Electric Actuator with Motor Specification

DCKW

3-Finger Gripper Type

CONTENTS

DCKW System Table

Actuator Model No.	Motor Size	Spring lead (mm)	Stroke (mm) 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 Type

DCKW-20

□28 Stepping Motor

For compatible detailed model Nos., please see our website.

Model No. Notation Method

DCKW - 20 S H4 04 N F3PH - F R1 A 1

❶Size
20	20

❷Connected Controller *1
S	ESC4

❸Spring Lead
H4	4.2 mm

❹Stroke
04	4 mm (2 mm one side)

❺Rubber Cover
N	None

❻Switch
NNNN	None
F3PH	F-type straight type
F3PV	F-type L-shape type

❼Connector Outlet Direction
F	Front

❽Relay Cable *2
N0	None
R1	Flexible 1 m
R3	Flexible 3 m
R5	Flexible 5 m
RX	Flexible 10 m

❾Controller Attached
N	None
A	DIN rail mounting specification
B	Panel mounting specification

❿IO Cable Length
N	None
1	1 m
3	3 m
5	5 m
X	10 m

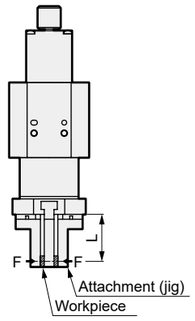
*1 For controllers, please refer to P. 611.
*2 For the external dimension drawing of the relay cable, please refer to P. 618.

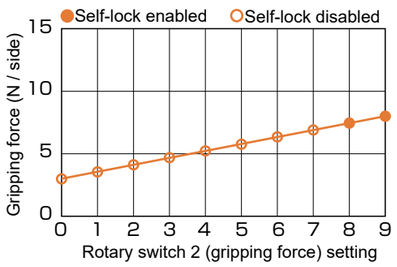
Specifications

Connected Controller	ESC4
Motor	□28 Stepping Motor
Drive Method	Cylindrical spring
Stroke mm	4 (one side 2)
Effective Pushing Range mm	2 (one side 1)
Max. Gripping Force *1 N	8 (per side)
Operating Speed Range mm/s	11 to 60
Max. Acceleration/Deceleration mm/s²	3879 (setting 9)
Gripping Speed Range mm/s	11 to 60
Repeatability *2 mm	±0.02
Insulation Resistance	10 MΩ, 500 VDC
Withstanding 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
Protection Structure	IP40
Weight g	400

*1 Gripping is only possible in the closing direction. Performing a gripping operation in the opening direction may lead to damage to the internal parts of the actuator.
*2 Repeatability indicates the variation when the same workpiece is repeatedly gripped under the same operating conditions.

Gripping force and rotary switch setting

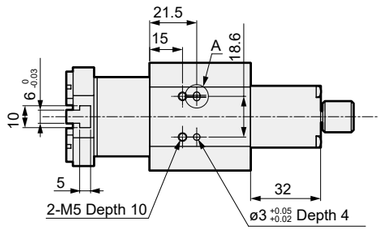


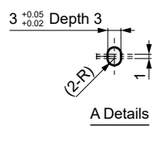


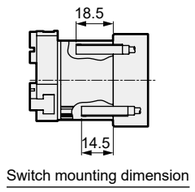
*1 The gripping force is a guideline. Errors will occur due to pushing position and cylinder switch adjustment.
*2 This is for speed setting 9 (41 mm/s). (L=20)
*3 Pushing position = stroke×0.5
*4 The self-locking range is a reference value. Self-locking may not work depending on the conditions.

External Dimension Drawing

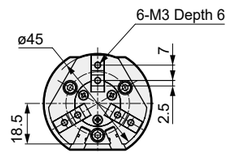
● DCKW-20

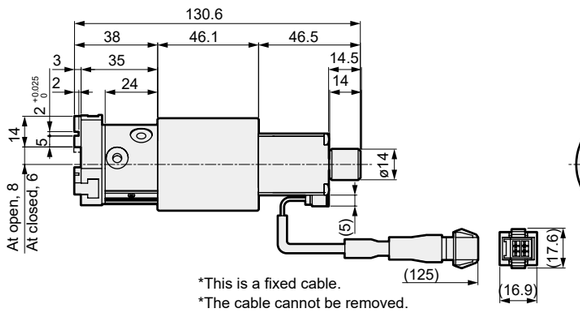


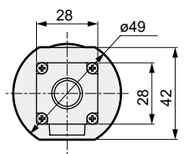




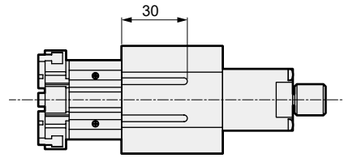
Switch mounting dimension







*This is a fixed cable.
*The cable cannot be removed.
*Minimum bending radius 40 mm



Electric Actuator 3-Finger Gripper Type

DCKW-32

□42 Stepping Motor

For compatible detailed model Nos., please see our website.

Model No. Notation Method

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

❶Size
32	32

❷Connected Controller *1
S	ESC4

❸Spring Lead
H6	6 mm

❹Stroke
08	8 mm (4 mm one side)

❺Rubber Cover
N	None

❻Switch
NNNN	None
F3PH	F-type straight type
F3PV	F-type L-shape type

❼Connector Outlet Direction
F	Front

❽Relay Cable *2
N0	None
R1	Flexible 1 m
R3	Flexible 3 m
R5	Flexible 5 m
RX	Flexible 10 m

❾Controller Attached
N	None
A	DIN rail mounting specification
B	Panel mounting specification

❿IO Cable Length
N	None
1	1 m
3	3 m
5	5 m
X	10 m

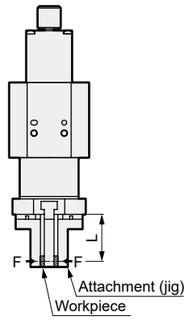
*1 For controllers, please refer to P. 611.
*2 For the external dimension drawing of the relay cable, please refer to P. 618.

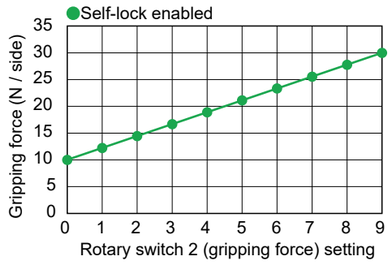
Specifications

Connected Controller	ESC4
Motor	□42 Stepping Motor
Drive Method	Cylindrical spring
Stroke mm	8 (one side 4)
Effective Pushing Range mm	4 (one side 2)
Max. Gripping Force *1 N	30 (per side)
Operating 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	10 MΩ, 500 VDC
Withstanding 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
Protection Structure	IP40
Weight g	1800

*1 Gripping is only possible in the closing direction. Performing a gripping operation in the opening direction may lead to damage to the internal parts of the actuator.
*2 Repeatability indicates the variation when the same workpiece is repeatedly gripped under the same operating conditions.

Gripping force and rotary switch setting

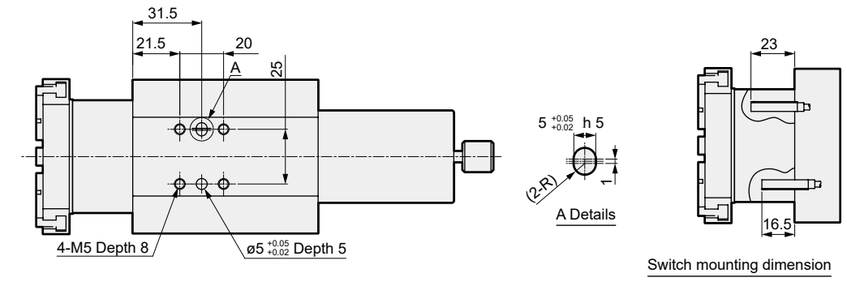


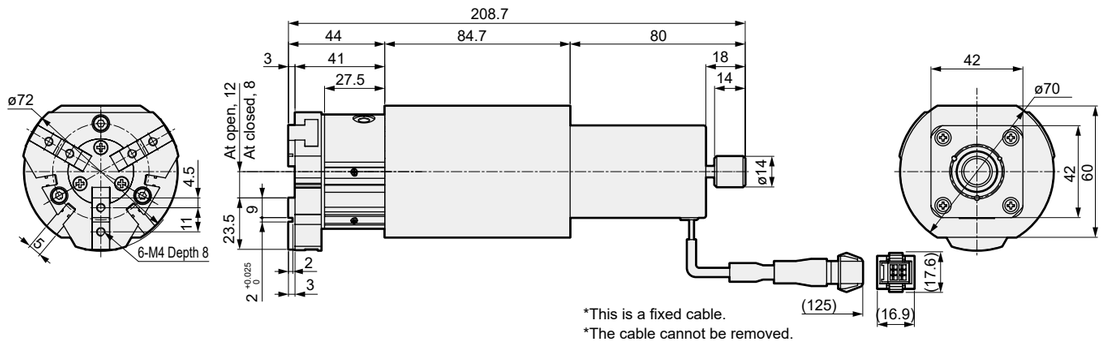


*1 The gripping force is a guideline. Errors will occur due to pushing position and cylinder switch adjustment.
*2 This is for speed setting 9 (70 mm/s). (L=20)
*3 Pushing position = stroke×0.5
*4 The self-locking range is a reference value. Self-locking may not work depending on the conditions.

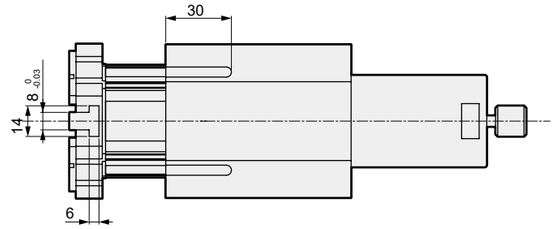
External Dimension Drawing

● DCKW-32





*This is a fixed cable.
*The cable cannot be removed.
*Minimum bending radius 40 mm



Model Selection

STEP1 Calculation of Required Gripping Force

To transport a workpiece (weight W_L), a gripping force F_W that satisfies the following formula is required.

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

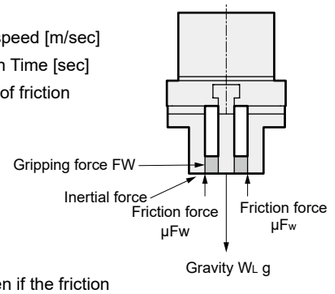
F_W : Required gripping force [N]
n : Number of attachments = 3
W_L : Workpiece weight [kg]
g : Gravitational acceleration = 9.8 [m/s²]
K : Transport coefficient
5 [Holding only]
10 [Normal transport]
20 [Rapid acceleration transport]

About Conveyance Factor K

Calculation Example) When decelerating from a conveyance speed V = 0.75 m/s to stop in 0.1 seconds, with a friction coefficient μ of 0.1 between the workpiece and finger, it is as follows.

Determine 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 = WL (V/t)
• Gravity = $W_L g$
• Required gripping force $F_W > \frac{W_L(V/t)+W_L g}{n\mu} = \frac{W_L(V/t+g)}{n\mu} = \frac{17.3W_L}{3\times0.1} = 57.7W_L$

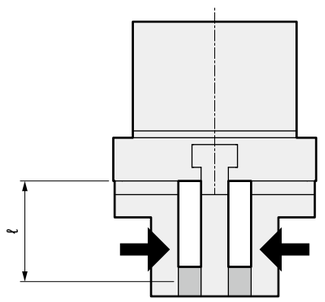
∴ The transport coefficient K at this time is, from the above formula $\frac{V/t+g}{\mu g} = \frac{0.75/0.1+9.8}{0.1\times9.8} \approx 20$

Note) The transport coefficient K needs to allow a margin for impacts during transport, etc. Even if the friction coefficient μ is higher than μ=0.1, for safety, please set the transport coefficient K to 10 to 20 or more.

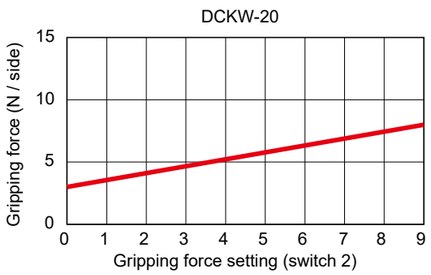
STEP2 Provisional selection of model from gripping force graph

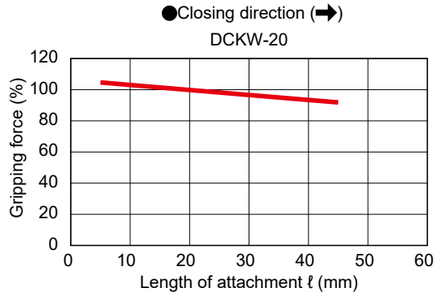
Confirm the conditions on the right and provisionally select a model from the gripping force graph. The gripping force changes depending on the gripping point distance ℓ and the gripping force setting. Please confirm that sufficient gripping force can be obtained under your conditions of use from the graph.

Gripping Direction

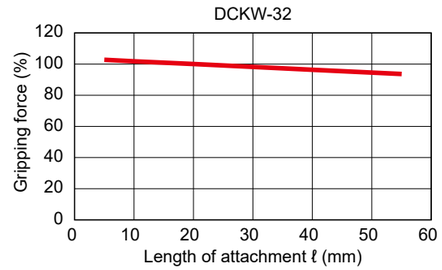


●Closing direction (➡)

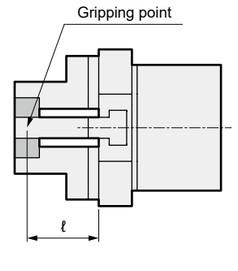




Gripping force and gripping point distance



STEP3 Confirmation of Attachment Shape

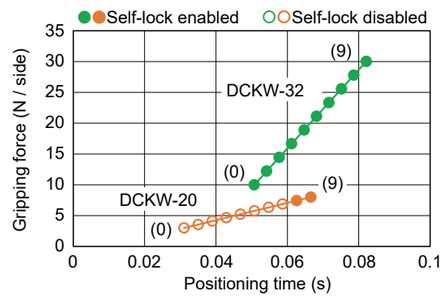


● Please use attachments that are as light and short as possible.
If they are long and heavy, the inertial force during opening and closing will be large, which may cause play in the fingers or accelerate wear on the finger sliding parts, adversely affecting the service life.

● Even if the attachment shape is within the performance data, making it as small as possible will allow the product to be used for a long time. Also, if ℓ is long, there is a risk of gripping errors, dropping during transport, etc., due to unexpected vibrations.

● The weight of the attachments affects the service life, so please keep it below the following.
W < 1/4H (1 piece) W: Weight of attachment
H: Gripper Product Weight

Positioning Time during Pushing Operation

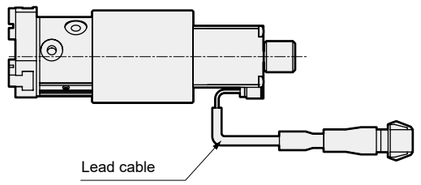


*1 ( ): Rotary switch 2 (gripping force) setting.
*2 The self-locking range is a reference value. Self-locking may not work depending on the conditions.
*3 The gripping force is a guideline. Errors will occur due to pushing position and cylinder switch adjustment.
*4 This is for when pushing position = center of stroke, and rotary switch 1 (speed) setting = 9.
*5 Positioning time is the time from when the motor starts rotating until it stops.

Special Order Product*

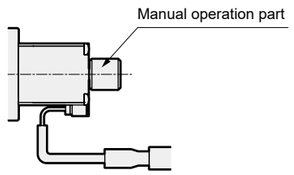
● Change of cable outlet direction

It is possible to change the outlet direction of the lead cable coming out of the motor.



● Add cover to manual operation part

A rubber cover can be included to the manual operation part at the rear of the motor.



*For details on special order products, please contact our sales office.

MEMO

D Series
DSSD2
DSTK
DSTG
DSTS
DSTL
DMSDG
DLSH
DCKW
Ending