DCKW

3-Finger Gripper

Electric actuator
Motor specifications

CONTENTS

DCKW Series variation

Actuator model No.	Motor Size	Spring lead (mm)	Stroke and Max. speed (mm/s)		Max. Gripping force (N)
			4	8	
DCKW-20	□28	4.2	60		8
DCKW-32	□42	6		63	30

Electric Actuator 3-Finger Gripper

DCKW-20

□28 Stepping motor

RoHS

How to order

DCKW - 20 ❶ S ❷ H4 ❸ 04 ❹ N ❺ F3PH ❻ - F ❼ R1 ❽ A ❾ 1 ❿

❶Size

20	20

❷Applicable controller * 1

S	ESC4

❸Spring lead

H4	4.2 mm

❹Stroke

04	4 mm (2 mm on one side)

❺Rubber cover

N	None

❻Switch

NNNN	None
F3PH	F-type straight
F3PV	F-type L-shaped

❼Connector leadout direction

F	Front

❽Relay cable * 2

N0	None
R1	Movable 1 m
R3	Movable 3 m
R5	Movable 5 m
RX	Movable 10 m

❾Controller included

N	None
A	DIN rail mounting specifications
B	Panel mounting specifications

❿IO cable length

N	None
1	1 m
3	3 m
5	5 m
X	10 m

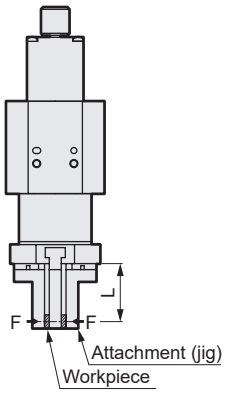
*1 For controller, refer to CC-1635A.
*2 Refer to page 104 for relay cable dimensions.

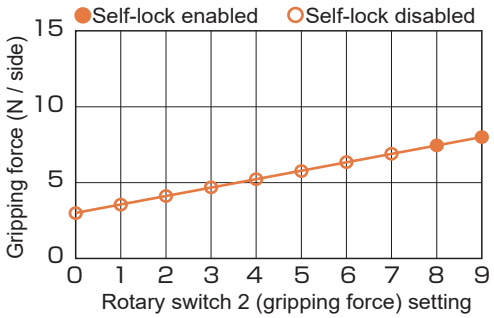
Specifications

Motor	□28 Stepping motor
Drive method	Coil spring
Stroke mm	4 (2 per side)
Pressing effective range mm	2 (1 per side)
Max. gripping force * 1 N	8
Operation speed range mm/s	11 to 60
Max. acceleration/deceleration mm/s^2	3879 (Setting 9)
Gripping speed range mm/s	11 to 60
Repeatability * 2 mm	±0.02
Insulation resistance	10MΩ, 500 VDC
Withstand voltage	500 VAC for 1 minute
Operating ambient temperature, humidity	0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity	-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere	No corrosive gas, explosive gas, or dust
Degree of protection	IP40
Weight g	400

*1 Gripping is possible only in the closed direction. Operating the grip in the open direction may lead to damage of the actuator internal parts.
*2 Repeat accuracy indicates the variation when the same workpiece is repeated gripped at the same power, under the same operation conditions.

Gripping force and rotary switch setting

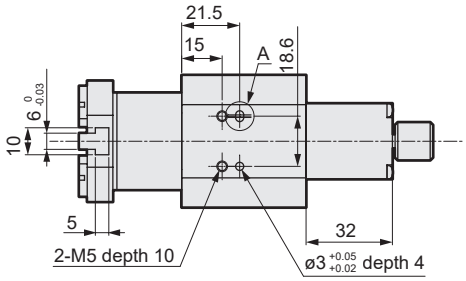


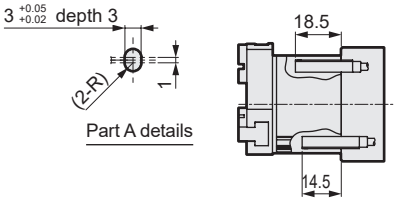


*1 Gripping force is a guideline. Errors may occur due to pressing position or cylinder switch adjustment.
*2 speed setting is 9 (41 mm/s). (L=20)
*3 Pressing position = stroke × 0.5
*4 The self-lock range is a reference value. Depending on conditions, the self-lock may not be effective.

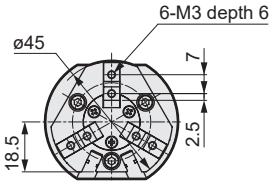
Dimensions

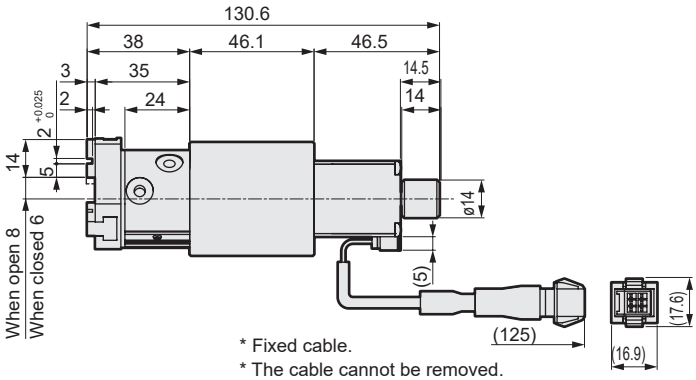
● DCKW-20

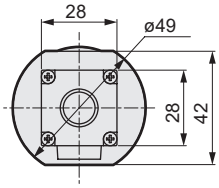




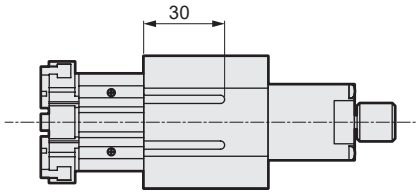
Switch installation dimensions







* Fixed cable.
* The cable cannot be removed.
* Min. bending radius is 40 mm



Electric Actuator 3-Finger Gripper

DCKW-32

□42 Stepping motor

RoHS

How to order

DCKW - 32 S H6 08 N F3PH - F R1 A 1

❶Size

32	32

❷Applicable controller * 1

S	ESC4

❸Spring lead

H6	6 mm

❹Stroke

08	8 mm (4 mm per side)

❺Rubber cover

N	None

❻Switch

NNNN	None
F3PH	F-type straight
F3PV	F-type L-shaped

❼Connector leadout direction

F	Front

❽Relay cable * 2

N0	None
R1	Movable 1 m
R3	Movable 3 m
R5	Movable 5 m
RX	Movable 10 m

❾Controller included

N	None
A	DIN rail mounting specifications
B	Panel mounting specifications

❿IO cable length

N	None
1	1 m
3	3 m
5	5 m
X	10 m

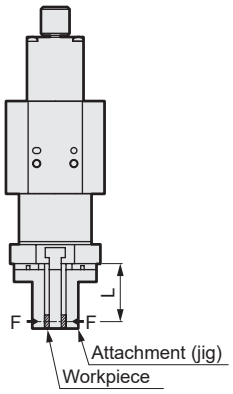
*1 For controller, refer to CC-1635A.
*2 Refer to page 104 for relay cable dimensions.

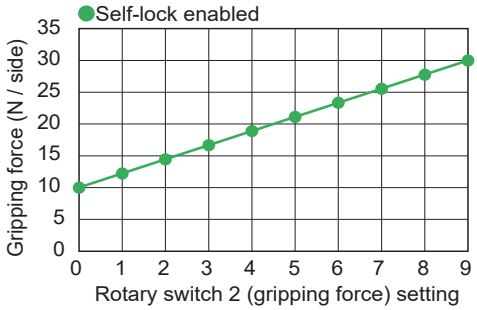
Specifications

Motor	□42 Stepping motor
Drive method	Coil spring
Stroke mm	8 (4 per side)
Pressing effective range mm	4 (2 per side)
Max. gripping force * 1 N	30
Operation speed range mm/s	15 to 63
Max. acceleration/deceleration mm/s²	5471 (Setting 9)
Gripping speed range mm/s	15 to 63
Repeatability * 2 mm	±0.02
Insulation resistance	10MΩ, 500 VDC
Withstand voltage	500 VAC for 1 minute
Operating ambient temperature, humidity	0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity	-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere	No corrosive gas, explosive gas, or dust
Degree of protection	IP40
Weight g	1800

*1 Gripping is possible only in the closed direction. Operating the grip in the open direction may lead to damage of the actuator internal parts.
*2 Repeat accuracy indicates the variation when the same workpiece is repeated gripped at the same power, under the same operation conditions.

Gripping force and rotary switch setting

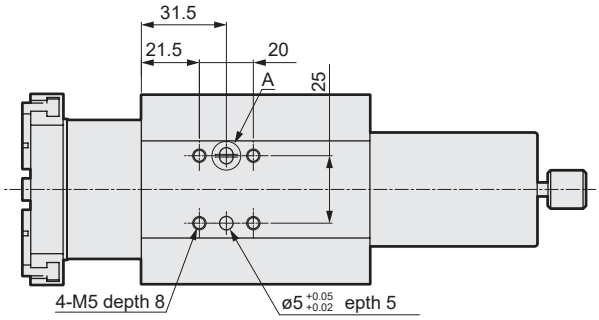


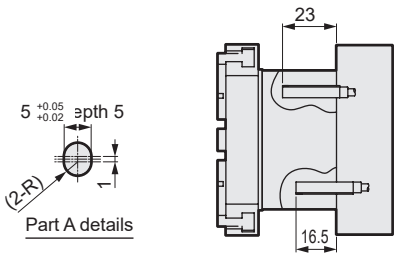


*1 Gripping force is a guideline. Errors may occur due to pressing position or cylinder switch adjustment.
*2 speed setting is 9 (70 mm/s). (L=20)
*3 Pressing position = stroke × 0.5
*4 The self-lock range is a reference value. Depending on conditions, the self-lock may not be effective.

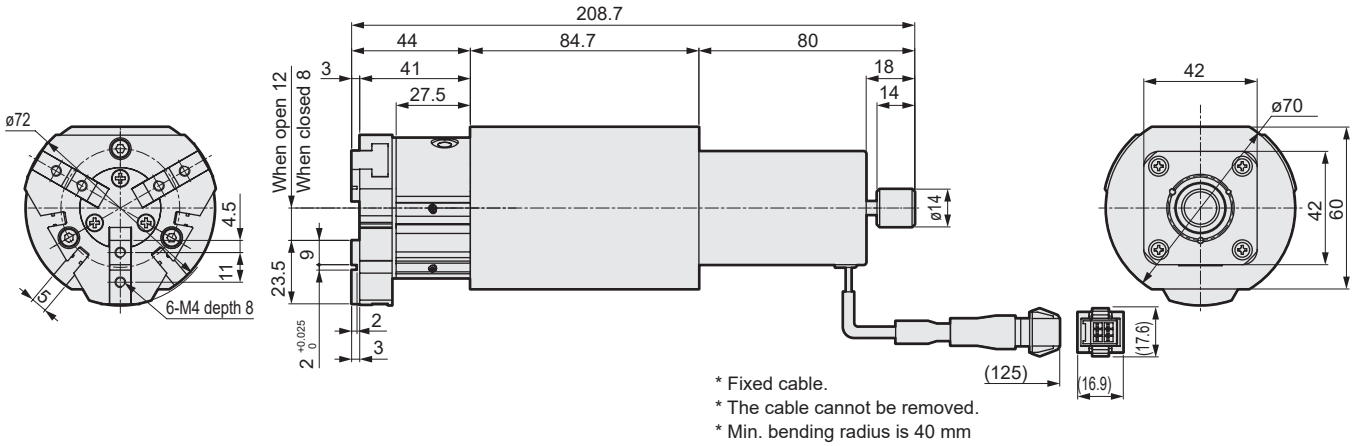
Dimensions

● DCKW-32

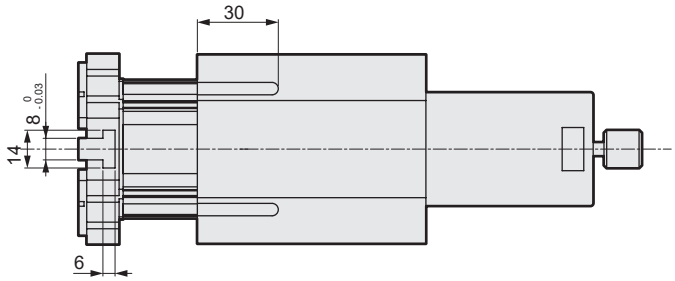




Switch installation dimensions



* Fixed cable.
* The cable cannot be removed.
* Min. bending radius is 40 mm



Model selection

STEP 1 Calculating the required gripping force

Gripping force F_W satisfying the following equation is required to transport the workpiece (weight W_L).

$$F_W > \frac{W_L \times g \times K}{n}$$

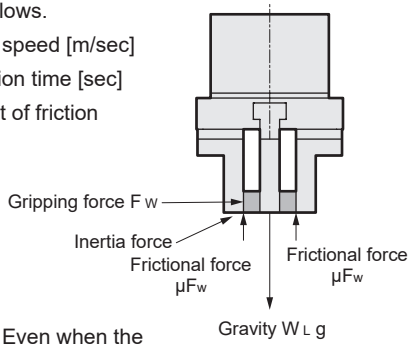
F_W : Required gripping force [N]
n : Number of attachments = 3
W_L : Weight of workpiece [kg]
g : Gravity acceleration 9.8 [m/s^2]
K : Transport coefficient
5 [Holding only]
10 [Normal transport]
20 [Sudden accelerated transport]

Transport coefficient K

Calculation example) Transport speed V = If the friction coefficient μ between the workpiece and the finger is 0.1 for the purpose of decelerating and stopping at 0.75 m / s in 0.1 seconds, the result is as follows.

Obtain the transport coefficient K from the force applied to the workpiece

V : Transport speed [m/sec]
t : Deceleration time [sec]
μ : Coefficient of friction



- Inertial force = $W_L (V/t)$
- Gravity = $W_L g$
- Required gripping force $F_W >$ $\frac{W_L (V/t) + W_L g}{n\mu} = \frac{W_L (V/t+g)}{n\mu} = \frac{17.3\, W_L}{3 \times 0.1} = 57.7\, W_L$

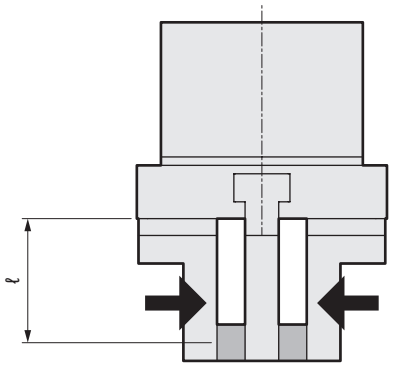
∴ Here, the transport coefficient K is calculated from the above equation: $\frac{V/t + g}{\mu g} = \frac{0.75/0.1 + 9.8}{0.1 \times 9.8} \approx 20$

Note) Allowance is required for transport coefficient K due to impacts during transportation, etc. Even when the coefficient of friction μ is higher than μ=0.1, set transport coefficient K from 10 to 20 or more for safety.

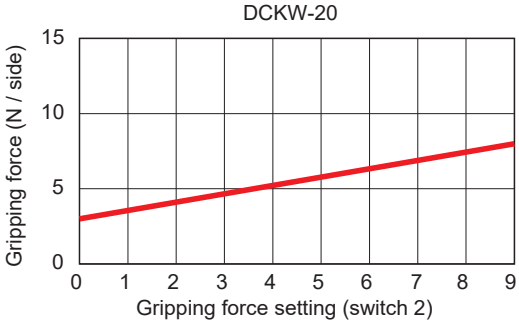
STEP 2 Temporarily select a model from the gripping force graph

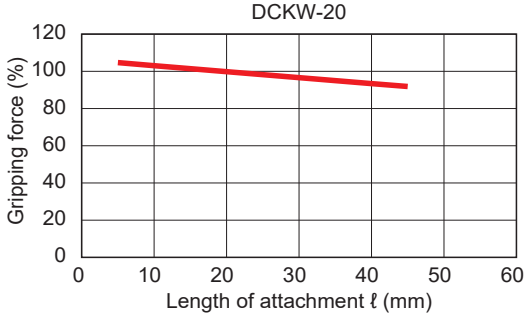
Check the conditions at right and temporarily select a model from the gripping force graph. The gripping force varies according to gripping point distance ℓ and gripping force setting. Confirm on the graph that sufficient force can be obtained under the working conditions.

Grip direction

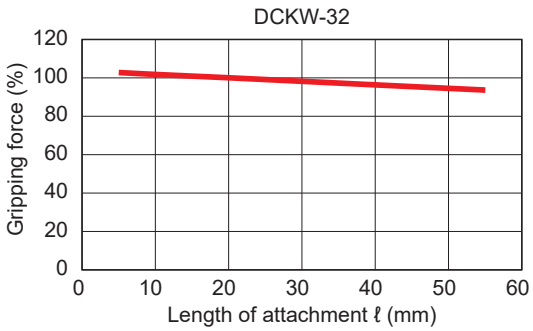


●Close direction (➡)

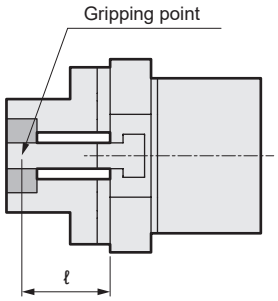




Gripping force and gripping point distance



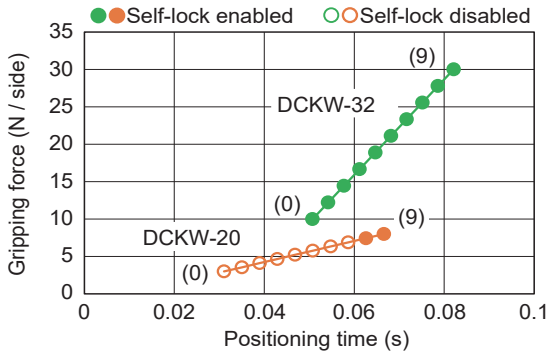
STEP 3 Confirmation of attachment shape



- **Use attachments as short and lightweight as possible.** If the attachment is long and heavy, inertia increases when opening and closing, this may cause play in the finger, and adversely affect durability.
- Minimizing the attachment shape as much as possible within the performance data enables the product to be used for a longer time. Also, if ℓ is long, unexpected vibration, etc., could cause erroneous gripping and falling during transport.
- The weight of the attachment affects durability, so check that the weight is less than the following value.

W < 1/4 H (1 pc.) W : Weight of attachment
H : Weight of Hand product

Positioning time for pressing operation



* 1 ( ): Rotary switch 2 (gripping force) setting.
* 2 The self-lock range is a reference value. Depending on conditions, the self-lock may not be effective.
* 3 Gripping force is a guideline. Errors may occur due to pressing position or cylinder switch adjustment.
* 4 Pressing position = center of stroke, rotary switch 1 (speed) setting = 9.
* 5 Positioning time is the time from the start of motor rotation to the stop thereof.