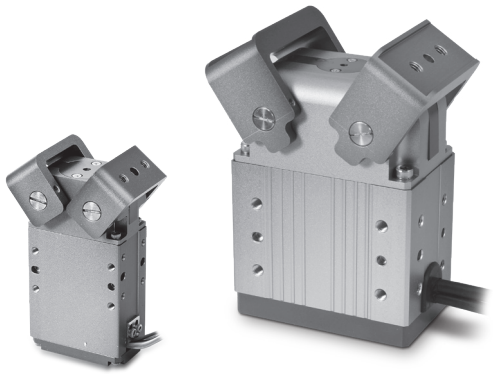
EDM series Angular Type Electric Gripper

Product features/ Code of order

Feature

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



Specification

Item \ Model		EDM 20	EDM 25	EDM 35	EDM 42
Gripping force	N	6.4	25	60	90
Rotation angle	°	180 °			
Max speed	°/s	600			
Actuation type		Worm gear, Helical gear			
Ambient and fluid temperature	°C	5~40			
Operating humidity range	%	35~85			
Motor size		20□	25□	35□	42□
Position repeatability	°	±0.05			
Finger backlash(one side)	°	1	2.5		
Idling stroke(one side)	°	0.1	0.3		

Note: 1. Idling stroke: Reference value when correcting the error caused by reciprocating motion.
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 **EDM – 20 – 03 – P**

1 2 3

1

Mark	Motor size □
20	20
25	25
35	35
42	42

2

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

● Standard: 3M

3

Mark	Actuator
P	P-servo

● Standard component Refer to P6-1.89

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 throug the gripping force chart → Selection of Touch Speed

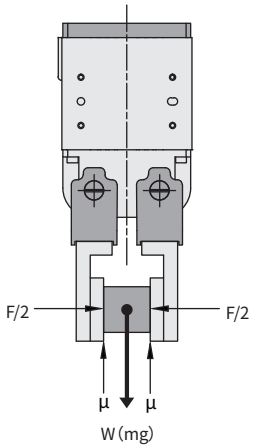
Example

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=
0.2kg x 20 x 9.8m/s ≒ 39.2N
if the gripping force is set for at least 20 times the weight of the workpiece

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/s²)
mg : Weight of Workpiece (N)

The condition of that the workpiece does not fall is Fμ > 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.

μ = 0.2	μ = 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)

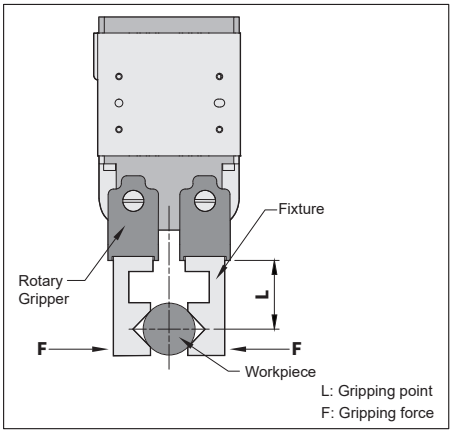
COF μ	Material Quality of Annex and Workpiece (standard)
0.1	Metal (surface roughness Rz is under 3.2)
0.2	Metal
Above 0.2	Rubber, Resin, etc.

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

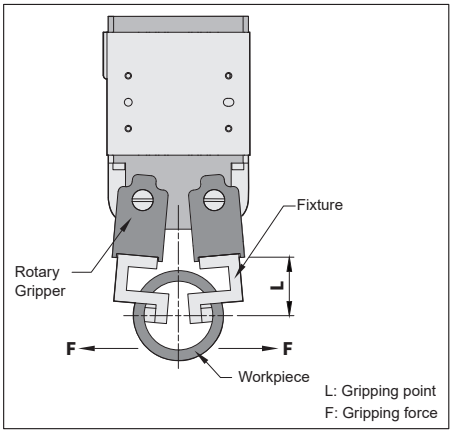
Demonstration of gripping force

- 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**.
- Working position of grip: **L** please perform it within the range designated in the figure below.

Outer Diameter Grip



Inner Diameter Grip



Seq 2 Confirm the gripping point and outward extension

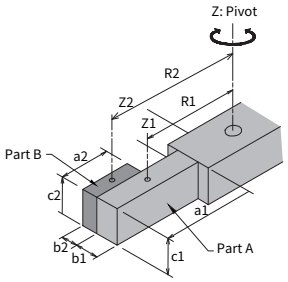
Please confirm whether the total moment of inertia of the gripper in z axis (pivot) is allowable. The calculation is based on the structure and formation of a gripper. As shown below, here is an example for the calculation by two parts divided, please refer to it.

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)

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

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



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)

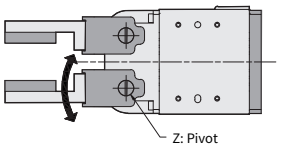
$$m1\ (kg) = a1 \times b1 \times c1 \times \text{specific weight} \times 10^{-6}$$

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

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)

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



Model	Allowable Moment of Inertia ($kg \cdot m^2$)	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

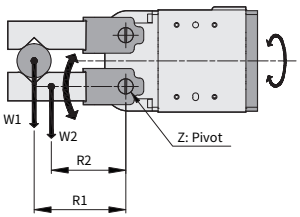
Seq 3 Confirm the external force applied on the gripper

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.

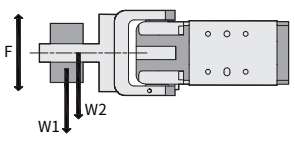
m1: Mass of Workpiece (kg)
R1: Distance between the Center of Gravity of Workpiece and the Pivot of Gripper Opening (mm)
m2: Mass of Gripper (kg)
R2: Distance between the Center of Gravity of Workpiece and the Pivot of Gripper Opening (mm)
g: Gravitational Acceleration ($9.8 m/s^2$)

$$T = (W1 \times R1 \times 10^{-3}) + (W2 \times R2 \times 10^{-3}) + (\text{other load torques})$$
$$= (m1g \times R1 \times 10^{-3}) + (m2g \times R2 \times 10^{-3}) + (\text{other load torques})$$



• 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	0.50



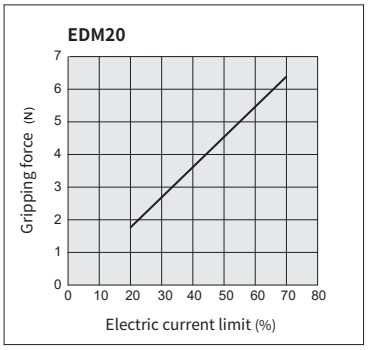
2. Allowable Thrust Load

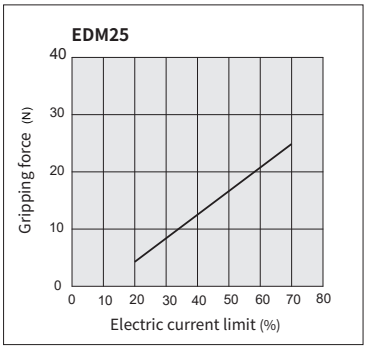
Please confirm whether the thrust load among the axis of the gripper opening is allowable.

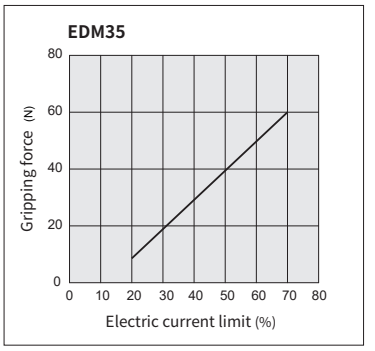
$$F = W1 + W2 + (\text{other load torques})$$
$$= m1g + m2g + (\text{other load torques})$$

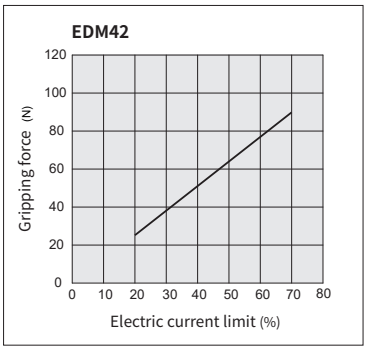
Model	Allowable Load of Thrust Force F (N)
EDM 20	0.05
EDM 25	0.35
EDM 35	0.70
EDM 42	0.50

Gripping force-current value graph

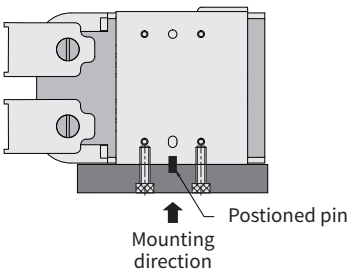


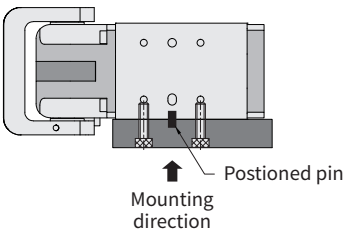




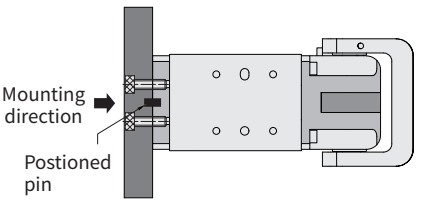


Side mounting





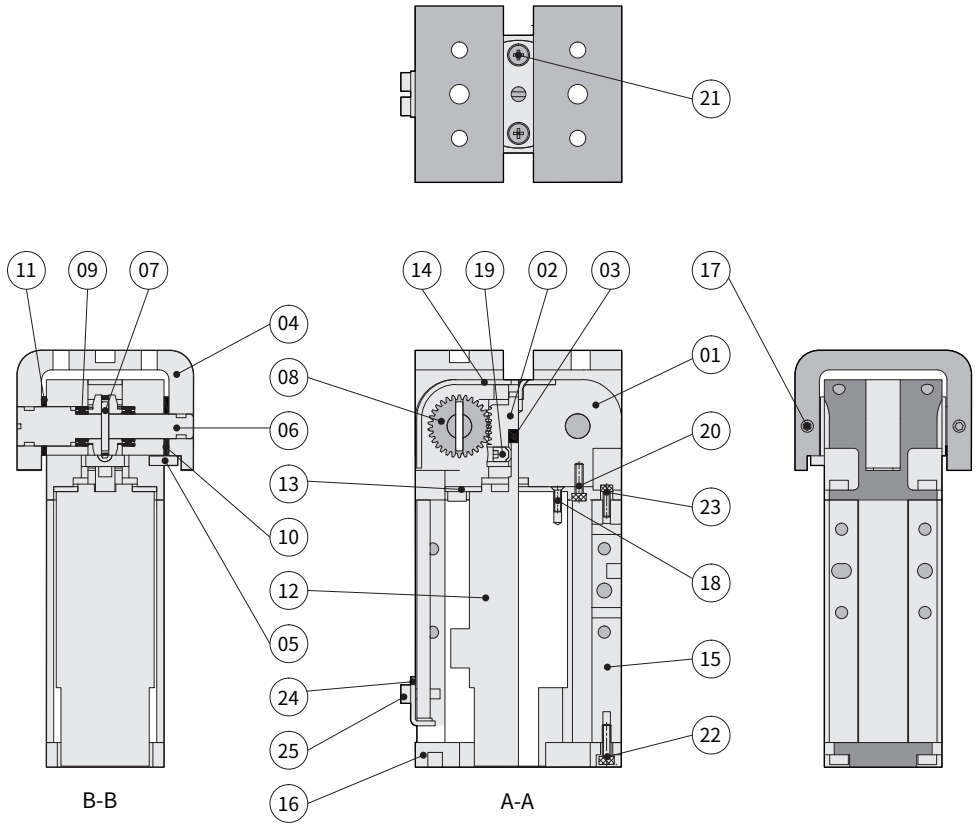
Bottom mounting



Product weight

Item \ Model	EDM 20	EDM 25	EDM 35	EDM 42
Weight (kg)	0.6(Basic)	0.8 (Long stroke)	1.6(Basic)	2.0 (Long stroke)

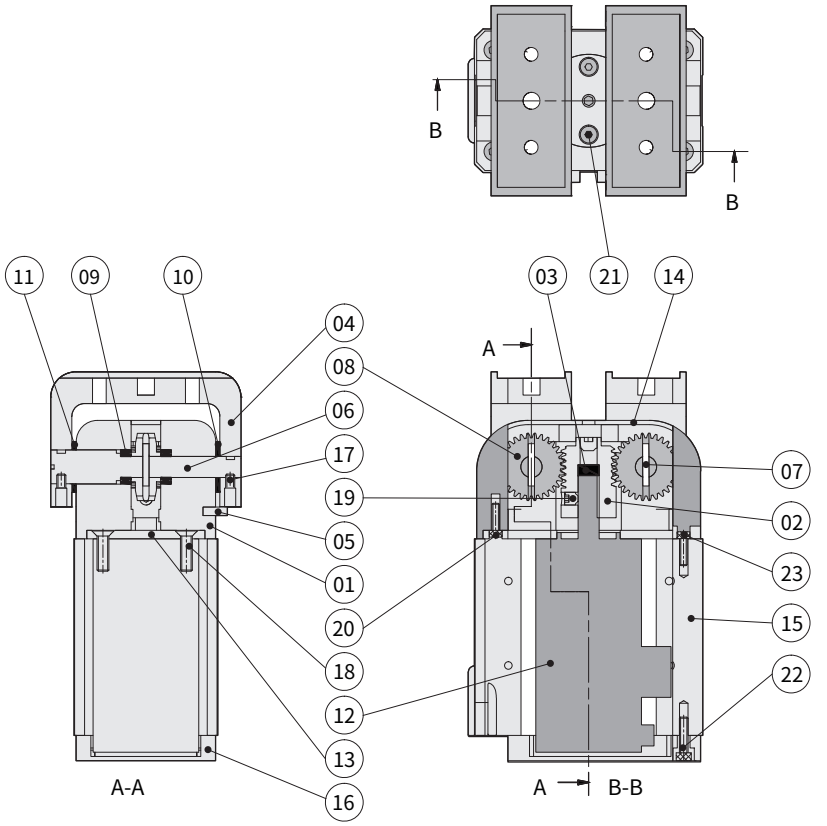
EDM20



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			

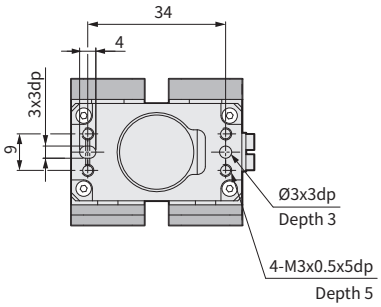
EDM25, EDM35, EDM42

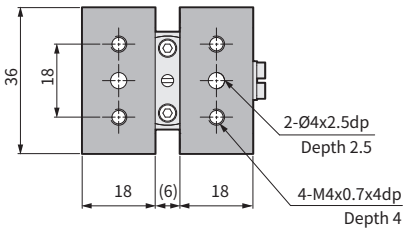


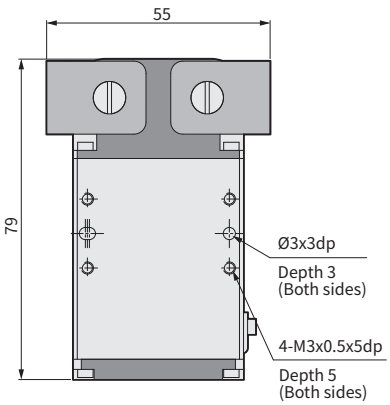
Components and material list

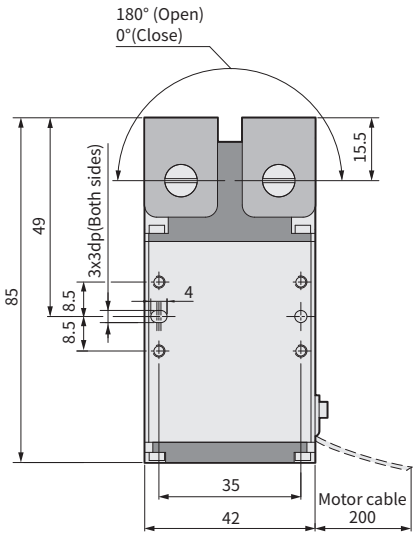
No.	Name	Material	No.	Name	Material
01	Body	Aluminum alloy	14	Motor Adapter Plate	Aluminum alloy
02	Ball screw	Stainless	15	Hood	Aluminum alloy
03	Screw washer	POM	16	shell	Aluminum alloy
04	Swivel Finger	Aluminum alloy	17	Base	Alloy steel
05	Swivel Finger Fixing Pin	Alloy steel	18	Swivel Finger Set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

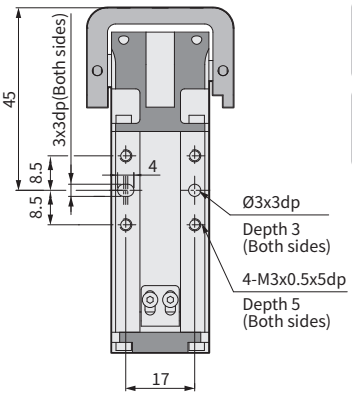
EDM20


34
4
3x3dp
9
Ø3x3dp
Depth 3
4-M3x0.5x5dp
Depth 5

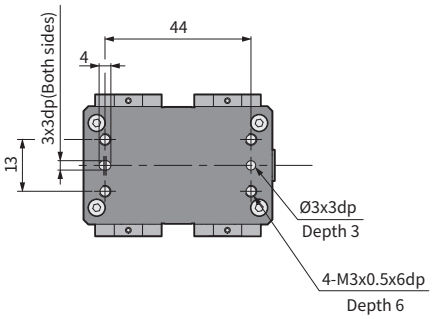

36
18
2-Ø4x2.5dp
Depth 2.5
18
(6)
18
4-M4x0.7x4dp
Depth 4

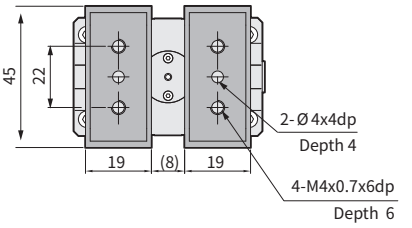

55
79
Ø3x3dp
Depth 3
(Both sides)
4-M3x0.5x5dp
Depth 5
(Both sides)

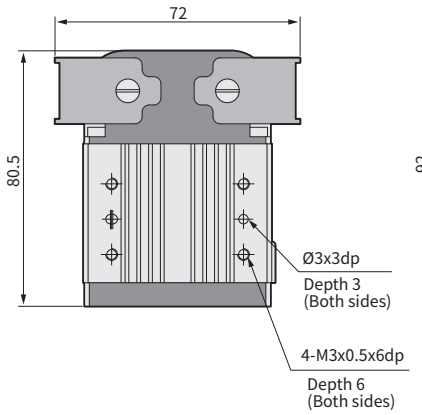

180° (Open)
0°(Close)
15.5
49
3x3dp(Both sides)
85
8.5
8.5
4
35
42
Motor cable
200

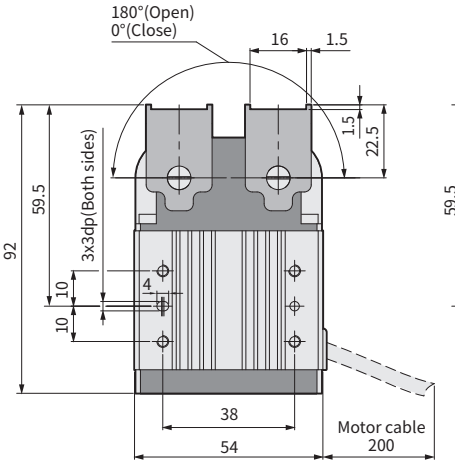

45
3x3dp(Both sides)
8.5
8.5
4
Ø3x3dp
Depth 3
(Both sides)
4-M3x0.5x5dp
Depth 5
(Both sides)
17

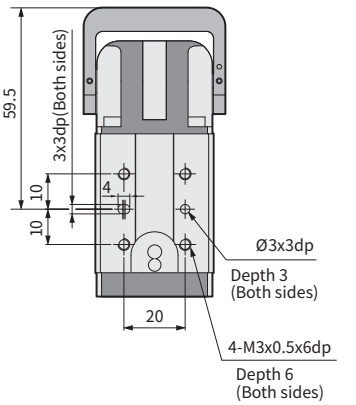
EDM25


44
4
3x3dp(Both sides)
13
Ø3x3dp
Depth 3
4-M3x0.5x6dp
Depth 6

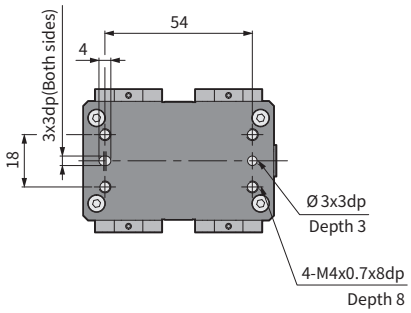

45
22
19
(8)
19
2-Ø4x4dp
Depth 4
4-M4x0.7x6dp
Depth 6

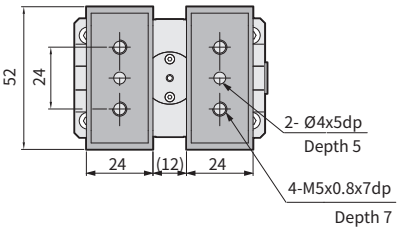

72
80.5
Ø3x3dp
Depth 3
(Both sides)
4-M3x0.5x6dp
Depth 6
(Both sides)

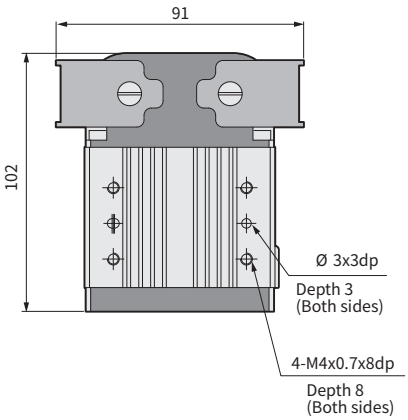

180°(Open)
0°(Close)
16
1.5
1.5
22.5
59.5
92
3x3dp(Both sides)
10
4
10
38
54
Motor cable
200

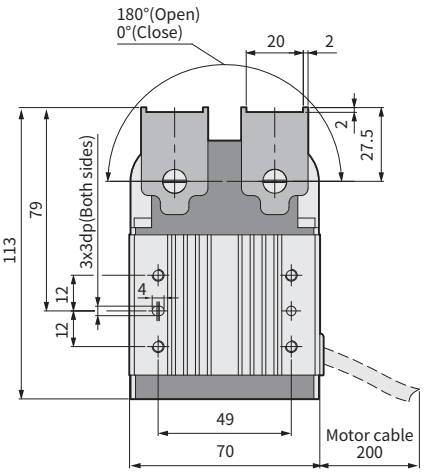

59.5
3x3dp(Both sides)
10
4
10
Ø3x3dp
Depth 3
(Both sides)
20
4-M3x0.5x6dp
Depth 6
(Both sides)

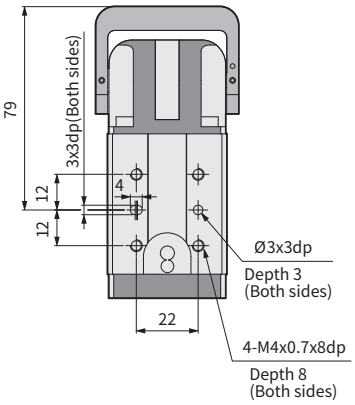
EDM35


54
4
3x3dp(Both sides)
18
Ø 3x3dp
Depth 3
4-M4x0.7x8dp
Depth 8

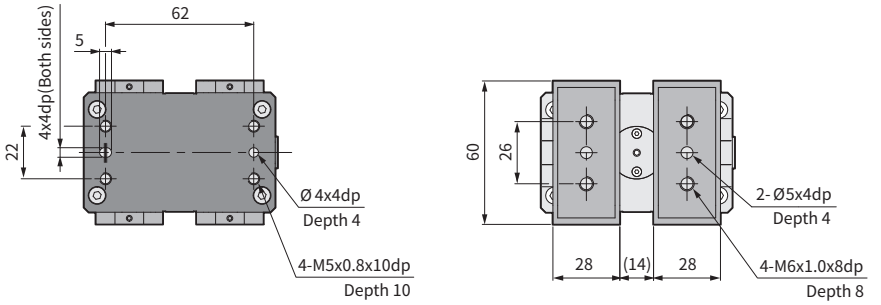

52
24
24
(12)
24
2- Ø4x5dp
Depth 5
4-M5x0.8x7dp
Depth 7

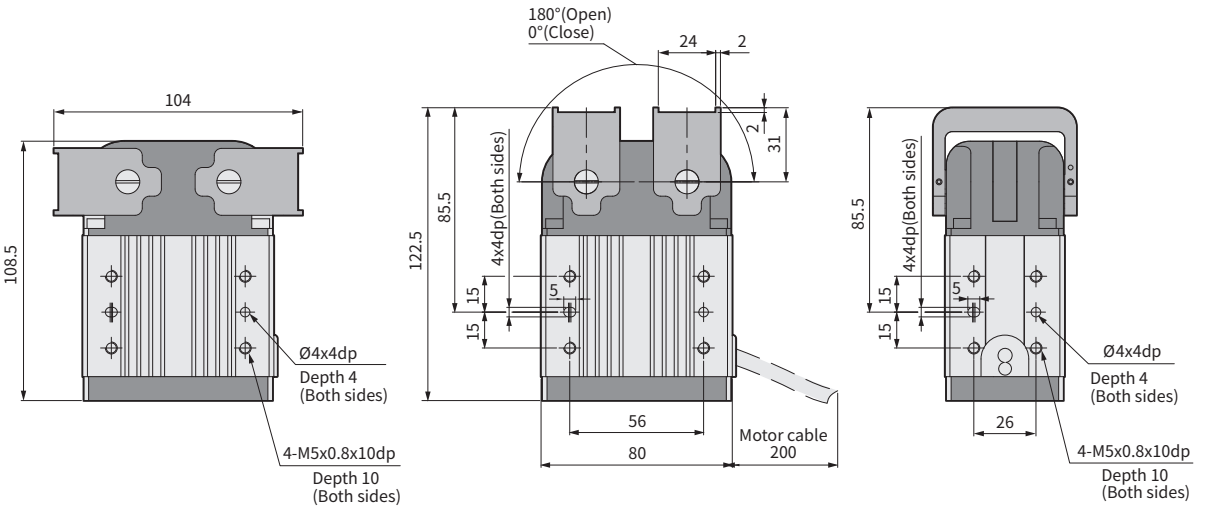

91
102
Ø 3x3dp
Depth 3
(Both sides)
4-M4x0.7x8dp
Depth 8
(Both sides)


180°(Open)
0°(Close)
20
2
2
27.5
113
79
3x3dp(Both sides)
12
12
4
49
70
Motor cable
200


79
3x3dp(Both sides)
12
12
4
Ø3x3dp
Depth 3
(Both sides)
22
4-M4x0.7x8dp
Depth 8
(Both sides)

EDM42


62
5
4x4dp(Both sides)
22
Ø 4x4dp
Depth 4
4-M5x0.8x10dp
Depth 10
60
26
2- Ø5x4dp
Depth 4
28
(14)
28
4-M6x1.0x8dp
Depth 8


104
108.5
Ø4x4dp
Depth 4
(Both sides)
4-M5x0.8x10dp
Depth 10
(Both sides)
180°(Open)
0°(Close)
24
2
2
31
122.5
85.5
4x4dp(Both sides)
15
15
5
56
80
Motor cable
200
85.5
4x4dp(Both sides)
15
15
5
Ø4x4dp
Depth 4
(Both sides)
26
4-M5x0.8x10dp
Depth 10
(Both sides)

MEMO