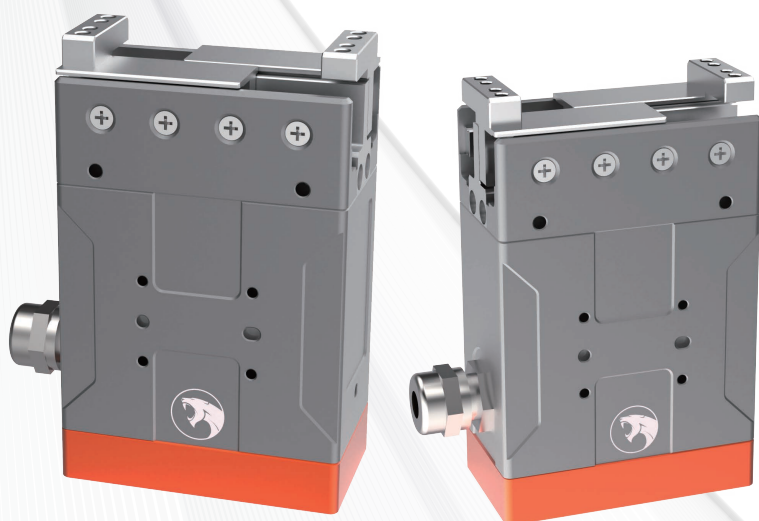


Z-EFG-50

Product Manual

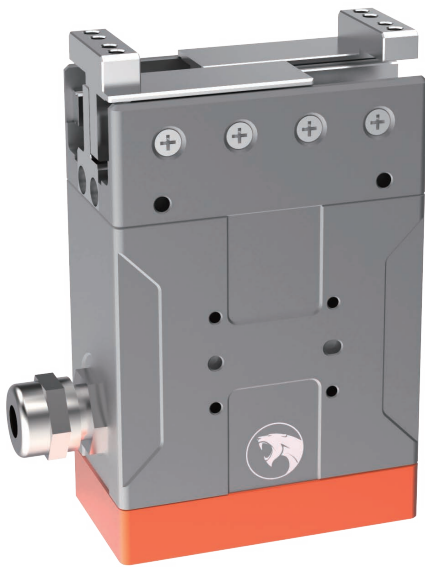
Industrial Robot / Collaborative Robot / Electric Gripper/
Intelligent Actuator / Automation Solution



Z-EFG-50

Electric 2-Fingers Parallel Gripper

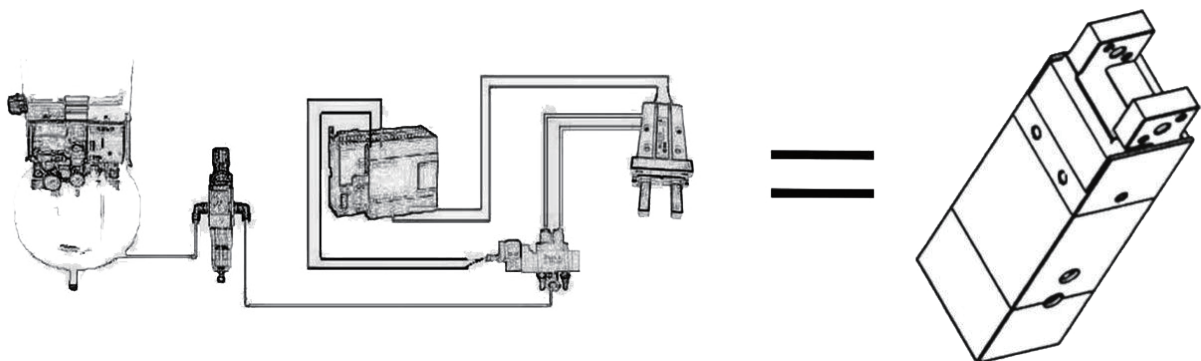
Promoting a revolution in the replacement of pneumatic grippers by electric grippers
First electric gripper with integrated servo system in China



Product Features

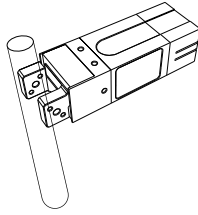
- Built-in controller
- Adjustable stroke and gripping force
- Use servo motor
- The end can be replaced to adapt to various needs
- Pick up fragile and deformable objects such as eggs, test tubes, rings, etc.
- Apply for scenes without air source (e.g. laboratory, hospital)

Highly Integrated

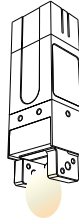


- Perfect replacement for air compressor + filter + solenoid valve + throttle valve + pneumatic gripper
- Multiple cycles service life, consistent with the traditional Japanese cylinder

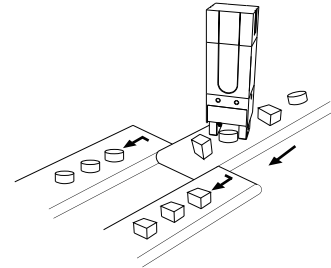
Application Scenes



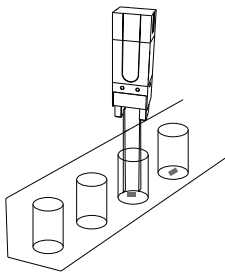
Fragile scene (e.g.test tube)



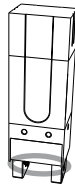
Fragile scene (e.g.eggs)



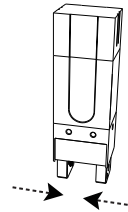
Sorting out things that are arranged in a mess



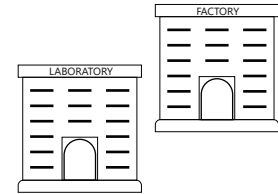
Gripping in narrow scene



Deformable scene (e.g.rings)



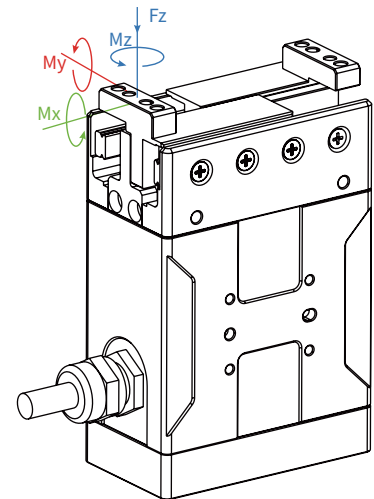
Gripping fragile items at high frequency



Medical, new retail, 3C industry, etc.

Specification Parameters

Model No. Z-EFG-30	Parameter
Total stroke	50mm adjustable
Gripping force	15-50N adjustable
Repeatability	±0.02mm
Recommended gripping weight	≤0.5kg
Transmission mode	Gear rack + Linear guide
Grease replenishment of moving components	Every six months or 1 million movements / time
One-way stroke motion time	0.30s
Movement mode	Two fingers move horizontally
Weight	0.7kg
Dimensions (L*W*H)	68*38*108mm
Operating voltage	24V±10%
Rated current	0.5A
Peak current	1A
Power	12W
Protection class	IP20
Motor type	Servo motor
Operating temperature range	5-55°C
Operating humidity range	RH35-80 (No frost)



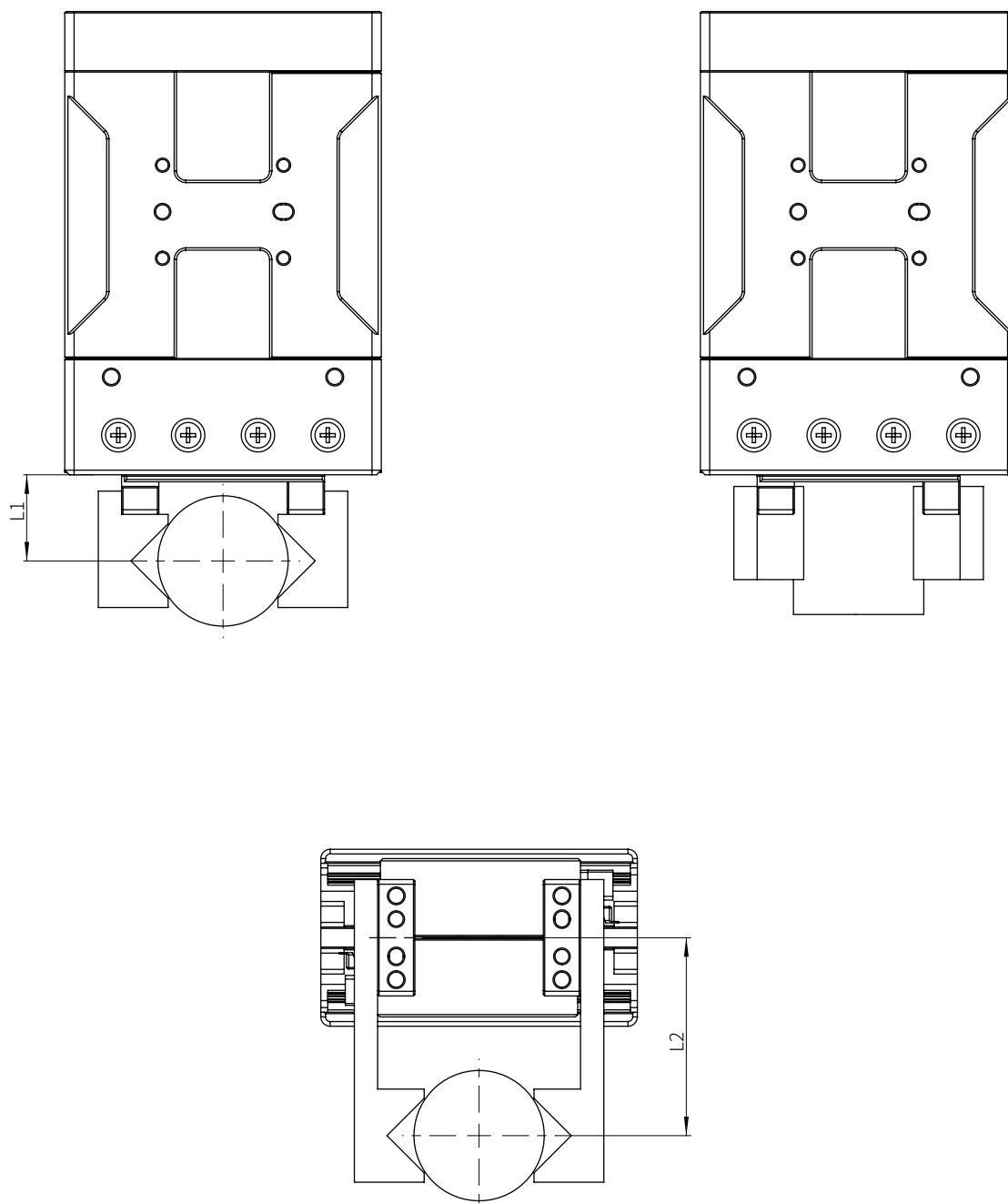
Permissible static load in vertical direction

Fz:	200 N
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Permissible torque

Mx:	1.6 N.m
My:	1.2 N.m
Mz:	1.2 N.m

Load Center of Gravity Offset



L1 Scope	0~50mm
L2 Scope	0~30mm

Communication version

Wire Sequence Description

Red	24V+
Black	GND
Yellow-white	485-
Yellow	485+
Brown-white	IN1
Brown	IN2
Blue	OUT1
Grey	OUT2

Notice:

1. Please make sure the positive and negative poles of the power cable is correct and the 485 communication line and I/O line is correct when wiring, as the burning due to incorrect wiring is not covered by the normal warranty.
2. 485 and 24V gripper are not isolated internally, if isolation is needed, customers will need to use other equipment for isolation.

RS485 Communication

The RS485 communication of Z-ERG-50 uses Modbus RTU protocol and the supports function codes including: 0x03 , 0x06 0x10, the default communication parameters are as follows.

Baud Rate	115200
ID	1
Data bits	8
Stop bits	1
Checksum	No

Communication Protocols

Function category	Address	Function	Read-write property	Default value (Data type)	Description
Control	0x0000	Initialization	R/W	0 (int)	1. Single direction calibration (calibration direction can be set)
	0x0001	(Reserved)	R/W		
	0x0002	Gripping position	R/W	Maximum value (float)	Unit: mm, Value range: 0~50
	0x0004	Gripping speed	R/W	Maximum value (float)	Unit: mm/s, Value range: 1~200
	0x0006	Gripping current	R/W	Maximum value (float)	Unit: A, Value range: 0.1~0.5
	0x0016	Enable motor	R/W	1 (int)	Write 0 to turn off the motor output, write 1 to enable the motor
	0x0017	Gripping point control point	R/W	0 (int)	gripping point position mode control parameter, select the communication trigger point, the range of values: 0 ~ 7
State Feedback	0X0040	Initialization state feedback	R/W	0 (int)	0: Uninitialized, 5: Initialization completed, Others: Initializing
	0X0041	Gripping state feedback	R	0 (int)	0: in place, 1: in motion 2: grip, 3: drop
	0X0042	Gripping position feedback	R	Maximum value (float)	Unit: mm
	0X0044	Gripping speed feedback	R	(float)	Unit: mm/s
	0X0046	Gripping current feedback	R	0 (float)	Unit: A
	0x0050	Error warning notification (reserved)	R	0 (int32)	
Parameter Configuration	0x0080	ID	R/W	1 (int)	Value range [1--247], valid for restart after saving parameters
	0x0081	Baud rate	R/W	4 (115200) (int)	0--8: baud9600, baud19200, baud38400, baud57600, baud115200, baud153600, baud256000, baud460800, baud921600
	0x0082	Initialization direction	R/W	0 (int)	Set position calibration direction. 0: Open calibration, 1: Close calibration.
	0x0083	Automatic initialization setting	R/W	0 (int)	Set position calibration mode. 0: Automatic calibration after power-on, 1: Manual control calibration. Valid for restart after saving parameters
	0x0084	Save parameters	R/W	0 (int)	Write 1 to save the parameters. Note: Do not use this command during real-time control. Use only for configuration parameters before actual use
	0x0085	Restore default parameters	R/W	0 (int)	Write 1 to restore default parameters
	0x0090	I/O mode switch	R/W	0 (int)	0: close I/O mode, 1: open I/O mode

Indicator Light Definition

The rotating gripper has two indicator lights, respectively indicating the state of gripping and rotation

Red light is always on	Uninitialized
Green light is always on	Initialization completed
Green light flashing	In motion
Blue light is always on	Grip the object
Blue light flashing	Drop the object

Working Process

1. When the gripper is powered on, it will be initialized automatically, and after the gripper is opened outward, initialization process is completed.

Manual initialization instructions:

Device address	Function code	Register start address	Register content	CRC check code
01	06 (HEX)	00 00	00 01 (Initialization)	48 0A

Reply: 01 06 00 00 00 01 48 0A

Note: When initializing, please make sure that there is no object blocking the finger to prevent errors when identifying the zero position, and you can set whether to automatically initialize through 0x0083 after power-on.

2. At this time, you can control the gripping and rotation of the gripper by command.

Close gripper:

Device address	Function code	Register start address	Register length	Number of bytes	Register content	CRC check code
01	10 (HEX)	00 02	00 02	04	00 00 00 00 (0 (float))	72 76

Reply: 01 10 00 02 00 02 E0 08

Set gripping speed 200:

Device address	Function code	Register start address	Register length	Number of bytes	Register content	CRC check code
01	10 (HEX)	00 04	00 02	04	43 48 00 00 (200 (float))	67 CE

Reply: 01 10 00 04 00 02 00 09

Set gripping current 0.2:

Device address	Function code	Register start address	Register length	Number of bytes	Register content	CRC check code
01	10 (HEX)	00 06	00 02	04	3E 4C CC CD (0.2 (float))	2B 2F

Reply: 01 10 00 06 00 02 A1 C9

Read gripping state:

Device address	Function 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 (00 00 means in place, 0: in place, 1, in motion 2: grip, 3, drop)

I/O Function

The input state and control point position are shown in the following table:

NPN type is effective at 0V, PNP type is effective at 24V

IN1	IN2	Control the gripping point
Invalid	Invalid	1
Valid	Invalid	2
Invalid	Valid	3
Valid	Valid	4

The gripper state indicated by the output state is shown in the following table:

NPN type is effective at 0V, PNP type is effective at 24V

OUT1	OUT2	Gripping state
Invalid	Invalid	In position
Valid	Invalid	In motion
Invalid	Valid	Grip
Valid	Valid	Drop

Pulse、 I/O version

Wire Sequence Description (NM)

Aviation Plug	Black Wire	Grey Wire	Function	Usage	Remarks
1	White	White	Control signal (control clamping or loosening)	If the controller logic level is 24V, it can be connected directly to the I/O port - When inputting 0V-0.7V (low level), and input the pulse signal at the same time, the gripper opens outwards - When inputting 19V-24V (high level) , and input the pulse signal at the same time, the gripper clamps inwards	Connected required
				If the output is NPN type I/O, just connect the I/O directly - When open drain output “Open Drain” (not valid) , and input the pulse signal at the same time, the gripper clamps inwards. - When inputting 0V-0.7V (valid) , and input the pulse signal at the same time, the gripper opens outwards	
				If the controller output is PNP type, please select PNP type gripper	
2	Pink	Red	+24V	Power supply	Connected required
3	Yellow	Yellow	Input pulse	- Connection method and high / low level definition are the same as port 1 (control signal) - Input 0~500 pulses, control the gripper to travel 0-50mm, each pulse travel 0.1mm - Maximum input 500 pulses, 25mm on each side,the highest frequency is 5KHz - The high and low level time is not less than 200us, 1KHz corresponds to the maximum speed, frequency more than 1KHz, less than 5KHz time, still perform 1KHz	Connected required
4	Orange	Green	Feedback pulse	- Read-only output, selective connected - The pulse is NPN pulse feedback, the effective level time is 100us, and it is related to the gripper stroke, each 0.1mm inward / outward travel, one pulse feedback	Selective connection
5	Grey	Black	GND	Power supply	Connected required

* Description

After power on, the gripper will open to the maximum position (initialization).

Wire Sequence Description (NK)

Aviation Plug	Black Wire	Grey Wire	Function	Usage	Remarks
1	White	White	Control signal	If the controller logic level is 24V, it can be connected directly to the I/O port	Connected required
				If the output is NPN type I/O, just connect the I/O directly	
				If the controller output is PNP type, please select PNP type gripper	
2	Pink	Red	+24V	Power supply	Connected required
3	Yellow	Yellow	Control signal	Same control mode as port 1	Connected required
4	Orange	Green	Feedback signal	· Selective connection, read-only and display the status of LED · Output 3.3V when in motion, Output 0V when motion ends	Selective connection
5	Grey	Black	GND	Power supply	Connected required

* Description

After power on, the gripper will open to the maximum position (initialization).

Wire Sequence Description (PM)

Aviation Plug	Black Wire	Grey Wire	Function	Usage	Remarks
1	White	White	Control signal (control clamping or loosening)	PLC uses 24V, PNP output mode, directly connected to I/O port. · If the input collector is open, the gripper opens outwards · when inputting 19~24V (high level) , the gripper clamps inwards · Input current <5mA If the controller logic level is 24V · When inputting 19~24V (high level) , the gripper clamps inwards · When inputting 0~12V (low level) , the gripper opens outwards · Input current <5mA	Connected required
2	Pink	Red	24V	Power supply	Connected required
3	Yellow	Yellow	Feedback pulse	· Read-only output, selective connected · output 0V as low level · Output 24V as high level · Output structure is NPN internal pull-up to 24V	Selective connection
4	Orange	Green	Input Pulse	· Connection method and high / low level definition are the same as port 1 (control signal) · Input 0~500 pulses, control the gripper to travel 0-50mm, each pulse travel 0.1mm · Maximum input 500 pulses, 25mm on each side · maximum pulse frequency should not exceed 5KHz · 1KHz corresponds to the maximum speed, when the frequency exceeds 1KHz and is less than 5KHz, the maximum speed of 1KHz is still executed	Connected required
5	Grey	Black	GND	Power supply	Connected required

* Description

After power on, the gripper will open to the maximum position (initialization) .

Wire Sequence Description (PK)

Aviation Plug	Black Wire	Grey Wire	Function	Usage	Remarks
1	White	White	Control signal	If the controller logic level is 24V, it can be connected directly to the I/O port	Connected required
				· If the controller logic level is 24V PNP, it can be connected directly to the I/O port · If the controller output is NPN type, please select NPN type gripper	
2	Pink	Red	24V	Power supply	Connected required
3	Yellow	Yellow	Feedback signal	· Selective connection, read-only and display the status of LED · Output 24V when in motion (internal pull-up 4.7K resistor to 24V) , output 0V when motion ends	Selective connection
4	Orange	Green	Control signal	Same control mode as port 1	Connected required
5	Grey	Black	GND	Power supply	Connected required

* Description

After power on, the gripper will open to the maximum position (initialization) .

FAQ

1. There is a requirement for the concentricity of rotation, so when the two sides of the gripper are close, does it stop at the middle position each time?

Answer: Yes, there is a symmetry error of <0.1mm, and the repeatability is ± 0.02 mm.

2. Does the gripper include the fixture part?

Answer: No. Users need to design their own fixture part according to the actual clamped items. In addition, Hitbot provides a few fixture libraries, please contact our staff for more details.

3. Where is the drive controller and do I need to pay extra money for it?

Answer: It is built-in, no extra charge, the amount of the gripper already includes the cost of controller.

4. Is it possible to have a single finger movement?

Answer: No, single finger movement grippers are still under development, please contact our staff for more details.

5. What is the operating speed of Z-EFG-50?

Answer: Z-EFG-50 takes 0.3s for a full stroke in one direction and 0.6s for a round trip.



M a k i n g A u t o m a t i o n E a s i e r

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