Quality and Innovation

MICRO CYLINDER RCL

www.intelligentactuator.com

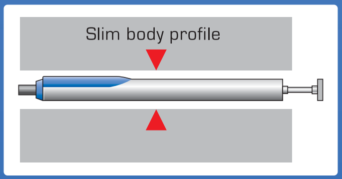
ROBO CYLINDER

Space-saving, high speed, high acceleration/deceleration and quiet operation

The new ultra-small linear servo cylinder offers functions comparable to an air cylinder at ø16mm

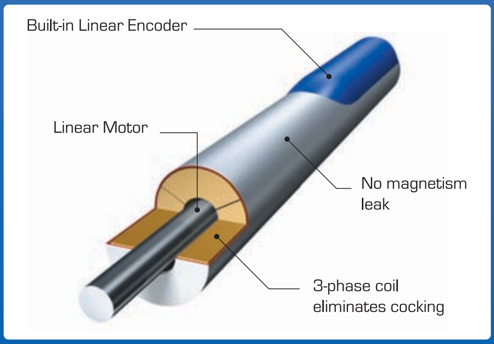
1 Ultra-small diameter cylinder actuator

The compact actuator with the minimum size of 16mm can be installed even in the most confined spaces. Installation is easier than an air cylinder, because there's no piping to worry about.



2 Compact size achieved by linear motor

IAI adopted the linear motor method requiring no rotating speed-reducer mechanism to accommodate all these features in a compact body.



3 Smooth, quiet operation

The sine-wave drive using 3-phase coil eliminates cocking. Furthermore, there's virtually no outside leakage of magnetism.

4 Built-in encoder supports multiple positioning points

Thanks to its built-in encoder, the RCL series can perform positioning to a maximum of 512 points when combined with a compact, affordable ACON controller.

5 Brake option

Designed for use in vertical applications, the brake-type RCL prevents the load from dropping when power outages occur or if the power is cut off accidentally.

6 Choice of controllers for different applications

The RCL series can be combined with ASEL controllers supporting program operation, or ACON controllers supporting operation by position specification. The ACON series includes different types of controllers including the standard type, solenoid type, pulse-train input type, and serial communication type. Choose a controller that best suits your specific application and purpose.

Lineup/Specifications

Outer Diameter (mm)	Stroke (mm)	Max Speed (mm/sec)	Max Load Capacity (kg)			Rated Thrust (N)	Max Momentary Thrust (N)	Max Acceleration (G)	Positioning Repeatability (mm)	Encoder	Controller Input Power
			Acceleration Condition	Horizontal	Vertical						
ϕ16 	25	300	0.5G	0.5	0.1	2.5	10	Horizontal: 2G Vertical: 1G	±0.1	Incremental	DC24V
			@ Max Acceleration	0.1	0.1						
ϕ20 	30	340	0.5G	1	0.2	5	18				
			@ Max Acceleration	0.2	0.2						
ϕ25 	40	450	0.5G	2	0.4	10	30				
			@ Max Acceleration	0.4	0.4						

The maximum load capacity decreases as the acceleration increases (contact IAI for details). The values at the maximum acceleration were measured based on 2G for horizontal installation and 1G for vertical installation. Even if the acceleration is reduced to less than 0.5G, the maximum load capacity will not increase beyond the specified capacity at 0.5G.

Types

Diameter	Stroke	Model
ϕ16 (mm)	25 (mm)	RCL-RA1L-I-2-N-25-A1- [ ]
ϕ20 (mm)	30 (mm)	RCL-RA2L-I-5-N-30-A1- [ ]
ϕ25 (mm)	40 (mm)	RCL-RA3L-I-10-N-40-A- [ ]

[ ] in the model names shown above indicates the cable length code.
(Refer to the table on the right.)

Model Reference

RCL- (1) -I- (2) -N- (3) - (4) - (5)

Series Name — Encoder Type (Incremental) — Ball screw lead (None)

(1) Type
- RA1L : ϕ16mm Type
- RA2L : ϕ20mm Type
- RA3L : ϕ25mm Type

(2) Applicable Driver Output
- 2 : 2W
- 5 : 5W
- 10 : 10W

(3) Stroke
- 25 : 25mm
- 30 : 30mm
- 40 : 40mm

(4) Applicable Controller
- A1 : ACON
- ASEL

(5) Cable Length
- N : No Cable
- P : 1m
- S : 3m
- M : 5m
- X[ ][ ] : Special Length

Cable Lengths

Type	Cable Length Code
Standard Type (Robot Cable)	P (1m)
	S (3m)
	M (5m)
Special Length	X06 (6m) - X10 (10m)
	X11 (11m) - X15 (15m)
	X16 (16m) - X20 (20m)

All RCL actuators come standard with robot cables

Applicable Controllers

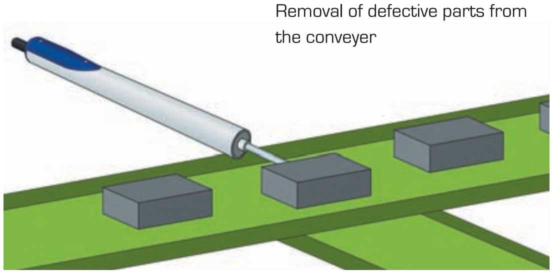
Name	Model
Positioner Type	ACON-C- [ ]I-NP-2-0
Safety-Category Compliant Type	ACON-CG- [ ]I-NP-2-0
Solenoid Type	ACON-CY- [ ]I-NP-2-0
Pulse Train Type (Differential)	ACON-PL- [ ]I-NP-2-0
Pulse Train Type (Open-collector)	ACON-PO- [ ]I-NP-2-0
Serial Type	ACON-SE- [ ]I-N-0-0
Program Control Type	ASEL-C-1- [ ]I-NP-2-0

[ ] in the model names shown above indicates the value of driver output

Applications

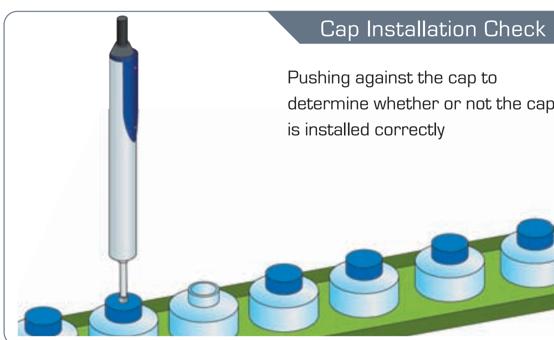
Removal of Defective Parts

Removal of defective parts from the conveyer



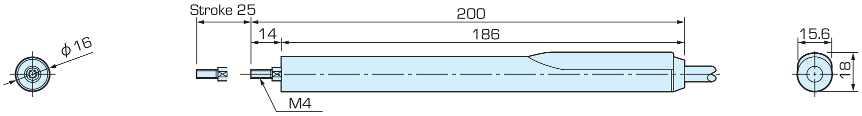
Cap Installation Check

Pushing against the cap to determine whether or not the cap is installed correctly

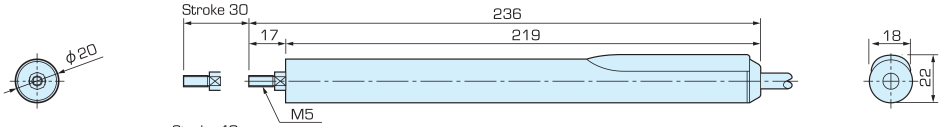


External Dimensions

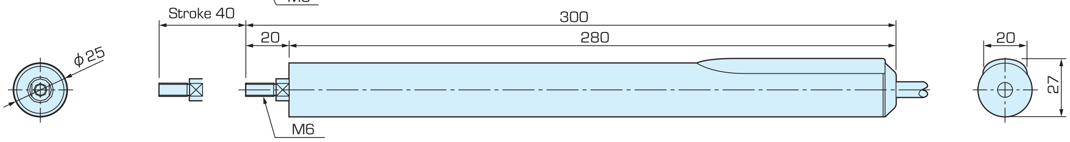
• **RCL-RA1L**



• **RCL-RA2L**



• **RCL-RA3L**

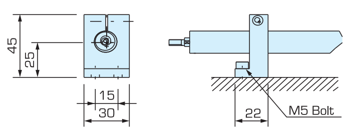


Mounting Bracket

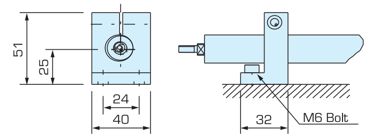
General-purpose mounting brackets like the ones shown below can be used. For details on brackets, contact your bracket supplier directly.

• Shaft holders by Misumi

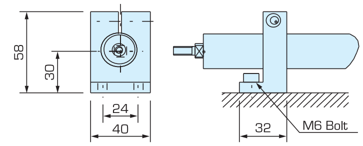
SHKSBT16 (ϕ 16 Type)



SHKSBT20 (ϕ 20 Type)

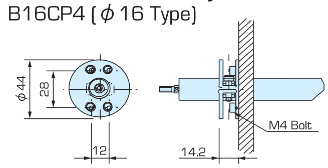


SHKSBT25 (ϕ 25 Type)

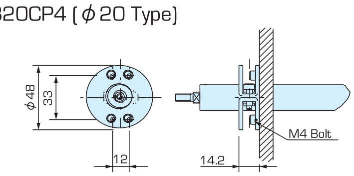


• Shaft brackets by Iwata Parts

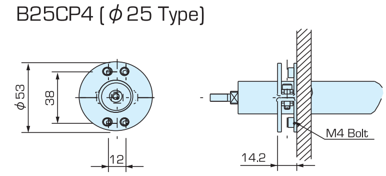
B16CP4 (ϕ 16 Type)



B20CP4 (ϕ 20 Type)

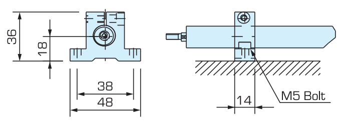


B25CP4 (ϕ 25 Type)

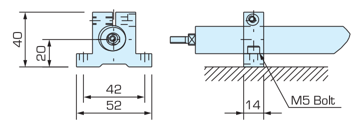


• Round Pijon brackets by Miyoshi Pijon

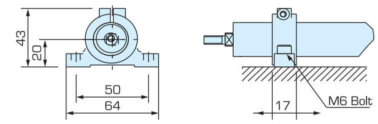
PN600 (ϕ 16 Type)



PQ600 (ϕ 20 Type)



PH600 (ϕ 25 Type)



Note When clamping the actuator pipe, strictly observe the tightening torque specified in the operation manual.
Tightening the actuator with excessive force may cause deformation or actuator malfunction.

Operating Conditions

• Setting the acceleration

The acceleration is determined by the load capacity and duty. If the duty is over 70% but not more than 100%, set an appropriate acceleration at which continuous operation is possible (duty = 100%). If the duty is 70% or less, set the acceleration based on a load of 70%.

Load Capacity (horizontal) and acceleration

Acceleration (G)	Load Capacity (kg)					
	RA1L		RA2L		RA3L	
	Continuous Operation Possible	70% Duty	Continuous Operation Possible	70% Duty	Continuous Operation Possible	70% Duty
0.1	0.5	0.5	1	1	2	2
0.3						
0.5	0.42		0.85		1.6	
1	0.2	0.25	0.4	0.5	0.78	1
1.5	0.11	0.15	0.24	0.3	0.46	0.6
2	0.07	0.1	0.15	0.2	0.3	0.4

$$\text{Duty} = \frac{\text{Operating Time}}{\text{Operating Time + Stationary Time}} \times 100$$

*Receive the load with an external guide, etc., to prevent the rod from receiving a lateral load or rotational load.

Load Capacity (vertical) and acceleration

Acceleration (G)	Load Capacity (kg)		
	RA1L	RA2L	RA3L
0.1	0.1	0.2	0.4
0.3			
0.5			
1			

*Receive the load with an external guide, etc., to prevent the rod from receiving a lateral load or rotational load.

• Setting the current-limiting value in push-motion operation

To perform push-motion operation, set a current-limiting value that determines the push force.
*The push time is not limited. The actuator can be set to push the load continuously.

Guide for push force [N]

Current-limiting Value	30%	40%	50%	60%	70%	80%
RA1L	0.75	1	1.25	1.5	1.75	2
RA2L	1.5	2	2.5	3	3.5	4
RA3L	3	4	5	6	7	8

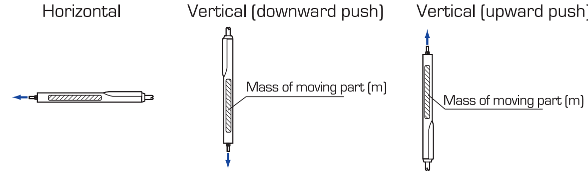
Notes
- The lower the current-limiting value, the greater the fluctuation of push force becomes.
- If the PC software or teaching pendant is of an older version, the current-limiting value cannot be set to 71% or higher.

Mass of moving part

Model	Mass of moving part (kg)
RA1L	0.05
RA2L	0.1
RA3L	0.18

Effect by push direction

Horizontal | Vertical (downward push) | Vertical (upward push)



Push force = Thrust
F = f

Push force =
Thrust + 9.8 x Mass of moving part
F = f + 9.8m

Push force =
Thrust + 9.8 x Mass of moving part
F = f + 9.8m

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