DPS5020 Digital power communication protocol V1.2

1. Introduction to the agreement

use RS232 、 RS485 Or Bluetooth serial port transmission interface， Communication protocol MODBUS-RTU protocol， This product only supports function codes 0x03、0x06、0x10。

2. Communication protocol introduction

The information is transmitted in an asynchronous manner，Modbus-RTU Mode to11 Bit in bytes

Word format (serial data)	10 Bit binary
Start bit	1 Place
Data bits	8 Place
Parity bit	no
Stop position	1 Place

Data frame structure：

Data frame interval	address code	function code	Data area	CRC check
3.5 Above the byte	1 byte	1 byte	N byte	2 byte

Before sending data, the data bus is required to have no data transmission time 3.5 (For example, 5ms at baud rate of 9600) The message is sent at least at a time interval of 3.5 bytes, and the entire message frame must be a continuous data stream. If there is more than 3.5 bytes of pause before the frame is completed, the receiving device will refresh the incomplete Message and assume that the next byte is the address field of a new message. Likewise, if a new message begins with a previous message in less than 3.5 characters, the receiving device will consider it a continuation of the previous message.

1.1 address code

The address code is the first byte (8 bits) of each communication message frame, from 1 to 255. This byte indicates that the slave set by the user will receive the information sent by the host. Each slave must have a unique address code, and only the slave code that matches the address code can respond to the loopback message. When the slave sends back the message, the loopback data starts with the respective address code. The address code sent by the host indicates the slave address to be sent, and the address code returned by the slave indicates the slave address of the loopback. The corresponding address code indicates where the information came from.

1.2 function code:

The function code is the second byte transferred for each communication message frame, and the function code defined by the ModBus communication protocol is 1 to 127. As a host request to send, through the function code to tell the slave should be what action. As a slave response, the function code returned by the slave is the same as the function code sent from the host and indicates that the slave has responded to the host and has performed the relevant operation. The unit only supports 0x03, 0x06, 0x10 function code.

function code	Definition	Operation (binary)
0x03	Read register data	Read data from one or more registers
0x06	Write a single register	Write a set of binary data to a single register
0x10	Write multiple registers	Write multiple sets of binary data to multiple registers

1.3 Data area

The data area includes what information needs to be returned from the slave or what action to perform, such as data (eg, digital input / output, analog input / output, register, etc.), reference address, and so on. For example, if the host tells the slave to return the value of the register (including the start address of the register to be read and the length of the read register) via function code 03, the returned data contains the data length of the register and the contents of the data.

0x03 Read the function of the host format

address code	function code	Register start address	Number of register addresses n (1 ~ 32)	CRC Check code
1 byte	1 byte	2 byte	2 byte	2 byte

0x03 Read function Slave returns format

address code	function code	Returns the number of bytes 2 * n	Register data	CRC Check code
1 byte	1 byte	1 byte	2*n Bytes	2 byte

0x06 Write a single register function in host format

address code	function code	Register address	Register data	CRC Check code
1 byte	1 byte	2 byte	2 byte	2 byte

0x06 Write a single register function from the machine to return the format

address	function	Register	Register data	CRC Check

code	code	address		code
1 byte	1 byte	2 byte	2 byte	2 byte

0x10 Write function host format

addre ss code	funct ion code	Register start address	Number of register addresses n (1 ~ 32)	Write the number of bytes 2 * n	Regist er data	CRC Check code
1 byte	1 byte	2 byte	2 byte	1 byte	2*n byte	2 byte

0x10 Write function slave return format

address code	function code	Register start address	Number of register addresses n (1 ~ 32)	CRC Check code
1 byte	1 byte	2 byte	2 byte	2 byte

Protocol register description (single register address data for double-byte data)

name	Description	num ber of byte s	Deci mal point	unit	Read and write	Register address
U-SET	Voltage setting	2	2	V	R/W	0000H
I-SET	Current setting	2	2	A	R/W	0001H
UOUT	Output voltage display value	2	2	V	R	0002H
IOUT	Output current display value	2	2	A	R	0003H
POWER	Output power display value	2	2	W	R	0004H
UIN	Input voltage display value	2	2	V	R	0005H
LOCK	Key lock	2	0	-	R/W	0006H
PROTECT	Protection state	2	0	-	R	0007H
CVCC	Constant voltage constant current state	2	0	-	R	0008H
ONOFF	Switch output	2	0	-	R/W	0009H
B_LED	Backlight brightness level	2	0	-	R/W	000AH
MODEL	Product number	2	0	-	R	000BH
VERSON	Firmware version number	2	0	-	R	000CH
EXTRACT_M	Quickly bring up data sets	2	0	-	W	0023H

U-SET	Voltage setting	2	2	V	R/W	0050H
I-SET	Current setting	2	3	A	R/W	0051H
S-OVP	Overvoltage protection	2	2	V	R/W	0052H
S-OCP	Overcurrent protection value	2	3	A	R/W	0053H
S-OPP	Over power protection value	2	1、2	W	R/W	0054H
B-LED	Backlight brightness level	2	0	-	R/W	0055H
M-PRE	The data is called to update the output	2	0	-	R/W	0056H
S-INI	Power on the output switch	2	2	-	R/W	0057H

Note 1: This product is designed with M0-M9 10 groups of data sets, each group has a serial number 10-17 a total of 8 data, which M0 data group for the product power default call data group, M1, M2 data set for the product panel shortcut The starting address of the data set is: 0050H + data set number * 0010H, for example, the starting address of the M3 data group is: 0050H + 3 * 0010H = 0080H.

注 2: Key lock function read and write values of 0 and 1,0 for non-locking, 1 for the lock.

注 3: Protection state read value is 0-3,0 for normal operation, 1 is OVP, 2 is OCP, 3 is OPP.

注 4: Constant voltage constant current state read value of 0 and 1,0 for the CV state, 1 for the CC state.

注 5: Switch output function read and write values of 0 and 1, 0 are off, 1 is open.

注 6: Backlit brightness level read and write range of 0-5,0 level of the darkest, 5 brightest.

注 5: Quickly call out the data group function to write the value of 0-9, write will automatically call out the corresponding data set data.

1.4Error check code（CRC check）：

The host or slave can use the check code to determine whether the received information is correct. Due to electronic noise or some other interference, the information in the transmission process sometimes error, error check code (CRC) can check the host or slave in the communication data transmission process is wrong, the wrong data can give up (regardless Is sent or received), which increases the security and efficiency of the system. The CRC (redundant cyclic code) of the MODBUS communication protocol contains 2 bytes, that is, 16-bit binary numbers. The CRC code is calculated by the sending device (host) and placed at the end of the transmitted message frame. The device that receives the information (slave) recalculates the CRC of the received message, compares the calculated CRC with the received match, and if the two do not match, it indicates an error. CRC check code to send low before the high, high in the post.

CRC Code calculation method:

(1) Preset 1 16-bit register is hexadecimal FFFF (ie all is 1); this register is called CRC register;

(2) the first 8-bit binary data (the first byte of the communication information frame) is different from the lower 8 bits of the 16-bit CRC register, and the result is placed in the CRC register;

(3) Move the contents of the CRC register one bit to the right (toward the lower) to fill the most significant bit with 0 and check the shifted bit after the right shift;

(4) If the shift bit is 0: repeat step 3 (move right one again); if the shift bit is 1: The CRC register is XORed with the polynomial A001 (1010 0000 0000 0001)

(5) Repeat steps 3 and 4 until the right 8 times, so that the entire 8-bit data is processed;

(6) Repeat steps 2 through 5 to proceed with the processing of the next byte of the communication information frame;

(7) After all the bytes of the communication information frame are calculated as described above, the high and low bytes of the 16-bit CRC register are exchanged;

(8) The final CRC register is the CRC code.

3. Communication examples

Example 1：The host reads the output voltage and the output current display value

Host sends the message format:

Host sent	The number of bytes	Send the information	Remarks
Slave Address	1	01	To the slave with address 01
function code	1	03	Read register
Register start address	2	0002H	Register start address
Number of register addresses	2	0002H	A total of 2 bytes
CRC code	2	65CBH	The CRC code is calculated from the host

For example, if the current display value is 05.00V, 15.00A, the slave response returns the message format:

Slave response	The number of bytes	The information returned	Remarks
Slave Address	1	01	From slave 01
function code	1	03	Read register
Read the number of bytes	1	04	A total of 1 byte
The address is the contents of the 0002H register	2	01F4H	Output voltage display value
The address is 0003H	2	05DCH	Output current display value
CRC code	2	B8F4H	The CRC code is calculated from the slave

Example 2：The host should set the voltage to 24.00V

Host sends the message format:

Host sent	number of bytes	Send the information	Remarks
Slave Address	1	01H	From slave 01
function code	1	06H	Write a single register
Register address	2	0000H	Register address
The address is the contents of the	2	0960H	Set the output voltage value

0000H register			
CRC Code	2	8FB2H	The CRC code is calculated from the host

After receiving the response from the slave, return the message format:

Slave response	number of bytes	information returned	Remarks
Slave Address	1	01H	To the slave with address 01
function code	1	06H	Write a single register
Register address	2	0000H	Register start address
The address is the contents of the 0000H register	2	0960H	Set the output voltage value
CRC Code	2	8FB2H	The CRC code is calculated from the slave

Example 3：The host to set the voltage of 24.00V, current 15.00A.

Host sends the message format:

Host sent	number of bytes	Send the information	Remarks
Slave Address	1	01H	From slave 01
function code	1	10H	Write register
Register start address	2	0000H	Register start address
Number of register addresses	2	0002H	A total of 2 bytes
Write the number of bytes	1	04H	A total of 1 byte
The address is the contents of the 0000H register	2	0960H	Set the output voltage value
The address is 0001H register contents	2	05DCH	Set the output current value

CRC Code	2	F2E4H	The CRC code is calculated from the host

After receiving the response from the slave, return the message format:

Slave response	number of bytes	The information returned	Remarks
Slave Address	1	01H	To the slave with address 01
function code	1	10H	Write register
Register start address	2	0000H	Register start address
Number of register addresses	2	0002H	A total of 2 bytes
CRC code	2	41C8H	The CRC code is calculated from the slave