ID	signal

data domain							
4 bits	12 bits	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7

1.2.1 Error Type

Table 1-1 Error Type

error type(4 bits)	description
0x0	no error, normal response
0x1	parameter error

0x2	invalid command
0x3	address identification is in progress
0x4	electric tag is not input
0x5	hardware fault of electronic tag input
0x6	loading interruption of the rectifier module
0x7	the rectifier module is regulating the voltage automatically
0x8	equipment cabinet address conflict

1.2.2 Signal ID

Table 1-2 Signal ID

signal ID	signal description	data type	note	default value	（W/R）	EEPROM
0x001	feature words of the rectifier module	III	see the corresponding attachment for details		W/R	YES
0x005	software & hardware version number	VII/VII/VII	see hardware and software version numbers for details		W/R	YES
0x100	DC output voltage setting value	I	48V voltage regulation range （41.5V~58.5V）	53.5V	W/R	
0x101	default output voltage	I	voltage regulation range（48V~58V）	53.5V	W/R	YES
0x102	DC output over-voltage protection point	I	48V setting range （56V~60.5V）	59.5V	W/R	YES
0x103	DC output current limit setting value	I	（0~1.22）rated current	1.22	W/R	
0x104	default current limit point	I	（0~1.22）rated current	1.22	W/R	YES
0x109	AC current limit setting & enabling	A：V B：I	A： 0 means prohibition， 1 means enabling B：0~100A	1/100A	W/R	YES (no storage for A)

0x10C	WALK-IN time	II	unit: s (8s~200s) 0 means prohibition	0 prohibitio n	W/R	YES
0x10D	sequential startup interval	II	unit: s (0s~200s) 0 means prohibition	0 prohibitio n	W/R	YES
0x10E	overall operation time	II	unit: hour	0	W/R	YES
0x132	module on/off control(being off completely)	V	0:on 1:off	0:on	W	
0x133	reset control of over-voltage lock	V	0：prohibition 1：reset	0: prohibitio n	W	
0x135	green light flickering control for communication	V	0: prohibition 1: reset	0: prohibitio n	W	
0x13A	address distribution control	V	0: prohibition 1: reset	0: prohibitio n	W	g_uiAdd Identify Flag
0x13B	actions setting after AC phase loss Description: only for three-phase input module(for example R48100G)	V	0: off 1: half load	0: off	W	YES
0x140	indicator control	A：V	see the corresponding attachment for more details	0: automatic (uncontrol led)	W	
0x141	phase loss enabling control description: only for modules with three-phase input(for example R48100G)	V	0: prohibition 1: allowed	0:prohibiti on	W	YES
0x142	alarm shielding	III	see the corresponding attachment for more details		W	
0x143	For communication interruption with the monitoring unit, the yellow light warning is shielded. Description: only for US clients and tools for backstage is	V	0:unshielded 1: shielded	0: unshielde d	W	YES

	configured specially.					
0x170	input power	I	W		R	
0x171	input frequency	I	Hz		R	
0x172	input current	I	A		R	
0x173	DC output power	I	W		R	
0x174	real-time efficiency	I	100%		R	
0x175	DC output voltage measuring value	I	V		R	
0x176	actual output current limit point	I	100% rated current		R	
0x177	actual output power limit point	I	100% power with full load		R	
0x178	input voltage of single phase module	I	V		R	
0x179	phase a voltage description: only for the module with three-phase input(R48100G)	A：VII B：I	V	B 0: no phase loss； 1: phase loss	R	
0x17A	phase b voltage description: only for the module with three-phase input(R48100G)	A：VII B：I	V	B 0: no phase loss； 1: phase loss	R	
0x17B	phase c voltage description: only for the module with three-phase input(R48100G)	A：VII B：I	V	B 0: no phase loss； 1: phase loss	R	
0x180	ambient temperature of air inlet	I	℃		R	
0x182	output current display value	I	A		R	
0x183	current alarm/status	IV	see the corresponding attachment for more details		R	
0x184	output external voltage	I	V		R	
0x188	rated current	VII	A The reported value is the actual rated current value ×100		R	

			For example, the reported value of 100A module is 100×100=10000.			

0x301	client information 1	II	ASCII code is converted for the host computer		W/R	YES
0x302	client information 2	II	ASCII code is converted for the host computer		W/R	YES
0x303	client information 3	II	ASCII code is converted for the host computer		W/R	YES
0x304	client information 4	II	ASCII code is converted for the host computer		W/R	YES
0x305	client information 5	II	ASCII code is converted for the host computer		W/R	YES
0x306	client information 6	II	ASCII code is converted for the host computer		W/R	YES
0x307	client information 7	II	ASCII code is converted for the host computer		W/R	YES
0x308	client information 8	II	ASCII code is converted for the host computer		W/R	YES

1.2.3 Signal Content

Data Type Description

The definition of the signal content format depends on the data type definitions in table 1-3:

Table 1-3 Data Type Description

data type	description
I	4 bytes fixed-point number（IQ10：2^10）
II	4 bytes integer number（IQ0：2^0）
III	4 bytes defined by the bit

IV	6 bytes defined by the bit
V	1 byte integer number
VI	2 bytes fixed-point number（IQ10：2^10）
VII	2 bytes integer number（IQ0：2^0）

The single signal with four bytes is sent in the way as below:

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0		four bytes variables			

The single signal combined with four bytes and two bytes is sent in the way as below:

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
2 bytes variables		4 bytes variables			

The single signal with one byte is sent in the way as below:

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0	1 byte variable	0			

Feature Words of Rectifier Module (Signal ID: 0x001)

The same type of modules share some common features, including the powering method, number of AC phase, AC voltage type, rated power, rated efficiency, output voltage type and hardware version etc., all software versions of the module with the same feature words are forward compatible; The monitoring unit can use the feature words to load online and identify the same type of modules; However, if the software version is incompatible due to hardware changes, the hardware version information in the feature word must be modified.

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
		feature words of the rectifier module			

feature words of the rectifier module																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
powering method		number of AC phase		input voltage		rated output current										output voltage type			efficiency type				minor version of hardware				major version of hardware			reserved	
00: single power supply **01**: double power supply		**00**: single phase **01**: three-phase		**00**: 220V AC **01**: 110V AC **11**: stands for AC input/DC input/photovoltaic input		1 stands for 0.5A 0~1023 stands for 0~511.5A for example: 50A (100 is 0x64): 00 0110 0100										**000**: 48V **001**: 24V **010**: 60V **011**: 48V/60V			**0000**: <90% **0001**: (90~91)% **0010**: (91~92)% **0011**: (92~93)% **0100**: (93~94)% **0101**: (94~95)% **0110**: (95~96)% **0111**: (96~97)% **1000**: (97~98)% **1001**: (98~99)% **1010**: >99%				minor hardware versions of each module shall be defined accordingly				**000~111 stands for the 1st generation to the 7th generation products respectively**			2	

Version Number of Software & Hardware (Signal ID: 0x005)

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
hardware version number		software version number 1 (DC/DC)		software version number 2(PFC)	

Current alarm/status (Signal ID: 0x183)

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
current alarm of the rectifier module/state word extension definition		current alarm of the rectifier module/state word extension definition			

current alarm of the rectifier module/state word extension definition		
Bit0	output over-voltage deadlock alarm	alarm: 1
Bit1	environment temperature over-temperature alarm	arm: 1
Bit2	module fault alarm	alarm: 1
Bit3	protection alarm	alarm: 1
Bit4	fan fault alarm	alarm: 1
Bit5	reserved	
Bit6	reserved	
Bit7	reserved	
Bit8	low-temperature shutdown alarm	alarm: 1
Bit9	module shutdown status	shutdown: 1
Bit10	reserved	
Bit11	WALK-IN enabling	enabling: 1
Bit12	over-temperature alarm inside	alarm: 1
Bit13	reserved	
Bit14	output over-voltage protection alarm	alarm: 1
Bit15	reserved	
Bit16	sequential starting function enabling	enabling: 1
Bit17	input under-voltage alarm	alarm: 1
Bit18	AC unbalance alarm	alarm: 1
Bit19	AC phase loss alarm	alarm: 1
Bit20	severe current unbalance warm caused by the fact that the module cannot carry load	alarm: 1
Bit21	reserved	
Bit22	input over-voltage alarm	alarm: 1

Bit23	PFC fault alarm	alarm: 1
Bit24	current unbalance alarm	alarm: 1
Bit25	middle wire drop alarm	alarm: 1
Bit26	internal communication abnormality alarm	alarm: 1
Bit27	module output fuse break alarm	alarm: 1
Bit28	reserved	
Bit29	module input power failure alarm	alarm: 1
Bit30	severe unbalance alarm of bus voltage	alarm: 1
Bit31	equipment cabinet address conflict alarm	alarm: 1

current alarm of the rectifier module/state word extension definition		
Bit0	malfunction alarm of hardware address	alarm: 1
Bit1	malfunction alarm of input common mode voltage	alarm: 1
Bit2	short circuit alarm of main relay coil	alarm: 1
Bit3	input inverse alarm	alarm: 1
Bit4~Bit15	reserved	

Alarm Shielding (Signal ID: 0x142)

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
alarm shielding command extension definition		alarm shielding command definition			

alarm shielding command definition		
Bit0	output over-voltage deadlock alarm	1: shielding 0: automatic
Bit1	environment temperature over-temperature alarm	1: shielding 0: automatic
Bit2	reserved	
Bit3	reserved	
Bit4	fan fault alarm	1: shielding 0: automatic
Bit5~Bit16	reserved	
Bit17	input under-voltage alarm	1: shielding 0: automatic
Bit18	AC unbalance alarm	1: shielding 0: automatic
Bit19	AC phase loss alarm	1: shielding 0: automatic
Bit20	severe current unbalance warm caused by the fact	1: shielding 0: automatic
Bit21	reserved	
Bit22	input over-voltage alarm	1: shielding 0: automatic
Bit23	PFC fault alarm	1: shielding 0: automatic
Bit24	current unbalance alarm	1: shielding 0: automatic
Bit25	middle wire drop alarm	1: shielding 0: automatic
Bit26	internal communication abnormality alarm	1: shielding 0: automatic
Bit27	module output fuse break alarm	1: shielding 0: automatic
Bit28	reserved	

Bit29	module input power failure alarm	1: shielding 0: automatic
Bit30	severe unbalance alarm of bus voltage	1: shielding 0: automatic
Bit31	equipment cabinet address conflict alarm	1: shielding 0: automatic

alarm shielding command extension definition		
Bit0	hardware address abnormality alarm	1: shielding 0: automatic
Bit1	input common-mode voltage abnormality alarm	1: shielding 0: automatic
Bit2	main relay coil short circuit alarm	1: shielding 0: automatic
Bit3	input inverse alarm	1: shielding 0: automatic
Bit4~Bit15	reserved	

Control Indicator (Signal ID: 0x140)

signal content					
Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0	control indicator command	0			

control indicator command							
Byte3							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
reserved		red indicator		yellow indicator		green indicator	
reserved		00: automatic 01: (0.5Hz)flicker slowly 10: (4Hz)flicker fast 11: be constant on		00: automatic 01: (0.5Hz) flicker slowly 10: (4Hz) flicker fast 11: be constant on		00: automatic 01: (0.5Hz)flicker slowly 10: (4Hz)flicker fast 11: be constant on	

2 Common Commands User Cases

2.1 Output Voltage Setting

Output voltage of all the rectifier modules is set as 53.5V via the broadcast message sent from the monitoring unit.

ID domain of CAN communication frame:

ID domain																											
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

protocol number (6 bits)						sub-node address (7 bits)							Command ID & message ID(8 bits)								M/S	reserved bit, must be filled in with 1						CNT
1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	0
0x21						0x00							0x80								0x1	0x3F						0x0
protocol number						broadcast command							control command								sent from the monitoring unit	reserved bits, must be filled in with 1						without any subsequent frame

Frame data domain of CAN communication is as below:

data domain							
Byte0		**Byte1**	**Byte2**	**Byte3**	**Byte4**	**Byte5**	**Byte6**	**Byte7**
4 bits	4 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits
error type	signal ID		data					
0x0	0x100		0x0000		0x0000D600			
0x01		0x00	0x00	0x00	0x00	0x00	0xD6	0x00
no error, data normal	setting DC output voltage signal ID		No error, 0 is filled in		setting DC output voltage, used as a benchmark for IQ10			

The rectifier module receives the setting command of the broadcast without any data response.

2.2 Output Voltage of Module 1 Setting

The output voltage of the rectifier module 1 is set as 53.5V via the monitoring unit.

ID domain of CAN communication frame is as below:

ID domain																												
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
protocol number(6 bits)						sub-node address(7 bits)							Command ID & message ID(8 bits)								M/S	reserved bit, 1must be filled in						CNT
1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
0x21						0x01							0x80								0x1	0x3F						0x0
protocol number						software address of module 1							control command								sent from the monitoring unit	reserved bits, 1 must be filled in						without any subsequent frame

Frame data domain of CAN communication is as below:

data domain							
Byte0	**Byte1**	**Byte2**	**Byte3**	**Byte4**	**Byte5**	**Byte6**	**Byte7**

4 bits	4 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits
error type	signal ID		data					
0x0	0x100		0x0000		0x0000D600			
0x01		0x00	0x00	0x00	0x00	0x00	0xD6	0x00
data normal	Setting DC output voltage signal ID		No data, 0 is filled in		DC output voltage setting, used as a benchmark for IQ10			

The rectifier module responses to data after receiving the point-point setting command.

ID domain of CAN communication frame is as below:

ID domain																												
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
protocol number (6 bits)						sub-node address (7 bits)							Command ID & message ID(8 bits)								M/S	reserved bits, 1 must be filled in						CNT
1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
0x21						0x01							0x80								0x0	0x3F						0x0
protocol number						Software address of module 1							control command								Sent from module 1	reserved bits, 1 must be filled in						without any subsequent frame

Frame data domain of CAN communication is as below:

data domain							
Byte0		**Byte1**	**Byte2**	**Byte3**	**Byte4**	**Byte5**	**Byte6**	**Byte7**
4 bits	4 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits
error type	signal ID		data					
0x0	0x100		0x0000		0x0000D600			
0x01		0x00	0x00	0x00	0x00	0x00	0xD6	0x00
no error, normal data	Setting output voltage signal ID		No data, 0 is filled in		setting output voltage, used as a benchmark for IQ10			

2.3 Inherent Information Query of Module 1

Batch command 0x50 is called to query module inherent information via the monitoring unit.

ID domain of CAN communication frame is as below:

ID domain																												
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
agreement number (6 bits)						sub-node(7 bits)							command ID & information ID(8 bits)								M/S	1 must be filled in for the reserved bit						CNT
1	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	1	1	1	1	1	1	1	0/1

0x21	0x01	0x50	0x1	0x3F	0x0/0x1
agreement number	software address of module 1	batch command 0x50 is called to query module inherent information	sent from the monitoring unit	1 must be filled in for the reserved bit	whether there's a subsequent frame or not

Frame data domain of CAN communication is as below:

data domain								
Byte0		**Byte1**	**Byte2**	**Byte3**	**Byte4**	**Byte5**	**Byte6**	**Byte7**
4 bits	4 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits
error type	signal ID		data					
0x0	0x001		0x0000		0x00000000			
0x0	0x005		0x0000		0x00000000			
0x00		0x01	0x00	0x00	0x00	0x00	0x00	0x00
0x00		0x05	0x00	0x00	0x00	0x00	0x00	0x00
no error, normal data	feature words of rectifier module software & hardware version number		no data , 0 is filled in		no data , 0 is filled in			

After receiving the point-to-point setting command, the rectifier module 1 shall respond to the data.

ID domain of CAN communication is as below:

ID domain																												
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
agreement number(6 bits)						sub-node address(7 bits)							command ID & information ID(8 bits)								M/S	1 is used for the reserved bit						CNT
1	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	0/1
0x21						0x01							0x50								0x0	0x3F						0x0/0x1
agreement number						software address of module 1							fixed information query with batch query command 0x50								sent from module 1	1 must be filled in for the reserved bit						whether there's a subsequent frame or not

Frame data domain of CAN communication is as below:

data domain

Byte No.	**Byte0**		**Byte1**	**Byte2**	**Byte3**	**Byte4**	**Byte5**	**Byte6**	**Byte7**
number of bit	4 bits	4 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits
definition	error type	signal ID		data					
feature words of the rectifier module	0x0	0x001		0x00	0x00	0x40	0x68	0x0E	0x27
software & hardware version number	0x0	0x005		0x01	0x00	0x02	0x02	0x02	0x02
description	no error, normal data	relevant signal ID		Specific data in reply according to the agreement					

2.4 All Real-time Data Query of Module 1

Batch query command 0x40 via the monitoring unit can be used to get all real-time data of module 1. Messages as below are delivered followed by command 0x40:

signal ID	signal phase module signal description	three-phase module signal description
0x010E	total running time	total running time
0x0170	input power	input power
0x0171	input frequency	input frequency
0x0172	input current	input current
0x0173	DC output power	DC output power
0x0174	real-time efficiency	real-time efficiency
0x0175	DC output voltage measuring value	DC output voltage measuring value
0x0176	actual output current limiting point	actual output current limiting point
0x0178	single phase module input voltage	/
0x0179	/	Phase A voltage
0x017A	/	Phase B voltage
0x017B	/	Phase C voltage
0x0180	environmental temperature of air intake	environmental temperature of air intake
0x0182	output current display value	output current display value
0x0183	current alarm/state	current alarm/state

3 Communication Strategies Recommended

Communication Characteristics

1. The monitoring unit can monitor all on-line rectifier modules. The setting command of the module can be broadcast, or sent to the designated module as required; for the query command of the module, the monitoring unit can send the commands to a single module in loop sequence.
2. Rectifier modules have software addresses (generated by internal sequencing between rectification modules) and hardware addresses (unavailable in some modules). It is suggested that the monitoring unit implement the module management through the software address, and the hardware address is only used to display the module slot number.
3. In a scenario where only software addresses are used, you can identify which module is currently being queried by controlling the green light flicker of the queried module with the command 0x0135 on the query page for module information.
4. When the communication between the rectifier module and the monitoring unit is interrupted for more than 1 minute, and the output of the rectifier module shall be restored to the default to ensure the power supply capacity. The defaults include: output voltage(the default voltage, if not set by the user, is 53.5v); current-limiting point(the default limit point, if not set by the user, is the maximum limit point); The module resuming work after the command of shut-down and sleep sent from the monitoring unit has limited power supply capability.
5. Software address rearrangement of the module might be caused by the newly inserted system, the state of re-powered up or plugging; and address rearrangement can ensure the continuity of the software address; however, due to the number of modules, the original software address might be changed. For cases of powering-up or the newly inserted system, CAN communication command 0x013A can be called to rearrange the address to insure the continuity.
6. Since the rectifier module does not actively report the registration request or registration information, the 0x50 command shall called to obtain the number of modules and related information in the system through.
7. Since the rectifier module does not report alarm, command 0x40 shall be called to check the real-time alarm information via the monitoring unit.

Communication Strategies Recommended

Step 1

After the monitoring unit is powered on, command 0x013A is used to notify each online module to carry out address redistribution; any module inserted into the system shall also cause each online module to redistribute the address. The error type in the data field shall indicate that the module is performing address identification. When address identification is in progress, the query command must be stopped.

Step 2

After the module address assignment (when the error type in the data field is not 3, it means the process is over), the monitoring unit can send setting commands to all online modules broadcast.

All modules do not respond to the setting command issued by the monitor broadcast. For point-to-point monitoring command, the corresponding module shall reply to.

It is recommended to set the following commands to monitor broadcasting each polling cycle: DC output current limit point set value; DC output voltage set value. Other command monitoring can be set in the form of an event trigger (such as set by a user).

Step 3

After sending the broadcast setting command, the monitoring can query the inherent information of each module according to the sequence from small to large with the query command 0x50.

The interval between commands is 15ms~120ms and the waiting time for reply shall be no less than 120ms. When a rectifier module (such as the one with address 10) fails to respond twice in a row, it is deemed that the rectifier module does not exist, and the next module is continued to be queried (such as the one with address 11). Similarly, if there is no response for two consecutive times, the query shall be stopped and the number of rectifier modules is determined to be 10.After this process, the monitor no longer issues the 0x50 command.

Step 4

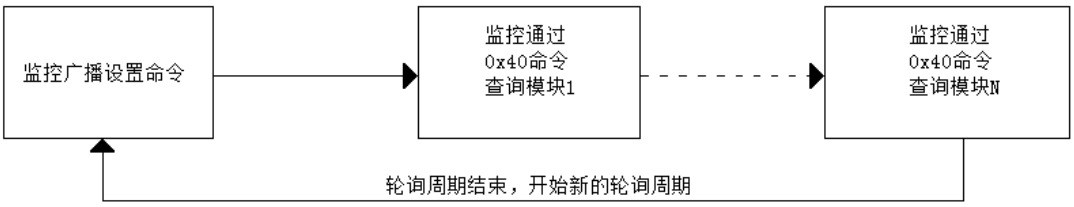
After obtaining the number of rectifier modules, the monitoring unit can query the real-time state information of each module according to the software address sequence from small to large with the polling query command 0x40.

The interval between commands is 30ms~140ms and the waiting time for reply shall be no less than 140ms. If the monitor unit replies properly and completely within the interval, the communication is normal; if the module N cannot reply correctly twice in a row, and so does the polling cycle, the monitoring unit shall produce "communication interruption alarm between the monitoring unit and module N".

Step 5

After the monitoring unit is powered up and the rectifier module reallocates the address, the monitoring unit shall repeat the above steps 2, 3 and 4.

The polling cycle of the monitoring unit is as below:



Step 6

Other settings and control commands for the monitoring unit are triggered by user interface parameter settings and controls.