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# Communication Protocol of Rectifier Module

(For Internal Use Only)

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## Revision Record

Date	Revised Version	Description	Author
2008-1-17	1.0	Document created	Zhihong ZHU
Unknown	2.0		Unknown
2009-12-4	2.1	1. Data transmission speed rate is revised as 4800.	Zhihong ZHU
		2. Obtain module output voltage, current, and alarm description, add AC power down recognition	
		3. Delete information about AC voltage and current obtain	
2009-12-18	2.2	add the information that module will auto open when communication stops for 1 minutes	Zhihong ZHU
2010-9-10	2.3	Add 0x08、0x09、0x12、0x13 command	Zhihong ZHU
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		add current limit point calibration commend ponp point calibration commend	
2012-12-13	2.5	Delete 0x02 commend	Jiehua Zhu
		Change 0x05 commend	
		add 0x14 commend	
		add 0x15 commend	
20130116	2.5	Correct some mistakes	Jiehua Zhu

# Communication Protocol of Rectifier Module

## 1 General

The communication Protocol of Rectifier Module(Protocol)describes protocol within power system between monitoring module and its specialized host, through which monitoring module releases command and controls data exchange.

## 2 Functions

Functions defined in the Protocol

The host(the principal node) controls monitoring module through command transmission (from nodes) to finish task. Such as search software version, alarm data, on/off data and so on.

Communication process is conducted through half-duplex, elongating, and single way reply. Host sends command to monitoring module. Every command is treated as one time bi-directional process. When each communication fails 500mS continuously(address is incorrect, exceeding-time receiving, incorrect ), then the communication is in failure.

## 3 Technical Terms

Host: specialized intellectual equipment managing monitoring modules, which stands for principal node in the principal-and-subordinate protocol

Monitoring module: intellectual management equipment in the form of power module, which stands for subordinate node in the principal-and-subordinate protocol.

a kind of bi-wire communication criteria, supportable in close range of half-duplex project.

Transmission command: communication format via which host makes monitoring module fulfill correspondent task.

Checking command: communication format via which host makes monitoring module report back the first information in the reporting queue.

Reporting queue:

the information queue reported from monitoring module to the host. When the monitoring module receives checking command from host, module will do reporting in the way of first in, first out. Each checking command fits with one reported information, showing the situation at that time.

## 4 Physical Ports

### 4.1 Electrical Standard for Communication in Series.

monitoring module communicate with the host in the way of half-duplex.

### 4.2 Information Transmission

Asynchronization, 1 starting position, 8 data positions, 1 stop position, no verifying position.

## 4.3 Data transmission speed rate

4800

## 4.4 Date coding

Hexadecimal only used in frame header, frame trail and command, other data is indicated by compressed BCD.

## 4.5 Frame Format

#	1	2	3	4	5	6	7
Byte	1	1	1	1	LENGTH -1	1	1
Format	SOI	ADDR	LENGTH	CID	INFO	CHKSUM	EOI

## 4.6 Format Explanation

#	Code	Stands for	Remark
1	SOI	Starting point	0x7E
2	ADDR	Descriptor of equipment address	
3	LENGTH	CID + INFO length	
4	CID	Command	
5	INFO	information	
6	CHKSUM	Checksum	
7	EOI	End code	0x0D

**Note:**CHKSUM = ADDR+ LENGTH+ CID+ INFO ,then transferred to BCD;when address code is 0x99, the broadcast frame is used, which shows during voltage regulation and start up and power off

## 5 Communication Way

The host and monitoring module is in principal-subordinate relation, in which, The host is the principal node while the monitoring module is subordinate node. After receiving data header, the monitoring module will judge whether the address next to data header is local machine address. If yes, monitoring module will continue receiving frames and judging CHKSUM. The CHKSUM is correct, then keep on judging type of command and response to the command; the CHKSUM is wrong, then response 0x7F except wrong address lead to give up.

## 6 Type of Information

communication code between monitoring module and the host

Command release code	Stands for	Command report code	
Rectifier Module			
0x01	Obtain software version	0x81	Obtain software version

0x03	Obtain module output voltage, output current and alarms	0x83	Obtain module output voltage, output current and alarms
0x04	Power on/off	0x84	Power on/off
0x05	Obtain module series information	0x85	Obtain module series information
0x06	module output voltage, output current setting		No response
0x07	Obtain setting parameter of module voltage and current	0x87	Obtain setting parameter of module voltage and current
0x10	Obtain module specification	0x90	Obtain module specification
0x11	Obtain module manufacturer information	0x91	Obtain module manufacturer information
0x08	Set up default voltage value of module	0x88	Set up default voltage value of module
0x09	Read default voltage value of module	0x89	Read default voltage value of module
0x12	calibrate display voltage/current parameter	0x92	calibrate display voltage/current parameter
0x13	read display voltage/current parameter	0x93	read display voltage/current parameter
0x24	Read current limit point coefficient	0x94	Read current limit point coefficient
0x25	Calibrate(setting) current limit point coefficient	0x95	Calibrate(setting) current limit point coefficient
0x14	Write in module serial number	0x96	module serial number
0x15	Default output voltage and current	0x97	Default output voltage and current
0x15	Default output voltage setting	0x97	Default output voltage setting
0x16	Default output voltage reading	0x98	Default output voltage reading
0x17	Default output current reading	0x60	Default output current reading
0x18	Default output current setting	0x61	Default output current setting

## 7 Data format

During the release commands, information domain provides the detailed parameters for the command execution; in the response commands, information domain contains data needed to be reported. Please refer to Enclose A for the detailed information.

### 7.1 Obtain software version(goldpower internal only)

#### a. Message

Frame header	0x7e
address	Xx
Message length	0x01
CMD	0x01

CHKSUM	Total sum of address, length and command
Frame trail	0x0d

## b. Message response

Frame header	0x7e
Address	1 byte
Message length	0x10
CMD	0x81
INFO	Response result (1 byte, 0 = normal)
	Single-board situation (1 byte, 0x00=good; other = failure)
	Software macro-version (1 byte); Software micro-version (1 byte)
	Hardware PCB version number (1 byte)
	Hardware programmable components version information (1 byte)
	year (1 byte); month (1 byte); day (1 byte)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

Note: the right bar on above form: from top to bottom is correspondent to data lowest to highest.

## 7.2 Software Version Information Obtain

## a. Message

Frame header	0x7e
Address	xx
Message length	0x01
CMD	0x02
CHKSUM	Total sum of address, length and command
frame trail	0x0d

## b. Message Response

Frame header	0x7e
Address	1 byte
Message length	0x10
CMD	0x82
INFO	Response Result (1 byte, 0 = normal)
	Software macro-version (1 byte); Software micro-version (1 byte)
	Hardware PCB version number (1 byte)
	Hardware programmable components version information (1 byte)
	Type of module (1 byte)
	year (1 byte); month (1 byte); day (1 byte)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

The types of module is 1 byte:05-5A module,10-10A module,20-20A module,30-30A module,40-40A module,50-50A module,the type of module default value = 30. When software version = 2.01;Then macro version is 2 ;micro version is 01;hardware PCB version default value = 1;programmable component version default = 1;date is user-defined,if programmed date of the software is 2000/4/16,the content in information domain should be:02-01-01-01-02-00-04-16 other 31 bytes for description.All reported date is BCD.

### 7.3 Module Voltage, Current, and Alarms Obtain

#### a. Message

Frame header	0x7e
Address	xx
Message length	0x01
CMD	0x03
CHKSUM	Total sum of address, length and command
frame trail	0x0d

#### b. Message response

Frame header	0x7e
Address	xx
Message length	0x12
CMD	0x83
INFO	Response Result(1 byte,0 = normal)
	Module output voltage (2 bytes)
	Module output current(2 bytes)
	Fan rotating speed(2 bytes) preserved
	0(2 bytes) preserved
	Module alarm(1 byte)
	Module protection type(1 byte)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

Each analog value of information domain is in 2 bytes, please see the enclosure A for detailed information.

#### Module alarm byte description:

- .7 : preserved
- .6 : module protection(0-normal,1-alarm)
- .5 : AC mains fail(0-normal,1-alarm)
- .4 : module fan failure(0-normal,1-alarm)
- .3 : preserved
- 2 : module power on and power off(0-power on,1-power off)
- 1 : preserved

0 : current limiting(0-normal,1-alarm)

Protection type of module:01-short circuit,02-over temperature,03-over voltage,06-AC power down

#### 7.4 Power on/Power off Controlling

##### a. Message

Frame header	0x7e
Address	xx
Message length	0x03
CMD	0x04
INFO	On/off status(1 byte; 0-power on,1-power off)
	lag time of auto re-power- on (1byte:0x00- power on with no delay; the lag time of other data is correspondent time calculated in minute. That is when power- on command is sent out within 1 min—99mins, the data is invalid and can be any value)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

##### b. Message response

Frame header	0x7e
Address	xx
Message length	0x02
CMD	0x84
INFO	Module status (1 byte,0x01- power off;0x00- power on)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

**Note: communication stops for 1 minute, module output is auto-on**

#### 7.5 Module Bar Code Information Obtain

##### a. Message

Frame header	0x7e
Address	xx
Message length	0x01
CMD	0x05
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

##### b. Message response



Frame header	0x7e
Reported address	1 byte
Message length	0x29
CMD	0x85
INFO	Response result(1 byte,0 = normal)
	Bar code(27 bytes)
	Factory code(1 byte)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

Instruction:

- Bar code format:

“DATE=xx(year)\_xx(month)\_xx(date)SN =xxxxxxxxxxxxxxxxxxxxxx”。

Year, Month, and Date is the produced time, showed in BCD character. Such as Feb-22-2002, the displayed format is DATE=02\_02\_22,DATE is explained by ASCII character, total 7 bytes。

SN is followed with specification, total 20 bytes。

- Factory code(1 byte)。

## 7.6 Module Output Voltage and Current Setting

### a. Message

Frame header	0x7e
Address	xx
Message length	0x05
CMD	0x06
INFO	Module output voltage (2 byte)
	Module output current(2 byte)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

B .Message response

**No response**

## 7.7 Obtain setting parameter of module voltage and current

### a. Message

Frame header	0x7e
Address	xx
Message length	0x01

CMD	0x07
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

b. Message response

Frame header	0x7e
Reported Address	1 个字节
Message length	0x06
CMD	0x87
INFO	Response Result(1 byte,0 = normal)
	Module output voltage (2 byte)
	Module output current(2 byte)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

7.8 单板注册 (公司内部使用)

a. 消息

帧头	0x7e
地址	xx
消息长度	0x01
CMD	0x10
校验字	地址、长度、命令、信息域的累加和
帧尾	0x0d

b. 消息响应

帧头	0x7e
上报地址	1 个字节
消息长度	0x11
CMD	0x90
INFO	应答结果(1 个字节, 0 表示正常)
	0 (1 字节)
	软件版本 (1 字节)
	模块类型 (1 字节)
	硬件版本 (1 字节)
	生产年 (1 字节)
	生产月 (1 字节)
	流水号 (2 字节)

	0 (1字节)
校验字	地址、长度、命令、信息域的累加和
帧尾	0x0d

## 7.9 Obtain module manufacturer information

### a. Message

Frame header	0x7e
Address	xx
Message length	0x01
CMD	0x11
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

### b. Message response

Frame header	0x7e
Address	1 byte
Message length	0x38
CMD	0x91
INFO	manufacturer information (37 byte ASCII explain)
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## 7.10 Module Voltage Setting

### a. Message

Frame header	0x7e
Address	0x99
Message length	0x03
CMD	0x08
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

### b. Message response

Frame header	0x7e
Reported Address	1 byte
Message length	0x03
CMD	0x88
INFO	2 byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

### 7.11 Read Module Voltage

#### a. Message

Frame header	0x7e
Address	0x99
Message length	0x01
CMD	0x09
CHKSUM	0x63
frame trail	0x0d

#### b. Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x03
CMD	0x89
INFO	2 byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

### 7.12 Calibrate display voltage/current coefficient

#### a. Message

Frame header	0x7e
Address	0x99

Message length	0x05
CMD	0x12
INFO	display voltage coefficient 2byte display current coefficient 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## b. Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x05
CMD	0x92
INFO	display voltage coefficient 2byte display current coefficient 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## 7.13-Read display voltage/current parameter

## a- Message

Frame header	0x7e
Address	0x99
Message length	0x01
CMD	0x13
INFO	0x73
CHKSUM	0x0d
frame trail	

## b- Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x05
CMD	0x93
INFO	display voltage coefficient 2byte display current coefficient 2byte

CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

#### 7. 14 Read current limit point coefficient (goldpower internal use only)

##### a. Message

Frame header	0x7e
Address	0x99
Message length	0x01
CMD	0x24
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

##### b. Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x03
CMD	0x94
INFO	current limit point coefficient 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

#### 7. 15 Calibrate(setting) current limit point coefficient (goldpower internal use only)

##### a. Message

Frame header	0x7e
Reported address	0x99
Message length	0x03
CMD	0x25
INFO	current limit point coefficient 2byte

CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## b. Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x03
CMD	0x95
INFO	current limit point coefficient 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## 7.16 写入模块序列号 (公司内部使用)

## a. 消息

帧头	0x7e
地址	xx
消息长度	0x01
CMD	0x14
校验字	地址、长度、命令、信息域的累加和
帧尾	0x0d

## b. 消息响应

帧头	0x7e
上报地址	1 个字节
消息长度	0x22
CMD	0x96
INFO	序列号信息 (21 字节) (数据以 ASCII 码传输)
校验字	地址、长度、命令、信息域的累加和
帧尾	0x0d

## 7.17 Default output voltage setting

## a. Message

Frame header	0x7e
Reported	0x99

address	
Message length	0x05
<b>CMD</b>	<b>0x15</b>
INFO	Default output voltage 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## b. Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x03
CMD	0x97
INFO	Default output voltage 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

**7.18** Default output voltage reading

## a. Message

Frame header	0x7e
address	0xXX
Message length	0x01
<b>CMD</b>	<b>0x16</b>
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

## b. Message response

Frame header	0x7e
Reported address	1 byte
Message length	0x01
CMD	0x98
INFO	Default output voltage 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d



**7.19 Default output current reading****a. Message**

Frame header	0x7e
address	0xXX
Message length	0x01
<b>CMD</b>	<b>0x17</b>
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

**b. Message response**

Frame header	0x7e
Reported address	1 byte
Message length	0x03
CMD	0x60
INFO	Default output voltage 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

**7.20 Default output current setting****a. Message**

Frame header	0x7e
address	0xXX
Message length	0x01
<b>CMD</b>	<b>0x18</b>
INFO	Default output voltage 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

**b. Message response**

Frame header	0x7e
Reported address	1 byte
Message length	0x01

CMD	0x61
INFO	Default output voltage 2byte
CHKSUM	Total sum of address, length, command, and information domain
frame trail	0x0d

**Note:**

Each analog value is indicated with 2 bytes, please see the Enclosure A for detailed information

**Enclosure A**

Each analog value is indicated with 2 bytes:

Analog value multiplies 100 during data transmission in information domain. Upper byte stands ahead, lower byte goes behind. For example: real time voltage of system is 53.55V, the data transmitted is 5355, the bytes transmitted is 0x53 and 0x55.

After receiving by monitoring module, the data divided by 100, the result is real analog value.