

Communication Function

1.1 Hardware

AC Servo Drive:

It has the serial communication function of RS-485 and it can realize parameter changes and status monitoring of servo system with MODBUS protocol.

1.2 Communication Parameters

Parameter	Name	Range	Default Value
PA-71	Drive ID No.	1~254	1

When using RS-485 communication, ID No. of the servo drive needs to be set to different values according to this parameter. The setting range of ID No. is from 1 to 254 and default value is 1. This ID No. represents the absolute address in communication network and if it is set repeatedly, it will lead to abnormal communication.

Parameter	Name	Range	Default Value
PA-72	MODBUS Baud Rate	48~1152×100	96

You can choose RS-485 baud rates through this parameter and the baud rate that you chose should keep consistent with PC controller's.

Parameter Meaning :

If selection is 96×100, the baud rate is 9600.

Meanwhile, the communication protocol of RS-485 should be consistent with PC controller's

The setting values as below:

8, N, 2 (MODBUS, RTU)

"8" represents the transmission data is 8 bits. "N" represents that it doesn't use odd or even bits."2" represents the ending bit is 2.

Parameter	Name	Range	Default Value
PA-73	MODBUS Communication Protocol Selection	0~2	0

You can choose communication protocol of RS-485 through this parameter and the communication protocol should be consistent with PC controller's. The setting values as below:

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

1: 8, E, 1 (MODBUS, RTU)

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

"8" represents the transmission data is 8 bits. "N,E,O" represents odd or even bit. While "N" represents it doesn't use this bit; "E" represents 1 even bit;"O" represents 1 odd bit; "1" represents the ending bit is 1 and "2" represents the ending bit is 2.

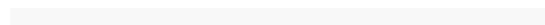
1.3 MODBUS Communication Protocol

When using RS485 serial port communication, each servo drive must set servo drive ID in the parameter. PC or controller should communicate with corresponding servo drive based on the ID No. And the baud rate need to set the parameters of the drive referring to the communicated parameters. Here, Modbus executes RTU(Remote Terminal Unit) mode.

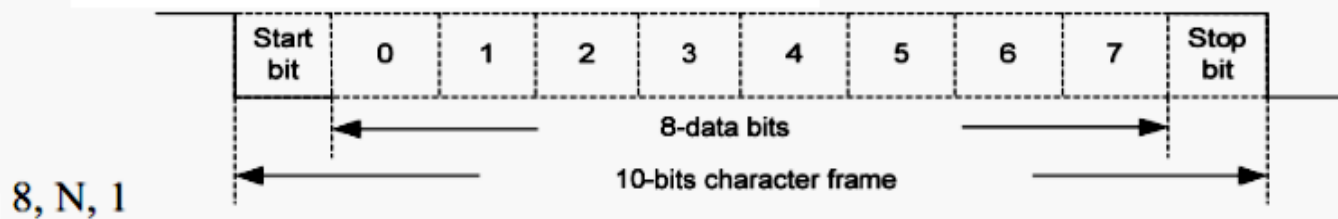
Encoder Meaning

Each 8-bit data consists of two 4-bit hexadecimal characters. For example, 1 byte data 64H.

Character Structure:



10-bit character frame (for 8-data bits without checking)



Communication Data Structure:

STX	The minimum time between the upper frame is 3.5 characters.
ADR	Communication address:1byte
CMD	Commmand code: 1byte
DATA(0)	Data: Nword=2Nbyte, N<=100
.....	
DATA(n-1)	
CRC	Checking code: 2byte
End1	The minimum time between the next frame is 3.5 characters.

The introduction for each item in the frame of communication data format is as following:

1、STX(Start of communication)

The minimum time between the upper frame is 3.5 characters.

2、ADR(Communication address)

The legal communication ranges from 1 to 254. Fro example, communicate with the drive of ID NO.16(hexadecimal10H):ADR=10H

3、CMD(Command code) And DATA(Data characters)

The data characters are depended on the command codes. The normal command codes are as follows:

(1) Command code 03H, read N words(16bit).

For example, 2 parameters are continuously read from the NO.5 parameter of the ID NO.01H servo drive.

Command :

ADR	01H
CMD	03H
The initial location of data	00H(High byte)
	05H(Lower byte)
Data bytes	00H(High byte)
	02H(Lower byte)
CRC Low	D4H(High byte)
CRC High	0AH(Lower byte)

Response:

ADR	01H
CMD	03H
Date bytes	04H
No.5 parameter	00H(High byte)
	96H(Lower byte)
No.6 parameter	00H(High byte)
	4BH(Lower byte)
CRC Low	5AH(High byte)
CRC High	28H(Lower byte)

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

For example, Write 100(0064H) into the No.5 parameter of the ID NO.01H

Command:

ADR	01H
CMD	06H
The initial location of the data	00H(High byte)
	05H(Low byte)
Data bytes	00H(High byte)
	64H(Low byte)
CRC Low	98H(High byte)
CRC High	20H(Low byte)

Response:

ADR	01H
CMD	06H
The initial location of the data	00H(High byte)
	05H(Low byte)
Data bytes	00H(High byte)
	64H(Low byte)
CRC Low	98H(High byte)
CRC High	20H(Low byte)

4、CRC Frame Checking Calculation:

The procedures of checking calculation:

Step 1: Initializes a 16-bit register with FFFFH, which named as CRC register.

Step 2: XOR(exclusive or data processing) is calculated between the first character of command information and the lower byte of 16-bit CRC register and then the result is stored in the CRC register.

Step 3: Check the lowest bit(LSB) of the CRC register. If it is 0, then move to the right one.

If it is 1, then move to the right one and after that, XOR(exclusive or data processing) operation is calculated with A001H.

Step 4: Back to step 3 and until the operation of step 3 has been executed for 8 times, you can enter into step 5.

Step 5: The next byte of command information is operated from step 2 to step 4 until all bytes have been processed completely as above, then the information of CRC register is CRC frame checking.

Note: After calculating the CRC frame checking, must firstly fill in the lower bits of CRC and then fill in the high bits in the command information.

For example, Continuously to read 2 parameters in the NO.5 parameter of the ID NO.01H servo drive. From ADR to the last byte of data, the final information of CRC register that was calculated is 0AD4H. Then the command information is as follows:

Note: ByteD4H should be served before the byte0AH.

ADR	01H
CMD	03H
The initial location of the data	00H(High byte)
	05H(Low byte)
Data bytes	00H(High byte)
	02H(Low byte)
CRC Low	D4H(High byte)
CRC High	0AH(Low byte)

5、Ending with End1 communication:

The minimum time between the next frame is 3.5 characters.

1.4 Write Parameters And Read Parameters

1、Write PA group parameters

PA group parameters of the servo drive refer to the chapter 6 of the servo manual. Each parameter is represented by 16 bits and their communication address is determined by the parameter No..For example,parameter 1(PA-0) is 0X0000;Parameter 2(PA-1) is 0X0001 and other parameters are like this.

2、Write P3 group parameters

P3 group parameters of the servo drive refer to the chapter 6.2 of the servo manual. Each parameter is represented by 16 bits and their communication address is determined by the parameter No..For example, parameter 1 (P3-0) is 0X0100H;Parameter 16(P3-15) is

3、The format of writing parameters and reading parameters

The introduction of the format of writing parameters and reading parameters(state volume reading refers to chapter 1.5): The parameter must be a decimal integer. The values of parameters with decimal points displayed on the drive are amplified in the process of reading and writing, which leads to make them converted into decimal integer.

PA Group Parameters	Drive Display	Communication Operation	Transformed Mode
1	315	315	No
63	1.00	100	Magnify 100 times
57	0100(binary)	4(decimal)	Binary to decimal


The values of parameters in the manual can be read and wrote through communication. The details refer to coresponding introductions of parameters in the manual.

1.5 Status Monitoring

The internal states in the servo drive can be read through the terminal of RS485 communication, but it can not be wrote. The states are saved as 16-bit data. And when values of parameters with decimal points are read by the communication terminal, they are amplified to 10 times or 100 times. This is like as the parameter reading. The order of status are as follows:

1000H:	Display motor speed
1001H:	Display the current position is 5-bit low
1002H:	Display the current position is 5-bit high
1003H:	Display position command(command pulse accumulation) is 5-bit low.
1004H:	Display position command(command pulse accumulation) is 5-bit high.
1005H:	Display positic
1006H:	Display position deviation is 5-bit high .
1007H:	Display motor torque
1008H:	Display motor current
1009H:	Display control mode
100AH:	Display temperature
100BH:	Display speed command
100CH:	Display torque command
100DH:	Display absolute position of the rotor in a roll is 5-bit low
100EH:	Display absolute position of the rotor in a roll is 5-bit high .
100FH:	Display input terminal state
1010H:	Display output terminal state
1011H:	Display encoder input signal
1012H:	Display voltage value of main line of main circuit
1013H:	Display alarm code
1014H:	Display logic chip version number
1015H:	Display the actuation state of the relay
1016H:	Display external voltage state
1017H:	Display external voltage state
1018H:	Display the absolute position 15 bit~0 bit
1019H:	Display the absolute position 13 bit~16 bit
101AH:	Display the absolute position 47 bit~32 bit
101BH:	Display the absolute position 63 bit~48 bit

1.6 Communication Wiring Definition

RS485 Communication Signal		
Pin	Definition	Picture
4	RS485-	<p>Connect No.4 and No.5 pin</p> 
5	RS485+	