CKD

New Products

Grippers for collaborative robots
RLSH/RHLF/RCKL-KW Series

CKD Corporation

CC-1586A

Kawasaki Powering your potential

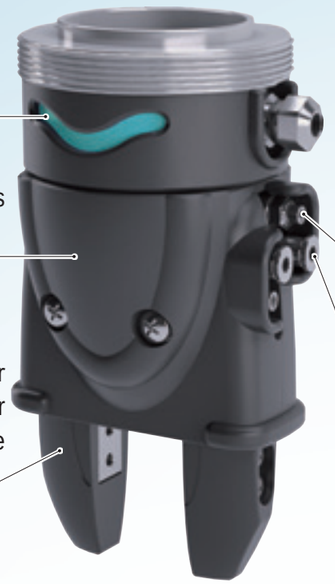
Robot
K-AddOn Registered Gripper
duAro1, duAro2 Compatible

Air Grippers: High affinity for Collaborative Robots

Collaborative Robot Grippers RLSH/RHLF/RCKL-KW Series is air driven, so it is compact and lightweight with high gripping power. Easy installation supports all customers' Collaborative Robot deployments.

Green Power
Collaborative Robot Grippers are manufactured with 100% RENEWABLE ENERGY (Certified by Green Power)

Winner of the 2020 Good Design Award



360° visible indicator lamp

Round shape without protrusions or sharp edges

Directional control valve for finger open/close* and gripping power can be easily set by adjusting the regulator

* Option

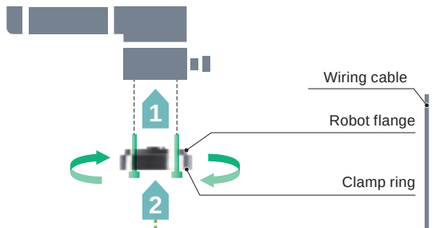
The gripping speed can be easily adjusted with the speed adjustment knob

Achieves high gripping force while being lightweight due to its air drive

Can be mounted on the robot in only 2 minutes

1. Attach the dedicated flange to the robot
2. Turn the clamp ring to mount the gripper

Installation complete!



Replace grippers without tools

- Through the adoption of a robot flange common to the entire series, changeover can be done simply by replacing the gripper.
- The gripper can be replaced without tools due to the simple design where the clamp ring only needs to be turned by hand.

3 models in the lineup to match your applications

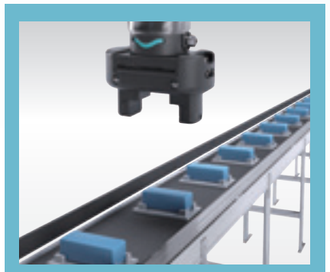
RLSH Series
Compact

Stroke : 18 mm
Gripping power : 42 N*
Weight : 0.8 kg

A compact body that does not disturb the trajectory of the robot

RHLF Series
Long stroke

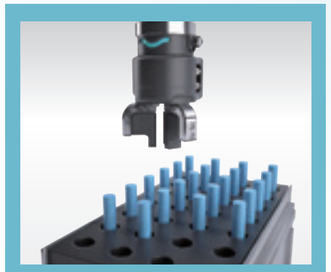
Stroke : 32 mm
Gripping power : 85 N*
Weight : 1.0 kg



Low profile, long stroke keeps height low

RCKL Series
3-way Fingers

Stroke : 10 mm
Gripping power : 125 N*
Weight : 1.1 kg



3-way finger ideal for round and cylindrical workpieces

*Supply pressure 0.5 MPa, finger length (ℓ) = 20 mm, value at stroke center

Total support air system

Various air components required for the gripper drive are available, enabling construction of the ideal system for each customer. (Refer to our website, https://www.ckd.co.jp/en/.)

Valve

- Directional control valve
- Fitting
- Silencer
- Air tube

*Options are set with the above 4 points as a set.

Other air systems

- Compact compressor (Portable Air Supply Unit)
- Filter, regulator
- Fitting
- Sensors
- Communication component.....etc.

*Ordered separately.

Grippers for collaborative robots Compact

RLSH -KW Series

With speed controller, cylinder switch
Port size: ø4 push-in fitting

Specifications

Descriptions		RLSH
Bore size	mm	ø20
Actuation		Double acting
Working fluid		Compressed air
Max. working pressure	MPa	0.7
Min. working pressure	MPa	0.1
Port size		ø4 push-in fitting
Ambient temperature	°C	0 to 50
Operating stroke length	mm	18
Repeatability	mm	±0.01
Weight	kg	0.8
Display lamp		Blue/green
Cylinder switch		With F2H (Lit when yellow LED ON)

Note: When manufacturing the attachment according to the workpiece, refer to page 4.

How to order

RLSH - A20D1N - L1 - F Y2V - KW

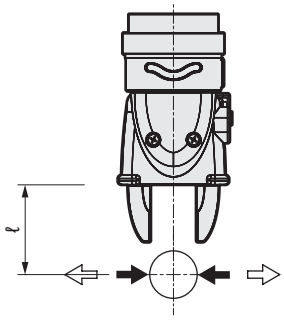
- F: Ⓐ Robot flange
- Y2V: Ⓑ Accessories
- KW: K-AddOn registered product

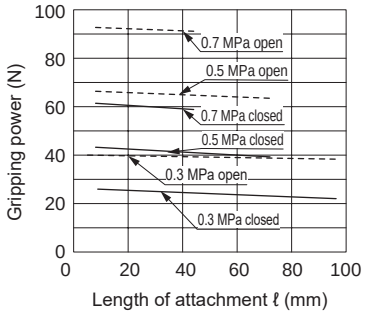
Code	Item
Ⓐ Robot flange	
Blank	Without robot flange
F	With robot flange (*1)
Ⓑ Accessories	
Blank	No accessories
Y2	Test attachment (*2)
V	Directional control valve/tube (*3)

*1: Robot flange mounting bolts included
*2: Use it for grip tests as it is made of resin. (Weight: 25 g per piece)
*3: Directional control valves are with ø4 push-in fitting (air supply port, A/B port), silencer (R1/R2 port) and mounting plate. Outer diameter ø4 length 2.5 m x 2 tubes
For details on the directional control valve, refer to the end of this section.

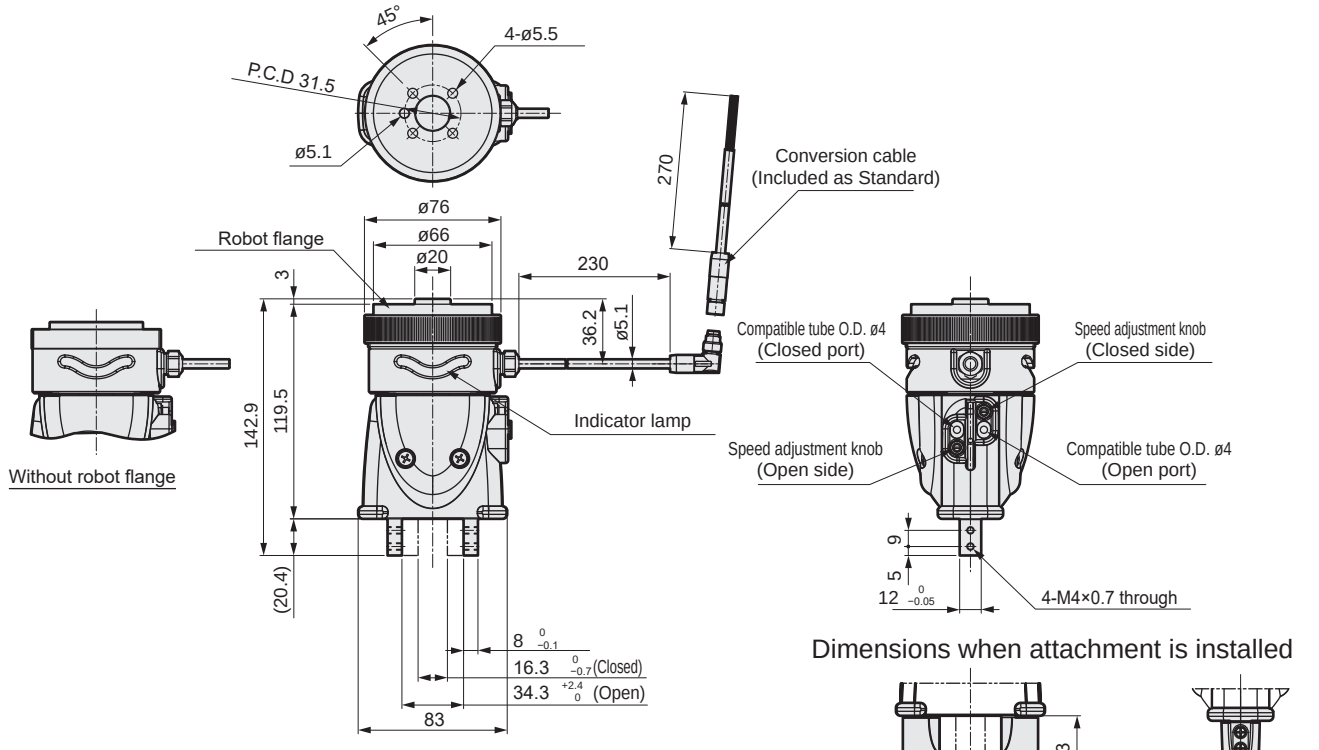
Gripping power performance data

- Gripping power is the thrust (one finger) in the direction of the arrow shown in the figure.
- The gripping force acting in the opening and closing directions of the gripper's attachment length ℓ when the supply pressure is 0.3, 0.5 and 0.7 MPa.
  - Open direction (⇦) ---------- (Broken line)
  - Close direction (➡) ———— (shown with continuous line)

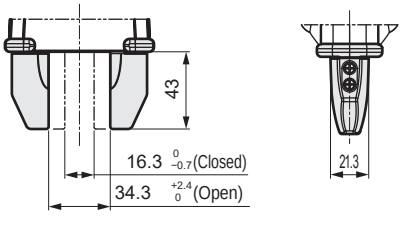




Dimensions



Dimensions when attachment is installed



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Grippers for collaborative robots Long stroke

RHLF -KW Series

With speed controller, cylinder switch
Port size: ø4 push-in fitting

Specifications

Descriptions		RHLF
Bore size	mm	ø16 x 2
Actuation		Double acting
Working fluid		Compressed air
Max. working pressure	MPa	0.7
Min. working pressure	MPa	0.2
Port size		ø4 push-in fitting
Ambient temperature	°C	5 to 50
Operating stroke length	mm	32
Repeatability	mm	±0.03
Weight	kg	1.0
Display lamp		Blue/green
Cylinder switch		With T2H (Lit when red LED is ON)

Note: When manufacturing the attachment according to the workpiece, refer to page 4.

How to order

RHLF - 16CS - F Y2V - KW

F: Ⓐ Robot flange
Y2V: Ⓑ Accessories
KW: K-AddOn Registered Product

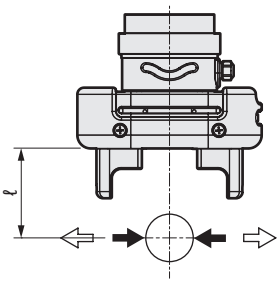
Code	Item
Ⓐ Robot flange	
Blank	Without robot flange
F	With robot flange (*1)
Ⓑ Accessories	
Blank	No accessories
Y2	Test attachment (*2)
V	Directional control valve/tube (*3)

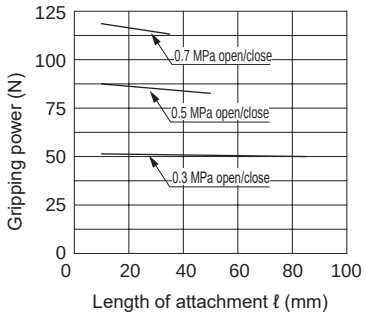
*1: Robot flange mounting bolts included
*2: Use it for grip tests as it is made of resin. (Weight: 30 g per piece)
*3: Directional control valves are with ø4 push-in fitting (air supply port, A/B port), silencer (R1/R2 port) and mounting plate. Outer diameter ø4 length 2.5 m x 2 tubes
For details on the directional control valve, refer to the end of this section.

Gripping power performance data

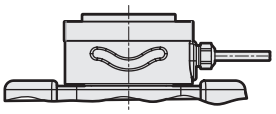
- Gripping power is the thrust (one finger) in the direction of the arrow shown in the figure.
- The gripping force acting in the opening and closing directions of the gripper's attachment length ℓ when the supply pressure is 0.3, 0.5 and 0.7 MPa.

• Open direction(⇦), closed direction (➡) ——— (shown with continuous line)

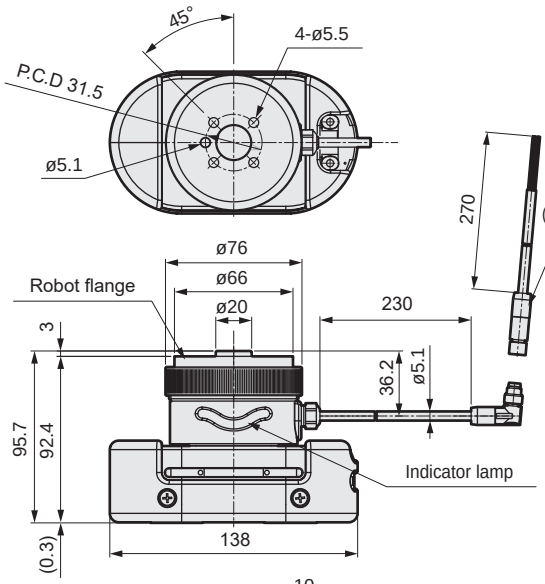


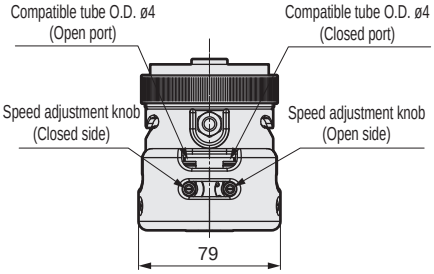


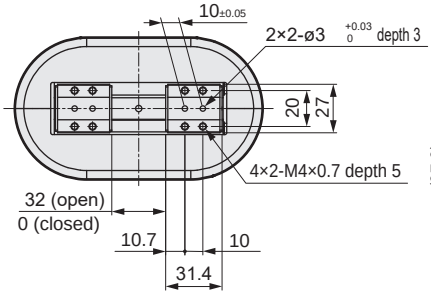
Dimensions



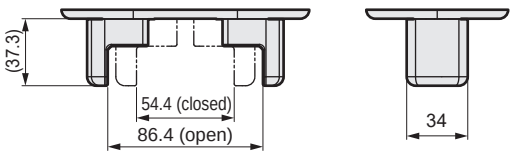
Without robot flange







Dimensions when attachment is installed



Grippers for collaborative robots 3-way finger type

RCKL -KW Series

With speed controller, cylinder switch
Port size: ø4 push-in fitting

Specifications

Descriptions		RCKL
Bore size	mm	ø40
Actuation		Double acting
Working fluid		Compressed air
Max. working pressure	MPa	0.7
Min. working pressure	MPa	0.3
Port size		ø4 push-in fitting
Ambient temperature	°C	5 to 50
Operating stroke length	mm	10
Repeatability	mm	±0.01
Weight	kg	1.1
Display lamp		Blue/green
Cylinder switch		With T2H (Lit when red LED is ON)

Note: When manufacturing the attachment according to the workpiece, refer to page 4.

How to order

RCKL - 40CS - F Y3V - KW

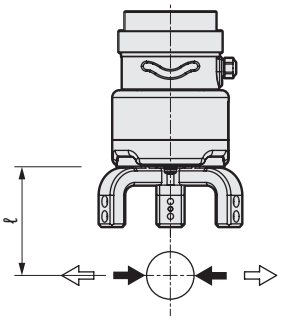
- F: Ⓐ Robot flange
- Y3V: Ⓑ Accessories
- KW: K-AddOn Registered Product

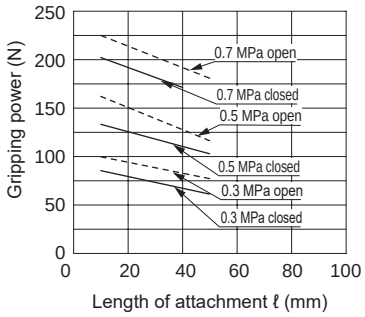
Code	Description
Ⓐ Robot flange	
Blank	Without robot flange
F	With robot flange (*1)
Ⓑ Accessories	
Blank	No accessories
Y3	Attachment (*2)
V	Directional control valve/tube (*3)

*1: Robot flange mounting bolts included
*2: Made-to-order product, aluminum. (Weight 50 g per pc)
*3: Directional control valves are with ø4 push-in fitting (air supply port, A/B port), silencer (R1/R2 port) and mounting plate. Outer diameter ø4 length 2.5 m x 2 tubes
For details on the directional control valve, refer to the end of this section.

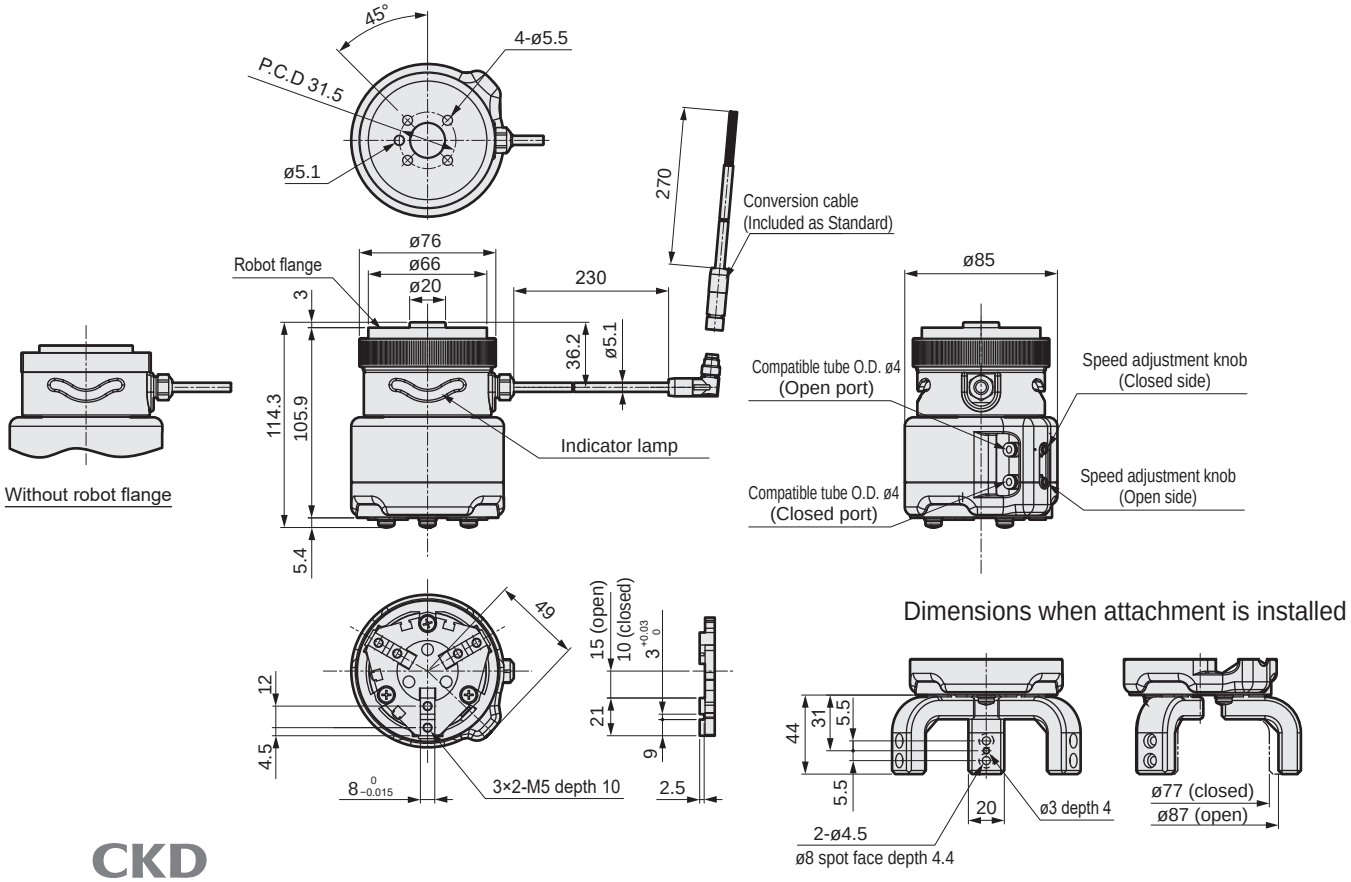
Gripping power performance data

- Gripping power is the thrust (one finger) in the direction of the arrow shown in the figure.
- The gripping force acting in the opening and closing directions of the gripper's attachment length ℓ when the supply pressure is 0.3, 0.5 and 0.7 MPa.
  - Open direction (⇦) ---------- (Broken line)
  - Close direction (➡) ———— (shown with continuous line)





Dimensions



Dimensions when attachment is installed

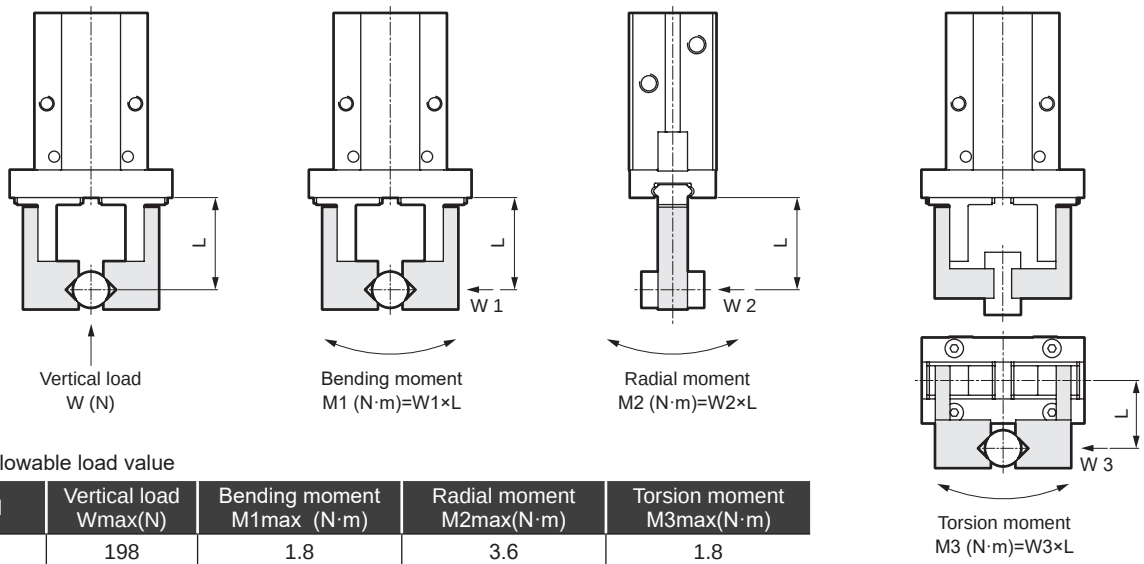
Attachments

- Use the attachments that are as short and lightweight as possible. If it is long or heavy, the inertial force during opening and closing will be large, which may cause the fingers to become loose or accelerate the wear of the finger sliding portion, which can have a negative impact on the lifespan.
- When mounting an L-shaped attachment, select the length as shown below.
  Ex.: If the L-shape is 30 mm in the finger direction and 30 mm at a 90° angle, assume the attachment length is 60 mm.
- The length of the attachment should be within the value of the gripping force performance data.
- The weight of the attachment affects durability, so follow the table below.

Model	Weight per attachment (W)
RLSH	W < 80g
RHLF	W < 100g
RCKL	W < 95g

External forces applied to the fingers

When an external force is applied to a finger such as when conveying and inserting workpieces, use it within [Table 1] parameters.
(* When using it for conveying, consider the impact to the terminal.)



[Table 1] Allowable load value

Model	Vertical load Wmax(N)	Bending moment M1max (N·m)	Radial moment M2max(N·m)	Torsion moment M3max(N·m)
RLSH	198	1.8	3.6	1.8
RHLF	164	0.94	2	1.1

L: Distance to the point where load is applied

• Sample calculation for external forces applied to the fingers

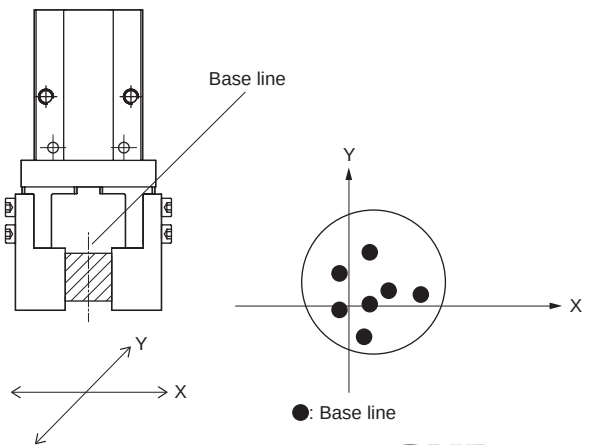
Sample calculation (1): When conveying a workpiece
Model No.: RLSH-A20D1N, When a workpiece (weight m=0.7kg, center of gravity distance L=40mm) is gripped and transported with an attachment (weight mk:0.07kg, center of gravity distance Lk=30mm)
(g: Gravity acceleration = 9.8m / s2, α: Impact coefficient generated at the end = 3)
$M_1 = \alpha \times W_1 \times L = \alpha \times (m_k \times g \times L_k \times 2 + m \times g \times L)$
$= 3 \times (0.07 \times 9.8 \times 30 \times 10^{-3} \times 2 + 0.7 \times 9.8 \times 40 \times 10^{-3} \approx 0.95 N \cdot m$, M1Can be used since it is max=1.8N·m or less

Sample calculation (2): When inserting a workpiece
Model No.: RLSH-A20D1N, L=40mm for load W_1: When 30 N is added
$M_1 = W_1 \times L = 30 \times 40 \times 10^{-3} = 1.2 N \cdot m$ and M1max= 1.8 N·m or less, so use is possible

Repeatability

The repeatability here indicates the displacement of the workpiece position deviation in the case of repeated clamping and unclamping under the same conditions (gripper fixed, same workpiece used, etc. Refer to right).

Conditions
- Workpiece dimensions, shape, weight
- Workpiece transfer position
- Clamp method, length
- Workpiece and workpiece receiving surface resistance
- Fluctuation of gripping power (air pressure), etc.



Safety Precautions

Be sure to read this section before use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.
It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

WARNING

1 This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience.

2 Use this product in accordance with specifications.

This product must be used within its stated specifications. In addition, never modify or additionally machine this product.
This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments.
(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)

❶ Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
❷ Use for applications where life or assets could be significantly affected, and special safety measures are required.

3 Observe organization standards and regulations, etc., related to the safety of device design and control, etc.

ISO4414, JIS B 8370 (Pneumatics fluid power - General rules and safety requirements for systems and their components)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

❶ Inspect and service the machine and devices after confirming safety of all systems related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ When inspecting or servicing the device, turn OFF the energy source (air supply or water supply), and turn OFF power to the facility.Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.
❹ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5 Observe warnings and cautions in the following pages to prevent accidents.

■ The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

⚠ DANGER:	When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.
⚠ WARNING:	If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.
⚠ CAUTION:	When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.
Every item provides important information and must be observed.

Warranty

1 Warranty period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

3 Compatibility check

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

Pneumatic components

Safety Precautions

Be sure to read this section before use. Refer to Pneumatic Cylinders (CB-030SA) for general information of the cylinder, hands and chucks, and cylinder switches.

Laws and regulations on robot safety

Please read the following standards carefully before use.

ISO10218 and JIS B 8433 (Robots and robotic devices)
ISO/TS 15066 (Robots and robotic devices)

Product-specific cautions: Grippers for collaborative robots

Design/selection

⚠WARNING

■ If a moving workpiece poses a danger to the human body, or if there is a possibility of human fingers being pinched by the fingers of the gripper or attachment, take safety precautions such as by installing a protective cover.

■ If the circuit pressure drops due to power failure or air source trouble, the gripping power may decrease and the workpiece may fall. Provide position locking measures, etc., so that personnel are not injured or machines damaged.

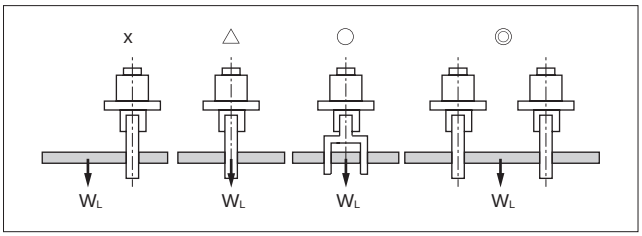
⚠CAUTION

■ Working environment

At cutting, casting, or welding plants, there is a risk of foreign matter, such as cutting fluid, chips, powder and dust, entering the equipment. Use covers and such to prevent this as much as possible. Do not use the equipment under the following environments.

- Exposed to cutting oil (because the sliding section is abraded by abrasive or polishing debris in the liquid)
- When the atmosphere contains organic solvents, chemicals, acids, alkalis, kerosene, etc.
- Exposed to water

■ When gripping long or large workpieces, stable gripping requires a grip on the center of gravity. Stability is a must when using larger or multiple workpieces as well.

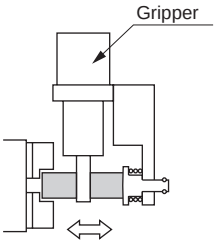


■ Select a model that has sufficient power to grip the workpiece weight.

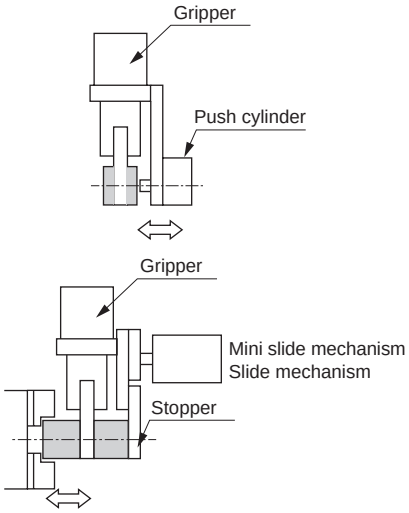
■ Select a model that has sufficient opening/closing width for the workpiece size.

■ When inserting the workpiece directly to the jig using a gripper, take the clearance into consideration during design. Otherwise the gripper may be damaged.

● Push-in jig with ejector



● When using a push cylinder



Note)Since the workpiece slides over the attachment, it may significantly shorten the service life of the gripper. The shape of the attachment should be sufficiently considered.

■ If the attachment is not rigid enough, the resulting sag could cause the finger to twist or adversely affect operation.

■ Adjust the gripper opening/closing speed using the speed controller. When using at high speed, backlash may occur sooner. In addition, the workpiece may vibrate due to shocks in opening/closing, which may lead to erroneous gripping, erroneous insertion of workpieces and poor repeatability.

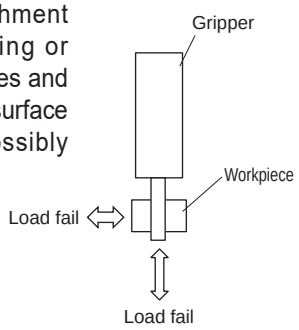
■ Condensation (water drops) may occur in the piping in certain conditions if an actuator with small bore size/short stroke is operated at high frequency. Take measures against condensation with a quick exhaust valve, etc.

■ To prevent workpieces from falling when the signal is shut off, use a 2-position double solenoid for the directional control valve.

Mounting, installation and adjustment

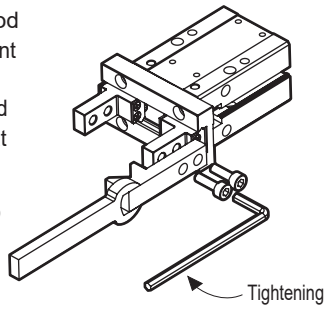
⚠CAUTION

■ Be sure not to apply an excessive load to the fingers and attachment when attaching and detaching or conveying workpieces. Scratches and dents may occur on the rolling surface of the finger linear guide, possibly causing malfunction.



■ Attachment mounting method
When mounting the attachment to the fingers, consider the impact to the gripper body and tighten it with a wrench so that the fingers are not twisted.

Do not apply load to the body.



Descriptions	Bolt used	Tightening torque (N·m)
RLSH-A20D1N	M 4 x 0.7	1.4
RHLF-16CS	M 4 x 0.7	1.4
RCKL-40CS	M 5 x 0.8	2.8

[Mounting method]

① Robot flange mounting

Loosen the clamp ring and remove the robot flange from the gripper. After inserting the parallel pin (included) into the robot flange surface, install the robot flange to the robot with 4 hexagon socket head cap screws (included).

Note: Tightening torque = 7N·m

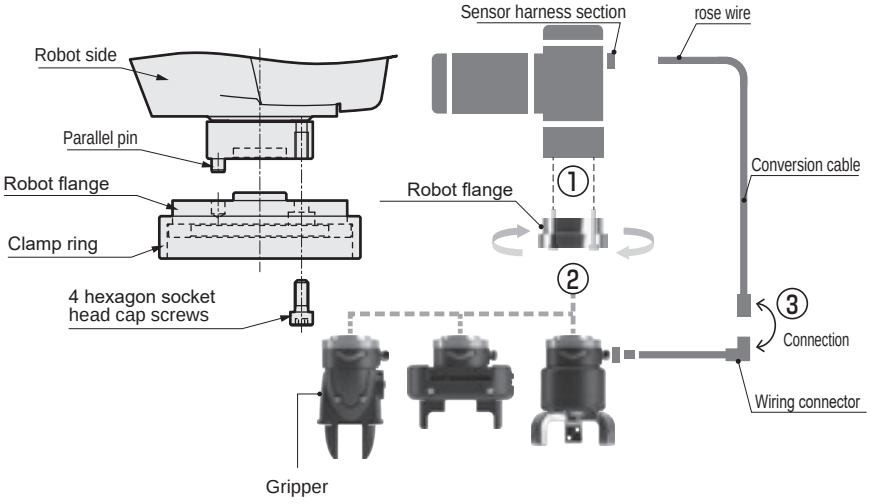
② Gripper mounting

Install the gripper on the robot flange and tighten the clamp ring to install.

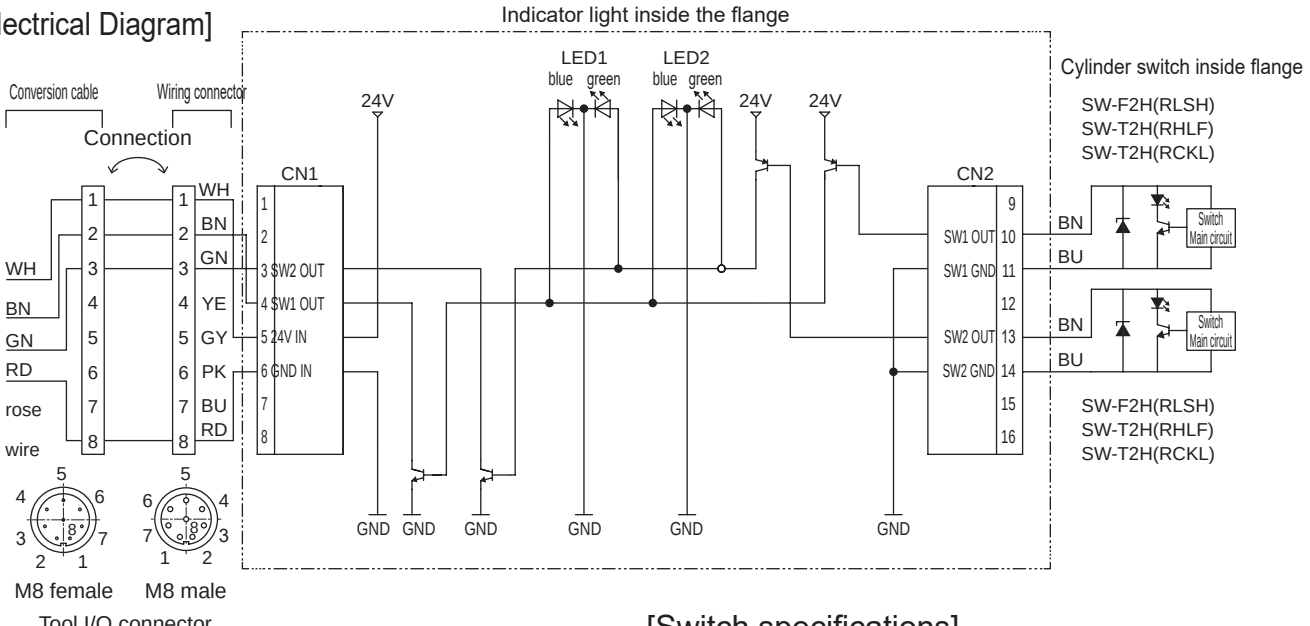
Note: Strongly tighten the clamp ring by turning with your hand and check that it is not loose.

③ Wiring

Connect the conversion cable (included) to the gripper wiring connector. For wiring connections between the sensor harness on the duAro arm and this product's loose wire, refer to the electric circuit diagram below and each instruction manual for the duAro body. Refer to Pneumatic Cylinders I (Catalog No.CB-029SA-9) Ending P.16 to 23 for detailed switch specifications.



[Electrical Diagram]



[Switch specifications]

Descriptions	Proximity 2-wire	
	F2H	T2H
Applications	Dedicated for programmable controller	
Load voltage/current	10 to 30 VDC 5 to 20mA	
Leakage current	1 mA or less	
Shock resistance	980m/s^2	
Weight g	10	18

Directional control valve (Option)

When Code B attachment V is selected (directional control valve / tube)

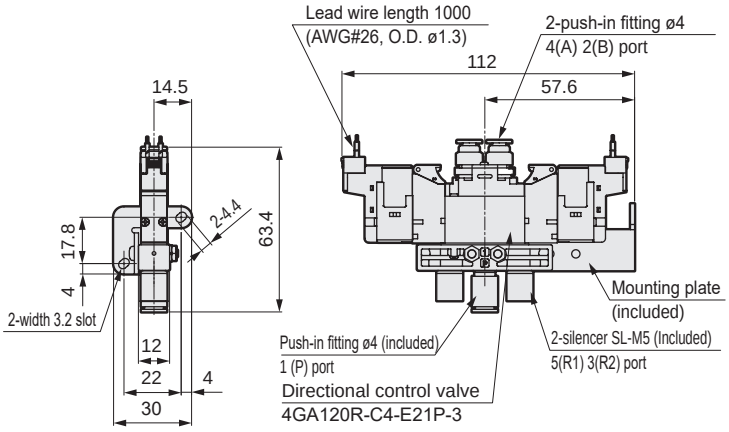
Directional control valve model No.
4GA120R-C4-E21P-FLA28482-3-ST

Refer to “Pneumatic Valves (No.CB-023SA)” for other specification products.

Specifications

Item		Description
Valve and operation		Pilot operated soft spool valve
Solenoid position		2-position double solenoid
Max. working pressure	MPa	0.7
Min. working pressure	MPa	0.2
Ambient temperature	°C	−5 to 55 (no freezing)
Fluid temperature	°C	5 to 55
Manual override		Non-locking/locking common
Response time	ms	9
Flow characteristics C[dm^3/(s·bar)], b		P→A/B: C=1.2, b=0.47 A/B→R1/R2:C=0.72, b=0.37
Rated voltage	V	24 VDC
Voltage fluctuation range		±10%
Holding current	A	0.017
Power consumption	W	0.40
Surge suppressor		Built in
Indicator		Built-in lamp

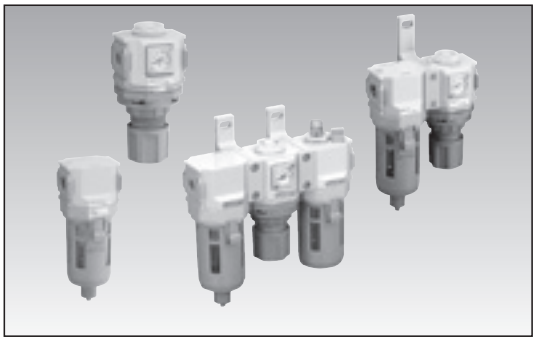
Dimensions



Related products

Modular design F.R.L.

Catalog No. CB-024SA



- Compact modular design with unified boundary dimensions of filters, regulators, lubricators, etc.
- Various combinations are possible to suit a variety of applications
- Long service life element
- Simple front service design

Portable air supply unit ASU-S

Catalog No. CC-1363A

- Easily Portable compact compressor
- Supplies clean air with built-in filter
- Continuous operation possible

CKD Corporation

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