LSC Series Servo Controller Communication Protocol V1.2

Serial Communication, Baud Rate is 9600 baud

Header	Data Length	Command	Parameter
0x55 0x55	Length	Cmd	Prm 1...Prm N

Header: Received two consecutive 0x55, indicates that the data packets arrived.

Length: Equal to the parameter number N plus a command and plus the byte length occupied by the data length itself. That means the data length is equal to the parameter N plus 2.
(Length=N +command+a byte length = N +2)

Command: Various control instructions.

Parameter: In addition to the command, the need to add control information

The user transmits the data actively to the servo controller

The pins of the user's controller that can transmit data are connected to the RX pin of the servo controller. Of course, the GND of user's controller should be connected to the GND of servo controller. If the user transmits the correct data to the servo controller, the blue LED 2 on the controller will flash one time, indicating that the correct data have been received. If the user transmits the wrong data, then the blue LED2 will not have any reaction and will keep the bright, then the buzzer will beep beep twice to remind the user of the data error.

1. Command name: CMD_SERVO_MOVE   Command value: 3
    Length(Data Length):

Description: Control the rotation of any servo(you can control anyone as you like), Length = the number of control servo*3+5

Parameter 1: The number of servo to be controlled
Parameter 2: Lower 8 bits of time value
Parameter 3: Higher 8 bits of time value
Parameter 4: Servo ID number
Parameter 5: Lower 8 bits of the angle position value
Parameter 6: Higher 8 bits of the angle position value
Parameter......: The format is the same as the parameter 4, 5 and 6, control the angle

positions of different IDs

For example:

(1). Control the No.1 servo to turn to 2000 position within 1000ms

Header	Length	Command	Parameter
0x55 0x55	0x08	0x03	0x01 0xE8 0x03 0x01 0xD0 0x07

(2). Control No.2 servo turn to 2000 position and No.9 servo turn to 2300 position within 800ms.

Header	Length	Command	Parameter
0x55 0x55	0x0B	0x03	0x02 0x20 0x03 0x02 0xB0 0x04 0x09 0xFC 0x08

2. Command name: CMD_ACTION_GROUP_RUN   Command value: 6
Length(data length): 5

Description: Control the running of action groups(however the premise is that is that the action group has been downloaded to the servo controller). You can control the number of times that the action group runs, if you want the action group to run all the time, set the value(running times of action group) to 0 and it will run all the time.

Parameter 1: The number of the action group to run
Parameter 2: Lower 8 bits of running times of action group
Parameter 3: Higher 8 bits of running times of action group

For example:

(1)Control the NO.8 action group to run once

Header	Length	Command	Parameter
0x55 0x55	0x05	0x06	0x08 0x01 0x00

(2)Control the NO.2 action group to run unlimited times.

Header	Length	Command	Parameter
0x55 0x55	0x05	0x06	0x02 0x00 0x00

3. Command name: CMD_ACTION_STOP   Command value: 7
Length(data length): 2

Description: Stop the running action group. If the action group is not running, the command would not affect anything.

Parameter: no parameter

For example:
    (1)Stop the running action group

Header	Length	Command	Parameter
0x55 0x55	0x02	0x07	No parameter

4. Command name: CMD_ACTION_SPEED   Command value: 11
    Length(data length): 5

Description: Using the format of percentage to express the speed of the control action group, for example, to control the speed of the No. 1 action group is twice the original speed, then the percentage number is 200, representing 200%, if the number of the action group is 0xFF, meaning to adjust the speed of all downloaded action groups.

Pay attention:
(1)The adjusted speed parameters will not be saved after shutdown, if you want to adjust the speed, you have to reset the speed every time you start up.
(2)The servo also has its own limiting speed, if you speed up to several times the original speed, however, the speed has exceeded the maximum speed of the itself, it is also meaningless to speed up, so please keep that in mind.

Parameter 1: The number of action group to be adjusted
Parameter 2: Lower 8 bits of the speed percentage value
Parameter 3: Higher 8 bits of the speed percentage value

For example:
(1)Control No.8 action group runs at 50% speed

Header	Length	Command	Parameter
0x55 0x55	0x05	0x0B	0x08 0x32 0x00

(2)The servo controller has downloaded several action groups, and want to adjust the speed of all the action groups to 3 times the original, this is 300%.

Header	Length	Command	Parameter
0x55 0x55	0x05	0x0B	0xFF 0x2C 0x01

5. Command name: CMD_GET_BATTERY_VOLTAGE   Command value: 11
Length(data length value): 2

Description: Get the servo controller's battery voltage in unit millivolts, the controller will immediately return the data after the command has been sent to it, the returned data is a data packet with two parameter values.
Parameter1: no parameter

Transmit:

Header	Length	Command	Parameter
0x55 0x55	0x02	0x0F	No parameter

Return: The parameter 1 of the data returned by servo controller represents the lower 8 bits of the voltage value, and parameter 2 represents the higher 8 bits of the voltage, such as the return voltage of 7500mV

Header	Length	Command	Parameter
0x55 0x55	0x04	0x0F	0x4C 0x1D

6. Command name: CMD_MULT_SERVO_UNLOAD   Command value: 20
Length(data length value): N

Description: Power off multiple servos and its motors, after sending this command, the corresponding servo can be rotated as you want by hand. Data length N= the quantity of controlled servos+3

Parameter1: the quantity of controlled servos
Parameter2: the ID number of servo a
Parameter3: the ID number of servo b
Parameter......: the ID number of servo x

For example:
(1) Power off servo No.1, No.2, No.3 and its motors

Header	Length	Command	Parameter
0x55 0x55	0x06	0x14	0x03 0x01 0x02 0x03

(2) Power off servo No.1, No.2, No.3, No.4, No.5, No.6 and its motors

Header	Length	Command	Parameter
0x55 0x55	0x09	0x14	0x06 0x01 0x02 0x03 0x04 0x05 0x06

7. Command name: CMD_MULT_SERVO_POS_READ   Command value: 21
Length(data length value): N

Description:
Read the angle position values of multiple servos. Data length N= the quantity of read servos+3

Parameter1: the quantity of read servos
Parameter2: the ID number of servo a
Parameter3: the ID number of servo b
Parameter......: the ID number of servo x

For example:
(1) Read the angle position values of servo No.1, No.2, No.3, No.4, No.5 and No.6

Send:

Header	Length	Command	Parameter
0x55 0x55	0x09	0x15	0x06 0x01 0x02 0x03 0x04 0x05 0x06

Return:
Data length N= the quantity of read servos
Parameter1: the quantity of read servos
Parameter2: the ID number of servo
Parameter3: 8 bits lower of the angle position
Parameter4: 8 bits higher of the angle position
Parameter......: the format is as same as parameter 2, 3, 4, read the angle positions of different ID

For example, all the returned angle position values are 500

Header	Length	Command	Parameter
0x55 0x55	0x15	0x15	0x06 0x01 0x01 0xF4 0x02 0x01 0xF4 0x03 0x01 0xF4 0x04 0x01 0xF4 0x05 0x01 0xF4 0x06 0x01 0xF4

The servo controller transmits data to the user proactively

During the running process of the servo controller, if the state has changed (such as the end of an action group operation), controller will transmit data to the user's control board through the serial port proactively, because there are more than one way to operate the controller.You can use wireless handle, connect Bluetooth module or through the user secondary development interface(serial port)to operate controller. So let the different control ways to know the current status of the servo controller can benefit your own management and operation. The following are the commands that the servo controller return to the user.

1. Command name: CMD_ACTION_GROUP_RUN   Command value: 6
Length(data length): 5

Description: When the action group of servo controller began to run, controller will immediately transmit data and bring the parameter information. In fact, the format of return data is the same with the format of the data sent by user controlling the action group operation

Parameter 1: The number of the running action group
Parameter 2: Lower 8 bits of running times of action group
Parameter 3: Higher 8 bits of running times of action group

For example:
(1)When the No.8 action group is running and the number of times is 1, the data returned by the servo controller to the user is:

Header	Length	Command	Parameter
0x55 0x55	0x05	0x06	0x08 0x01 0x00

Pay attention: Even though the user himself through the serial port to control the operation of an action group, when the servo controller receive the user's commands and began to run an action group, it will immediately return the data to the user through the serial port.

2. Command name: CMD_ACTION_GROUP_STOP   Command value: 7
Length(data length): 2

Description: This command will be returned when a running action group is forced to stop by other ways (such as a handle) or by a stop command sent by uses themselves . In fact, the format of return data is the same as the format of the data sent by the user to stop the action group.

Parameter: no parameter

For example:
(1). The data is returned when a running action is forced to terminate.

Header	Length	Command	Parameter
0x55 0x55	0x02	0x07	No parameter

3. Command name: CMD_ACTION_GROUP_COMPLETE   Command value: 8
Length(data length): 5

Description:When an action group is running to the natural end(it is not forced to stop running, but the running time is out so the natural running go to the end), the controller will return the command.

Parameter 1: the number of running action group
Parameter 2: Lower 8 bits of running times of action group
Parameter 3: Higher 8 bits of running times of action group

For example:
(1)When the running times of No.8 action group is 1, after the end of the natural running, the data returned by the servo controller to the user is:

Header	Length	Command	Parameter
0x55 0x55	0x05	0x08	0x08 0x01 0x00