# IAI
**Quality and Innovation**

MICRO CYLINDER RCL

RC ROBO CYLINDER

Ultra-small Linear Servo Cylinder
with a minimum diameter of 16mm

# RC 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.

Slim body profile
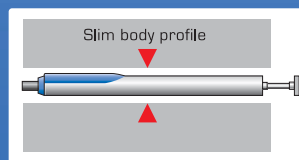
### 2 Compact size achieved by linear motor

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

Built-in Linear Encoder

Linear Motor

No magnetism leak

3-phase coil eliminates cocking
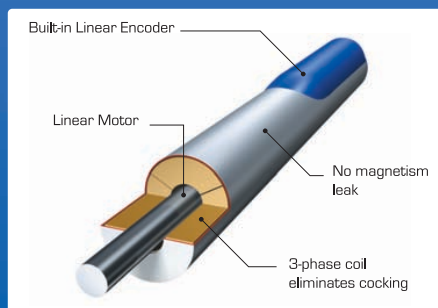
### 3 Smooth, quiet operation

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

ACON    ASEL

Position Controller        Program Controller

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

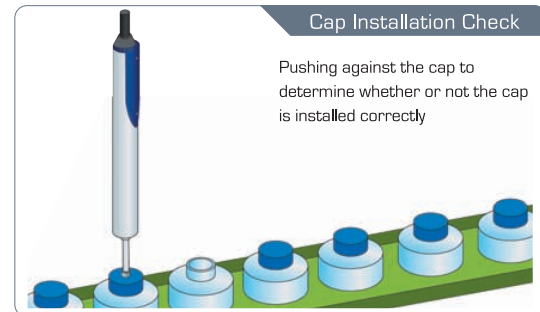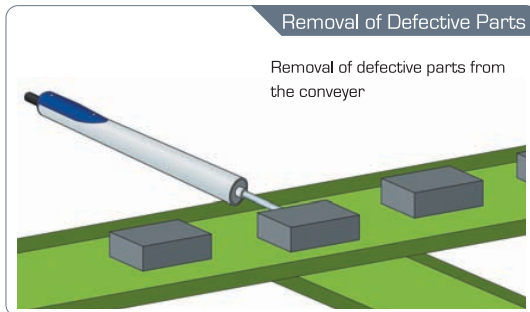**(4) Applicable Controller**
A1 : ACON
ASEL

**(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

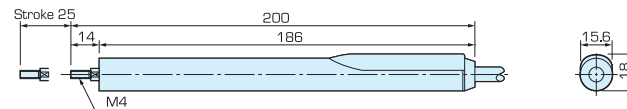| Name | Model |
|---|---|
| Positioner Type | ACON-C- [ ]I-NP-2-0 |
| Safety-Category Compliant Type | ACON-CG- [ ]I-NP-2-0 |
| Solenoid Type | ACON-CY- [ ]I-NP-2-0 |
| Pulse Train Type (Differential) | ACON-PL- [ ]I-NP-2-0 |
| Pulse Train Type (Open-collector) | ACON-PO- [ ]I-NP-2-0 |
| Serial Type | 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**

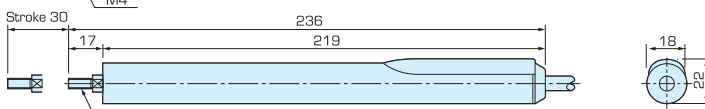Pushing against the cap to determine whether or not the cap is installed correctly
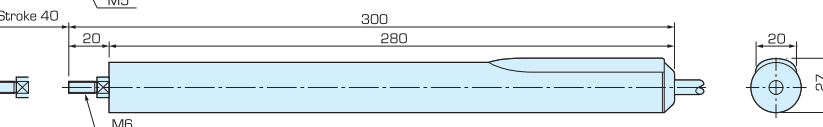
# External Dimensions

• RCL-RA1L

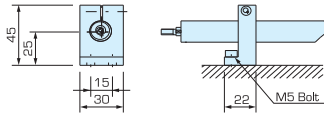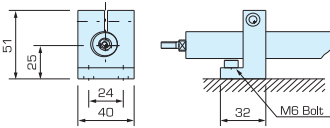

• RCL-RA2L



• 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.
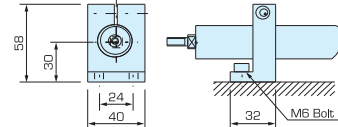
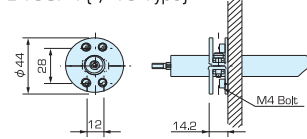## • Shaft holders by Misumi

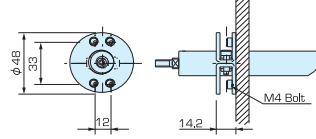SHKSBT16 [φ16 Type]

SHKSBT20 [φ20 Type]

SHKSBT25 [φ25 Type]

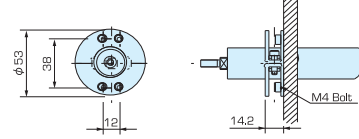## • Shaft brackets by Iwata Parts

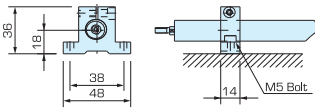B16CP4 [φ16 Type]

B20CP4 [φ20 Type]
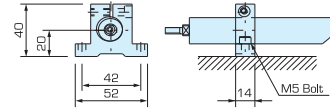
B25CP4 [φ25 Type]

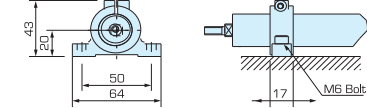## • Round Pijon brackets by Miyoshi Pijon

PN600 [φ16 Type]

PQ600 [φ20 Type]

PH600 [φ25 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 | 0.5 | 1 | 1 | 2 | 2 |
| 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 |

### Load Capacity (vertical) and acceleration

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

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

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

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

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

To perform push-motion operation, set a current-limiting value that determines the push force.

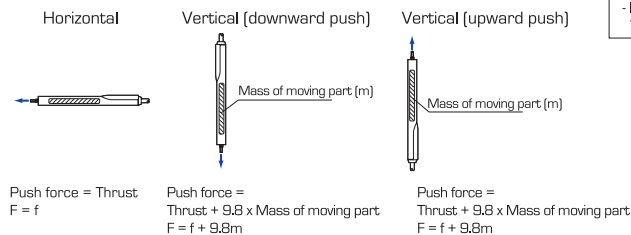*The push time is not limited. The actuator can be set to push the load continuously.

### 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.

### Effect by push direction

Horizontal

Vertical (downward push)

Vertical (upward push)

Mass of moving part (m)

Mass of moving part (m)

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

### Mass of moving part

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