

KST Servo RS485 Communication Protocol V1.3

This protocol defines the RS485 communication protocol design between upper computer and lower computer, and it can be expanded or revised as needed.

一、 Default Value

Node Address: 0x25
Baud Rate: 115200bps
Communication Format: 8N1

二、 Frame Format

Byte	1	1	1	1	4	1	1
Name	Frame head	Version	Address	Command code	data	Checksum	Frame end
Content	0xFE	0xCA	2.2	2.3	2.4	2.5	0x0A

2.1 Frame head, Version, Frame end

These three bytes is fixed value.

2.2Address

Slave node address, range from 0x00 to 0xFF. 0x00 is the command to send the broadcast. Both commands and responses use slave node addresses, so the master node does not need addresses.

2.3Command Code

Command code is the code that sends commands or responses, and range from 0x00 to 0x3F. Normal response code equals command code plus 0x40, error response code equals command code plus 0xC0. See the instructions in point 3 specifically.

2.4Data

Fixed to 4 bytes, if not enough, filled with 0x00. See the instructions in point 3 specifically.

2.5Checksum

Adding 7 bytes of arithmetic sum from version to data, leaving out high overflow and taking 8 bits lower.

三、 Command Specification

1、 Baud Rate Setting Command

Baud rate default is 115200. The baud rate can be set to an optional value in the control table using the setup command.

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x06	X	0x00	0x00	0x00

X is the baud rate setting byte, and the baud rate setting comparison table is as follows:

X	00	01	02	03	04	05	06	07
Baud rate	9600	19200	38400	57600	115200	256000	512000	921600

Received the following response indicating that the setup was successful:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x46	X	0x00	0x00	0x00

Baud rate changes must be saved using save commands, and it will not take effect until it is restarted.(Higher baud rate has special requirements for communication cables and wiring structures.Refer to the relevant RS485 protocol for specific requirements.)

2、 Node Number Setting Command

Node number defaults to 0x25.

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x08	X	0x00	0x00	0x00

X is the new node number.

Received the following response indicating that the setup was successful:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x48	X	0x00	0x00	0x00

Node number changes must be saved using save commands, and it will not take effect until it is restarted.

3、 Save Command (lower computer does not need to respond)

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x0F	0x73	0x61	0x76	0x65

Saving node number and baud rate, etc.

4、 Reading Node Number

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x18	0x00	0x00	0x00	0x00

response:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x58	X	0x00	0x00	0x00

X is the current device node number returned.

5、Setting Location Command

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x09	Low	High	0x00	0x00

Position setting command step size : 0.1° ,range: -100° ~+100° , it is represented by complements.(Out of range location instruction, current device returns error code. The accuracy of position setting is $\pm 0.5^\circ$)

Position	-100	-10.9	-0.8	0	0.8	10.9	10
High	0xFC	0xFF	0xFF	0x00	0x00	0x00	0x03
Low	0x18	0x93	0xF8	0x00	0x08	0x6D	0xE8

Received the following response indicating that the setup was successful:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x49	Low	High	0x00	0x00

Once the setup is successful, the current value change takes effect immediately and restart to the default value.

6、Reading Position

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x19	0x00	0x00	0x00	0x00

Response:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x59	Low	High	0x00	0x00

With the same set of bytes defined position of High and low.

7、Reading the Status of the Lower Computer

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x10	0x00	0x00	0x00	0x00

Response:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x50	X1	X2	X3	0x00

The types of X1, X2 and X3 represent state information.

X1X2 represents the working current (accuracy $\pm 5\%$, or 0.01A), in units of 10mA, for example

X2	0x00	0x00	0x00	0x01	0x01
X1	0x32	0x4B	0x64	0x00	0xF4
current	0.50A	0.75A	1.00A	2.56A	5.00A

X3 represents the working temperature (temperature range - 40 ~ + 120°C, accuracy $\pm 2^\circ\text{C}$), and is expressed by complements, such as:

X3	0xD8	0xF6	0x00	0x19	0x78
temperature	-40°C	-10°C	0°C	25°C	120°C

8、Reading firmware version

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x1A	0x00	0x00	0x00	0x00

Response:

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0x5A	X1	X2	X3	X4

X1X2X3X4 is version string.

9、Reading and writing failure response

Command code	Byte 1	Byte 2	Byte 3	Byte 4
0xC0+X	Error code			

SDO ERROR CODE

0503 0000	Toggle bit not alternated
0504 0000	SDO protocol timed out
0504 0001	Client/server command specifier not valid or unknown
0504 0002	Invalid block size (block mode only)
0504 0003	Invalid sequence number (block mode only)
0504 0004	CRC error (block mode only)
0504 0005	Out of memory
0601 0000	Unsupported access to an object
0601 0001	Attempt to read a write only object
0601 0002	Attempt to write a read only object
0602 0000	Object does not exist in the object dictionary
0604 0041	Object cannot be mapped to the PDO
0604 0042	The number and length of the objects to be mapped would exceed PDO length
0604 0043	General parameter incompatibility reason
0604 0047	General internal incompatibility in the device
0606 0000	Access failed due to a hardware error
0607 0010	Data type does not match, length of service parameter does not match
0607 0012	Data type does not match, length of service parameter too high
0607 0013	Data type does not match, length of service parameter too low
0609 0011	Sub-index does not exist
0609 0030	Value range of parameter exceeded (only for write access)
0609 0031	Value of parameter written too high
0609 0032	Value of parameter written too low
0609 0036	Maximum value is less than minimum value
0800 0000	General error
0800 0020	Data cannot be transferred or stored to the application
0800 0021	Data cannot be transferred or stored to the application because of local control
0800 0022	Data cannot be transferred or stored to the application because of the present device state
0800 0023	Object dictionary dynamic generation fails or no object dictionary is present
