

Instructions for Synchronous Controller

4-Channel(HTTW4)/2-Channel(HTTW2)

(MSC-04-25A-A)(MSC-02-25A- A)

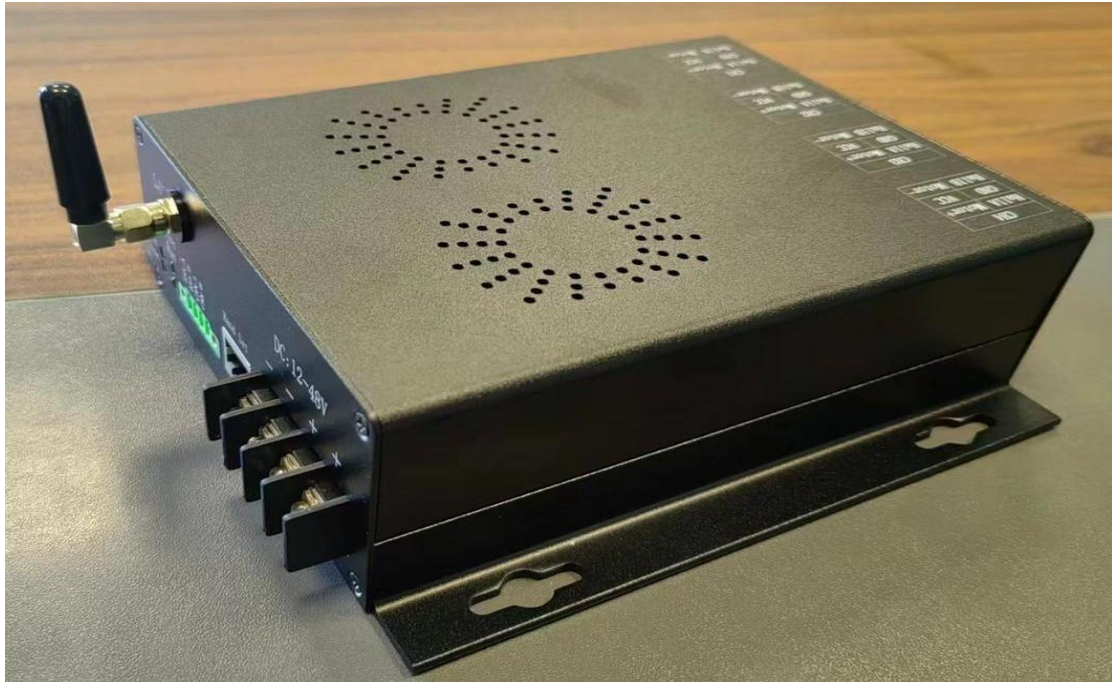


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Product Overview

The MSC-04-F/MSC-02-F is a high-power four-channel/two-channel linear actuator synchronous controller, easily and quickly applied to linear actuator synchronous control scenarios. It supports wireless remote control, wired handle, RS485 communication control, and CAN communication control. Featuring precise position control, it can be matched with various electric linear actuator products with Hall effect signals through parameter configuration. It supports motor soft start and soft stop functions, reducing the impact of the large instantaneous current during startup on the motor hardware and extending the motor's lifespan.

Product parameters:

Product Model	MSC-04-25A-A / MSC-02-25A- A
External dimensions	MSC- 04: 155*150*52mm MSC- 04: 130*120*50mm
working power supply	DC: 12~36V
Maximum number of putters	4 units/ 2 units
Single-channel output current	25A
Communication port	RS232, CAN2.0, RS485
remote control	433M remote control , 2.4G remote control
Communication Protocol	RS232 custom protocol /CAN custom protocol , RS485 Modbus RTU
Work environment	-20℃ ~ 80℃
Work frequency	10%

Controller Interface Description

1. Four-channel controller interface





2. Two-channel controller interface



3. Controller Interface Definition Description

Serial Number	Controller Interface	Function Description
1	Pari	To enter pairing mode , press and hold the remote control pairing button for 5 seconds.
2	Reset	Press and hold the push rod reset button for 5 seconds to start the reset process. Do not release the button during the reset.
3	LAN	Remote control antenna
4	485-A/485- B	RS485 communication bus interface
5	CAN-H/CAN- L	CAN communication bus interface
6	Hand Set	Handset interface / Debug touchscreen interface
7	PWR	Power indicator light
8	RUN	Run indicator light, running status indicator, error code indicator
9	CH1- CH4	Actuator interface (motor interface + Hall effect signal interface)
10	+ -	External power supply interface (DC: 12-36V)

4. Electric linear actuator interface signal definition

Serial Number	Signal definition	Push rod interface signal label
1	negative pole of motor	
2	Hall B	
3	Hall positive electrode	
4	Hall negative electrode	
5	negative pole of motor	
6	Hall A	

5. Gamepad Interface/Touchscreen Interface Signal Definition

serial number	Signal definition	Function Description	network port
1	SWDIO	System debugging signals	
2	SWCLK	System debugging signals	
3	RX - Controller	Handheld serial port signal transmission	
4	TX - Controller	Handle serial port receives signals	
5	RX - Touchscreen	Debugging the serial port signal transmission of the touch screen	
6	TX - Touchscreen	Debugging the serial port receiving signal of the touch screen	
7	+5V	External power supply positive terminal	
8	GND	External power supply negative terminal	

Wired Handle User Manual



The wired handle uses touch controls to raise and lower the electric linear actuator, and features a data display function that shows real-time actuator height information or controller alarm information. It supports 6 -way touch button functionality, with button operation support and audible prompts. The handle connects to the controller's HandSet port via an RJ45 connector for communication control.



①	Display area	Data display area, real-time display of push rod height position, system error codes.
②	Up button	Press and hold: Push the lever up; Release: Push the lever to stop.
③	Down button	Press and hold: Lower the lever; Release: Stop the lever.
④	1# Memory Key	Long press the memory button: The display flashes, and the current position is saved to the button. Short

⑤	Memory key #2	press the memory button: The slider automatically moves to the position saved by the button.
⑥	3# Memory Key	
⑦	Reset button	Press and hold the reset button, then push the lever to reset. This is necessary for initial installation or in case of an error alarm on the controller.

Instructions for Debugging the Touchscreen

The touchscreen offers more operating methods, enabling control of the actuator's movement and modification of controller parameters to match different actuator models. It provides a product aging test function, facilitating long-term aging tests to verify product quality. An interface for monitoring controller parameters allows real-time monitoring of multiple key data points during actuator movement.

1. Touchscreen main interface



- Control handle: Provides motion control functions for the push rod.
- Aging test: Conduct aging tests on the product and monitor key data during operation.
- Parameter settings: Configure controller parameters to match different types of actuators.
- Information about: View system information

2. Control handle interface



The control handle interface provides the function of stick motion control. The operation method of this part is exactly the same as that of the touch handle . Please refer to the operation process of the touch handle.

3. Aging test interface



※Number of executions: Counts the number of times the aging test has been executed.

※Tilt angle: The gyroscope inside the controller measures the angle change during motion.

- ✖Channel 1 Pulse: Statistically calculate the number of Hall signals in Channel 1.
- ✖Channel 2 pulse: Statistically calculate the number of Hall signals in channel 2.
- ✖Channel 3 Pulse: Statistically calculate the number of Hall signals in Channel 3 (four-channel controller only)
- ✖Channel 4 Pulse: Statistically calculate the number of Hall signals in Channel 4 (four-channel controller only)
- ✖Duty Cycle 1: Duty cycle of the motor drive signal in Channel 1
- ✖Duty Cycle 2: Duty cycle of the motor drive signal in Channel 2
- ✖ Duty Cycle 3: Duty cycle of the motor drive signal in channel 3 (four-channel controller only)
- ✖ Duty Cycle 4: Duty cycle of the motor drive signal for channel 4 (four-channel controller only)
- ✖Channel 1 Current: The operating current of the Channel 1 push rod (unit : mA)
- ✖Channel 2 Current: The operating current of the Channel 2 push rod (unit : mA)
- ✖Channel 3 Current: Current current of the channel 3 actuator (unit : mA) (four-channel controller only)
- ✖Channel 4 Current : Current (mA) for Channel 4 actuator operation (four-channel controller only)
- ✖ Current speed: The current speed of the push rod (unit : mm/s)
- ✖ Hall Frequency: The average frequency (Hz) of the Hall signals from each channel.
- ✖Waiting time: The waiting time between two aging tests
- ✖ Error Codes: Displays the current error code for the controller.
- ✖ Start button: The button to start the aging test.
- ✖ Stop button: The button to stop the aging test.
- ✖ Power supply current: The total current input to the power supply (mA)
- ✖ Power supply voltage: The current input voltage (V)
- ✖ Desktop height: Current height of the push rod (mm)

Parameter setting interface

参数设置1

通道1使能1

通道2使能1

通道3使能0

通道4使能0

上升同步10

下降同步10

同步偏倚200

角度使能0

倾斜角度3

推杆过流1

➡

参数设置2

初始高度mm55

遇阻回退mm50

上升限位mm1250

下降限位mm60

复位上升mm5

上升缓停mm10

下降缓停mm10

复位缓停mm10

PWM驱动频率13000

导程mm/100001125

导程计算

⬅️➡️

参数设置3

上升速度mm/s35

下降速度mm/s35

复位速度mm/s20

停止速度mm/s4

上升加速度20

下降加速度20

复位加速度20

上升减速度30

下降减速度30

复位减速度30

⬅️➡️

参数设置4

跳变电流K100

跳变电流D115

电源过流mA14000

电机上升过流mA7000

电机下降过流mA7000

复位电流mA3500

热保护使能0

冷却时间s1080

热保护距离mm1000

保存时间s30

⬅️➡️

参数设置5

关机延时s30

老化上止mm1250

老化下止mm65

老化次数10000

单停时间s10

中停次数60

中停时间s60

已执行次数130

占空比上限950

占空比下限100

⬅️➡️

参数设置6

速度偏差10

霍尔偏差200

记忆位置1700

记忆位置2800

记忆位置31200

高度公制/英1

PID比例0.05

PID积分0.02

PID微分0.01

遥控类型0

CAN地址1

⬅️

- ✖Channel 1 Enable: 0: Channel 1 is off; 1: Channel 1 is on (After being off, the push rod for this channel will not move) .
- ✖ Channel 2 Enable: 0: Channel 2 is off; 1: Channel 2 is on
- ✖Channel 3 Enable: 0: Channel 3 disabled; 1: Channel 3 enabled (four-channel controller only)
- ✖Channel 4 Enable: 0: Channel 4 disabled ; 1: Channel 4 enabled (4-channel controller only)
- ✖Upward Synchronization/Downward Synchronization/Synchronization Bias: Push rod synchronous motion control; larger values result in better synchronization. However, it will jitter; the value is small, the synchronization effect is poor, but it is stable.
- ✖ Angle Enable: 0: Tilt detection off; 1: Tilt detection on
- ✖Tilting Angle: Tilting range. With the angle enable on, if the tilt deviation exceeds this angle, an alarm will sound and the push rod movement will stop.
- ✖ Actuator Overcurrent Protection: 0: Actuator without overcurrent protection; 1: Actuator with built-in overcurrent protection.
- ✖Initial height: Installation distance of the push rod (mm)
- ✖ Obstacle Reversal: The distance the push rod moves in the opposite direction after encountering resistance.
- ✖ Lift Limit: The maximum distance the push rod can move forward. The standard setting is the initial height plus the push rod travel.
- ✖Lower limit: The maximum distance the push rod can move backward. The typical setting is the initial height plus the reset rise.
- ✖ Reset and rise: The distance the push rod moves upward after resetting.
- ✖ Deceleration during ascent: The distance at which the push rod decelerates and stops during ascent.
- ✖ Descending and stopping: The distance at which the push rod decelerates and stops during descent.
- ✖ Reset easing: Deceleration distance during the push rod reset process
- ✖ PWM drive frequency: The frequency of the PWM signal driving the motor.
- ✖Lead : The actual distance traveled by the push rod corresponding to 1000 Hall pulses.
- ✖ Ascending speed: The speed at which the push rod moves during the ascent (mm/s)
- ✖ Descent speed: The speed at which the push rod travels during descent (mm/s)
- ✖ Reset speed: The speed at which the push rod moves during the reset process (mm/s)
- ✖Stopping speed: The minimum speed at which the motion decelerates at the end of its process.
- ✖Acceleration upon ascent: The acceleration at the start of ascent; the greater the acceleration, the faster the acceleration process.
- ✖Descending acceleration: The acceleration at the start of descent; the greater the acceleration, the faster the acceleration process.
- ✖Reset Acceleration: Reset starts acceleration; the greater the acceleration, the faster the acceleration process.

- ※Deceleration during ascent: The deceleration at which the ascent stops; the greater the deceleration, the faster the deceleration process.
- ※Deceleration during descent: The deceleration at which the descent stops; the greater the deceleration, the faster the deceleration process.
- ※ Reset deceleration: The deceleration at which the reset process stops. The greater the deceleration, the faster the deceleration process.
- ※ Jump current K/ Jump current D: Sets the sensitivity of the obstacle detection and backoff mechanism. The smaller the K/D value, the higher the sensitivity.
- ※ Overcurrent: The maximum total input current of the power supply.
- ※ Motor rising overcurrent: The maximum current for a single channel push rod to rise during operation.
- ※ Motor descent overcurrent: Maximum current during single-channel push rod descent operation
- ※Reset Current: The maximum current operating during the reset process for a single channel push rod.
- ※ Thermal protection enabled: 0 disables push rod overheat protection function; 1 enables push rod overheat protection function.
- ※Cooling Time: This is the time required for the push rod to cool down after the overheat protection alarm sounds. During this period, the push rod cannot be operated.

- ✖ Thermal protection distance: The distance at which the push rod triggers overheat protection during continuous operation.
- ✖ Retention Time: The time for Hall signal parameters to be retained after the exercise ends.
- ✖ Shutdown Delay: The time it takes for the controller to enter sleep mode when there is no operation.
- ✖ Aging Stop: During the aging test, the maximum distance the push rod moves upward.
- ✖ Aging Stop: During the aging test, the maximum distance the push rod travels downwards.
- ✖ Aging cycles: The number of times the aging test is allowed to be performed. The aging test will stop when the set value is reached.
- ✖ Single pause time: The waiting time (short rest) after a single putt movement.
- ✖ Number of pauses: Set the number of times the pusher runs continuously, followed by a long rest period.
- ✖ Pause Time: The waiting time (long rest) after reaching the required number of pauses.

For example, in the image parameter settings 5 , the time interval between each run is 10 seconds. After running 60 times consecutively, rest for 60 seconds, and then repeat the cycle.

- ✖ Number of executions: The number of times the aging test has been performed.
- ✖ Duty Cycle Limit: Maximum duty cycle of PWM signal (1000)
- ✖ Duty Cycle Lower Limit: The lower limit of the PWM signal duty cycle (minimum 0)
- ✖ Speed Deviation %: The allowable deviation between the push rod's operating speed and the set speed.
- ✖ Hall effect deviation: In extreme cases, asynchrony may occur. If the difference in the number of Hall pulses between each actuator exceeds the Hall effect deviation, an alarm will sound and the system will shut down.
- ✖ Memory Position 1: Set memory position 1 (mm)
- ✖ Memory Position 2: Set memory position 2 (mm)
- ✖ Memory position 3: Set memory position 3 (mm)
- ✖ Height Metric/Imperial: Height display for switching between metric and imperial units. 0: Metric 1: Imperial
- ✖ PID Proportional: Speed Adjustment PDI - Proportional
- ✖ PID Integral: Speed Regulation PDI - Integral
- ✖ PID Derivative: Speed Regulation PDI - Derivative
- ✖ Remote Control Type: Remote control control type 0: Jog; 1: Interlock;
- ✖ CAN Address : The address used for CAN communication.

4. Information about the interface

信息关于



软件版本	Ver1.2	系统 日志	
硬件版本	Ver1.1		
参数版本	Ver2.4	遥控 配对	
屏幕版本	Ver1.0		
编译日期	Oct 21 2021 10:50:14	出厂 设置	
控制器ID	2031383855545309000d003b		

※ Software version: Synchronous controller control program version

- ✖ **Hardware Version:** Synchronous Controller Hardware Version
 - ✖ **Parameter Version:** Synchronous Controller Parameter Version
 - ✖ **Screen Version:** Touchscreen App Version
 - ✖ **Compilation Date:** Compilation date of the synchronization controller control program
 - ✖ **Controller ID:** Controller product serial number
 - ✖ **System Log:** View the system's recorded work logs.
 - ✖ **Remote Pairing:** Press this button to put the controller into remote pairing mode.
 - ✖ **Factory Reset:** Pressing this button will restore all controller parameters to our default settings.
- parameter

5. Instructions for use of the 2.4G remote control

Serial Number	Function Description
①	Data information display area
②	Up button
③	Stop/Reset Button
④	Down button

Remote Control User Manual

1. A constantly lit network icon in the upper left corner of the display indicates normal communication, while a flashing icon indicates a communication error.
2. The battery icon in the upper right corner of the display shows the current battery level of the remote control.
3. The up/down buttons enable jog/chain operation based on the "Remote Control Type" setting in the controller parameters.
4. During the push rod movement, a short press of the stop button will stop the push rod; a long press for 5 seconds will reset the push rod.

Remote control pairing process instructions

1. First, operate the controller to enter remote control pairing mode.
2. Simultaneously press the up and down buttons five times in quick succession to enter pairing mode on the remote control.
3. In pairing mode, the remote control's height information display will flash "—".
4. of the number at the CH position increasing from 1 to 50 indicates that pairing data is being successfully sent.
5. After pairing is complete, both the remote control and the controller will automatically exit pairing mode.

Note: One 2.4G remote control can only operate one controller, but one controller can be paired with multiple controllers.

2.4G controller. However, multiple 2.4G remote controls paired with the same controller cannot be used simultaneously.



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6. Controller error codes

1. System Error Code Table

Error code	Processing logic
E01 : Retreat upon encountering resistance	When the push rod encounters resistance during its movement, the error code is automatically cleared after it retracts.
E02 : Synchronization Deviation Alarm	In extreme abnormal situations, the push rods are out of sync, and there is a Hall effect deviation exceeding the limit between channels. An alarm will sound if the set value is exceeded.
E03 : Low Voltage Warning	If the input voltage is lower than the minimum allowable voltage, check if the power supply is functioning correctly.
E04 : Tilt Warning	Desktop tilt alarm, lever stops, system reset required to clear error code.
E05 : Channel 1 overcurrent	If the single-channel actuator experiences overcurrent, check if the actuator load exceeds the allowable range . Encirclement
E06 : Channel 2 overcurrent	
E07 : Channel 3 Overcurrent	
E08 : Channel 4 Overcurrent	
E09 : Power overcurrent	If the total power supply current is too high, check if the load is too heavy.
E10 : Channel 1 Hall effect signal is not present.	If a single actuator has no Hall signal, check the connection between the actuator and the controller for reliability, check for actuator stalling, and reset the system to clear the error code.
E11 : Channel 2 Hall effect signal is not present.	
E12 : Channel 3 Hall effect sensor has no signal	
E13 : Channel 4 Hall effect signal is not present.	
E14 : Overheat warning	The push rod overheats and an alarm will sound. The error code will automatically clear during the rest period.
E15 : Incorrect password	This controller is unregistered and being used illegally. Registration is required for its use.
E16 : Abnormal power failure alarm	If the power is interrupted during the operation of the push rod, a reset is required to clear the error.

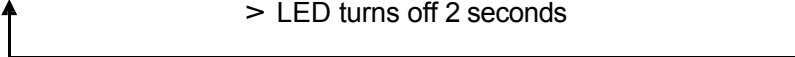
2. System running indicator light status display

- 1. Normal operating status** : Green led Lights on 0.5 seconds, off 0.5 seconds per 1
Flashes once per second, flashes slowly.
- 2. Remote control pairing status** : Green led Lights on 0.2 seconds, off 0.2 seconds per 0.4
Flashes once per second, flashes rapidly.
- 3. Error code display status** : When the system **encounters** an error and generates an error code, the LED indicator will automatically switch to the error code display mode.

The display status will be updated. Once the error code is cleared, the LED indicator will

automatically return to normal operation. The error code status display process is as follows;
repeat this process until the error code disappears.

LED always on for 2 seconds ---> LED off for 2 seconds ---> LED flashing rapidly Next ---
> LED turns off 2 seconds



We need to confirm the specific number of times the flashing occurs (n times). For example, if n=2, the corresponding error code would be E02: Synchronization Deviation Alarm.

7. RS485 Modbus RTU Communication

Register Definitions

Communication method: 9600/8/N/1 , default address 0x01 , which can be changed via command.

Communication parameters and control function requirements					
Serial Number	project	Function	Remark	Register type	Register address
1	Control function	Inching upward		coil (1x)	1
		Inching down			2
		Automatic rise			3
		Automatic descent			4
		stop	Stop at any position		5
		Reset	Push rod reset operation		6
		Target position movement touch hair	Initiate target position movement		7
		Parameter saving	Save the modified parameters		8
2	Position status	Rise to position signal		Input register (3x)	1
		Descending signal			2
		Height position coordinates			3
		Putter motion state			4
		Controller alarm information	Feedback alarm code		5
3	Controller parameters	Controller Lock/Unlock	Locked state base operation	Holding register (4x)	1
		Slave communication address			2
		Target movement position			3

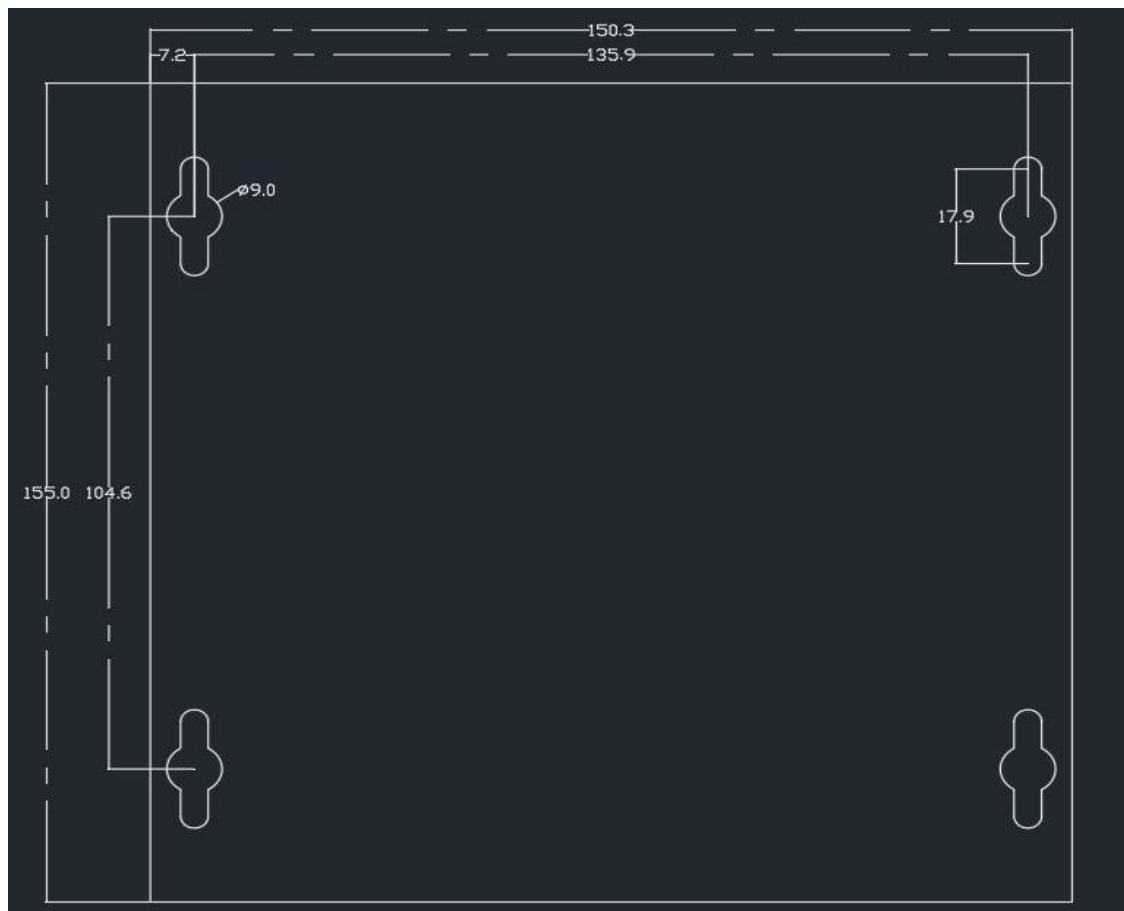
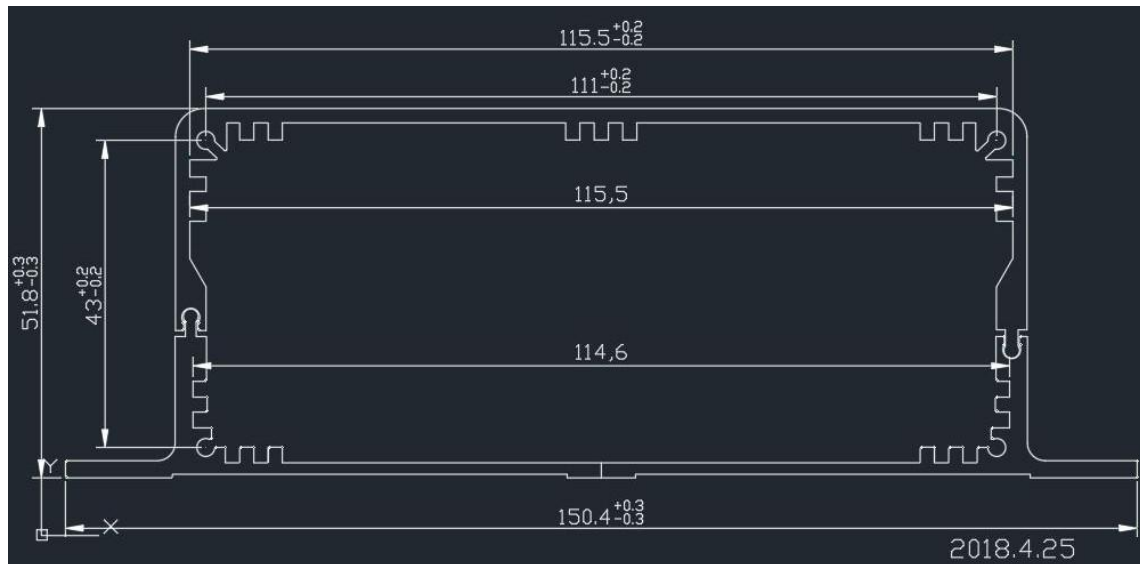
Register Function Introduction			
type	Register address	Register Name	Function Description
coil (1x)	1	Inching upward	The main station writes 1: The putter rises; if the putter is at its highest position, no action is taken. Master station writes 0: push rod stops
	2	Inching down	The main station writes 1: The push rod descends; if the push rod is at its lowest position, no action is taken. Master station writes 0: push rod stops

	3	Automatic rise	The main station writes 1: The lever rises until it reaches its highest point and stops, or Upon receiving a stop command, the push rod stops rising. The push rod controller automatically resets this position .
	4	Automatic descent	The main station writes 1 : The push rod descends until it stops at the lowest point, or Upon receiving a stop command, the push rod stops rising. The push rod controller automatically resets this position .
	5	stop	The main station writes 1 : If the push rod is in operation, it will stop. Push rod stopped state. The position remains unchanged, requiring no further action. The push rod controller automatically resets this position.
	6	Reset	The main station writes 1 : The push rod controller controls the push rod reset operation. Push rod control. The device automatically clears this bit.
	7	Target motion trigger	The main station writes 1 : The push rod moves to the preset target position. Push rod control. The controller automatically clears this bit.
	8	Parameter saving	The main station writes 1 : The actuator controller saves the modified parameters. Actuator Controller Automatically clear this bit
Input register (3x)	1	Rise to position signal	1 : The putter is at its highest point. 0 : The putter is not at its highest position.
	2	Descending signal	1 : The push rod is at its lowest point. 0 : The push rod is not at its lowest position.
	3	Height position coordinates	Real-time height coordinate register for the actuator, in millimeters (mm).
	4	Putter motion state	0 : Push rod stops 1 : Push rod rises 2 : Push rod descends 3 : Push rod reset

	5	Alarm codes	0x0000 : No system alarms 0x0001 : Alarm signal for push rod encountering resistance and retracting. 0x0002 : Push rod synchronization deviation alarm 0x0004 : Controller undervoltage alarm 0x0008 : Tilt warning 0x0010 : Channel 1 motor overcurrent 0x0020 : Channel 2 motor overcurrent 0x0040 : Channel 3 motor overcurrent 0x0080 : Channel 4 motor overcurrent 0x0100 : Total power supply overcurrent 0x0200 : Channel 1 Hall signal abnormality 0x0400 : Channel 2 Hall signal abnormality 0x0800 : Hall signal abnormality in channel 3 0x1000 : Channel 4 Hall signal abnormal 0x2000 : Motor overheating alarm 0x4000 : Incorrect password 0x8000 : Abnormal power failure alarm
Holding register (4x)	1	Controller locked/Unlock	0 : Controller unlocked, allowing the actuator to perform actions. 1 : The controller is locked, and the push rod is not allowed to perform any actions.
	2	Slave communication address	After modifying the communication address settings (1-120) for the slave station, you need to perform a "Parameter Save" operation on the coil if you need to save the settings. After modification, you need to re-enter the settings. New power-on effective
	3	Target movement position	Set the target motion coordinates for the push rod (the coordinates must not exceed the travel range).

8. Controller size

1. Four-channel synchronous controller size



2. Two-channel synchronous controller size

