Secondary Development Protocol

Function Code Introduction

Function Code	Description
03	Read Holding Registers
04	Read Input Registers
06	Write Single Holding Register

Register Address Description

Address (HEX)	Address Storage Content	Register Value	Access	Modbus Function Code
3x0000	Channel 1 Voltage	Unsigned, unit: mV	Read	0x04
3x0001	Channel 1 Current	Signed, unit: mA	Read	0x04
3x0002	Channel 1 Power	Unsigned, unit: 10 mW	Read	0x04
3x0003	Channel 2 Voltage	Unsigned, unit: mV	Read	0x04
3x0005	Channel 2 Current	Signed, unit: mA	Read	0x04
3x0006	Channel 2 Power	Unsigned, unit: 10 mW	Read	0x04
3x0007	Channel 3 Voltage	Unsigned, unit: mV	Read	0x04

Address (HEX)	Address Storage Content	Register Value	Access	Modbus Function Code
3x0008	Channel 3 Current	Signed, unit: mA	Read	0x04
3x0009	Channel 3 Power	Unsigned, unit: 10 mW	Read	0x04
3x000A	Channel 4 Voltage	Unsigned, unit: mV	Read	0x04
3x000B	Channel 4 Current	Signed, unit: mA	Read	0x04
3x000C	Channel 4 Power	Unsigned, unit: 10 mW	Read	0x04
4x2000	Serial Port Parameters	High byte: Parity (0x00~0x02) Low byte: Baud Rate (0x00~0x07)	Read/Write	0x03, 0x06
4x4000	Device Address	Stores Modbus address directly Device address: 0x0001-0x00FF	Read/Write	0x03,0x06
4x8000	Software Version	Convert to decimal, then shift decimal point two places left for version 0x0064 = 100 = V1.00	Read	0x03

Operation Command Description

Read Input Register Command

Transmission Code: 01 04 00 00 00 0C F0 0F

Field	Description	Notes
01	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
04	04 Command	Read Input Registers

Field	Description	Notes
00 00	Register Start Address	0x0000 - 0x0007 correspond to input channels 1~8
00 0C	Number of Registers	Number of registers to read, up to 8 channels
F0 0F	CRC16	CRC16 checksum of the first 6 bytes of data

Return Code: 01 04 18 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 82 8B

Field	Description	Notes
01	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
04	04 Command	Read Input Registers
18	Byte Count	Data length
00 00 ..... 00 00	Register Data	Represents voltage, current, power values for the 4 channels
82 8B	CRC16	CRC16 checksum of the first 6 bytes of data

Example: Device with address 1

```
Read Channel 1 Voltage: 01 04 00 00 00 01 31 CA
Read Channel 1 Current: 01 04 00 01 00 01 60 0A
Read Channel 2 Voltage, Current and Power data: 01 04 00 03 00 03 40 0B
```

Set Baud Rate Command

Transmission Code: 00 06 20 00 00 05 43 D8

Field	Description	Notes
00	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
06	06 Command	Set baud rate, set device address

Field	Description	Notes
20 00	Command Register	0x2000 for setting baud rate, 0x4000 for setting device address
00	Parity Mode	0x00 for no parity, 0x01 for odd parity, 0x02 for even parity
05	Baud Rate Value	Baud rate value mapping: 0x00: 4800 0x01: 9600 0x02: 19200 0x03: 38400 0x04: 57600 0x05: 115200 0x06: 128000 0x07: 256000
43 D8	CRC16	CRC16 checksum of the first 6 bytes of data

Return Code: 00 06 20 00 00 05 43 D8

Field	Description	Notes
00	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
06	06 Command	Set baud rate, set device address
20 00	Command Register	0x2000 for setting baud rate, 0x4000 for setting device address
00	Parity Mode	0x00 for no parity, 0x01 for odd parity, 0x02 for even parity
05	Baud Rate	Baud rate value mapping: 0x00: 4800 0x01: 9600 0x02: 19200 0x03: 38400 0x04: 57600 0x05: 115200 0x06: 128000 0x07: 256000
43 D8	CRC16	CRC16 checksum of the first 6 bytes of data

Example: Device with address 1

```
Set baud rate 4800 : 00 06 20 00 00 00 83 DB
Set baud rate 9600 : 00 06 20 00 00 01 42 1B
Set baud rate 115200 : 00 06 20 00 00 05 43 D8
```

Set Device Address Command

Transmission Code: 00 06 40 00 00 01 5C 1B

Field	Description	Notes
00	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
06	06 Command	Set baud rate, set device address
40 00	Command Register	0x2000 for setting baud rate, 0x4000 for setting device address
00 01	Device Address	Device address set, 0x0001-0x00FF
5C 1B	CRC16	CRC16 checksum of the first 6 bytes of data

Return Code: 00 06 40 00 00 01 5C 1B

Field	Description	Notes
00	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
06	06 Command	Set baud rate, set device address
40 00	Command Register	0x2000 for setting baud rate, 0x4000 for setting device address
00 01	Device Address	Device address set, 0x0001-0x00FF
5C 1B	CRC16	CRC16 checksum of the first 6 bytes of data

Example: Device with address 1

```
Set device address to 0x01 : 00 06 40 00 00 01 5C 1B
Set device address to 0x02 : 00 06 40 00 00 02 1C 1A
Set device address to 0x03 : 00 06 40 00 00 03 DD DA
```

Read Device Address Command

Transmission code: 00 03 40 00 00 01 90 1B

Field	Description	Notes
00	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
03	03 Command	Read device address command
40 00	Command Register	0x4000 for reading device address, 0x8000 for reading software version
00 01	Byte Count	Fixed 0x0001
90 1B	CRC16	CRC16 checksum of the first 6 bytes of data

Return code: 01 03 02 00 01 79 84

Field	Description	Notes
01	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
03	03 Command	Read software version, read device address command
02	Byte Count	Returned byte count
00 01	Device Address	Device address set, 0x0001-0x00FF
79 84	CRC16	CRC16 checksum of the first 6 bytes of data

For example:

```
Transmission Code: 00 03 40 00 00 01 90 1B
Return Code: 01 03 02 00 01 79 84 // Address 0x01

Transmission Code: 00 03 40 00 00 01 90 1B
Return Code : 02 03 02 00 02 7D 85 //Address 0x02

Transmission Code: 00 03 40 00 00 01 90 1B
Return Code: 03 03 02 00 03 81 85 // Address 0x03
```

Read Software Version Command

Transmission Code: 00 03 80 00 00 01 AC 1B

Field	Description	Notes
00	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
03	03 Command	Read software version, read device address command
80 00	Command Register	0x4000 for reading device address, 0x8000 for reading software version
00 01	Byte Count	Fixed 0x0001
AC 1B	CRC16	CRC16 checksum of the first 6 bytes of data

Return Code: 01 03 02 00 64 B9 AF

Field	Description	Notes
01	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
03	03 Command	Read software version, read device address command
02	Byte Count	Returned byte count
00 64	Software Version	Convert to decimal, then shift decimal point two places left for version 0x0064 = 100 = V1.00
B9 AF	CRC16	CRC16 checksum of the first 6 bytes of data

Example: Device with address 1

```
Transmission Code: 00 03 80 00 00 01 AC 1B
Return Code: 01 03 02 00 64 B9 AF       //0x0064 = 100 =V1.00
```

Exception Function Codes

If the received command is incorrect or an exception occurs, the device will return an exception response. The exception response format is as follows:

Return Code: 01 85 03 02 91

Field	Description	Notes
01	Device Address	0x00 indicates broadcast address; 0x01-0xFF indicate device address
85	Exception Function Code	Exception function code = Request function code + 0x80
03	Byte Count	Exception code
02 91	CRC16	CRC16 checksum of the first 6 bytes of data

The exception code is a single-byte value indicating the type of error. Several common exception codes defined by the Modbus protocol:

Exception Code	Name	Description
0x01	Illegal Function	The requested function code is not supported
0x02	Illegal Data Address	The requested data address is incorrect
0x03	Illegal Data Value	The requested data value or operation cannot be performed
0x04	Server Failure	Server device failure
0x05	Acknowledge	Request received and processing
0x06	Device Busy	Device is busy and cannot execute the requested operation