

Ver. 1-2

CAT-2012

CHELIC[®]

AUTOMATION

PNEUMATIC EQUIPMENT

Electric Actuators catalog 2

High precision

High stability

High flexibility



The Keystone of Industrial 4.0

Selection/Installation Precautions; Operation and Maintenance

■ Warrant Period and Scope

• Warrant Period

Warrant period shall be any of the follows that comes first.

The Warrant Period is:

- 1.12 months after installation.
- 2.18 months after delivery from our plant.
- 3.2500-hour operation

• Scope of warrant

We will be responsible for free of charge repair for any product fault under normal operation during the Warrant Period except for the following items:

- 1.Flaking off of external coating or natural discoloration.
- 2.Replacement of consumables.
- 3.Damage resulting from earthquake, storm, flood, lightening, fire or other calamity or human error.
- 4.Improper installation or use by the user.
- 5.Arbitrary modification of product without the consent of our company.
- 6.Using lubricant or grease other than that specified by the company.
- 7.Incomplete or erroneous maintenance and inspection.
- 8.Repairs done by third-party other than our authorized dealer.

Furthermore, we are only responsible for repairing our own products; we shall not be held responsible for any damage resulting from the faulty product.

■ Precautions

Safety Precautions for using CHELIC Products

For safely using the product, carefully read Safety Precautions and Operation Manual before selecting model and using the product. These Safety Precautions aim to prevent any injury caused by erroneous use of the product. Make sure you fully understand and observe precautions and markings given in the Operation Manual.

1.Safety Notes

Industrial products are the machinery having high-level of procedure design and extensive freedom of movements. In order to use CHELIC products safely, the following safe relevant notes must be observed. Failure to take necessary safety measures or erroneous operation may result in faults or damage of the product, or even injury, death or major incident of the user (including ones who install, operate, adjust, or check the product).



DANGER

> Incorrect operation may lead to death or severe injury.



WARNING

> Incorrect operation may lead to death or severe injury.



CAUTION

> Incorrect operation may lead to injury or damage of objects.



IMPORTANT

> Description of product operation sequence.

Operation Manual cannot describe all the details of the safety issues; the user is required to observe these precautions for building up correct safety awareness and judging capabilities. Refer to product layout given in this booklet for product positions, basic rules for use, and specifications. Furthermore, warning signs and Operation Manual of the product is for the use in Taiwan area only. For exporting overseas, alterations must be made for the warning signs and the Operation Manual.

2.Special Precautions

The follows are important precautions on product operation. Further notes regarding installation, operation, checking and maintenance are given in respective chapters. All these notes require strict observation.

Selection/Installation Precautions; Operation and Maintenance

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(1) Notes on Automation

1. Safety Fence must be installed for preventing the operator getting injured by contacting moving parts of the product when entering its range of movement.
2. Interlocking device for Open and Emergency Stop must be provided at the entrance of Safety Fence.
3. Avoid as far as possible accessing the machine via other positions than the entrance with the interlock device.



DANGER

Severe injury may occur if getting contact with operating product.

- Do not enter the Safety Fence during an automated operation.
- For entering the Safety Fence, push down the Emergency Stop Button.

(2) Prevent from Pinch of Hand

Pay attention to avoid the hand from being pinched by moving parts when operating the product.



WARNING

Pinch of Hand may occur.

- Do not reach your hand close to moving parts.
- Keep distance from moving parts of product.

(3) Operation Instructions

1. Peruse Operation Manual before installing the product. Carry out tasks and operation as instructed.
2. After perusing Operation Manual, also read Safety Precautions for using CHELIC Products before operating the product.
3. Do not carry out any installation, checking, maintenance, or operation item not described in the Operation Manual.



WARNING

Severe injury may occur if product is incorrectly installed or operated.
Peruse Operation Manual before installation/operation.

(4) Using the product in environments with flammable gas is strictly forbidden.



WARNING

1. This product is not explosion proof.
2. Do not use the product in environments with flammable gas, powder, or liquid, otherwise an explosion or fire may occur.

(5) Never use the product in environments with potential of electromagnetic influence hazards.



WARNING

Do not use the product in hazardous environments having electromagnetic influence, static discharge, or radio wave influences.
Erroneous operation of the product may cause dangers.

(6) Cautions for checking Controller



WARNING

1. To prevent electrocution, cut off power supply of the controller and power mains when carrying out checks of the controller, external contactor terminals and wiring posts.
2. Never touch the internal of controller.

(7) Handling Damages and Anomalies of Product



WARNING

1. It is dangerous to use the product in damaged or abnormal conditions; Stop use immediately and contact our company.
2. Timing Belt, Timing Wheel Belt, Worm Gear, and Worm Screw are consumables; of which annual replacement is recommended.

(8) Cautions for touching high-temperature points on Motor and Reducer Box



WARNING

Automated motor and reducer box may reach very high temperatures that will result in burn injury if touched. When checking the contactor, always cut off power supply of the controller. Temperature lowers as time goes by; make contact only when the temperature is lowered.

Selection/Installation Precautions; Operation and Maintenance

(9) It is strictly forbidden to remove, alter or damage any warning sign



WARNING

1. Arbitrary removal of a warning sign may result in incidents due to not seeing the warning.
2. Avoid blockage of a warning sign on the product by a near-by machine.
3. Make sure the graph and text of the warning sign can be clearly seen from outside the Safety Fence.

(10) Protective Connection



WARNING

To avoid static charge, always connect the product and controller to Ground.

(11) Pay attention to Parameter Settings



WARNING

To allow inertial factor and tip mass, product movement shall be maintained at proper acceleration. Failure to do so may result in premature lifespan expiry of moving parts, damages, and residual vibration during alignment.

3. Safety Functions of Product

(1) Overload Detection

Detect motor overload and cut off servo power supply.

(2) External Limit

Under SENSOR states of axes and external limits, Movement Range of manual operation and automated operation is limited after Homing. Furthermore, the limited area based on external SENSOR is called Movement Range.

(3) Mechanical Blocks

Mechanical Block is installed for the prevention of exceeding Movement Range of an Axis, allowing emergency stop and safety functions when cutting off servo power supply at high-speed motion; no Mechanical Block is provided for axis return. The area limited by Mechanical Block is also called moving range.



WARNING

A moving axis cannot be stopped immediately with the operation of emergency stop or safety function, this is why the installation (of Mechanical Stops), therefore pay special attention.

4. System Safety Measures

Compared to Electrical Slide units, assembling an automated system with built-in Electrical Slide(s) is more likely to cause system hazards. For system manufacturers, it is necessary to adopt safety measures that match with respective systems. The system manufacturer must properly operate relevant measures regarding system safety, operation, and maintenance.

5. Test Run

Carry out Test Run in the following sequence after installation, adjustment, check, maintenance, repair, etc. of the robot.

(1) No safety fence prepared after installation

Provide extended cable and locks outside the Movement Range in lieu of a Safety Fence; strictly observe the following items:

1. Props must be hard to move.
2. Easy to recognize from the outside.
3. Set up "No Entry; In Operation" signage at easy to see location; the operator shall be restricted to enter a Movement Range.

(2) Verifications before plugging-in the Controller

1. Proper product installation
2. Proper electrical installation
3. Proper connection with Ground
4. Proper connection with the product
5. Whether safety measures (Safety Fence, etc.) are in place.
6. Whether installation environment complies with specifications.

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(3) Verifications after plugging-in the Controller

Verify the follows after plugging-in the Controller:

1. Check normal operation of Start, Stop, and Mode Selection buttons.
2. Check software limits by turning respective axes.
3. Check the final result for compliance with the plan.
4. Check for normal signal exchange with final results and peripheral machines.
5. Check Emergency Stop for normal function.
6. Check Teach Pendant (or, Demonstrator) for normal function.
7. Check Safety Protection and connection device for normal function.
8. Check for proper movement in automated operation.

6. Operation inside the Safety Fence

(1) Operation inside the Safety Fence

Except for the following exceptions, always cut off controller power supply when operating inside the Safety Fence; explicit marking shall be provided during the work to ensure no other operator will turn on the power of the controller or the operation panel.

1. Setting of external Limit Sensors
2. Teach demo.
 1. Take precautions in the following order during the operation.
 2. Refer to (II) below.

(2) Teach

Take the following procedures for teaching inside the Safety Fence:

1. Verify the following items from outside the Safety Fence:
 1. Visually verify if there is any danger inside the Safety Fence.
 2. Whether the hand-held programmer is working normally.
 3. Check the product for any fault.
 4. Check Emergency Stop Device for normal operation.
 5. Automated operation is prohibited in Demonstrator Mode.
2. Never enter the Movement Range of the Robot Arm (Safety Hood)

7. Automation

(1) Verifications before Operation

Verify the following items before operation:

1. No one is inside the Safety Fence.
2. Holding Demonstrator or tool at specified position.
3. Whether anomalies of the product and peripheral machines are displayed with indicators.
4. Whether Safety Fence is set and interlocking function is working.

(2) During operation and when anomaly occurs

1. When operation starts, verify the operation status and automation via indicators.
2. Entering into Safety Fence is absolutely forbidden during the operation.
3. In the event of an anomaly of machine or peripheral machines, take the following procedures for entering into Safety Fence:
 1. Press down Emergency Stop Button to stop the product.
 2. Indicate on the Power Switch that emergency measures are taken; take necessary measures to prevent anyone other than the operator to operated the product.

8. Adjustment and Checking

Do not carry out any installation, adjustment, checking, maintenance, etc. not described in the Operation Manual.

9. Repair and Modification

Repair, part replacement and modification are not listed in this Operation Manual. These tasks must be carried out by professionals. Do not attempt to do them arbitrarily or danger may occur.

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Powerful Functionality and Comprehensive Specifications

Mechanical Grippers, Electric Cylinders and Linear Motor Modules developed by CHELIC are indispensable products for the automation equipment due to their powerful functions, comprehensive specifications, high-quality, and competitive price.

2-Finger Electric Gripper

P.7

Small size

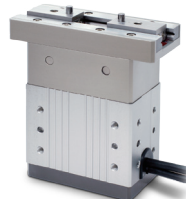
EDG 20



Max. stroke 8mm
Max. gripping force 14N
Motor size 20 □

Large size

EDG 35



Max. stroke 22mm
Max. gripping force 140N
Motor size 35 □

Middle size

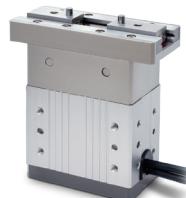
EDG 25



Max. stroke 14mm
Max. gripping force 80N
Motor size 25 □

Large size

EDG 42



Max. stroke 30mm
Max. gripping force 22N
Motor size 42 □

2-Finger Electric Gripper /Long Stroke

P.23

Small size

EDF 20



Gripping force 46N
Open/close speed 0~50mm/s
Motor size 25 □

Middle size

EDF 32



Gripping force 142N
Open/close speed 0~50mm/s
Motor size 42 □

Angular Type Electric Gripper

P.35

Small size

EDM 20



Max. Angle 180°
Max. gripping force 6.4N
Motor size 20 □

Large size

EDM 35



Max. Angle 180°
Max. gripping force 60N
Motor size 42 □

Middle size

EDM 25



Max. Angle 180°
Max. gripping force 25N
Motor size 25 □

Large size

EDM 42



Max. Angle 180°
Max. gripping force 90N
Motor size 42 □

Electric Gripper/Open-loop

P.23

Small size

EDP 12



Stroke 4mm
Max. thrust 3N
Motor size 12 □

Small size

EDP 16



Stroke 4mm
Max. thrust 6N
Motor size 16 □

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3-Finger Round Body Electric Gripper

P.23
Small size
EDQ 25


Max. stroke 10mm
Max. Gripping force 22N
Motor size 25 □

Large size
EDQ 42


Max. stroke 14mm
Max. Gripping force 102N
Motor size 42 □

Electric Slide Table

P.47
Small size
EDX 16


Max. stroke 100mm
Max. thrust 466N/233N
Motor size 25 □

Electric Slide Table/Open-loop

P.23
Small size
EDK 25


Strokes 25, 50, 75, 100mm
Max. thrust 20N
Motor size 25 (PM)

Large size
EDK 36

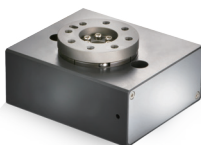

Strokes 25, 50, 75, 100mm
Max. thrust 60N
Motor size 36 (PM)

Electric Actuator

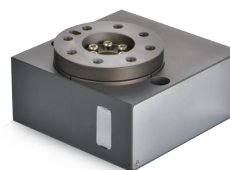
P.59
Small size
EQX 10


Max. stroke 100mm
Position repeatability $\pm 0.02\text{mm}$
Motor size 25 □

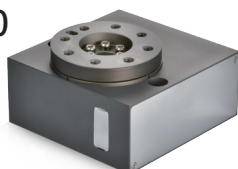
Electric Rotary Table

P.71
Small size
ETB 10


Max. angles 330°
Max. load 10N
Motor size 20 □

Large size
ETB 50


Max. angles 330°
Max. load 150N
Motor size 42 □

Middle size
ETB 30


Max. angles 330°
Max. load 50N
Motor size 25 □

P-SERVO Closed-loop stepping motor servo system

P.83
Small size


Voltage 24V DC
Rated Current 4A
Close Loop Driver

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EDG series 2-Finger Electric Gripper

EDG20/EDG25/EDG35/EDG42

Speed

Fast **157mm/s**

62.8~157mm/s

Weight

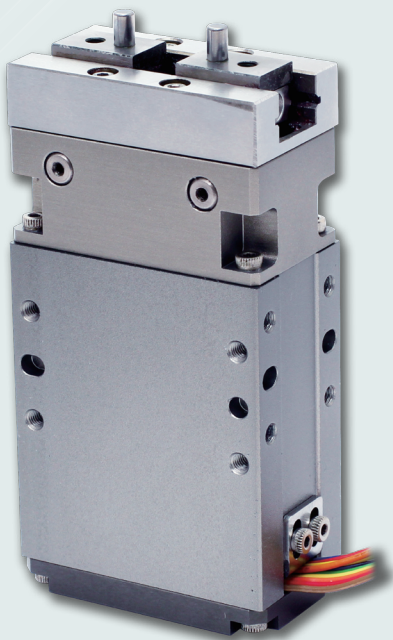
Light **0.3kg**

0.3~1.4kg

Gripping
force

Strong **220N**

14~220N



Aluminum shell
Large heat dissipation

Close-loop motor
Feedback signal

Worm

Self-lock mechanism

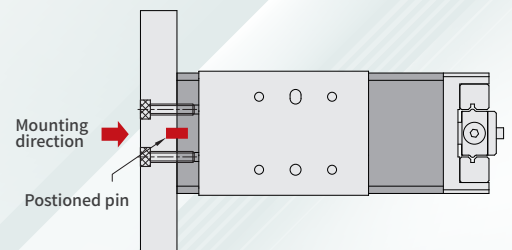
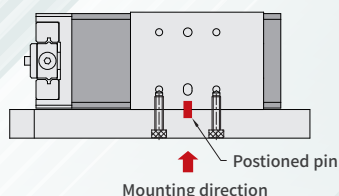
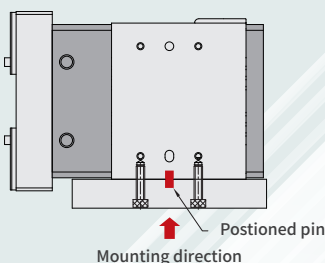
Worm gear

Force endurance during start and stop

High precision roller slide

Repeating accuracy **± 0.02 mm**

Multiple mounting way



EDG series 2-Finger Electric Gripper

EDG20/EDG25/EDG35/EDG42

Small size

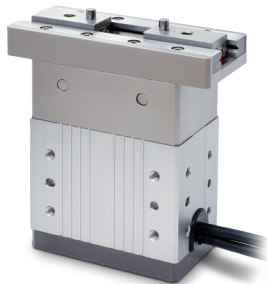
EDG 20



Max. stroke 8mm
Max. gripping force 14N
Motor size 20 □

Middle size

EDG 25



Max. stroke 14mm
Max. gripping force 80N
Motor size 25 □

Large size

EDG 35



Max. stroke 22mm
Max. gripping force 140N
Motor size 35 □

Large size

EDG 42



Max. stroke 30mm
Max. gripping force 220N
Motor size 42 □

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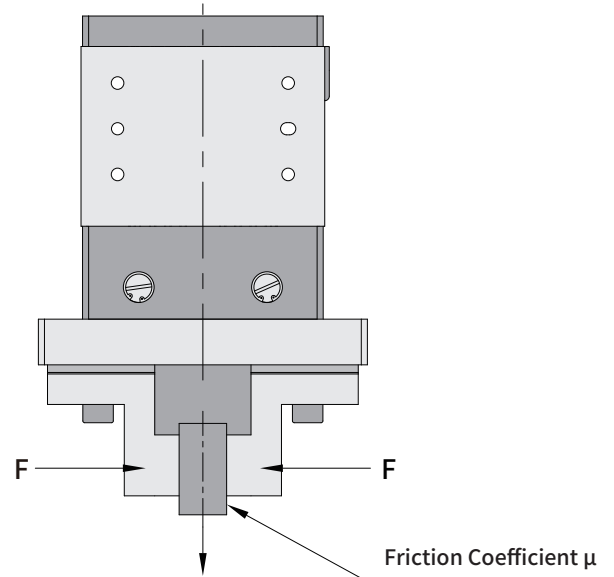
P-SERVO

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Gripper Specifications

■ Gripper (EDG, EDF) is used in combination with jig for opening object.

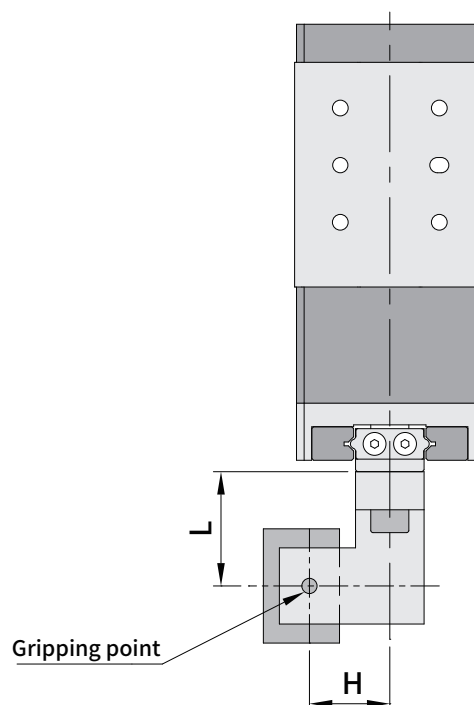
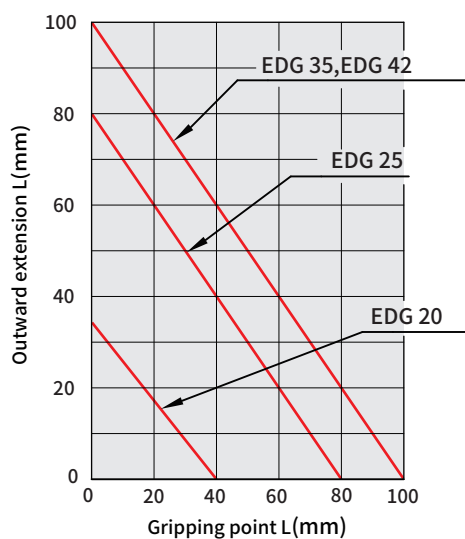
1. Verify actual gripping force
2. Verify gripping point
3. Verify external force exerted on the Gripper



If safety factor is a, then F is:

$$F > \frac{mg}{\mu} \times 2 \text{ (safety value)}$$

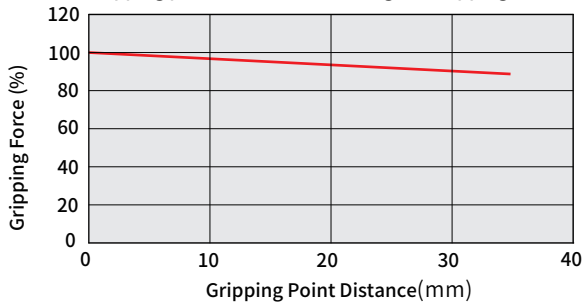
- F: Gripping force (N)
- μ: Friction coefficient between accessory and workpiece
- m: Mass of workpiece
- g: Acceleration of gravity (=9.8m/s²)
- mg: Weight of workpiece



Gripper Specifications

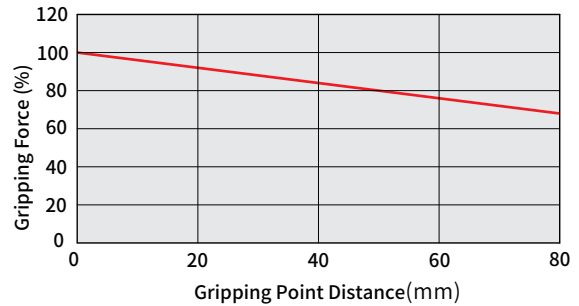
EDG 20

Gripping point distance and change of Gripping force



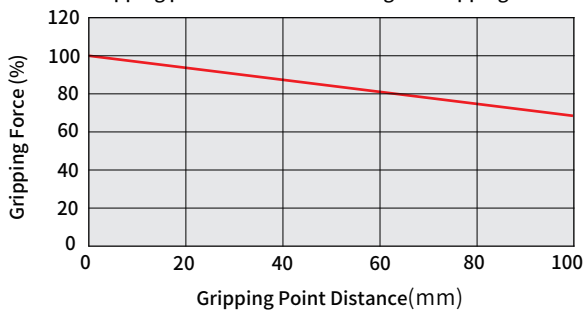
EDG 25

Gripping point distance and change of Gripping force



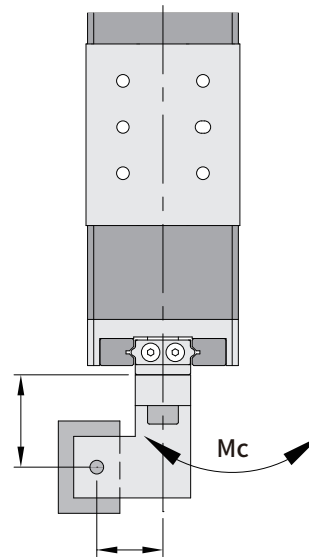
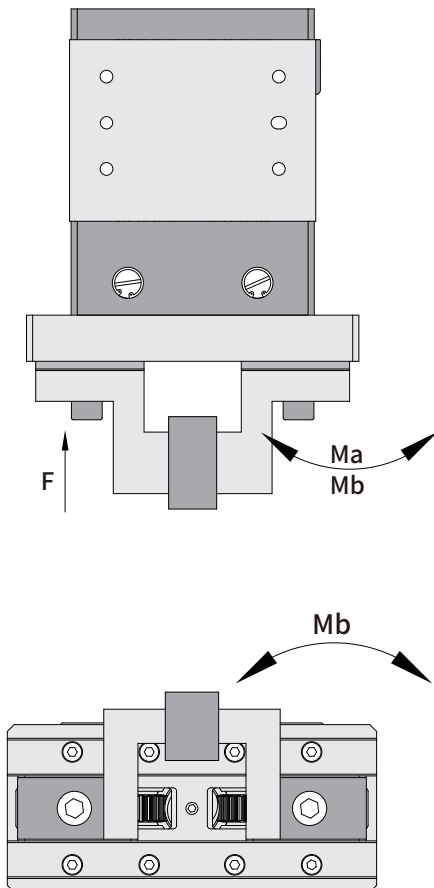
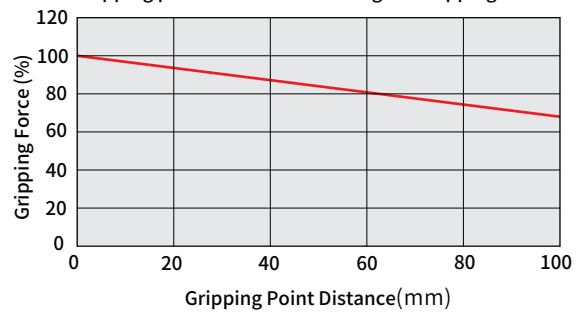
EDG 35

Gripping point distance and change of Gripping force



EDG 42

Gripping point distance and change of Gripping force



Spec	Allowable Vertical Load F (N)	Max. Allowable Loading Moment (Nm)		
		Ma	Mb	Mc
EDG 20	60	0.5	0.5	1.5
EDG 25	356	1.9	2.7	4.6
EDG 35	558	3.8	5.5	9.5
EDG 42	651	5.1	7.2	12.4

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Sequence of Model Selection

Seq 1 Confirm the gripping force → **Seq 2** Confirm the gripping point and outward extension → **Seq 3** Confirm the external fore implied on the gripper

Seq 1 Confirm the gripping force

Conditions Confirmed → The gripping force is therefore calculated by → Choose the model through the gripping force chart → Selection of Touch Speed

Example

Mass of Workpiece: 0.2kg

• Model should be selected based on 10 to 20 times of the weight of the workpiece according to the diverse COFs and shapes of the annexes and workpieces.
※ For further details, please refer to the calculation of gripping force.

• Additionally, considering the acceleration and impact force when transporting workpiece, a SF must be established.

Ex. The required gripping force = $0.3\text{kg} \times 20 \times 9.8\text{m/s}^2 = 58.8\text{N}$
if the gripping force is set for at least 20 times the weight of the workpiece

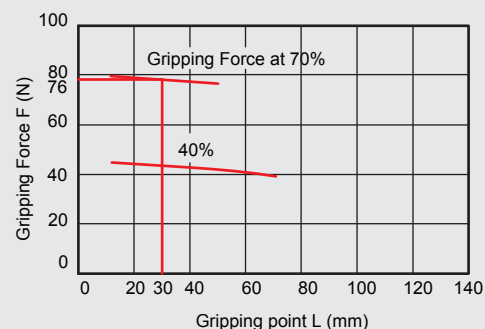
Gripping Force: 40%

Thrust force is an input value of the controller steposition information.

Distance of Gripping Point: 30mm

Gripping Speed: 30mm/sec

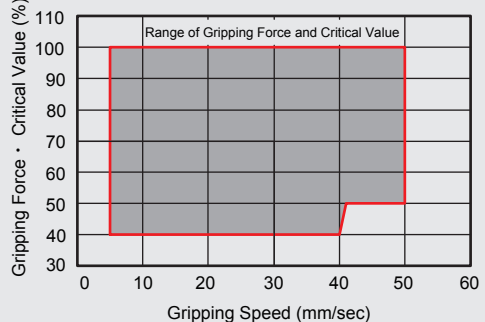
EDG 25



When choosing EDG 25 Series

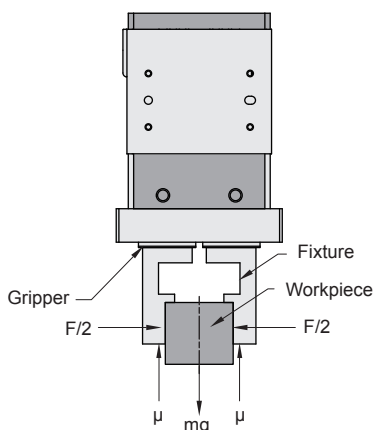
- From the distance of the gripping point $L=30\text{mm}$, and the intersection point positioned at 70% of the thrust force, we can learn that the gripping force is 27N.
- The gripping force is 27.6 times of the weight of the workpiece, which satisfies the required setup of gripping force for 20 times above.

EDG 25



- According to the intersection of 70% of the gripping force and 30mm/sec of the gripping speed, the latter is thereby judged to meet the requirement.
- Confirm the range of gripping speed based on the specified gripping force (%).

■ The gripping force is therefore calculated by



Gripping a workpiece, as shown in the left figure

F : Gripping Force (N)
 μ : COF between Annex and Workpiece
 m : Mass of Workpiece (kg)
 g : Acceleration of Gravity ($=9.8\text{m/s}^2$)
 mg : Weight of Workpiece (N)

The condition of that the workpiece does not fall is $F\mu > mg$;

$$\text{Hence } F > \frac{mg}{\mu}$$

Provided SF is a, then F is

$$F = \frac{mg}{\mu} \times a$$

About "10 to 20 Times above the Weight of Workpiece"

The data "10 to 20 Times above the Weight of Workpiece" recommended by the Company is calculated through the impact force during transport when $SF=4$.

$\mu = 0.2$	$\mu = 0.1$
$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$

10 Times of the Weight of Workpiece

20 Times of the Weight of Workpiece

<Reference>COF μ (variable depending on different usage environments or surface pressure)

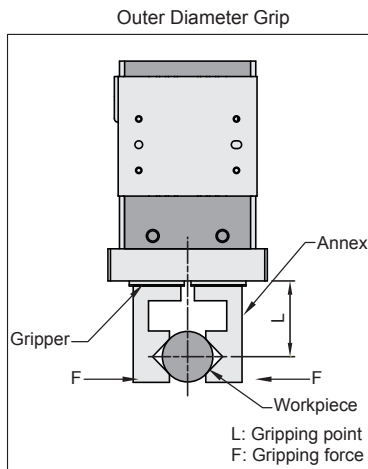
COF μ	Material Quality of Annex and Workpiece (standard)
0.1	Metal (surface roughness R_z is under 3.2)
0.2	Metal
Above 0.2	Rubber, Resin, etc.

- When the COF μ is higher than 0.2, please select the model of which the weight is 10 times to 20 times of the workpiece for safety concern.
- Considering the larger acceleration and impact force when transporting the workpiece, it is necessary to increase the SF.

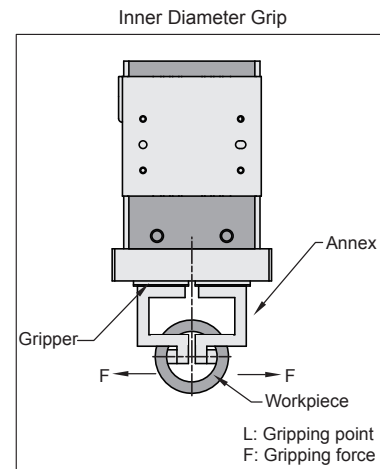
Sequence of Model Selection

• Demonstration of Gripping Force

The figure below shows the gripping force is applied by the complete touch by the two grippers, annex and workpiece, which is represented by F.

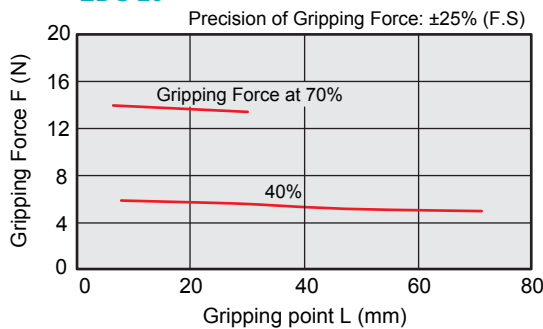


• Working Position of Grip: L; please perform it within the range designated in the figure below.

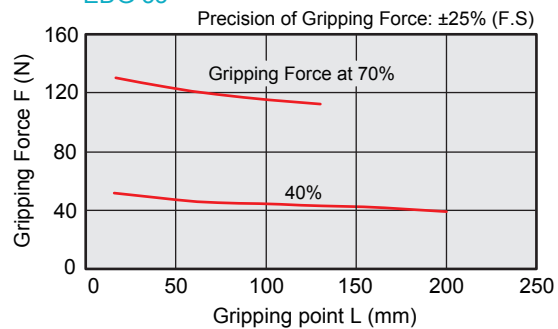


• Curve Graph of Gripping Force and Gripping Point

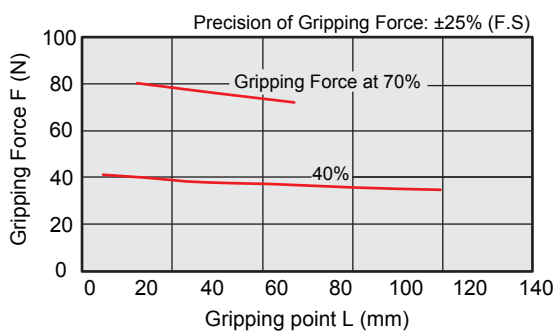
EDG 20



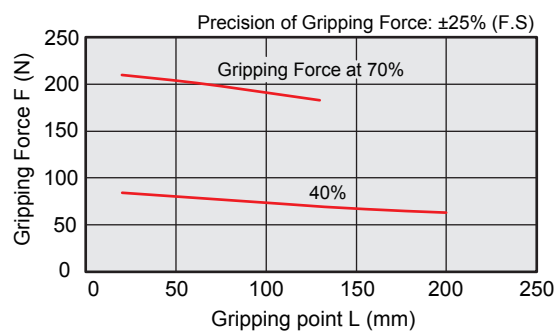
EDG 35



EDG 25



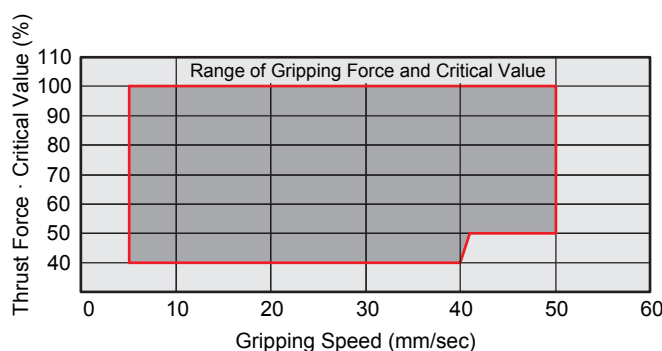
EDG 42



• Gripping force is an input vale of the drive information.

Setup of Gripping Speed

- Please use the fundamental model within the range designated in the figure below when setting the gripping force and critical value.

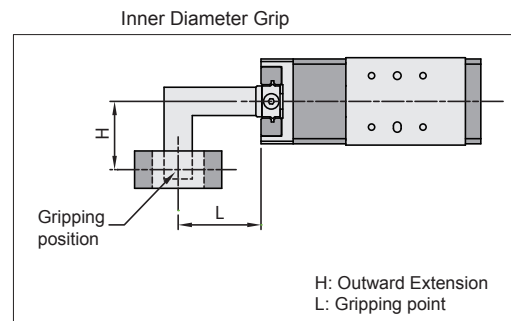
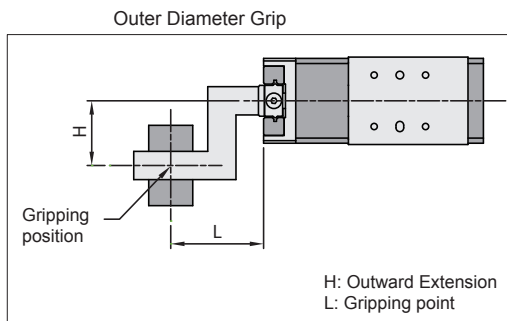


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Sequence of Model Selection

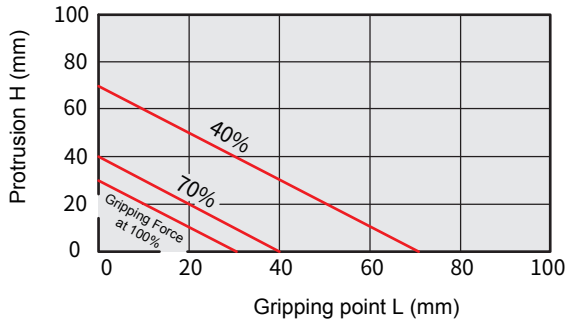
Seq 2 Confirmation of Gripping Point and Outward Extension

- Gripping Position and Outward Extension of Workpiece: H - please perform it within the range designated in the figure below.
- If the gripping position exceeds the range of limitation, the service life of the electric gripper will be impacted.

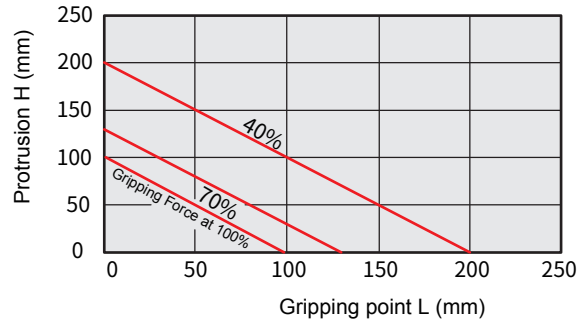


Basic Type · Thrust force is an input value of the controller step position information.

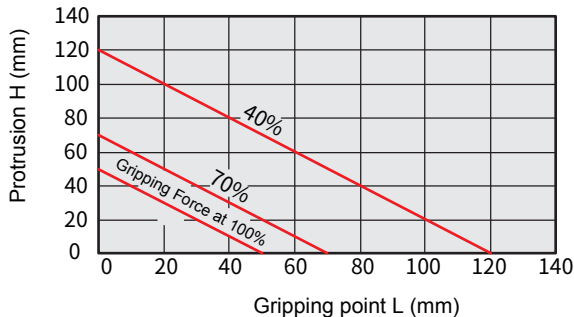
EDG 20



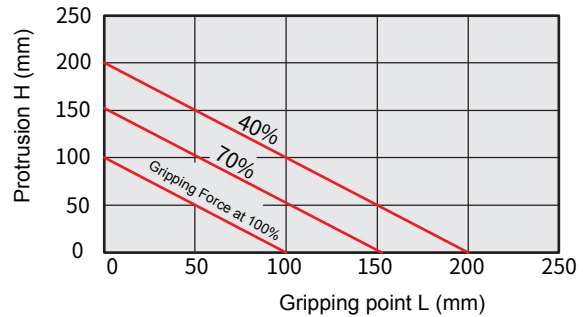
EDG 35



EDG 25

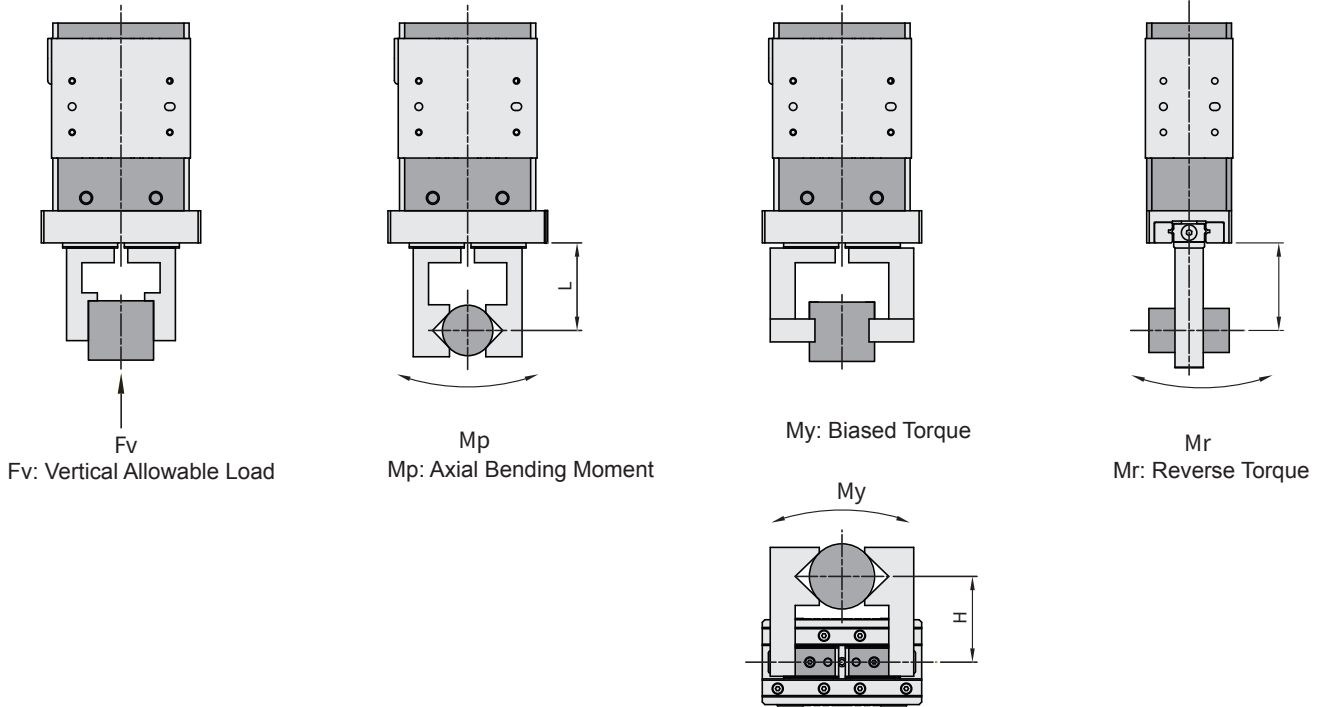


EDG 42



Sequence of Model Selection

Seq 3 Confirm the utmost external force used in the fingers



Calculation of Allowable External Force (when bearing load torque)	Example
$\text{Allowable Load } F \text{ (N)} = \frac{M \text{ (Allowable Static Torque) (N} \cdot \text{m)}}{L \times 10^{-3}}$ *Definite Number of Conversion of Units	The axial bending moment generated by the static load at $f=10\text{N}$ when the guide rail of EDG20 is reaching $L=30\text{mm}$ can be used. $\text{Allowable Load } F = \frac{0.68}{30 \times 10^{-3}} = 22.7\text{(N)}$ Load $f = 10\text{(N)} < 22.7\text{(N)}$

Model	Vertical Load Fv (N)	Allowable Static Torque		
		Axial Bending Moment: Mp (N·m)	Biased Torque: My (N·m)	Reverse Torque: Mr(N·m)
EDG 20	60	0.5	0.5	1.5
EDG 25	356	1.9	2.7	4.6
EDG 35	558	3.8	5.5	9.5
EDG 42	651	5.1	7.2	12.4

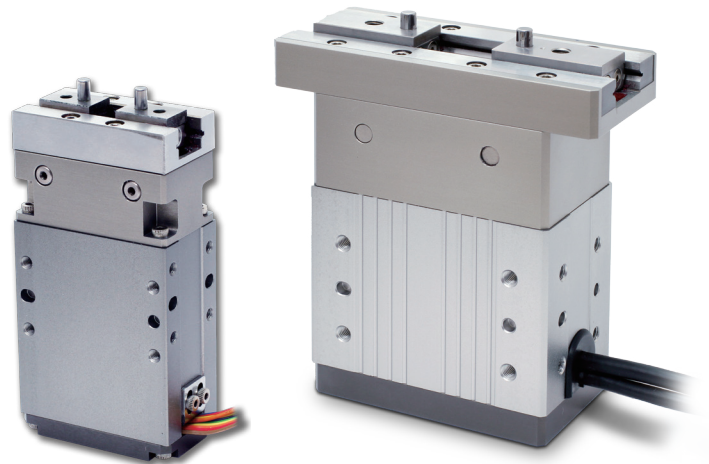
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EDG series 2-Finger Electric Gripper

Feature, Specification and Code of Order

Feature:

- Worm Gear Drive
- Signal and Feedback
- High Precision



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Gripping force	Gripper stroke	Max speed	Actuation type	Ambient and fluid temperature	Operating humidity range	Motor size	Position repeatability	Finger backlash (one side)	Idling stroke (one side)	Weight	
		(N)	(mm)	(mm/s)		(°C)	(%)		(mm)	(mm)	(mm)	(kg)	
General environment	EDG 20	14	8	62.8	Worm + Double-helical + Helical rack gears	5 ~ 40	35 ~ 85	20 □	±0.02	0.2	0.05	0.3	
	EDG 25	80	14	78.5				25 □		0.3	0.15	0.5	
	EDG 35	140	22	125				35 □		0.4		1.0	
	EDG 42	220	30	157				42 □				1.4	

Remark 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

EDG - 20 - 03 - P

①	Mark	Type	②	Mark	Wire length	③	Mark	Actuator
	20	20		01	1 m		P	P-Servo
	25	25		03	3 m			
	35	35		05	5 m			
	42	42		10	10 m			

* Standard: 3M

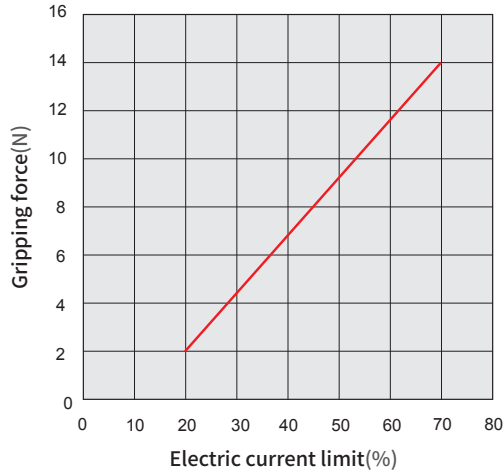
* Standard component Refer to page 83

EDG series 2-Finger Electric Gripper

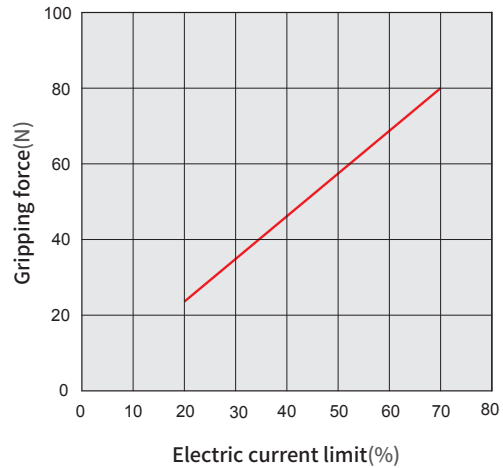
Gripping force-current value graph, Side mounting , Bottom mounting

Gripping force-current value graph

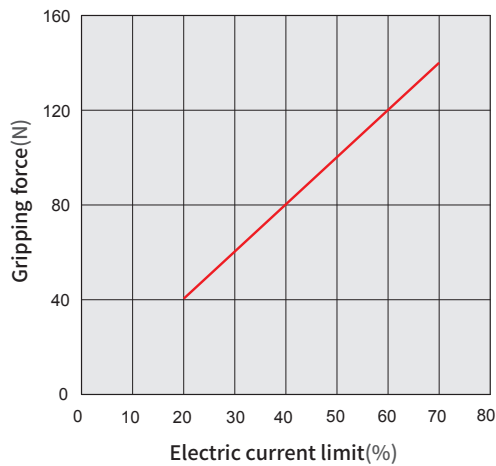
EDG20



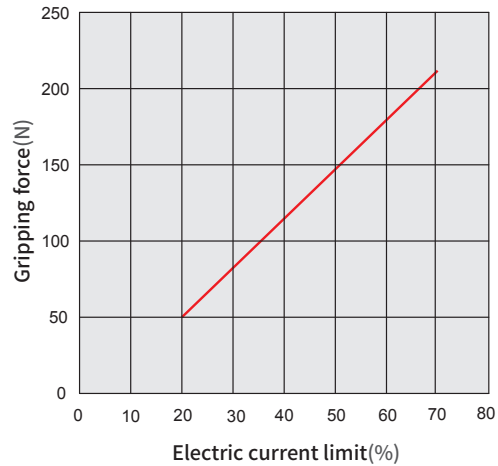
EDG25



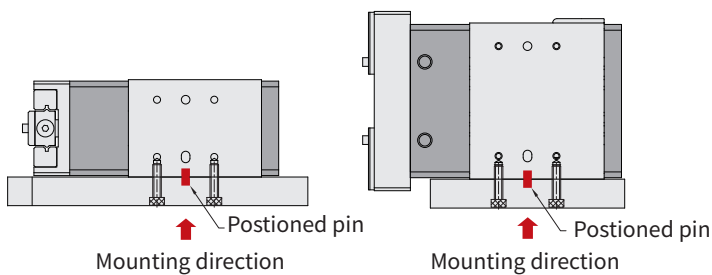
EDG35



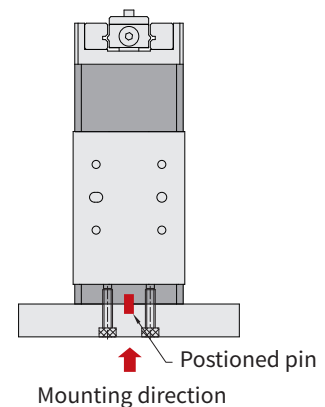
EDG42



Side mounting



Bottom mounting

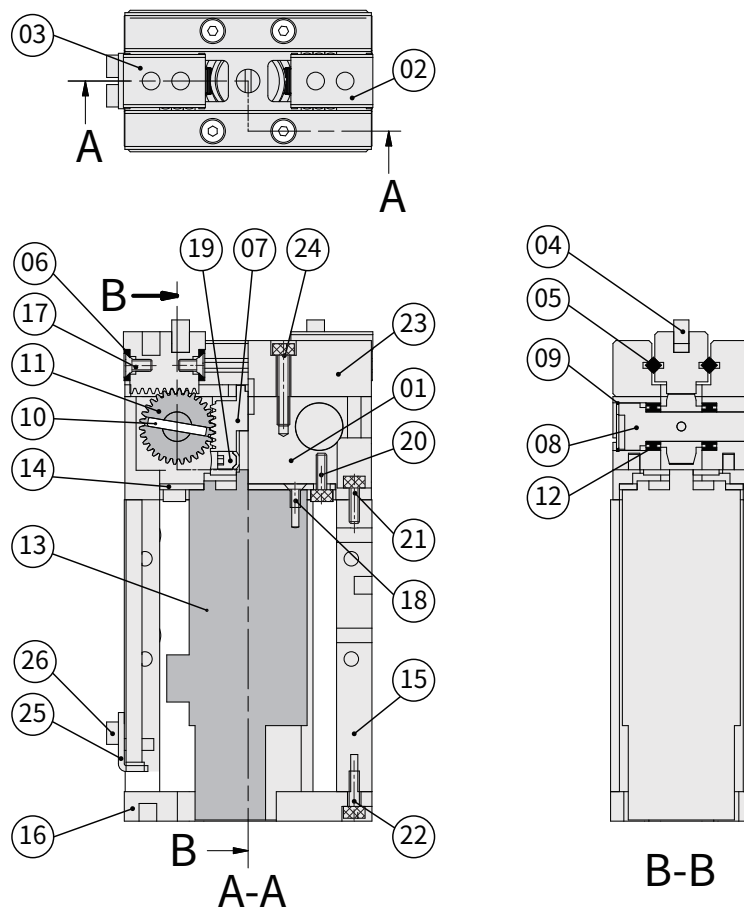


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EDG series 2-Finger Electric Gripper

Internal structure, Components and Material list

EDG20



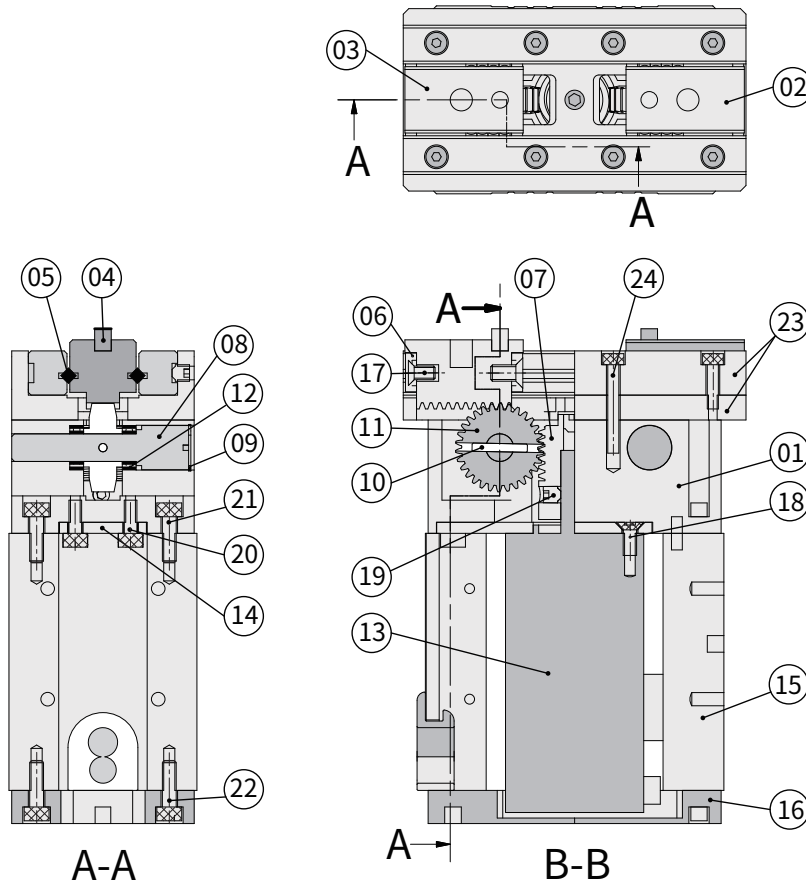
Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	14	Motor Adapter Plate	Aluminum alloy
02	Finger	Stainless	15	Shell	Aluminum alloy
03	Finger	Stainless	16	Base	Aluminum alloy
04	Finger Plate Fixing Pin	-	17	Ball Stop Fixing Screw	Alloy steel
05	Finger Plate Roller	-	18	Motor Fixing Screw	Alloy steel
06	Roller block	Stainless	19	Motor Set Screw	Alloy steel
07	Worm gear	Stainless	20	Adapter Plate Fixing Screw	Alloy steel
08	Shaft	Stainless	21	Body Fixing Screw	Alloy steel
09	Shaft Clip Ring	-	22	Bottom Plate Fixing Screw	Alloy steel
10	Shaft Spring Pin	-	23	Finger Plate Holder	Stainless
11	Close-loop Motor	POM	24	Finger Plate Holder Fixing Screw	Alloy steel
12	Axial Bearing	Bearing steel	25	Wire Cover Plate	Stainless
13	Gear shaft	Customized	26	Wire Cover Plate Fixing Screw	Alloy steel

EDG series 2-Finger Electric Gripper

Internal structure, Components and Material list

EDG25, EDG35, EDG42



Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	13	Close-loop Motor	Customized
02	Finger	Stainless	14	Motor Adapter Plate	Aluminum alloy
03	Finger	Stainless	15	Shell	Aluminum alloy
04	Finger Plate Fixing Pin	-	16	Base	Aluminum alloy
05	Finger Plate Roller	-	17	Ball Stop Fixing Screw	Alloy steel
06	Roller block	Stainless	18	Motor Fixing Screw	Alloy steel
07	Ball screw	Stainless	19	Motor Set Screw	Alloy steel
08	Shaft	Stainless	20	Adapter Plate Fixing Screw	Alloy steel
09	Shaft Clip Ring	-	21	Body Fixing Screw	Alloy steel
10	Shaft Spring Pin	-	22	Bottom Plate Fixing Screw	Alloy steel
11	Gear shaft	POM	23	Finger Plate Holder	Stainless
12	Radial bearing	Bearing steel	24	Finger Plate Holder Fixing Screw	Alloy steel

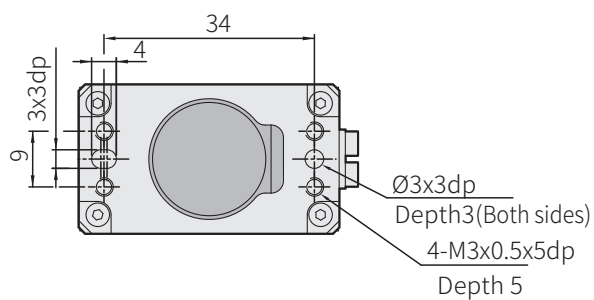
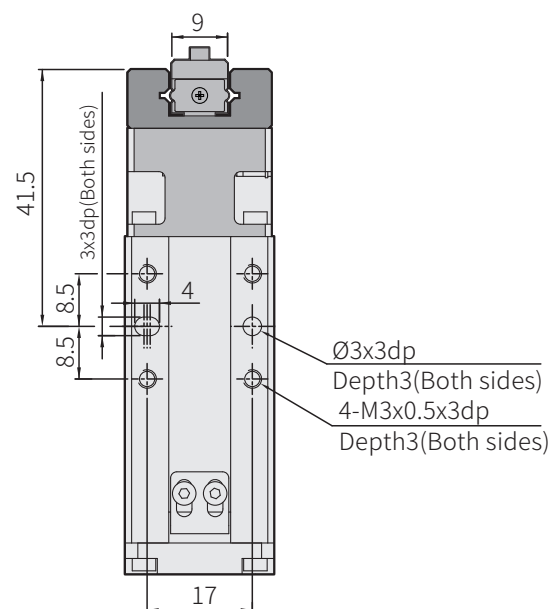
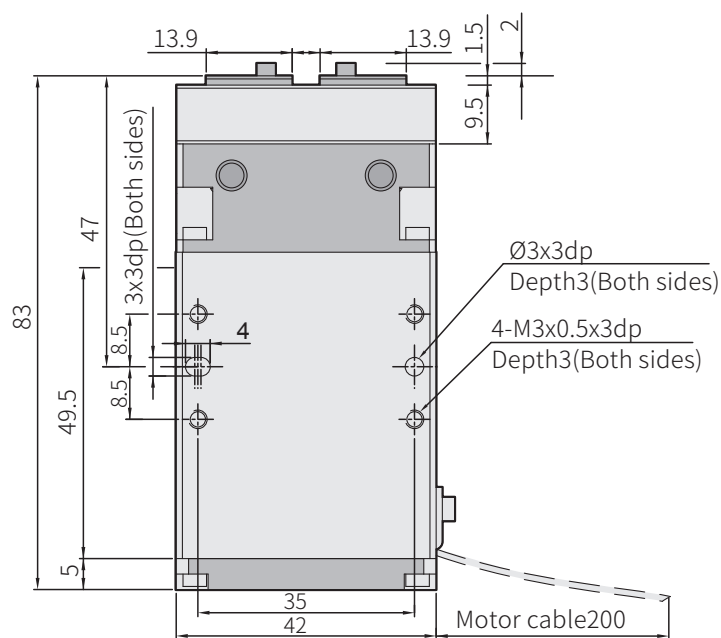
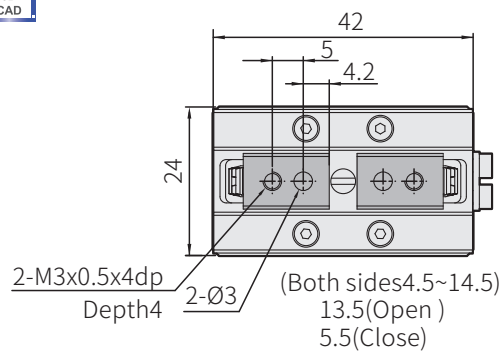
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EDG series 2-Finger Electric Gripper

External dimensions

■ EDG20

Unit:mm

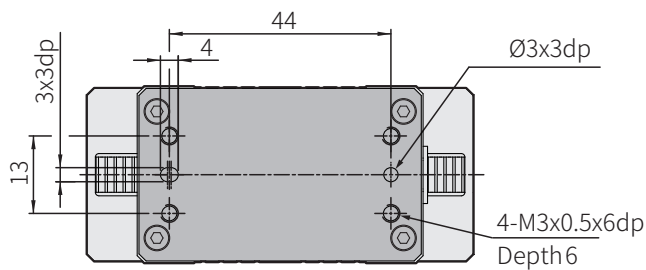
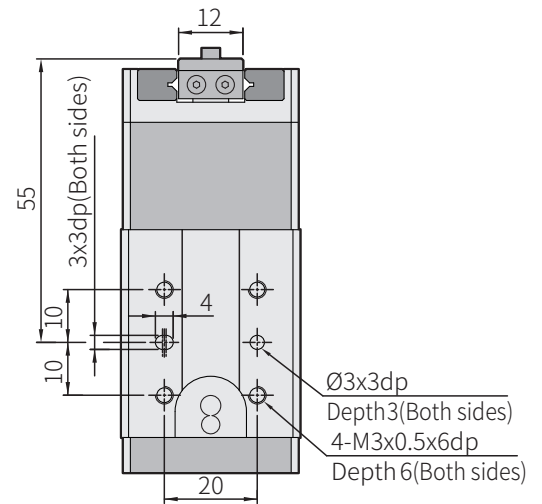
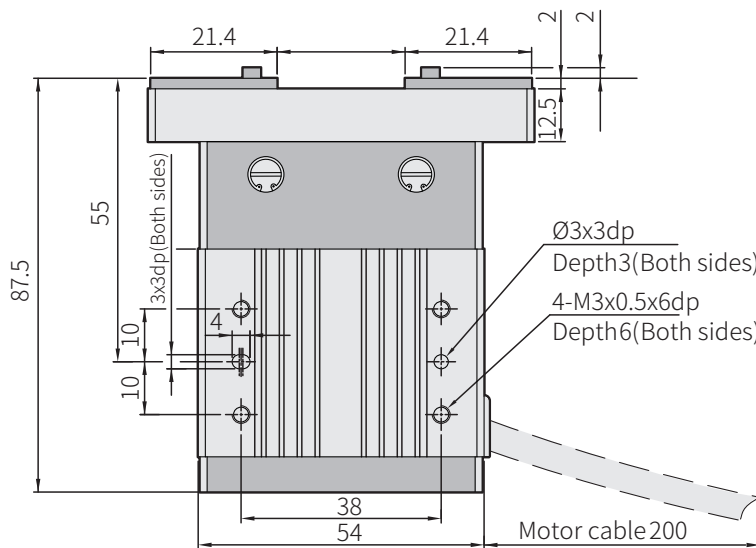
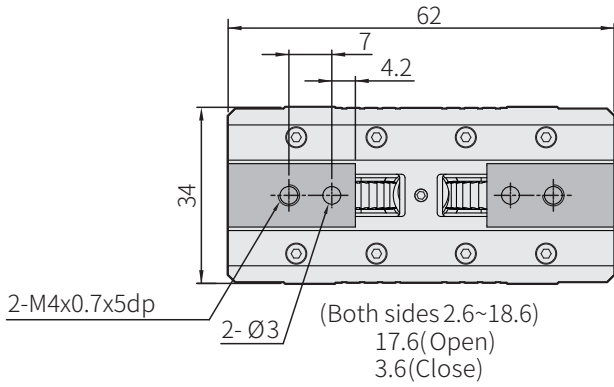


EDG series 2-Finger Electric Gripper

External dimensions

EDG25

Unit:mm



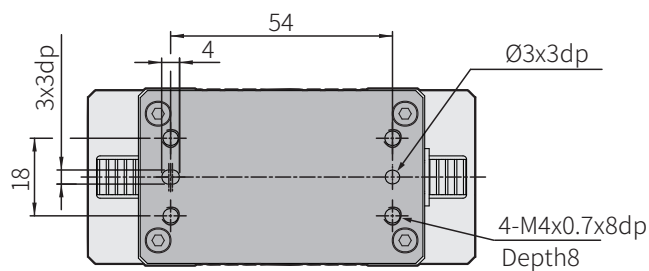
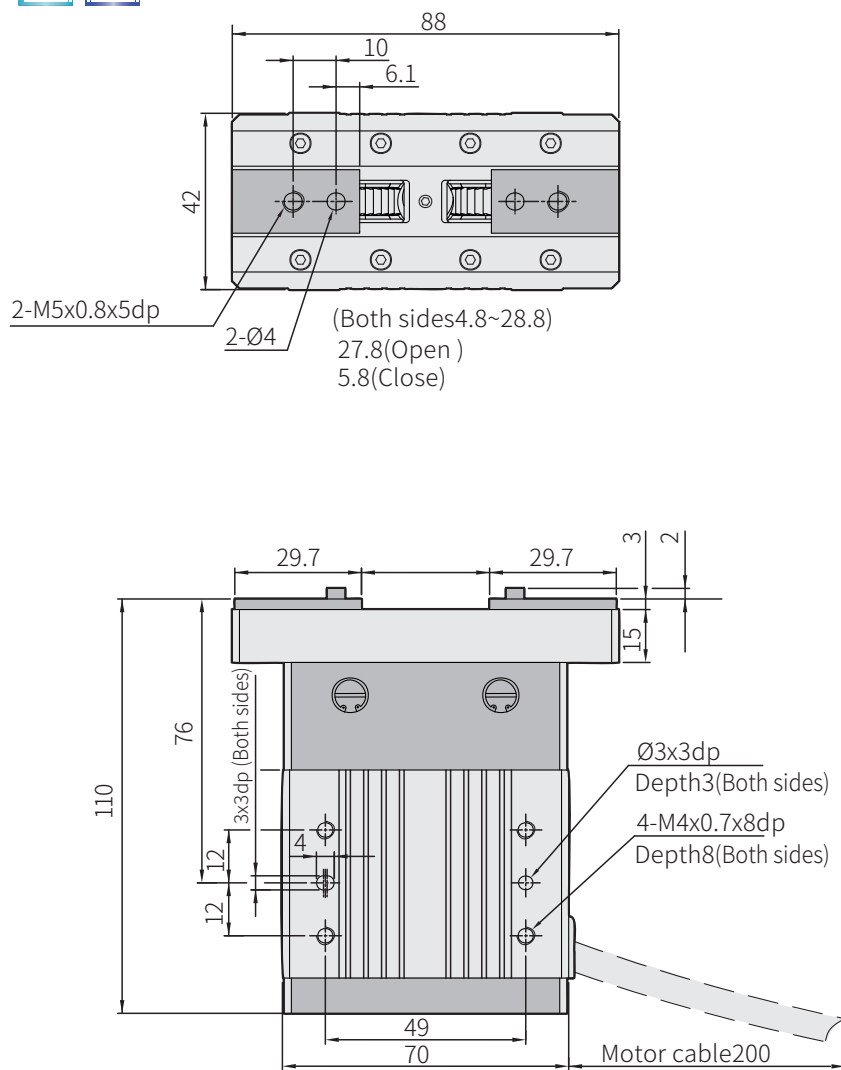
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EDG series 2-Finger Electric Gripper

External dimensions

EDG35

Unit:mm

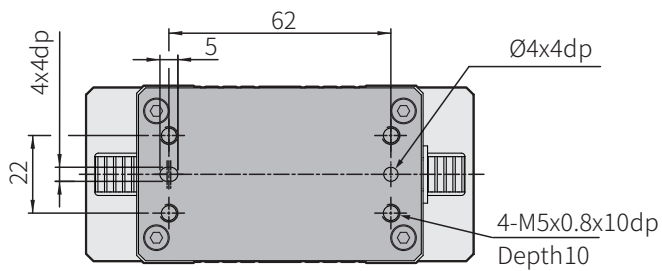
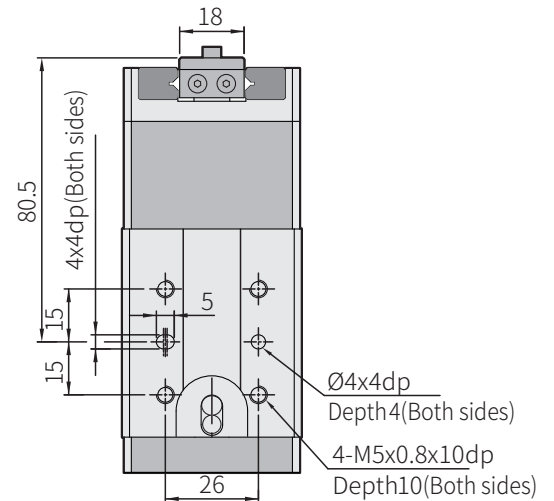
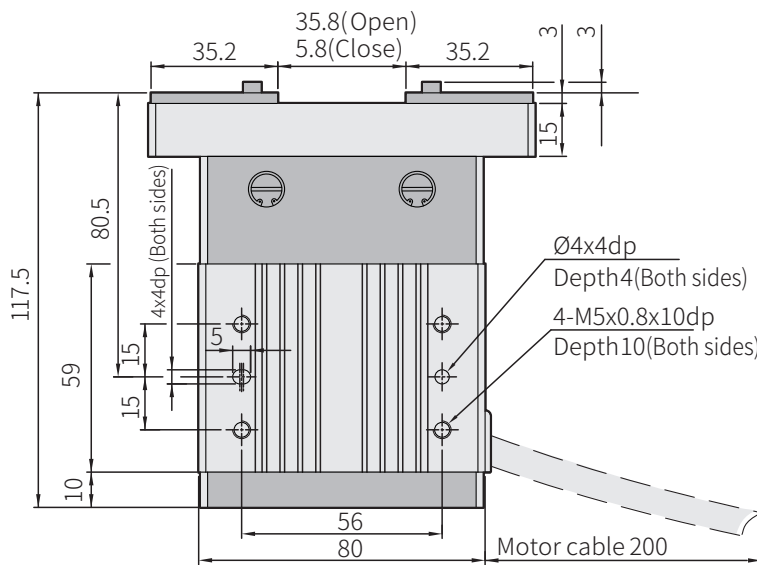
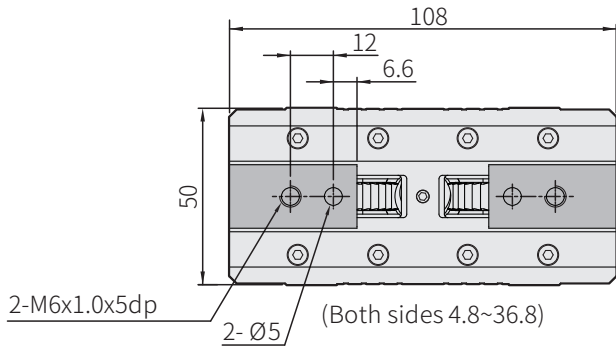


EDG series 2-Finger Electric Gripper

External dimensions

EDG42

Unit:mm



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EDF series 2-Finger Electric Gripper /Long Stroke

EDF20/EDF32

Longer stroke

24, 32, 48, 64 mm

64 mm

Light weight

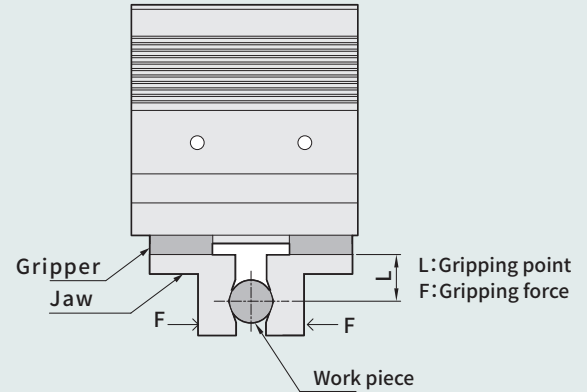
0.5, 0.8, 1.6, 2.0kg

0.5 kg

High gripping force

46, 142N

142 N



1

Aluminum shell

Large heat dissipation

2

Close-loop motor

Feedback signal

3

High precision roller slide

Repeating accuracy $\pm 0.05\text{mm}$

4

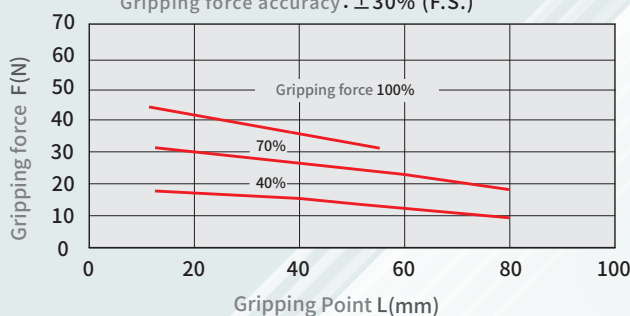
Worm, Worm gear

Self-lock mechanism

Force endurance during start and stop

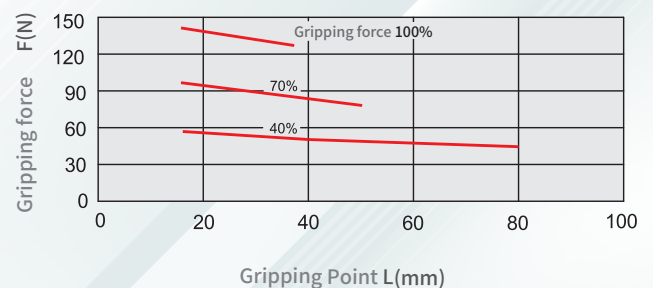
EDF 20

Gripping force accuracy: $\pm 30\%$ (F.S.)



EDF 32

Gripping force accuracy: $\pm 30\%$ (F.S.)



EDF series 2-Finger Electric Gripper /Long Stroke

EDF20/EDF32

Small size

EDF 20



Gripping force 46N

Open/close speed(mm/s) 0~50mm/s

Motor size 25 □

Middle size

EDF 32



Gripping force 142N

Open/close speed(mm/s) 0~50mm/s

Motor size 42 □

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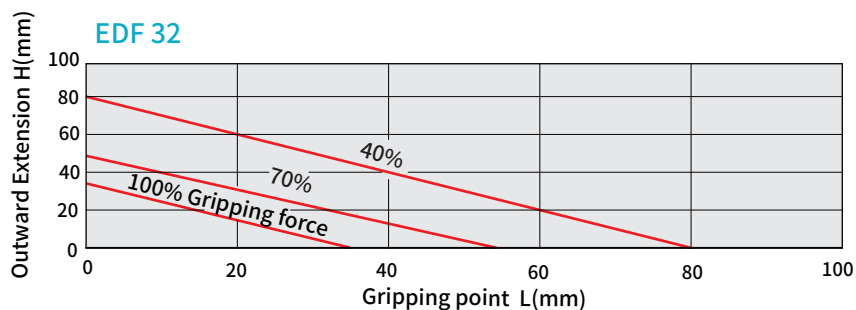
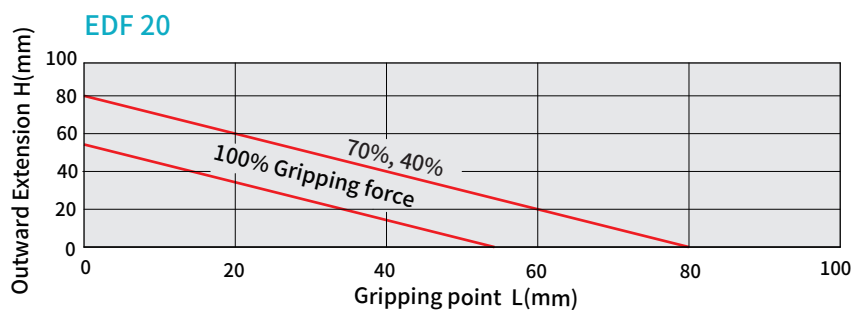
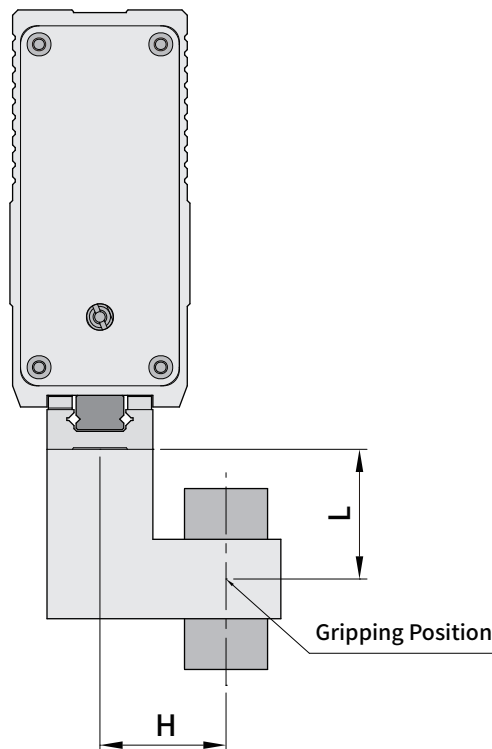
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Gripping point-Outward Extension graph



- 1) Gripping Position and Outward Extension of Workpiece:H - please perform it within the range designated in the figure below.
- 2) If the gripping position exceeds the range of limitation, the lifetime of electric gripper will be impacted.

Sequence of Model Selection

Seq 1 Confirm the gripping force → Seq 2 Confirm the gripping point and outward extension → Seq 3 Confirm the external force applied on the rotary gripper

Seq 1 Confirm the gripping force

Conditions Confirmed → The gripping force is therefore calculated by → Choose the model through the gripping force chart → Selection of Touch Speed

Example

Mass of Workpiece: 0.1kg

• Model should be selected based on 10 to 20 times of the weight of the workpiece according to the diverse COFs and shapes of the annexes and workpieces.
※ For further details, please refer to the description chart of model selection.

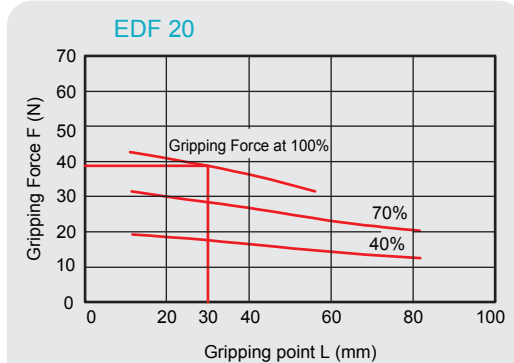
• Additionally, considering the acceleration and impact force when transporting the workpiece, an SF must be established.

Ex. The required gripping force = $0.1\text{kg} \times 20 \times 9.8\text{m/s}^2 \div 19.2\text{N}$ at least, if the gripping force is set for above 20 times the weight of the workpiece.

Thrust Force: 100%

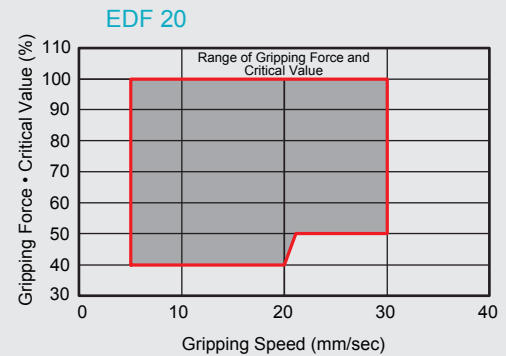
Distance of Gripping Point: 30mm

Gripping Speed: 20mm/sec



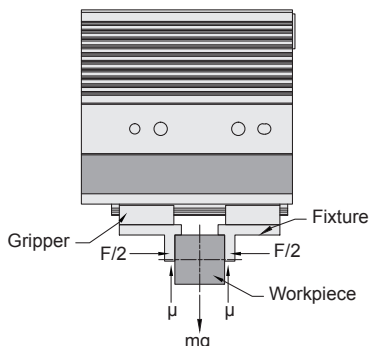
When choosing EDG 20 Series

- From the distance of the gripping point L=30mm, and the intersection point positioned at 100% of the thrust force we can learn that the gripping force is 38.7N.
- The gripping force is 38.7 times the weight of the workpiece, which satisfies the required setup of gripping force for 20 times above.



- According to the intersection of 100% of the gripping force and 20mm/sec of the gripping speed, the latter is thereby judged to meet the requirement.
- Confirm the range of gripping speed based on the specified gripping force (%).

■ The gripping force is therefore calculated by



Gripping a workpiece, as shown in the left figure

F : Gripping Force (N)
μ : COF between Annex and Workpiece
m : Mass of Workpiece (kg)
g : Acceleration of Gravity (=9.8m/s)
mg : Weight of Workpiece (N)

The condition of that the workpiece does not fall is $F\mu > mg$;

$$\text{Hence } F > \frac{mg}{\mu}$$

Provided SF is a, then F is

$$F = \frac{mg}{\mu} \times a$$

About "10 to 20 Times above the Weight of Workpiece"

The data "10 to 20 Times above the Weight of Workpiece" recommended by the Company is calculated through the impact force during transport when SF=4.

$\mu = 0.2$	$\mu = 0.1$
$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$

10 Times the Weight of Workpiece

20 Times the Weight of Workpiece

<Reference>COF μ (variable depending on different usage environments or surface pressure)

COF μ	Material Quality of Annex and Workpiece (standard)
0.1	Metal (surface roughness Rz is under 3.2)
0.2	Metal
Above 0.2	Rubber, Resin, etc.

- When the COF μ is higher than 0.2, please select the model of which the weight is 10 to 20 times that of the workpiece for safety concern.
- Considering the larger acceleration and impact force when transporting the workpiece, it is necessary to increase the SF.

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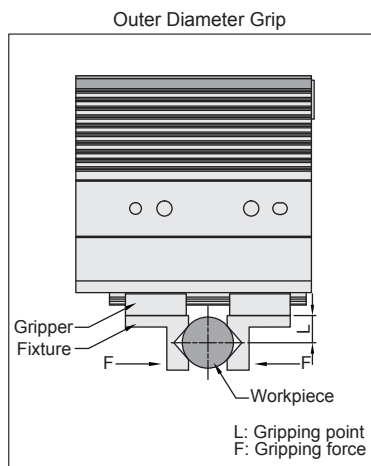
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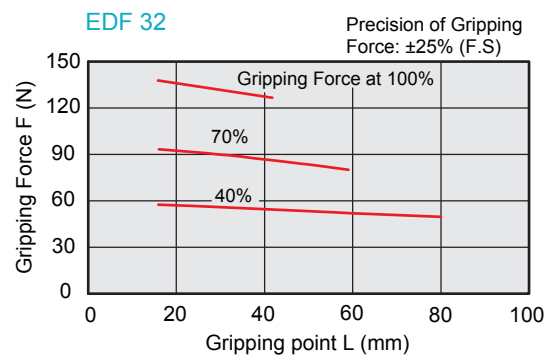
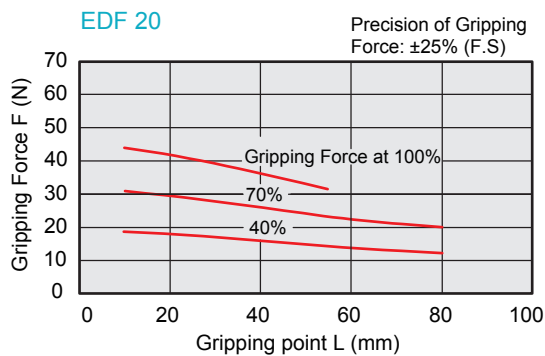
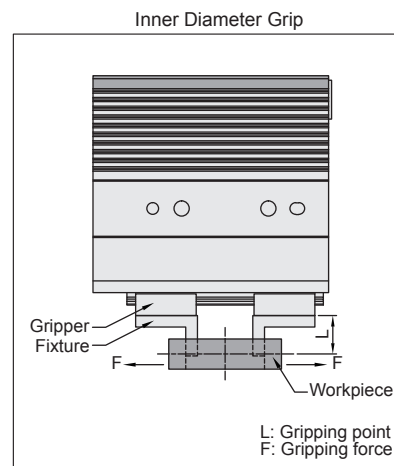
Seq 1 Confirm the gripping force

• Demonstration of Gripping Force

The figure below shows the gripping force is applied by the complete touch by the two grippers, annex and workpiece, which is represented by F.



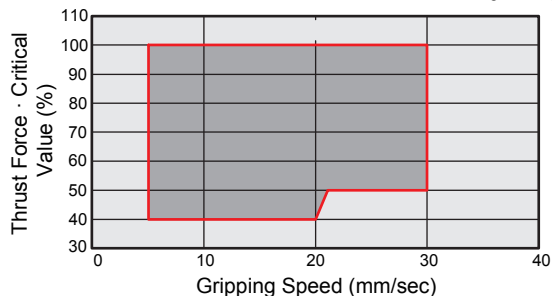
• Working Position of Grip L: please perform it within the range designated in the figure below.



• Selection of Gripping Speed

Please follow the range designated in the figure below to set the gripping force and critical value.

Range of Gripping Force and Critical Value

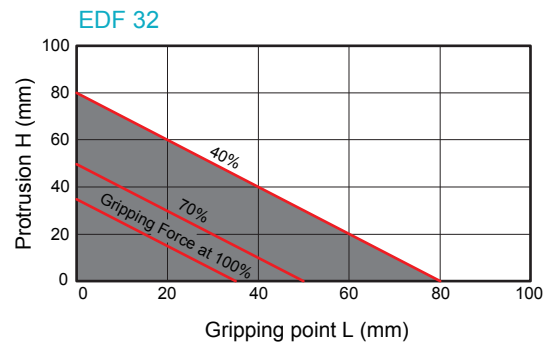
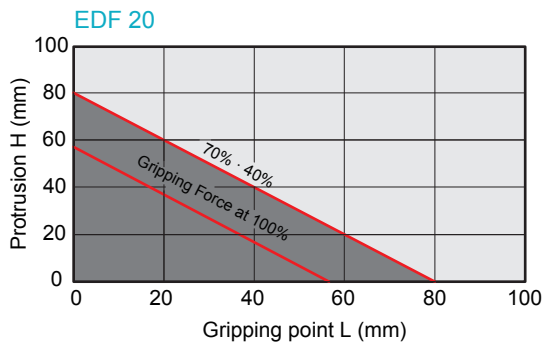
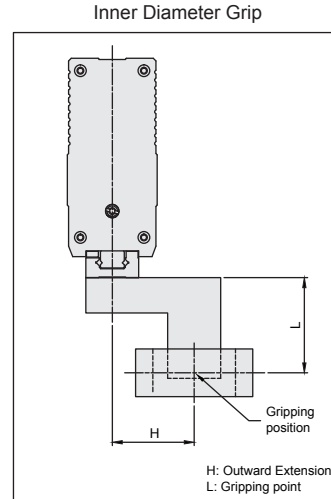
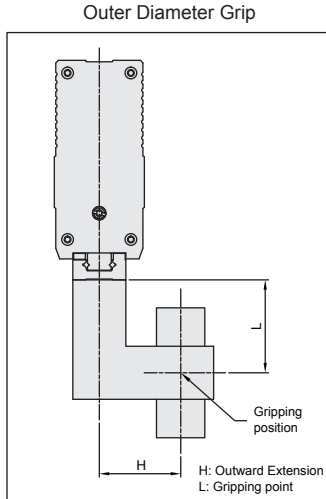


Sequence of Model Selection

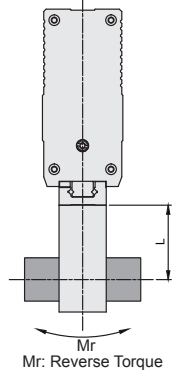
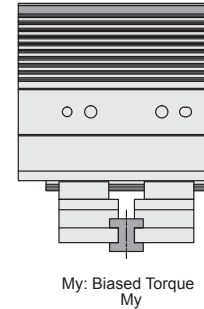
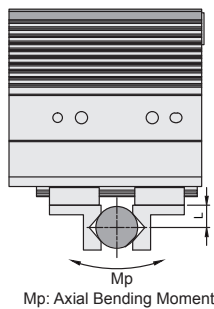
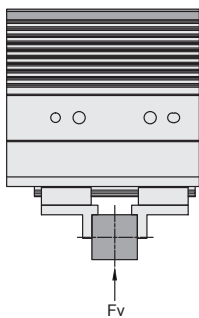
Seq 2 Confirmation of Gripping Point and Outward Extension

- Gripping Position and Outward Extension of Workpiece: H - please perform it within the range designated in the figure below.

- If the gripping position exceeds the range of limitation, the service life of electric gripper will be impacted.



Seq 3 Confirm the external force applied on the slider



Model	Vertical Load Fv (N)	Allowable Static Torque		
		Axial Bending Moment: Mp (N·m)	Biased Torque: My (N·m)	Reverse Torque: Mr (N·m)
EDF 20x□	98	0.68	0.68	1.4
EDF 32x□	176	1.4	1.4	2.8

Calculation of Allowable External Force (when bearing load torque)	Example
$\text{Allowable Load F (N)} = \frac{M (\text{Allowable Static Torque}) (\text{N} \cdot \text{m})}{L \times 10^{-3}}$ Definite Number of Conversion of Units	The axial bending moment generated by the static load at f=10N when the guide rail of EDF20 is reaching L=30mm Allowable Load F = $\frac{0.68}{30 \times 10^{-3}} = 22.7(\text{N})$ and the load f=10(N) < 22.7(N) can be used.

EDF series 2-Finger Electric Gripper /Long Stroke

Feature, Specification and Code of Order

Feature:

- Timing Belt Transmission
- Signal and Feedback
- High Precision



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Gripper stroke (mm)		Lead (mm)	Gripping force (N)	Open/close speed (mm/s)	Position repeatability (mm)	Drive mode	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Finger backlash/one side (mm)	Idling stroke (mm)	load (kg)
		Basic	Long stroke											
General environment	EDF 20	24	48	1	46	0 ~ 50	±0.05	Worm wheel+ Belt drive	5 ~ 40	35 ~ 85	25 □	0.5 or less	0.3 or less	0.6 (Basic) 0.8 (Long stroke)
	EDF 32	32	64	1.25	142						42 □			1.6 (Basic) 2.0 (Long stroke)

Remark 1. Idling stroke:Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.
If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Code of order

EDF - 20 - 24 - 03 - P

①

②

③

④

Mark	Type □
20	25
32	42

Stroke	Stroke
24	24
48	48
32	32
64	64

Mark	Wire length
01	1 m
03	3 m
05	5 m
10	10 m

* Standard: 3M

Mark	Actuator
P	P-Servo

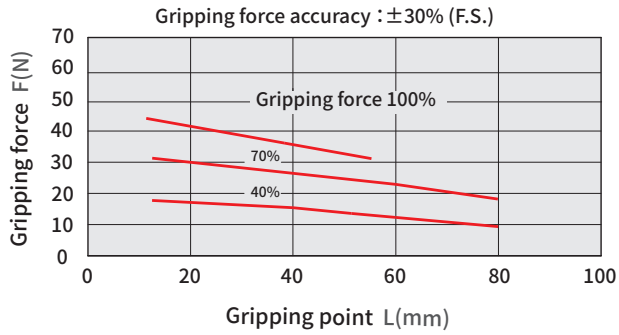
* Standard component Refer to page 83

EDF series 2-Finger Electric Gripper /Long Stroke

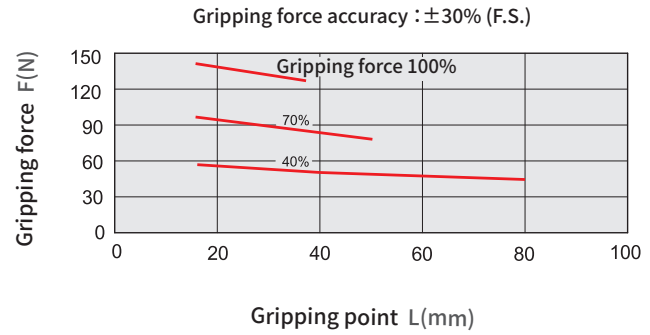
Gripping force-current value graph, Side mounting, Plate mounting, Bottom mounting

Gripping force-current value graph

EDF 20



EDF 32



Side mounting

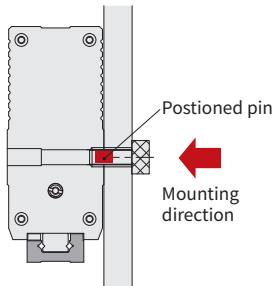
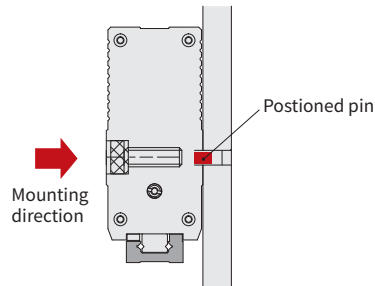
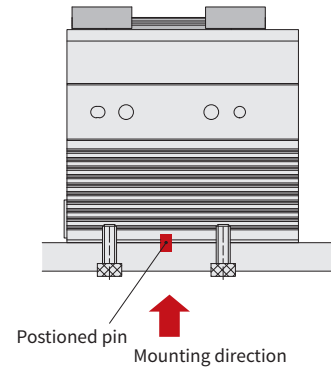


Plate mounting



Bottom mounting

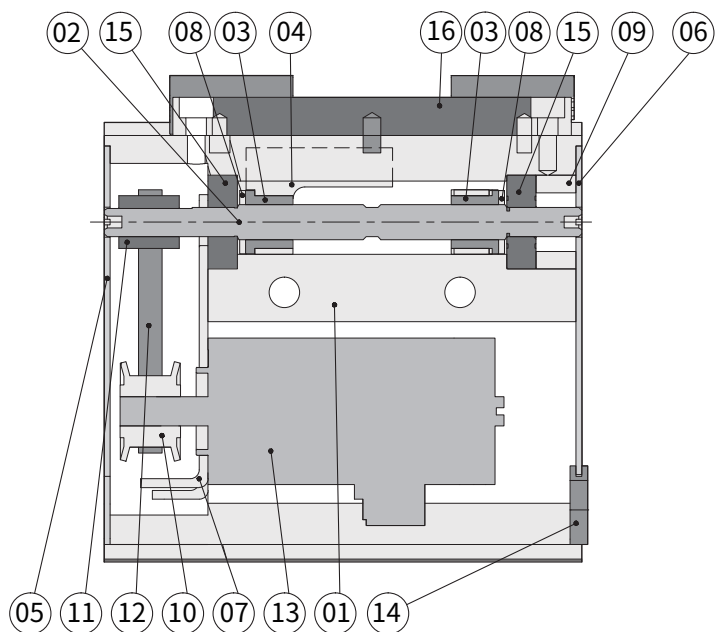


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EDF series 2-Finger Electric Gripper /Long Stroke

Internal structure, Components and Material list

EDF 20



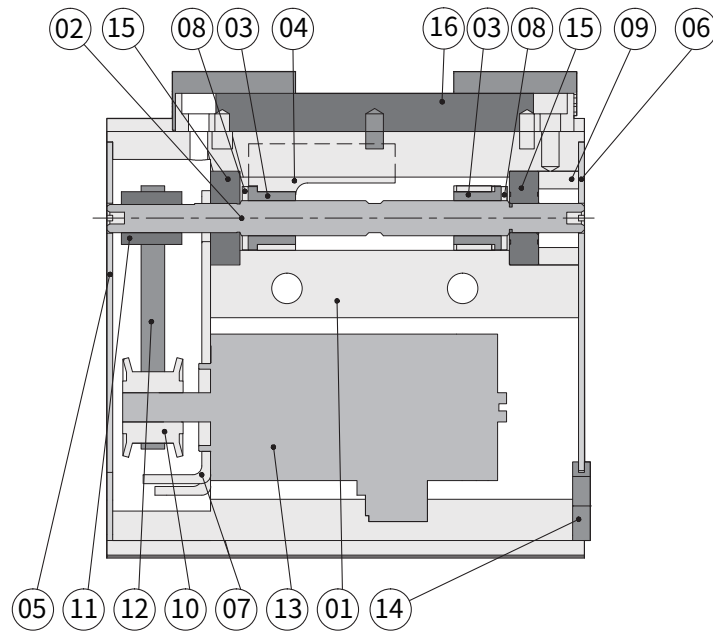
Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	09	Cushion	POM
02	Ball screw	Alloy steel	10	Timing belt pulley/5AF	Customized
03	Internal thread sleeve	Alloy steel	11	Timing belt pulley/5A	Customized
04	Action fixing block	Stainless	12	Timing belt	Customized
05	Stopper	Stainless	13	Closed loop motor	Customized
06	Cabel stopper	Stainless	14	Outlet rubber	Rubber
07	Motor fixing plate	Stainless	15	Bearing	Customized
08	Sleeve fixing piece	Stainless	16	Slider wirh slide base	Stainless

EDF series 2-Finger Electric Gripper /Long Stroke

Internal structure, Components and Material list

EDF 32



Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	09	Cushion	POM
02	Ball screw	Alloy steel	10	Timing belt pulley/5AF	Customized
03	Internal thread sleeve	Alloy steel	11	Timing belt pulley/5A	Customized
04	Action fixing block	Stainless	12	Timing belt	Customized
05	Stopper	Stainless	13	Closed loop motor	Customized
06	Cabel stopper	Stainless	14	Outlet rubber	Rubber
07	Motor fixing plate	Stainless	15	Bearing	Customized
08	Sleeve fixing piece	Stainless	16	Slider wirh slide base	Stainless

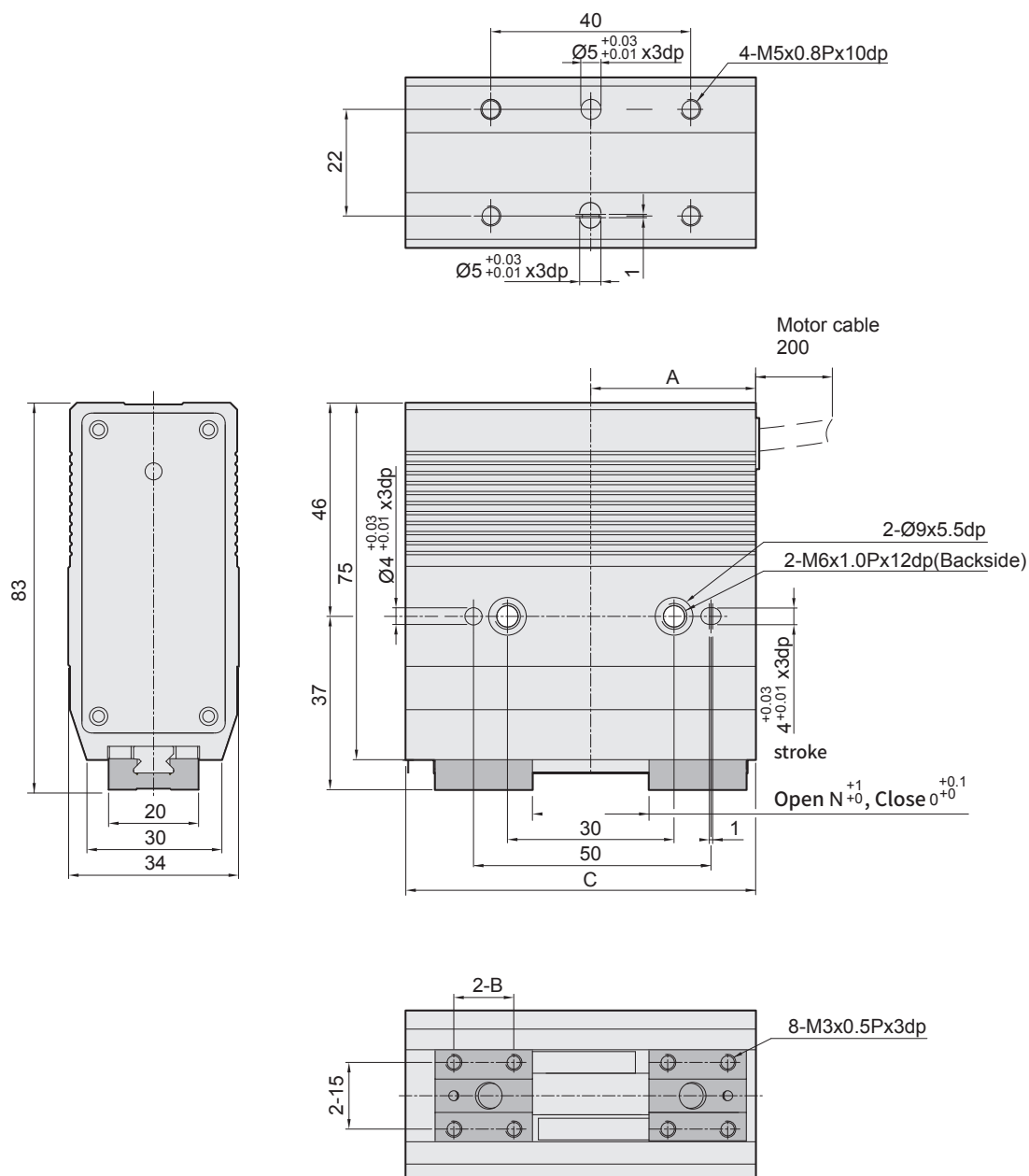
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EDF series 2-Finger Electric Gripper /Long Stroke

External dimensions

EDF 20

Unit:mm



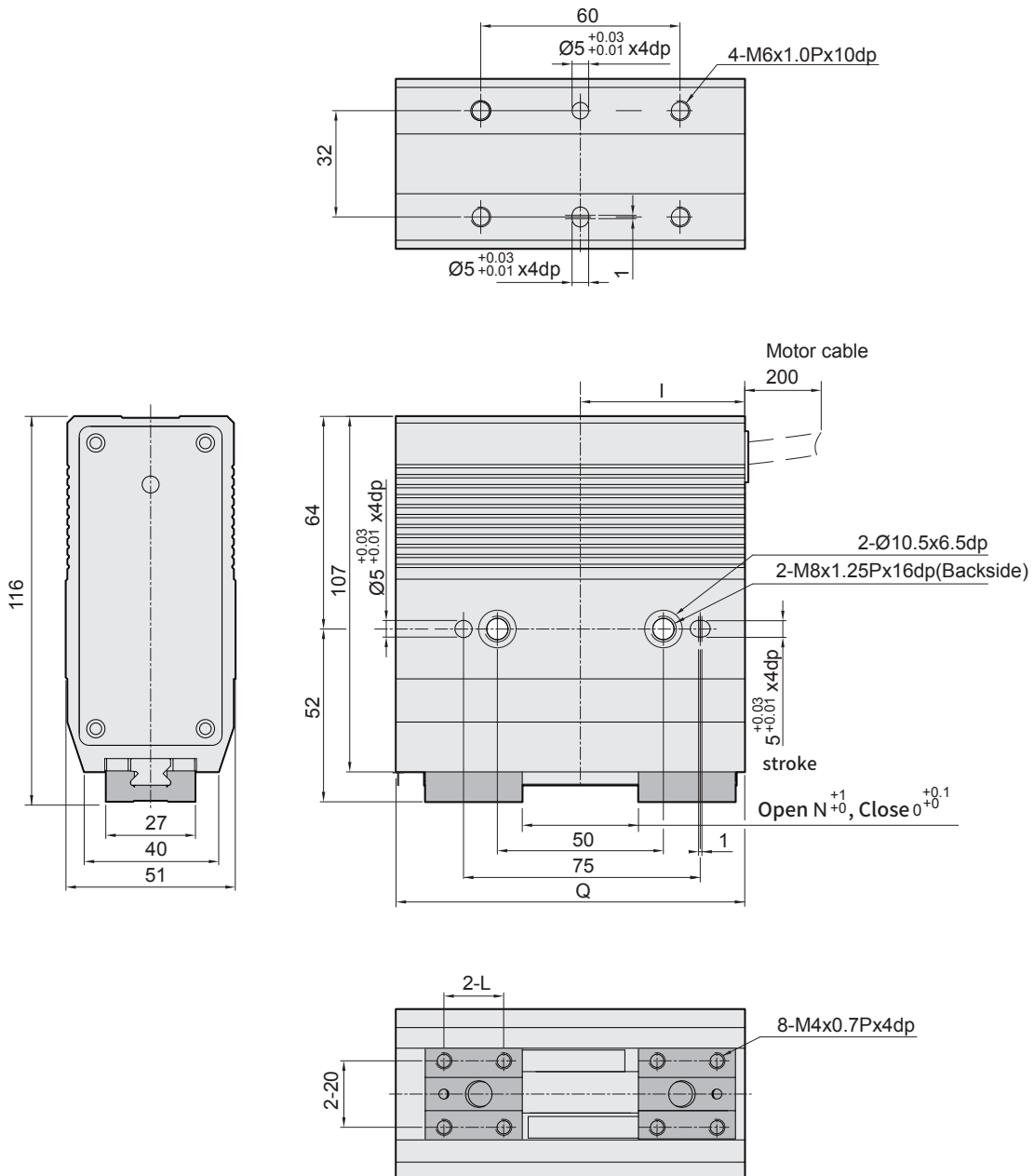
size(mm)	A	B	C	N
EDF 20x24	35.8	12	81.5	24
EDF 20x48	53.8	18	110	48

EDF series 2-Finger Electric Gripper /Long Stroke

External dimensions

EDF 32

Unit:mm



size(mm)	A	B	C	N
EDF 32x32	49.5	29	105	32
EDF 32x64	72.5	37	145	64

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EDM series Angular Type Electric Gripper

EDM20/EDM25/EDM35/EDM42

High
speed

600 (°/s)

High
gripping
force

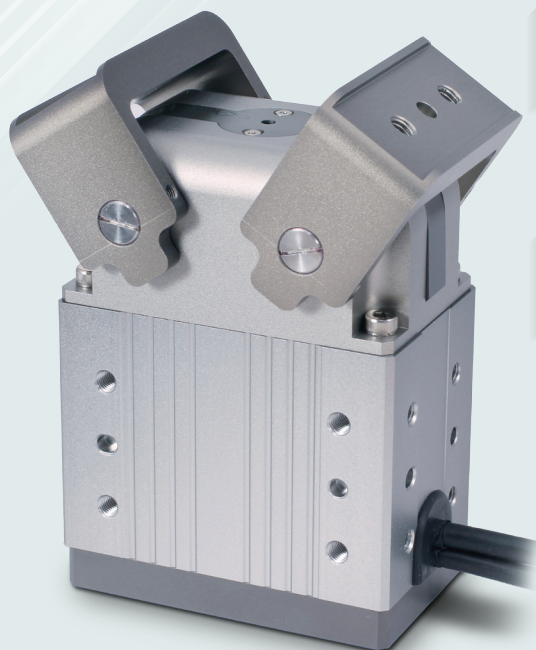
90 (N)

6.4~90N

Light
weight

0.3 (kg)

0.3~1.3kg



Worm **Self-lock mechanism**
Worm gear Force endurance during start and stop

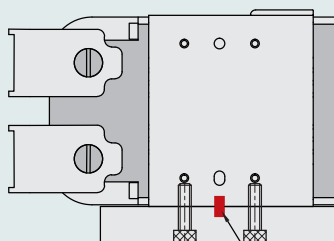


Precision rotary gripper
Repeating accuracy $\pm 0.05^\circ$

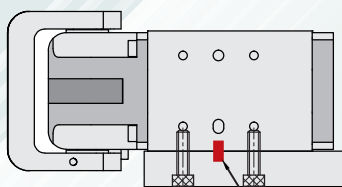
Aluminum shell
Large heat dissipation

Close-loop motor
Feedback signal

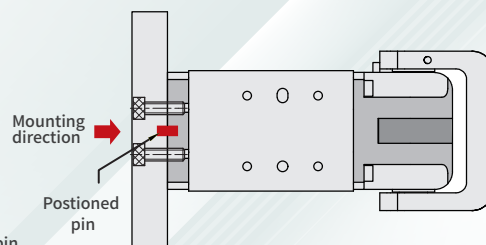
 **Multiple mounting way**



Positioned pin
Mounting direction



Positioned pin
Mounting direction



Mounting
direction
Positioned
pin

EDM series Angular Type Electric Gripper

EDM20/EDM25/EDM35/EDM42

Small size

EDM 20



Max. angles 180°
Max. gripping force 6.4N
Motor size 20 □

Middle size

EDM 25



Max. angles 180°
Max. gripping force 25N
Motor size 25 □

Large size

EDM 35



Max. angles 180°
Max. gripping force 60N
Motor size 35 □

Large size

EDM 42



Max. angles 180°
Max. gripping force 100N
Motor size 42 □

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Sequence of Model Selection

Seq 1 Confirm the gripping force → **Seq 2** Confirm the gripping point and outward extension → **Seq 3** Confirm the external force applied on the rotary gripper

Seq 1 Confirm the gripping force

Conditions Confirmed → The gripping force is therefore calculated by → Choose the model through the gripping force chart → Selection of Touch Speed

Example

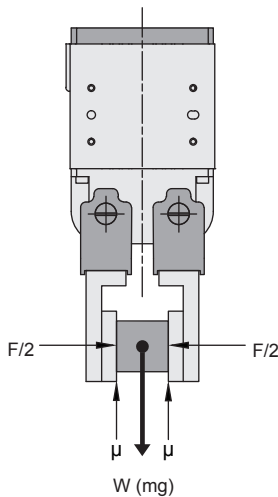
Mass of Workpiece: 0.2kg

- Model should be selected based on 10 to 20 times of the weight of the workpiece according to the diverse COFs and shapes of the annexes and workpieces.
- ※ For further details, please refer to the calculation of gripping force.

Ex. The required gripping force = $0.2\text{kg} \times 20 \times 9.8\text{m/s}^2 \approx 39.2\text{N}$ at least, if the gripping force is set for above 20 times the weight of the workpiece.

- Additionally, considering the acceleration and impact force when transporting the workpiece, an SF must be established.

The gripping force is therefore calculated by



Gripping a workpiece, as shown in the left figure

F : Gripping Force (N)
 μ : COF between Annex and Workpiece
 m : Mass of Workpiece (kg)
 g : Acceleration of Gravity (=9.8m/s)
 mg : Weight of Workpiece (N)

The condition that workpiece does not fall

$$F\mu > mg$$

Hence $F > \frac{mg}{\mu}$

Provided SF is a, then F is

$$F = \frac{mg}{\mu} \times a$$

About "10 to 20 Times above the Weight of Workpiece"

The data "10 to 20 Times above the Weight of Workpiece" recommended by the Company is calculated through the impact force during transport when SF=4.

$\mu = 0.2$	$\mu = 0.1$
$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$

10 Times the Weight of Workpiece

20 Times the Weight of Workpiece

<Reference>COF μ (variable depending on different usage environments or surface pressure)

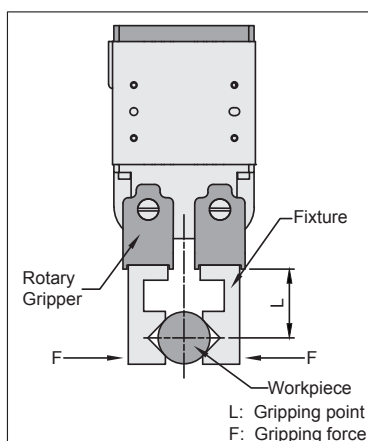
COF μ	Material Quality of Annex and Workpiece (standard)
0.1	Metal (surface roughness Rz is under 3.2)
0.2	Metal
Above 0.2	Rubber, Resin, etc.

- When the COF μ is higher than 0.2, please select the model of which the weight is 10 to 20 times that of the workpiece for safety concern.
- Considering the larger acceleration and impact force when transporting the workpiece, it is necessary to increase the SF.

• Demonstration of Gripping Force

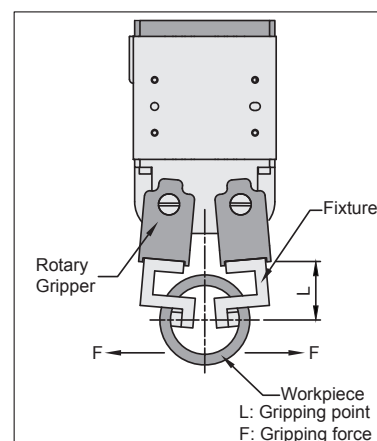
The figure below shows the gripping force is applied by the complete touch by the two grippers, annex and workpiece, which is represented by F.

Outer Diameter Grip



• Working Position of Grip: L; please perform it within the range designated in the figure below.

Inner Diameter Grip



Sequence of Model Selection

Seq 2 Confirm the moment of inertia of the gripping annex (gripper)

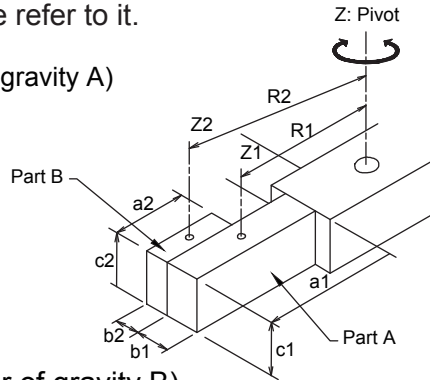
Please confirm whether the total moment of inertia of the gripper in z axis (pivot) is allowable. The calculation is based on the structure and formation of a gripper. As shown below, here is an example for the calculation by two parts divided, please refer to it.

1. Moment of Inertia (part A) in Z1 Axis (center of gravity A)

m1: mass of A (kg)
a1, b1 and c1: dimension of part A (mm)

$$m1 \text{ (kg)} = a1 \times b1 \times c1 \times \text{specific weight} \times 10^{-6}$$

$$IZ1 \text{ (kg} \cdot \text{m}^2) = \frac{m1 (a1^2 + b1^2) \times 10^{-6}}{12}$$



2. Moment of Inertia among Z2 Axis (center of gravity B)

m2: mass of B (kg)
a2, b2 and c2: dimension of part B (mm)

$$m1 \text{ (kg)} = a1 \times b1 \times c1 \times \text{specific weight} \times 10^{-6}$$

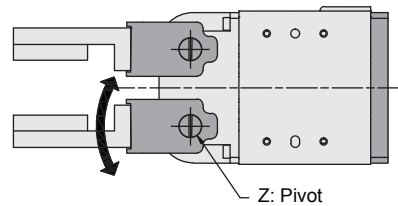
$$IZ1 \text{ (kg} \cdot \text{m}^2) = \frac{m2 (a2^2 + b2^2) \times 10^{-6}}{12}$$

3. Moment of Inertia (part B) among Z Axis (pivot)

R1: distance between the center of gravity A and the pivot of gripper opening (mm)
R2: distance between the center of gravity B and the pivot of gripper opening (mm)

$$I \text{ (kg} \cdot \text{m}^2) = (IZ1 + m1R1^2 \times 10^{-6}) + (IZ2 + m2R2^2 \times 10^{-6})$$

Model	Allowable Moment of Inertia (kg·m ²)	Mass (kg)
EDM 20	1.5×10^{-4}	0.07
EDM 25	6.0×10^{-4}	0.15
EDM 35	1.3×10^{-3}	0.25
EDM 42	3.0×10^{-3}	0.4



Seq 3 Confirm the external force applied on the gripper

1. Allowable Load Torque

Please confirm whether the load torque applied on each gripper is allowable. The equation to calculate the load torque generated by the masses of gripper and workpiece is shown as below.

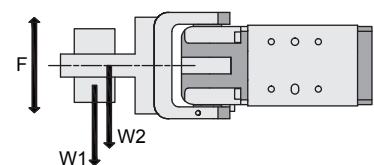
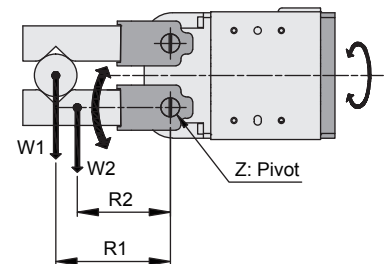
m1: Mass of Workpiece (kg)
R1: Distance between the Center of Gravity of Workpiece and the Pivot of Gripper Opening (mm)
m2: Mass of Gripper (kg)
R2: Distance between the Center of Gravity of Workpiece and the Pivot of Gripper Opening (mm)
g: Gravitational Acceleration (9.8m/s²)

$$T = (W1 \times R1 \times 10^{-3}) + (W2 \times R2 \times 10^{-3}) + (\text{other load torques})$$

$$= (m1g \times R1 \times 10^{-3}) + (m2g \times R2 \times 10^{-3}) + (\text{other load torques})$$

• The centrifugal force generated when rotary gripper heads are clamping the workpiece and the inertia force generated due to acceleration/deceleration of horizontal movement will both become the load torque applied on the grippers. Under the circumstance, please confirm whether the total torque including the aforementioned torque is within the range of the MAX allowable load torque.

Model	MAX Allowable Load Torque T (N·mm)
EDM 20	0.05
EDM 25	0.35
EDM 35	0.70
EDM 42	1.50



2. Allowable Thrust Load

Please confirm whether the thrust load among the axis of the gripper opening is allowable.

$$F = W1 + W2 + (\text{other load torques})$$

$$= m1g + m2g + (\text{other load torques})$$

Model	Allowable Load of Thrust Force F (N)
EDM 20	15
EDM 25	20
EDM 35	25
EDM 42	30

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EDM series Angular Type Electric Gripper

Feature, Specification and Code of Order

Feature:

- Worm Gear Drive
- Signal and Feedback
- High Precision



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Gripping force (N)	Rotation angle (°)	Angular speed (°/s)	Actuation type	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Position repeatability (°)	Finger backlash (one side) (°)	Idling stroke (one side) (°)	Weight (kg)
General environment	EDM 20	6.4	180	600	Worm gear + Helical gear	5 ~ 40	35 ~ 85	20 □	±0.05	1	0.1	0.3
	EDM 25	25						25 □		2.5	0.3	0.5
	EDM 35	60						35 □				1.0
	EDM 42	90						42 □				1.3

Remark 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

EDM - 20 - 03 - P

①

②

③

Mark	Type
20	20
25	25
35	35
42	42

Mark	Wire length
01	1 m
03	3 m
05	5 m
10	10 m

* Standard: 3M

Mark	Actuator
P	P-Servo

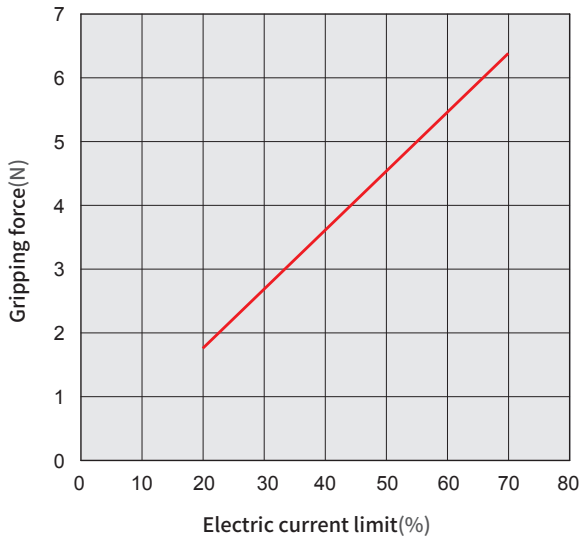
* Standard component Refer to page 83

EDM series Angular Type Electric Gripper

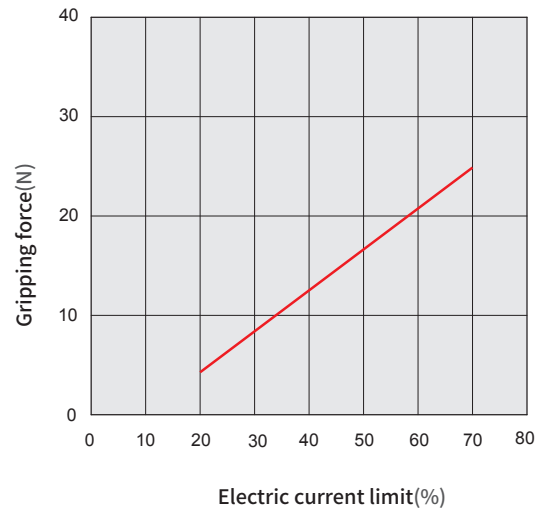
Gripping force-current value graph, Side mounting, Bottom mounting

Gripping force-current value graph

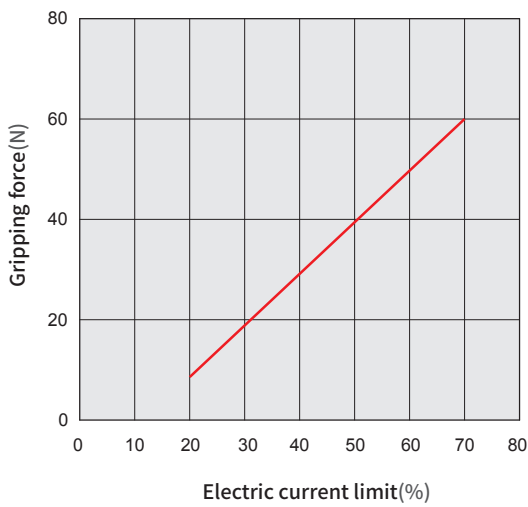
EDM20



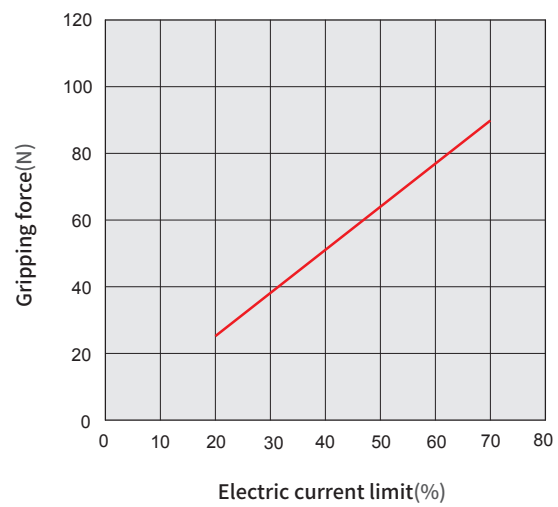
EDM25



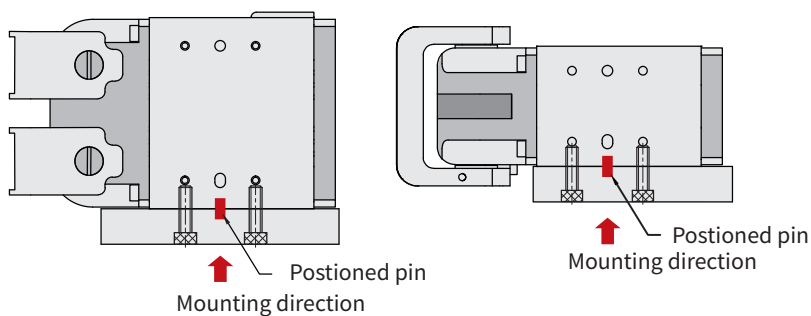
EDM35



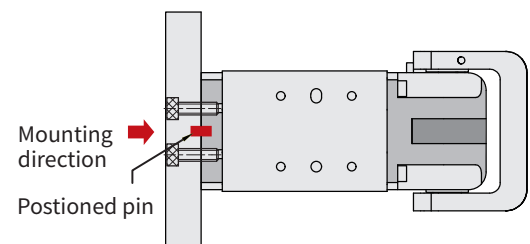
EDM42



Side mounting



Bottom mounting

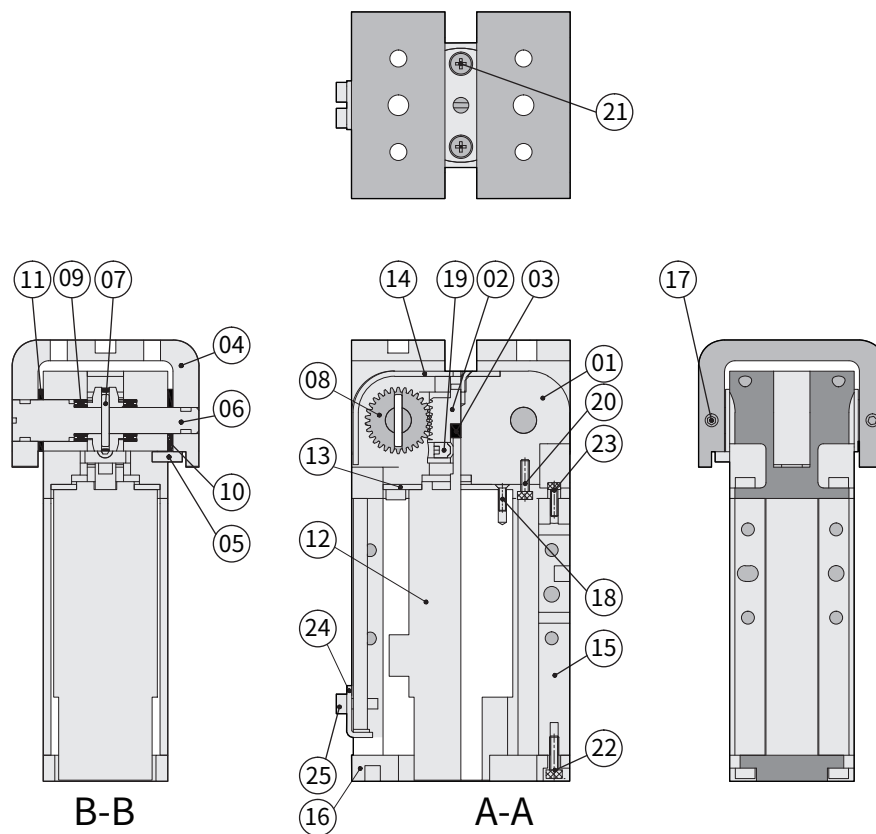


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EDM series Angular Type Electric Gripper

Internal structure, Components and Material list

EDM20



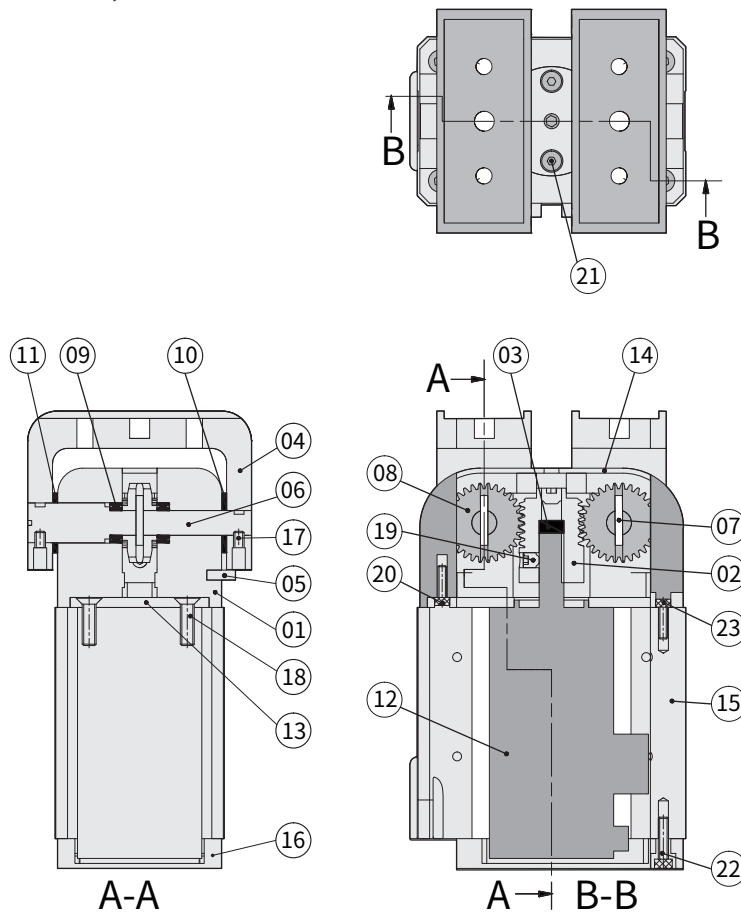
Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	14	Dust cover	Aluminum alloy
02	Ball screw	Stainless	15	shell	Aluminum alloy
03	Screw washer	Stainless	16	Base	Aluminum alloy
04	Swivel Finger	Stainless	17	Swivel Finger Set Screw	Alloy steel
05	Swivel Finger Fixing Pin	Alloy steel	18	Motor Fixing Screw	Alloy steel
06	Shaft	Stainless	19	Motor Set Screw	Alloy steel
07	Shaft Spring Pin	Customized	20	Adapter Plate Fixing Screw	Alloy steel
08	Gear shaft	POM	21	Hood Fixing Screw	Alloy steel
09	Radial bearing	Bearing steel	22	Bottom Plate Fixing Screw	Alloy steel
10	Washer (small)	Aluminum alloy	23	Body Fixing Screw	Alloy steel
11	Washer (large)	Aluminum alloy	24	Wire Cover Plate	Stainless
12	Closed loop motor	Customized	25	Wire Cover Plate Fixing Screw	Alloy steel
13	Motor Adapter Plate	Aluminum alloy	26		

EDM series Angular Type Electric Gripper

Internal structure, Components and Material list

EDM25, EDM35, EDM42



Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	13	Motor Adapter Plate	Aluminum alloy
02	Ball screw	Stainless	14	Hood	Aluminum alloy
03	Screw washer	POM	15	shell	Aluminum alloy
04	Swivel Finger	Aluminum alloy	16	Base	Alloy steel
05	Swivel Finger Fixing Pin	Alloy steel	17	Swivel Finger Set Screw	Alloy steel
06	Shaft	Stainless	18	Motor Fixing Screw	Alloy steel
07	Shaft Spring Pin	Customized	19	Motor Set Screw	Alloy steel
08	Gear shaft	POM	20	Adapter Plate Fixing Screw	Alloy steel
09	Radial bearing	Bearing steel	21	Hood Fixing Screw	Alloy steel
10	Washer (small)	Aluminum alloy	22	Bottom Plate Fixing Screw	Alloy steel
11	Washer (large)	Aluminum alloy	23	Body Fixing Screw	Alloy steel
12	Close-loop Motor	Customized	24		

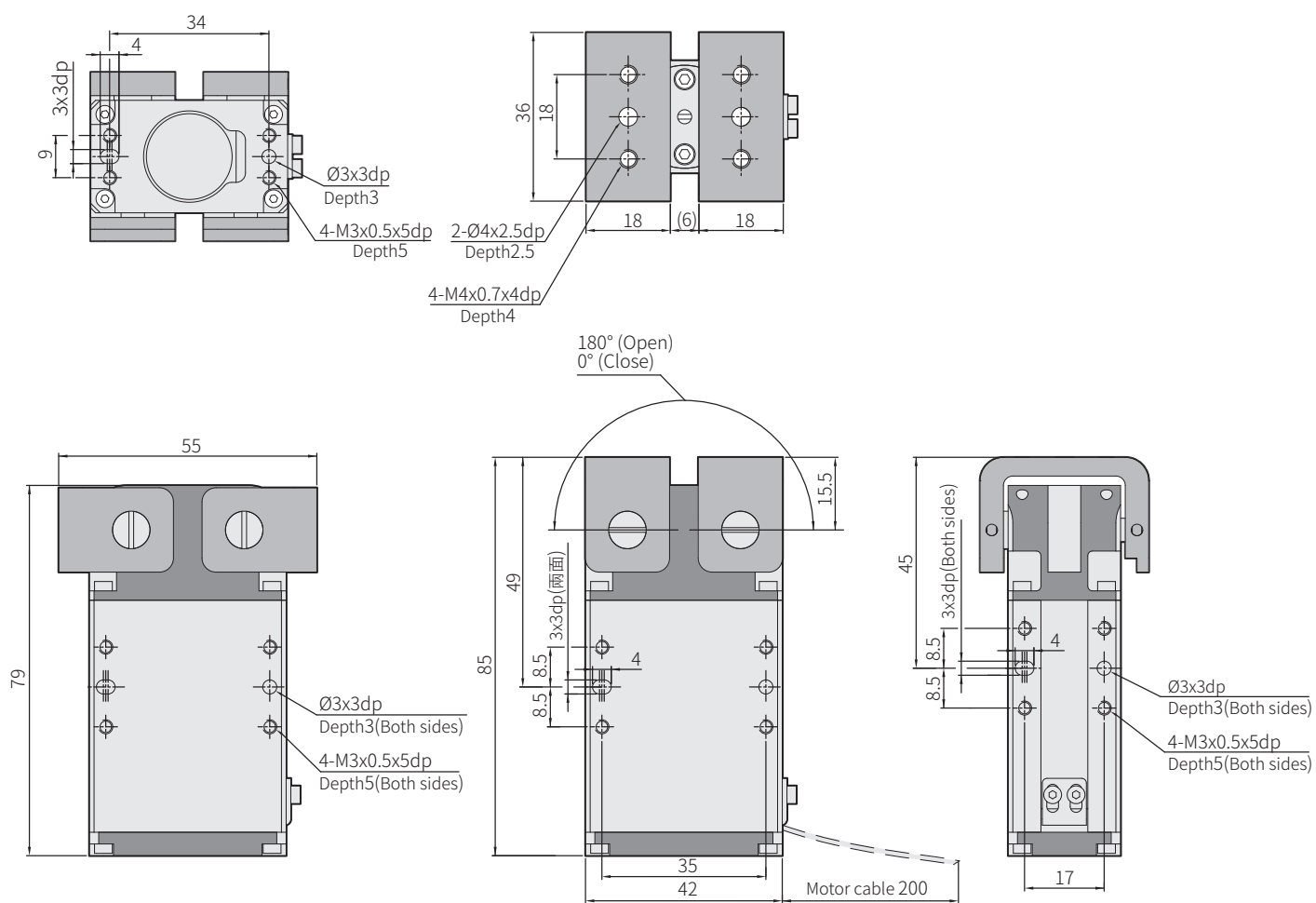
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EDM series Angular Type Electric Gripper

External dimensions

EDM20

Unit:mm



EDM series Angular Type Electric Gripper

External dimensions

EDM25

Unit:mm



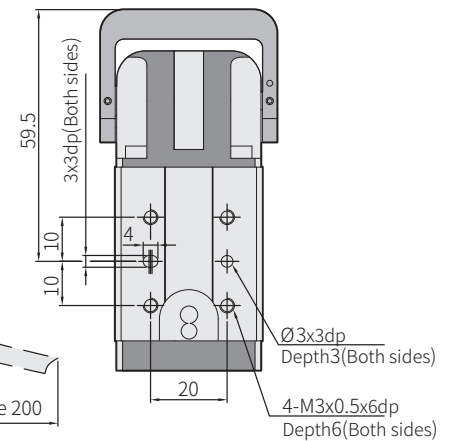
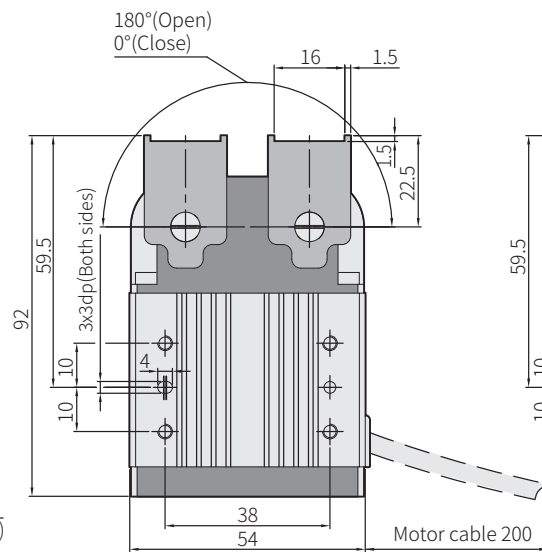
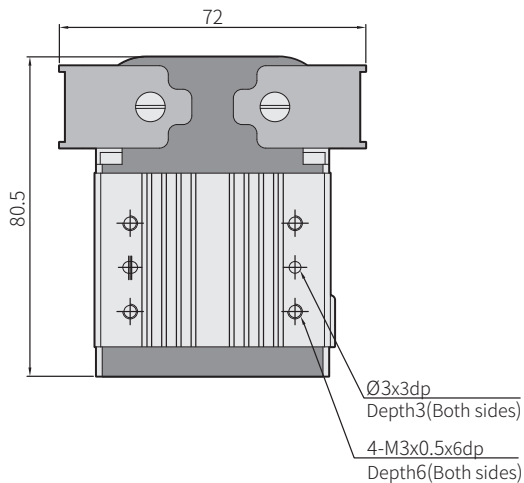
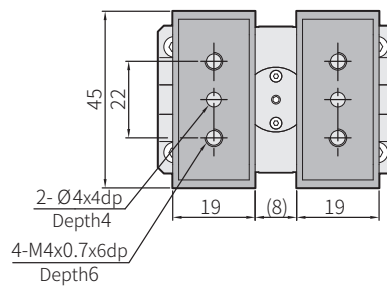
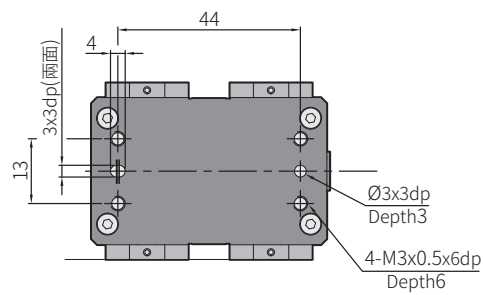
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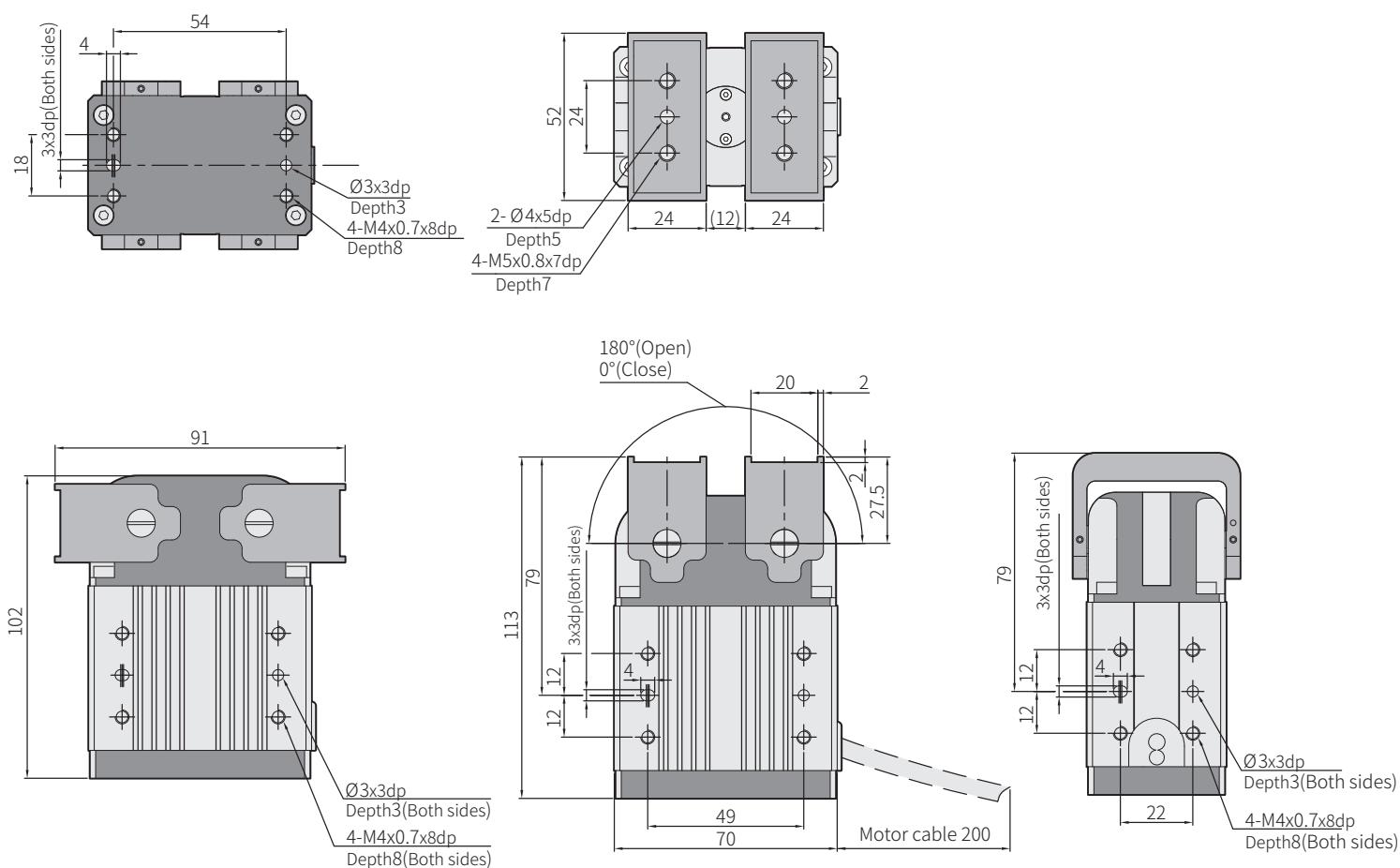


EDM series Angular Type Electric Gripper

External dimensions

EDM35

Unit:mm



EDM series Angular Type Electric Gripper

External dimensions

EDM42

Unit:mm



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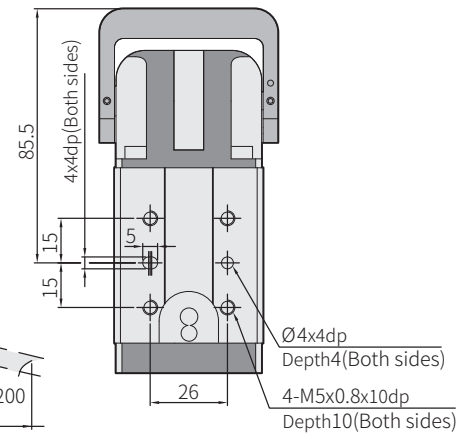
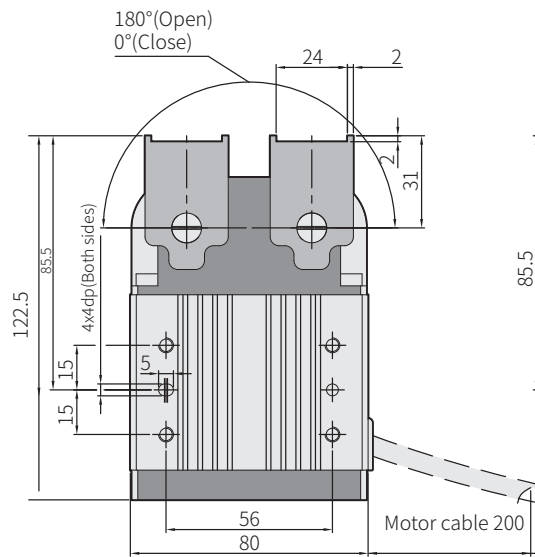
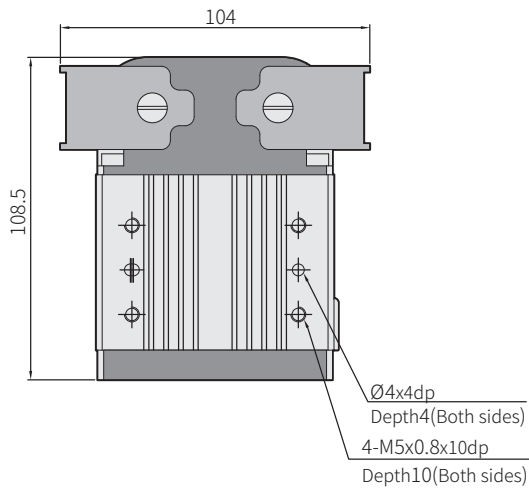
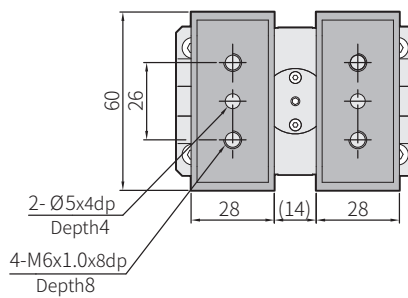
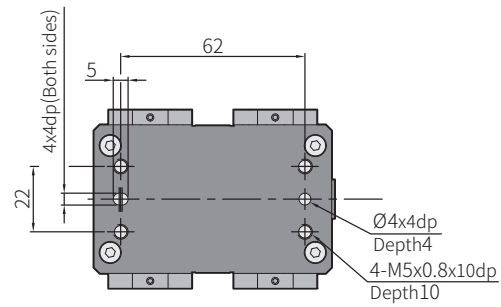
EQX

ETB

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EDP series Electric Gripper/Open-loop

EDP12/EDP16

Speed

Fast **40mm/s**

10~40mm/s

Weight

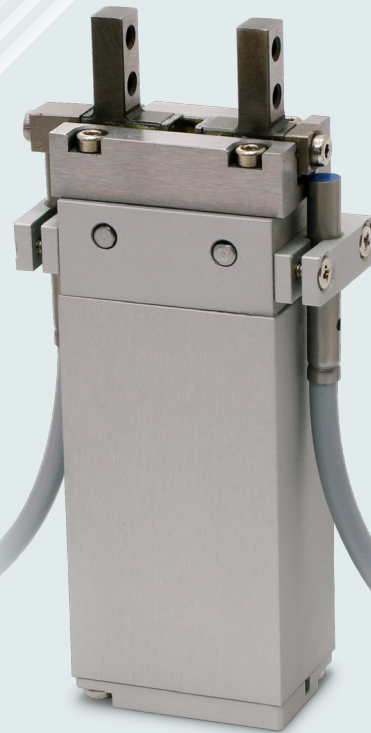
Light **0.15kg**

0.15~0.18kg

Gripping force

Strong **6N**

3~6N



Aluminum shell
Large heat dissipation

Close-loop motor
Feedback signal

Worm

Self-lock mechanism

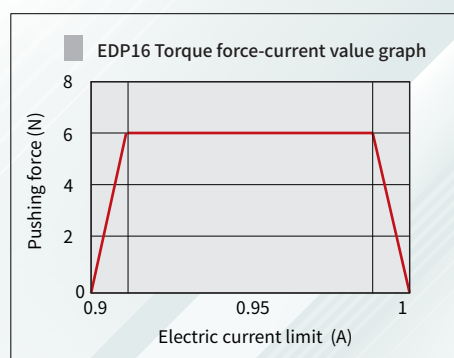
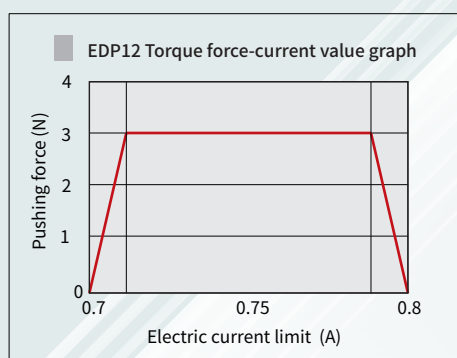
Worm gear

Force endurance during start and stop

Proximity sensor

fixed point in place without back and forth correction

Pushing force-Electric current limit

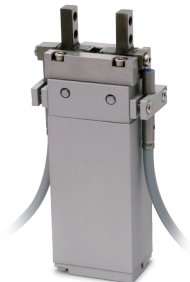


EDP series Electric Gripper/Open-loop

EDP12/EDP16

Small size

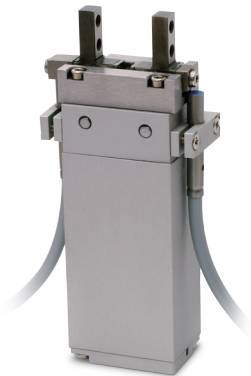
EDP12



Stroke 4mm
Max. thrust 3N
Motor size 12 □

Small size

EDP16



Stroke 4mm
Max. thrust 6N
Motor size 16 □

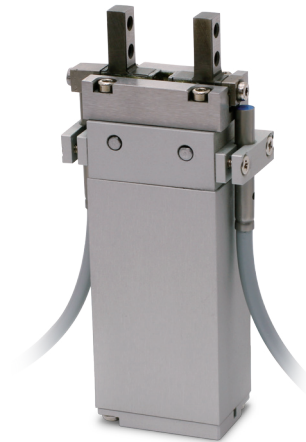
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EDP series Electric Gripper/Open-loop

Feature, Specification and Code of Order

Feature:

- Worm wheel and gear movement
- Proximity sensor fixed point in place without back and forth correction
- Used in light loading, stable stop when moving
- Suitable for the place without air source, replace gripper.



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Pushing force (N)	Gripper stroke (m)	Max. speed (°/s)	Actuation type	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Position repeatability (°)	Weight (kg)
General environment	EDP 12	3	4	10	Worm screw + Worm wheel	5 ~ 40	35 ~ 85	Ø12	0.05	0.15
	EDP 16	6		40	+ Belt drive			Ø16		0.18

Remark 1. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 2. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

EDP - 16 - 4

①

②

①

Mark	Motor model	Actuator
12	Ø12	OLC-4806L-00
16	Ø16	OLC-3003S-00

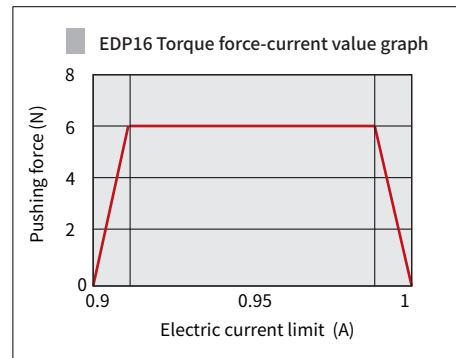
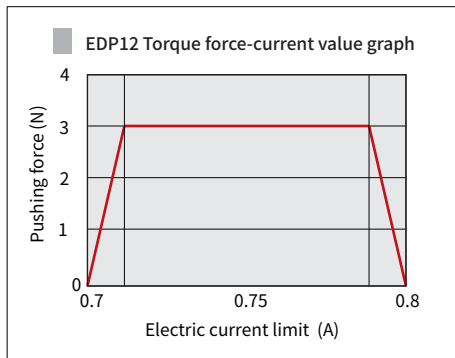
②

Mark	Wire length(mm)
4	4 mm

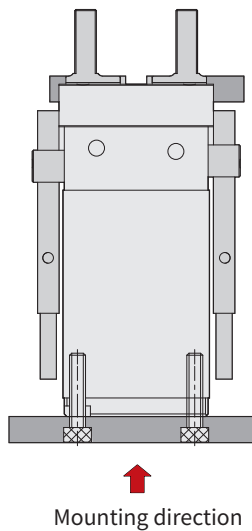
EDP series Electric Gripper/Open-loop

Pushing force-Electric current limit, crew-hole mounting

■ Pushing force-Electric current limit



■ Screw-hole mounting



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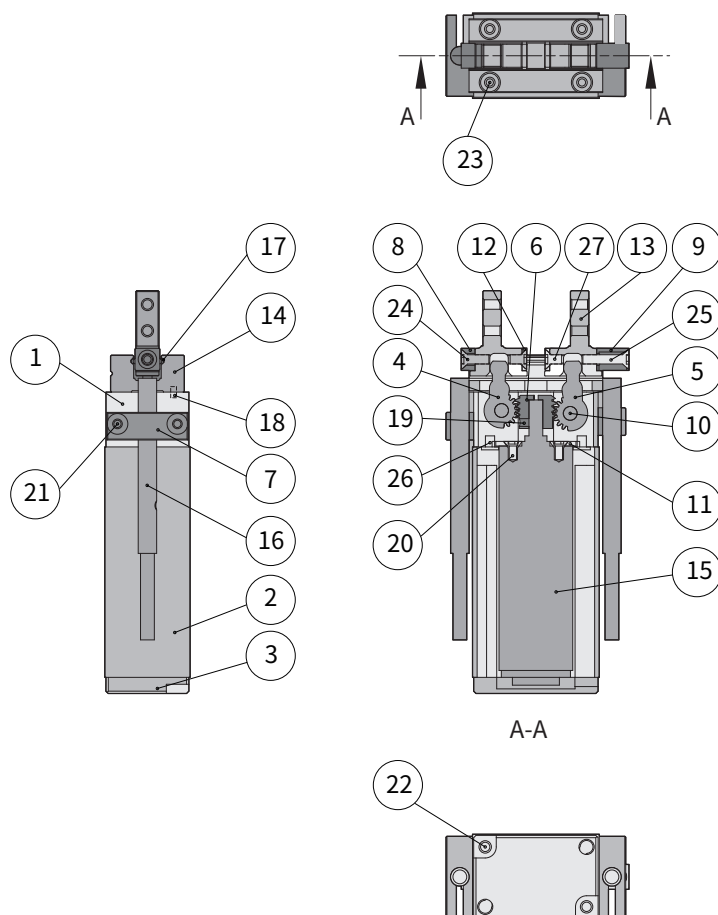
P-SERVO

Operation Instructions

EDP series Electric Gripper/Open-loop

Internal structure, Components and Material list

EDP12, EDP16



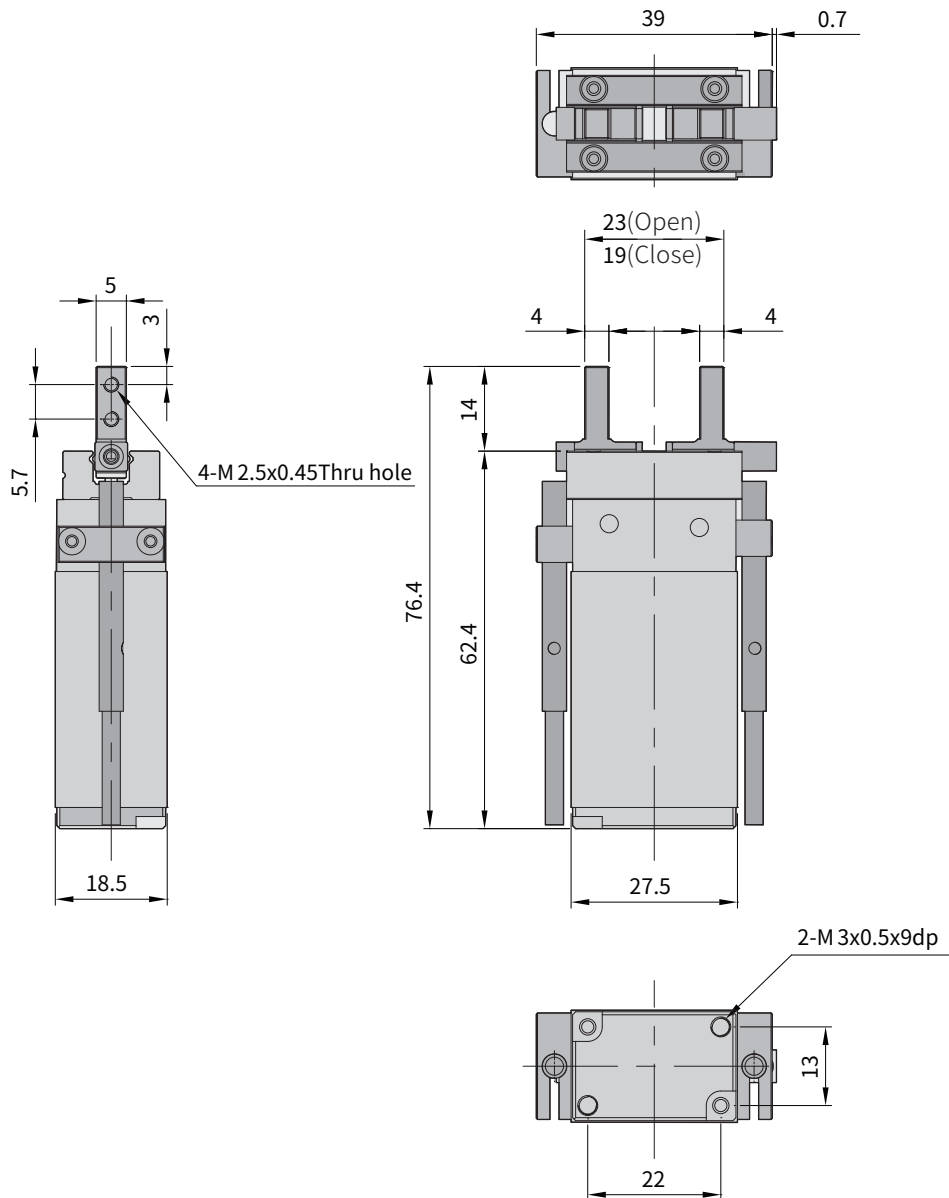
Components and Material list

No.	Name	Material	No.	Name	Material
01	Holder	Aluminum alloy	15	Motor	Customized
02	Shell	Aluminum alloy	16	Proximity sensor	Customized
03	bottom cover	Aluminum alloy	17	Ball bearing	Bearing steel
04	Action lever(left)	Stainless	18	Pin	Bearing steel
05	Action lever(right)	Stainless	19	Motor Set Screw	Alloy steel
06	Ball screw	Stainless	20	Motor Fixing Screw	Alloy steel
07	Sensor switch holder	Aluminum alloy	21	Proximity sensor mount screws	Alloy steel
08	Inductive partition(open)	Steel	22	Bottom cover mount screws	Alloy steel
09	Inductive partition(close)	Steel	23	Finger set mount screws	Alloy steel
10	Shaft	Steel	24	Inductive partition(open) mount screws	Alloy steel
11	Motor Adapter Plate	Stainless	25	Inductive partition(close) mount screws	Alloy steel
12	Roller block	Stainless	26	Motor adapter board mount screws	Alloy steel
13	Finger	Stainless	27	Ball Stop Fixing Screw	Alloy steel
14	Finger base	Stainless	28		

EDP series Electric Gripper/Open-loop

External dimensions

EDP12



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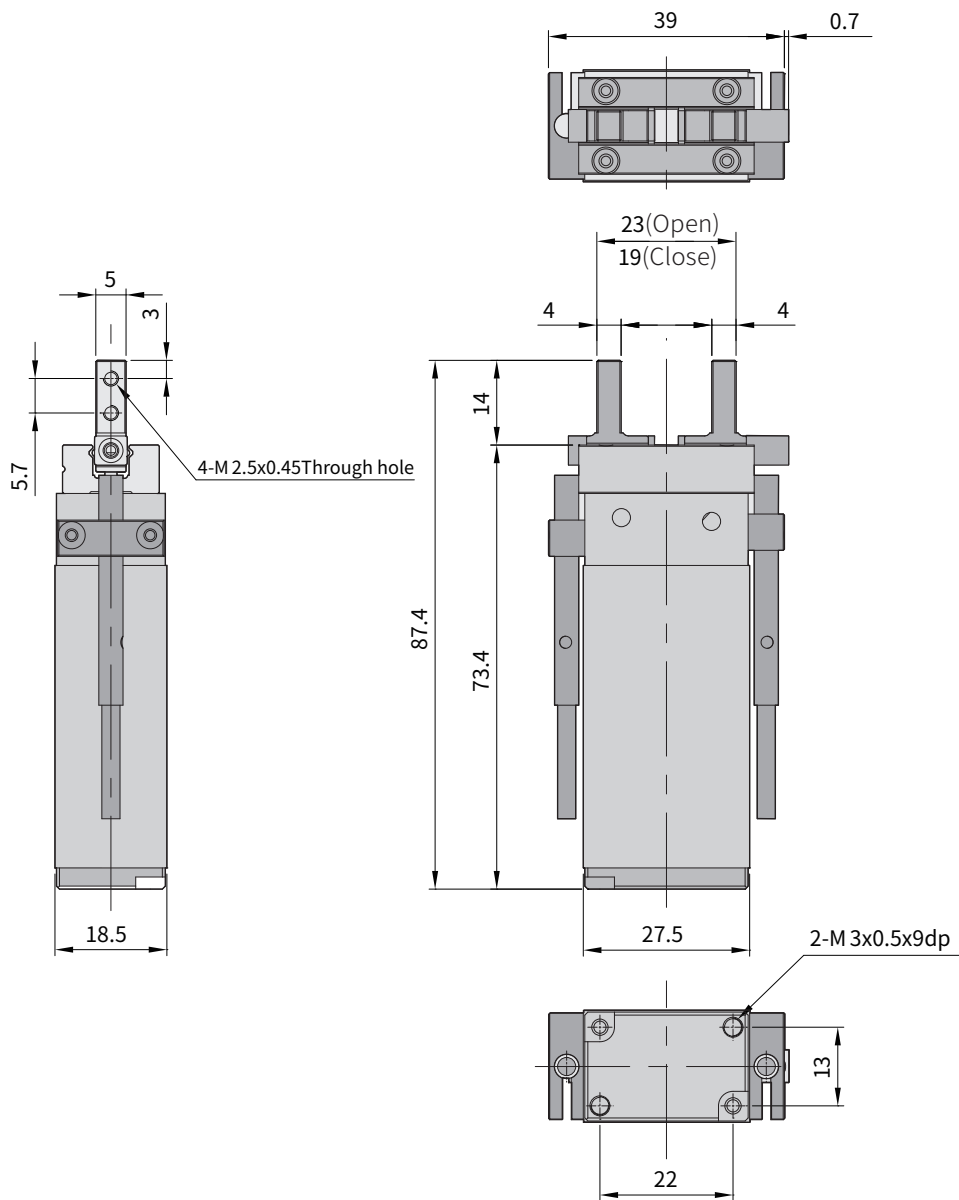
P-SERVO

Operation Instructions

EDP series - Angular Electric Gripper (Open-loop)

External dimensions

EDP16



EDP series - Angular Electric Gripper (Open-loop)

OLC-3003S-00 Drive Instruction Manual

Function Parameters

Operation Mode	8-48VDC Maximum Current 6A Variable Speed Control (without sensor) Open-loop control; Load protection function, stall protection CW/CCW control
Electronic Data	
1.DC Motor Maximum	300W
2.Operation Voltage (Vcc)	8-48 VDC
3.Max. Output Current	8A , <30S
4.Continuous output power	6A
5.Pulse Width Modulation Frequency	16KHz
6.Sampling frequency current control	16KHz
7.Max. Speed (1 complex pole)	50000rpm
8.Efficiency	95%
Input/ Output	
9.Digital Input/ Output	4
10.Set Value "SP"	Set value speed 0.... +5V (1024steps)
11.Enable (EN)	Enable 0...+5V
12.Direction "F/R"	Direction 0...+5V
13.Brake (BK)	---
14.Speed Feedback "PG"	OC output(30V/10mA max)
15.Status Indicator	Operation: LED light/Blink at 1 HZ ;Error: LED Blink at 20 Hz
Environment Status	
16.Working Temperature	-30....+45°C
17.Storing Temperature	-40....+85°C
Technical Data	
18.Weight	Approx. 90g
19.Dimensions (LxWxH)	55 x 86 x 21mm
20.Mounting hole diameter	for screws M3

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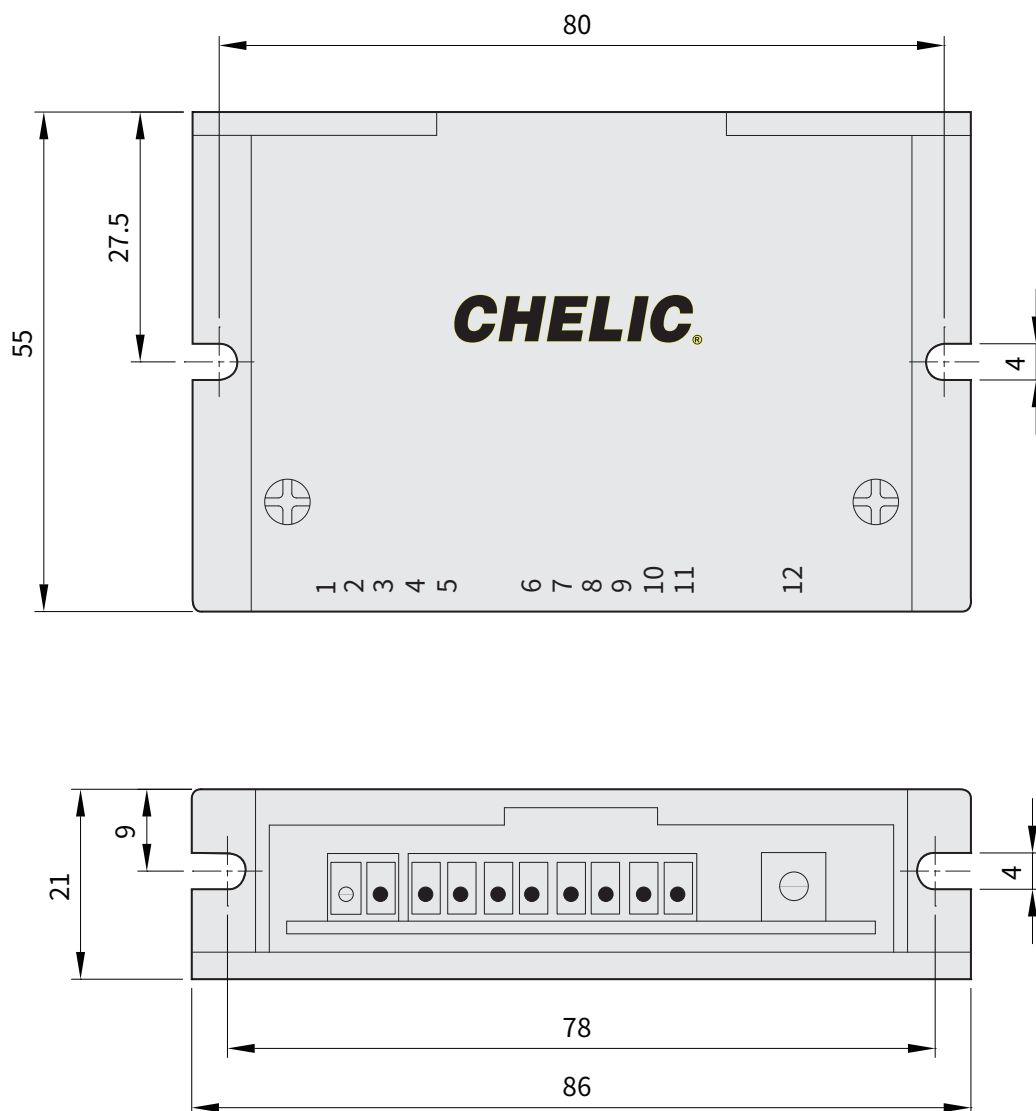
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EDP series - Angular Electric Gripper (Open-loop)

OLC-3003S-00 Drive Instruction Manual



Pin 1 POWER +
Pin 2 POWER -
Pin 3 MA
Pin 4 MB
Pin 5 MC

Pin 6 GND
Pin 7 PG
Pin 8 SP
Pin 9 F/R
Pin 10 EN
Pin 11 +5V, Output

EDP series - Angular Electric Gripper (Open-loop)

OLC-3003S-00 Drive Instruction Manual

Function Parameters

Operation Mode	8-48VDC Maximum Current 6A Variable Speed Control (without sensor) Open-loop control; Load protection function, stall protection CW/CCW control
Electronic Data	
1.DC Motor Maximum	90W
2.Operation Voltage (Vcc)	8-30 VDC
3.Max. Output Current	5A , <60S
4.Continuous output power	3A
5.Pulse Width Modulation Frequency	20KHz
6.Sampling frequency current control	20KHz
7.Max. Speed (1 complex pole)	60000rpm
8.Efficiency	92%
Input/ Output	
9.Hall Sensor Signal	HA,HB,HC
10.Digital Input/ Output	5
11.Set Value "SP"	Set value speed 0.... +5V (1024steps)
12.Enable (EN)	Enable 0...+5V
13.Direction "F/R"	Direction 0...+5V
14.Brake (BK)	Brake 0...+5V
15.Speed Feedback "PG"	TTL
16. Status Indicator	
17.Hall Sensor Input Voltage	+5 VDC
18.Hall and Ground Signal	GND
Environment Status	
19.Working Temperature	-30....+45°C
20.Storing Temperature	-40....+85°C
Technical Data	
21.Weight	Approx. 20g
22.Dimensions (LxWxH)	65 x 52 x 18mm
23.Mounting hole diameter	for screws M3

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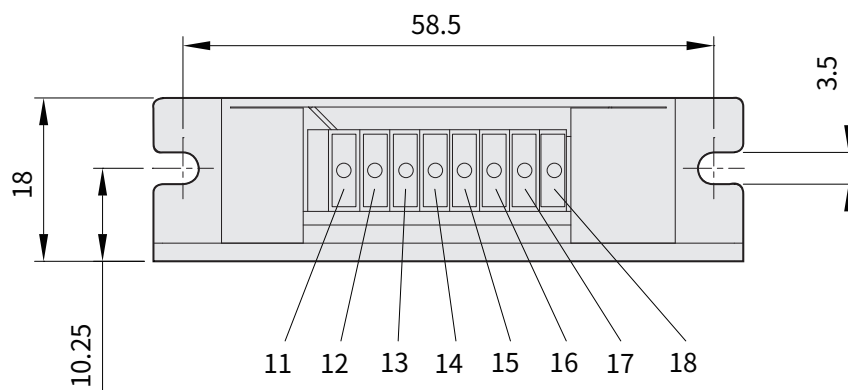
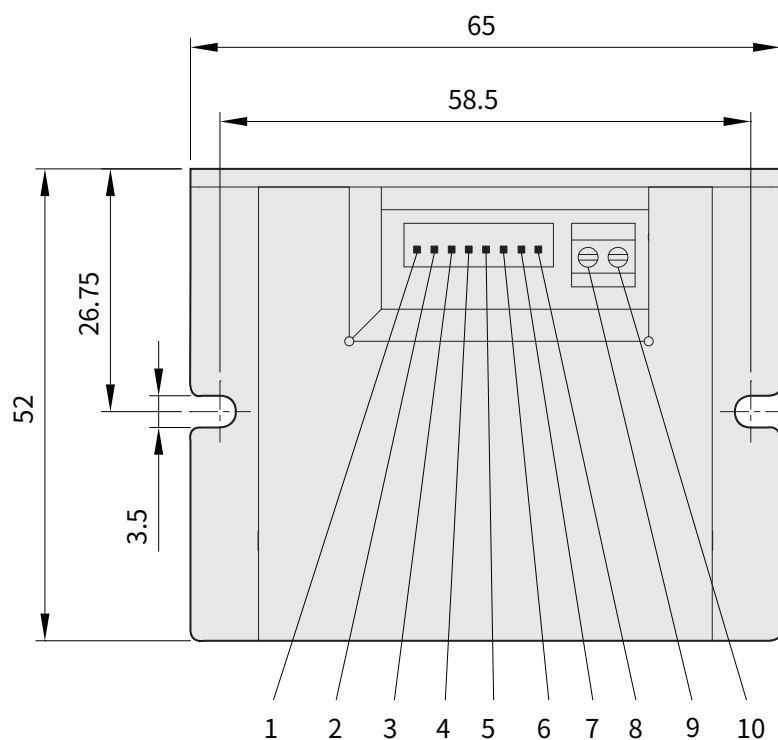
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EDP series - Angular Electric Gripper (Open-loop)

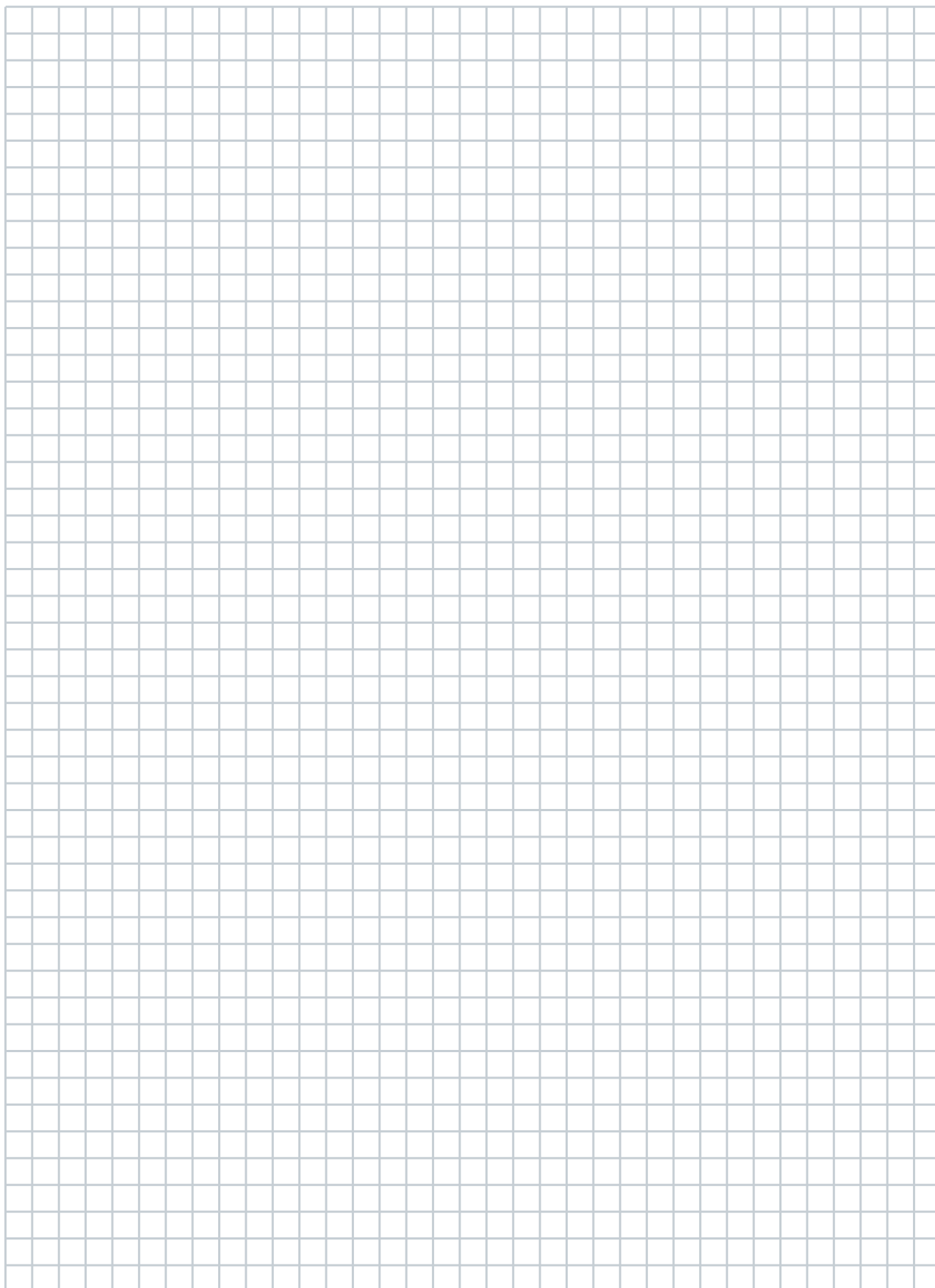
OLC-3003S-00 Drive Instruction Manual



Pin 1 +5V,Output
Pin 2 HA
Pin 3 HB
Pin 4 HC
Pin 5 GND
Pin 6 MA
Pin 7 MB
Pin 8 MC
Pin 9 POWER +
Pin 10 POWER -

Pin 11 PG
Pin 12 SP
Pin 13 GND
Pin 14 GND
Pin 15 +5V,Output
Pin 16 EN
Pin 17 F/R
Pin 18 BK

Memo



EDQ series 3-Finger Round Body Electric Gripper

EDQ25/EDQ42

Speed Fast

50 mm/s

40~50mm/s

Weight light

0.5 kg

0.5~1.0kg

Gripping force
Strong

102 N

22~102kg

Aluminum shell
Large heat dissipation

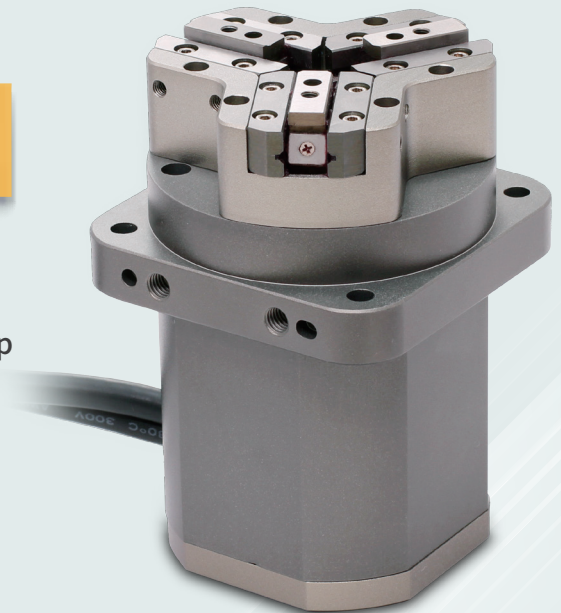
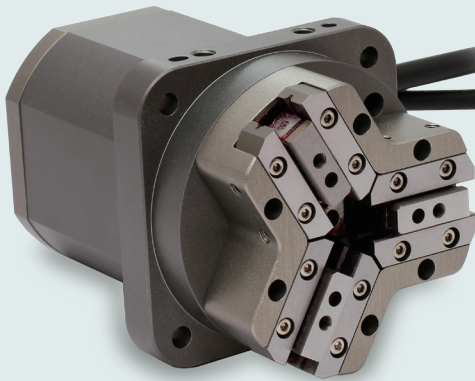
Close-loop motor
Feedback signal

Worm

Self-lock mechanism

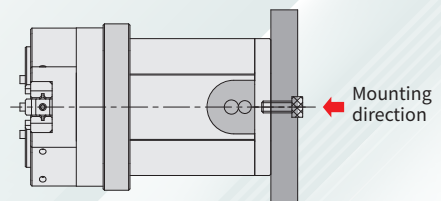
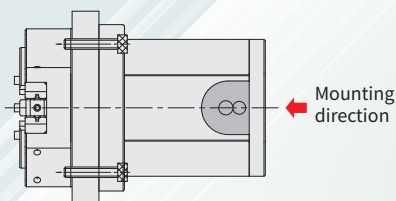
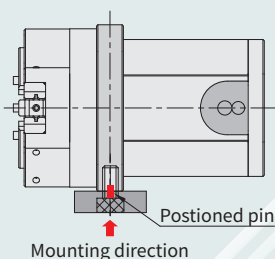
Worm gear

Force endurance during start and stop



High precision roller slide
Repeating accuracy ± 0.02 mm

Multiple mounting way



EDQ series 3-Finger Round Body Electric Gripper

EDQ25/EDQ42

Small size

EDQ 25



Max. stroke 10mm

Max.Gripping force 22N

Motor size 25 □

Large size

EDQ 42



Max. stroke 14mm

Max.Gripping force 102N

Motor size 42 □

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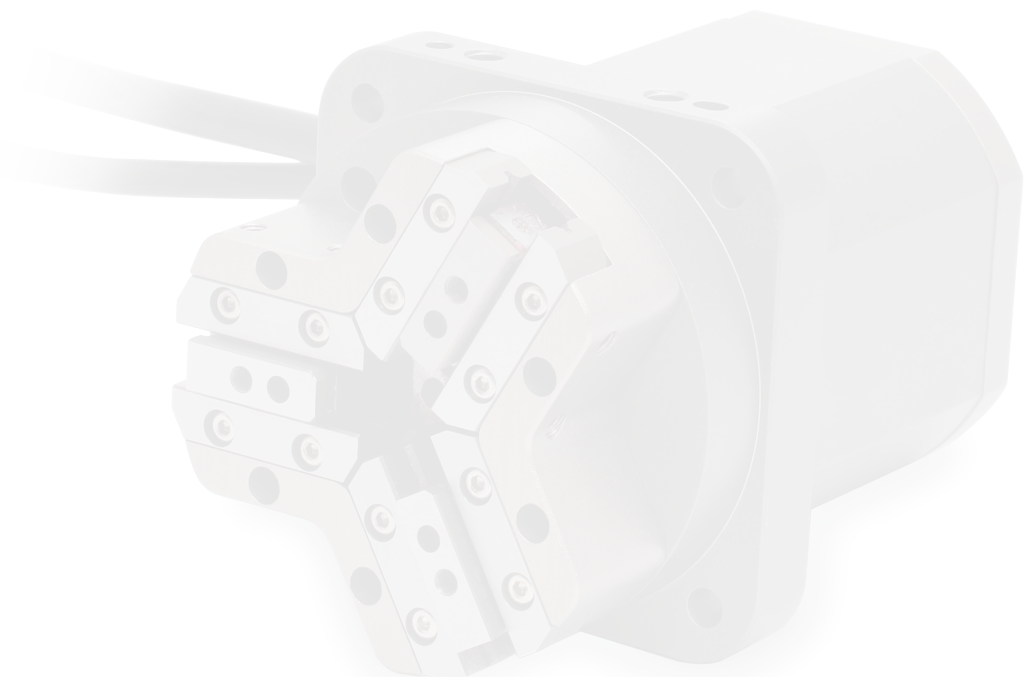
EQX

ETB

Product Application Examples

P-SERVO

Operation Instructions



Gripper Specifications

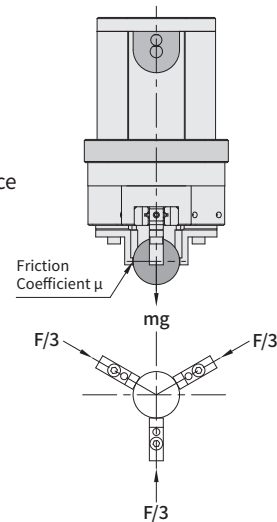
Use Gripper in combination with jig for opening object.

1. Verify actual gripping force
2. Verify gripping point
3. Verify external force exerted on the Gripper

F : Gripping force (N)
 μ : Friction coefficient between accessory and workpiece
 m : Mass of workpiece (kg)
 g : Acceleration of gravity ($\approx 9.8 \text{ m/s}^2$)
 mg : Weight of workpiece (N)

Safety Factor = a , then F is

$$F = \frac{mg}{\mu} \times a$$



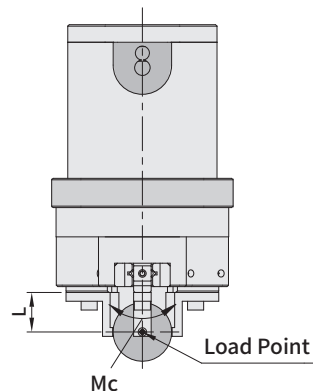
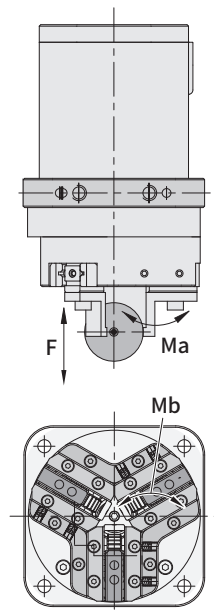
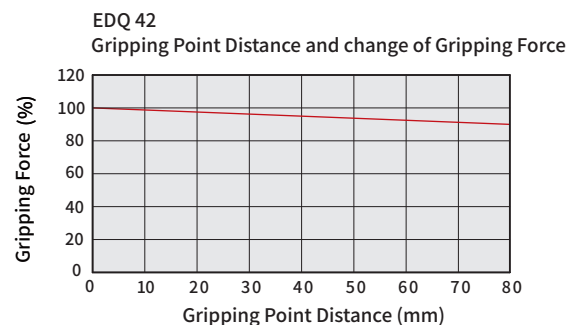
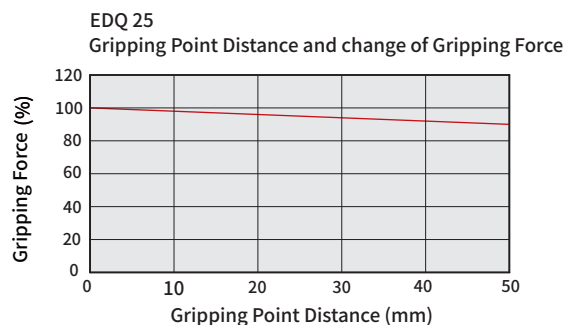
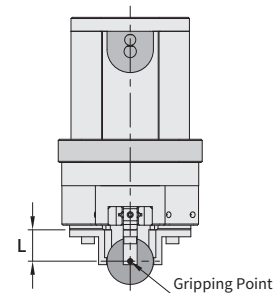
Verify gripping point distance

Distance between gripper installation face and gripping point shall be controlled within the following range. Exceeding the limit range will cause excessive torque to gripper moving part and internal mechanism, therefore reducing its service lifespan.

Outward Extension (L)

EDQ 25 → $L < 50 \text{ mm}$

EDQ 42 → $L < 80 \text{ mm}$



Spec	Allowable Vertical Load F (N)	Allowable Load Torque (N-m)		
		Ma	Mb	Mc
EDQ 25	169	3.8	3.8	3.0
EDQ 42	253	6.3	6.3	5.7

Gripper Specifications

Order Verify Gripping Force

Verify Conditions → Calculate required Gripping Force → Select Model Number from Gripping Force Chart
→ Select Gripping Speed

Example

Workpiece Mass: 0.1kg →

⊙ Based on Friction Coefficient between accessory and workpiece and different shapes, select the model number for more than 7-13 times of workpiece weight.

※ See calculation of Gripping Force for details

⊙ Set a safety factor by considering acceleration and impact force for handling the workpiece.

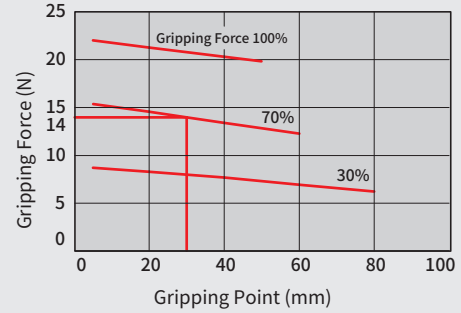
Ex.: Gripping Force set at more than 20 times of workpiece weight, the required Gripping Force = $0.1\text{kg} \times 13 \times 9.8\text{m/s}^2 \approx 12.7\text{N}$ or more.

Gripping Force: 70%

Gripping Point Distance: 30mm

Gripping Speed : 30mm/sec

EDQ 25

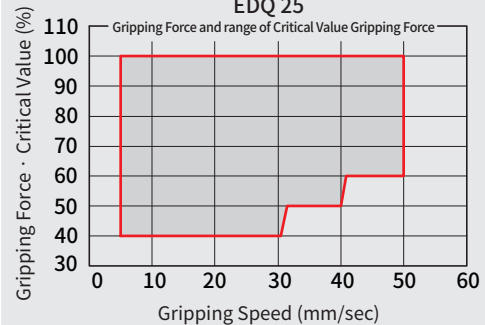


If EDQ 25 is selected

● At the intersection of Gripping Point Distance L=30mm and 70% touch force, we can get Gripping Force as 14N.

● Gripping Force is 14 times of workpiece weight, satisfying the condition of more than 13 times.

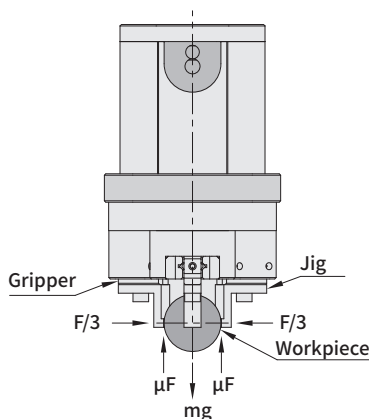
EDQ 25



● Based on intersection of 70% Gripping Force and 30mm/sec Gripping Speed, verify that gripping speed satisfies requirements.

● Verify range of gripping speed based on the selected Gripping Force (%).

Calculation of required Gripping Force



When workpiece is gripped as shown on the left

F: Gripping force (N)

μ : Friction coefficient between accessory and workpiece

m: Mass of workpiece(kg)

g: Acceleration of gravity (=9.8m/s²)

mg: Weight of workpiece

Condition for the workpiece not to drop $F\mu > mg$

$$F > \frac{mg}{\mu}$$

Safety Factor is a, then F is

$$F = \frac{mg}{\mu} \times a$$

Regarding [7-13 time of workpiece weight]

We obtained this condition based on a safety factor of 4 for impacts occurred in normal handling work.

$\mu=0.2$	$\mu=0.1$
$F = \frac{mg}{3 \times 0.2} \times 4 = 6.7 \times mg$	$F = \frac{mg}{3 \times 0.1} \times 4 = 13.3 \times mg$

7 times workpiece weight

13 times workpiece weight

Reference. Friction Coefficient μ (differs with environment of use, interface pressure, etc.)

Friction Coef. μ	Material of accessory and workpiece (baseline)
0.1	Metal (surface roughness < Rz3.2)
0.2	Metal
above 0.2	Rubber, Twig, etc.

- If Friction Coefficient > 0.2, for the sake of safety, select the model with 7-13 times workpiece weight recommended by our company.
- Safety Factor may need to be increased if considering high acceleration and impact force when handling the workpiece.

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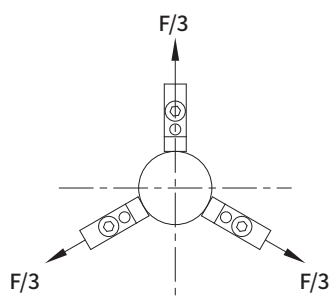
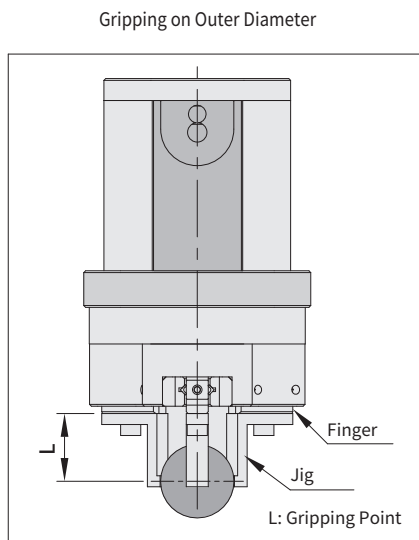
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Gripper Specifications

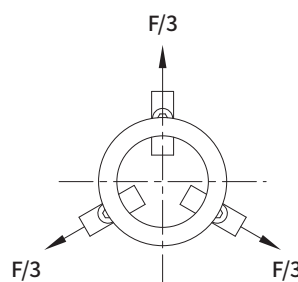
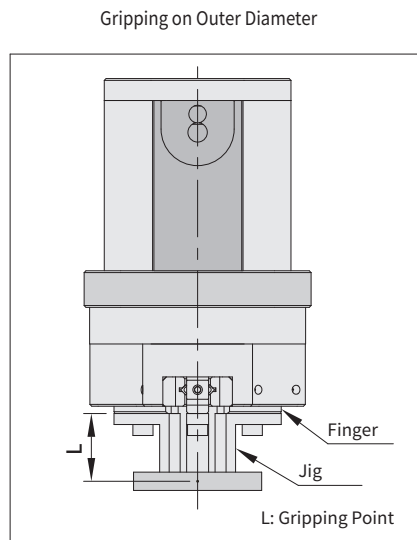
Indication of Gripping Force

The following figure shows the Gripping Force when 3 fingers and accessories are in full contact with workpiece; Gripping Force is expressed as F.

- Gripping Point on the workpiece: L shall be within the range shown below.



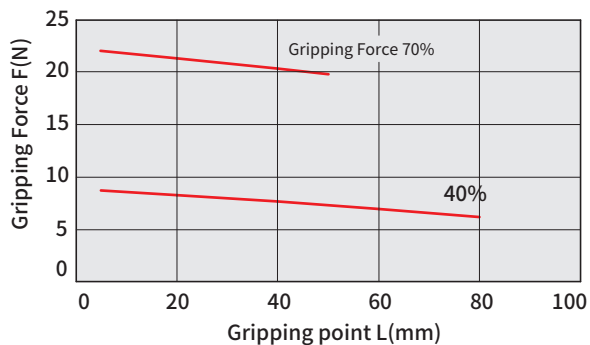
F: Gripping Force



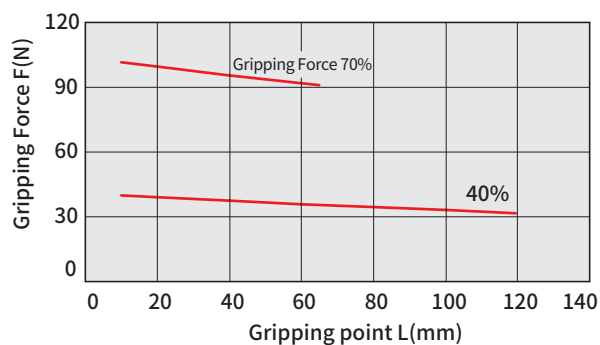
F: Gripping Force

Curve of Gripping Force and Gripping Point

EDQ 25 Gripping Force Accuracy: $\pm 25\%$ (F.S)



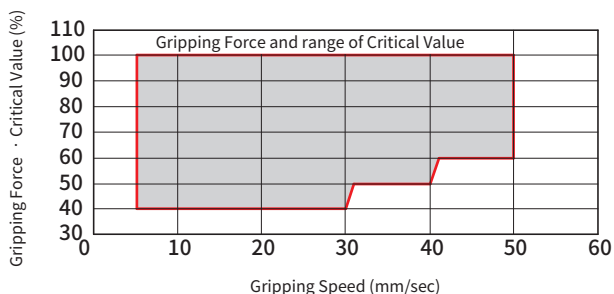
EDQ 42 Gripping Force Accuracy: $\pm 25\%$ (F.S)



Gripping Force is Input Value of Drive Message

Gripping Speed Setting

Gripping Force and Critical Value shall be used within the range of the following diagram.



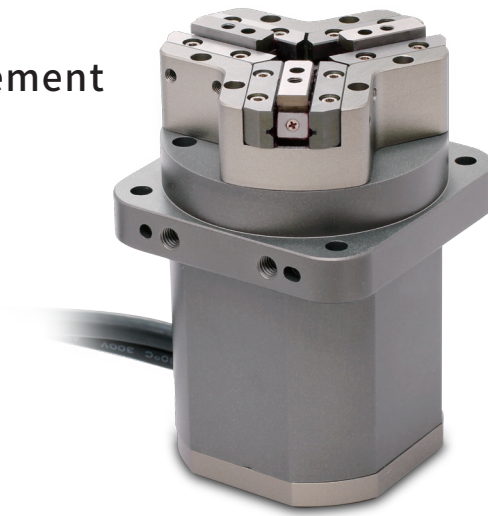
EDQ series 3-Finger Round Body Electric Gripper

Feature, Specification and Code of Order

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Feature:

- Worm wheel and gear movement
- Feedback signal
- High precision



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Gripping force (N)	Switch Stroke (mm)	Angular speed (°/s)	Actuation type	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Repeatability (mm)	Finger backlash (one side) (mm)	Idling stroke (one side) (mm)	Weight (kg)
General environment	EDQ 25	22	10	40	Worm screw + Worm wheel + Belt drive	5 ~ 40	35 ~ 85	25 □	0.02	0.3	0.15	0.5
	EDQ 42	102	14	50				42 □		0.4		1.0

Remarks 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.

Remark 2: The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Remark 4. The speed must be set at 5mm/s during clamping.

Code of Order

EDQ - 25 - 03 - P

① ② ③

①

Mark	Type
25	25
42	42

②

Mark	Wire length
01	1 m
03	3 m
05	5 m
10	10 m

* Standard: 3M

③

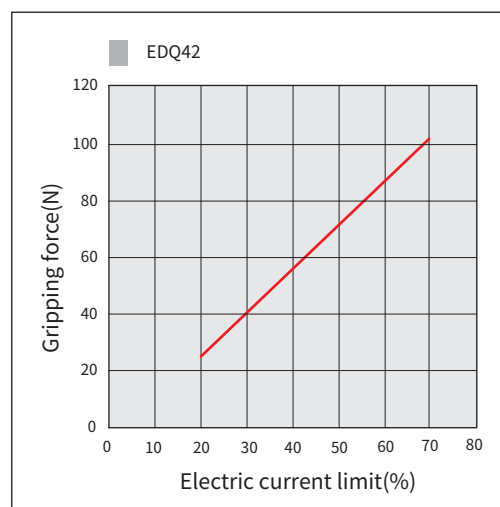
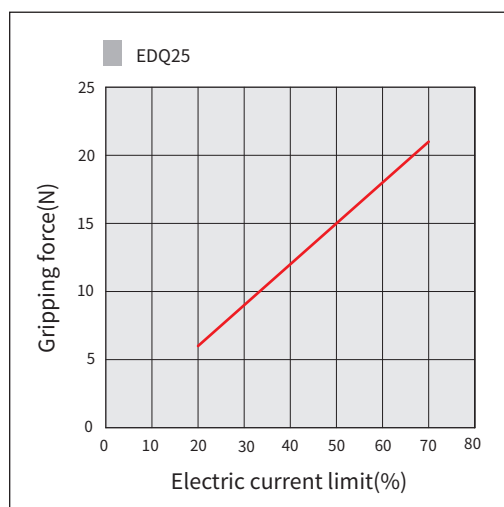
Mark	Actuator
P	P-Servo

* Standard component Refer to page 83

EDQ series 3-Finger Round Body Electric Gripper

Allowable inertia graph, Side mounting, Plate mounting, Bottom mounting

Allowable inertia graph



Side mounting

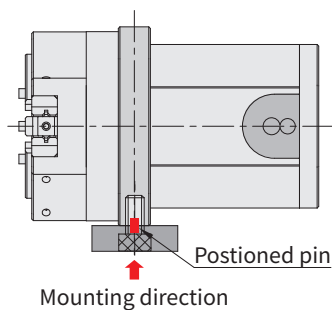
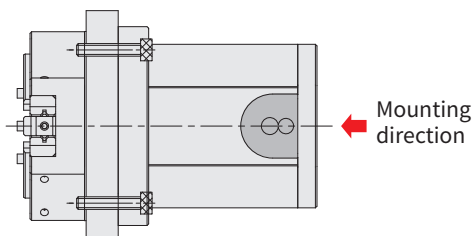
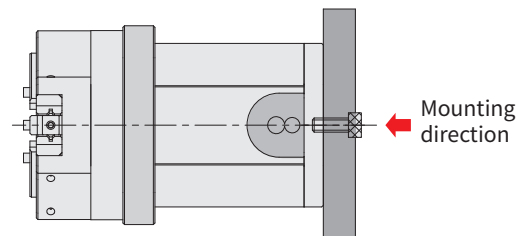


Plate mounting



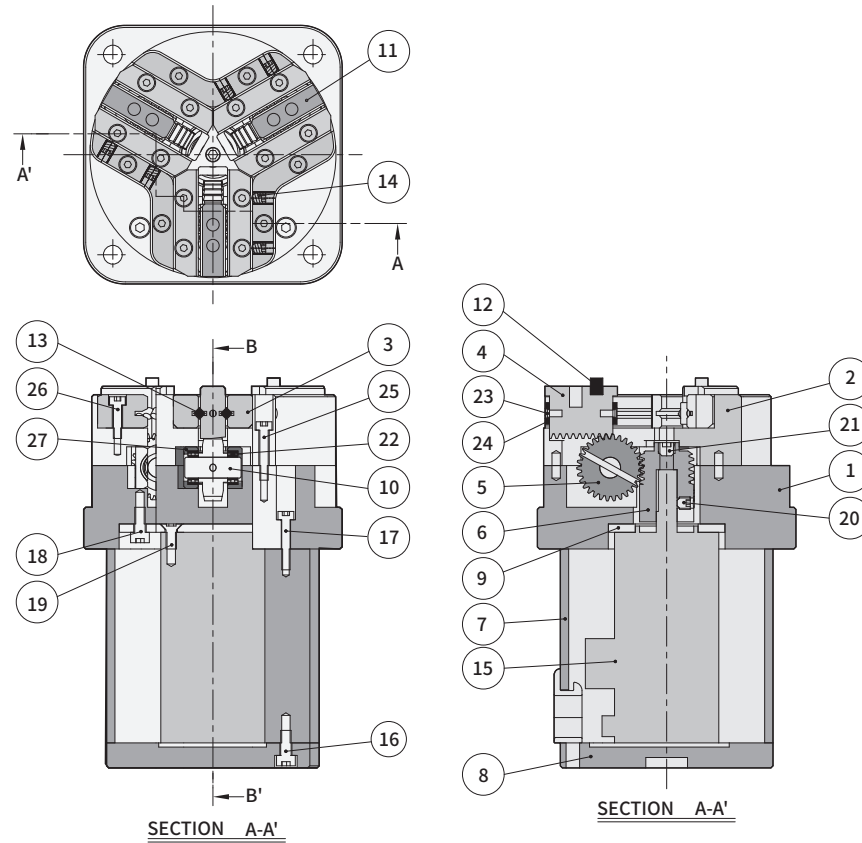
Bottom mounting



EDQ series 3-Finger Round Body Electric Gripper

Internal structure, Components and Material list

EDQ25, EDQ42



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Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	15	Motor	Customized
02	Side Rail Holder	Aluminum alloy	16	Bottom Plate Fixing Screw	Alloy steel
03	Side Rail	Stainless	17	Body Fixing Screw	Alloy steel
04	Finger Plate	Stainless	18	Adapter Plate Fixing Screw	Alloy steel
05	Gear	Stainless	19	Motor Fixing Screw	Alloy steel
06	Screw	Customized	20	Motor Set Screw	Alloy steel
07	Housing	Aluminum alloy	21	Screw Set Screw	Alloy steel
08	Bottom Plate	Aluminum alloy	22	Radial Bearing	Bearing steel
09	Motor Adapter	Aluminum alloy	23	Ball Stop Fixing Screw	Alloy steel
10	Shaft	Stainless	24	Ball Stop	Stainless
11	Finger Plate-2	Stainless	25	Side Rail Holder Fixing Screw	Alloy steel
12	Finger Plate Fixing Pin	Alloy steel	26	Side Rail Fixing Screw	Alloy steel
13	Finger Plate Roller	Bearing steel	27	Bearing Holder	Aluminum alloy
14	Side Rail Set Screw	Alloy steel			

External dimensions

EDQ25



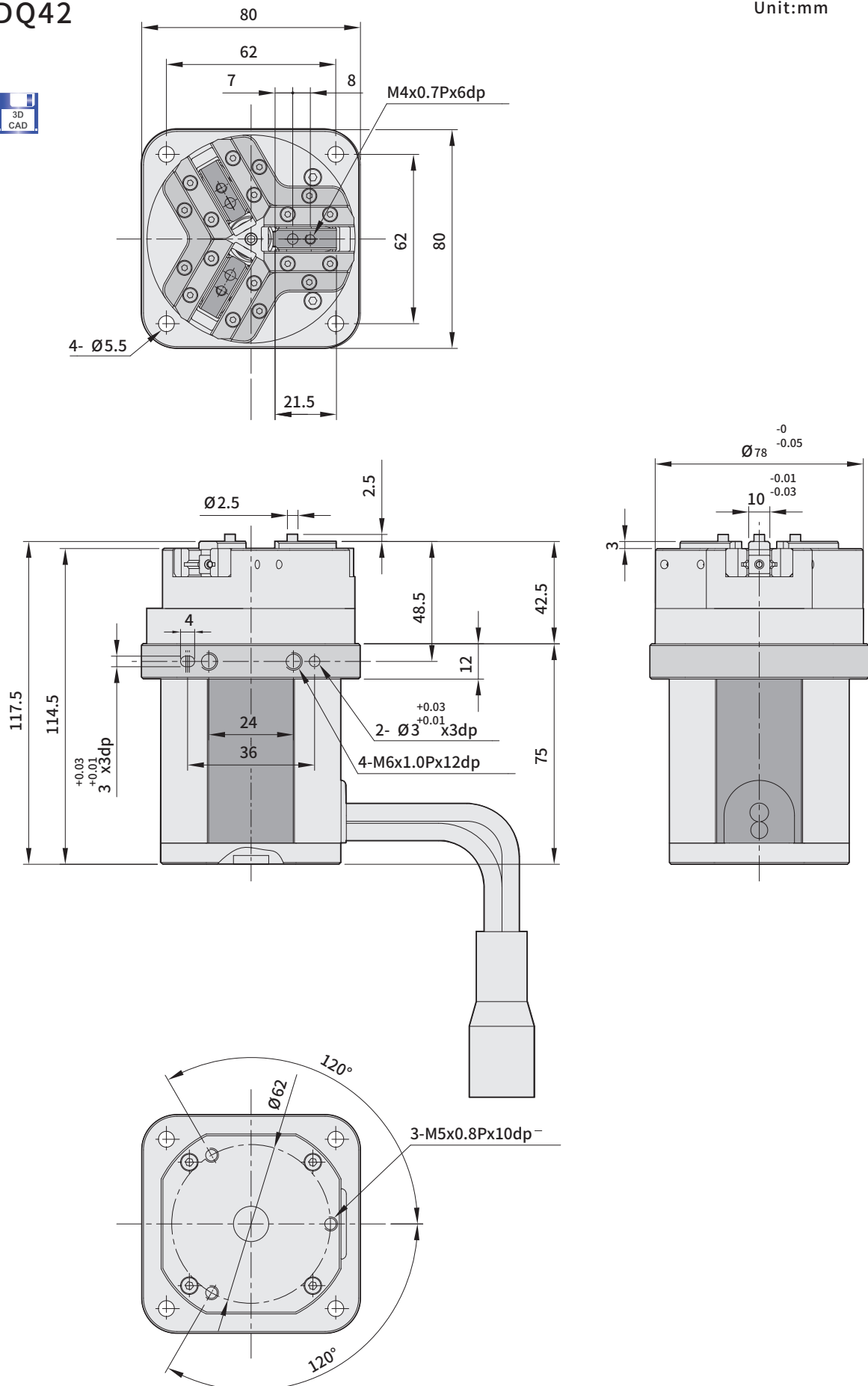
EDQ series 3-Finger Round Body Electric Gripper

External dimensions

EDQ42



Unit:mm



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EDX series Electric Slide Table

EDX16

High rigidity
High pay-load

High precision

Longer
stroke

Light
weight

Large
push
force

100 mm

30~50~75~100 mm

1 kg

1~1.3kg

466 N

233~466N



1

Close-loop motor
Feedback signal

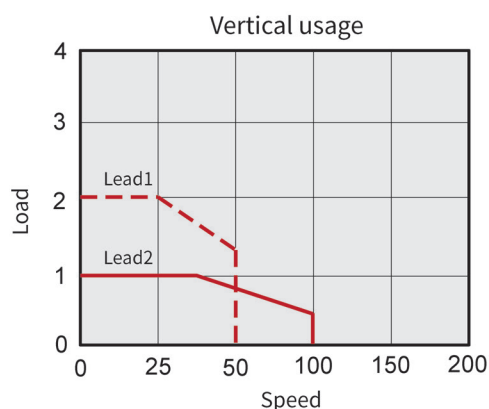
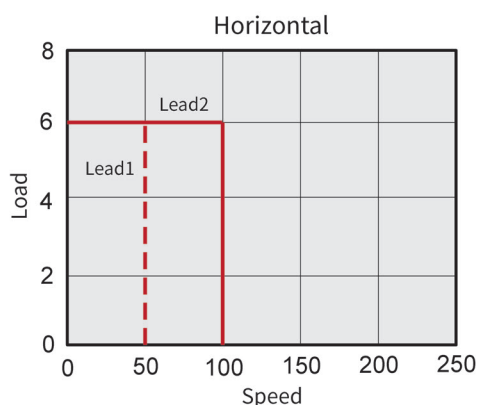
2

Timing belt movement
Synchronized in accuracy

3

Stainless circulation type
Circuit roller slider

Load—Speed curve



EDX series Electric Slide Table

EDX 16

Small size

EDX 16

Max. stroke 100mm

Max. thrust 466N/233N

Motor size 25 □

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Model Selection Sequence-1

Seq 1 Confirm the mass transported and velocity



Seq 2 Confirm the actuation time



Seq 3 Confirm the allowable torque

Seq 1 Confirm the mass transported and velocity

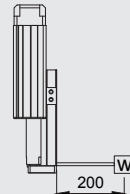
Based on the (velocity–mass transported curve chart) to select the target model by the mass of workpiece and speed.

※EDX16-50 is temporarily selected according to the conditions listed on the right side.

Conditions of Use

- Mass of Workpiece: 0.5 (kg)
- Velocity: 100 (mm/s)
- Installation Method: Vertical
- Stroke: 50 (mm)
- Acceleration/Deceleration: 5,000 (mm/s²)

• Conditions of Workpiece Installation:



Seq 2 Confirm the actuation time

After learning the overall actuation time from Method 1, we can further obtain the details from Method 2, which is described below.

Method 1: confirm by the curve chart (actuation time)

Method 2: confirm by the formula (curve chart of velocity–movable mass)

The actuation time can be thereby calculated by the method as follows.

Actuation Time: to obtain T from the equation as below

$$T = T1 + T2 + T3 + T4 (s)$$

- T1: time of acceleration, and T3: the time of deceleration can be acquired from the equation below.

$$T1 = V/a1 (s) \quad T3 = V/a2 (s)$$

- T2: the time of constant velocity can be acquired from the equation below.

$$T2 = \frac{L - 0.5 \cdot V \cdot (T1 + T3)}{V}$$

- T4: time of stability varies due to different motor models, and different positioning widths of step position, where selection should be made referring to conditions as shown as follows as well as the positioning widths of step position.

$$T4 = 0.15 (s)$$

Example)

Provided the values from T1 to T4 are as follows.

$$T1 = V/a1 = 100/5000 = 0.02 (s)$$

$$T3 = V/a2 = 100/5000 = 0.02 (s)$$

$$T2 = \frac{L - 0.5 \cdot V \cdot (T1 + T3)}{V}$$

$$= \frac{50 - 0.5 \cdot 100 \cdot (0.02 + 0.02)}{100}$$

$$= 0.48 (s)$$

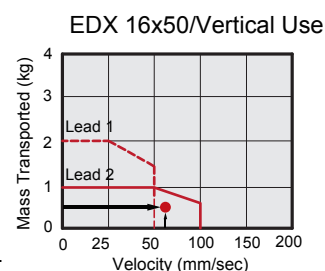
$$T4 = 0.15 (s)$$

Hence, work time: T is

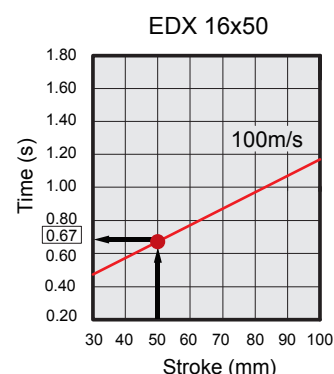
$$T = T1 + T2 + T3 + T4$$

$$= 0.02 + 0.48 + 0.02 + 0.15$$

$$= 0.67 (s)$$



Velocity–Mass Transported Curve Chart



Actuation Time

Seq 2 Confirm the actuation time

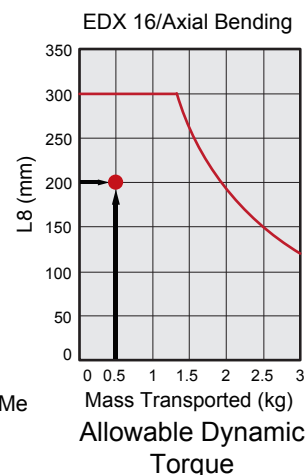
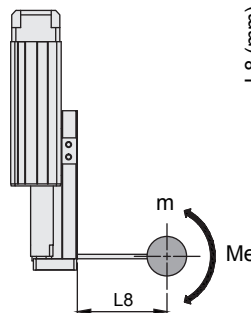
After learning the overall actuation time from Method 1, we can further obtain the details from Method 2, which is described below.

Seq 3 Confirm the allowable (allowable static torque) torque

(allowable static torque)

Please confirm whether the dynamic torque and static torque applied on operating units are allowable.

According to the outcomes shown as above, EDX16–50 is selected.



Model Selection Sequence-1

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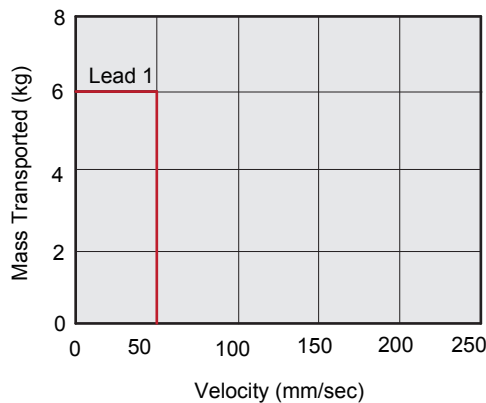
Velocity – Mass Transported Curve Chart

Step Motor (with a DC24V encoder)

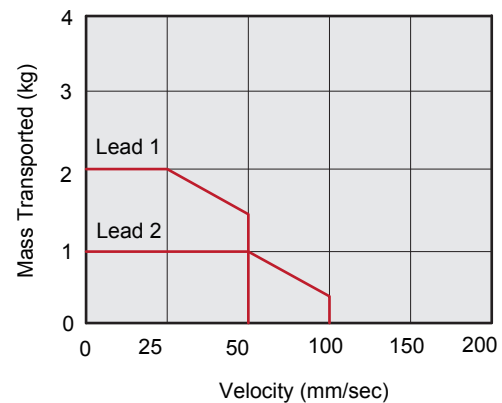
※The table below shows when the positioning thrust force is at 100%

Velocity – Movability Curve Chart

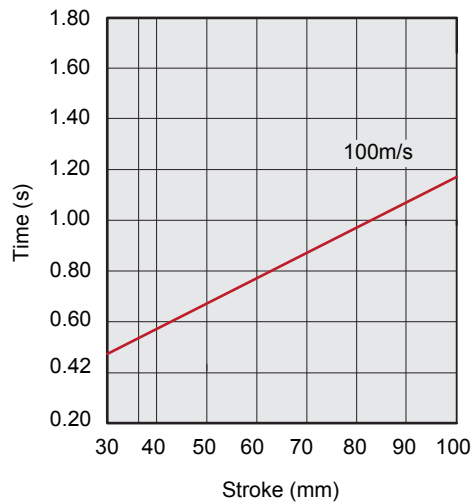
EDX 16 – Horizontal Use



EDX 16 – Vertical Use



Actuation Time



Operating Conditions

Acceleration/Deceleration: 3000mm/s²

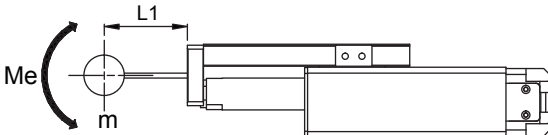
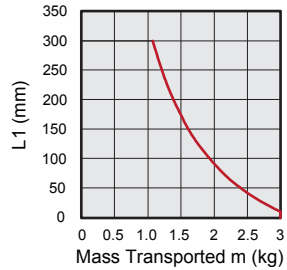
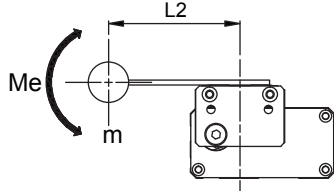
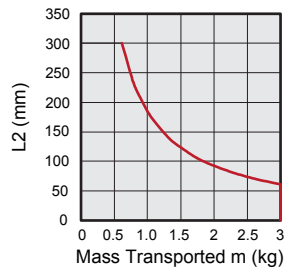
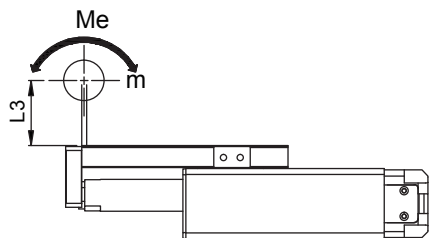
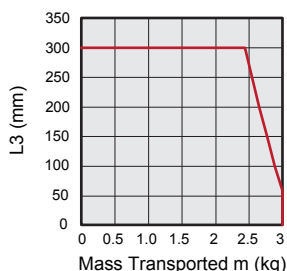
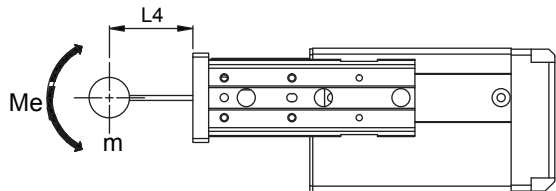
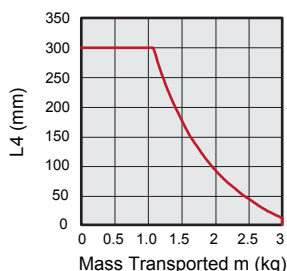
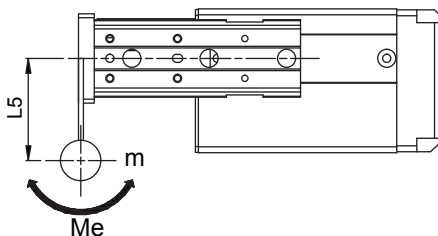
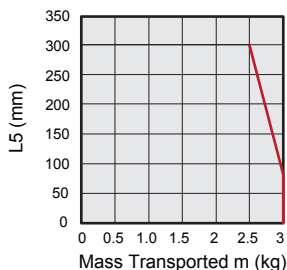
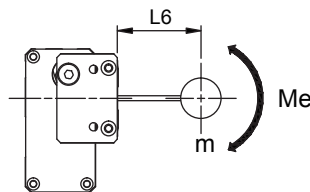
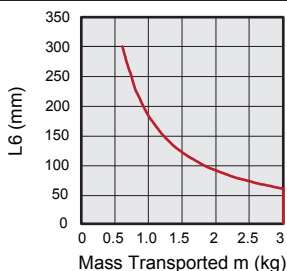
Positioning Width: 0.5mm

Allowable Static Torque

Model		EDX16
Axial Bending	(N·m)	4.8
Biased	(N·m)	4.8
Reverse	(N·m)	1.8

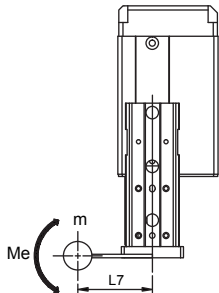
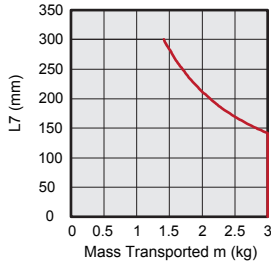
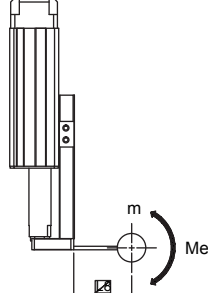
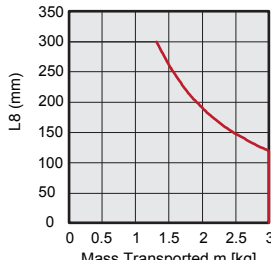
Model Selection Sequence-1

Allowable Torque

Method	Direction of Load Extension m: Mass Transported (kg) Me: Allowable Dynamic Torque (N·m) L: Extension of the Center of Gravity of Workpiece (mm)		Model
			EDX 16
Horizontal • Top		X	
		Y	
		Z	
Walls		X	
		Y	
		Z	

Model Selection Sequence-1

Allowable Dynamic Torque

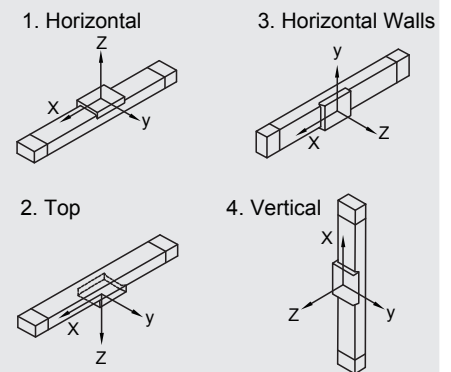
Method	Direction of Load Extension m: Mass Transported (kg) Me: Allowable Dynamic Torque (N·m) L: Extension of the Center of Gravity of Workpiece (mm)	Model
		EDX 16
Vertical		
		

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Calculation of Load Factor of Lead

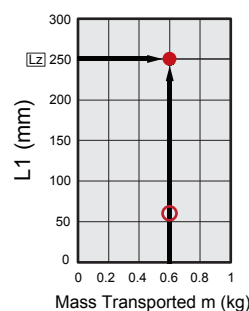
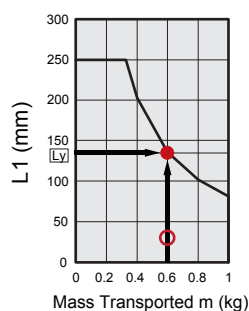
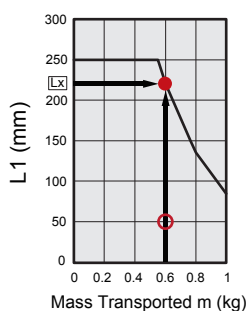
- Determine the conditions of use
Model: EDX
Size: 16
Dimension of Installation: Horizontal/Top/
Horizontal Walls/Vertical
Acceleration (mm/s²): a
Mass Transported (kg): m
Center of Gravity of Mass Transported (mm): Xc/Yc/Zc
- Select the corresponding graphs based on model, size and installation method
- According to the acceleration and mass transported, we can learn the outward extension (mm) from the graphs: Lx/Ly/Lz.
- Solve the load factor of each direction.
 $\alpha_x = X_c/L_x$ $\alpha_y = Y_c/L_y$ $\alpha_z = Z_c/L_z$
- Confirm the sum of α_x , α_y and α_z is less than or equal to 1.
 $\alpha_x + \alpha_y + \alpha_z \leq 1$
If the value exceeds 1, please take the countermeasures such as reducing the acceleration, lowering the mass transported, changing the center of gravity or changing the series.

Installation Method



Example

- Conditions of Use
Model: EDX
Spec: 16
Installation Method: Horizontal
Acceleration (mm/s²): 5000
Mass Transported (kg): 0.6
Center of Gravity of Mass Transported (mm): Xc=50, Yc=30, Zc=60
- Lx=220mm, Ly=135mm, Lz=250mm
- The load factors in each direction are shown as follows.
 $\alpha_x = 50/220 = 0.23$
 $\alpha_y = 30/135 = 0.22$
 $\alpha_z = 60/250 = 0.24$
- $\alpha_x + \alpha_y + \alpha_z = 0.69 \leq 1$



Model Selection Sequence-2

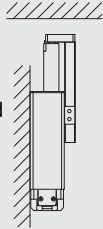
Seq 1 Confirm the required thrust force → **Seq 2** Confirm the setup of thrust force → **Seq 3** Confirm the duty ratio

Example

Conditions of Use

- Thrust Force: 90N
- Mass of Workpiece: 1kg
- Velocity: 100mm/s
- Stroke: 100mm

- Installation Method: Vertical and Upward
- Gripping Time+ Actuation(A): 1.5sec
- Full Actuation Time(B): 6sec



Seq 1 Confirm the required thrust force

The overall required thrust force can be calculated hereby

- Thrust Force: 90 (N)
- Mass of Workpiece: 1 (kg)

Hence, the overall required thrust force is: $90 + 10 = 100$ (N)

According to the Spec Table

- Overall Required Thrust Force: 100 (N)
- Velocity: 100(mm/s). Hence, EDX 16□ is temporarily selected.

Then, we will calculate the necessary thrust force for thrusting.

When selecting a vertical and upward installation method, the mass of the slider carrying the components must also be included.

According to the table of slider mass

- EDX 16□ Slider Mass: 0.55 (kg)

Hence, the required thrust force is: $100 + 5 = 105$ (N)

Seq 2 Confirm the setup of thrust force

Referring to the thrust force default-thrust force line graph, the target model must be selected via necessary thrust force to confirm the thrust force default.

From the right table

- Required Thrust Force: 105 (N)

Hence, EDX 16x□ is temporarily selected.

The thrust force setup is at 40 (%)

Seq 3 Confirm the duty ratio

According to the allowable duty cycle, the allowable duty cycle is confirmed by the thrust force setup.

According to the Allowable Duty Cycle Table

- Thrust Force Setup: 40 (%)

Hence, the allowable duty cycle is 30 (%).

Based on the conditions of use to calculate the duty cycle, where the allowable duty cycle will be acquired depending on the conditions as below.

- Gripping Time+Actuation(A): 1.5sec
- Total Actuation Time(B): 6sec

Hence, the duty cycle is $1.5/6 \times 100 = 25(\%)$, which is within the allowable range.

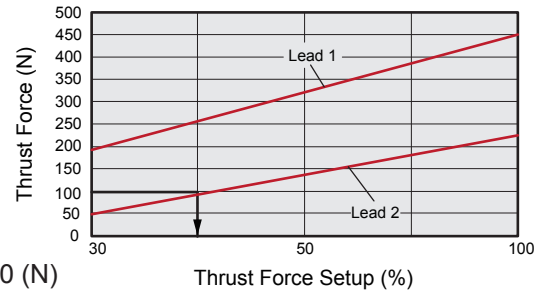
According to the outcomes above, EDX 16-100 is to be selected.

For the selection method of allowable torque, it is as the same as the selection of positioning control.

Model	Stroke (mm)			
	30	50	75	100
EDX 16 Slider	0.27	0.34	0.45	0.55

※Slider mass should be added into the calculation when installing in vertical and upward direction.

EDX 16x□/Step Motor

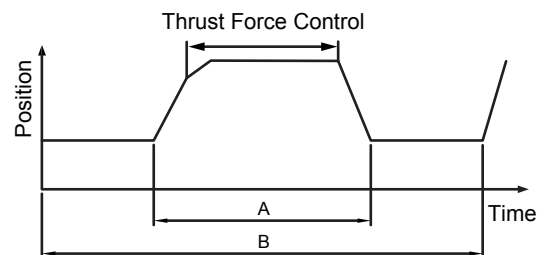


Thrust Force Setup - Thrust Force Line Graph

Allowable Duty Cycle

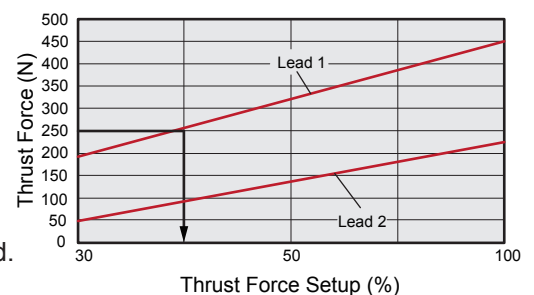
Step Motor (with a DC24V encoder)

Thrust Force Setup (%)	Duty Cycle (%)	Continuous Thrust Time (min)
30	—	—
50 below	30 below	5 below
70 below	20 below	3 below



Thrust Force Default - Thrust Force Line Graph Step Motor (with a DC24V encoder)

EDX 16x□/Step Motor



EDX series Electric Slide Table

Feature, Specification and Code of Order

Feature:

- Belt with Screw Transmission
- Closed-Loop Step Motor
- High Precision



The picture is for reference only.
Please be subject to the specification table.

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Specification

Use occasion	Model	Gripper stroke (mm)	Lead (mm)	Max. thrust (N)	Work load (Kg)		Speed (mm/s)	Actuation type	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Position repeatability (mm)	Idling stroke (mm)	Weight (kg)
					horizontal	vertical								
General environment	EDX 16	30, 50, 75, 100	1	466	6	2	0 ~ 50	Ball screw + belt	5 ~ 40	35 ~ 85	25 □	±0.02	0.3 or less	30mm: 1 50mm: 1.1 75mm: 1.2 100mm: 1.3
			2	233	6	1	0 ~ 100							

Remark 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

EDX - 16 - 30 - 03 - 1 - P

①

②

③

④

⑤

Mark	Type
16	16

Mark	Stroke
30	30 mm
50	50 mm
75	75 mm
100	100 mm

Mark	Cable Length
01	1 m
03	3 m
05	5 m
10	10 m

* Standard : 3m

Mark	Lead
1	1
2	2

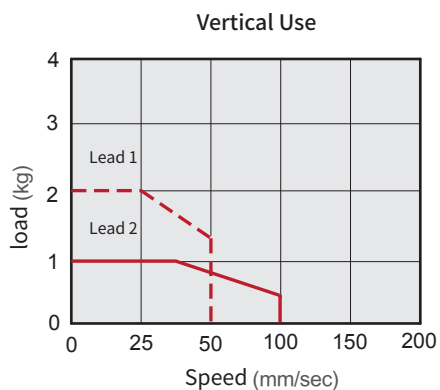
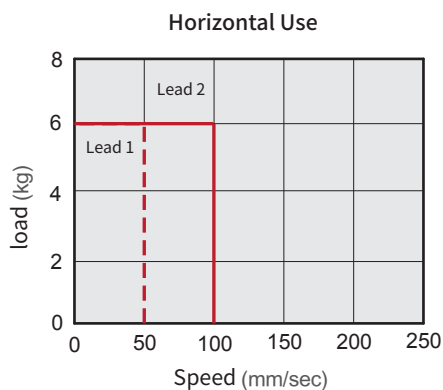
Mark	Actuator
P	P-Servo

* Standard component Refer to page 83

EDX series Electric Slide Table

Load-Speed graph, Table deflection (Reference)

Load-Speed graph



Slide Table Deflection (Reference Value)

Table Deflection by horizontal load

Table Deflection at arrow mark caused by weight of load when Slide Table extends out.

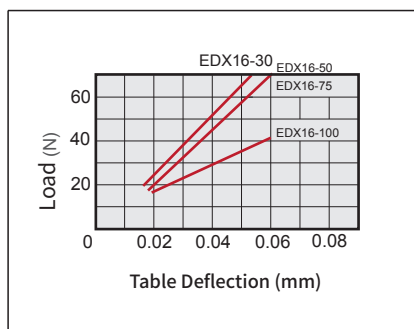


Table Deflection by lateral load

Table Deflection at arrow mark caused by weight of load when Slide Table extends out.

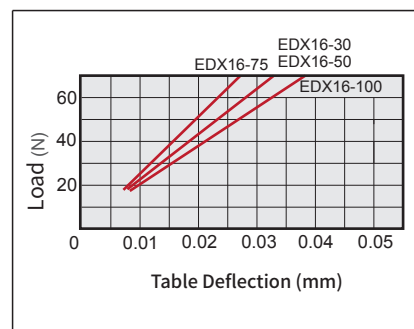
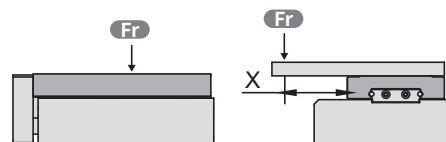
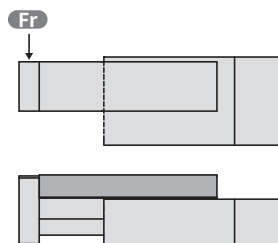
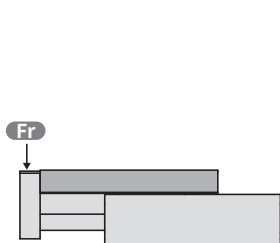
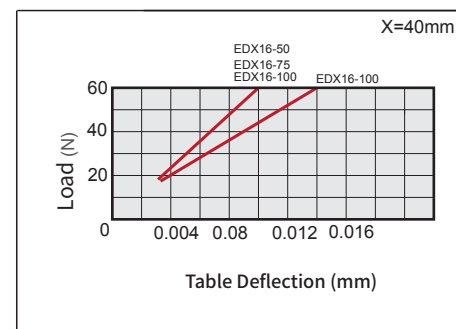


Table Deflection by offset load

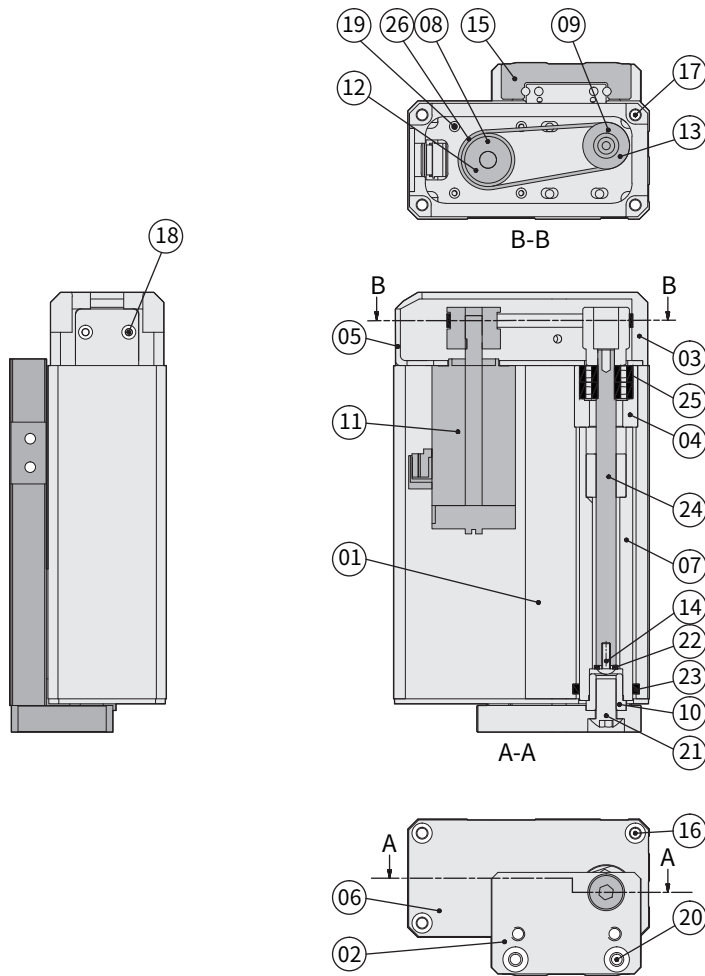
Deflection at arrow mark caused by resulting torque at center of offset load cylinder.



EDX series Electric Slide Table

Internal structure, Components and Material list

EDX16



Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	14	Screw nuts	Alloy steel
02	Front plate	Aluminum alloy	15	Slider with slide base	Stainless
03	Rear cover	Aluminum alloy	16	Front rail fixing screw	Alloy steel
04	Bearing mount ring	Aluminum alloy	17	Rear cover mount screws	Alloy steel
05	Motor fixing plate	Stainless	18	Motor fixing plate fixing screw	Alloy steel
06	Front block	Stainless	19	Motor Fixing Screw	Alloy steel
07	Main shaft	Carbon steel	20	Front slider fixing screw	Alloy steel
08	Motor drive wheel	Aluminum alloy	21	Braces fixing screws	Alloy steel
09	Screw synchronization wheel	Aluminum alloy	22	Screw	POM
10	Bush	Carbon steel	23	Packing	Rubber
11	Closed loop motor	Customized	24	Ball screw	Customized
12	Motor drive wheel set screw	Alloy steel	25	Bearing	Bearing steel
13	Screw synchronization wheel set screw	Alloy steel	26	Timing belt	Customized

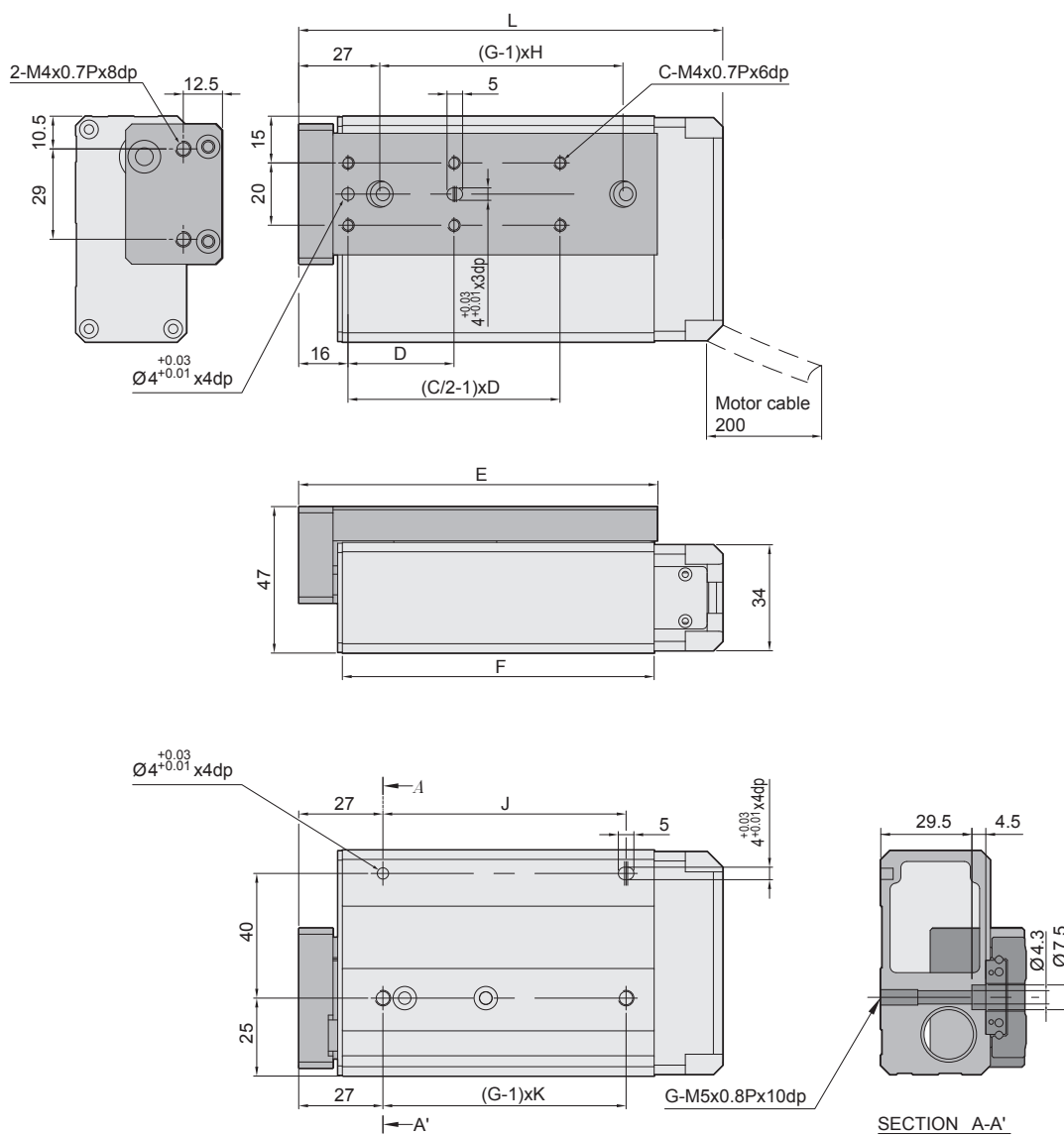
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EDX series Electric Slide Table

External dimensions

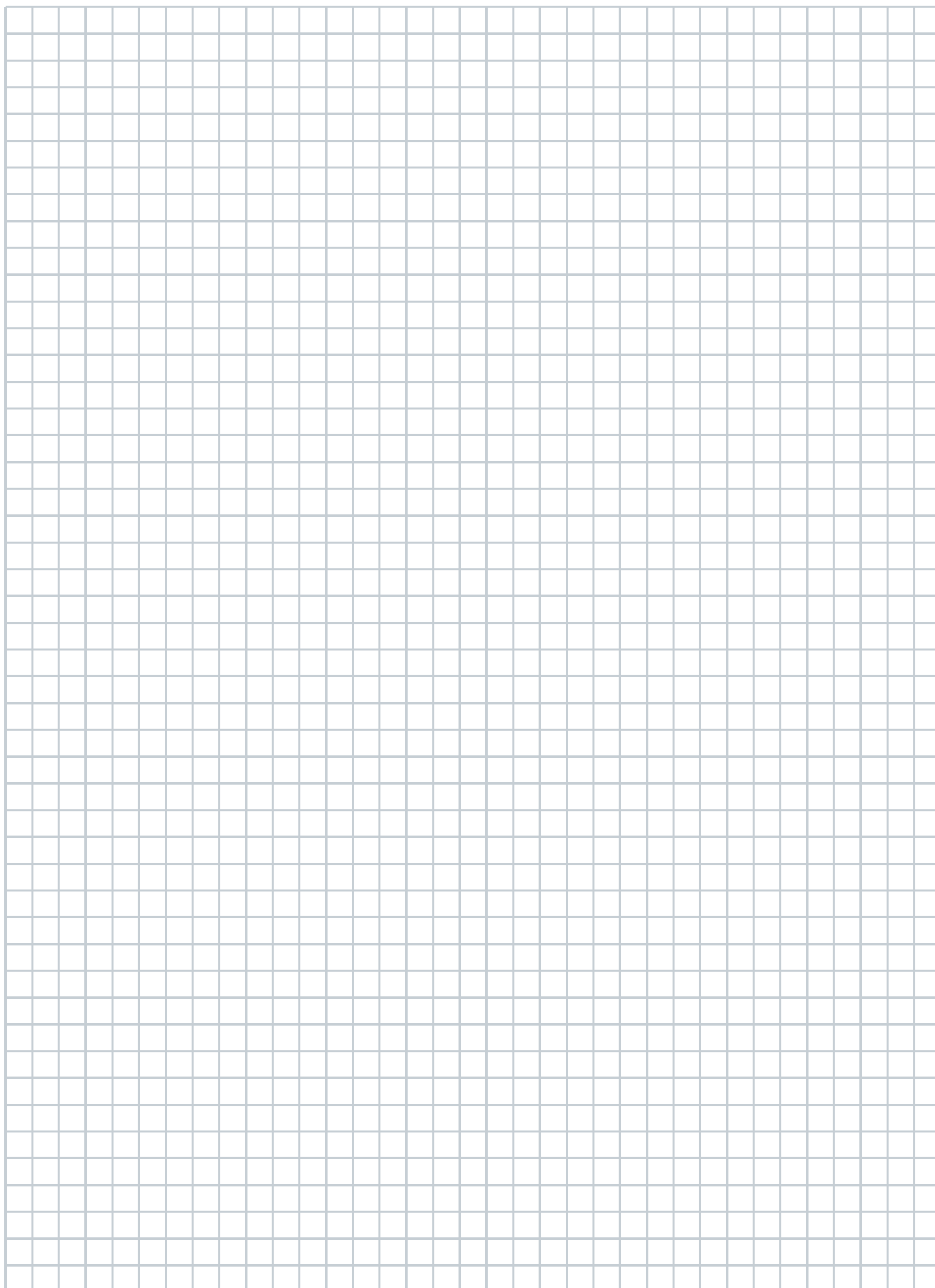
EDX16

Unit:mm



size(mm)	L	C	D	E	F	G	H	J	K
EDX 16-30	108	4	38	85	76	2	40	40	40
EDX 16-50	132	6	34	112	100	2	39	78	78
EDX 16-75	162	8	36	156	130	4	36	72	36
EDX 16-100	182	10	36	181	150	4	36	108	36

Memo



EDK series Electric Slide Table/Open-loop

EDK25/EDK36

Speed Fast

100

mm/s

Weight light

0.4 kg

0.4~1.5kg

Gripping force
Strong

60 N

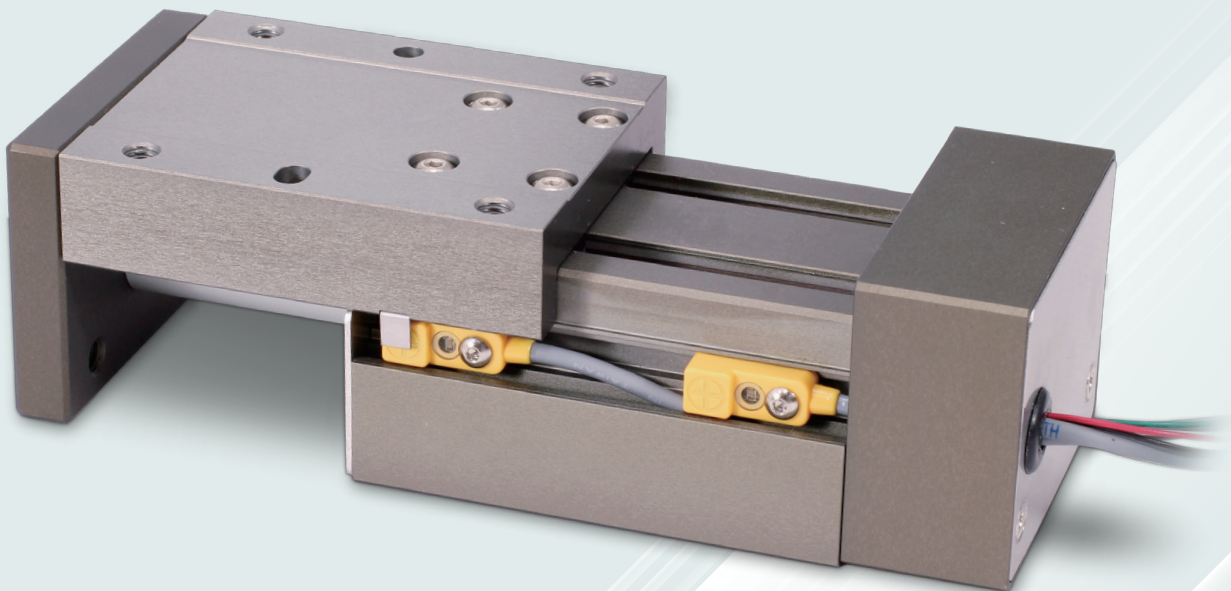
20~60N

Aluminum shell
Large heat dissipation

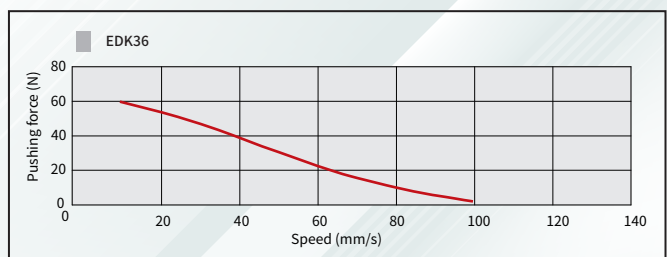
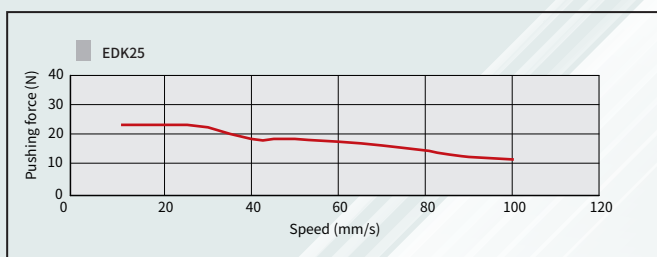
Close-loop motor
Feedback signal

Proximity sensor

fixed point in place without back and forth correction



Pushing force - Speed graph

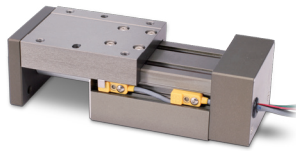


EDK series Electric Slide Table/Open-loop

EDK25/EDK36

Small size

EDK25



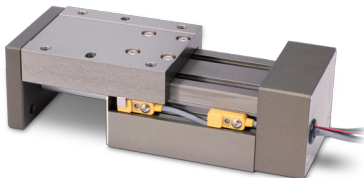
Strokes 25, 50, 75, 100mm

Max. thrust 20N

Motor size 25 (PM)

Large size

EDK36



Strokes 25, 50, 75, 100mm

Max. thrust 60N

Motor size 36 (PM)

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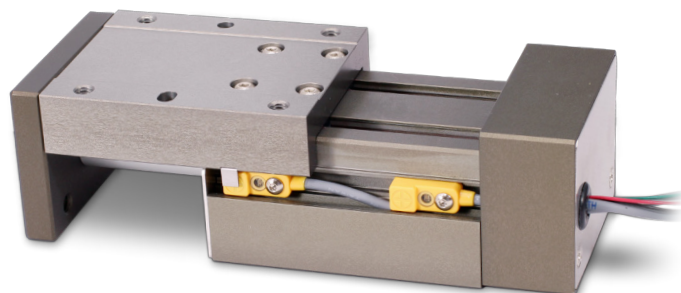
Operation
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EDK series Electric Slide Table/Open-loop

Feature, Specification and Code of Order

Feature:

- Proximity sensor fixed point in place without back and forth correction.
- Used in light loading, stable stop when moving.



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Gripping force (N)	Gripper stroke (mm)	Max. speed (mm/s)	Actuation type	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Repeatability (°)	Weight (kg)
General environment	EDK 25	20	25, 50, 75, 100	100	Ball screw	5 ~ 40	35 ~ 85	25	0.05	25mm:0.4 50mm:0.55 75mm:0.65 100mm:0.8
	EDK 36	60						36		25mm:0.9 50mm:1.1 75mm:1.3 100mm:1.5

Remark 1. Idling stroke:Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

EDK - 25 - 50 - P

① ② ③

①

Mark	Type
25	25
36	36

②

Mark	Stroke(mm)
25	25 m
50	50m
75	75 m
100	130 m

③

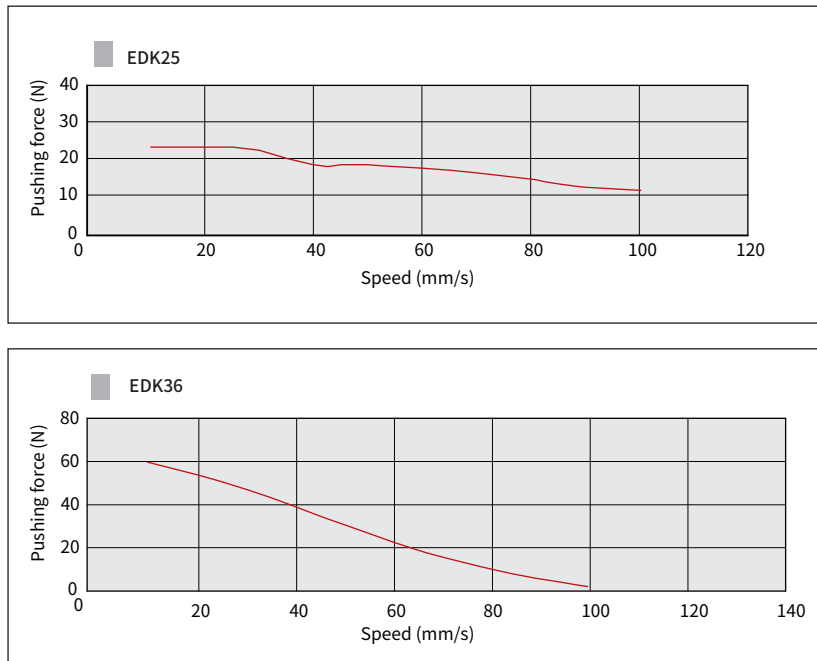
Mark	Actuator
P	OLC-001

* Standard component Refer to page 83

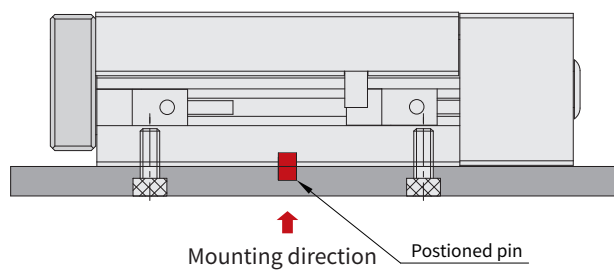
EDK series Electric Slide Table/Open-loop

Pushing force - Speed graph

Pushing force - Speed graph



Screw-hole mounting

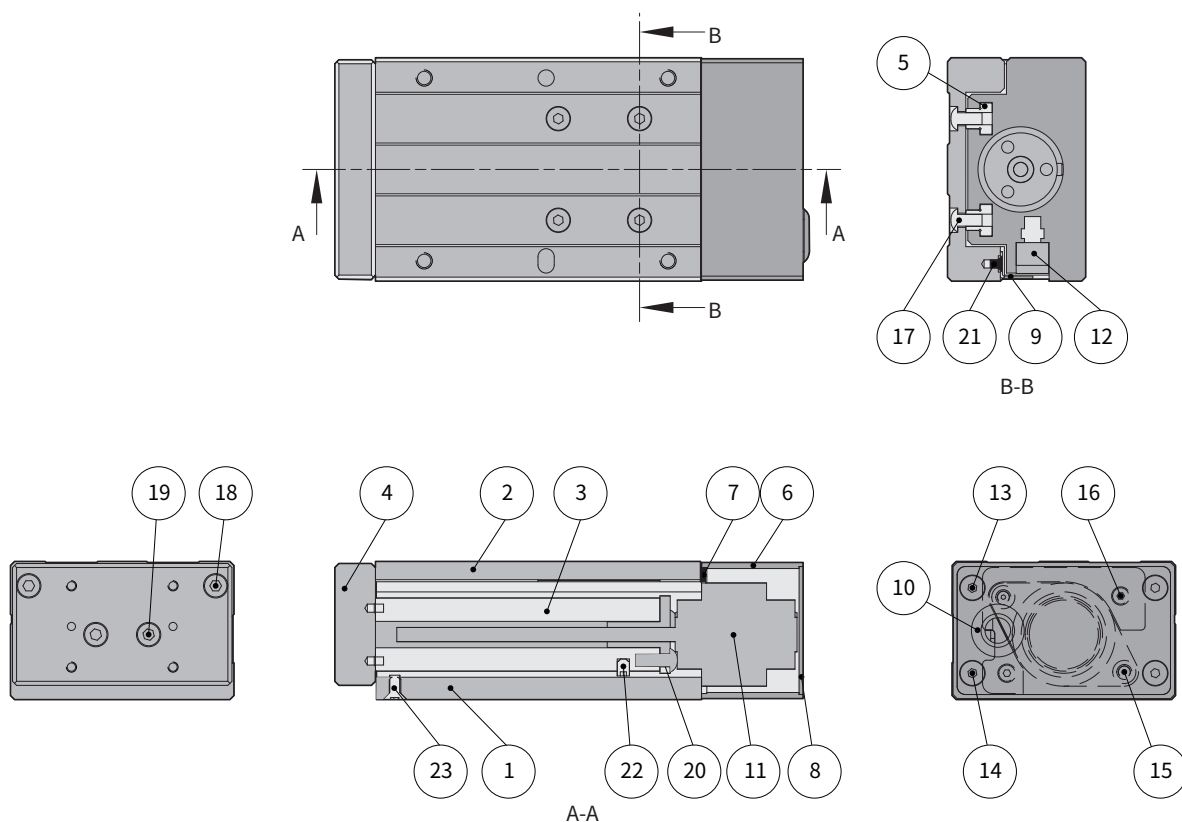


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Internal structure, Components and Material list

EDK25



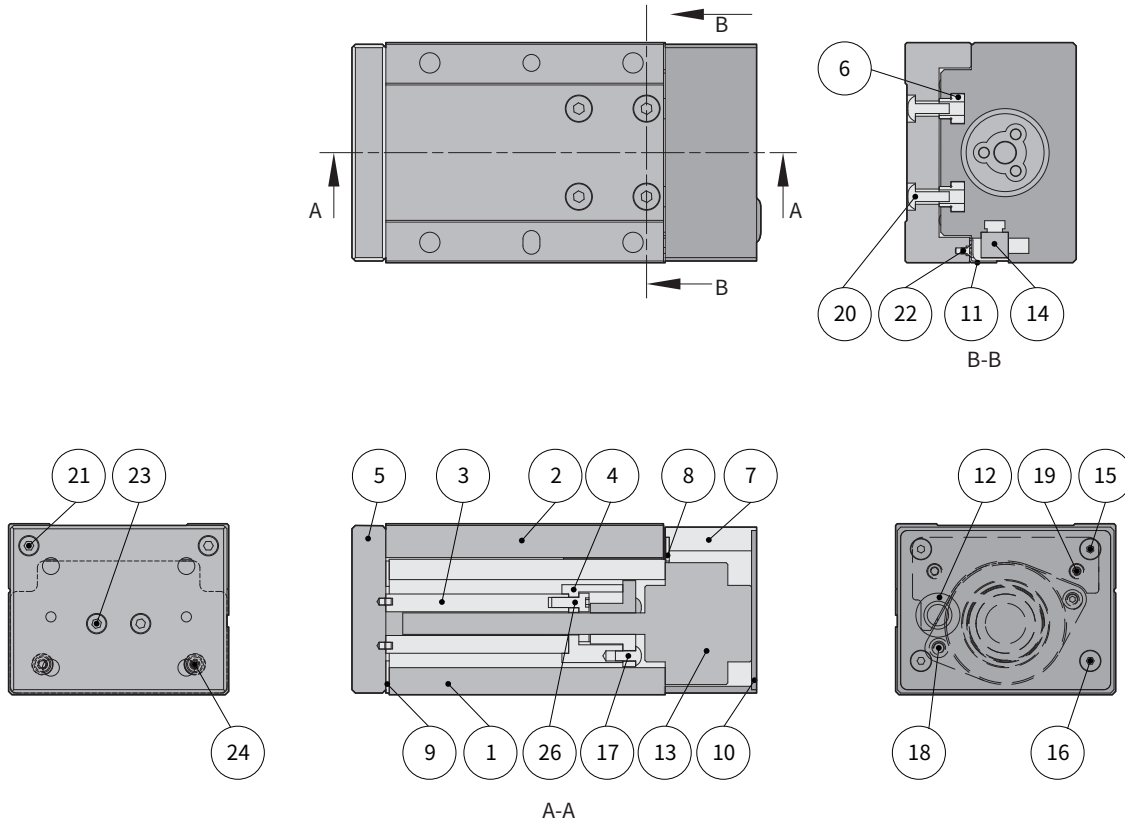
Components and Material list

No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	13	Rear Baffle Fixing Screw	Alloy steel
02	Slide base	Aluminum alloy	14	Rear Baffle Fixing Screw	Alloy steel
03	Adapter Shaft	Aluminum alloy	15	Motor Fixing Screw	Alloy steel
04	Front plate	Aluminum alloy	16	Motor Cover Fixing Screw	Alloy steel
05	T-Slide	Carbon steel	17	T-Slide Fixing Screw	Alloy steel
06	Rear cover	Aluminum alloy	18	Front Slide Fixing Screw	Alloy steel
07	Motor Cover Plate	Stainless	19	Adapter Shaft Fixing Screw	Alloy steel
08	Rear Baffle	Stainless	20	Motor/Adapter Shaft Fixing Screw	Alloy steel
09	Sensing chip	Stainless	21	Sensing Chip Fixing Screw	Alloy steel
10	Grummet	Rubber	22	Adapter Shaft Set Screw	Alloy steel
11	Motor	Customized	23	Body Countersunk Head Screw	Alloy steel
12	Sensor	Customized			

EDK series Electric Slide Table/Open-loop

Internal structure, Components and Material list

EDK36



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Components and Material list

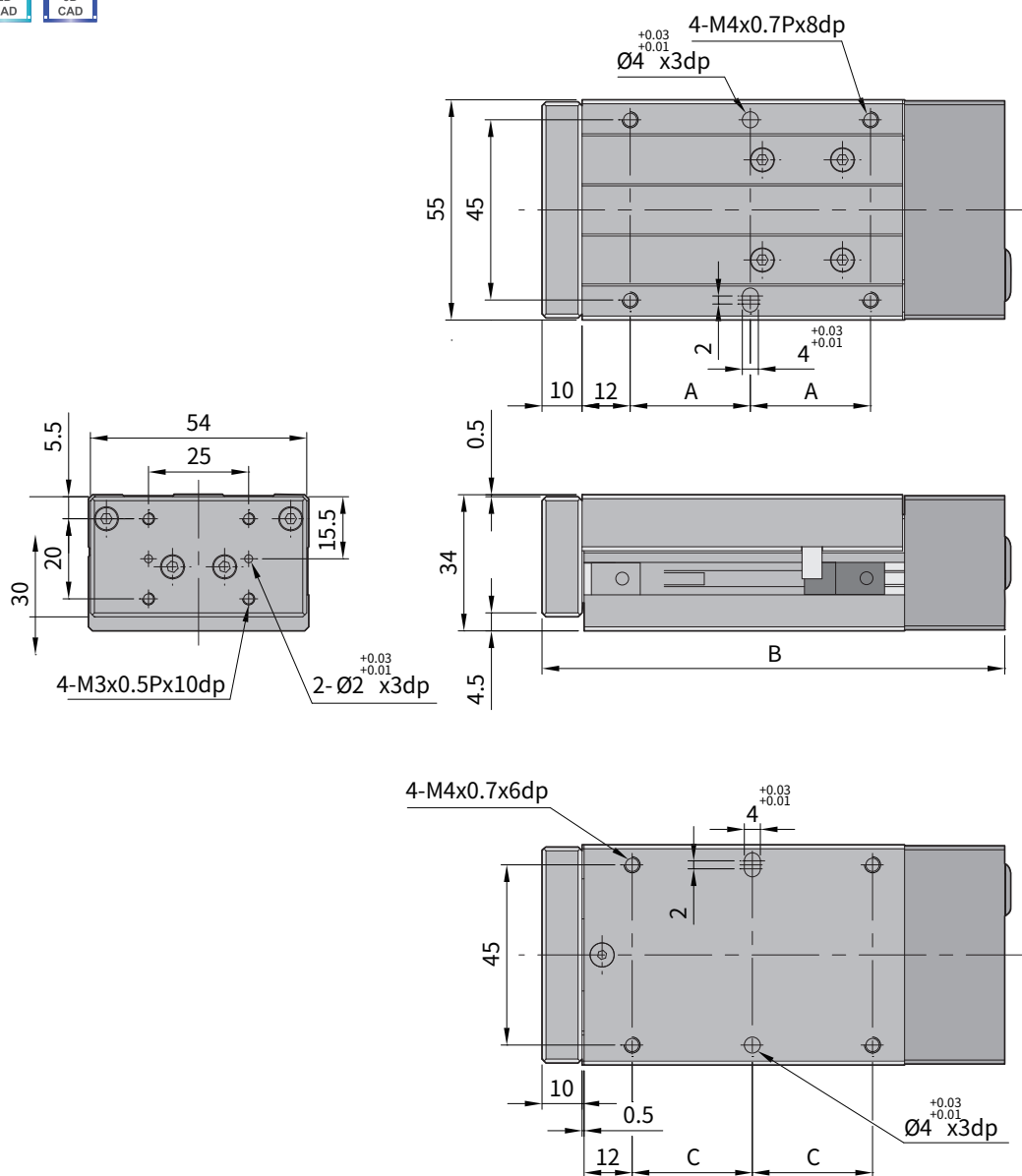
No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	14	Sensor	Customized
02	Slide base	Aluminum alloy	15	Rear Baffle Fixing Screw	Alloy steel
03	Adapter Shaft	Aluminum alloy	16	Rear Baffle Fixing Screw	Alloy steel
04	Adapter Cover	Aluminum alloy	17	Adapter Cover Fixing Screw	Alloy steel
05	Front plate	Aluminum alloy	18	Motor Fixing Screw	Alloy steel
06	T-Slide	Carbon steel	19	Motor Cover Fixing Screw	Alloy steel
07	Rear cover	Aluminum alloy	20	T-Slide Fixing Screw	Alloy steel
08	Motor Cover Plate	Stainless	21	Front Slide Fixing Screw	Alloy steel
09	Front Baffle	Stainless	22	Sensing Chip Fixing Screw	Alloy steel
10	Rear Baffle	Stainless	23	Adapter Shaft Fixing Screw	Alloy steel
11	Sensing chip	Stainless	24	Front Baffle Fixing Screw	Alloy steel
12	Grummet	Rubber	25	Adapter Cover, Shaft Fixing Screw	Alloy steel
13	Motor	Customized			

EDK series Electric Slide Table/Open-loop

External dimensions

EDK25

Unit:mm



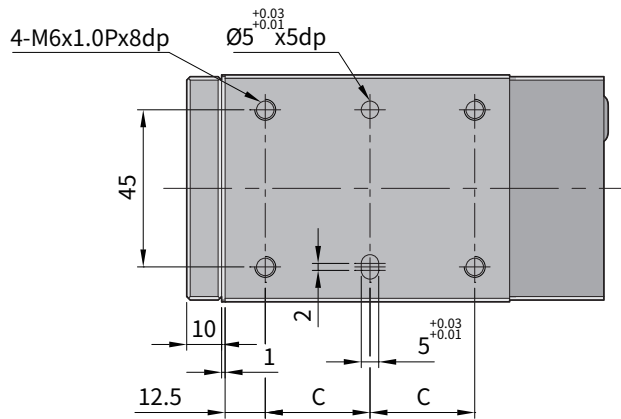
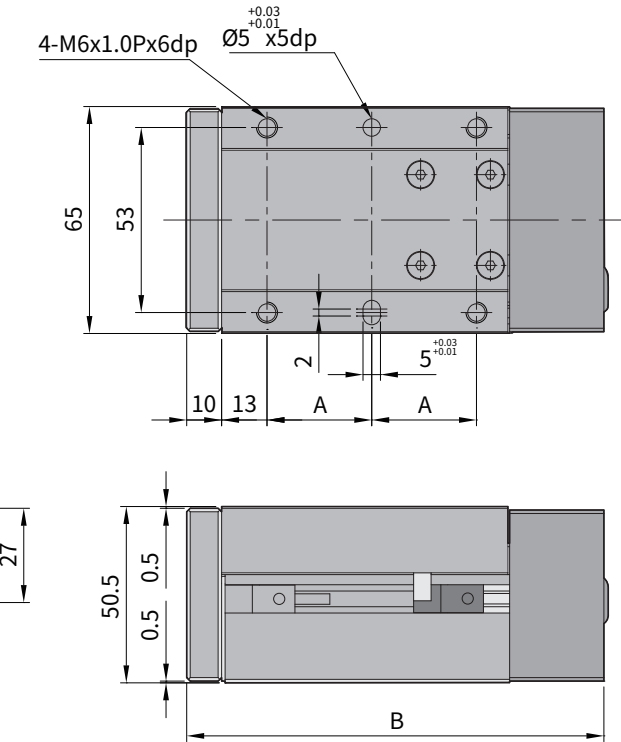
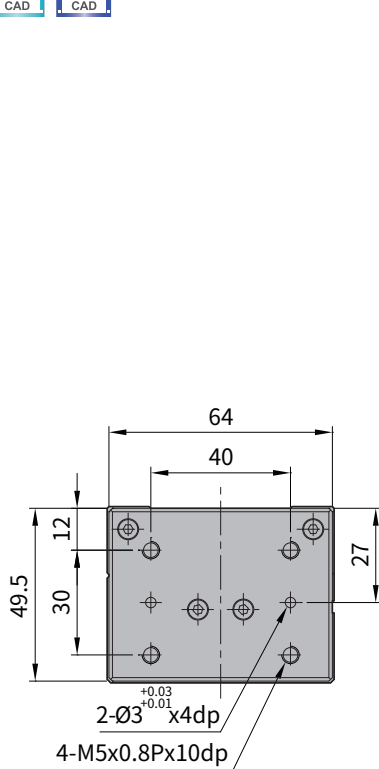
Size(mm)	A	B	C
EDK 25-25	17.5	90.5	17.5
EDK 25-50	30	115.5	30
EDK 25-75	42.5	140.5	42.5
EDK 25-100	55	165.5	55

EDK series Electric Slide Table/Open-loop

External dimensions

EDK36

Unit:mm



Size(mm)	A	B	C
EDK 36-25	17.5	94.5	17.5
EDK 36-50	30	119.5	30
EDK 36-75	42.5	144.5	42.5
EDK 36-100	55	169.5	55

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OLC-001 Drive Instruction

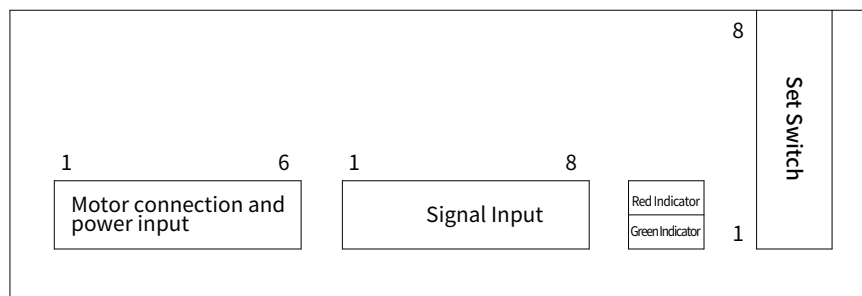
Technical Parameters

- Power Input: DC20V-30V
- 8-level Current selectable
- PPMW constant current bipolar subdivision Drive
- 16-level subdivision selection
- Single-/Double-Pulse Selection
- Optically Isolated Input: 5-24VDC compatible
- Motor Short-circuit Protection
- Self-diagnosis
- Compact design, low noise, low vibration
- Off-line capability provided

Technical Parameters

Drive Model		OCL-001
Applicable Motor		2-phase mixed step motor; maximum 3.2A (peak) applicable for OCL-001
Power Supply		20 - 30V DC
Output Current		OCL-001: 0.4A-3.2A /phase (peak)
Drive Method		Full-bridge bipolar PWM Drive
Input Signal	Pulse signal	Photocoupler input voltage H=3.5-26V, L= 0-0.8V Trigger Current 6-15mA 5V and 24V signals compatible
	Off signal	
	Direction Signal	
Dimensions		94(L)x27(W)x60(D), without plug-in program
Weight		Approx. 180g
Use Environment	location	Avoid dust, oil mist and corrosive gas
	Humidity	<85% RH, no condensation
	Temperature °C	0~40
	Heat Dissipation	Installed in ventilated environment

Illustration and Interface Definition

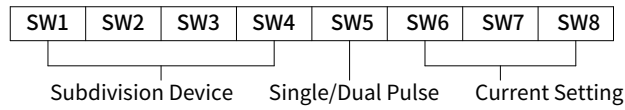


1. Signal input (as shown in the figure, from the left to the right)
Pin1 – Pulse STEP+, Pin2 – Pulse STEP-; Pin3 –Dir+; Pin4 – Dir+
Pin5 – Off-line FREE+; Pin6 - Off-line FREE-; Pin7 – OUT+; Pin8- OUT-
2. Motor Connection and Power Input (as shown in the figure, from the left to the right)
Pin1 – V+; Pin2 –V-; Pin3 - A+; Pin4 – A-; Pin5 – B+; Pin6 – B-

EDK series Electric Slide Table/Open-loop

OLC-001 Drive Instruction

Set Switch



3.Subdivision Device

DIP Switch				Pulse number, revolution
SW1	SW2	SW3	SW4	
ON	ON	ON	ON	400
ON	ON	ON	OFF	800
ON	ON	OFF	ON	1600
ON	ON	OFF	OFF	3200
ON	OFF	ON	ON	6400
ON	OFF	ON	OFF	12800
ON	OFF	OFF	ON	25600
ON	OFF	OFF	OFF	102400
OFF	ON	ON	ON	1000
OFF	ON	ON	OFF	2000
OFF	ON	OFF	ON	4000
OFF	ON	OFF	OFF	5000
OFF	OFF	ON	ON	8000
OFF	OFF	ON	OFF	10000
OFF	OFF	OFF	ON	40000
OFF	OFF	OFF	OFF	100000

4. Current Setting

DIP Switch			OLC-001 Phase Current
SW6	SW7	SW8	
ON	ON	ON	0.4A
ON	ON	OFF	0.8A
ON	OFF	ON	1.2A
ON	OFF	OFF	1.6A
OFF	ON	ON	2.0A
OFF	ON	OFF	2.4A
OFF	OFF	ON	2.8A
OFF	OFF	OFF	3.2A

5. Operation Mode

SW5	Running Direction	Remark
ON	Dual Pulse	
OFF	Pulse + Direction	

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OLC-001 Drive Instruction

Pulse + Direction Mode: Apply pulse at pulse input end; Motor rotates in one direction when Photocoupler at Direction input is OFF; Motor rotates in the other direction when Photocoupler at Direction input is ON.

Dual Pulse Mode: Motor rotates in one direction when pulses are applied at Pulse input; Motor rotates in the other direction when pulses are applied at Direction input.

Note: Switch Multiple Use (Test Run Function) is used for testing drive function. Toggle SW5 to ON when power is turned off; then switch the Power on. Toggling SW5 from ON position to OFF and toggling it back after 1 second, this will activate the try-run function; (with the applicable phase current, Motor will rotate 1 revolution respectively in CW and CCW direction at speed of 1 turn/s).

6. Phase lock current

When there is no pulse input for 500ms, the current will be automatically lowered to 50% of the setting value (default setting) to reduce heat generation; the current resumes to setting value when pulse is input. Consultation with our company is recommended if the customer demands that the phase current to be maintained at 10%-90% when there is no pulse input, for ensuring phase-locked torque (motor will dissipate more heat).

7. Functions of Indicators

The product has 2 LED indicators, 1 red and 1 green, for status indication:

Function	Indicator Status	Description
Motor Stop	Green LED blinks	No impulse input or Drive off-line
Motor Run	Red LED on constantly	Impulse inputting, motor running
Motor Overcurrent	1 Green + 1 Red	Excessive phase current in Motor or Drive failure
Motor not connected	1 Green + 2 Red	Motor not connected
Overvoltage	1 Green + 3 Red	Input Voltage > 50V
No voltage	1 Green + 4 Red	Input Voltage < 18V
Other Fault	1 Green + 5 Red	

Power Supply :

Voltage

Cut-off Wave Drive constantly alters magnitude and direction of voltage across motor windings, and takes current measurements to ensure precise phase current. For ensuring to maintain high efficiency and low noise at the same time, voltage supplied to the Drive must be at least 5 times the Rated Phase Voltage of the Motor (and Motor Rated Phase Current x Phase Resistance). If you want better high-speed performance of the motor, you need to increase the supply voltage to the Drive. If voltage-regulated power supply is used, its voltage shall not exceed 30V. Since rated current of non-voltage-regulated power supply is the full load current; when the load is light, such as the motor is not running, the actual voltage is almost 1.4 times of the rated voltage. To ensure smooth and quiet motor operation, a lower voltage shall be used.

Current

Maximum supply current shall be the sum of 2 phase currents; in general conditions, the current you need is dependent on the model, voltage, rpm and load conditions of the motor. The actual current value is significantly lower than the maximum current value. Since the Drive uses switching mode amplifier, the applied high-voltage low-current supply is converted into low-voltage and high-current, the more the supplied voltage exceeds the motor rating, the lesser supply current will be needed.

Recycled Power Discharge

When the motor decelerates, it will convert dynamic energy into electricity like a power generator. Some energy will be consumed by the Drive and motor. If your application has large load in high-speed operation, substantial dynamic energy will be converted into electricity; which tends to activate a Drive alarm (overvoltage), or even to damage the Drive. Since this Drive is provided with polarity protection that prevents reversed connection of power source, thereby damage of the Drive; the shortcoming of this function is that the current can only flow in from the power supply but no flow-out of the Drive, therefore the external absorption resistance or capacitor is of no use.

If your application has large load in high-speed operation, please consult with our company in advance, for shielding the polarity protection function and for connecting external absorption resistance and capacitor. When there is no polarity protection in place, attention must be paid not to connect the positive and negative poles reversely; damage cause by reversed connection is not covered by the warrant.

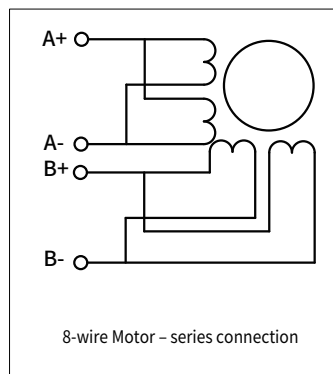
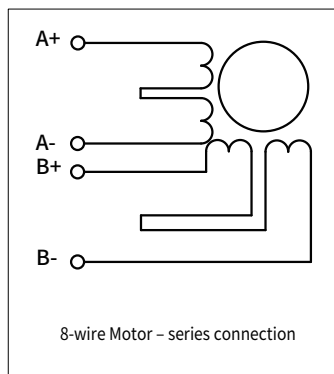
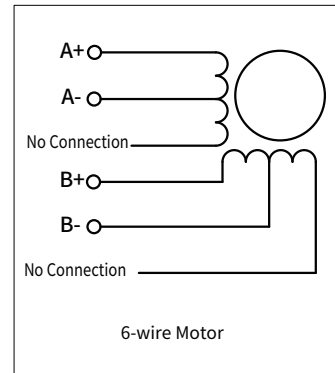
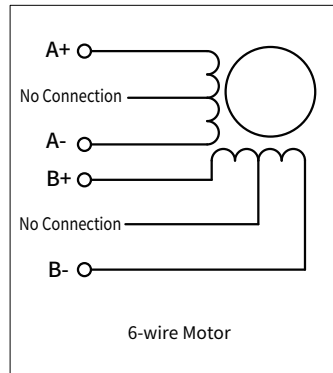
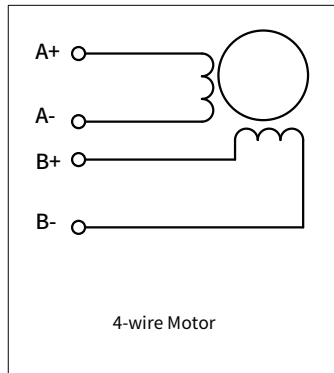
EDK series Electric Slide Table/Open-loop

OLC-001 Drive Instruction

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Motor Connecti

Warning: When connecting a motor to the Drive, make sure the power to the motor is turned off. Make sure that unused motor leads are not short-circuiting with other objects. Never cut off the motor when the Drive is energized. Never connect motor leads to the Ground or to Power Supply.



1. A 4-wire motor can only be connected by one method.
2. A 6-wire motor can be connected in 2 ways: Full winding or half winding. In full winding mode, the motor gives higher torque at low rpm, but is unable to run as fast as in the half winding connection. When running the motor with full winding, make sure the current is lower than 30% of that for the full winding connection, otherwise motor may overheat.
3. An 8-wire motor can be connected in 2 ways: Series or Parallel. Series connection gives higher torque at low speed but less torque at high speed. When running in series connection, provide 50% current as for the series connection to prevent from overheating.

Caution :

1. Different motors have different corresponding (wire) colors; refer to motor data sheet for guidance. For example, model 28 and model 42 motors have different wire colors.
2. Phases are relative, though windings of different phases shall not be connected to terminals of a same phase of the Drive (A+ and A- belong to one phase; B+ and B- belong to another). Should the motor rotate in an unexpected direction, just change positions of A+ and A-.
3. This Drive can only drive 2 phase mixed type step motors; it cannot drive a 3-phase or 5-phase step motor.
4. How to verify the correct connection of step motor in series or parallel mode: Turn the motor shaft when the motor is not connected to the Drive; if the shaft is turned easily, the connection is correct; if it is sluggish or accompanied with certain noise, the connection must be wrong.

EQX series Electric Actuator

EQX10

Max.
Stroke

100mm

25·50·75·100 mm

Position
repeatability

±0.02mm

Max.
High

100mm/s

50·100 mm/s

Thin type and
light slider

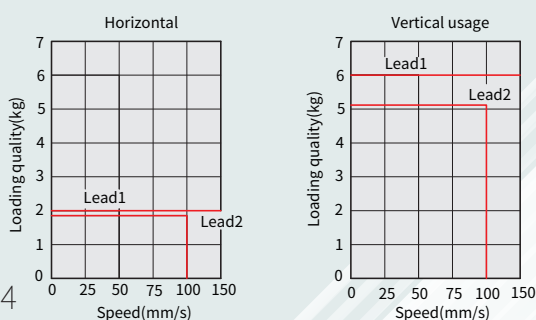
Circuit roller slider

Direct moving;
Synchronized
in accuration

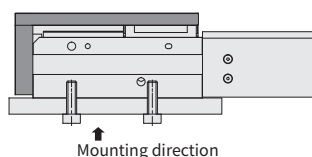
Aluminum shell
Large heat dissipation

Close-Loop step motor

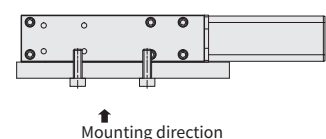
Affordable loading in speed curve



■ Front side mounting



■ Side mounting

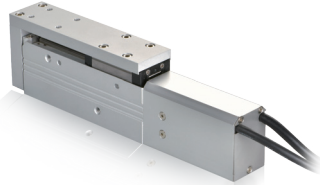


EQX series Electric Actuator

EQX10

Small size

EQX 10



Max. stroke 100mm

Position repeatability ± 0.02

Motor size 25 □

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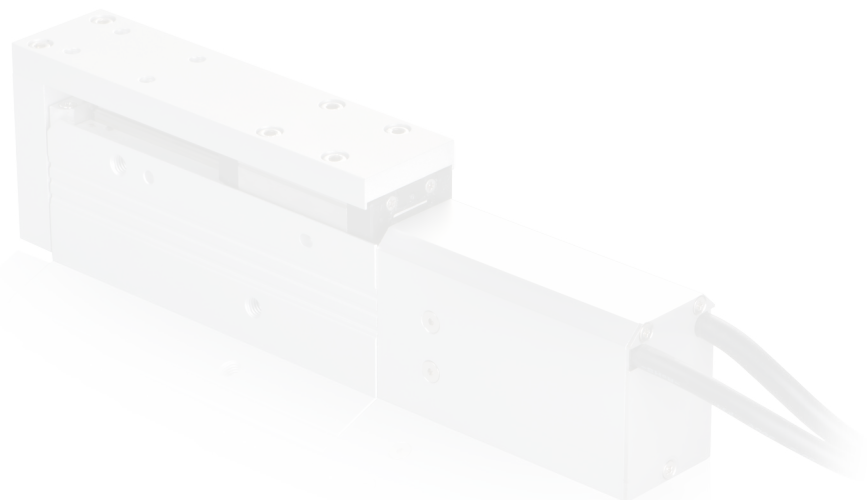
EQX

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Product Application Examples

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Operation Instructions



Model Selection Sequence-1

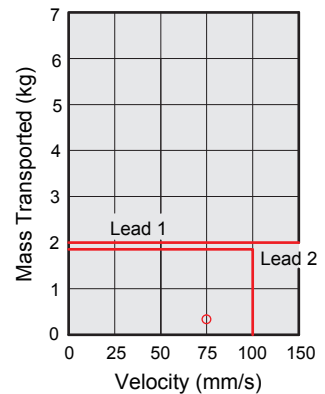
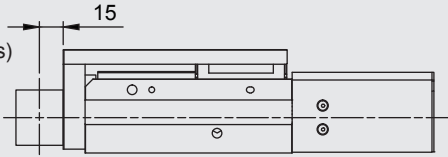
Positioning Control, Sequence Selection

Seq 1 Confirm the mass transported and velocity → **Seq 2** Confirm the actuation time (vertical move)

Example

Conditions of Use

- Mass of Workpiece: 0.25 (kg)
- Velocity: 100 (mm/s)
- Acceleration/Deceleration: 3,000(mm/s)
- Stroke: 50 (mm)
- Installation Condition: Horizontal Move



Seq 1 Confirm the mass transported – velocity and velocity – vertical movable mass graphs

Refer to the velocity – vertical move mass graph, where the target model is to be selected by mass and speed of workpiece.

Example

From the right graph, EQX 10 is temporarily selected.

Seq 2 Confirm the actuation time

From the calculations shown as below, we can obtain the actuation time. Actuation Time:

T can be solved through the equation below

$$T = T1 + T2 + T3 + T4(s)$$

- T1: Acceleration Time, and T3: Deceleration Time

From the equation below we can learn:

$$T1 = V/a1(s) \quad T3 = V/a2(s)$$

- T2: time of constant velocity can be obtained through the equation below.

$$T2 = \frac{L - 0.5 \cdot V \cdot (T1 + T3)}{V} \quad (s)$$

- T4: time of stability, which might vary due to different motor models, loads and positioning widths of step position; the values shown as follows should be included considering the selection.

$$T4 = 0.15(s)$$

Example

The values from T1 to T4 are shown as follows.

$$T1 = V/a1 = 100/3000 = 0.033(s)$$

$$T2 = \frac{L - 0.5 \cdot V \cdot (T1 + T3)}{V} = \frac{50 - 0.5 \cdot 100 \cdot (0.033 + 0.033)}{100}$$

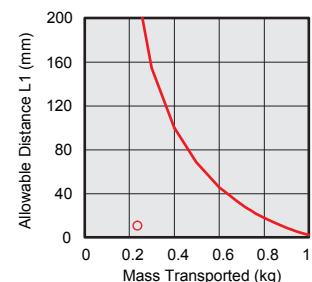
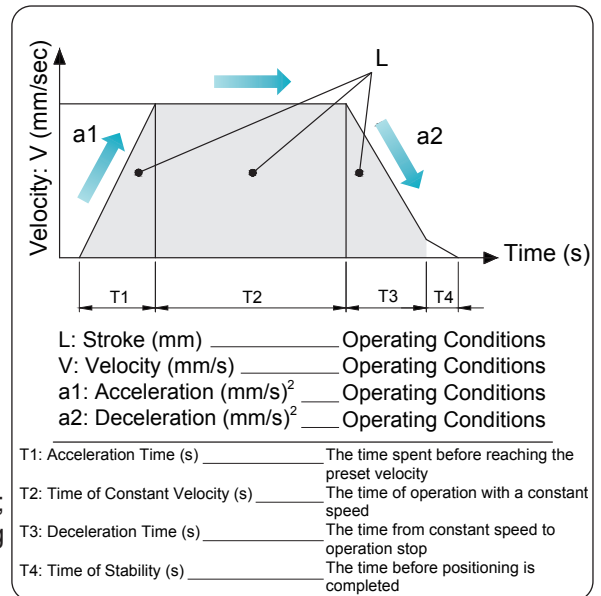
$$T3 = V/a2 = 200/3000 = 0.033(s)$$

$$T4 = 0.15(s)$$

As a result, the actuation time: T is

$$T = T1 + T2 + T3 = 0.033 + 0.467 + 0.033 + 0.15 = 0.683(s)$$

From the outcomes shown as above, EQX 10 is selected



Model Selection Sequence-2

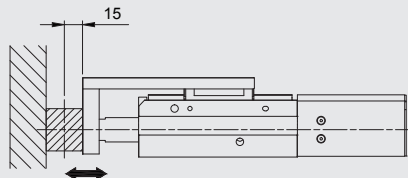
Thrust Control, Sequence Selection

Seq 1 Confirm the duty cycle → **Seq 2** Confirm the thrust force → **Seq 3** Confirm the allowable distance – movable mass curve

Example

Conditions of Use

- Installation Condition: horizontal (touch)
- Duty Cycle: 30(%)
- Jig Mass: 0.3(kg)
- Velocity: 100 (mm/s)
- Thrust Force: 120(N)
- Stroke: 40 (mm)



Seq 1 Confirm the duty cycle Conversion Table of Thrust Force – Duty Cycle

Refer to the conversion table of thrust force–duty cycle According to the duty cycle to select “thrust force”.

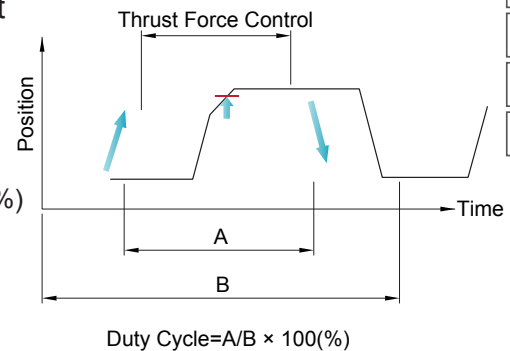
Example

From the table below, we can learn that the duty cycle: 30(%) As a result, the thrust force setup=70(%)

Conversion Table of Thrust Force–Duty Cycle of EQX 10

Thrust Force Setup (%)	Duty Cycle (%)	Continuous Thrust Time (min)
60 below	100	—
70	30	3
100	15	1

※ “Thrust force setup” is an input value of step position information of the driver.
 ※ “Continuous thrust time” is the time of continuous thrust.



Seq 2 Confirm the thrust force Thrust Force Setup – Thrust Force Graph

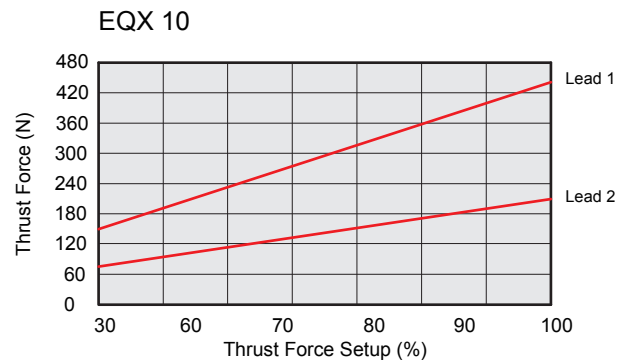
Refer to Thrust Force Setup – Thrust Force Graph

Example

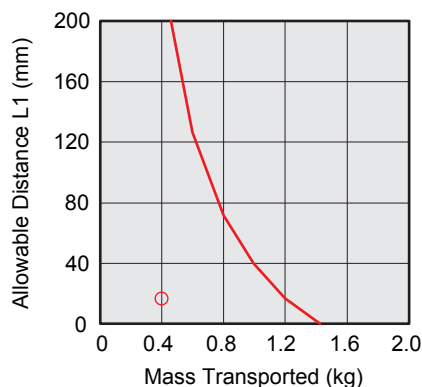
From the right graph

- Thrust Force Setup: 70(%)
- Thrust Force: 120(N)

Hence, EQX 10 is selected



Seq 3 Confirm the allowable distance-movable mass curve



From the outcomes shown as above, EQX 10 is selected

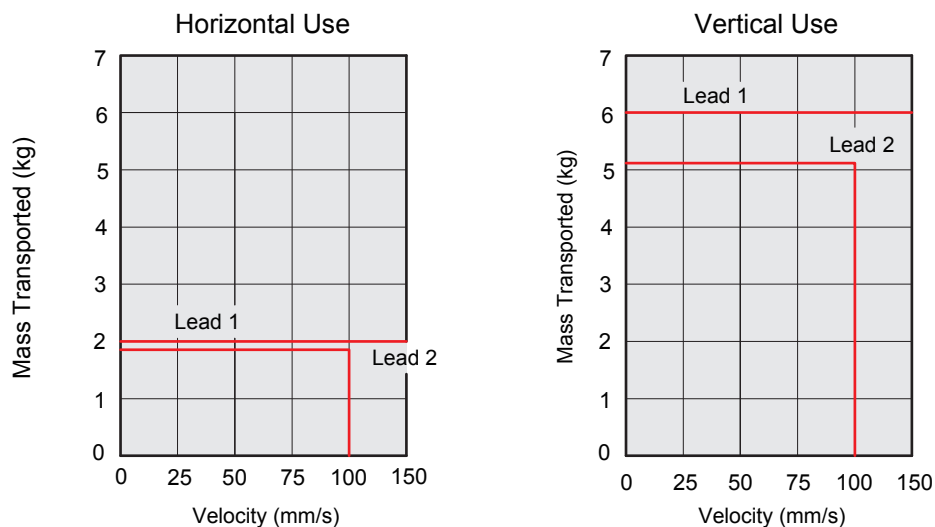
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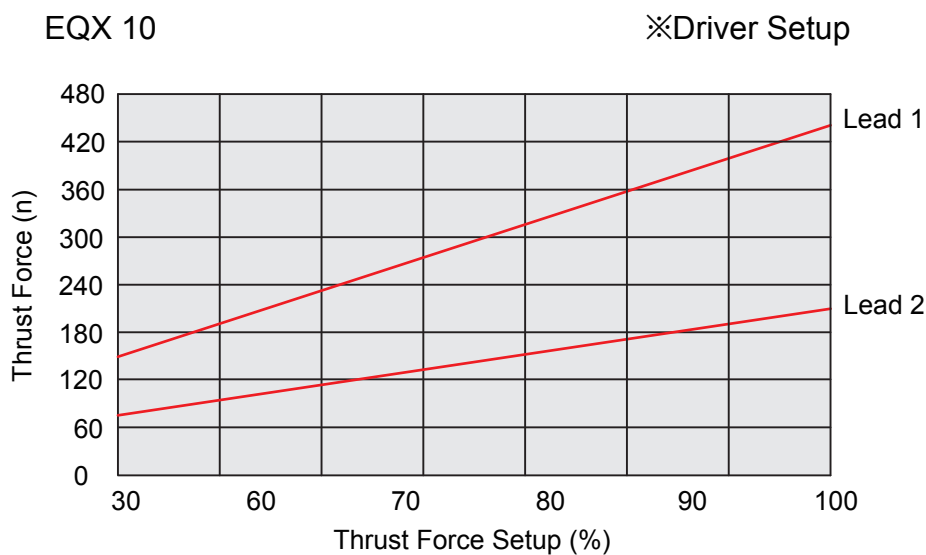
Velocity – Movable Mass Graph Criterion, Thrust Force Setup – Thrust Force Graph

Velocity – Movable Mass Graph Criterion

EQX 10 Movable Mass – Velocity Curve Graph



Thrust Force Setup – Thrust Force Graph



Thrust Force Setup (%)	Duty Cycle (%)	Continuous Thrust Time (min)
60 below	100	—
70	30	3
100	15	1

EQX series Electric Actuator

Allowable Torque

Allowable Torque

Acceleration, Deceleration
3000mm/s²

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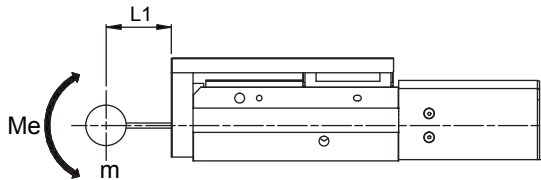
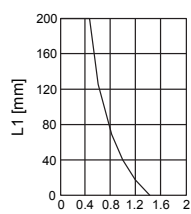
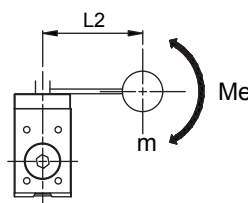
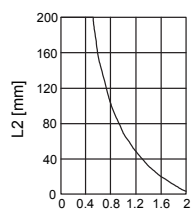
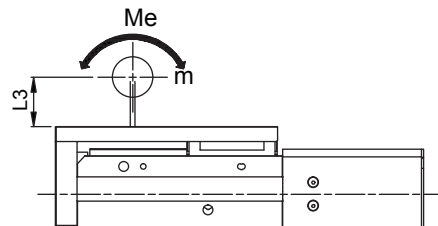
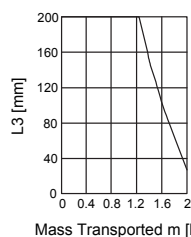
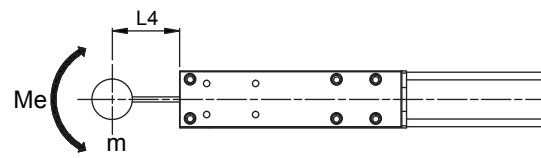
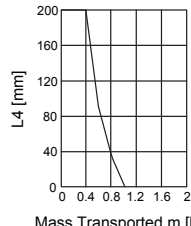
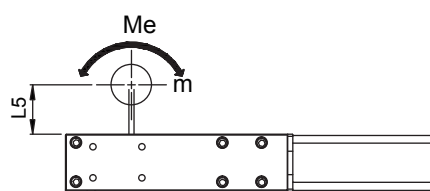
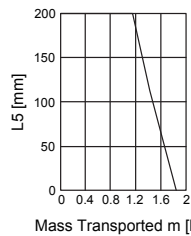
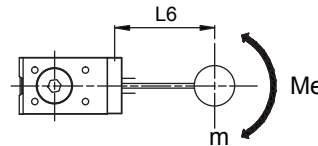
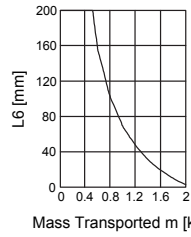
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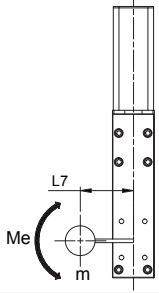
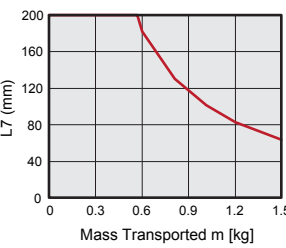
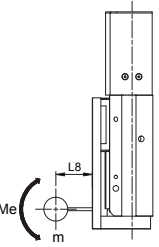
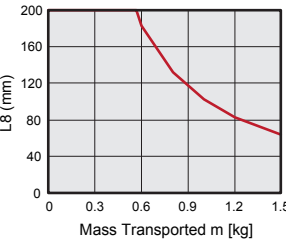
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Method	Direction of Load Extension m: Mass Transported (kg) Me: Allowable Dynamic Torque (N·m) L: Extension of the Center of Gravity of Workpiece (mm)	Model	
		EQX 10	
Horizontal • Top		X	 Mass Transported m [kg]
		Y	 Mass Transported m [kg]
		Z	 Mass Transported m [kg]
Walls		X	 Mass Transported m [kg]
		Y	 Mass Transported m [kg]
		Z	 Mass Transported m [kg]

EQX series Electric Actuator

Allowable Dynamic Torque, Offset of Slider

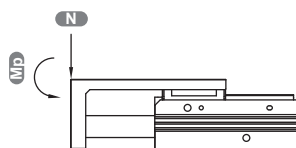
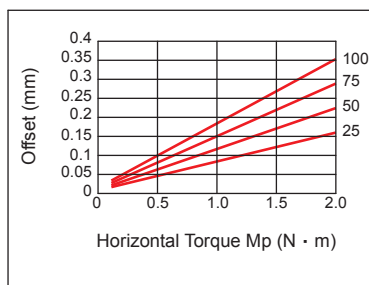
Allowable Dynamic Torque

Method	Direction of Load Extension m: Mass Transported (kg) Me: Allowable Dynamic Torque (N·m) L: Extension of the Center of Gravity of Workpiece (mm)	Model	
		EDX 10	
Vertical		Y	
		Z	

Offset of Slider (reference) Table Deflection (reference)

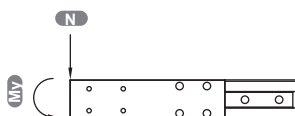
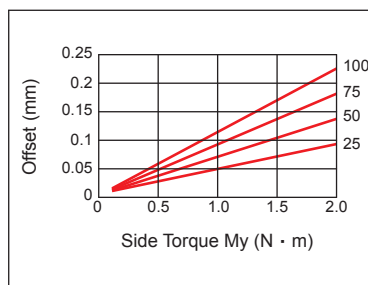
The table deflection of horizontal load

The deflection is incurred by the load on the table when the table is completely extended. (outermost)



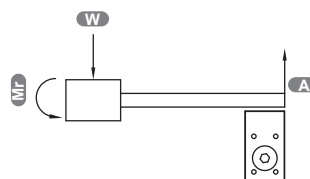
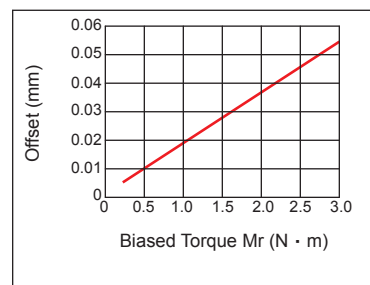
The table deflection of lateral load

The deflection is incurred by the load on the table when the table is completely extended. (outermost)



The table deflection of lateral load

When the table is completely extended, the deflection is incurred when the load on the table is generated when the load is shifted outside the table. (outermost)

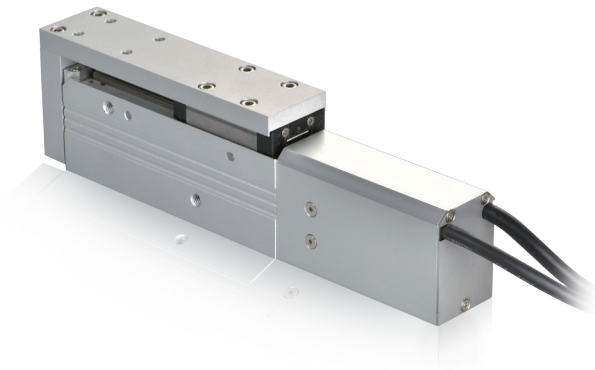


EQX series Electric Actuator

Feature, Specification and Code of Order

Feature:

- Ball Screw Transmission
- Closed-Loop Step Motor
- High Precision



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Lead	Pushing force (N)	Work load (Kg)		Stroke (mm)	Max speed (mm/s)	Actuation type	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Position repeatability (mm)	Idling stroke (mm)	Clearance (mm)	Weight (kg)
				horizontal	vertical										
General environment	EQX 10	1	466	6	2	25, 50, 75, 100	50	Ball screw	5 ~ 40	35 ~ 85	25 □	±0.02	0.2 or less	0.2 or less	25mm: 0.64 50mm: 0.74 75mm: 0.84 100mm: 0.94
		2	230	5.2	1.7		100								

Remark 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

EQX - 10 - 50 - 03 - 1 - P

① ② ③ ④ ⑤

①	Mark	Type
	10	10

②	Mark	Stroke
	25	25 mm
	50	50 mm
	75	75 mm
	100	100 mm

③	Mark	Wire length
	01	1 m
	03	3 m
	05	5 m
	10	10 m

* Standard: 3M

④	Mark	Lead
	1	1
	2	2

⑤	Mark	Actuator
	P	P-Servo

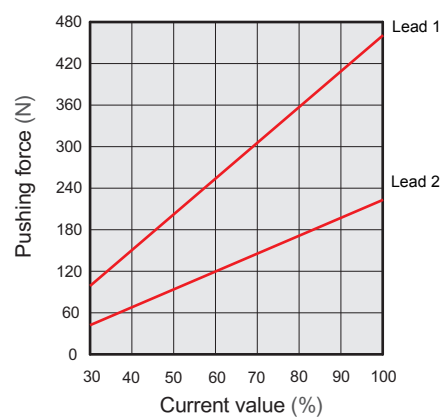
* Standard component Refer to page 83

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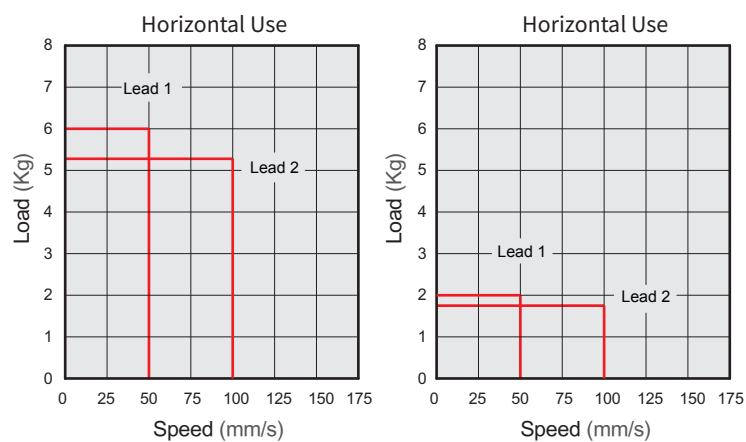
EQX series Electric Actuator

Pushing force-Current value, Load-Speed graph

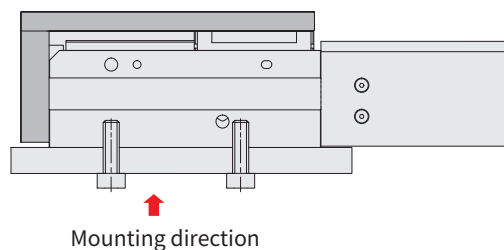
■ Pushing force-Current graph



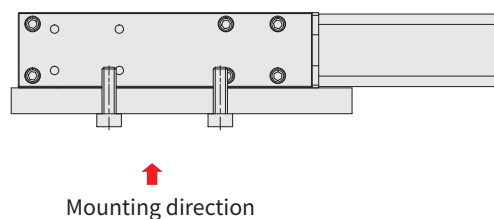
■ Load-Speed graph



■ Body mounting



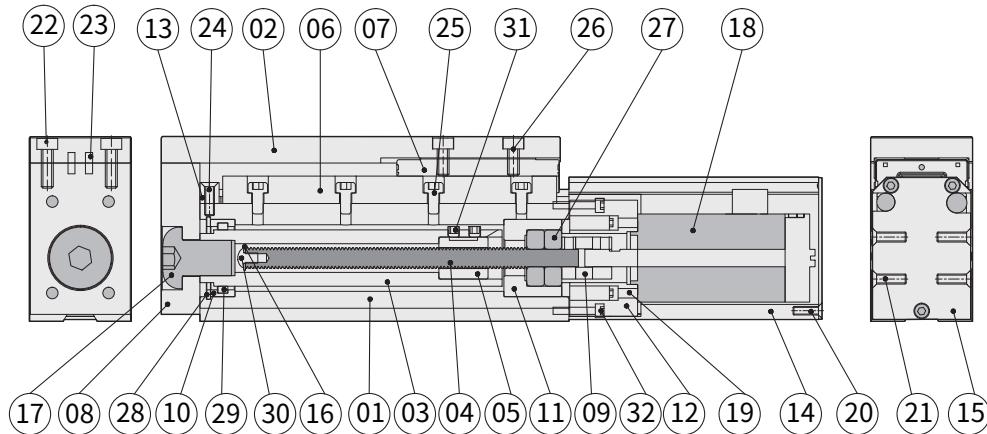
■ Side mounting



EQX series Electric Actuator

Internal structure, Components and Material list

EQX10



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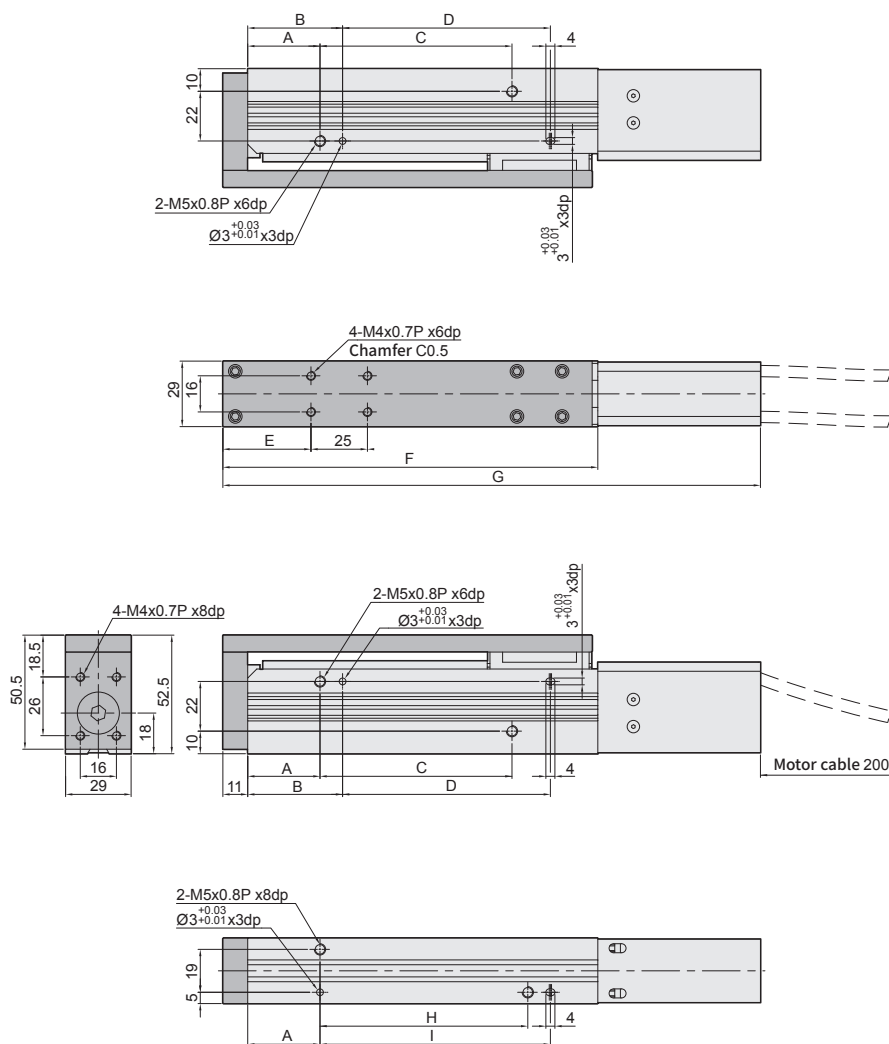
No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	17	Shaft screw	Alloy steel
02	Slider-1	Aluminum alloy	18	Closed loop motor 25	Customized
03	Main shaft	Carbon steel	19	Motor mount screw	Alloy steel
04	Ball screw(Ball screw)	Customized	20	Rear cover mount screws	Alloy steel
05	Ball screw(Nut)	Customized	21	Shell mount screws	Alloy steel
06	Linear slide (Rail)	Stainless	22	Slider mount screw	Alloy steel
07	Linear slide(Slider)	Stainless	23	Positioned pin	Bearing steel
08	Slider-2	Aluminum alloy	24	Positioning block mount screw	Alloy steel
09	Packing mount ring	Customized	25	Slide rail mount screws	Alloy steel
10	Packing mount ring	Aluminum alloy	26	Slider mount screw	Alloy steel
11	Bearing mount ring	Aluminum alloy	27	Radial bearing	Bearing steel
12	Motor mount	Aluminum alloy	28	Packing block buckle	Alloy steel
13	Spacer block	Aluminum alloy	29	Shaft packing	NBR
14	Shell	Aluminum alloy	30	Screw washer mount screw	Alloy steel
15	Rear cover	Stainless	31	Screw mount screw	Alloy steel
16	Ball screw gasket	Nylon	32	Motor mount fixing screw	Alloy steel

EQX series Electric Actuator

External dimensions

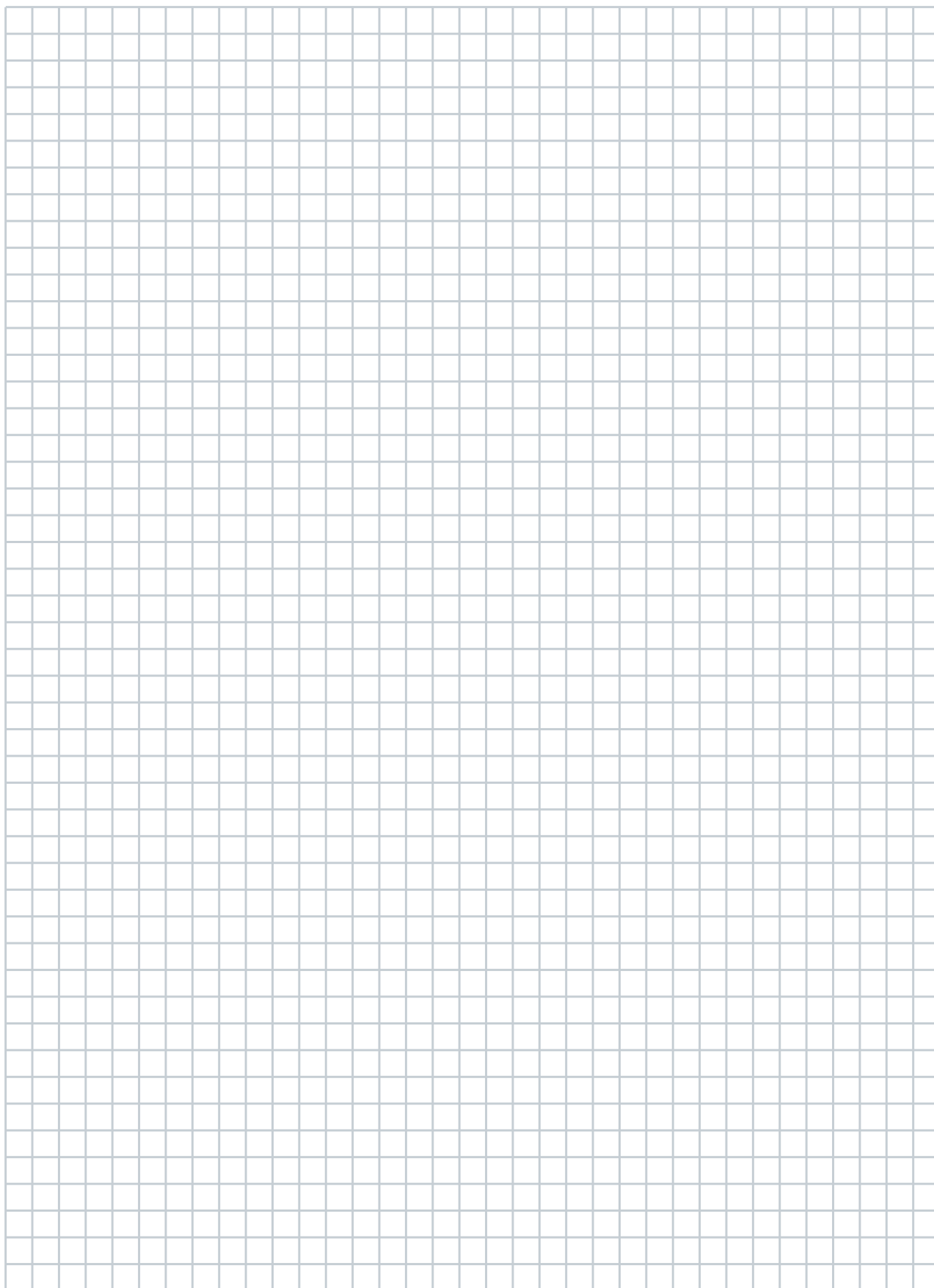
EQX10

Unit:mm



size(mm)	A	B	C	D	E	F	G	H	I
EQX 10-25	20	30	22	29	14	91	164	29	39
EQX 10-50	24	34	43	50	14	116	189	50	60
EQX 10-75	28	38	64	71	39	141	214	71	81
EQX 10-100	32	42	85	92	39	166	239	92	102

Memo



ETB series Electric Rotary Table

ETB10/ETB30/ETB50

01 Precised horizontal level

03 High anodizing rigidity surface

02 Key worm type screw

04 Belt and screw moving type

Rotation torque

Max. **7.0** N-m

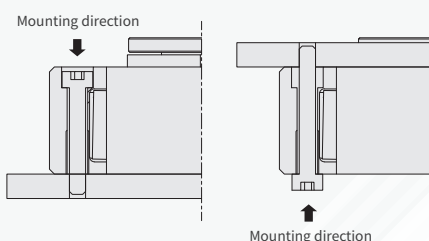
Light weight
0.5 kg

Rotation range
330°

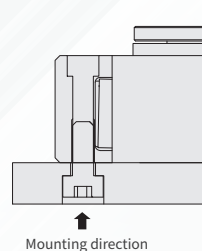
Max. load
150N

Max. Speed
420 °/s

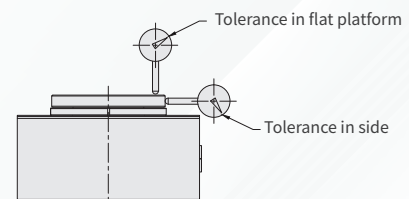
Through-hole mouting



Screw-hole mouting



Deviation: When swing at 180° displacement (approx.)



Measurement Area	ETB series (mm)
Tolerance in flat platform	0.1
Tolerance in side	0.1

ETB series Electric Rotary Table

ETB10/ETB30/ETB50

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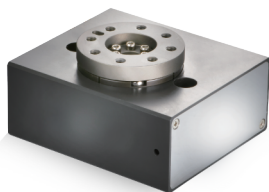
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Small size

ETB 10



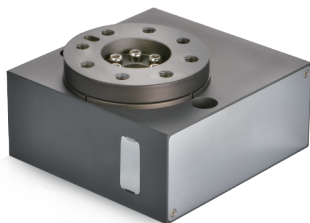
Max. angles 330°

Max. load 10N

Motor size 20 □

Middle size

ETB 30



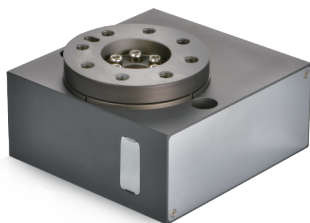
Max. angles 330°

Max. load 50N

Motor size 25 □

Large size

ETB 50



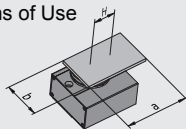
Max. angles 330°

Max. load 150N

Motor size 42 □

ETB series Electric Rotary Table

Conditions of Use



Electric Oscillation: ETB 30
Installation Method: Vertical
Load Type: Inertia Load T_a
Load Shape: 150mm x 80mm
(rectangular)
Oscillation Angle: 180°

Angular Acceleration • Deceleration ω :
 $1,000^\circ/\text{sec}$
Angular Velocity ω : $420^\circ/\text{sec}$
Load Mass m : 2.0kg
Distance between the Centers of Gravity
of Shafts H : 40mm

Seq 1 Moment of Inertia – Angular Acceleration/Deceleration

1. Calculation of Moment of Inertia
2. Refer to the moment of inertia – angular acceleration/deceleration graph for the related information.
The adequate model should be selected depending on the moment of inertia and angular acceleration/deceleration.

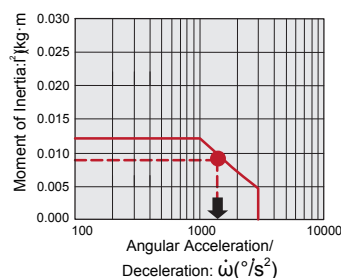
Formula

$$I = m \times (a^2 + b^2)/12 + m \times H^2$$

Example

$$I = 2.0 \times (0.15^2 + 0.08^2)/12 + 2.0^2 \times 0.04 = 0.00802 \text{ kg} \cdot \text{m}$$

ETB 30



Seq 2 Required Torque

1. Load Types
 - Static Load: T_s
 - Resistive Load: T_f
 - Inertia Load: T_a
2. Refer to the effective torque – rotary speed graph for the related information.
The controllable value in regard with velocity should be confirmed via the effective torque from rotary speed.

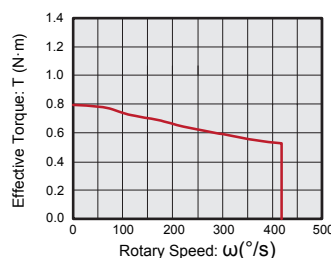
Formula

$$\begin{aligned} \text{Effective Torque} &\geq T_s \\ \text{Effective Torque} &\geq T_f \times 1.5 \\ \text{Effective Torque} &\geq T_a \times 1.5 \end{aligned}$$

Example

$$\begin{aligned} \text{Inertial Load: } T_a \\ T_a \times 1.5 &= I \times \omega \times 2/360 \times 1.5 \\ &= 0.00802 \times 1,000 \times 0.0175 \times 1.5 \\ &= 0.21 \text{ N} \cdot \text{m} \end{aligned}$$

ETB 30



Seq 3 Allowable Load

1. Confirm the allowable load
 - Radial Load
 - Axial Load
 - Torque

Formula

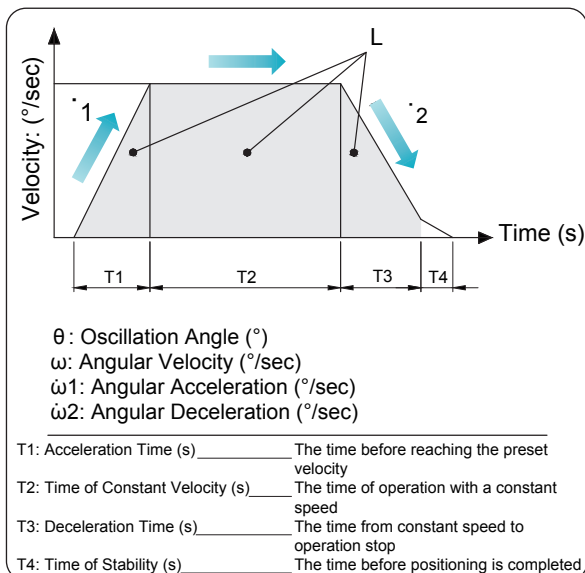
$$\begin{aligned} \text{Allowable Axial Load} &\geq m \times 9.8 \\ \text{Allowable Torque} &\geq m \times 9.8 \times H \end{aligned}$$

Example

- Axial Load
 $2.0 \times 9.8 = 19.8 \text{ N} < \text{Allowable Load, OK}$
- Allowable Load
 $2.0 \times 9.8 \times 0.04 = 0.784 \text{ N} \cdot \text{m} < \text{Allowable Load, OK}$

Seq 4 Oscillation Time

1. Calculation of Production Cycle Time (oscillation time)



Formula

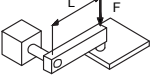
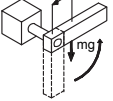
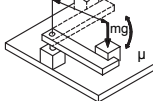
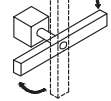
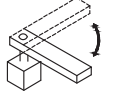
$$\begin{aligned} \text{Time of Angular Acceleration } T_1 &= \omega/\omega_1 \\ \text{Time of Angular Deceleration } T_3 &= \omega/\omega_2 \\ \text{Time of Constant Velocity } T_2 &= (\theta - 0.5 \times \omega \times (T_1 + T_3))/\omega \\ \text{Time of Stability } T &= T_1 + T_2 + T_3 + T_4 \end{aligned}$$

Example

- Time of Angular Acceleration $T_1 = 400/1,000 = 0.40 \text{ sec}$
- Time of Angular Deceleration $T_3 = 400/1,000 = 0.40 \text{ sec}$
- Time of Constant Velocity
 $T_2 = (180 - 0.5 \times 400 \times (0.40 + 0.40))/400 = 0.05 \text{ sec}$

- Time Cycle $T = T_1 + T_2 + T_3 + T_4 = 0.40 + 0.05 + 0.40 + 0.2 = 1.05 \text{ (sec)}$

ETB series Electric Rotary Table

Load Type		
Static Load: Ts	Resistive Load: Tf	Inertial Load: Ta
When only thrust force is necessary (gripping, etc.)	When gravity in reverse direction overlaps friction	When a load with inertia is reversing
	<gravity reaction>  <friction reaction> 	<reverse center and load center are the same point>  <reverse axis is vertical> 
$T_s = F \cdot L$ Ts: Static Load (N·m) F: Gripping Force (N) L: Distance between the Center of Oscillation and Gripping Position (m)	Reverse Direction When gravity is working $T_f = m \cdot g \cdot L$ Tf: Resistive Load(N·m) m: Load Mass(kg) g: Gravitational Acceleration 9.8(m/s ²) L: Distance between the Center of Oscillation and the Working Point of Gravity of Friction (m) μ: COF	$T_a = I \cdot \omega \cdot 2/360$ $(T_a = I \cdot \omega \cdot 0.0175)$ Ta: Inertia Load(N·m) ² I: Moment of Inertia(kg·m ²) ω: Angular Acceleration/Deceleration(°/sec) ω: Rotary Speed(°/sec)
Torque Required T=Ts	Torque Required T=Tf × 1.5	Torque Required T=Ta × 1.5
- For Resistive Load → gravity and friction react with each other in reverse direction - EX1) If the reverse axis is horizontal, the reverse center and the load center will differ - EX2) If a load is sliding on the lathe ※The required torque is the sum of resistive load and inertia load. $T = (T_f + T_a) \times 1.5$	- For Non-resistive Load → gravity and friction do not react with each other in reverse direction - EX1) If the reverse axis is vertical - EX2) If the reverse axis is horizontal, the reverse center and the load center will be the same point ※The only torque required is inertia load. $T = T_a \times 1.5$	

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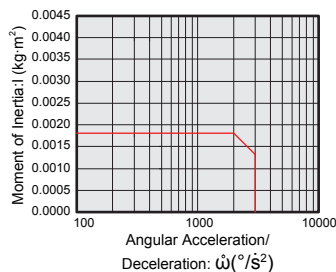
Product Application Examples

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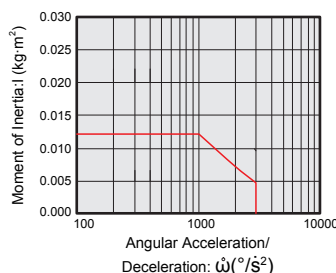
Operation Instructions

Moment of Inertia – Angular Acceleration/Deceleration

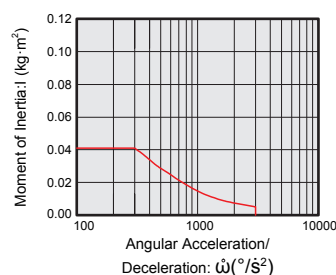
ETB 10



ETB 30

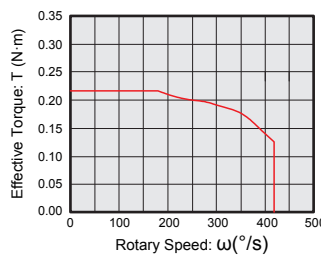


ETB 50

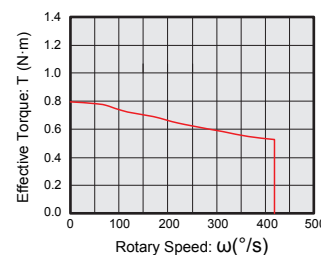


Effective Torque – Rotary Speed

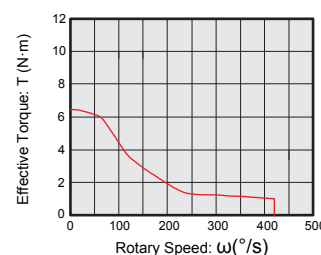
ETB 10



ETB 30



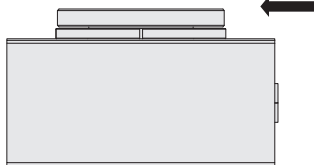
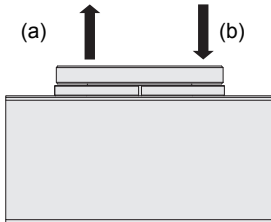
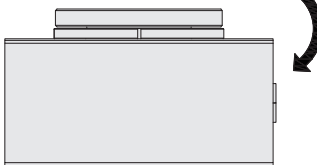
ETB 50



ETB series Electric Rotary Table

Allowable Load, Displacement of Slider, Deviated Precision

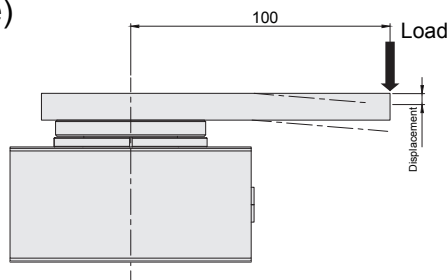
Allowable Load

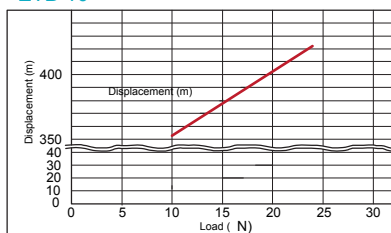
Size	Allowable Radial Load (N)		Allowable Radial Load(N)				Allowable Torque(N·m)	
	Basic Type	High Precision Type	(a)		(b)		Basic Type	High Precision Type
			Basic Type	High Precision Type	Basic Type	High Precision Type		
10	78	86	74	78	107	2.4	2.9	
30	196	233	197	363	398	5.3	6.4	
50	314	378	296	398	517	9.7	12.0	

Displacement of Slider (reference)

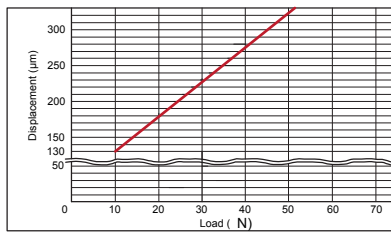
The offset of the load on point A which is 100mm away from the reverse center.



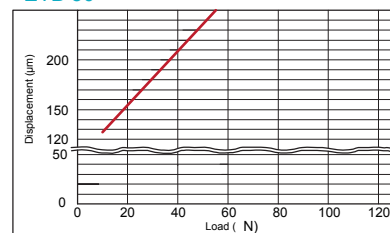
ETB 10



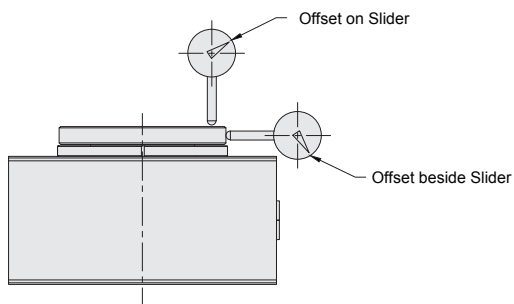
ETB 30



ETB 50



Offset Precision: Offset of Oscillation at 180° (approximately)



Measure Point	ETB Series
Offset on Slider	0.1
Offset beside Slider	0.1

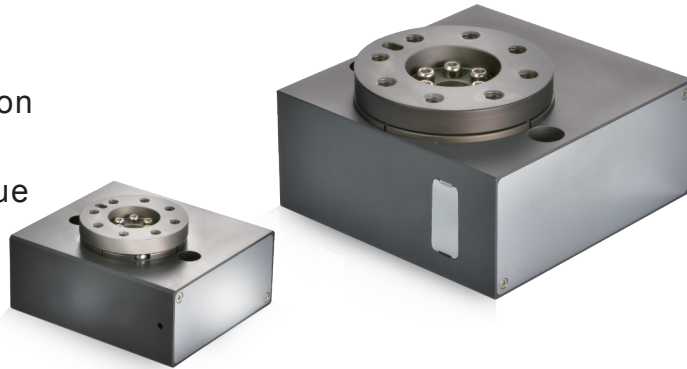
(mm)

ETB series Electric Rotary Table

Feature, Specification and Code of Order

Feature:

- Belt with Screw Transmission
- Closed-Loop Step Motor
- High Precision, Large Torque



The picture is for reference only.
Please be subject to the specification table.

Specification

Use occasion	Model	Rotating torque (N·m)	Work load (N)	Rotation angle (°)	Angular speed (°/s)	Drive mode	Ambient and fluid temperature (°C)	Operating humidity range (%)	Motor size	Position repeatability (°)	Backlash (°)	load (kg)
General environment	ETB 10	0.2	10	330	420	Worm screw+ Worm wheel+ Belt drive	5 ~ 40	35 ~ 85	20 □	0.05	± 0.3	0.5
	ETB 30	0.8	50						25 □			0.8
	ETB 50	7.0	150						42 □			1.5

Remark 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.

Remark 2. The speed and thrust will change base on the length of the wire, load weight and mounting conditions...etc.

If the length of the wire over 5m, the speed and thrust will reduce 10% per 5m.

Remark 3. If the load weight over the recommended value, the lifetime will shorter.

Code of Order

ETB - 50 - 03 - P

①

②

③

Mark	Type
10	10
30	30
50	50

②

Mark	Wire length
01	1 m
03	3 m
05	5 m
10	10 m

* Standard: 3M

③

Mark	Actuator
P	P-Servo

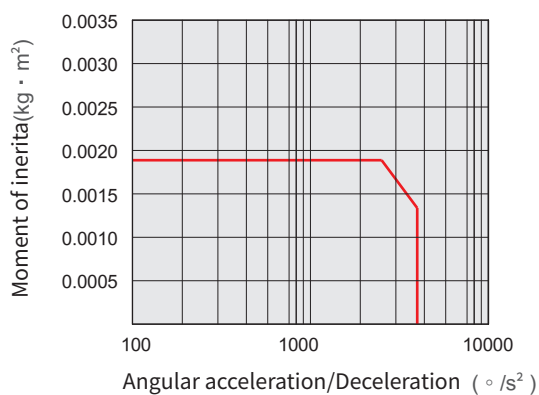
* Standard component Refer to page 83

ETB series Electric Rotary Table

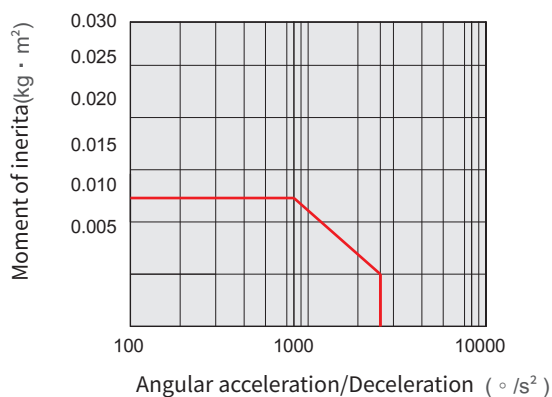
Allowable inertia graph, Rotating torque graph, Through-hole mounting, Screw-hole mounting

■ Moment of inertia graph

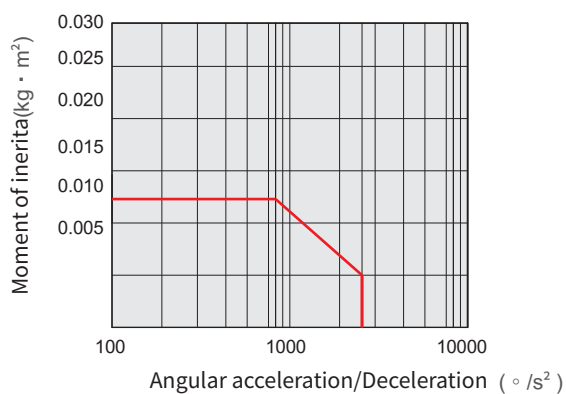
■ ETB 10



■ ETB 30

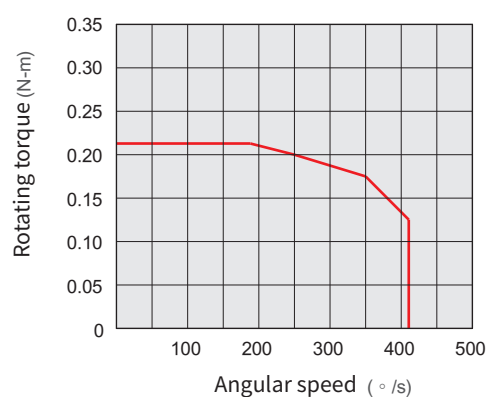


■ ETB 50

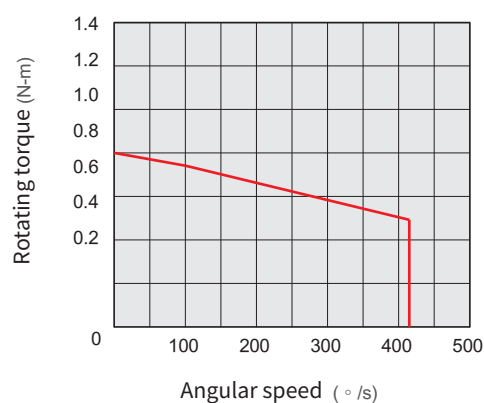


■ Rotating torque graph

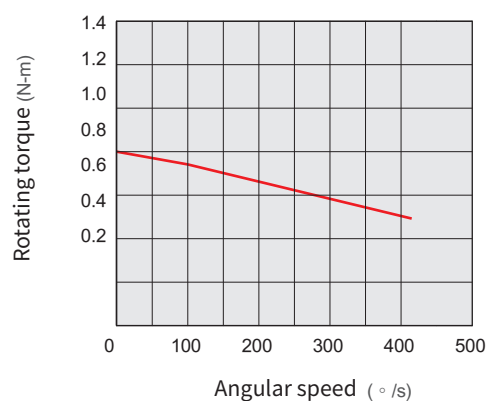
■ ETB 10



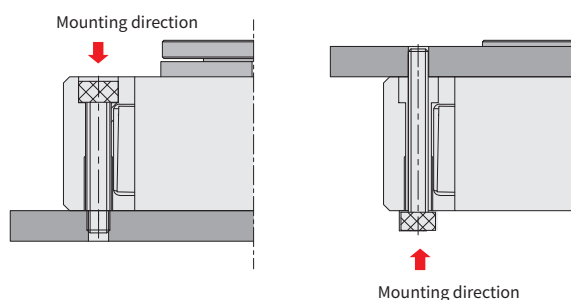
■ ETB 30



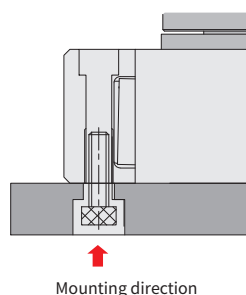
■ ETB 50



■ Body through hole installation



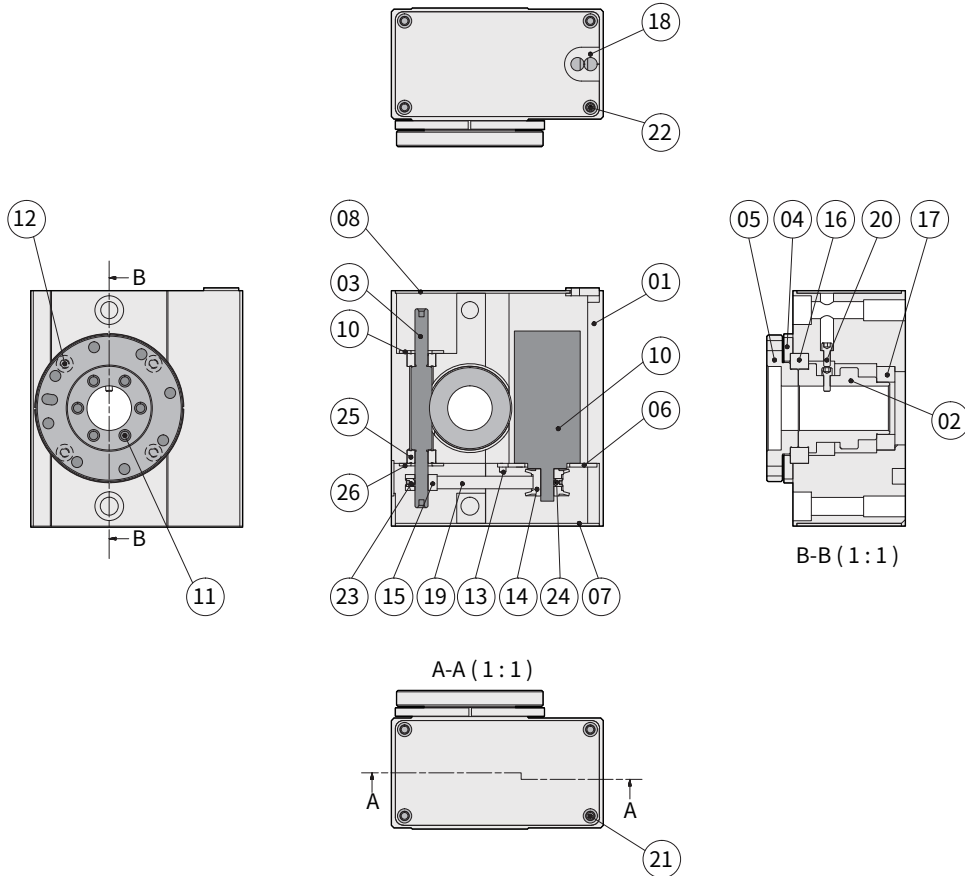
■ Body screw hole installation



ETB series Electric Rotary Table

Internal structure, Components and Material list

ETB10, ETB30, ETB50



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Components and Material list

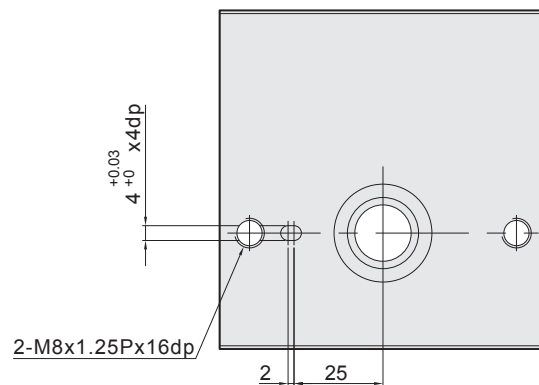
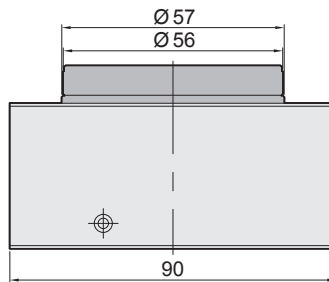
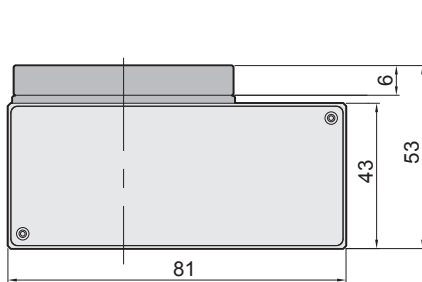
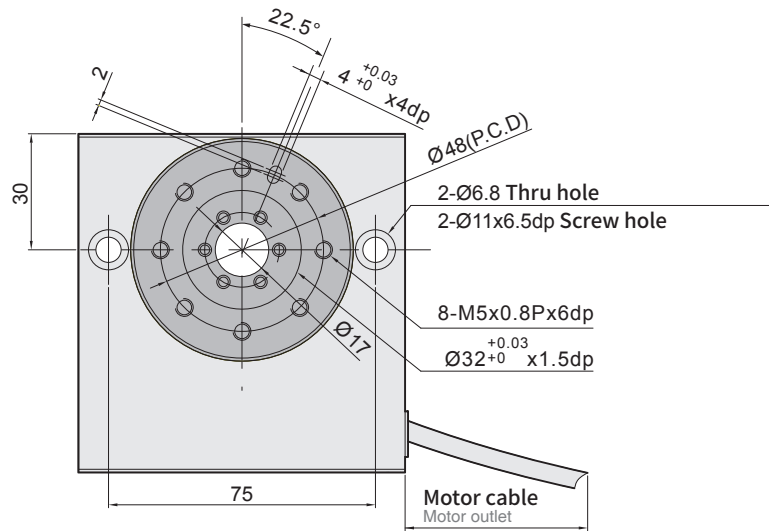
No.	Name	Material	No.	Name	Material
01	ETB 10 Body	Aluminum alloy(A6063)	14	Motor belt pulley	Aluminum alloy(A6061)
02	ETB 10 Gear shaft	Alloy steel	15	Worm belt pulley	Aluminum alloy(A6061)
03	ETB 10 Worm wheel	Alloy steel	16	Gear shaft bearing (large)	Bearing steel
04	ETB 10 Bearing cap	Aluminum alloy(A6061)	17	Gear shaft bearing (small)	Bearing steel
05	ETB 10 Dial scale	Aluminum alloy(A6061)	18	Outlet rubber	Rubber
06	ETB 10 Motor stopper	Stainless	19	Pulley belt	Customized
07	ETB 10 Stopper	Stainless	20	Blocking screw	Alloy steel
08	ETB 10 Cabel stopper	Stainless	21	Stopper set screws	Alloy steel
09	ETB 30 Screw stopper	Stainless	22	Cable stopper set screw	Alloy steel
10	Closed loop motor 20	Customized	23	Motor pulley set screw	Alloy steel
11	Dial set screw	Alloy steel	24	Worm pulley stop screw	Alloy steel
12	Bearing cover set screw	Alloy steel	25	Worm Bearing	Bearing steel
13	Motor stopper set screw	Alloy steel	26	Screw stopper set screw	Alloy steel

ETB series Electric Rotary Table

External dimensions

ETB30

Unit:mm



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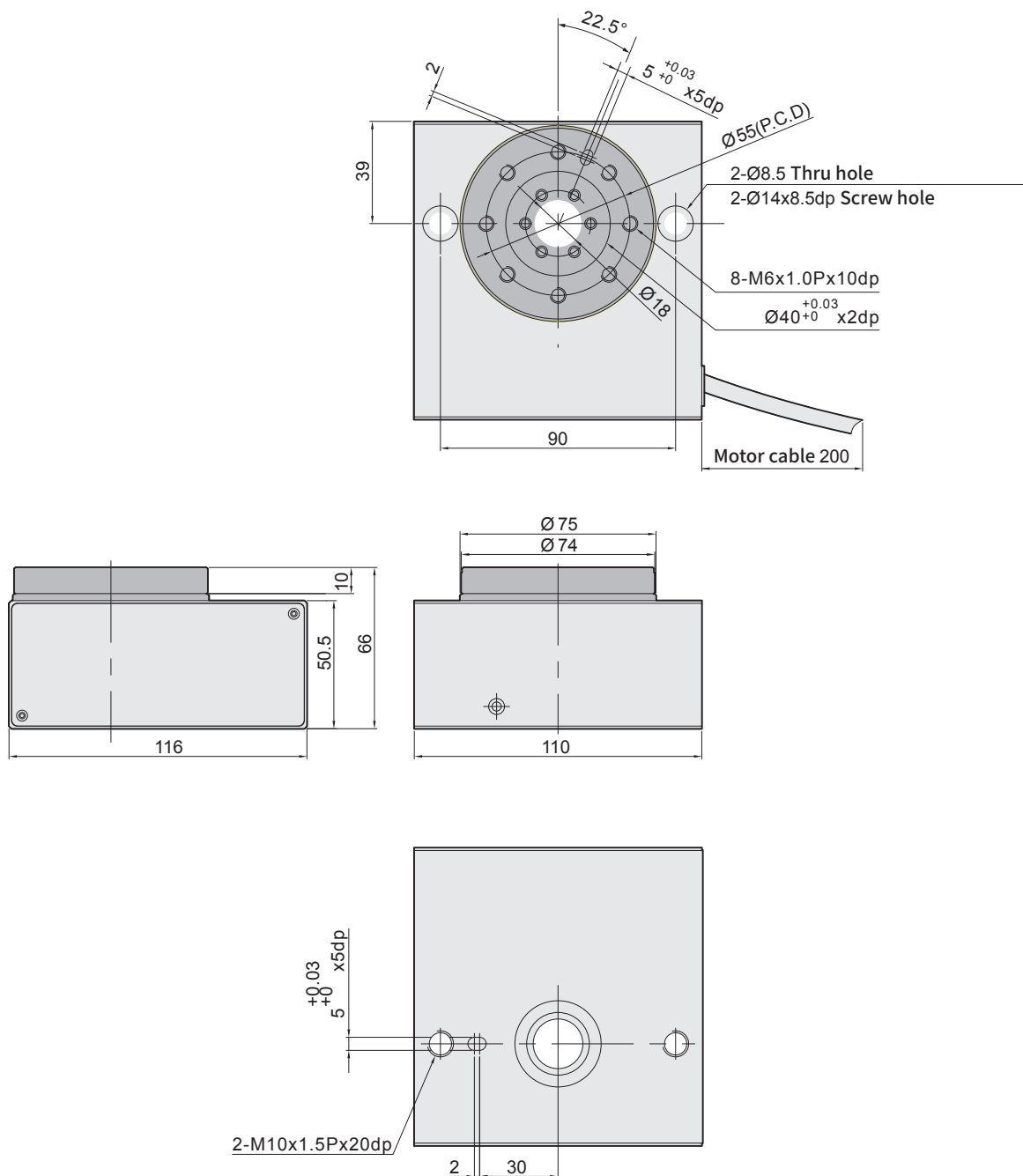
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ETB series Electric Rotary Table

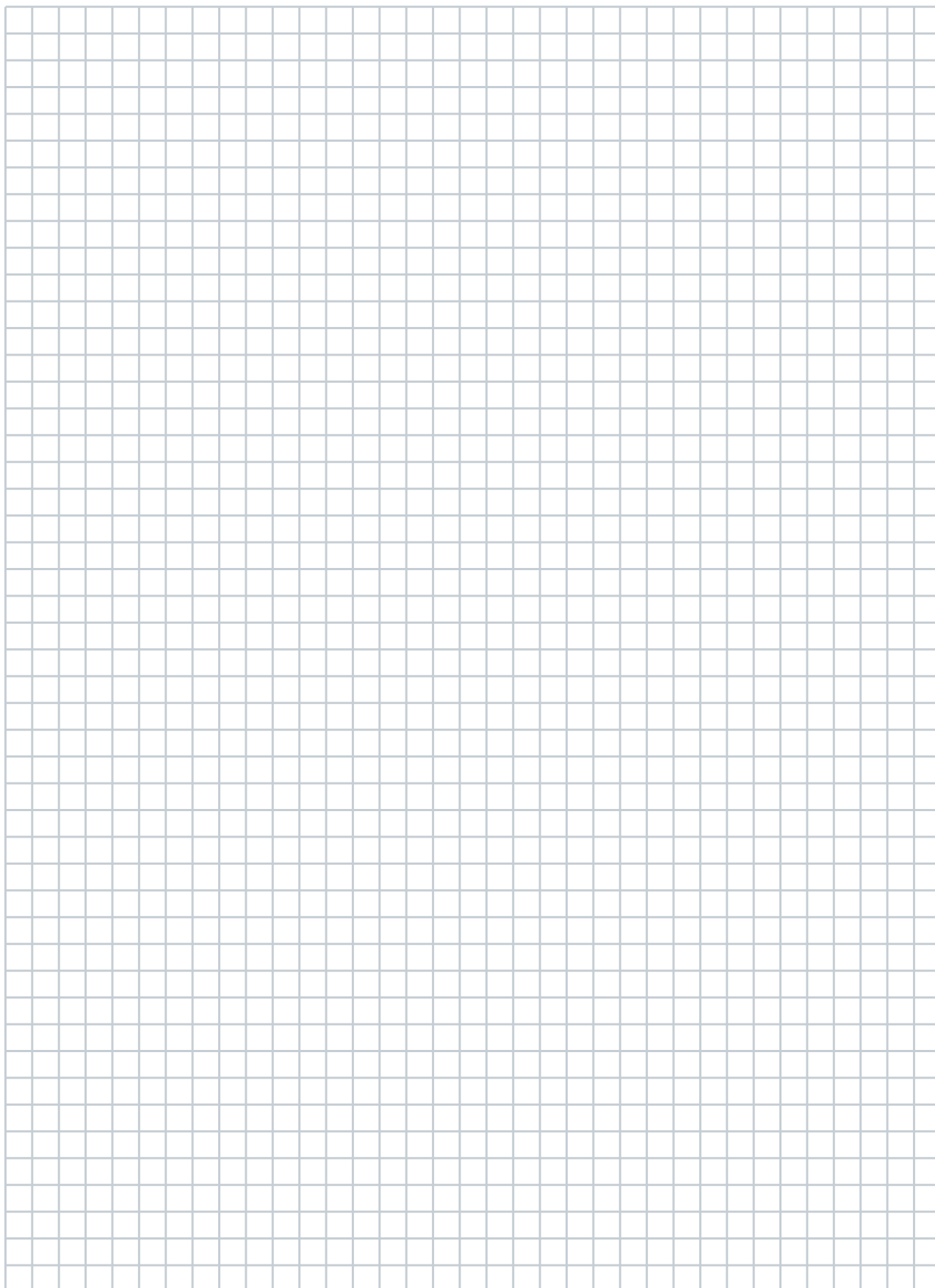
External dimensions

ETB50

Unit:mm



Memo





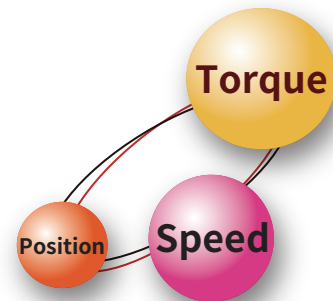
P-SERVO

Closed-loop stepping motor servo system

P-SERVO Closed-loop stepping motor servo system

All-Round Stepping motor servo system

P-SERVO is adopted with the closed-loop stepping motor servo system.
The most evident features are diverse torque control and high-accuracy positioning.



Three drive modes and control methods

Drive mode:

- (1) Position control
- (2) Torque control
- (3) Speed control

Control method:

- (1) I/O
- (2) External pulse input (CW/CCW, PUL/DIR)
- (3) RS485/RS232 communication

Support: Modbus ASCII/RTU connects to PC/HMI to carry out multi-axis control (up to 16 axes).



The driver with position/speed/torque/**PUSH Control**
(position with torque/soft landing)

Low heat and energy saving

High-efficiency operation is possible because optimum current can be achieved by load during control.

01

High response

Instant torque can reach 150% of the rated torque, great for agile operation.

02

High rotational speed and torque

The smart algorithm is used for maximum motor operation, and high rotational speed and torque.

03

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P-SERVO

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Example of product application

■ Main specifications

Item	Content	Remark
Model	P-SERVO (FXB5040-ST2)	
Input power voltage	DC 24V $\pm$ 5%	Rated 4A, maximum 8A
	DC 48V $\pm$ 10%	Rated 2A, maximum 6A
Rated output current	ST2 $\sim$ 4A (o-peak)	
Maximum output current	ST2 $\sim$ 6A (o-peak)	
Control subject motor	Encoder and two-phase stepping motor included	
Drive method	PWM chopper drive	
Control quadrant	Four quadrants	
Interface	Input: Digital input*5 Machine Sensor Input +LM, -LM, ORG Analog Input (Option)*1 Encoder Input (A, B, Z) Output: Digital output*4 Actuation output (for brake only)	Digital output/input can be assigned
Digital input content	/SERVO ON(Servo On) /RESET(Alarm Reset) /CONT MODE(Switch Control Mode) /START(Motor Start/Stop) SELECT PROGRAM(4 bit)	
Digital output content	/IN POSITION ALARM /TORQUE LIMIT	
LED display	Power, alarm and motor in rotation	Three types
Communication I/F	RS485, up to 32 nodes RS232C	MODBUS protocol, baud rate 19200 bps (default) (9600bps~115200bps)
Control method	Position control mode	Positioning based on the command pulse (RS485/external pulse) Positioning based on RS232C/RS485 communication
	Speed control mode	Digital command (resolution $\pm$ 1/350 and above)
	Torque control mode	Digital command (resolution $\pm$ 1/350 and above)
	Push control mode	Torque limit control in position and speed control
Adequate load inertia	Below 20 times of motor inertia	During position and speed control
Size of substrate shape	W 80 x D116 x H20	
Operating temperature/humidity	Below 0~50°C, 85%RH	Avoid condensation
Storage temperature	Below -20~85°C, 85%	Avoid condensation
Environmental gas	Avoid corrosive gas	

Example of product application

Main specifications

Position control specifications		
Position mode (four modes)	① Full time closed loop ② Dual mode ③ Full time open loop ④ Open-loop compensation	Micro-stepping drive when the position mode is open. The position precision of resolution for encoder will be not be compensated.
Position precision	Resolution of Encoder: ± 1 Pulse	
Maximum frequency of command	• 900(Kpps)	
Electronic gear	• A/B • A=1~10000 • B=1~10000	
Feedforward	0~100(%)	
Range of completed positioning (Inposition)	0~ ± 1000	
Abnormal scope of maximum count	$\pm 1 \sim 2147483647$	
Speed control specifications		
Speed command	• Digital value (PPS)	The rotation number varies based on the encoder resolution.
Speed control ratio	500:1 and above	
Direction of command rotation	• Digital input (DIR) • Parameter	
Start/Stop	• Digital input (START) • Parameter	
Acceleration and deceleration function	• $n \times \text{Max. rpm} \times 0.125\text{ms}$ • Parameter n:0~10	No Acceleration or deceleration when n=0
Torque control specifications		
Torque command	• Digital value (x 0.1%)	
Variable torque scope	0~100.0%	It is the rated torque of motor when the scope is at 100%.
Speed limit	• Digital value (RPM)	
Direction of command rotation	• Digital input (DIR) • Parameter	
Start/Stop	• Digital input (START) • Parameter	

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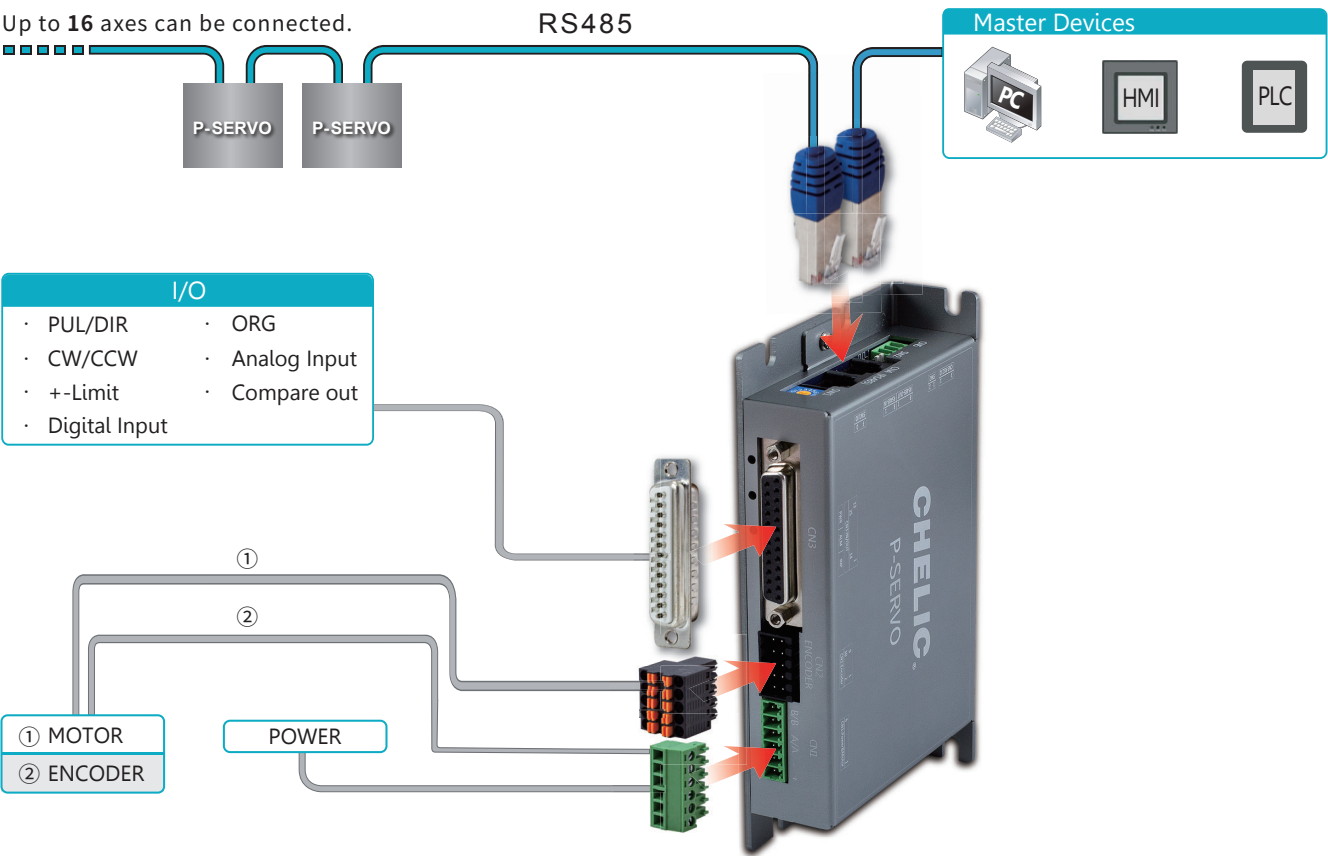
P-SERVO

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Example of product application

System configuration

RS485 Linear interpolation function



Filament options

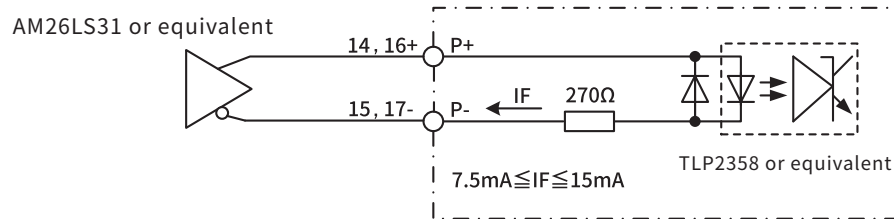
The cable can be extended up to **10m**

The motor size available	20mm
Motor extension cable	☐
Encoder extension cable	☐

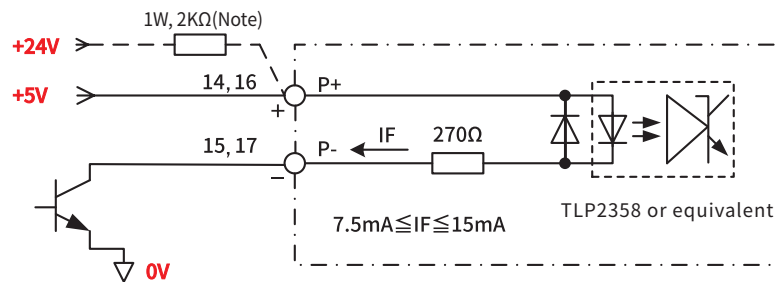
Example of product application

Input circuit diagram

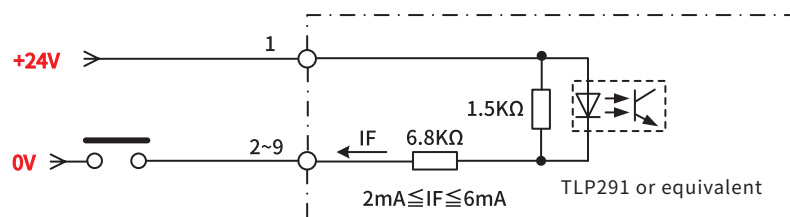
Command pulse input circuit (Line Driver)



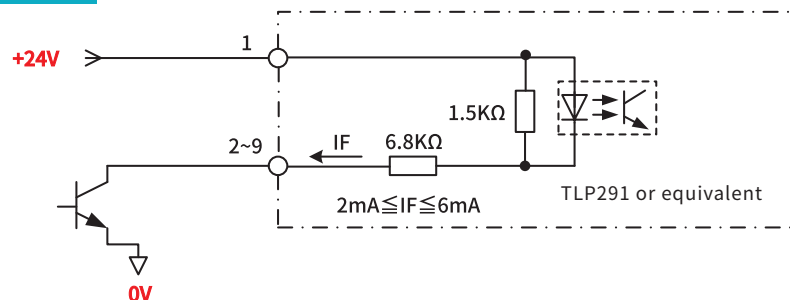
24V PLC command pulse input circuit (open collector)



Sensor, digital input circuit (connector)



Sensor, digital input circuit (open collector)



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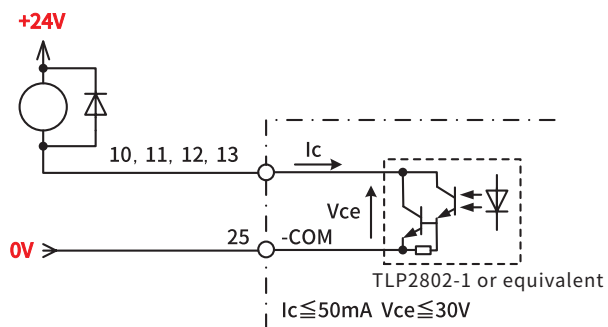
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Example of product application

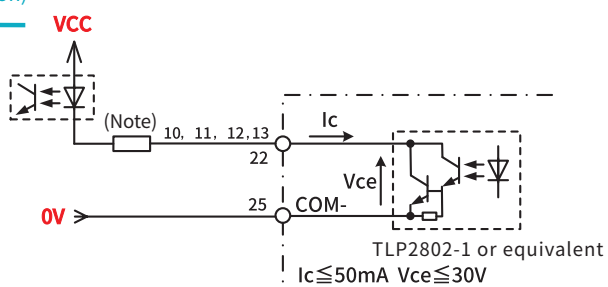
System configuration

Digital output circuit, COMP OUT circuit (relay connection)

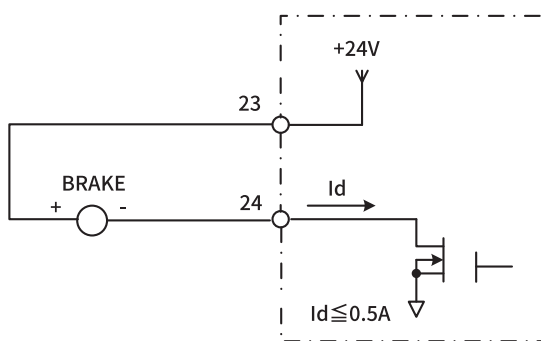


Digital output, COMP OUT circuit (optical coupling connection)

Note: When selecting the resistance value, make sure the current value is strong enough to continue to drive the LED for optical coupling.

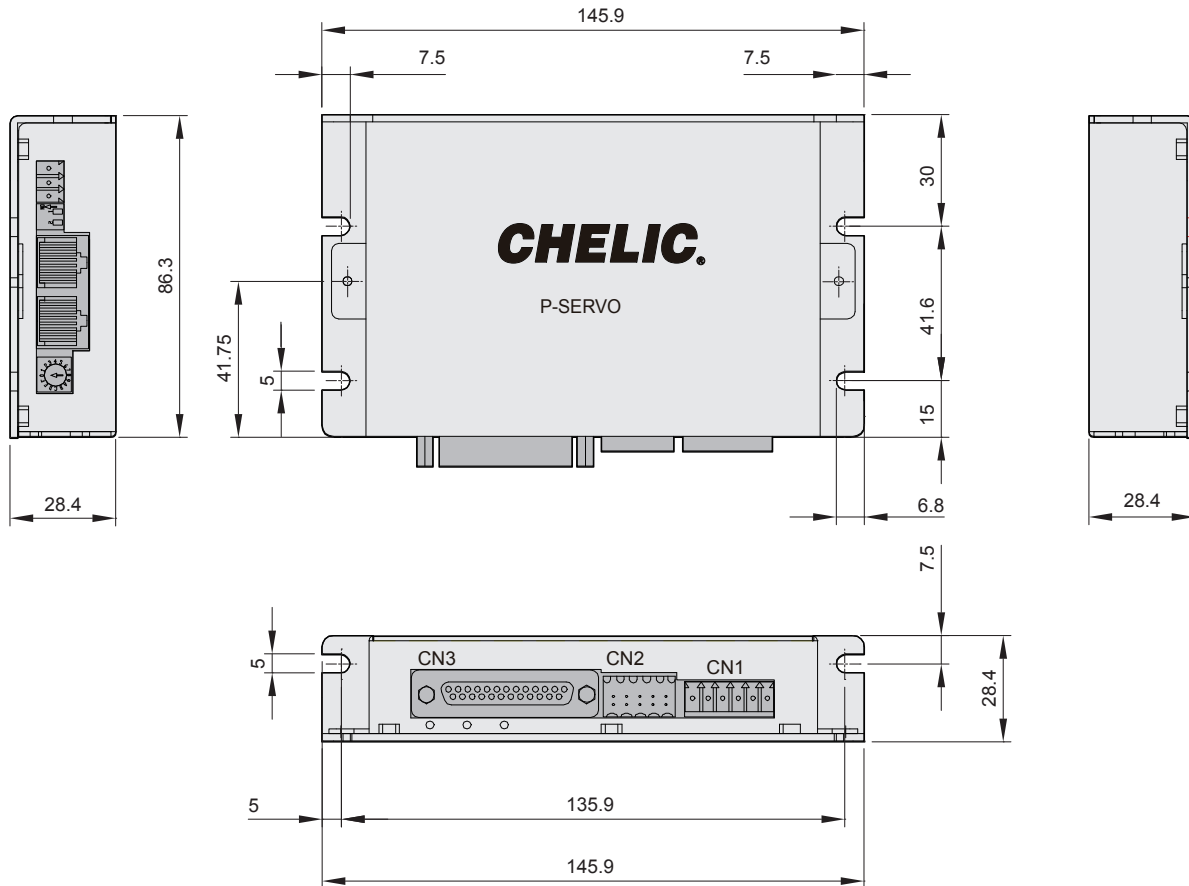


Actuation output circuit (brake)



Example of product application

Appearance and interface diagram



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Interface type

Part no.	Use
CN1	Power and motor connector
CN2	Encoder connector
CN3	Interface connector
CN4	RS485 connector
CN5	RS232C connector
SW1	Switch for node ID setting
SW2	Switch for connecting the terminal
LED1	Power LED
LED2	Alarm LED
LED3	LED for motor in operation



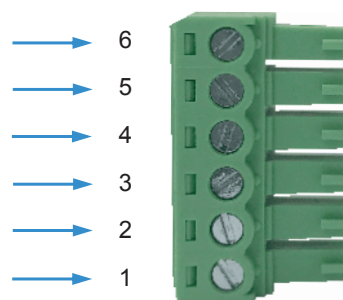
Example of product application

Pin and definition

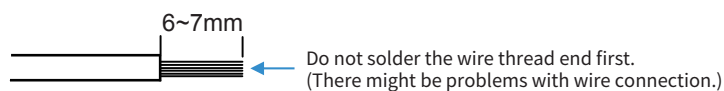
CN1 pin

Power & Motor (CN1)

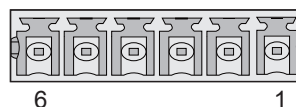
Pin.	Signal
6	Motor / B(Orange)
5	Motor / B(Blue)
4	Motor / A(Yellow)
3	Motor / A(Red)
2	Power 0V
1	Power+(DC24V OR 48V)



- Connector:ETB45060 G100Z (ECE)
- Cable size:AWG24~AWG16(multi-core twisted pair line)
- Length of stripped wire:6~7mm



- Pay attention to the polarity of power.

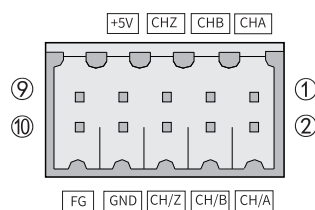


CN2 pin

Encoder (CN2)

Pin.	Signal	Pin.	Signal
1	CH A(White)	2	CH/A(Green)
3	CH B(Brown)	4	CH/B(Yellow)
5	CH Z(Blue)	6	CH/Z(Orange)
7	+5V (Red)	8	GND (Black)
9	(NC)	10	FG

- Cable size:AWG24~AWG18 (multi-core twisted pair line)
- Length of stripped wire:7~8mm



Example of product application

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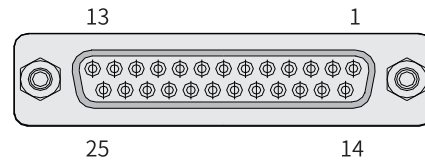
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CN3 pin

Sensor & Interface (CN3)

Pin.	Signal	Pin.	Signal
1	+COM (+24V)	14	CW+
2	+LM	15	CW-
3	-LM	16	CCW+
4	ORIGIN	17	CCW-
5	IN1	18	Analog in(TBD)
6	IN2	19	AGND (TBD)
7	IN3	20	-
8	IN4	21	-
9	IN5	22	COMP OUT
10	OUT1	23	BRK+
11	OUT2	24	BRK-
12	OUT3	25	-COM
13	OUT4		

D-SUB 25P

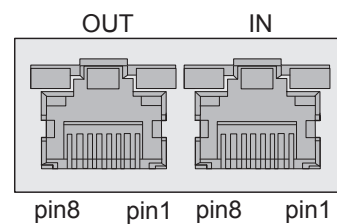


- Pay attention to the polarity of power.

CN4 pin

RS485 (CN4)

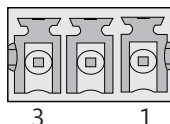
Pin.	Signal	Pin.	Signal
1	(NC)	2	GND
3	A Input (RS485)	4	(NC)
5	GND	6	B Input (RS485)
7	(NC)	8	GND



CN5 pin

RS232C (CN5)

Pin.	Signal
1	RXD
2	TXD
3	GND

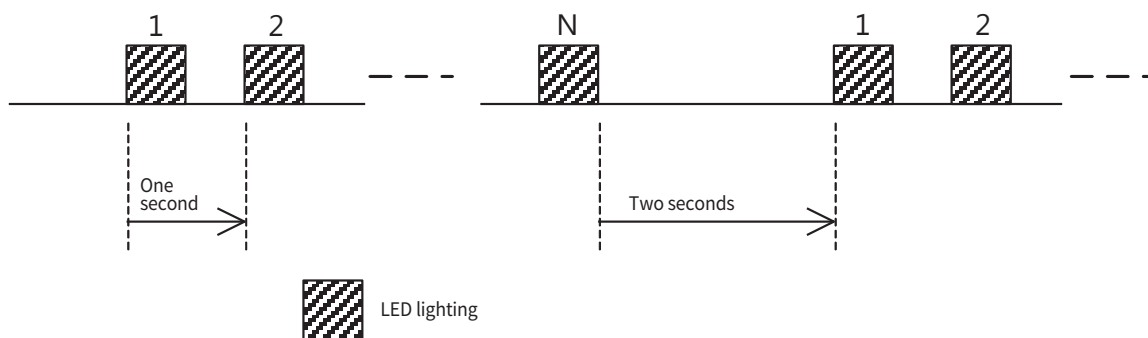


Example of product application

Alarm function

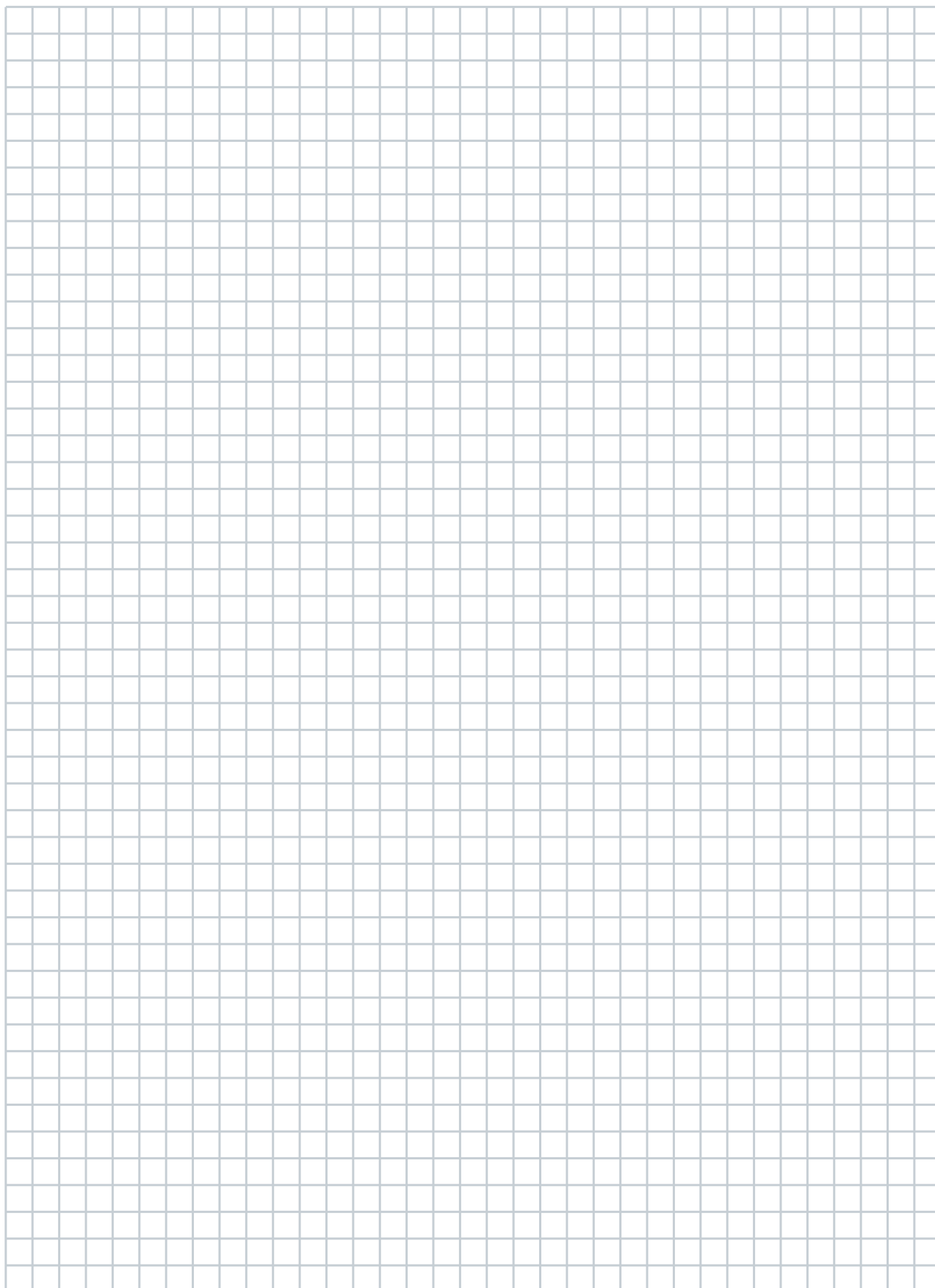
Please check the alarm based on the number of flashes

When the alarm appears, the digital output “alarm” will become Active. The above mentioned “ALM” LED will flash. The light flashes every two seconds, as shown. After reaching the number of flashes that the alarm should appear, the light will be off for two seconds and starts to flash every two seconds again.



Number of flashes	Alarm	Cause	Cause Measures
2	Cause Measures	Overloading	Reduce the load
		The motor speed did not catch up with the command during position control.	Force the maximum frequency of command pulse to stay below the maximum rotation of motor.
3	Full count	Overloading	The motor speed did not catch up with the command pulse during position control.
		Force the load to stay below the continuous rated torque.	Force the cyclic frequency of command pulse to stay below the rated motor speed. Force the curve angle of acceleration and deceleration to become flat.
4	Overspeed	An error occurred to the motor speed	Force the cyclic frequency of command pulse to stay below the maximum rotation of motor
5	Poor gain adjustment	- Motor hunting occurred due to improper adjustment. - This could also happen when entering the command without acceleration or deceleration.	Adjust the proportional gain (P) again to execute the acceleration and deceleration of command pulse.
6	Overvoltage	The internal power voltage increased due to regeneration.	Add a regenerator (option)
7	Abnormal initialization	The load has exceeded the maximum rated value of motor.	Please reduce the load
8	EEPROM Error	An error occurred to the EEPROM data	Perform repair
9	Abnormal position compensation during open circuit control	- Overloading - The moment of inertia is too large or the motor already has a problem.	Reduce the speed of position compensation and increase the tolerance of position compensation.

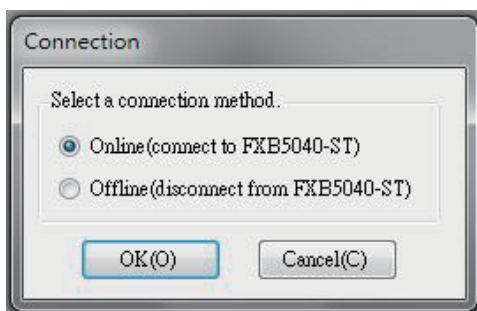
Memo



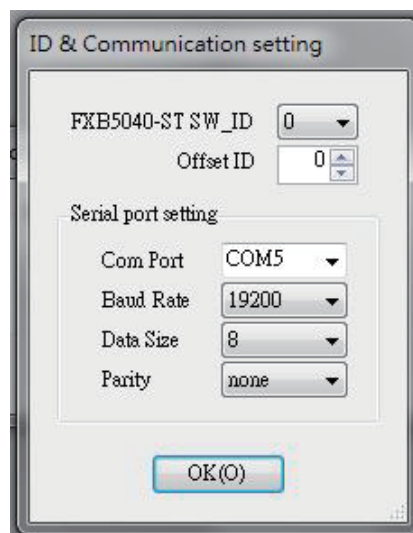
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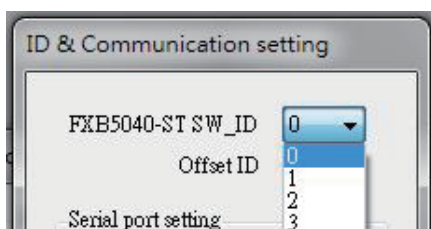
Step 1 – Select On-line Operation (link with device) after entering the screen



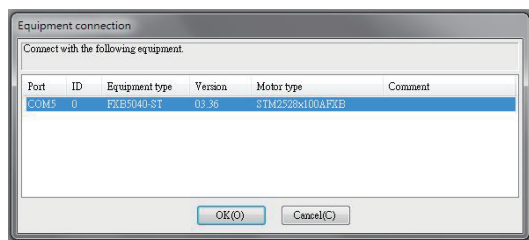
Step 2 – Press LINK when “ID and Communication” Dialog Box appears



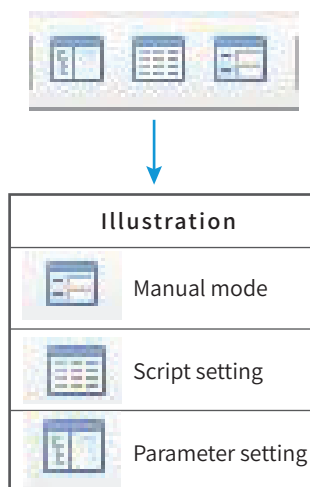
Step 3 – Select ID option after entering Link
Step 4 – Verify if knob number on lateral side of controller corresponds to that of SW-JD.



Step 5 – Select motor code



Step 6 – Three options as picture show



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Step 7 – Parameter Setting Interface

Parameter- [Online data]

Comment

<< All >>

Addr	Symbol	Description	Range	Data
0100h	PKp	Position loop gain		100
0101h	PKv	Base integral time constant		20
0102h	PTv	Base integral time constant		20
0103h	PKd	Speed feedback gain		300
0104h	PDv	Compensated derivative gain	0 ~ 20	5
0105h	PKvp	Proportional gain for P control		5
0106h	Ft	Feed forward(%)	0 ~ 100	0
0107h	ErrCountClr	Clear deviation counter when servo OFF	0 ~ 1	0
0108h	FullCountValue	Full count alarm count value	1 ~ 2147483647	3000000
010Ah	InPositionZone	In position zone count value	0 ~ 1000	4
010Bh	ElectroGearNum	Electronic gear: numerator	1 ~ 10000	1
010Ch	ElectroGearDen	Electronic gear: denominator	1 ~ 10000	1
010Dh	OpenModeSwitch	Pattern in position control	0 ~ 2	0

Position loop gain
Positioning time can be shortened by setting larger value, but it also may cause overshoot.
Too large setting value causes hunting.

Constantly changeable
Motor control parameter
Need power cycle. The power must be OFF and then ON after writing parameters to EEPROM.

Step 8 – Script Setting Interface

Program- [Online data]

When a program function is used, Group 05:Common parameter "SelChangeMode: A selection of a control mode by a control mode selection input" should be set to "2(mode 2)".
Also when a program mode "03: +TLS", "04: -TLS" is used as a program data parameter, then Group 05:Common parameter "ModeSwitch: A software switch of a mode selection" should be set to "1".
Or input port "CONT_MODE: A selection of a control mode" should be set to "ON".

No	Mode	Displacement distance	Speed (%)	Torque (x 0.1%)	Target port	Range L	Range H	Wait(msec)	Next
0	00:INC	0	100	500	0	0	0	0	-1
1	00:INC	0	100	500	0	0	0	0	-1
2	00:INC	0	100	500	0	0	0	0	-1
3	00:INC	0	100	500	0	0	0	0	-1
4	00:INC	0	100	500	0	0	0	0	-1
5	00:INC	0	100	500	0	0	0	0	-1
6	00:INC	0	100	500	0	0	0	0	-1
7	00:INC	0	100	500	0	0	0	0	-1
8	00:INC	0	100	500	0	0	0	0	-1
9	00:INC	0	100	500	0	0	0	0	-1
10	00:INC	0	100	500	0	0	0	0	-1
11	00:INC	0	100	500	0	0	0	0	-1
12	00:INC	0	100	500	0	0	0	0	-1
13	00:INC	0	100	500	0	0	0	0	-1
14	00:INC	0	100	500	0	0	0	0	-1

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Step 9 – Manual Mode Interface

Manual operation control mode: Once (position mode)

Move

Servo ON Alarm reset
Servo OFF Def.Count Clear

Position/force (position) control
Move Speed[%](0=LowSpeed) 10
Move speed override

JOG
- + ☐ continuous

Emergency stop Slow stop

Rel. POS 0 - +
Abs. POS 0 Exec.
Set. POS 0 Exec.

Signal search
Target inp. port 00: ORG rising edge
- Direction + Direction

Zero return (Speed setting = 901h)
Mode (Setting = 900h)
12: torque limit Exec.

Force (position) control
Torque limit search
- Direction + Direction

Speed/Torque control
Spd[%] 100 Trq[%] 100
- Direction + Direction Stop

Teaching
Step No. 0 Exec.

Status

Servo ON/OFF 1: SERVO ON
Operation status 0: STOP
Position control
In position 1: ON

Speed control
Zero speed 0: ROTATE
Target speed 0: OFF

Torque/force control
Torque limit 0: OFF

Common

Alarm	0: No alarm
Motor speed (rpm)	0
Motor current (%)	2.9
Command position	0
Encoder position	0
Program No.	-1
Supply voltage (V)	24

Output

1	VELO_ZERO	☒	3	TRQ_LMT	☐
2	ALARM	☐	4	VELO_COIN	☐

Input

1	SERVO_ON	☐	ORG
2	ALARM_RST	☐	+LM
3	START	☐	-LM
4	VELO_DIR	☐	Z phase
5	CONT_MODE	☐	

Comm. status 0: No error

Straight Interpolation

X_SWID	X_Index	Start speed [pps]	Accel time [ms]
0	0	100.0	1
Y_SWID	Y_Index	Max speed [pps]	S_Curve [%]
0	0	1000.0	0

Move
☒ X_Axis ☒ Y_Axis
Exec.
Stop

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Step 10 – Select Servo ON when entering the screen to switch on the power. Click JOG+ and JOG- to observe if cylinder moves normally. After that, adjust required torque and rotation speed according to Parameter Setting and Zero instructions given below.

The screenshot displays a comprehensive manual operation control interface for a servo motor system. The interface is organized into several functional panels:

- Move Panel:** Includes buttons for Servo ON, Servo OFF, Alarm reset, and Def.Count Clear. It features position/force control settings with Move Speed [%] (0=LowSpeed) set to 10, a Move speed override button, and JOG controls with - and + buttons and a continuous mode checkbox. Emergency stop and Slow stop buttons are also present. Relative (Rel. POS), Absolute (Abs. POS), and Set (Set. POS) position controls are available with numeric inputs and direction buttons. Signal search includes a target input port (00: ORG rising edge) and direction buttons. Zero return settings (Speed = 901h, Mode = 900h) and a 12-torque limit are shown. Force control includes torque limit search with direction buttons. Speed/Torque control has Spd [%] and Trq [%] inputs (both at 100) and direction buttons. Teaching includes a Step No. input and an Exec. button. Straight Interpolation settings include X and Y axis switches, indices, start/max speeds, acceleration time, and S-Curve settings.
- Status Panel:** Displays Servo ON/OFF (1: SERVO ON), Operation status (0: STOP), Position control (In position: 1: ON), Speed control (Zero speed: 0: ROTATE, Target speed: 0: OFF), Torque/force control (Torque limit: 0: OFF), and Common parameters (Alarm: 0: No alarm, Motor speed (rpm): 0, Motor current (%): 2.9, Command position: 0, Encoder position: 0, Program No.: -1, Supply voltage (V): 24).
- Output Panel:** Shows 5 output channels: 1 VELO_ZERO, 2 ALARM, 3 TRQ_LMT, and 4 VELO_COIN.
- Input Panel:** Shows 5 input channels: 1 SERVO_ON, 2 ALARM_RST, 3 START, 4 VELO_DIR, and 5 CONT_MODE, each with a corresponding input signal name.
- Comm. status:** Displays 0: No error.
- Move Panel (Bottom):** Includes checkboxes for X_Axis and Y_Axis, an Exec. button, and a Stop button.

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Step 11 – Script Function

Program- [Online data]

When a program function is used, Group 05:Common parameter "SelChangeMode: A selection of a control mode by a control mode selection input" should be set to "2(mode 2)".
Also when a program mode "03: +TLS", "04: -TLS" is used as a program data parameter, then Group 05:Common parameter "ModeSwitch: A software switch of a mode selection" should be set to "1".
Or input port "CONT_MODE: A selection of a control mode" should be set to "ON".

No	Mode	Displacement distance	Speed (%)	Torque (x 0.1%)	Target port	Range L	Range H	Wait(msec)	Next
0	00:INC	0	100	500	0	0	0	0	-1
1	00:INC	0	100	500	0	0	0	0	-1
2	00:INC	0	100	500	0	0	0	0	-1
3	00:INC	0	100	500	0	0	0	0	-1
4	00:INC	0	100	500	0	0	0	0	-1
5	00:INC	0	100	500	0	0	0	0	-1
6	00:INC	0	100	500	0	0	0	0	-1
7	00:INC	0	100	500	0	0	0	0	-1
8	00:INC	0	100	500	0	0	0	0	-1
9	00:INC	0	100	500	0	0	0	0	-1
10	00:INC	0	100	500	0	0	0	0	-1
11	00:INC	0	100	500	0	0	0	0	-1
12	00:INC	0	100	500	0	0	0	0	-1
13	00:INC	0	100	500	0	0	0	0	-1
14	00:INC	0	100	500	0	0	0	0	-1

Script Mode:

- 0 : Relative Position
- 1 : Absolute Position
- 2 : Homing
- 3 : Positive Torque Detection
- 4 : Negative Torque Detection
- 5 : Positive Signal Detection
- 6 : Negative Signal Detection
- 7 : Position Setting
- 8 : Clear Offset Count
- 9 : Common Output
- 10 : Common Output (Coordinates comparison - large)
- 11 : Common Output (Coordinates comparison - small)
- 12 : Set Counter
- 13 : Count result -1; if 0, next step; if not 0, execute line number specified in the next step.

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Step 12 – Script Functions

Script Mode: there are 14 (0-13) modes that can be adjusted according to customer needs.

1-1 Mode: Relevant mode can be set for controlling electric cylinder (13 settings as indicated in the red frame above.)

1-2 Stroke/Angle: Enter a position within the adjustable range of that specification.

1-3 Speed: Adjust speed based on corresponding spec (%).

1-4 Torque: Adjust speed based on corresponding spec (0.1%).

1-5 Subject Port: Combined with mode setting, allows to output to an external controller, such as PLC.

1-6 Range-L: Combined with Item 7, allows range setting.

1-7 Range-H: Combined with Item 6, allows range setting.

1-8 Wait (ms): Waiting time after executing that instruction line, 1000(ms) = 1(s) Second

1-9 Next Step: Specifies action of any other line after executing that instruction line; -1 for stand still.

1. Allows to set Stroke/ Angle, Speed and Torque after mode selection.

2. Setting of “Next Step” cell is a Jump Function; as shown in the above figure, after completing Line No.0 action, the next step is 1, then switch to Line No.1 action, and so on. This function can be used for automatic circulation: when -1 is set for the next step, no action will be executed.



Step 13 – Homing (Click Input to Ram or Input to ROM after modification)

► Homing Speed: adjustable (1-100%)

► Homing Offset: used for fine-tuning offset of one-direction gear gap

► Homing Torque Limit: Sets torque value according to user requirement; when carrying out homing, reaching the set torque value indicates the completion of homing.

► Homing Position Setting: After completing homing and compensating offset of one-direction gear gap, the current position is set as Home.

Parameter- [Online data]

Comment

<< Group 09:Zero return parameter >>

Address	Symbol	Description	Range	Data
0900h	OrgMode	Homing sequence pattern	1 ~ 12	12
0901h	OrgSpeed	Homing sequence speed(%)	1 ~ 100	20
0902h	OrgOffset	Offset of homing sequence		1500
0904h	OrgData	Data of homing sequence		0
0906h	OrgTrqLimit	Torque limit of homing sequence(×0.1%)	0 ~ 1000	600

1 ORG: Detect the +edge of ORG signal. (Default)
 2 ORG,Z: Detect the - rising edge of Z-phase after the + edge of ORG signal has been detected.
 3 +LM: Detect the edge of + LM signal. 4 Z: Detect the + edge of Z-phase.
 5 +LM,Z: Detect the - rising edge of Z-phase after the edge of + LM signal has been detected.
 6 ORG: Detect the - edge of ORG signal.
 7 ORG,Z: Detect the + rising edge of Z-phase after the - edge of ORG signal has been detected.
 8 -LM: Detect the edge of - LM signal. 9 Z: Detect the - edge of Z-phase.
 10 -LM,Z: Detect the + rising edge of Z-phase after the edge of - LM signal has been detected.
 11 Detect the + torque limit.
 12 Detect the - torque limit.

Legend:

- Constantly changeable
- Motor control parameter
- Need power cycle. The power must be OFF and then ON after writing parameters to EEPROM.

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Step 14 – Type 05 of Parameter Table, Common Parameters:

For switching over to automatic and continuous control: alter 0502h to 2 and 0503h to 1, click input to Ram and input to Rom; this allows to one-key operation by clicking START under Manual Mode. To stop activation, just release START). (Note: to alter parameters in orange color, you need to re-start the power).

Address	Symbol	Description	Range	Data
0500h	MaxTrqRate	Maximum torque value(x 0.1%)	0 ~ 1000	1000
0501h	FullTrqTime	Loop error detection time(msec)	500 ~ 10000	1000
0502h	SelChangeMode	Selection of control mode by external control	0 ~ 5	2
0503h	ModeSwitch	Software switch to select internal digital modes	0 ~ 1	1
0504h	ProContSwitch	Software switch to select internal digital P/Pi controls	0 ~ 1	0
0505h	BrakeOffDelay	Timing of "brake off"	0 ~ 100	100
0506h	AutoPIDetect	Activation of initialization	0 ~ 2	0
0507h	PIDetectMode	Initialization modes	0 ~ 3	0
0508h	SelLED	Select LED(INP) indication	0 ~ 1	0
0509h	DrvLogicLmtP	Logic level of +limit input signal	0 ~ 1	0
050Ch	DrvLogicLmtM	Logic level of -limit input signal	0 ~ 1	0
050Dh	DrvLogicLmtCond	Set the type of stopping by limit input signal	0 ~ 2	2
050Eh	SelReBrake	Activation of regenerative brake when servo is OFF	0 ~ 1	0

When set to 100%, means 150% of rating torque.
(Default = 1000)

Legend:
Constantly changeable
Motor control parameter
Need power cycle. The power must be OFF and then ON after writing parameters to EEPROM.

Move

Servo ON / Servo OFF

Alarm reset / Def.Count Clear

Position/force (position) control

Move Speed [%](0=LowSpeed) 10

Move speed override

JOG

Emergency stop / Slow stop

Rel. POS 0

Abs. POS 0

Set. POS 0

Signal search

Target inp.port 00: ORG rising edge

- Direction / + Direction

Zero return (Speed setting = 901h)

Mode (Setting = 900h)

12: torque limit

Exec.

Force (position) control

Torque limit search

- Direction / + Direction

Speed/Torque control

Spd [%] 100

Trq [%] 100

- Direction / + Direction / Stop

Teaching

Step No. 0

Exec.

Straight Interpolation

X_SWID 0

X_Index 0

Start speed [pps] 100.0

Accel time [ms] 1

Y_SWID 0

Y_Index 0

Max speed [pps] 1000.0

S_Curve [%] 0

Move

X_Axis / Y_Axis

Exec.

Stop

Status

Servo ON/OFF 1: SERVO ON

Operation status 0: STOP

Position control

In position 1: ON

Speed control

Zero speed 0: ROTATE

Target speed 0: OFF

Torque/force control

Torque limit 0: OFF

Common

Alarm 0: No alarm

Motor speed (rpm) 0

Motor current (%) 2.9

Command position 0

Encoder position 0

Program No. -1

Supply voltage (V) 24

Output

1 VELO_ZERO 3 TRQ_LMT

2 ALARM 4 VELO_COIN

Input

1 SERVO_ON ORG

2 ALARM_RST +LM

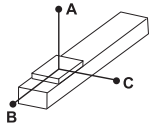
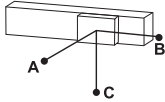
3 START -LM

4 VELO_DIR Z phase

5 CONT_MODE

Comm. status 0: No error

Specification Selection Table

CHELIC Linear Motor Requirement Specification Survey Sheet							
Company Name		Date		Filled-in By			
Add.				email:			
TEL.			Fax:				
Requirements:	Load (kg): Speed (mm/s): Repetition Precision(mm): Stroke (mm): ☐ ± 0.002 ☐ ± 0.005 Acceleration(mm/s ²):			Movement Circulation Time(s): Stop Time (s):			
	Allowable load torque (mm)	Horizontal Installation			Wall-mount Installation		
							
		A	B	C	A	B	C
Application	☐ Layout			Drawing			
	Visual application	☐ Position Test					
		☐ Movement Test					
	☐ Process Machine						
	☐ Screw Use						
	☐ Spot glue use						
Environment of Use	☐ Other						
	☐ General Environment						
Equipment	☐ For massive production ☐ For testing						
Remark							



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