

# Parallel Gripper 3-finger

CHT

Best suitable for gripping  
cylindrical work-pieces



Cylinder I.D. : 34mm or 44mm

2 types of double-acting grippers



Characteristics

- Compact body
- Space-saving installation
- High gripping force generated by circular-piston-drive wedge cam
- High repeat accuracy:  $\pm 0.01$  mm
- Sensor switch and EOAT (End of Arm Tooling) mounting flange (non-standard item) optionally available

**Sensor Switch**

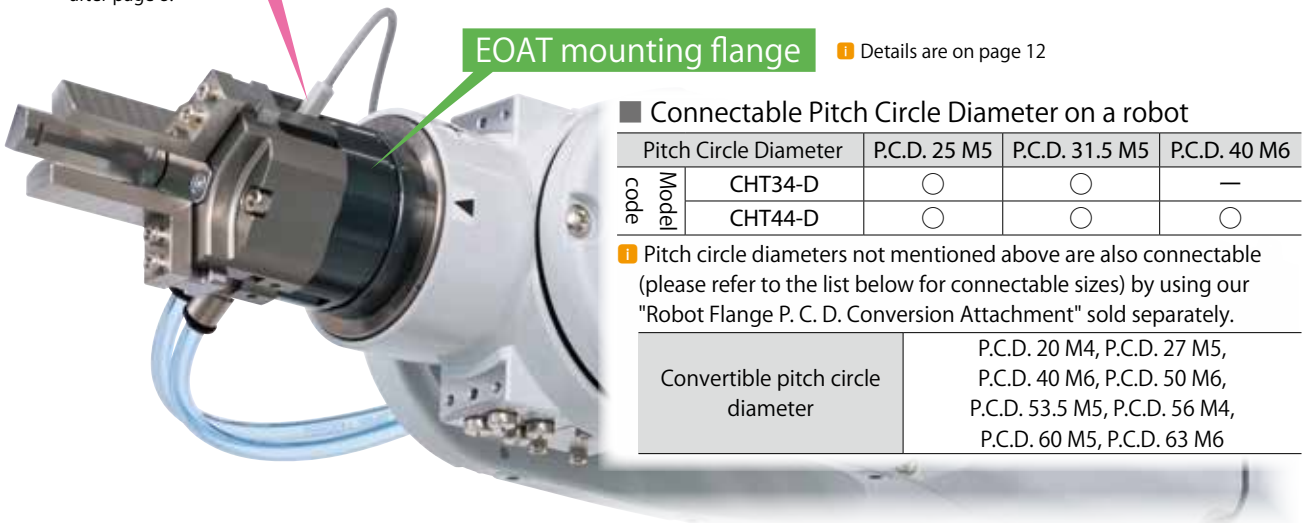
Details are on and after page 8.

■ Sensor switch wiring & output

Wiring & Output types	No contact, 2 wires	No contact, 3 wires, NPN output	No contact, 3 wires, PNP output
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**EOAT mounting flange**

Details are on page 12



■ Connectable Pitch Circle Diameter on a robot

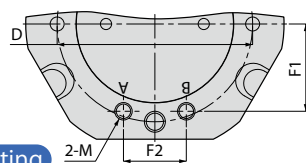
Pitch Circle Diameter	P.C.D. 25 M5	P.C.D. 31.5 M5	P.C.D. 40 M6
Model code	○	○	—
CHT34-D	○	○	○
CHT44-D	○	○	○

Pitch circle diameters not mentioned above are also connectable (please refer to the list below for connectable sizes) by using our "Robot Flange P. C. D. Conversion Attachment" sold separately.

Convertible pitch circle diameter	P.C.D. 20 M4, P.C.D. 27 M5, P.C.D. 40 M6, P.C.D. 50 M6, P.C.D. 53.5 M5, P.C.D. 56 M4, P.C.D. 60 M5, P.C.D. 63 M6
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■ Directly mountable to an end of arm tooling

No thread connection from gripper top is necessary for air supply.

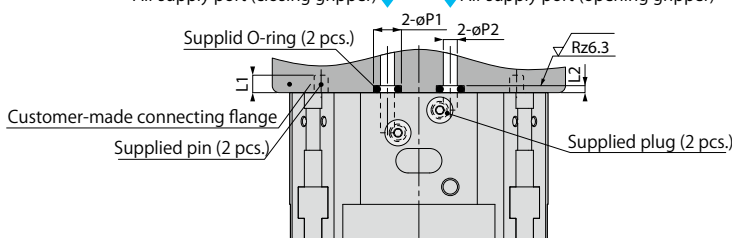


Unit: mm

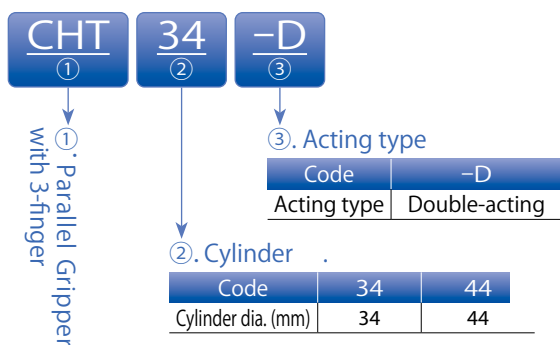
Model code	M	L1	L2	øP1	øP2	F1	F2	D	O-ring
CHT34-D	M3×0.5	4	0.7	5	3	19	12	45	3×1
CHT44-D	M5×0.8	7	1.2	8	5	25	18	56	5×1.5

**Example of direct mounting**

Air supply port (closing gripper) ↓ Air supply port (opening gripper)



## Model Designation (Example)

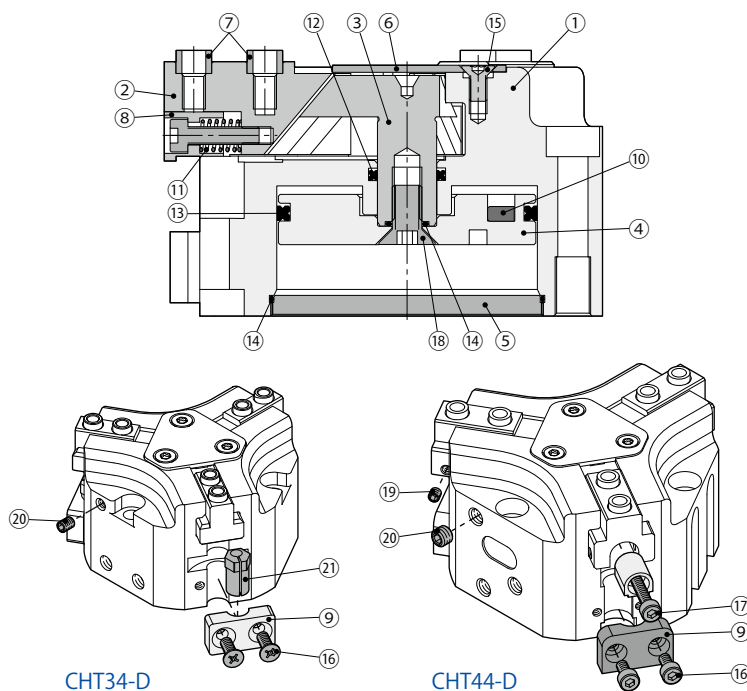


## Specifications

Model code	CHT34-D		CHT44-D	
Acting type	Double-acting			
Cylinder I. D.	34mm		44mm	
Finger stroke	4mm (Dia. 8mm)		6mm (Dia. 12mm)	
Effective gripping force (at 0.6MPa)*	O. D.	97N	198N	
	I. D.	114N	209N	
Fluid medium	Air			
Operating pressure range	0.2 - 0.8MPa			
Operating temperature range	5 - 80°C (No freezing)			
Lubrication	Not required			
Repeatability	±0.01mm			
Weight	220g		500g	

\*) Values at gripping length: 40 mm.

## Sectional & structural drawings



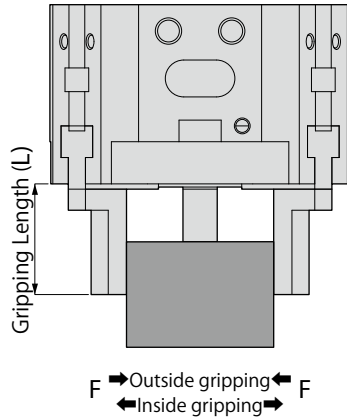
No.	Parts	Material (surface treatment)	
		CHT34-D	CHT44-D
①	Body	Aluminum	
②	Finger	Carbon steel	
③	Rod	Carbon steel	
④	Piston	Aluminum	
⑤	Cap	Stainless steel	
⑥	Top cover	Stainless steel	
⑦	Bush	Stainless steel	
⑧	Sensor adjustment part	—	Aluminum
⑨	Sensor fixing holder	Aluminum	—
⑩	Magnet	Magnet	
⑪	Spring	—	Piano wire
⑫	Rod packing	NBR	
⑬	Piston packing	NBR	
⑭	O-ring	NBR	
⑮	Torx screw	Carbon steel	
⑯	Sensor fixing screw	Stainless steel	
⑰	Hexagon socket head bolt	—	Stainless steel
⑱	Hexagon socket counter-sunk head screw	Stainless steel	
⑲	Hexagon socket set screw	—	Stainless steel
⑳	Hexagon socket set screw	Stainless steel	
㉑	Adjustment socket	Stainless steel	—

Supplied:

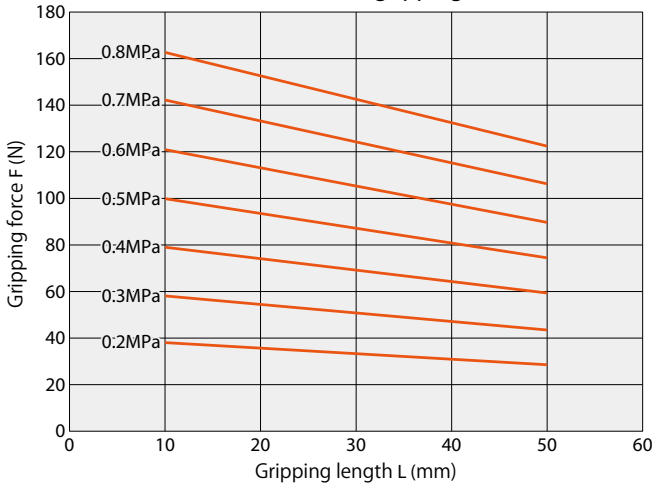
O-ring (x2)	Plug (x2)	Pin (x2)	Bush (x6)

## Effective gripping force

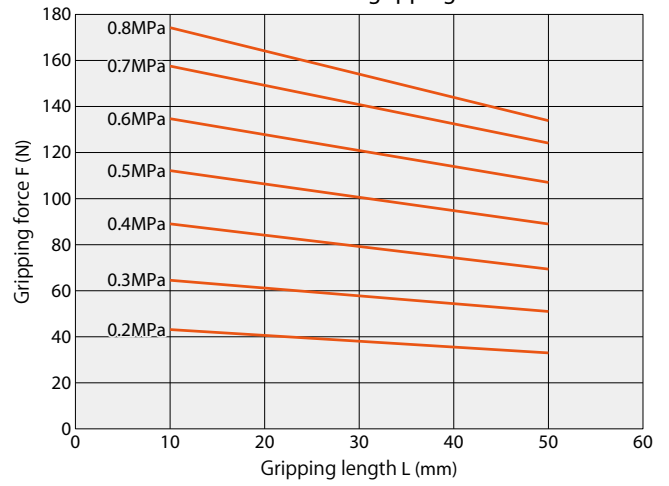
Gripping force of a finger at the gripping length (L) at each operating pressure is as shown in the figures below.



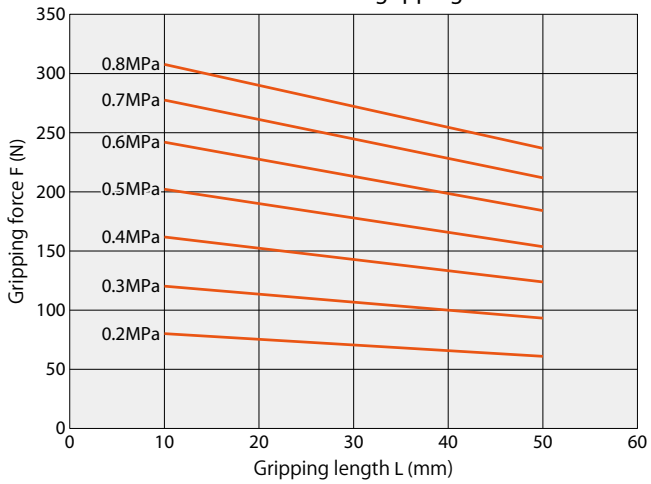
CHT34-D Outside gripping force



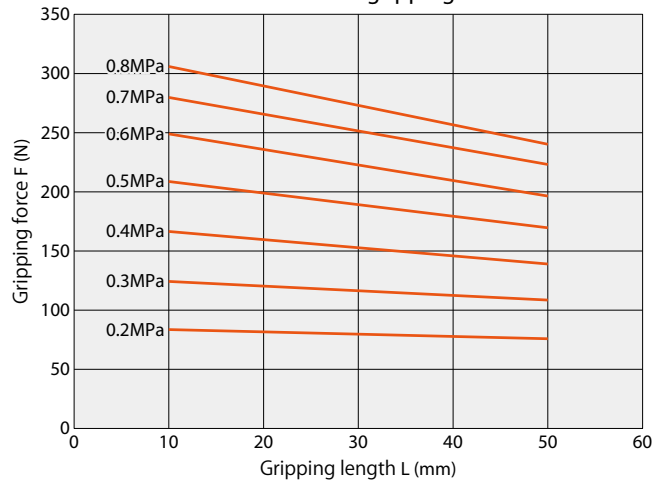
CHT34-D Inside gripping force



CHT44-D Outside gripping force



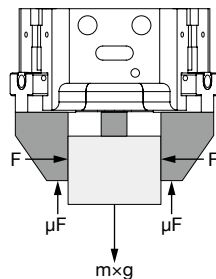
CHT44-D Inside gripping force



## Model selection (Example)

When gripping a work-piece as shown to the right:

- F: Gripping force of a finger (N)
- n: Number of fingers = (3 fingers)
- $\mu$ : Friction coefficient between finger attachment and work-piece
- m: weight of work-piece (kg)
- g: gravitational acceleration (=9.8m/s<sup>2</sup>)
- a: safety factor



Condition for a work-piece not to fall is

$$n \times \mu F > m \times g$$

Thus,

$$F \geq \frac{m \times g}{n \times \mu}$$

Determining F with safety factor as "a," then

$$F \geq \frac{m \times g}{n \times \mu} \times a$$

<Concrete example of model selection>

Selecting a model under the following conditions: There is no large acceleration nor impact when transferring a work-piece; the work-piece weight for outside gripping (m) is 1.2 kg; operating pressure is 0.5MPa; gripping length (L) is 30mm; and friction coefficient ( $\mu$ ) is 0.1. Gripping force calculated by the above equation

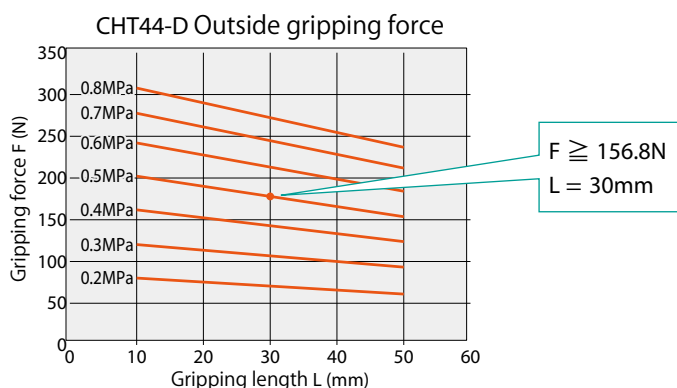
$$F \geq \frac{1.2 \times 9.8}{3 \times 0.1} \times 4$$

$$F \geq 156.8N$$

In the gripping force graph below, CHT44-D can be selected with an operating pressure of 0.5 MPa, gripping length of 30mm, and gripping force of 157N.

### Notes on model selection

1. For use in regular gripping and transfer, we let safety factor (a) be 4.
2. When friction coefficient ( $\mu$ ) is unknown, we regard  $\mu$  as 0.1 ( $\mu=0.1$ ).
3. Bigger safety factor (a) needs to be estimated when large acceleration will be added on a gripper.



## △ Safety instructions

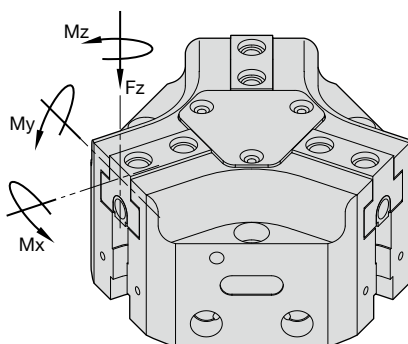
<Parallel Gripper with 3-finger>

- △ Notes 1. The gripper has a built-in magnet. Attention is needed when using the gripper in the environment where magnetic material should be avoided (such as piled-up iron powder, peripheral sensors or work-pieces).
- 2. Refer to the tightening torque table below when installing a gripper. Improper tightening may cause malfunctions, shorter product life time, or loosning.

Screw size	Tightening torque (N·m)
M4×0.7	1.5
M5×0.8	2.9
M6×1	5.2

3. Install a gripper on flat surface. If the installation surface is not flat, the gripper cylinder may get deformed.

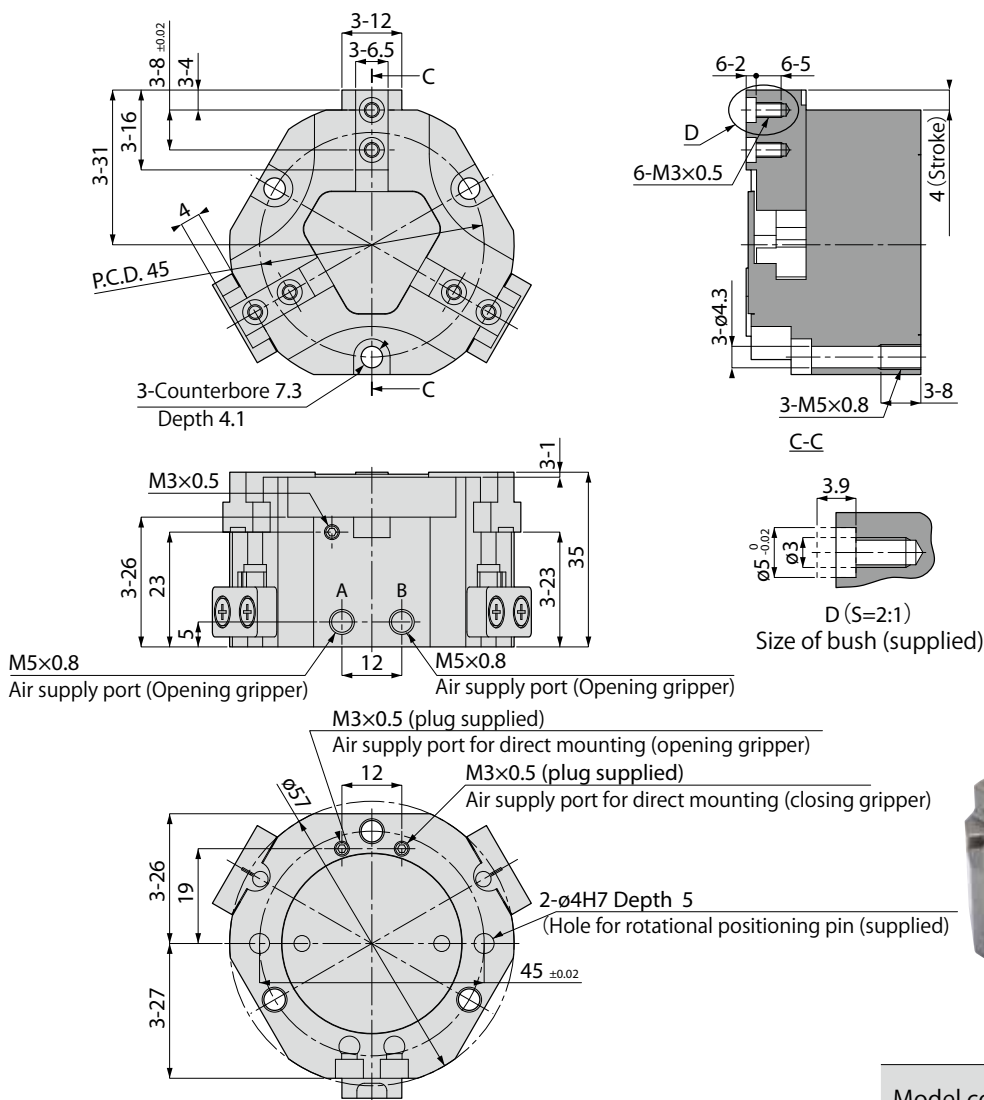
4. See the table to the right for maximum allowable moment and allowable load on fingers. Exceeding the values listed may cause damage to the gripper.



Model code	Mx max. (N·m)	My max. (N·m)	Mz max. (N·m)	Fz max. (N)
CHT34-D	15	15	8	700
CHT44-D	50	45	35	1,200

Exterior dimensional drawings





Model code: CHT34-D



Unit: mm

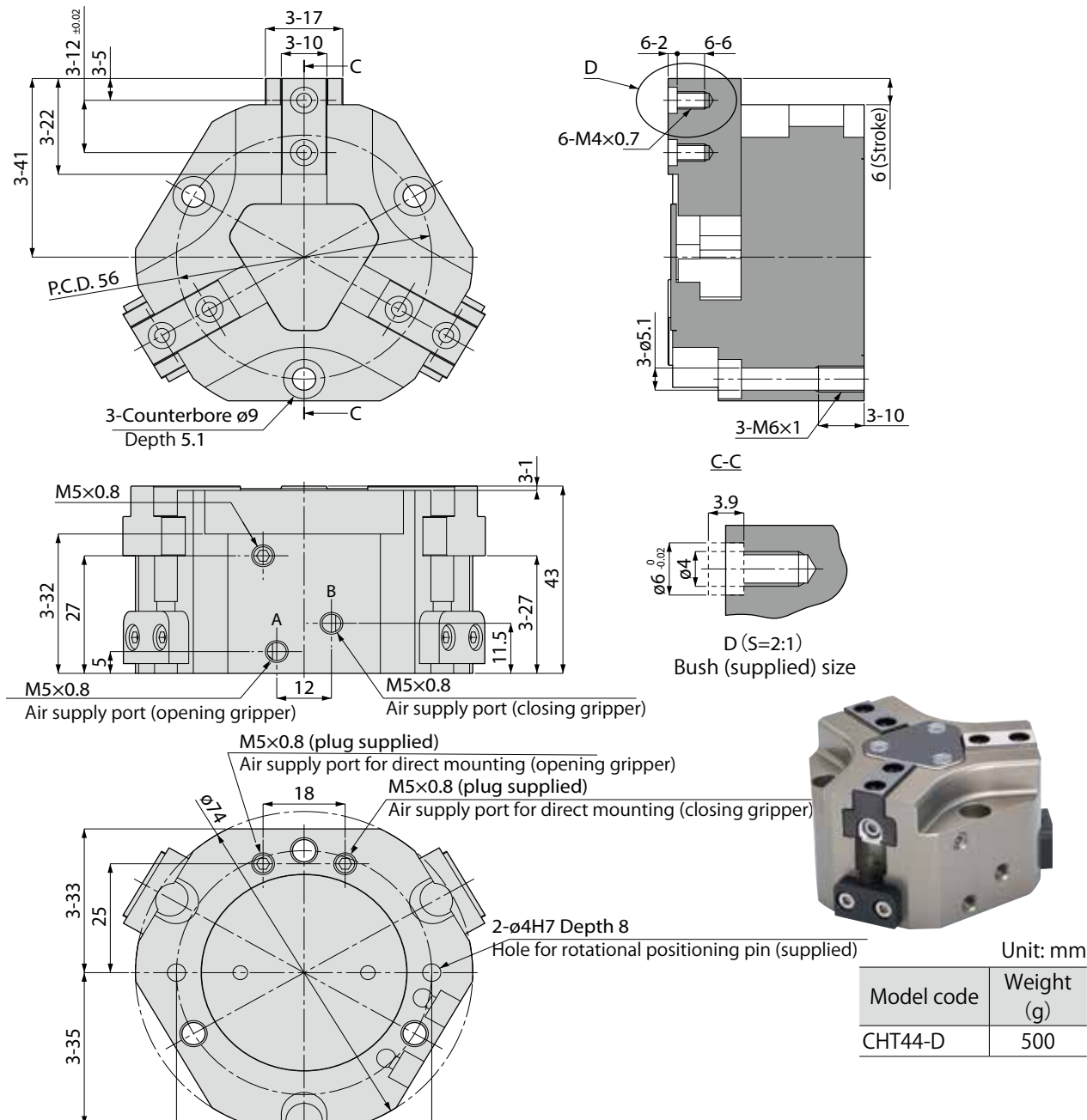
Model code	Weight (g)
CHT34-D	220

Supplied:

Parts				
	O-ring (x2)	Plug (x2)	Pin (x2)	Bush (x6)
Intended use	For direct mounting. Act as a seal between customer-made flange and gripper's air supply port.	For direct mounting. To plug the air supply port on the side of gripper.	Rotational positioning pin to prevent positional displacement.	To prevent positional displacement of customer-made jaw and finger.



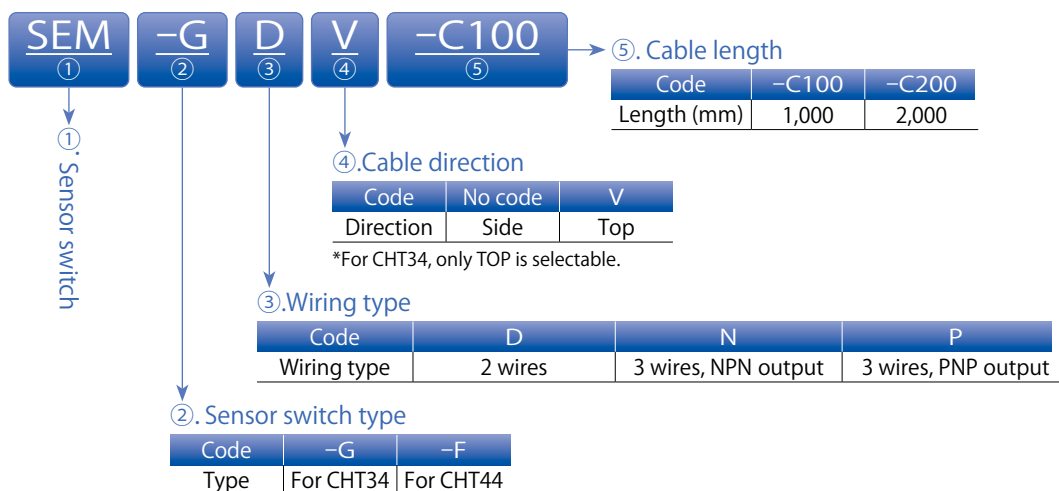
Model code: CHT44-D



Supplied:

Parts	O-ring (x2)	Plug (x2)	Pin (x2)	Bush (x6)
For direct mounting. Act as a seal between customer-made flange and gripper's air supply port.		For direct mounting. To plug the air supply port on the side of gripper.	Rotational positioning pin to prevent positional displacement.	Bush to prevent positional displacement of customer-made jaw and finger.

### Sensor Switch Model Designation (Example)



### Specifications of sensor switch

Model code	SEM-GDV 5	SEM-GNV 5	SEM-GPV 5	SEM-FD 5	SEM-FDV 5	SEM-FN 5	SEM-FNV 5	SEM-FP 5	SEM-FPV 5
Wiring type	No contact, 2 wires	No contact, 3 wires		No contact, 2 wires		No contact, 3 wires			
Output types	—	NPN output	PNP output	—		NPN output		PNP output	
Cable direction	Top			Side	Top	Side	Top	Side	Top
Load voltage	DC10 ~ 28V	DC5 ~ 28V		DC5 ~ 30V					
Load current	4 ~ 20mA max.	50mA max.				80mA max.	50mA max.	80mA max.	
Current consumption	—	10mA max. (DC24V)		—		10mA max. (DC24V)	6mA max. (DC24V)	10mA max. (DC24V)	6mA max. (DC24V)
Internal voltage drop	3.5V max.	0.5V max. (at 50mA)		3.5V max.		0.5V max. (at 50mA)			
Leakage current	0.8mA max.	0.01mA max.		0.1mA max.		0.01mA max.			
Indicator	ON - Red LED indicator turns on								
Response time	1msec max.								
Operating temp. range	-10 ~ 70°C (No freezing)								
Impact resistance	490m/s <sup>2</sup> (Non-repeated)								
Vibration resistance	88.3m/s <sup>2</sup> (Total amplitude 1.5mm, 10~55Hz)								
Protective structure	IP67								
Surge protection circuit	Surge protection	Surge protection, Reverse connection prevention							
Weight	12g (Lead wire: 1,000mm) 23g (Lead wire: 2,000mm)			13g (Lead wire: 1,000mm) 24g (Lead wire: 2,000mm)					

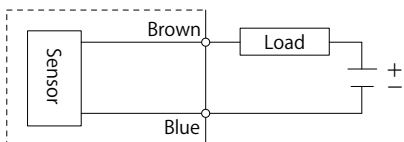
### △ Safety instructions

#### <Sensor Switch>

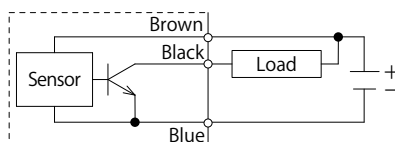
- △ Notes
1. Connect the lead wires according to their color. Incorrect wiring will cause damage to the sensor switch.
  2. Do not give a strong tensile force or extreme bending to the lead wire.
  3. To avoid malfunction, keep the sensor away from strong external magnetic fields.
  4. Avoid using the sensor switch in environments where chemicals are present.
  5. When using multiple (2 or more) 2-wire sensors by AND (series) connection, load failure may occur due to the internal voltage drop corresponding to the connected number of sensors.
  6. When connecting 2-wire sensors by OR (parallel) connection, load failure may occur due to the increased current leakage corresponding to the connected number of sensors.

### Internal circuit diagram of sensor switch

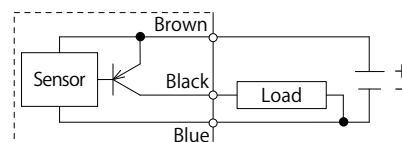
SEM-GDV, SEM-FD 4



SEM-GNV, SEM-FN 4



SEM-GPV, SEM-FP 4

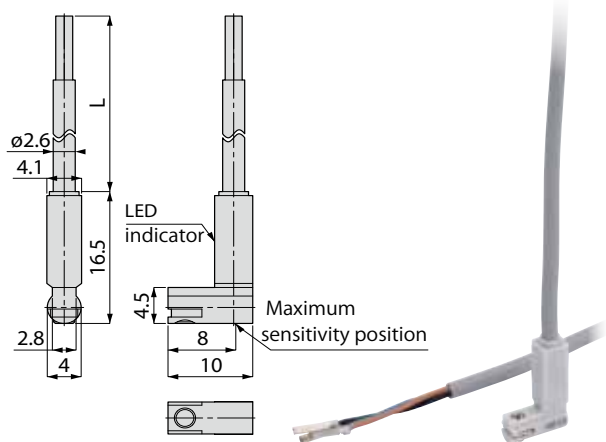




Exterior dimensional drawings of sensor switch

Model code: SEM-G3V5

Cable direction for CHT34: Top Sensor Switch

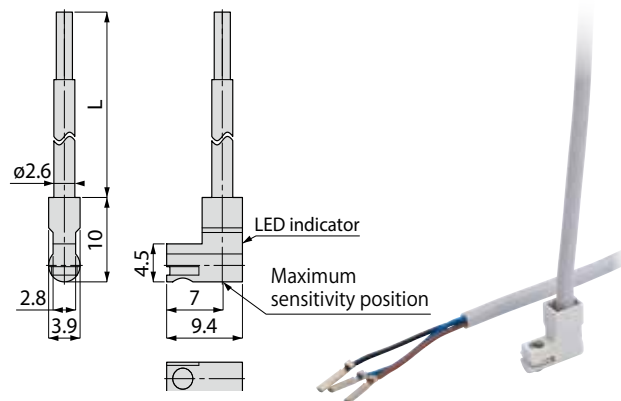


Unit: mm

Model code	Weight (g)	
	5 : -C100	5 : -C200
SEM-GDV5	12	23
SEM-GNV5		
SEM-GPV5		

Model code: SEM-F3V5

Cable direction for CHT44: Top Sensor Switch

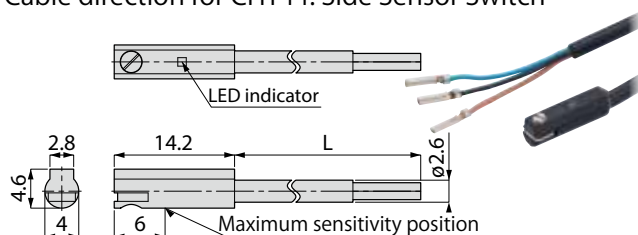


Unit: mm

Model code	Weight (g)	
	5 : -C100	5 : -C200
SEM-FDV5	13	24
SEM-FNV5		
SEM-FPV5		

Model code: SEM-F35

Cable direction for CHT44: Side Sensor Switch



Unit: mm

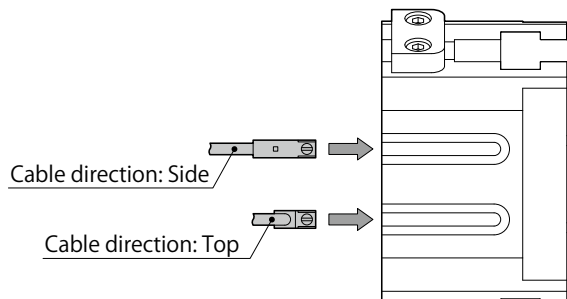
Model code	Weight (g)	
	5 : -C100	5 : -C200
SEM-FD5	13	24
SEM-FN5		
SEM-FP5		

## Sensor switch setting example and installation position setting procedure

The sensor switch can be used in a variety of ways depending on the combination of installing quantity and detection position.

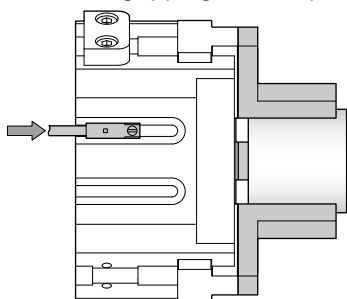
### <Installation>

Insert the sensor switch into the sensor switch installing slot from the direction shown below.

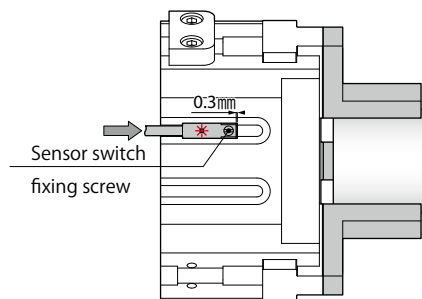


### <Setting ①>

1. To confirm the outside gripping of work-piece

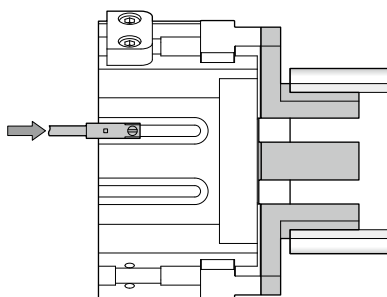


A LED turns on as sliding the sensor switch along the slot toward arrowed direction.

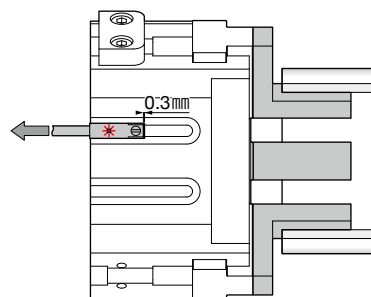


Slide the sensor switch 0.3mm further toward arrowed direction from the position the LED turns on, and fix it with a sensor switch fixing screw. (Tightening torque: 0.1 - 0.2N·m)

2. To confirm the inside gripping of work-piece



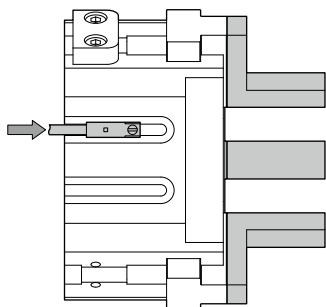
A LED turns on as sliding the sensor switch along the slot toward arrowed direction. Slide it further until LED turns off.



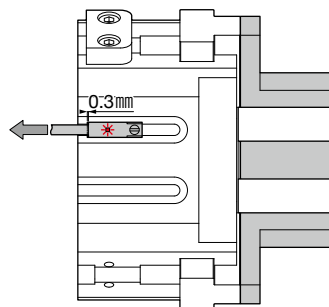
Slide back the sensor switch toward arrowed direction until LED turns on again. Slide the sensor switch 0.3mm further toward arrowed direction from the position the LED turns on, and fix it with a sensor switch fixing screw. (Tightening torque: 0.1 - 0.2N·m)

### <Setting ②>

To confirm the gripper is fully open



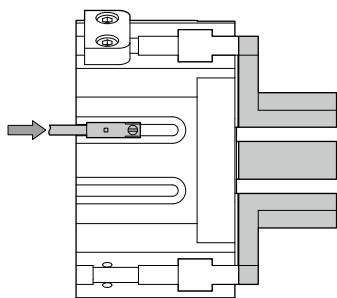
A LED turns on as sliding the sensor switch along the slot toward arrowed direction. Slide it further until LED turns off.



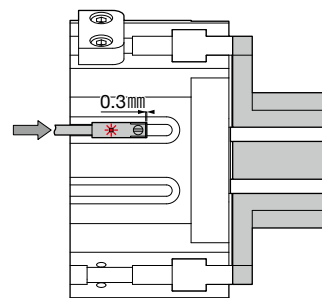
Slide back the sensor switch toward arrowed direction until LED turns on again. Slide the sensor switch 0.3mm further toward arrowed direction from the position the LED turns on, and fix it with a sensor switch fixing screw. (Tightening torque: 0.1 - 0.2N·m)

〈Setting ③〉

To confirm the work-piece is not gripped



A LED turns on as sliding the sensor switch along the slot toward arrowed direction.

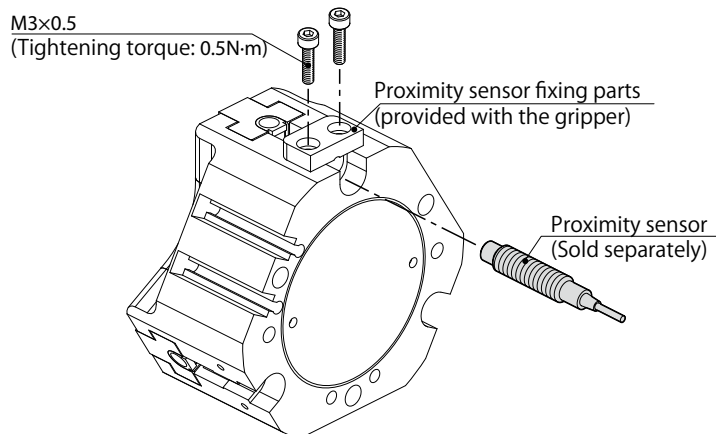


Slide the sensor switch 0.3mm further toward arrowed direction from the position the LED turns on, and fix it with a sensor switch fixing screw. (Tightening torque: 0.1 - 0.2N·m)

## Installation of proximity sensor

- A gripper has 2 slots for proximity sensor. See the table below for installable sensor size. Proximity sensor is not included in the sensor option.

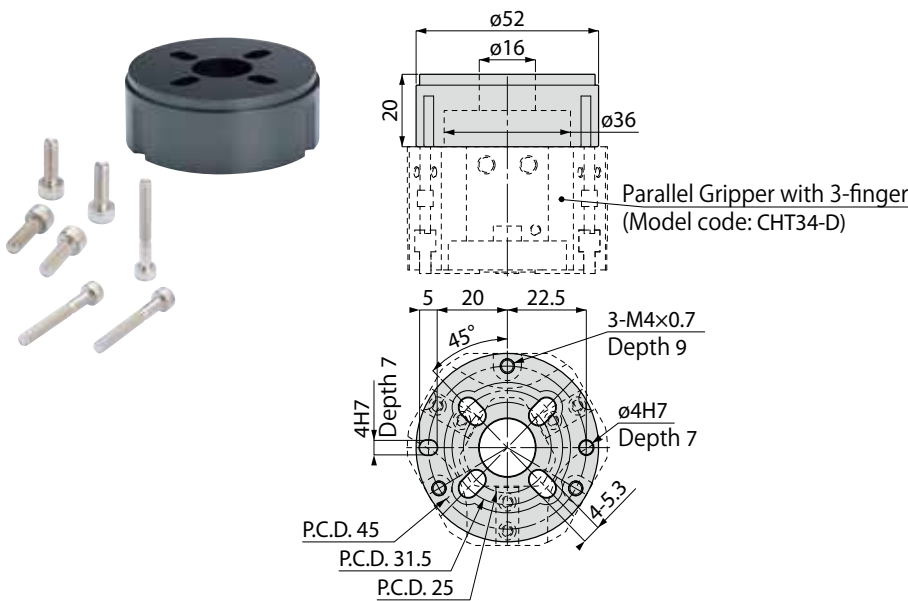
Model code	Installable sensor size
CHT34-D	Cylindrical type $\phi 3\text{mm}$
CHT44-D	Screw type M8



# Mounting Flange for EOAT (non-standard item)

## Exterior dimensional drawings

Mounting flange for 34mm cylinder I.D. (gripper type: CHT34-D)



Unit: mm	
Model code	Weight (g)
HSC-CHT34	100

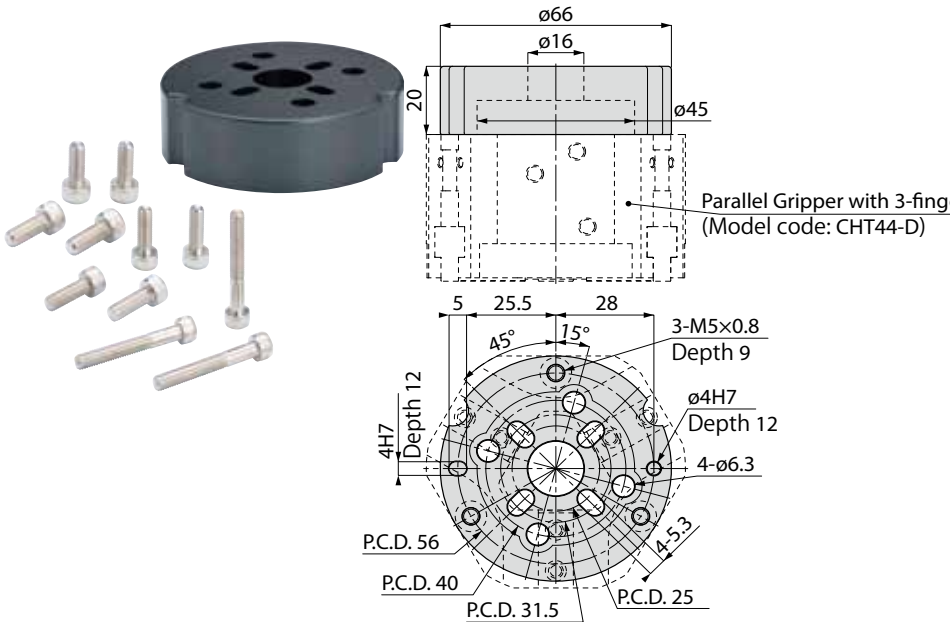
Sample image of installation on a robot (illustration purposes only)



### Supplied screws

- M5x15 (4 pieces): Hexagon socket head bolts for EOAT mounting flange (to be used when the pitch of mounting hole is P.C.D. 25 or P.C.D. 31.5)
- M4x30 (3 pieces): Hexagon socket head bolts for Parallel Gripper with 3-finger

Mounting flange for 44mm cylinder I.D. (gripper type: CHT44-D)



Unit: mm	
Model code	Weight (g)
HSC-CHT44	180

Sample image of installation on a robot (illustration purposes only)



### Supplied screws

- M6x15 (4 pieces): Hexagon socket head bolts for EOAT mounting flange (to be used when the pitch of mounting hole is . 40)
- M5x15 (4 pieces): Hexagon socket head bolts for EOAT mounting flange (to be used when the pitch of mounting hole is . 25 or P.C.D. 31.5)
- M5x35 (3 pieces): Hexagon socket head bolts for Parallel Gripper with 3-finger



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 TEL. +66-(0)2-612-7366

FAX. +81-(0)265-76-3305  
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 FAX. +886-(0)6-726-1526  
 FAX. +82-32-327-0385  
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