



Z-EFG-60-150 Product Manual

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



Huiling-tech Robotic Co.,Ltd.

Electric Gripper Z-EFG-60-150

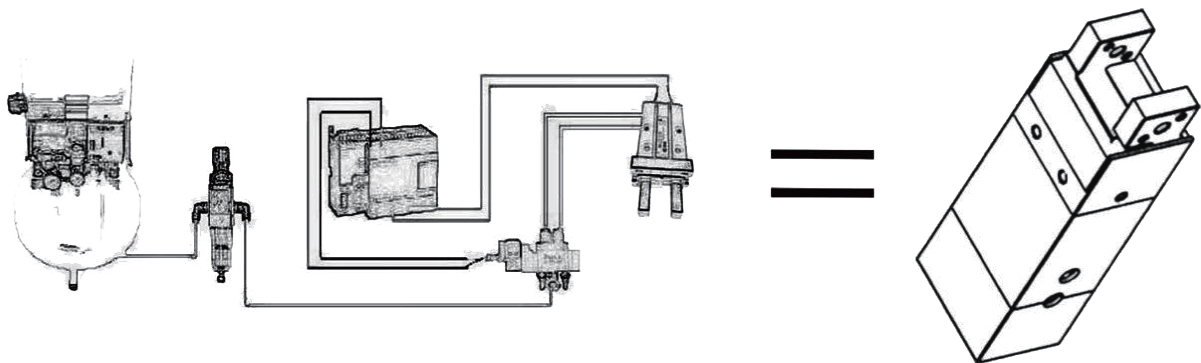
Promoting a revolution in the replacement of pneumatic grippers by electric grippers
First electric gripper with integrated servo system in China



Product Features

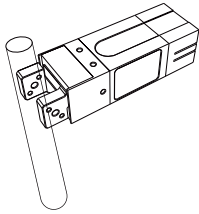
- Powerful Clamping force.power-off self-locking
- Stroke and clamping force are adjustable
- Long lifespan: tens of millions of cycles, surpassing pneumatic grippers
- Built-in controller: small footprint, easy integration
- Control modes: 485 (Modbus RTU), I/O

Highly Integrated

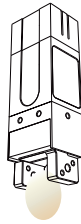


- Perfect replacement for air compressor + filter + solenoid valve + throttle valve + pneumatic gripper
- Multiple cycles long life span, consistent with the traditional Japanese actuator

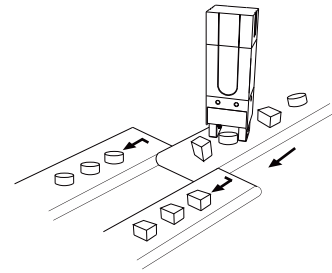
Applications



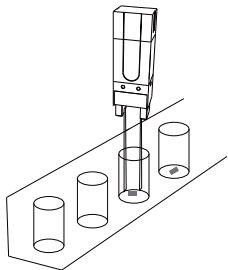
Fragile scene (e.g. test tube)



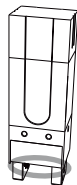
Fragile scene (e.g. eggs)



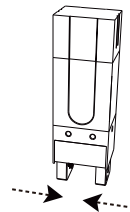
Sorting out things that are arranged in a mass



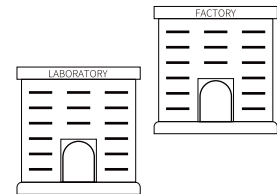
Gripping in narrow scene



Deformable scene (e.g. rings)

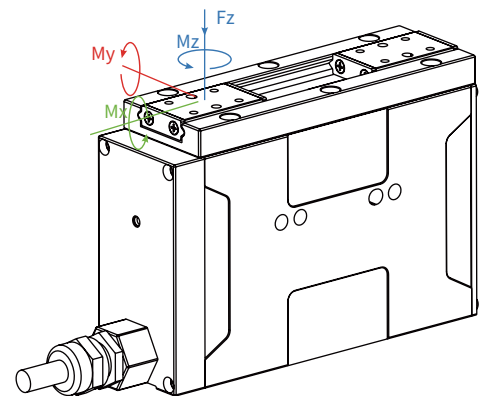


Gripping fragile items at high frequency


Industry Applications
(e.g. medical, new-retail, 3C)

Specification

Item	Specification
Total stroke	60mm (Adjustable)
Clamping force	40~300N (Adjustable)
Repeat positioning accuracy	± 0.02 mm
Recommended clamping weight	≤ 1.5 kg
Transmission method	Screw rod + Timing belt + Ball guide rail
Control Method	485(Modbus RTU),I/O
Shortest time for unidirectional motion	0.6s
Motion method	Two-finger parallel motion
Weight	1.7kg
Dimension	140*47*112mm
Operating voltage	DC24V $\pm 10\%$
Rated current	1A
Peak current	8A
Power	30W
Protection level	IP40
Motor type	Servo motor
Operating temperature range	5~55°C
Operating humidity range	35~80% RH (non-condensing)



Permissible static load in the vertical direction

Fz: 250 N

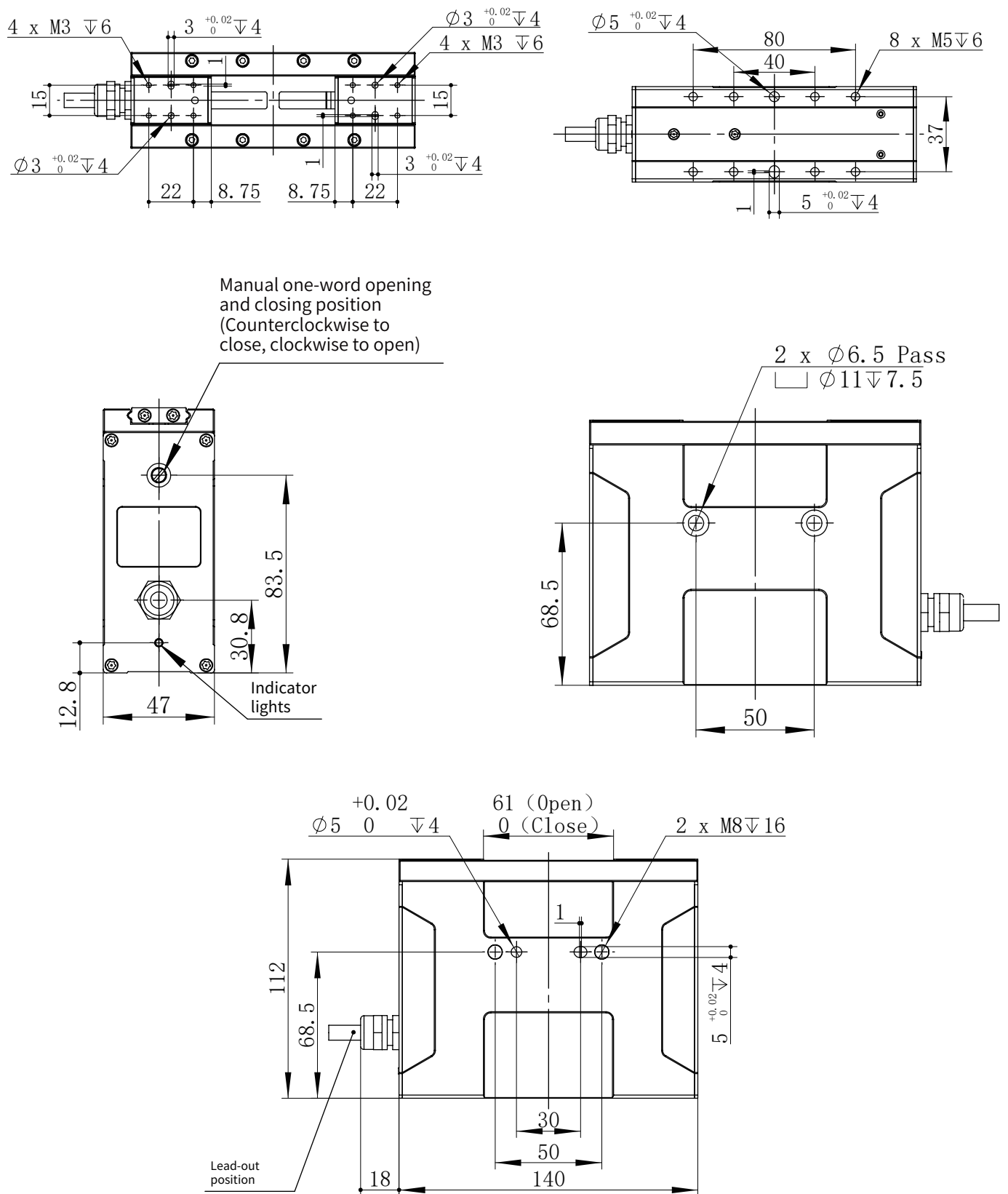
Load allowable torque

Mx: 58.5 N·m

My: 15 N·m

Mz: 25.5 N·m

Working Range and Dimension



Wire Sequence Explanation

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

Note:

1. Please make sure to confirm the correct polarity of the power supply line and the correct connection of 485 communication line and I/O line during wiring. Damage caused by wiring errors is not covered by the normal warranty.
2. The 485 and 24V jaws are not internally isolated. If isolation is needed, customers should use other devices for isolation.
3. The ground wire of the gripper must be connected to the 485 ground of the user-side controller!!
4. During the power-on process, do not touch the 24V power supply and IO input cables of the IO output cables!!

RS485 Communication

The RS485 communication of Z-EFG-60-150 uses the Modbus RTU protocol, supporting function codes: 0x03, 0x06, 0x10. The default communication parameters are as follows:

Baud rate	115200
ID	1
Data bits	8
Stop bits	1
Parity	None

Communication Protocol

Function group	Address	Function	Read/Write	Default value (Data type)	Explanation
Control	0x0000	Initialization	R/W	0 (int)	1: Manual initialization (the calibration direction can be set through "Initialization Direction")
	0x0001	(Reserve)	R/W	0 (int)	
	0x0002	Clamping position	R/W	Maximum value (float)	Unit mm, value range: 0~60
	0x0004	Clamping speed	R/W	Maximum value (float)	Unit mm/s, value range: 2~200
	0x0006	Holding current	R/W	0.5 (float)	Unit A, value range: 0.25~0.5
	0x0017	clamping point control point	R/W	0 (int)	Clamping point position mode control parameter, selects the point for communication triggering, value range: 1-4
	0x0019	Clamping mode	R/W	0 (int)	0: Close the object-grabbing mode; 1: Open the object-grabbing mode; when modifying this mode, Do not allow the gripper to continue working. After saving the parameters, power off and restart to take effect.
Status feedback	0X0040	Initialization status feedback	R	0 (int)	0: Not initialized, 5: Initialization completed, others: Initializing
	0X0041	Gripping status feedback	R	0 (int)	0: In place, 1: In motion, 2: Clamping, 3: Dropped
	0X0042	Gripping position feedback	R	Maximum value (float)	Unit mm
	0X0044	Clamping speed feedback	R	(float)	Unit mm/s
	0X0046	Holding current feedback	R	0 (float)	Unit A
Parameter configuration	0x0080	ID	R/W	1 (int)	Value range [1~247], valid after saving parameters and restarting
	0x0081	Baud rate	R/W	4 (115200) (int)	0~6: 9600, 19200, 38400, 57600, 115200, 153600, 256000, Valid after saving parameters and restarting
	0x0082	Initialization direction	R/W	0 (int)	Set the position calibration direction. 0: open calibration, 1: closed calibration
	0x0083	Automatic initialization settings	R/W	0 (int)	Set position calibration mode. 0: Automatic calibration on power-on, 1: Manual control calibration. Valid after saving parameters and restarting
	0x0084	Save parameters	R/W	0 (int)	Write 1 to save the parameters. Note: Do not use this command during real-time control. The configuration parameters are only used before actual use. After the setting is successful, this value becomes zero.
	0x0085	Restore default parameters	R/W	0 (int)	Write 1 to restore the default parameters. After the setting is successful, the value becomes zero.
	0x0090	I/O mode switch	R/W	0 (int)	0: Turn off I/O mode, 1: Turn on I/O mode
	0x0100	1# clamping point distance	R/W	(float)	Set the position of 1# clamping point, unit: mm
	0x0102	1# clamping point speed	R/W	(float)	Set the speed of 1# clamping point, unit: mm/s
	0x0108	1# clamping point current	R/W	(float)	Set the current of 1# clamping point, unit: A
	0x010C	2# clamping point distance	R/W	(float)	Set the position of 2# clamping point, unit: mm
	0x010E	2# clamping point speed	R/W	(float)	Set the speed of 2# clamping point, unit: mm

Parameter configuration	0x0114	2# clamping point current	R/W	(float)	Set the current of 2# clamping point, unit: A
	0x0118	3# clamping point distance	R/W	(float)	Set the position of 3# clamping point, unit: mm
	0x011A	3# clamping point speed	R/W	(float)	Set the speed of 3# clamping point, unit: mm/s
	0x0120	3# clamping point current	R/W	(float)	Set the current of 3# clamping point, unit: A
	0x0124	4# clamping point distance	R/W	(float)	Set the position of 4# clamping point, unit: mm
	0x0126	4# clamping point speed	R/W	(float)	Set the speed of 4# clamping point, unit: mm/s
	0x012C	4# clamping point current	R/W	(float)	Set the current of 4# clamping point, unit: A

Indicator Meaning

Red light steady	Not initialized
Green light steady	Initialization successful/In place
Green light blinking	Moving
Blue light steady	Object clamped
Blue light blinking	Object dropped

Modbus Instruction Description

Manual Initialization

The gripper will automatically initialize when powered on. After the gripper opens outward, the initialization process is completed. The gripper can be manually initialized again through the 485 command after power-on.

Manual Initialization

Device Address	Function Code	Register Starting 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

(06 Function Code Reply Data Parsing: 01: Device Address, 06: Function Code, 0000 Register Starting Address, 0001: Register Content, 480A: CRC Check Code)

Note: Ensure that there are no objects blocking the fingers during initialization to prevent errors in recognizing the zero point position. The automatic initialization on power-up can be set using 0x0083.

Basic Control Parameters

At this point, different speeds and current control for gripping can be set using the 485 command.

Close the gripper (set the clamping position to 0mm)

Device Address	Function Code	Register Starting 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

(10 Function Code Reply Data Parsing: 01: Device Address, 10: Function Code, 0002: Register Starting Address, 0002: Number of Registers Modified, E008: CRC Check Code)

Set the clamping speed to 50

Device Address	Function Code	Register Starting Address	Register length	Number of bytes	Register Content	CRC Check Code
01	10 (HEX)	00 04	00 02	04	42 48 00 00 (50 (float))	66 32

Reply: 01 10 00 04 00 02 00 09

Set the clamping current to 0.3:

Device Address	Function Code	Register Starting Address	Register length	Number of bytes	Register Content	CRC Check Code
01	10 (HEX)	00 06	00 02	04	3E 99 99 9A (0.3 (float))	44 79

Reply: 01 10 00 06 00 02 A1 C9

Read clamping feedback data

Read clamping status feedback

Device Address	Function Code	Register Starting Address	Register length	CRC Check Code
01	03 (HEX)	00 41	00 01	D4 1E

Reply: 01 03 02 00 00 B8 44 (Register Content 00 00 indicates in place, 0001: Moving, 0002: Clamping, 0003: Dropping) (03 Function Code Reply Data Parsing: 01: Device Address, 03: Function Code, 02: Number of Bytes in Returned Data, 0000: Read Register Value, B844: CRC Check Code)

Read clamping position feedback

Device Address	Function Code	Register Starting Address	Register length	CRC Check Code
01	03 (HEX)	00 42	00 02	64 1F

Reply: 01 03 04 XX XX XX XX CRC1 CRC2

Read clamping current feedback

Device Address	Function Code	Register Starting Address	Register length	CRC Check Code
01	03 (HEX)	00 46	00 02	25 DE

Reply: 01 03 04 XX XX XX XX CRC1 CRC2

ID Setting

The ID number can be set in the range of 1-247, and it is effective after saving parameters and restarting.

Set the slave ID to 1:

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 80	00 01	49 E2

Reply: 01 06 00 80 00 01 49 E2

Baud Rate Setting

Write values 0 to 6 correspond to baud9600, baud19200, baud38400, baud57600, baud115200, baud153600, baud256000. It is effective after saving parameters and restarting.

Set the baud rate to 115200

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 81	00 04	D8 21

Reply: 01 06 00 81 00 04 D8 21

Clamping Initialization Direction Setting

Set the clamping direction during initialization calibration, write 0 for open calibration, write 1 for close calibration.

Set open calibration (effective after saving parameters and restarting)

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 80	00 00	29 E2

Reply: 01 06 00 80 00 01 49 E2

Auto/Manual Initialization Setting

Set the automatic/manual initialization on power-up, write 0 for automatic initialization, write 1 for manual initialization.

Set manual initialization on power-up (effective after saving parameters and restarting)

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 83	00 01	B9 E2

Reply: 01 06 00 83 00 01 B9 E2

Save Parameters

Write 1 to the save parameters register. The data will not revert to default values after power-off and restart.

Set save parameters:

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 84	00 01	08 23

Reply: 01 06 00 84 00 01 08 23

Restore Default Parameters

Write 1 to the restore default parameters register. The data will revert to default values. It is still effective after power-off and restart.

Set save parameters

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 85	00 01	59 E3

Reply: 01 06 00 85 00 01 59 E3

IO Mode

Open IO Mode

Device Address	Function Code	Register Starting Address	Register Content	CRC Check Code
01	06 (HEX)	00 90	00 01	48 27

Reply: 01 06 00 90 00 01 48 27

I/O Functionality

IO Input Pin Description

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

IN1	IN2	Control clamping position
Ineffective	Ineffective	1
Effective	Ineffective	2
Ineffective	Effective	3
Effective	Effective	4

IO Output Pin Description

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

OUT1	OUT2	Control clamping position
Ineffective	Ineffective	In place
Effective	Ineffective	Moving
Ineffective	Effective	Clamping object
Effective	Effective	Object dropped



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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