Oriental motor

Electric Gripper

EH Series

αSTEP AZ Series Equipped

Delicate grip.

Delicate grip.

Electric Gripper

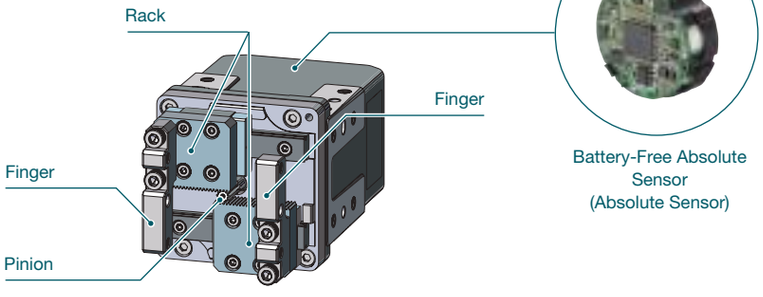
EH Series

αSTEP AZ Series Equipped

The **EH** Series electric gripper is a rack-and-pinion mechanism equipped with an **AZ** Series motor.
The delicate grip aids in automation and labor-saving.

The Motor Uses the αSTEP AZ Series

- Built-In Battery-Free Absolute Sensor, for Constant Monitoring of Motor Position Information without an External Sensor
- High Reliability with Closed Loop Control
- High Efficiency Technology Reduces Motor Heat Generation and Saves Energy



The electric gripper driver and cables are the same as for the **AZ** Series.

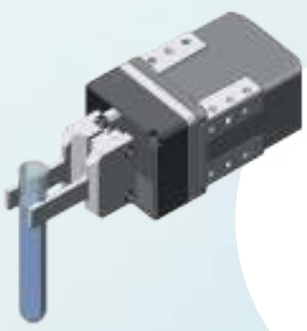
Please see the individual catalog for the **AZ** Series or the Oriental Motor website for the following.

・Driver Specifications ・RS-485 Communication Specifications
・Dimensions (Driver, connection cable)
・Connection and Operation ・Cables

The On-board **AZ** Series Provides Delicate Grip.

Delicate grip is achieved by fine-tuning the gripping force in 1% running current increments and implementing a slow approach to the load.

● Please prepare attachments (tabs or arms) separately.



Test tube

1

Grip

Can grip loads that break and deform easily.

O-ring

Electronic parts

2

Coordinate

The direction and position of the load can be coordinated.

3

Measure

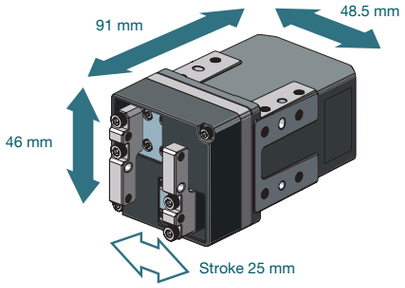
Size determination and size measurement of loads is possible.

Contributes to a Reduction in the Size of the Equipment.

Small and Lightweight

91 mm×46 mm×48.5 mm in size, and weighs 380 g.

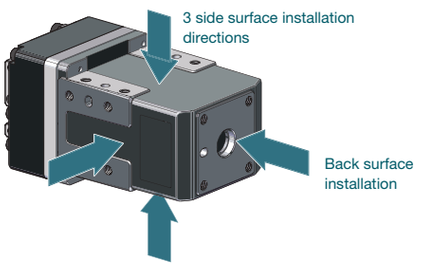
The combination of a motor with a frame size of 28 mm and the rack-and-pinion mechanism results in smaller equipment. 25 mm is secured for the stroke of moving parts.



Multi-Surface Installation OK

Installation in various directions is possible.

The design is compatible with multi-surface installation, making it optimal for installation on robotic arms, etc.

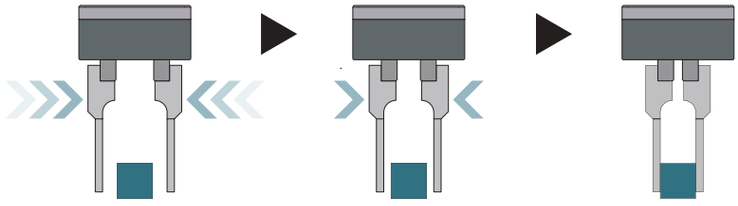


1 Grip — Reliably Grip Loads that Easy Deform or Break.

Freely set the gripping force, gripping time, and speed according to the object being gripped.
Safely and reliably grip objects that easily break, like glass, and objects that easily deform, like plastic and springs.

Quick Approach, Slow Grip

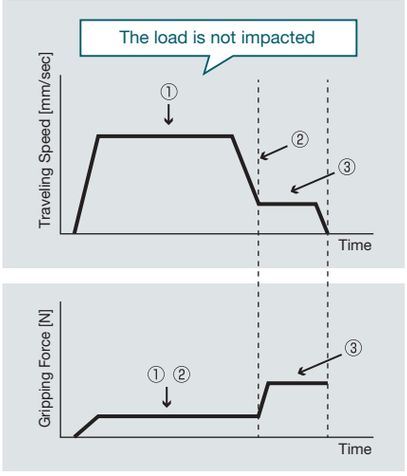
The motor approaches the load at high speed. The motor decelerates just before hitting the surface at low speed.



① The motor approaches the load at high speed and low gripping force

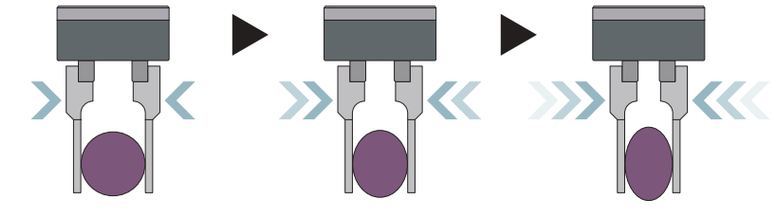
② The motor decelerates right before gripping the load, and grips the load slowly

③ After the load is gripped, push-motion operation starts. Torque is held at the set gripping force



Grips at Low Gripping Force, then Gradually Increases the Force

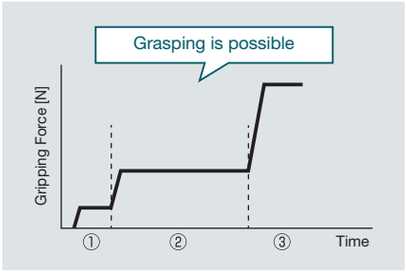
Push force and timing can be easily changed.



① Starts with reduced grip

② The gripping force is gradually increased

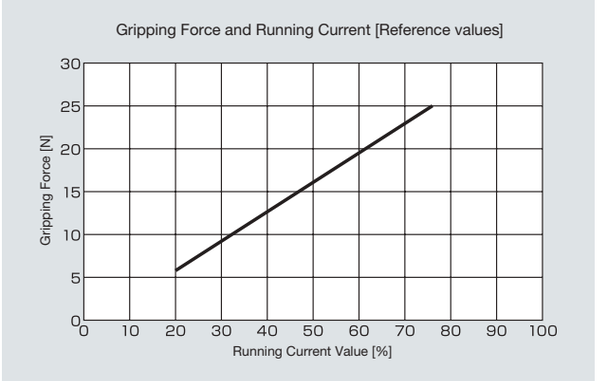
③ Gripped with even stronger force



● Please prepare attachments (tabs) separately.

Gripping Force Characteristics during Push-Motion Operation

The gripping movement of the electric gripper depends on the push-motion operation.
The push force (gripping force) is set according to the running current of the motor.

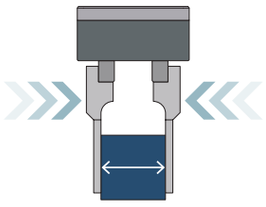


Max. gripping force **25 N**
[Gripping force range (reference value)
Approx. 6 N~25 N]

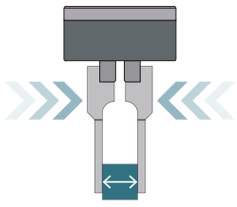
● Push-motion operation speed max. 10 mm/s (one side)

2 Coordinate — The Direction and Position of the Load can be Coordinated.

The minimum travel amount of the finger is 0.02 mm, so the direction and position of the loads can be coordinated by gripping them according to their size.



Large load

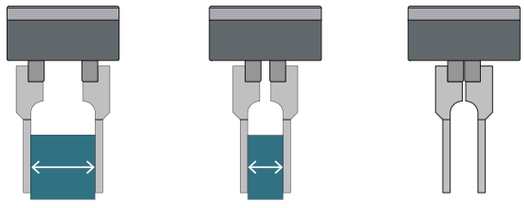


Small load

3 Measure — The Size of the Load can be Confirmed without an External Sensor.

The Size and Presence of a Load are Determined within the Operational Range of the Finger

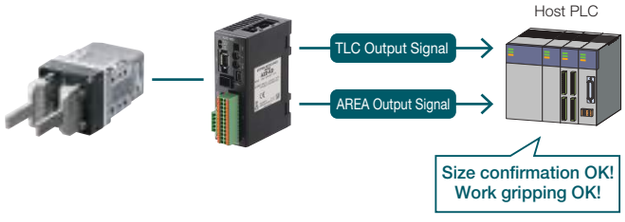
The operational range of the finger is confirmed by the output signal (TLC output, AREA output) from the driver, allowing the size and presence of a load to be determined.



① OK (within tolerance) ② NG (out of tolerance) ③ NG (no load inserted)

①② **Determination of size of load**
The position of the attachment when the load is gripped is confirmed, allowing for sorting by size.

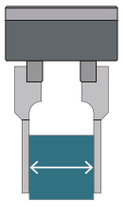
③ **Determination of presence of load**
Determine whether or not a load is gripped.



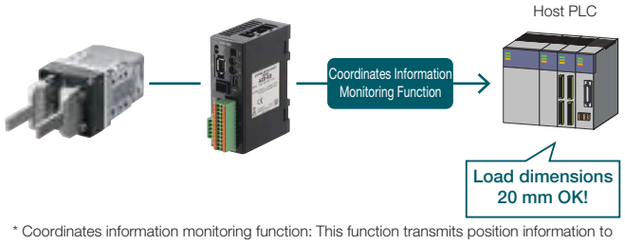
* AREA output: This signal is output when the motor is in a set area.
TLC output: This signal is output during push-motion operation when the output torque reaches a set torque limiting value.

Monitor the Position Information from the Gripper to Measure Size

The driver coordinates information, monitoring function loads, coordinates information from the electric gripper into the host PLC, allowing the size of the load to be measured.



Measurement of size of load



* Coordinates information monitoring function: This function transmits position information to the host system.

● Please prepare attachments (tabs) separately.

Product Line

Electric Gripper

EH Series

AZ Series Driver (DC Input)

Built-in Controller Type FLEX

The positioning data is set in the driver (256 points). Using a network converter (sold separately) allows the FA network to be controlled.

Pulse input type with RS-485 communication

RS-485 communication allows the motor's position, speed, torque, alarm, and temperature to be monitored.

Pulse Input Type

Controls the motor from a positioning module (pulse generator).

Network-Compatible Multi-Axis Driver

-SSCNETⅢ/H-compatible
-MECHATROLINKⅢ-compatible
-EtherCAT-compatible

Gripper operation programs can be registered in the driver to distribute the load on host systems

● Applies to: Built-in controller type drivers, network-compatible drivers (excluding EtherCAT)

EH Series allows for sequence programs to be easily registered in the driver while referencing the status of external input signals from sensors or internal output signals.
For simple applications, products can even be operated simply with START and STOP commands.

Some example of **EH** Series programs are introduced in "Usage Navigation" on the Oriental Motor website.

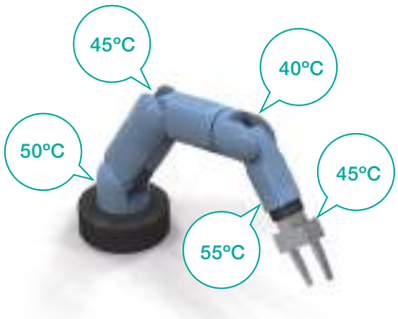



Real-time monitoring of motor status

The motor status of motorized actuators equipped with **αSTEP AZ** Series including **EH** Series can be constantly monitored over a network.

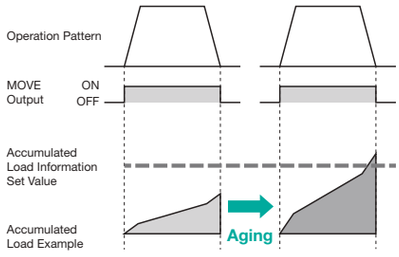
Motor Temperature Monitor

The temperature of a robot can be monitored in real-time, even if the robot is covered with a case or other structure.



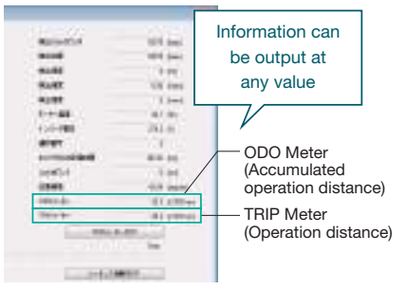
Accumulated Load Monitor

In addition to monitoring the momentary load factor, the load factor can be determined over an area in a single motor operation pattern and detected as a value. This makes it possible to identify long-term changes in load caused by factors such as aging.



ODO/TRIP Monitor

The accumulated number of rotations can be monitored, similar to the odometer on a vehicle. An information signal can be output once a set threshold is reached. This can be used for maintenance or other tasks.



● For details on monitoring items, see the User's Guide of the **AZ** Series.

◆ Dedicated MEXE02 Support Software (Free download)

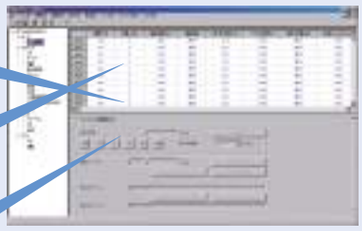
Basic settings can be configured easily from a PC, such as editing operating data and setting parameters. Simple sequence programs can also be created.

This popular tool makes it easy for anyone!

The travel distance and speed can be displayed and input using any unit (mm, deg)

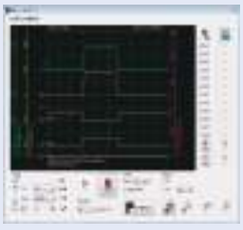
The simple sequence function can simplify programs

Settings can be copied and backed up



Intuitive operation —
Easy to understand and use

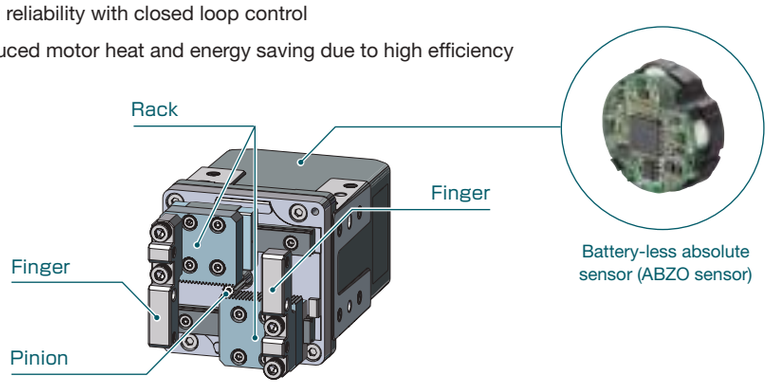
Teaching can also be performed from the PC



Also includes a waveform monitor for checking signal input status

Driving motor equipped with α_{STEP} AZ Series

- Built-in battery-less absolute sensor; constantly monitors motor location information with no external sensor required
- High reliability with closed loop control
- Reduced motor heat and energy saving due to high efficiency



Electric gripper drivers and cables are the same as for **AZ** Series.

For the following information, see the separate **AZ** Series catalog or the website.

・Driver Specifications ・Communication Specifications
・Dimensions (Drivers, connection cables)
・Connection and Operation ・Cables

EH Series Lineup

Electric Gripper

EH3-AZAKH	EH4-AZAKH
	

Drivers (DC power supply input)

Built-in Controller Type	Pulse Input Type with RS-485 Communication	Pulse Input Type	Network-Compatible	Compact Driver
FLEX Positioning data is set in the driver (256 points). The use of a network converter (sold separately) allows the control of an FA network.	RS-485 communication allows the monitoring of the position, speed, torque, alarm, and temperature of the motor.	The motor is controlled from a positioning unit (pulse oscillator).	The driver can be directly controlled from an host control device over an FA network.	Modbus (RTU)-compatible
			 EtherNet/IP EtherCAT PROFINET	

◆ EH Series is recommended over an air pressure gripper for more delicate operations!

Gripping force adjustment in 1% increments	No need to adjust the regulator (decompression valve), such as with an air pressure gripper. The gripping force can be adjusted digitally, for simpler and more delicate adjustment.
Speed adjustment in 0.02 mm/s increments	No need to adjust the speed controller (speed control valve), such as with an air pressure gripper. Control is provided by a stepping motor, making it easy to adjust the speed and to grip at low speed.
Travel distance adjustment in 0.02 mm increments	The gripper takes advantage of the high positioning accuracy of a stepping motor. It can approach works of various shapes.
Positioning monitoring using an ABZO sensor	Detailed feedback on location information is provided for use in gripping and transporting, as well as in determining the size of the work.

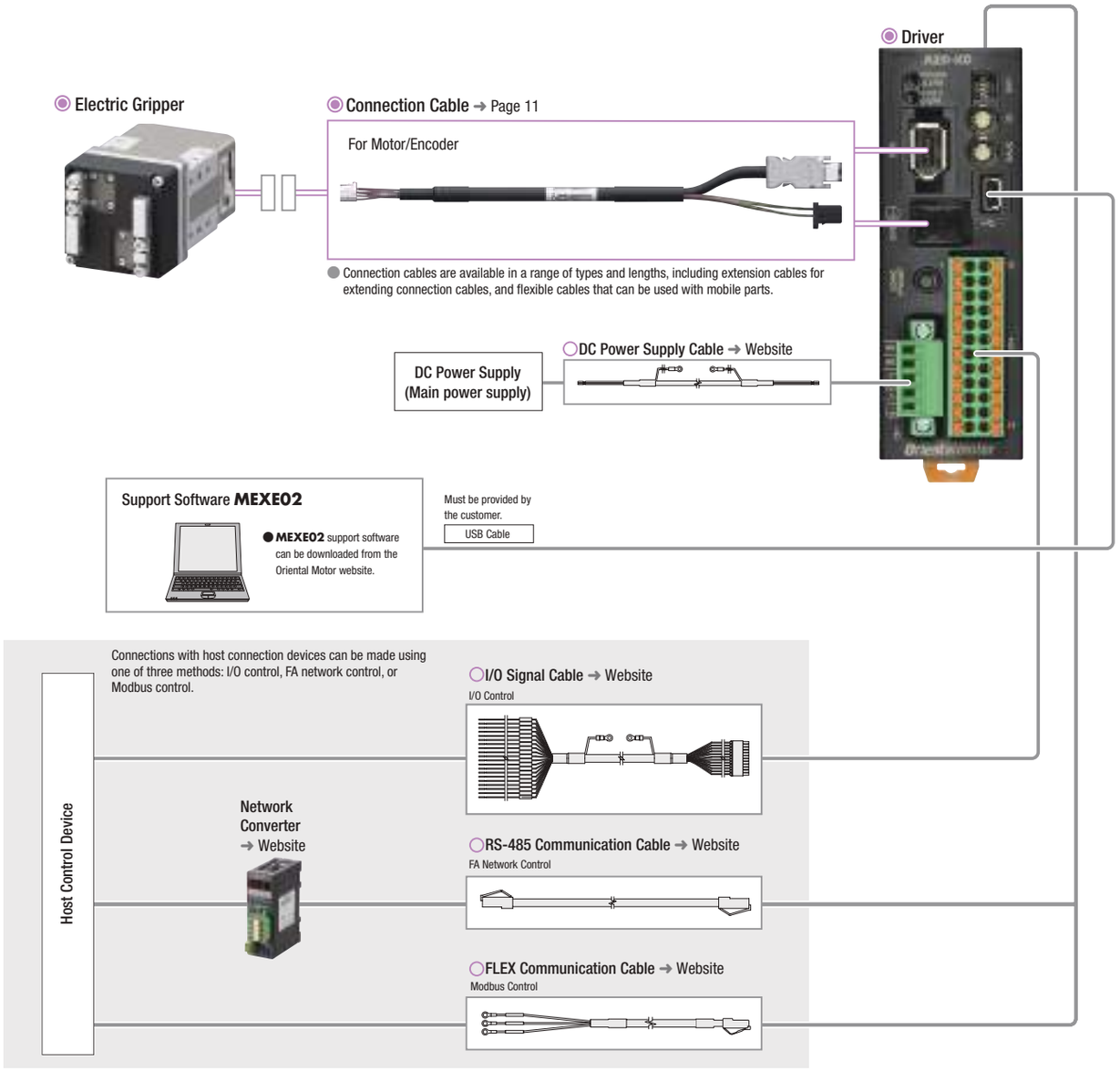
System Configuration

Combination of Electric Gripper and Built-in Controller Type Driver or Pulse Input Type Driver with RS-485 Communication

An example of a configuration using I/O control or RS-485 communication is shown below.
The electric gripper, driver, and connection cable set/flexible connection cable set need to be separately provided.

●For information on the system configuration when combined with a pulse input type driver, refer to the website.

◉Must be purchased
○Purchase if required



● Price Examples of System Configurations

Electric Gripper		Driver		Cables	
				Connection Cable (1 m)	I/O Signal Cable with Connector (1 m)
EH4-AZAKH	+	AZD-KD	+	CC010VZ2F2	CC24D010C-1
◉		◉		◉	○

●The system configuration shown above is an example. Other combinations are available.

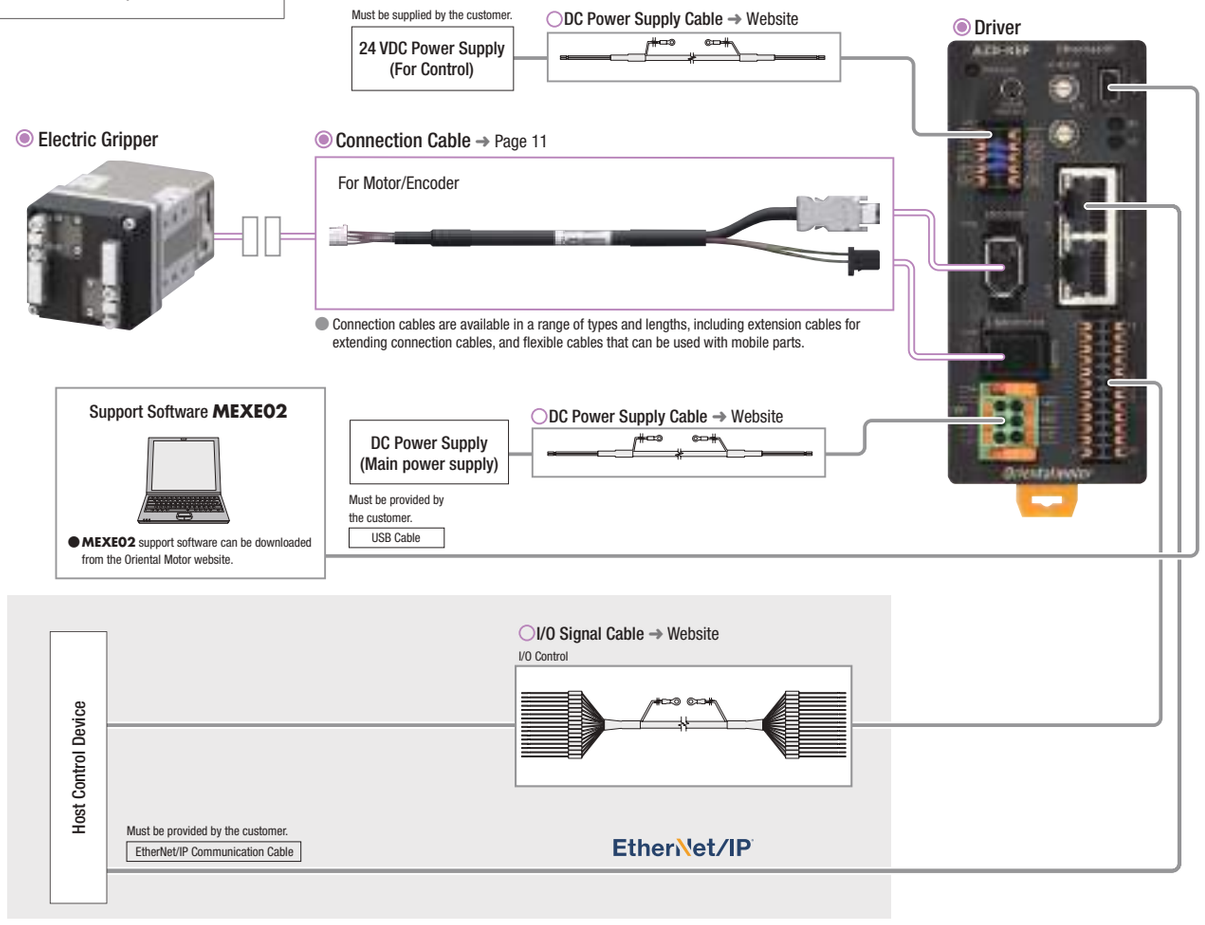
Note

●The motor/encoder cable from the motor cannot be connected directly to the driver. To connect the motor to the driver, use a connection cable.

Combination of Electric Gripper and Network-compatible Driver

An example of a configuration using an I/O control or EtherNet/IP with an EtherNet/IP-compatible driver is shown below.
The electric gripper, driver, and connection cable set/flexible connection cable set need to be separately provided.

◉Must be purchased
○Purchase if required



Price Examples of System Configurations

Electric Gripper		Driver		Cables	
				Connection Cable (1 m)	General-Purpose Cable for I/O Signals (1 m)
EH4-AZAKH	+	AZD-KEP	+	CC010VZ2F2	CC16D010B-1
◉		◉		◉	○

The system configuration shown above is an example. Other combinations are available.

Note

The motor/encoder cable from the motor cannot be connected directly to the driver. To connect the motor to the driver, use a connection cable.

Product Number Code

Electric Gripper

EH 4 - AZ A K H

① ② ③ ④ ⑤ ⑥

①	Series Name	**EH**: **EH** Series
②	Product	**3**: Width 36 mm × Height 36 mm (Finger side) **4**: Width 46 mm × Height 46 mm (Finger side)
③	Installed Motor	**AZ**: **AZ** Series
④	Additional Function	**A**: No Additional Functions
⑤	Motor Specifications	**K**: DC Power Supply Input Specifications
⑥	Cable Drawing Direction	**H**: Left/Right

Driver

AZD - K D

① ② ③

①	Driver Type	**AZD**: **AZ** Series Driver
②	Power Supply Input	**K**: 24 VDC
③	Type	**D**: Built-in Controller Type **X**: Pulse Input Type with RS-485 Communication Blank: Pulse Input Type **EP**: EtherNet/IP-compatible **ED**: Compatible with EtherCAT drive profile **PN**: PROFINET-compatible

Connection Cable/Flexible Connection Cable

CC 050 V Z 2 F 2

① ② ③ ④ ⑤ ⑥ ⑦

①		**CC**: Cable
②	Length	**005**: 0.5 m **010**: 1 m **015**: 1.5 m **020**: 2 m **025**: 2.5 m **030**: 3 m **040**: 4 m **050**: 5 m **070**: 7 m **100**: 10 m **150**: 15 m **200**: 20 m
③	Reference Number	
④	Applied Model	**Z**: For **AZ** Series
⑤	Reference Number	**2**: For 20 mm, 28 mm Frame Size
⑥	Cable Type	**F**: Connection Cable **R**: Flexible Connection Cable
⑦	Cable Specifications	**2**: For DC Power Supply Input

Product Line and Price

Electric Gripper

Product Name	List Price
EH3-AZAKH **EH4-AZAKH**	

Driver

◇Built-in Controller Type

Product Name	List Price
AZD-KD	

◇Pulse Input Type with RS-485 Communication

Product Name	List Price
AZD-KX	

◇Pulse Input Type

Product Name	List Price
AZD-K	

◇EtherNet/IP-compatible

Product Name	List Price
AZD-KEP	

◇Compatible with EtherCAT Drive Profile

Product Name	List Price
AZD-KED	

◇PROFINET-compatible

Product Name	List Price
AZD-KPN	

Connection Cable/Flexible Connection Cable

Use a flexible connection cable if the cable will be bent.

◇For Motor/Encoder

Type	Length (m)	Product Name	List Price
Connection Cable	0.5	**CC005VZ2F2**	
	1	**CC010VZ2F2**	
	1.5	**CC015VZ2F2**	
	2	**CC020VZ2F2**	
	2.5	**CC025VZ2F2**	
	3	**CC030VZ2F2**	
	4	**CC040VZ2F2**	
	5	**CC050VZ2F2**	
	7	**CC070VZ2F2**	
	10	**CC100VZ2F2**	
	15	**CC150VZ2F2**	
	20	**CC200VZ2F2**	

Type	Length (m)	Product Name	List Price
Flexible Connection Cable	0.5	**CC005VZ2R2**	
	1	**CC010VZ2R2**	
	1.5	**CC015VZ2R2**	
	2	**CC020VZ2R2**	
	2.5	**CC025VZ2R2**	
	3	**CC030VZ2R2**	
	4	**CC040VZ2R2**	
	5	**CC050VZ2R2**	
	7	**CC070VZ2R2**	
	10	**CC100VZ2R2**	
	15	**CC150VZ2R2**	
	20	**CC200VZ2R2**	

Accessories

Electric Gripper

Operating Manual 1 Set

Driver

Type \ Accessories	Connector
Built-in Controller Type Pulse Input Type with RS-485 Communication Pulse Input Type	For CN1 (1 pc.) For CN4 (1 pc.)
EtherNet/IP-compatible Compatible with EtherCAT Drive Profile PROFINET-compatible	For CN1 (1 pc.) For CN4 (1 pc.) For CN7 (1 pc.)

Connection Cable/Flexible Connection Cable

Type \ Accessories	Operating Manual
Connection Cable	–
Flexible Connection Cable	1 Set

The drivers and cables that can be used in combination with the actuator are the same as for α_{STEP} AZ Series.

A separate α_{STEP} **AZ** Series catalog is available. Refer also to the separate catalog (V-184) when selecting products.

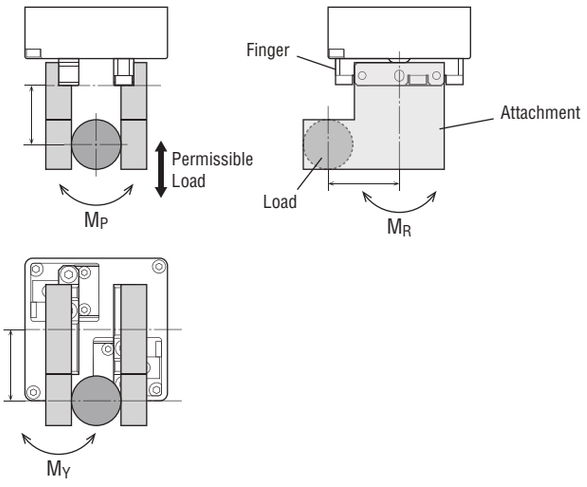
Specifications

Actuator Product Name		EH3-AZAKH	EH4-AZAKH
Included Motor (**AZ** Series)		**AZM14**	**AZM24**
Maximum Gripping Force [N]		7	25
Repetitive Positioning Accuracy [mm]	One Side	±0.02	±0.02
Backlash [mm]	One Side	0.2	0.1
Stroke [mm]	Both Sides	15	25
	One Side	7.5	12.5
Maximum Speed [mm/s]	Both Sides	156	156
	One Side	78	78
Maximum Acceleration [m/s²]	Both Sides	20	20
	One Side	10	10
Push-Motion Speed [mm/s]	Both Sides	20	20
	One Side	10	10
Minimum Traveling Amount [mm]	Both Sides	0.02	0.02
	One Side	0.01	0.01
Permissible Load [N]		2	5
Static Permissible Moment [N·m]*		M_P: 0.7 M_Y: 0.2 M_R: 0.2	M_P: 1.2 M_Y: 0.12 M_R: 0.4

*This is the static permissible moment at the finger edge. Be sure to take factors such as the load, attachment mass, and gripping force (including impact load) into account during use.

Note

- The actual load mass that can be transported will vary significantly based on factors such as the attachment, load friction coefficient, and acceleration. Use up to 1/10th the gripping force to allow sufficient leeway.



- Load Moment Formula

$$\frac{|\Delta M_P|}{M_P} + \frac{|\Delta M_Y|}{M_Y} + \frac{|\Delta M_R|}{M_R} \leqq 1$$

ΔM_P: Load moment in the pitching direction (N·m)
ΔM_Y: Load moment in the yawing direction (N·m)
ΔM_R: Load moment in the rolling direction (N·m)
M_P: Load moment in the pitching direction (N·m)
M_Y: Load moment in the yawing direction (N·m)
M_R: Load moment in the rolling direction (N·m)

Descriptions of the Terms on the Specification Table

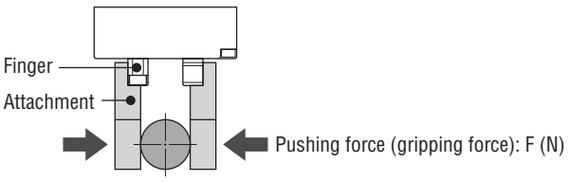
Maximum Gripping	The maximum force at which the work can be gripped.
Repetitive Positioning Accuracy	A value indicating the amount of error that is generated when positioning is performed repeatedly to the same position in the same direction. (Accuracy is measured at a constant temperature under a constant load.)
Backlash	This is the play of the finger when the motor shaft is fixed.
Stroke	The maximum distance at which the finger can be opened/closed.
Maximum Speed	The maximum speed at which the finger can be opened/closed.
Maximum Acceleration	The maximum acceleration at which the finger can be opened/closed.
Push-Motion Speed	The operating speed during push-motion operation (Gripping operation).
Minimum Traveling Amount	The travel distance per pulse set by default.
Permissible Load	The permissible external force.
Static Permissible Moment	The moment allowed when gripping.

Relationship between Pushing Force (Gripping force) and Current

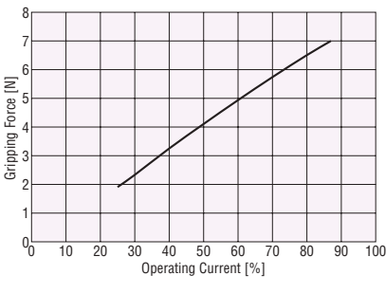
The gripping operation of the electric gripper is performed via push-motion operation.
Pushing force (Gripping force) is set by the operating current.

Actual Pushing Force (Gripping force) Value

Reference values for pushing force (Gripping force) and current are shown below.
Check on the actual device for the actual pushing force (Gripping force).

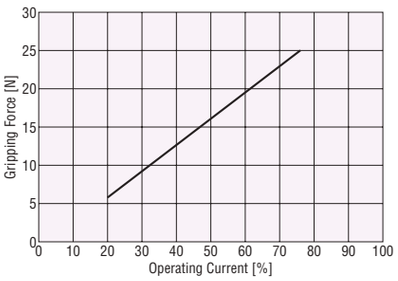


EH3-AZAKH



- Set the push-motion operation gripping force to 7 N or less.
- Set the push-motion operating speed to 10 mm/s or less (One side).

EH4-AZAKH



- Set the push-motion operation gripping force to 25 N or less.
- Set the push-motion operating speed to 10 mm/s or less (one side).

Driver Specifications

Product Name			AZD-KD、AZD-KX、AZD-K	AZD-KEP、AZD-KED、AZD-KPN
Main Power Supply	Input Voltage	EH3	24 VDC±5%	
		EH4		
	Input Current	EH3	0.5 A	0.4 A
		EH4	1.6 A	1.6 A
Control Power Source	Input Voltage		–	24 VDC±5%
	Input Current		–	0.15 A

General Specifications

		Electric Gripper	Driver
Heat-resistant Class		130 (B)	–
Insulation Resistance		The measured value is 100 MΩ or more when a 500 VDC megger is applied between the following location: ・Case – Motor windings	The measured value is 100 MΩ or more when a 500 VDC megger is applied between the following location: ・Protective earth terminal – power supply terminal
Dielectric Strength Voltage		No abnormality is found with the following application for 1 minute: ・Case – Motor windings 0.5 kVAC 50 Hz or 60 Hz	–
Operating Environment (In operation)	Ambient Temperature	0～+40°C (Non-freezing)*	0～+50°C (Non-freezing)
	Ambient Humidity	85% or less (Non-condensing)	
	Atmosphere	Use in an area without corrosive gases and dust. The product should not be exposed to water, oil or other liquids.	
Degree of Protection		–	IP10

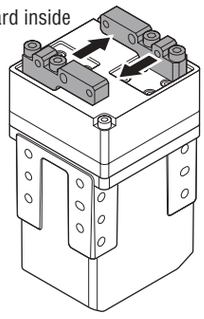
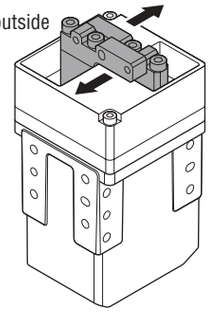
* Under the Oriental Motor's measurement conditions

Note

● When measuring insulation resistance or performing a dielectric strength voltage test, be sure to disconnect the motor from the driver beforehand. Also, do not conduct these tests on the ABZO sensor section of the motor.

Traveling Direction

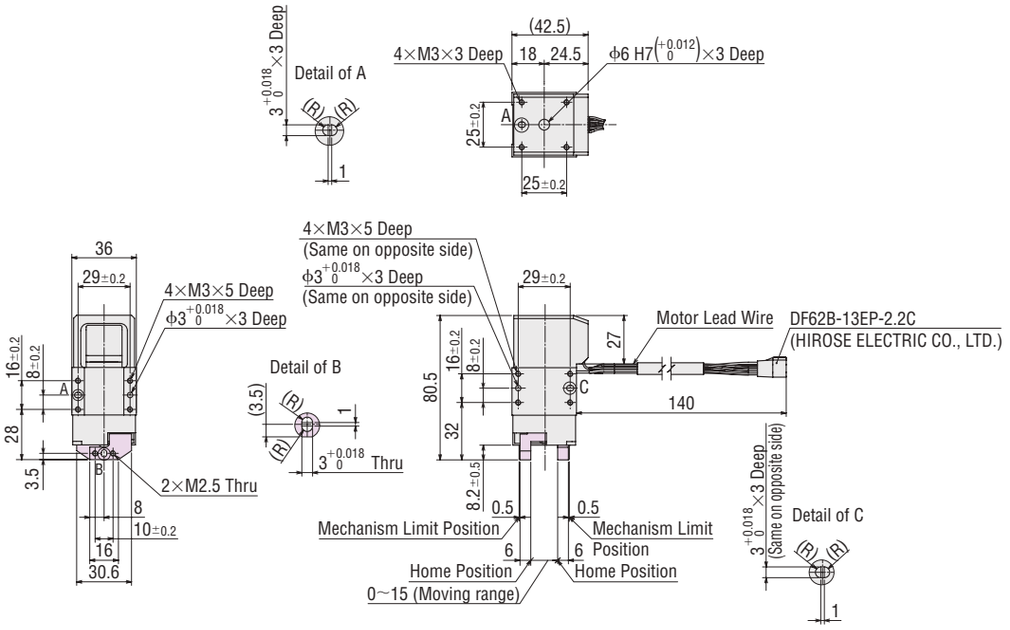
The traveling direction is set by default as follows.

Traveling Direction	Traveling Direction
Travels toward inside + side (CW)	Travels toward outside – side (CCW)
	

Dimensions (Unit = mm)

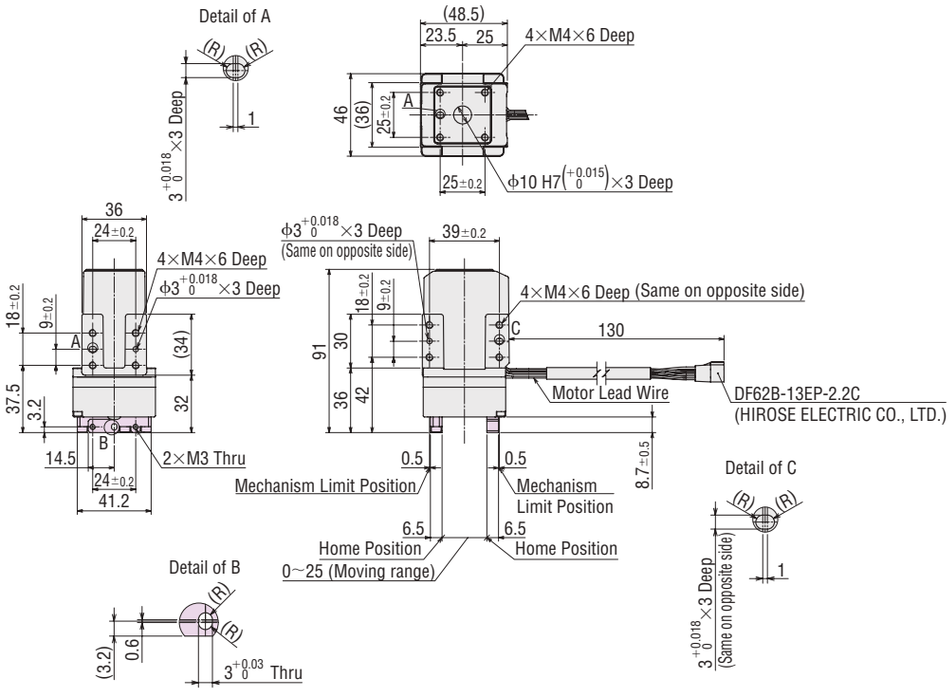
2D & 3D CAD

Product Name	Mass kg	2D CAD
EH3-AZAKH	0.2	D7908



2D & 3D CAD

Product Name	Mass kg	2D CAD
EH4-AZAKH	0.38	D7903



The shaded areas are moving parts.

⚠ Safety Precautions

- To ensure correct operation, carefully read the Operating Manual before using it.
- The products listed in this catalogue are for industrial use and for built-in component. Do not use for any other applications.

- The factories which manufacture the products listed in this catalogue have obtained Quality Management Systems ISO9001 and Environment Management Systems ISO14001.
- The content listed in this catalogue such as performance and specifications of the products are subject to change without notice for improvements.
- The price of all products listed in this catalogue does not include the consumption tax etc.
- For details of the products, please contact the nearest dealer, sales office or the following "Order Support Center" or "Customer Support Center".
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