

Z-ECG-20

Product Manual

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



Three-Finger Electric Gripper Z-ECG-20

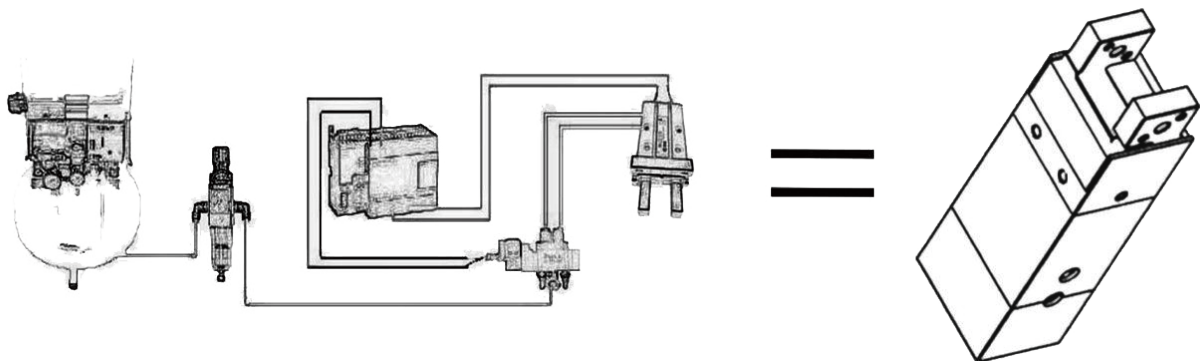
Promoting a revolution in the replacement of pneumatic grippers by electric grippers
First electric gripper with integrated servo system in China



Product Feature

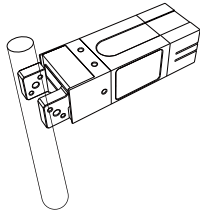
- Gripping drop detection, area output function
- Force, position, and speed controllable, precise control via Modbus
- Three-fingered gripper
- Built-in controller: occupies small space, easy integration
- Multiple control methods: 485 (Modbus RTU), I/O

Highly Integrated

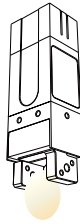


- Perfect replacement for air compressor + filter + solenoid valve + throttle valve + pneumatic gripper
- Multiple cycles service life, consistent with the traditional Japanese cylinder

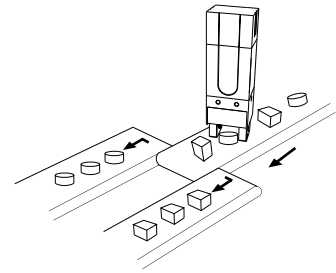
Application Scenes



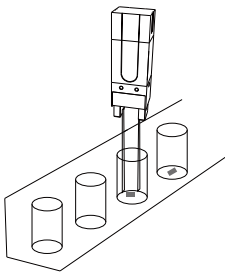
Fragile scene (e.g.test tube)



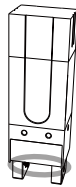
Fragile scene (e.g.eggs)



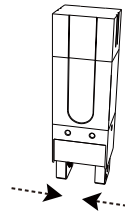
Sorting out things that are arranged in a mess



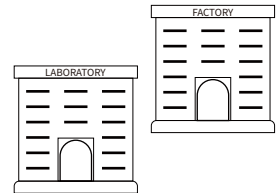
Gripping in narrow scene



Deformable scene (e.g.rings)



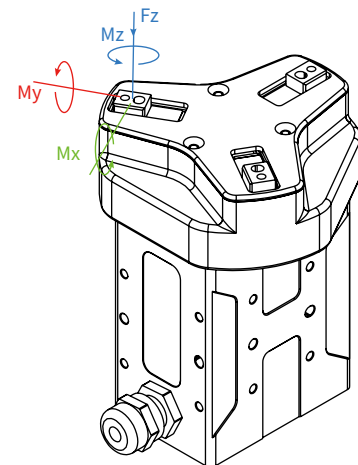
Gripping fragile items at high frequency



Medical, new retail, 3C industry, etc.

Specification Parameters

Model No. Z-ECG-20	Parameter
Total stroke	20mm adjustable
Gripping force	30~80N adjustable
Repeatability	$\pm 0.03\text{mm}$
Recommended gripping weight	$\leq 1.0\text{kg}$
Transmission mode	Gear rack + Linear guide
Grease replenishment of moving components	Every six months or 1 million movements / time
One-way stroke motion time	0.5s
Movement mode	Two fingers move horizontally
Weight	1.5kg
Dimensions (L*W*H)	114*114*124.5mm
Operating voltage	24V $\pm 10\%$
Rated current	0.8A
Peak current	2A
Power	20W
Protection class	IP67
Motor type	Servo motor
Operating temperature range	5-55°C
Operating humidity range	RH35-80 (No frost)



Permissible static load in vertical directi

Fz: 150 N

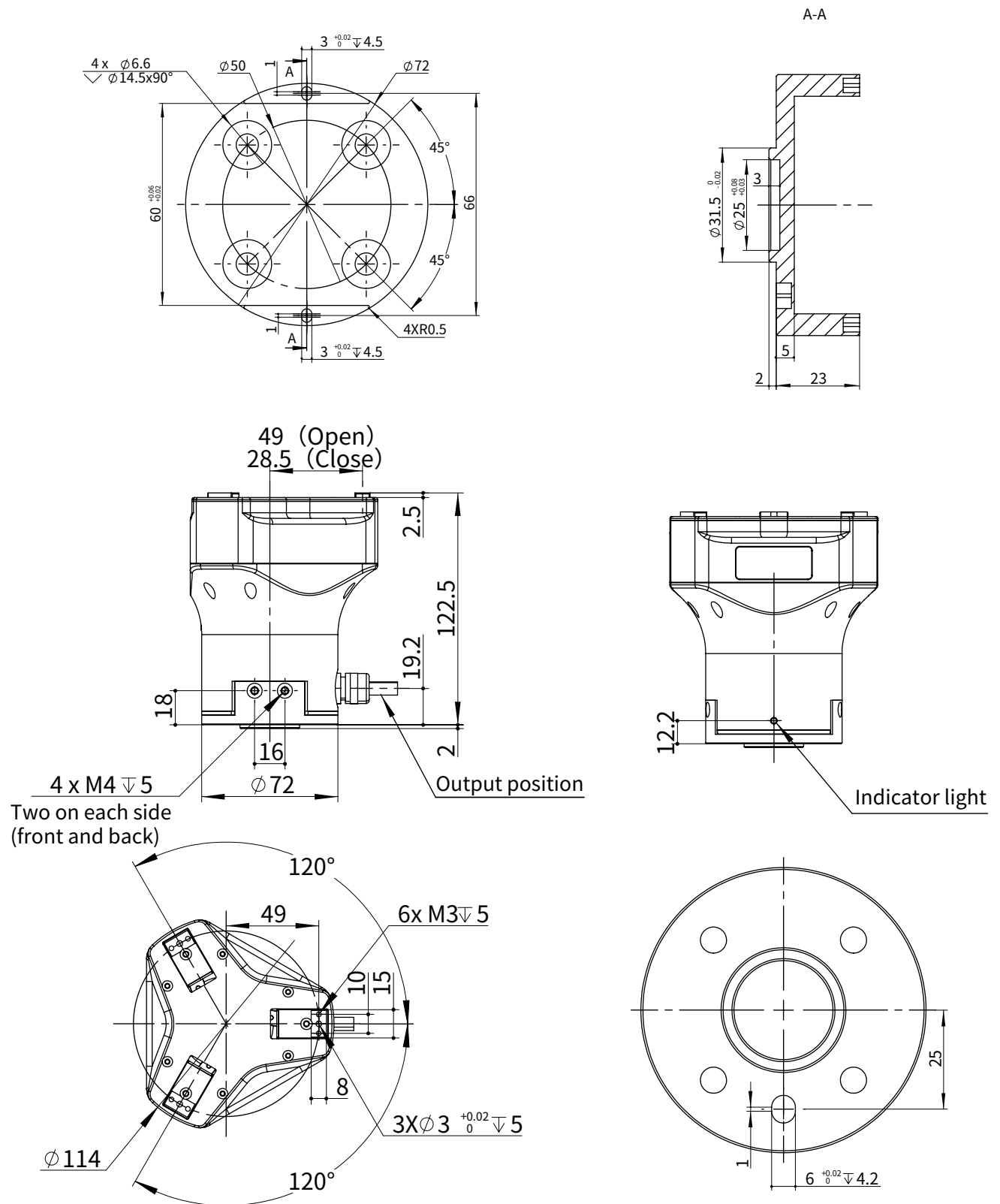
Permissible torque

Mx: 1.5 N·m

My: 1.5 N·m

Mz: 1.5 N·m

Dimensional Installation Drawing



Wire Sequence Explanation

Red	24V+
Black	GND
Yellow	485+
Yellow-white	485-
Brown	IN1
Brown-white	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!!

RS485 Communication

The RS485 communication of Z-ECG-20 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 (Calibration direction can be set through "Initialization Direction")
	0x0001	Reserved	R/W	0 (int)	
	0x0002	Clamping position	R/W	Maximum value (float)	Unit mm, Value range: 0~20
	0x0004	Clamping speed	R/W	Maximum value (float)	Unit mm/s, Value range: 1~100
	0x0006	Clamping current	R/W	0.5 (float)	Unit A, Value range: 0.1~0.5
	0x0017	Clamping position	R/W	0 (int)	Clamping position mode control parameters, select the position triggered by communication, value range: 1-4
Status feedback	0x0040	Initialization status feedback	R	0 (int)	0: Not initialized, 5: Initialization completed, Others: Initializing
	0x0041	Clamping status feedback	R	0 (int)	0: In place, 1: Moving, 2: Clamping, 3: Dropping
	0x0042	Clamping position feedback	R	Maximum value (float)	Unit mm
	0x0044	Clamping speed feedback	R	(float)	Unit mm/s
	0x0046	Clamping current feedback	R	0 (float)	Unit A
Parameter configuration	0x0080	ID	R/W	1 (int)	Value range [1~247], effective after saving parameters and restarting
	0x0081	Baud rate	R/W	4 (115200) (int)	0~6: 9600, 19200, 38400, 57600, 115200, 153600, 256000, Effective after saving parameters and restarting
	0x0082	Initialization direction	R/W	0 (int)	Set the calibration direction. 0: Open calibration, 1: Close calibration
	0x0083	Automatic initialization setting	R/W	0 (int)	Set calibration mode. 0: Power-on automatic calibration, 1: Manual control calibration. Effective after saving parameters and restarting
	0x0084	Save parameters	R/W	0 (int)	Write 1 to save parameters. Note: Do not use this command during real-time control, only configure parameters before actual use. After successful setting, this value becomes zero.
	0x0085	Restore default parameters	R/W	0 (int)	Write 1 to restore default parameters. After successful setting, this value becomes zero
	0x0090	I/O mode switch	R/W	0 (int)	0: Turn off I/O mode, 1: Turn on I/O mode

Indicator Meaning

Red light steady	Not initialized
Green light steady	Initialization successful/In place
Green light blinking	Moving
Blue light steady	Clamping object
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 ModeC

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 lead Angle description

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

OUT1	OUT2	Control clamping position
Ineffective	Ineffective	In placeC
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

Huiling-tech Robotic Co.,Ltd.

Tel: 0755-36382405

Hotline: 0086-15220259858

Email: Marketing@hitbot.cc

Website: hitbotrobot.com

Address: 2nd Floor, Building E, Huafeng International Robot Industrial Park,
Hangcheng Ave, Xixiang St, Baoan District, Shenzhen City, Guangdong Province, China

V_2024.03.27