ROBS-I60I MANUEL

OC-Servo Electronics Technology Co.,Ltd

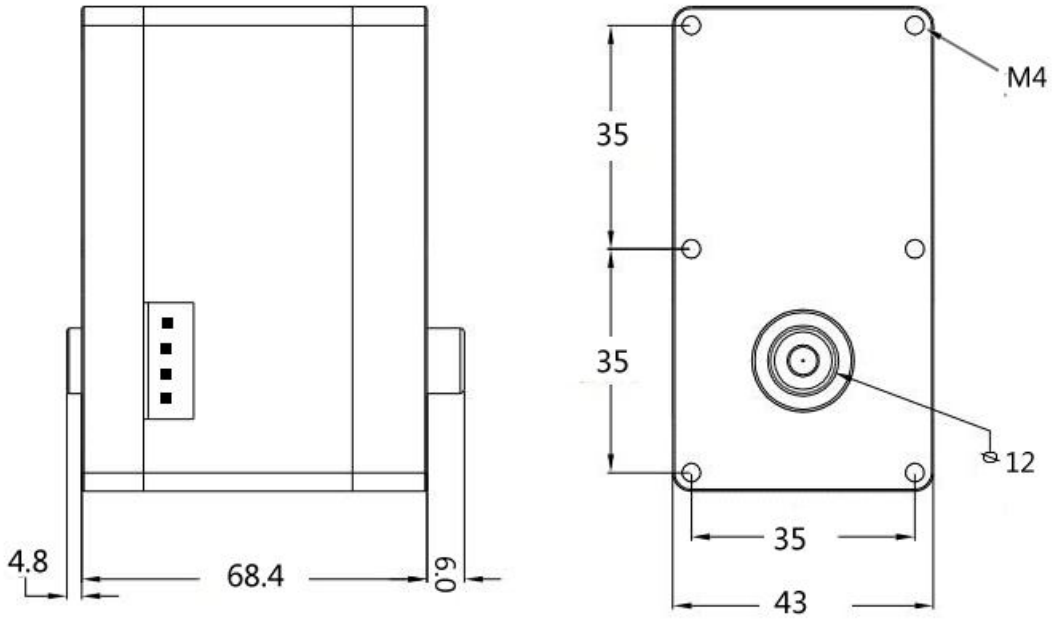
Chapter 1 Overview

1.1 Properties

ROBS-1601 is a robot servo developed and produced as a set of motor, servo drives, and modbus communication interface in an integrated servo unit. It's mainly used for robot joints, wheel drives or mechanical arms, and also other situations that need precise position control. The product features are as follows:

- Large Torque: 160kgf·cm (18.0V)
- High Voltage supply： DC 12.0V ~ 18.0V
- High Resolution: 0.15°
- Unique connection method，suitable for a variety of combination assembled.
- High-precision full metal gears，double balls bearing
- Full metal case，outstanding heat dissipation
- Rotation range 0~360°in servo mode
- Can be set as motor mode, rotating continuously
- Modbus connection，can be cascaded to 254 units in theory
- Communication speed: 38400bps-1Mbps
- With position，temperature，speed，voltage，and other feedbacks.

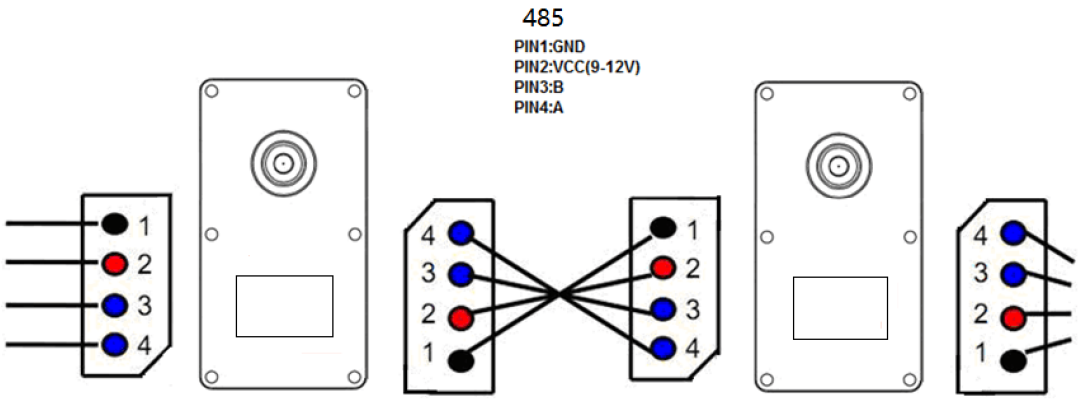
■ 1.2 Structure & Size



■ 1.3 Electrical connection

■ 1.3.1 Pin Definitions

The connection of ROBS-1601 is as shown below, two series terminals can be individually connected in series(their pin definitions should be the same);



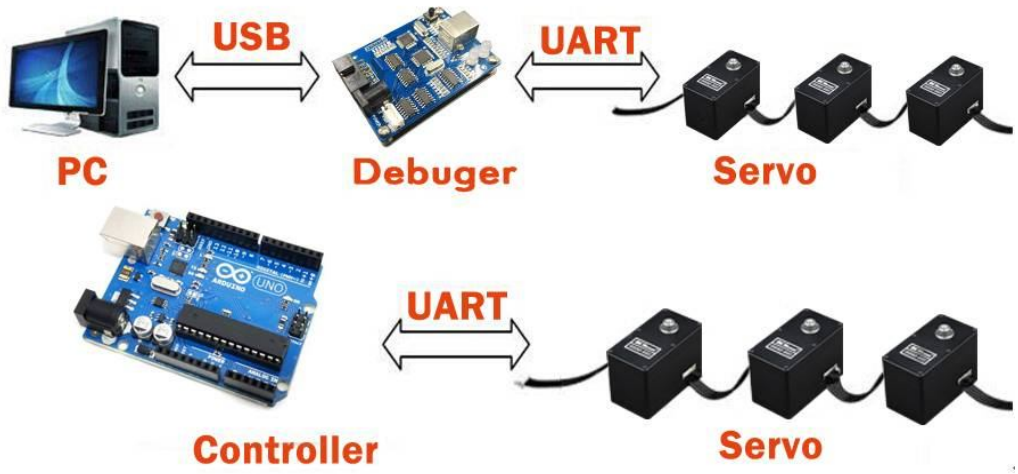
■ 1.3.2 Servo Communication Protocol

ROBS-1601 uses the full-duplex asynchronous serial communication modbus. Theoretically, 254 robot servos can be grouped by modbus in a series， controlled by serial interface UART asynchronous. Each servo can be as different ID，multiple servos can move unified，and can be also controlled independently.

Its communication instruction is open，communicates with user's PC (controller) through asynchronous serial interface; You are able to set up its parameters and its control mode. By sending commands through the asynchronous serial interface, ROBS-1601 can be set to motor mode or servo mode. In the motor mode，we can use it as a DC gear motor in an adjustable speed. In the servo mode，ROBS-1601 has the rotation range 0~360°,with high precision in position control and has an adjustable speed in servo mode.

You can communicate with the ROBS-1601 if you use the

Full-duplex UART asynchronous serial interface which is in keeping with the protocol. To control the ROBS-1601， you have several ways as follows：



Method 1：Debuger

PC will recognize the debuger as a serial device，data packet will be sent to the servo through the serial ports. ROBS-1601 executes the instructions on the packet and if it's a check command, servos will go back to the data packet.

You can also design your own software according to the protocol provided in the Manuel.

Method 2：Arduino board or other controllers

Method 1 enables us to debug our robot servo rapidly， and change its function parameters fast. But in this way，you can't do it without your PC，so you can't make a robot configuration independently. The Arduino controller or other proprietary controller is used to control the servo. However, you need to convert the TTL level to 485 level.

■ Chapter 2 Communication Protocol

2.1 Protocol

Between the controller and the servo using question and Return mode of communication, the controller sends a command packet, the servo return Return packet.

A number of servos are allowed in a network, so each servo is assigned an ID number. The control command issued by the controller contains the ID information, only the servo that matches the ID number can receive the command completely and return the Return information.

Asynchronous is a serial communication mode, one frame data is divided into one start bit, eight data bits and one stop bit, no parity bit, and total of 10 bits.

2.2 OCS instruction packet

Prefix	ID	Data Length	Instruction	Parameters	Sum
0XFF 0XFF	ID	Length	Instruction	Parameter1 ...Parameter N	Check Sum

Prefix: received two 0XFF, ready to run the OCS instruction.

ID:each servo has its own ID number. ID range 0 to 253, 0X00~0XFD(Hexadecimal).

Broadcast ID:ID 254 is the broadcast ID, if the ID number in one

instruction is 254(0XFE), all servos receive the order, but no Return.

Data length: Please refer to the specific length of each instruction explanation.

Parameter: Supplementary control information except instruction.

Summary： The calculation method is as following：

Check Sum= ~（ID+Length+Instruction+Parameter1+……+ParameterN）

If the Sum in the brackets in this calculation is over 255, then take the lowest of a byte, "~" means inversion.

2.3 Return packet

The Return packet is the Return of controller to some Instructions：

Prefix	ID	Data length	Instruction	Parameter	Check Sum
0XFF 0XFF	ID	Length	Instruction	Parameter1 ...Parameter N	Check Sum

The returned Return packet contains the current state ERROR of the servo. If the current working status of the servo is not normal, it will be reflected by the byte. The information of each bit is as follows：

BIT	Title	Details
BIT7	0	---
BIT6	0	---
BIT5	Overload	The position output torque is less than the load setting
BIT4	0	---
BIT3	Current error	The current exceeds the specified range
BIT2	Temperature error	The temperature exceeds the specified range
BIT1	Angle error	The angle exceeds the specified range
BIT0	Voltage error	The voltage exceeds the specified range

If error is 0， there is no error.

If the instruction is the instruction(read) READ DATA, then Parameter1 ...

Parameter N is the information.

2.4 OCS Instruction type

OCS Instructions:

Instructions	Function	Value	Data length
PING	Query the working status	0X01	0X02
READ	Query control table of characters	0X02	0X04
WRITE	Write characters to the control table	0X03	N+3
REG WRITE	Similar to WRITE DATA, but not immediately after the control characters written, until the ACTION command to reach	0X04	N+3
ACTION	Trigger REG WRITE Write action	0X05	0
SYNC WRITE	For simultaneously controlling a plurality of servos	0X83	(L + 1) * N + 4
BULKWRITE DATA	For simultaneous control of multiple servos and discontinuous memory spaces	0x09	See the detailed description
RESET	Reset the control table to the factory values	0X06	0

2.4.1 Stats query Instruction PING

Function Used to read the work state of the servo

Length 0X02

Instruction 0X01

Parameter no

Example: Read Servo 1's working state

Instruction packet: 0XFF 0XFF 0X01 0X02 0X01 0XFB

Prefix	ID	Data Length	Instruction	Check Sum
0XFF 0XFF	0X01	0X02	0X01	0XFB

Return packet: 0XFF 0XFF 0X01 0X02 0X00 0XFC

Prefix	ID	Data length	Instruction	Check Sum
0XFF 0XFF	0X01	0X02	0X00	0XFC

2.4.2 Instruction Read

Function Used to read the data inside the servo

Length 0X04

Instruction 0X02

Parameter 1 Read the address

Parameter 2 Read the length of parameter

Example: Read Servo 1's internal temperature

It is known from the memory control table that the address 0X3F (parameter 1) is the address of the temperature and then needs to read one byte (0X01).

Instruction packet: 0XFF 0XFF 0X01 0X04 0X02 0X3F 0X01 0XB8

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0X01	0X04	0X02	0X3F 0X01	0XB8

Return packet: 0XFF 0XFF 0X01 0X03 0X00 0X20 0XDD

Prefix	ID	Data length	Instruction	Parameter	Check Sum
0XFF 0XFF	0X01	0X03	0X00	0X1E	0XDD

Read out the data is 0X1E, 0X1E converted to decimal is 30, indicating that the current temperature is 30 ℃.

2.4.3 OCS Write Instruction

Function This command is used to write parameters to the servo memory control table

Length N+3 (N is the number of parameter written)

Instruction 0X03

Parameter1 First part of data address

Parameter 2 The first data

Parameter 3 The second data

Parameter N+1 The Nth data

Example: Change a servo's ID to ID1。

The address of the saving ID is 0X05, so you can write 1 in the address 0X05. We use broadcast ID254 (0XFE) to send instructions.

Instruction： 0XFF 0XFF 0XFE 0X04 0X03 0X05 0X01 0XF4

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0XFE	0X04	0X03	0X05 0X01	0XF4

2.4.4 Instruction REG Write

REG Write is similar with Write instruction, the only difference is the execution time. When the REG WRITE packet is received, the servo will store the received data in the buffer and set the address 0X40 to 1. When the ACTION instruction is received, the stored instruction executes.

Function	This command is used to write parameters to the servo memory control table
Length	N+3 (N is the number of parameter written)
Instruction	0X03
Parameter1	First part of data address
Parameter 2	The first data
Parameter 3	The second data
Parameter N+1	The Nth data

2.4.5 Instruction ACTION

Function	Used to activate the instruction written by REG WRITE instruction.
Length	0X02
Instruction	0X05

Parameter no

The **ACTION** instruction is useful for controlling multiple servos at the same time.

The ACTION instruction allows the first and last servos to perform their respective actions simultaneously without any delay in the control of the servos with different IDs.

When the ACTION instruction is sent to multiple servos on the series, the broadcast ID254 (0XFE) is used. Therefore, there is no data frame return when this instruction is sent.

Example : Let the servo0 to 0 ° position, and servo1 to turn to 360 ° position, the two servo need to move at the same time

Analysis: As the need for two movements at the same time, we can use the above 2.4.4 asynchronous write REG_WRITE directive and ACTION instructions to achieve their simultaneous action, so the following steps were written , and at last all instruction will be activated by ACTION instruction. As the servo 0-360 ° corresponds to the value 0-4095, so 0 ° position is 0X0000, 360 ° position is 0X0FFF.

ID=0; Instruction = REG_WRITE; Address = 0X2A; Parameter = 0X00, 0X00

ID=1; Instruction = REG_WRITE; Address = 0X2A; Parameter = 0XFF, 0X0F

ID=0XFE; Instruction = ACTION

Instruction packet of Servo 0：0XFF 0XFF 0X00 0X05 0X04 0X2A 0X00 0X00 0XCC

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0X00	0X05	0X04	0X2A 0X00 0X00	0XCC

Response packet of Servo 0: 0XFF 0XFF 0X00 0X02 0X01 0XFC

Prefix	ID	Data Length	State	Parameters	Check Sum
0XFF 0XFF	0X00	0X02	0X00		0XFD

Instruction packet of Servo 1: 0XFF 0XFF 0X01 0X05 0X04 0X2A 0XFF 0X0F 0XBD

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0X01	0X05	0X04	0X2A 0XFF 0X0F	0XBD

Response packet of Servo 1: 0XFF 0XFF 0X01 0X02 0X00 0XFC

Prefix	ID	Data Length	State	Parameters	Check Sum
0XFF 0XFF	0X01	0X02	0X00		0XFC

ACTION Instruction packet: 0XFF 0XFF 0XFE 0X02 0X05 0XFA

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0XFE	0X02	0X05		0XFA

PS: The ACTION instruction packet is sent by the ID254 broadcast instruction, so no response packet data is returned.

2.4.6 Instruction SYNC WRITE

Unlike the REG WRITE + ACTION instruction, the SYNC WRITE has a higher real-time performance. A SYNC WRITE instruction can modify the contents of multiple servos memory control tables at once, while the REG WRITE + ACTION instruction is a step-by-step procedure. When using the SYNC WRITE instruction, the length of the data to be written and the address of the data to be saved must be the same, ie the same action must be performed. Simply can not control a servo at the same time, the other a servo for temperature. Can only control a few servos to move at the same time, or inquire about the temperature of a few servo at

the same time, and so on.

Function Used to control several servos to do the same action.(The sequence of this instruction is H-L)

ID 0XFE

Length (L + 1) * N + 4 (L: length of each parameter received by servo, N: Number of servo)

Instruction 0X83

Parameter1	Write into first part of data address
Parameter 2	Write the data length(L)
Parameter 3	Write first servo ‘s ID
Parameter 4	Write first date of servo1
Parameter 5	Write second date of servo2
...	
Parameter L+3	Write Lth date of servo1
Parameter L+4	Write second servo ‘s ID
Parameter L+5	Write first date of servo2
Parameter L+6	Write second date of servo2
...	
Parameter 2L+4	Write Lth date of servo2

Example: Use the SYNC WRITE Instruction to simultaneously control the Servo 0 to the 180 ° position in 2000 ms. The 1st servo turns to the 180 ° position in 3000 ms and the 4th Servo turns to the 0 ° position in 4000 ms.

Analysis: Control several servos, we use the broadcast ID254 (0XFE). Data length is (L + 1) * N + 4. In this example, the data length is 4 and the number of

servos is three. Therefore, the instruction data length is (4 + 1) * 3 + 4 = 19, and 0X13 (Hexadecimal). First address of servo position is 0X2A, data length is 0X04. So the following content (high byte first, low byte in the post):

First address、data length：0X2A 0X04

ID0：goal position：0X07FF；operating time：0X07D0

ID1：goal position：0X07FF；operating time：0X0BB8

ID4：goal position：0X0000；operating time：0X0FA0

Instruction: 0XFF 0XFF 0XFE 0X13 0X83 0X2A 0X04 0X00 0X07 0XFF 0X07 0XD0 0X01 0X07 0XFF 0X0B 0XB8 0X04 0X00 0X00 0X0F 0XA0 0XE3

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0XFE	0X13	0X83	0X2A 0X04 0X00 0X07 0XFF 0X07 0XD0 0X01 0X07 0XFF 0X0B 0XB8 0X04 0X00 0X00 0X0F 0XA0	0XE3

2.4.7 Instruction BULK WRITE

Function	Used to control several servos to do the same action。
Length	L1 + L2 +L3 … + 2
Instruction	0X09
Parameter 1-1	ID of First servo
Parameter 1-2	Write first part of data address
Parameter 1-3	data length L1
Parameter 1-4	write the first data of first part of servo1
Parameter 1-5	write the second data of first part servo1
……	
Parameter 2-1	ID of First servo
Parameter 2-2	Write second part of data address of servo1
Parameter 2-3	Data length L2
Parameter 2-4	Write the first data of second part of servo1
Parameter 2-5	Write the second data of second part of servo1
…	

Parameter (1-L)	ID of Lth servo
Parameter (1-L) +1	Write the first part of data address of servo L
Parameter (1-L) +2	Data length L3
Parameter (1-L) +3	Write the first data of first part of servo L
Parameter (1-L) +4	Write the second data of first part of servo L
...	
Parameter (2-L)	ID of Lth servo
Parameter (2-L) +1	Write the second part of data address of servo L
Parameter (2-L) +2	Data length L4
Parameter (2-L) +3	Write the first data of second part of servo L
Parameter (2-L) +4	Write the second data of second part of servo L
...	

One BULK WRITE instruction can modify the contents of multiple control tables that are not continuous.

Note: The data order of this instruction is L to H, write low byte first, then write high byte, remember!

2.4.8 Instruction RESET

Function	Reset to the factory default value
Length	0X02
Instruction	0X06
Parameter	no

Example: Reset Servo 1 to factory default value

Instruction packet: 0XFF 0XFF 0X01 0X02 0X06 0XF6`

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0X01	0X02	0X06		0XF6

Response packet: 0XFF 0XFF 0X01 0X02 0X00 0XFC

Prefix	ID	Data Length	Instruction	Parameters	Check Sum
0XFF 0XFF	0X01	0X02	0X00		0XFC

2.5 OCS mode memory control table

The information and control parameters of the robot servo itself form a table that is stored in the RAM and EEPROM areas of its control chip. By changing the contents, you can control the servo constantly. This is called the memory control table.

2.5.1 Descriptions

2.5.1.1 EEPROM and RAM

Data in EEPROM area do not change even the power is off, while data in RAM area will be reset each time re-powered, the data won't be saved.

2.5.4.1.2 Byte L and H

High and Low Byte is generated when we need a 16-bits data. Such as: our servo can be controlled in 360 °, through these examples, we know that 0-360° corresponds AD value 0-4095.

4095 convert to hexadecimal 0XFFF that is 0000 1111 1111 1111, red part is high byte H, blue part is low byte L, and we know that low byte L comes first, then the high byte H. So be sure the order in 2.4.6 and 2.4.7.

2.5.2 OCS mode memory control table:

Address	Instructions	Read/Write	Defaut Value	Storage area
0 (0X00)	--	--	--	EEPROM
1 (0X01)	--	--	--	
2 (0X02)	--	--	--	

3(0X03)	Firmware version(L)	Read	--	
4(0X04)	Firmware version (H)	Read	--	
5(0X05)	Servo ID	R/W	1(0X01)	
6(0X06)	Baud Rate	R/W	0(0X00)	
7(0X07)	Response delay	R/W	0(0X00)	
8(0X08)	Response level	R/W	1(0X02)	
9(0X09)	Min angel limit (L)	R/W	0(0X00)	
10(0X0A)	Min angel limit (H)	R/W	0(0X00)	
11(0X0B)	Max angel limit (L)	R/W	255(0XFF)	
12(0X0C)	Max angel limit (H)	R/W	15(0X0F)	
13(0X0D)	Max Temperature limit	R/W	80(0X50)	
14(0X0E)	Max input voltage	R/W	130(0X82)	
15(0X0F)	Min input voltage	R/W	70(0X46)	
16(0X10)	Max torque (L)	R/W	255(0XFF)	
17(0X11)	Max torque (H)	R/W	3(0X03)	
18(0X12)	Motor Driven PWM phase	R/W	0(0X00)	
19(0X13)	Uninstall condition	R/W	37(0X25)	
20(0X14)	LED Alarm condition	R/W	37(0X25)	
21(0X15)	PID: P Gain	R/W	15(0X0F)	
22(0X16)	PID: D Gain	R/W	00(0X00)	
23(0X17)	PID: I Gain	R/W	00(0X00)	
24(0X18)	Start Power (L)	R/W	0(0X00)	
25(0X19)	Start Power (H)	R/W	0(0X00)	
26(0X1A)	CW dead band width	R/W	1(0X02)	
27(0X1B)	CCW dead band width	R/W	1(0X02)	
28(0X1C)	Max integral limit (L)	R/W	0(0X00)	
29(0X1D)	Max integral limit (H)	R/W	0(0X00)	
30(0X1E)	--	--	--	
31(0X1F)	--	--	--	
32(0X20)	--	--	--	
33(0X21)	Output shaft neutral point correction (L)	R/W	0(0X00)	
34(0X22)	Output shaft neutral point correction (H)	R/W	0(0X00)	
35(0X23)	Running mode	R/W	0(0X00)	
36(0X24)	Protect Current	R/W	7(0X07)	
37-39	--	--	--	
40(0X28)	Torque switch	R/W	0(0X00)	RAM
41(0X29)	--	--	--	

42(0X2A)	goal position (L)	R/W	--	
43(0X2B)	goal location (H)	R/W	--	
44(0X2C)	operation time (L)	R/W	0(0X00)	
45(0X2D)	operation time (H)	R/W	0(0X00)	
46(0X2E)	operation speed (L)	R/W	0(0X00)	
47(0X2F)	Operation speed (H)	R/W	0(0X00)	
48(0X30)	Lock sign	R/W	1(0X01)	
49(0X31)	--	--	--	
50(0X32)	--	--	--	
51(0X33)	Relative movement sign	R/W	0(0X00)	
52-55	--	--	--	
56(0X38)	current position (L)	Read	?	
57(0X39)	current position (H)	Read	?	
58(0X3A)	Current speed (L)	Read	?	
59(0X3B)	Current speed (H)	Read	?	
60(0X3C)	Current lead (L)	Read	?	
61(0X3D)	Current lead (H)	Read	?	
62(0X3E)	Current voltage	Read	?	
63(0X3F)	Current temperature	Read	?	
64(0X40)	REG WRITE sign	Read	0(0X00)	
65(0X41)	--	--	--	
66(0X42)	Servo operating signs	Read	?	
67(0X43)	The current goal location (L)	Read	?	
68(0X44)	The current goal location (H)	Read	?	
69(0X45)	Current current (L)	Read	?	
70(0X46)	Current current (H)	Read	?	

2.5.2 Details of the list:

Address: 0X05

This address is used for storage of servo ID， able to read/write，default value is 1(0X01)

Address：0X06

This address is used for storage of Baud rate，able to read/write，default value is 0(0X00)，Baud rate is 1M.

Address value	Actual baud rate	Baud rate Set	Deviation
0	1M	1M	0.0%
1	500000	500000	0.0%
2	250000	250000	0.0%
3	128000	128000	0.0%
4	115107.9	115200	0.079%
5	76923	76800	-0.16%
6	57553.9	57600	0.008%
7	38461.5	38400	-0.16%

Address:0X07

This address is used for storage of Response delay，able to read/write, default value is 0(0X00)

When the servo received an Instruction to be answered，the delay time can be set as you like. Time range: parameter(0~255)*2μs， if parameter is 100，the response is 200μs. Default parameter is 0，it means it response in a shortest time，since the servo requires a minimum response time of about 8μs，the practical minimum response time is 8μs.

Address: 0X08

This address is used for setting response level，able to read/write, default value is 2，servo turns the Instructions back.

Address value 0X10	Respond level
0	Only the Read command and the Ping command are answered
1	All instructions return the reply packet (except broadcast)

Address：0X09~0X0C

This address is used for setting angel range， able to read/write. Min angle limit and max angle have effect to goal position. The minimum angle limit must be less than the maximum angle limit.

Address：0X0D

This address is used for setting max temperature of servo，able to read/write，max temp is set to 80℃.

Address：0X0E～0X0F

This address is used for setting upper limit and lower limit of voltage，able to read/write.

Address：0X10～0X11

This address is used for setting max output torque，able to read/write，1000 is the maximum output.

Address：0X13-0X14

The address is used to set the unloading conditions of the servo, able be read or write

BIT	Function
BIT7	--
BIT6	--

BIT5	If set to 1, the torque is unloaded when overload condition occurs. Then Led alarm.
BIT4	--
BIT3	If set to 1, the torque is unloaded when an over current condition occurs. Then Led alarm.
BIT2	If set to 1, the torque is unloaded when an over heat condition occurs. Then Led alarm.
BIT1	If set to 1, the torque is unloaded when angle sensor error condition occurs. Then Led alarm.
BIT0	If set to 1, the torque is unloaded when it's out of range of voltage. Then Led alarm.

If the above occurs at the same time, follow the logic [OR] . LED alarm condition (0X14) Set to 0 to turn off the LED, otherwise turn on the LED.

Address：0X15~0X17

This address is used for parameter P，I，D，able to read/write.

P Increased P value can increase the output of the servo, but it is easy to cause the servo to overshoot or shake.

I suppress overshoot caused by increased P parameters

D do not need to be adjusted normally

Address：0X18~0X19

Used to control the servo motor duty cycle of the steering gear. Modifying this parameter can change the motor driving force.

Address：0X1A~0X1B

This address is used for setting CW and CCW deadband size. While both of the two value set to 1 and the deadband size is about 0.087 degrees.

Address：0X1C~0X1D

This address is used for setting max limit for PID control integral value

Address：0X21~0X22

It is used to correct the 0 position of the servo. 0-2047 indicates the positive direction and 2048-4095 indicates the negative direction.

Address：0X23

mode,

mode	function
Mode 0	Set to 0, 0-360° servo control mode
--	--
Mode 2	Set to 2, Constant torque output mode, see chap 2.5.5

Address：0X28

This address is used for turn on or off the output torque.

Address：0X2A~0X2B

Used to set the address of the servo goal position, you want the servo to run to a location, you want to write the two locations in the corresponding location. 0 to 4095 (0XFFF) are available.

Address：0X2C~0X2D

It is used to set the address of the time parameter that the servo is running to the goal position. 0-65535 (0XFFFF) can be used in units of 1 millisecond.

If it is set to 0, which means that the servo rotate at the maximum speed.

For example, it is set to 3000, and the servo reaches the goal position in 3sec.

Address：0X2E~0X2F

This is used to set the speed of the servo, can be read and write. 0-65535 (0XFFFF) can be used, if the parameters exceed the motor speed limit, will be the fastest speed.

The range and value of this parameter vary according to the following operating modes.

Servo mode

0-65535 (0XFFFF) can be used in units of 1AD/msec

For example, set it to 1000 and the speed is 1000AD/sec.

Motor mode

0-65535 (0XFFFF) can be used in units of 1AD / ms

If the value is in the range of 0 to 32767, it will be stopped by rotating to the CCW direction by setting to 0.

If the value is in the range 32767-65535, it will be stopped at CW 32768.

The fifteenth byte becomes the position byte to control the direction, as in the following example:

0000 1011 1011 1000 Clockwise 3000 speed, converted into hexadecimal for the 0X0BB8, with the writing order of L-H is B8 0B

1000 1011 1011 1000 The counterclockwise 3000 speed is converted to hexadecimal 0X8BB8 (0X0BB8 + 0X8000), with the L-H write order is B8 8B

Address：0X30

Adress for Locking data

数值	功 能
0（0X00）	EEPROM area can be modified
1（0X01）	EEPROM area can not be modified

Note: Frequent write to the servo EEPROM will affect the life of the servo

Address：0X38~0X3F

This address is used for giving feedback; include position, speed, overload, voltage, and temperature, only read.

Address：0X40

If there is REG Write to be activated, it presents 1, when the REG Write is over, it display 0.

Address：0X42

If the servo has reached the goal position, 0 will be displayed and 1 will be displayed if it has not reached the goal position.

Address：0X43, 0X44

The current command is sent to the target position of the servo.

Address：0X45, 0X46

Current of the current servos.

Address：0X47, 0X48

Number of turns the servo has been running in multi - turn mode.

2.5.5 Constant Torque Mode in OCS Mode

The servo can be switched to the constant torque output mode and can be used on actuators that require constant torque output such as wheels and tracks. Set the running mode (0X23) to 2, and then give a time (0X2C ~ 0X2D), the servo will rotate with constant torque output, the torque and direction control mode, as shown in the following table:

BIT	10	9~0
Value	0/1	Time value

Address 0X2C~0X2D: Bit10 is the direction bit, 0 is the CCW direction, and 1 is the CW direction. Bit 0~9 is the torque, and the input range is 0~1000.

0000 0001 1111 0100 The red bit indicates the direction, the blue indicates the torque 500, and the hexadecimal is: 01F4

0000 0111 1110 1000 The red bit indicates the direction, the blue indicates the torque 1000, and the hexadecimal is: 07E8

Example: Make the No. 1 servo rotate CCW with a torque of 500

Switching mode: FF FF 01 04 03 23 02 D2

Operating torque and direction: FF FF 01 05 03 2C F4 01 D5

Caution:

1. This product is a high-precision product, do not artificially rotate the arm vigorously , so as not to damage the inside of the product
2. This product is a high-torque servos, exercise caution when using, to prevent accidental injury
3. Remember not to increase servos when the servos on connection is working
4. This product is similar electronic products, so as not to overload, reasonable running torque ≈1/3stall torque
5. Do not use excess pressure, otherwise easily lead to damage to the product