RS-485 communication function

1.1 Communication hardware interface

server Driver:

With the serial communication function of RS-485, the use of MODBUS protocol can realize many functions such as servo system parameter change and servo system status monitoring.

1.2 Communication parameters

parameter	name	scope	Default value
PA-71	drive ID number	1～254	1

When using RS-485 communication, the station number of the servo drive needs to be set to different values by this parameter. The setting range of the station number address is 1~254, and the default value is 1. This station number represents that the drive is connected to the communication network. The absolute address in the , repeating the setting of the station number will result in failure of normal communication.

parameter	name	scope	Default value
PA-72	MODBUS communication baud rate	48～1152×100	96

Use this parameter to select the baud rate of RS-485 communication. The selected communication baud rate must be consistent with the communication baud rate of the host controller.
Parameter meaning:
Select 96×100, the baud rate is 9600

In addition, the communication protocol of RS-485 should be consistent with the communication protocol of the upper controller. The specific setting values are as follows: 8, N, 2 (MODBUS, RTU)
The number 8 means that the transmitted data is 8 bits; the letter N means that the parity bit is not used; the number 2 means that the end bit is 2.

parameter	name	scope	Default value
PA-73	MODBUS communication protocol selection	0～2	0

Select the communication protocol of RS-485 through this parameter. The selected communication protocol must be consistent with the communication protocol of the host controller. The specific setting values are as follows:

0: 8, N, 2 (MODBUS, RTU)
1:8, E, 1 (MODBUS, RTU)

2: 8, O, 1 (MODBUS, RTU)

The number 8 means that the transmitted data is 8 bits; the letters N, E, O represent the parity bit, N means that this bit is not used, E means 1 even bit, O means 1 odd bit; the number 1 means the end bit is 1, and the number 2 Indicates that the end bit is 2.

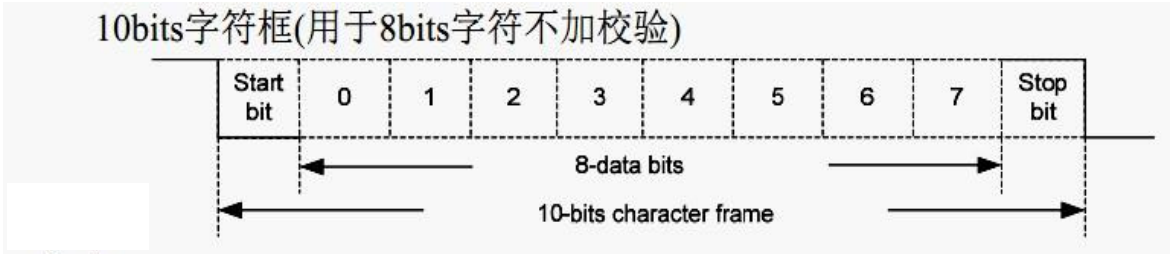
1.3MODBUS communication protocol

When using RS-485 serial communication, each servo drive must set the servo drive station number on the parameters in advance. The computer or the host controller communicates with the corresponding servo drive according to the station number, and the communication baud rate needs to refer to the host controller. the communication parameters to set the drive parameters. Here MODBUS uses RTU (Remote Terminal Unit) mode.

Encoder meaning

Each 8bits data consists of two 4bits hexadecimal characters. For example: 1byte data 64H.

Character structure:



Communication data structure:

STX	The minimum time interval from the previous frame is 3.5 characters
ADR	Mailing address: 1byte
CMD	Command code: 1byte
DATA(0)	Data content: Nword=2Nbyte, N<=100
.....	
DATA(n-1)	
CRC	Check code: 2byte
End1	The minimum time interval from the next frame is 3.5 character time

The items in the communication data format box are explained as follows:

1. STX (start of communication)

The minimum time interval from the previous frame is 3.5 character time.

2. ADR (communication address)

The legal communication address range is between 1 and 254, as shown below: Connect with the servo drive whose station number is 16 (hexadecimal 10H).

Line communication: ADR=10H

3. CMD (command name) and DATA (data character)

The format of the data characters depends on the command code. The commonly used command codes are described as follows:

(1) Command code 03H, read N words (16bit).
(2) For example: read 2 parameters consecutively from parameter No. 5 of the servo drive with station No. 01H.

Command information :

ADR	01H
CMD	03H
starting data location	00H(high byte)
	05H(low byte)
Number of data	00H(high byte)
	02H(low byte)
CRC Low	D4H(high byte)
CRC High	0AH(low byte)

Response information:

ADR	01H
CMD	03H
Number of data (calculated in bytes)	04H
No.5 parameter content	00H(high byte)
	96H(low byte)
No.6 parameter content	00H(high byte)
	4BH(low byte)
CRC Low	5AH(high byte)
CRC High	28H(low byte)

(2) Command code 06H, write 1 parameter.

For example: write 100 (0064H) to the No. 5 parameter of the servo drive with station No. 01H.

Command information :

ADR	01H
CMD	06H
starting data location	00H(high byte)
	05H(low byte)
data content	00H(high byte)
	64H(low byte)
CRC Low	98H(high byte)
CRC High	20H(low byte)

Response information:

ADR	01H
CMD	06H
starting data location	00H(high byte)
	05H(low byte)
data content	00H(high byte)
	64H(low byte)
CRC Low	98H(high byte)
CRC High	20H(low byte)

4. CRC frame check calculation:

Step description of the verification calculation:

Step 1: Initialize a 16bits register whose content is FFFFH, which is called a CRC register.

Step 2: XOR the first character of the command information with the low byte of the 16-bitsCRC register, and store the result back

CRC register.

Step 3: Check the least significant bit (LSB) of the CRC register, if this bit is 0, shift right by one; if this bit is 1, then the CRC register value

After shifting one bit to the right, perform XOR operation with A001H.

Step 4: Go back to Step 3 until Step 3 has been executed 8 times, then go to Step 5.

Step 5: Repeat steps 2 to 4 for the next byte of the command information, until all bytes have completed the above processing, at this time

The content of the CRC register is the frame check of the CRC.

Description: After calculating the CRC frame check, in the command information, you must first fill in the low order of the CRC, and then fill in the high order of the CRC.

For example: read the 5th parameter of the servo drive whose station number is 01H and read 2 parameters continuously. From ADR to last byte of data

The final content of the calculated CRC register is 0AD4H, then its command information is as follows, it should be noted that: byte D4H

Should be transmitted before byte 0AH.

ADR	01H
CMD	03H
starting data location	00H (high byte)
	05H (low byte)
Number of data	00H (high byte)
	02H (low byte)
CRC Low	D4H (high byte)
CRC High	0AH (low byte)

5. Endl communication ends:

The minimum time interval from the next frame is 3.5 character time.

1.4 Writing and reading parameters

1. Writing of PA group parameters

For all PA parameters of the servo drive, please refer to the corresponding chapters in the manual. Each parameter is represented by 16bit data, the communication address of each parameter is determined by the parameter serial number, and the address is 16bits. For example, the address of the parameter: parameter 1 (PA-0) is expressed as 0X 0000 , parameter 2 (PA-1) is expressed as 0X 0001 , and other parameters are deduced in turn.

2. Writing of P3 group parameters

For all P3 parameters of the servo drive, please refer to the corresponding chapters in the manual. Each parameter is represented by 16bit data, the communication address of each parameter is determined by the parameter serial number, and the address is 16bits. For example, the address of the parameter: parameter 1 (P3-0) is represented as 0x0100H, parameter 16
(P3-15) is represented as 0x010FH, and other parameters are deduced by analogy.

3. Writing of P4 group parameters

For all P4 parameters of the servo drive, please refer to the corresponding chapters in the manual. Each parameter is represented by 16bit data, the communication address of each parameter is determined by the parameter serial number, and the address is 16bits. The address of the parameter is for example: parameter 1 (P4-0) is represented as 0x0200H, parameter 16
(P4-15) is represented as 0x020FH, and other parameters are deduced by analogy.

4. Parameter format description for parameter writing and reading

Format description of the parameters that can be written and read through communication (please refer to chapter 1.5 for reading status): The parameters to be read and written must be integer numbers in decimal, which are marked on the display panel of the drive and in the instruction manual. The parameters of the decimal point are amplified by the corresponding multiples during the read and write operations, making them into decimal integers. Arguments in binary format are actually used during read and write operations as their decimal equivalent. The details are as follows. For details of the changing method of each parameter of the PA group, please refer to the description in the chapter corresponding to the parameter in the manual:

PA group parameter serial number	Instruction manual display value	Communication operation value	Transformation
1	315	315	constant
63	1.00	100	100x magnification
57	0100 (binary)	4 (decimal)	binary to decimal

All parameters described in the parameter section can be read and written through communication. For details, please refer to the corresponding parameter description in the manual.

1.5State quantity monitoring

The internal state quantity of the servo drive can be read out through the RS-485 communication port, but cannot be written. The state quantity is stored in 16bit data, in which the value is accurate to decimal places. When read out through the communication port, the value is amplified by 10 times and 100 times. This situation is the same as the parameter reading part, and the assembly sequence of the related state quantities is as follows:

1000H: Display the motor speed

1001H: Display the lower 16 bits of the current position (pulse)

1002H: Display the current position (pulse) high 16 bits
1003H: Display position command (pulse) lower 16 bits
1004H: Display position command (pulse) high 16 bits
1005H: Display position deviation (pulse) low 16 bits
1006H: Display position deviation (pulse) high 16 bits
1007H: Display motor torque
1008H: Display motor current
1009H: Display the current control mode
100AH: Display the current temperature
100BH: Display speed command
100CH: Display torque command
100DH: Displays the absolute position of the rotor during one revolution by 16 bits lower
100EH: Display the absolute position of the rotor in one revolution by 16 bits high
100FH: Display input terminal status
1010H: Display output terminal status
1011H: Display encoder input signal
1012H: Display the main circuit bus voltage value

1013H: Display alarm code
1014H: Display logic chip version number
1015H: Display relay pull-in state

1016H: Display running status
1017H: Display external voltage status
1018H: Display 15bit~0bit of absolute position value
1019H: Display 31bit~16bit of absolute position value
101AH: Display 47bit~32bit of absolute position value
101BH: Display 63bit~48bit of absolute position value

1.6Parameter temporary storage and temporary storage address

According to the customer's needs, it is necessary to continuously update the parameter values during the operation of the driver. In order to ensure the life of the EEPROM and speed up the program execution efficiency, the parameter temporary storage function is added. When using the corresponding temporary storage address to modify the parameters, the parameters can be modified, but not saved. After the drive is powered on again, the parameters will return to their initial values. as follows:

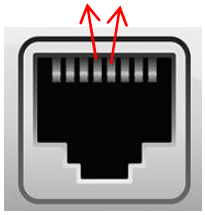
The communication address for saving the forward torque limit value is 0x0022. When this address is used to modify the parameter to 200, the parameter is saved in EEPROM. After the drive is powered off, the parameter is 200 and will not be lost; and the communication address for temporarily storing the forward torque limit value is: 0x00A2, when using this address to modify the torque limit value to 200, the parameter value will be set in, it will take effect immediately, but after the power is turned on again, the initial value will be restored to 300.

Please refer to the description of 1 in 1.4 and the parameter description chapter in the corresponding driver manual for the communication address of the parameters saved in the PA group parameters; and the communication address of the PA group parameters temporarily saved is the address offset 0x0080 of the saved parameters, as follows:

(1) The communication address of the saving parameter of the forward torque limit value is 0x0022. After offset by 0x0080, the communication address of the temporary storage parameter of the forward torque limit value is 0x00A2.

(2) The communication address of the storage parameter of the reverse torque limit value is 0x0023. After offset by 0x0080, the communication address of the temporary storage parameter of the reverse torque limit value is 0x00A3.

1.7 Communication Wiring Definition

RS485 communication signal		
terminal pin	definition	icon
4	RS485-	**4 and 5** feet can be connected 
5	RS485+	