



Z-ESC-70 Product Manual

Main category: Industrial robot arm / Collaborative robot arm /
Electric gripper / Intelligent actuator / Automation solutions



Electric Suction Cup Z-ESC-70

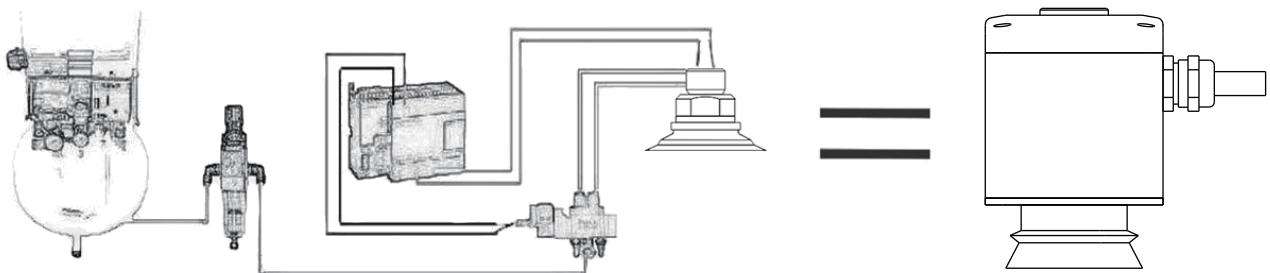
Promoting a revolution in the suction cup replacement of pneumatic by electric



Features

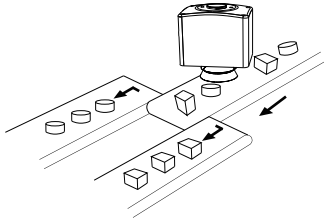
- Various control methods: 485 (Modbus RTU) 、I/O
- Uptake and drop detection
- No air source required and long life
- Adjustable suction and quick holding object
- Built-in controller: Small space and easy integration
- Compatible with suckers of different numbers and sizes

Highly Integrated

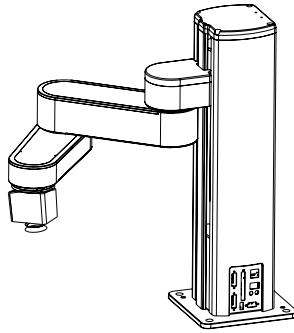


- Perfect replacement for air compressor + filter + solenoid valve + throttle valve + pneumatic suction cup

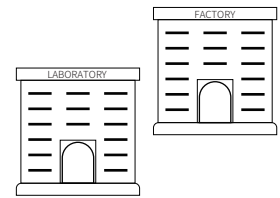
Application



Sorting of messy parts



No air source required and long life



Applied in various occasions such as medical care, new retail, 3C industry, etc

Specification

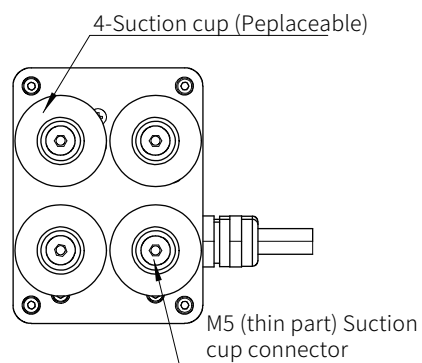
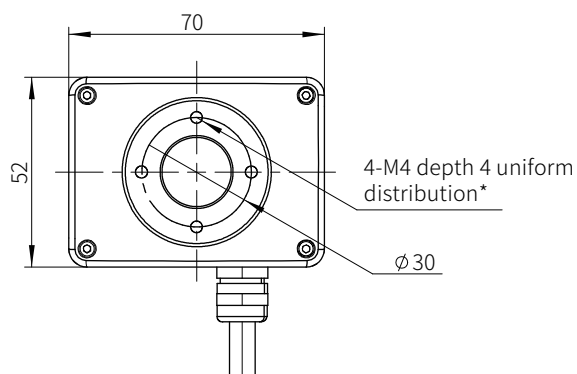
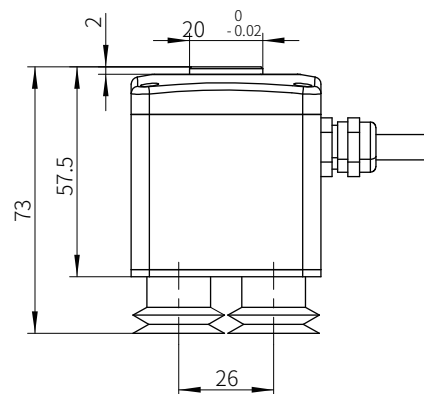
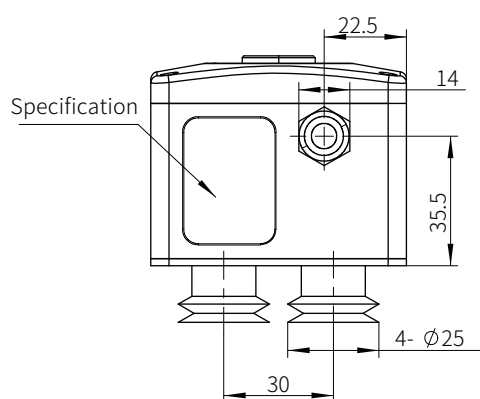
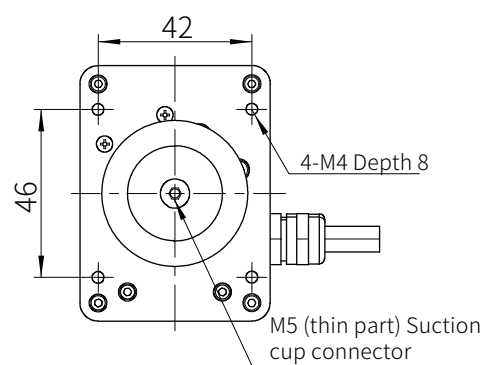
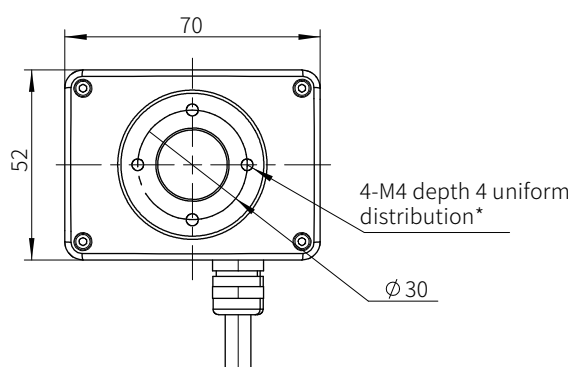
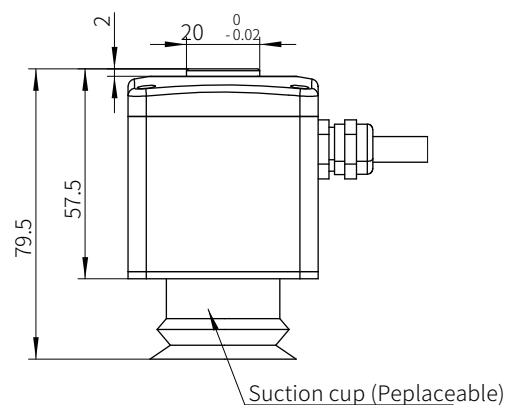
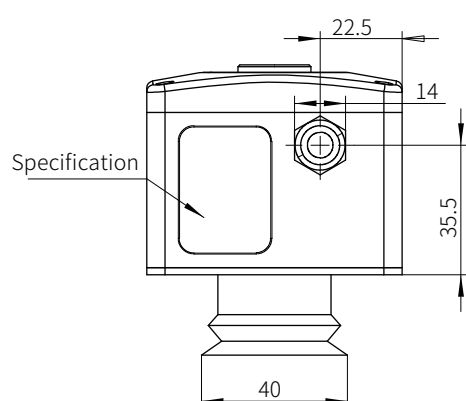
Item	Parameter
Max vacuum	50%
Suction	10~50N*
Flow	1.5L/min
Recommended suction weight	≤1kg
Absorption/release time	0.5S/0.3S
Number of suction cups	1~ 4
Weight	0.35kg
Dimension	70*52*74.5mm
Operating voltage	24V±10%
Rated current	0.3A
Peak current	0.6A
Power	10W
Degree of protection	IP20
Noise	60dB (A)
Type of motor	Brushless Motor
Service temperature range	5~55°C
Service humidity range	35~80%RH (不结霜)

*Parameters of suction force:

In the actual test, the suction force is related to the number and diameter of the suction nozzle. The specific parameters are shown in the following table.

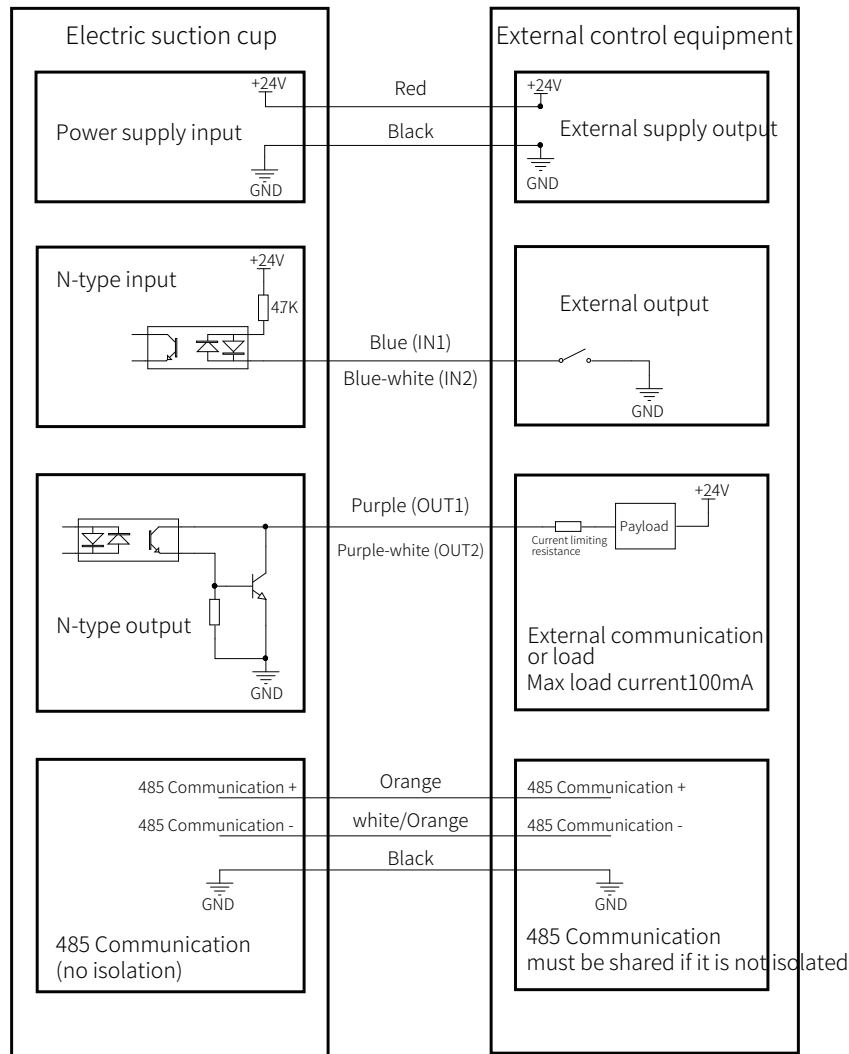
Number of suction cups	1	4	4
Diameter size	40mm	20mm	25mm
Maximum suction	30N	25N	50N

Range of Motion and Size



*The depth of screwing into the thread should be within 4mm, otherwise the internal parts and wiring will be crushed.

Sequence Description



Attention:

1. Please ensure that the positive and negative poles of the power cable are correct, and that the 485 communication cable and I/O cable are correct. Burnt out due to wiring error not covered by the warranty.
2. The 485 is not isolated from the 24V suction cup. If there is a need for isolation, please use other devices for isolation.

RS485 Communication

The RS485 communication of Z-ESC-70 uses the Modbus RTU protocol, and the supported function codes include: 0x03, 0x06 0x10. The default communication parameters are as follows

Baud rate	115200
ID	1
Data bit	8
Stop bit	1
Calibration	None

Communication Protocol

Functional group	Address	Function	Read-write attribute	Default value (data type)	Description
Control	0x0002	Suction cup control	R/W	0 (int)	1: Absorb; 2: Release; 3: Suction according to the vacuum setting
	0x0003	Min vacuum setting	R/W	Min value (int)	Value range: 0 to 50
	0x0004	Max vacuum setting	R/W	Max value (int)	Value range: 0 to 50
Status feedback	0x0041	Holding status feedback	R	0 (int)	0: The object is released or the suction cup is activated; 1: Hold object 2: Unhold object; 3: The object falls
	0x0042	Vacuum feedback	R	0 (int)	0~50
	0x0044	IN1 status feedback	R	0 (int)	0: IN1 is low level (low level effective); 1: IN1 is high level
	0x0045	IN2 status feedback	R	0 (int)	0: IN2 is low level (low level effective); 1: IN2 is high level
	0x0048	OUT1 Status feedback	R	0 (int)	0: OUT1 is low level; 1: OUT1 is high level
	0x0049	OUT2 Status feedback	R	0 (int)	0: OUT2 is low level; 1: OUT2 is high level
Parameter configuration	0x0080	ID	R/W	1 (int)	The value ranges from [1 to 247]. This parameter is valid after being saved and restarted
	0x0081	Baud rate	R/W	4 (115200) (int)	0~8: baud9600, baud19200, baud38400, baud57600, baud115200, baud153600, baud256000
Control	0x0084	Save the parameters	R/W	0 (int)	Write 1 Save parameter. Note: Do not use this command for real-time control, only configure parameters before and after the actual use of it.
	0x0090	I/O mode switch	R/W	0 (int)	0: Disable I/O mode; 1: Enable I/O mode
	0x0091	Holding judgment time	R/W	2 (int)	The initial value is 2s, unit: s. The user can set the judging time of whether the object is held or not.
Device information	0x00C0	Suction cup model	R	0xEF70 (int)	
	0x00C1	Hardware version	R	0x0001 (int)	
	0x00C2	Software version	R	0x0002 (int)	
Point information	0x0100	Point 1 (control)	R/W	2 (int)	1: absorb; 2: release
	0x0101	Point 1 (Min vacuum)	R/W	30 (int)	Value range: 0 to 50
	0x0102	Point 1 (Max vacuum)	R/W	50 (int)	Value range: 0 to 50
	0x0103	point2 (Control)	R/W	1 (int)	1: absorb; 2: release
	0x0104	Point 2 (Min vacuum)	R/W	10 (int)	Value range: 0 to 50
	0x0105	Point 2 (Max vacuum)	R/W	30 (int)	Value range: 0 to 50
	0x0106	Point 3 (Control)	R/W	1 (int)	1: absorb; 2: release
	0x0107	Point 3 (Min vacuum)	R/W	20 (int)	Value range: 0 to 50

0x0108	Point 3 (Max vacuum)	R/W	40 (int)	Value range: 0 to 50
0x0109	Point 4 (Control)	R/W	1 (int)	1: absorb; 2: release
0x010A	Point 4 (Min vacuum)	R/W	30 (int)	Value range: 0 to 50
0x010B	Point 4 (Max vacuum)	R/W	50 (int)	Value range: 0 to 50

Indicator Meaning

The sucker has an indicator light indicating the state of the suction process

Green light on	The object is released or the suction cup is activated
Green flashing	Holding
Blue light on	Hold object
Red light on	Unhold object
Red light flashing	Object fall

Work Flow

1. Control the suction and release of the suction cup through different commands in the 485 mode.

Suction cup suction:

Device address	Functional code	Register start address	Register content	CRC check code
01	06 (HEX)	00 02	00 01 (Holding)	E9 CA

Reply: 01 06 00 02 00 01 E9 CA

Suction cup release:

Device address	Functional code	Register start address	Register content	CRC check code
01	06 (HEX)	00 02	00 02 (release)	E9 CB

Reply: 01 06 00 02 00 02 A9 CB

Set the suction according to the vacuum degree (take the vacuum degree range of 30%-50% as an example):

Device address	Functional code	Register initiation	Register length	Number of bytes	Register content	CRC check code
01	10 (HEX)	00 02	00 03	06	00 03 00 1E 00 32	E2 99

Reply: 01 10 00 02 00 03 21 C8

Note: Write the values of three registers consecutively (suction cup control register, minimum vacuum setting Register and maximum vacuum setting register). In the content of the register, 0003 refers to the adjustable vacuum mode controlled by the suction cup; 001E refers to the min vacuum degree of 30; 0032 refers to the max vacuum degree of 50. Please set the max and min vacuum degrees first range when using this mode, the data of max and min vacuum are only valid for this mode.

2. Read the suction status feedback of the suction cup.

Device address	Functional code	Register start address	Register content	CRC check code
01	03 (HEX)	00 41	00 01	D4 1E

Reply: 01 03 02 00 00 B8 44

(0000: Initialize or release object; 0001: Hold object; 0002: Unhold object or the object falls)

3. In addition to the 485 control mode, the I/O mode (input different levels to IN1 and IN2) can also control the suction cup (I/O mode is disabled by default and it needs to be manually tun on)

Device address	Functional code	Register start address	Register content	CRC check code
01	06 (HEX)	00 90	00 01 (打开I/O模式)	48 27

Reply: 01 06 00 90 00 01 48 27

Note: Only one of 485 mode and I/O mode can be used at the same time. When using 485 mode, please disable I/O mode.

Set the control of point 1 (suction/discharge vacuum degree range) :

For example, set point 1 to control the release of the suction cup and the vacuum degree range is 10-20. (The starting address of point 1 is 0x0100. Use function code 10 (HEX) to write data into three registers (sucker control register, min vacuum setting register and max vacuum setting register)

Device address	Functional code	Register initiation	Register length	Number of bytes	Register content	CRC check code
01	10 (HEX)	01 00	00 03	06	00 02 00 0A 00 14	BB B1

Reply: 01 10 01 00 00 03 81 F4

For example, set point 2 to control the release of the suction cup and the vacuum degree range is 10-30. (The starting address of point 2 is 0x0103. Use function code 10 (HEX) to write data into three registers (sucker control register, min vacuum setting register and max vacuum setting register)

Device address	Functional code	Register initiation	Register length	Number of bytes	Register content	CRC check code
01	10 (HEX)	01 03	00 03	06	00 01 00 0A 00 1E	8F B9

Reply: 01 10 01 03 00 03 71 F4

Note: point 1 is IN1=0, IN2=0; point 2 is IN1=0, IN2=; point 3 is IN1=1, IN2=0; point 4 is IN1=1, IN2=1

4. Set different parameters (vacuum degree, ID, baud rate, I/O mode switch, point information, etc.) according to different usage requirements. Write 1 when saving parameters, and the values will be saved after the device is powered off.

Saving parameter:

Device address	Functional code	Register start address	Register content	CRC check code
01	06 (HEX)	00 84	00 01 (Saving parameter)	08 23

Reply: 01 06 00 84 00 01 08 23

Note: Write 1 to save parameters. Do not use this command for real-time control, only to configure parameters before and after actual use.

5. If you need to set the time for judging whether the device has picked up the object, you can change the time of holding judgment. Default value: 2 Unit: s

Change the time of holding judgment:

Device address	Functional code	Register start address	Register content	CRC check code
01	06 (HEX)	00 91	00 02 (The suction judgment time is 2s)	59 E6

Reply: 01 06 00 91 00 02 59 E6

Note: The judgment time should be greater than or equal to 1s. If the object is not picked up after the judgment time, it is judged that the object has not been held.

I/O Function

In the I/O function of the ESC-70 electric suction cup, the suction cup can control different point states according to the input level of IN1 and IN2. Users can change the vacuum value of different points as required.

Input status and control points are shown in the table below (active low level) :

IN1	IN2	Control suction point
Void	Void	1
Effective	Void	2
Void	Effective	3
Effective	Effective	4

Note: The input state in the default is control point 1 (IN1=1, IN2=1). When inputting a valid level (low level) to IN1, it is control point 2 (IN1=0, IN2=1), point 3 (IN1=1, IN2=0), point 4 (IN1=0, IN2=0)

The output status indication is shown in the table below:

OUT1	OUT2	Holding status
0	0	The object is released or the suction cup is activated
1	0	Holding object
0	1	Unhold object
1	1	Object falling

Note: The default output state is to release the object or the suction cup is activated (OUT1=0, OUT2=0); when the object is held, OUT1=1, OUT2=0; when the object is not held, OUT1=0, OUT2=1, when the object falls, OUT1=1, OUT2=1.



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