



*WU-S/  
WU-M*

# Rotating joint 2-axis unit

## Wrist Unit is now available

1

IAI's Unique design makes the parts light and compact.

Equipped with a Battery-less Absolute Encoder as Standard

Small S type

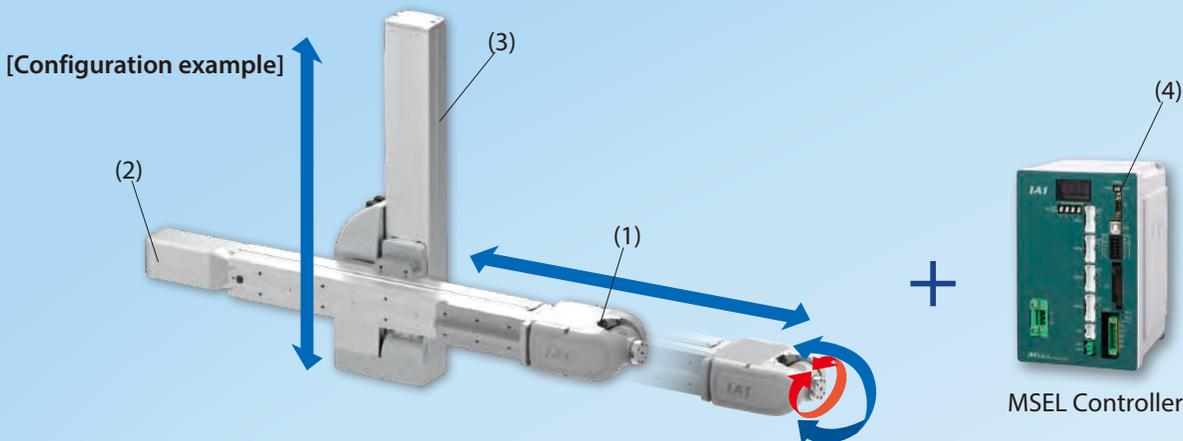
Medium M type



2

Ideal for reducing the cost of equipment. Low cost compared to 6-axis articulated robots.

Diagonal approaches and tip swiveling, possible until now only with vertically articulated robots, can now be performed with the minimum required axis configuration. Ideal for reducing the cost of equipment.



(1) Wrist Unit:	WU-S	
(2) Table Type:	RCP6-TA6C	Stroke: 320 mm
(3) Slider Type:	RCP6-SA7R	Stroke: 300 mm
(4) Controller:	MSEL	

1

**Work in tight spaces**

Combination with a high-straightness cartesian robot makes it capable of avoiding obstacles and working in tight spaces.

**Work in a wide operation range**

It is also ideal for work with a wide operation range.

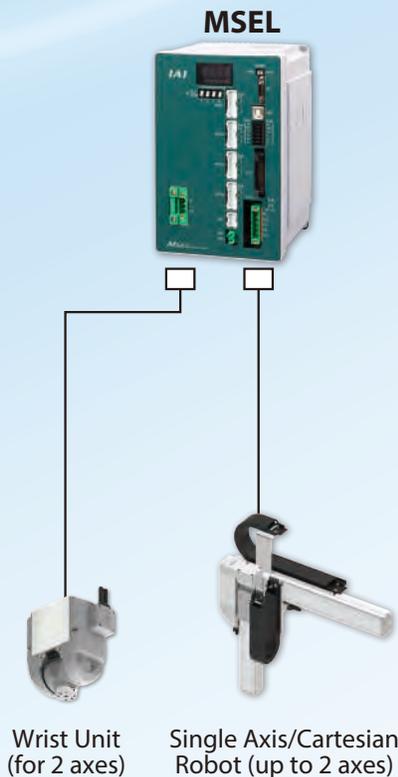
**Flexible combinations**

The combination pattern, number of axes and stroke can be freely selected according to the application.

# 3 Orthogonal axes and interpolation commands are possible

**(1) When connecting Wrist Unit and 2-axis actuator<sup>(\*)1</sup>**

<sup>(\*)1</sup> Stepper motor mounted actuator

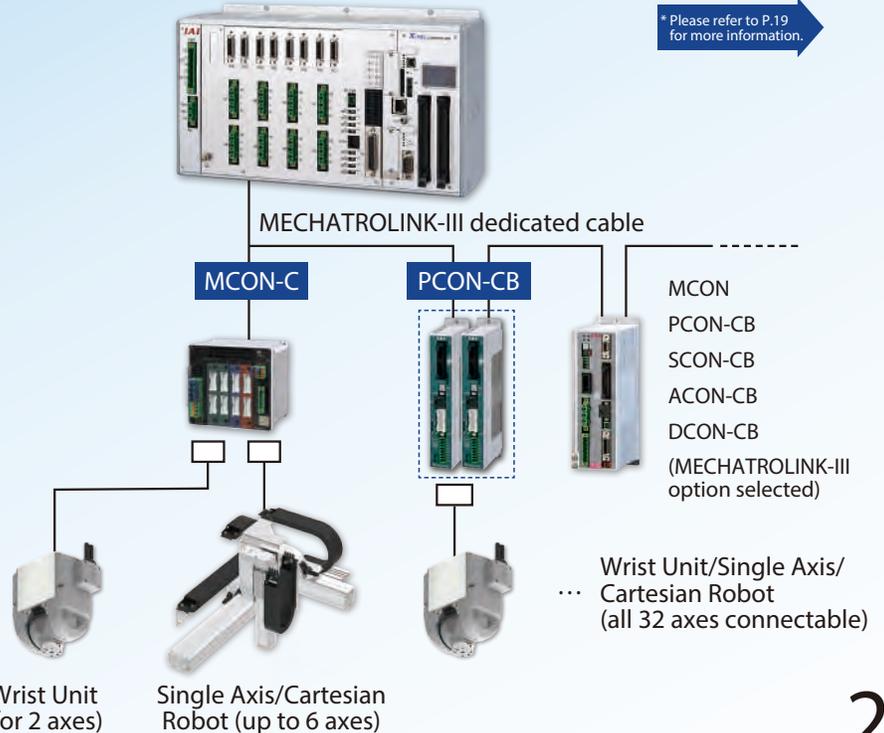


**(2) When connecting Wrist Unit and 3-axis or more actuator<sup>(\*)2</sup>**

<sup>(\*)2</sup> Stepper/servo motor mounted actuator

**XSEL-RA/SA expanded motion control function** (equipped as standard)

\* Please refer to P.19 for more information.



**Application Examples**

**Bottle labeling equipment**

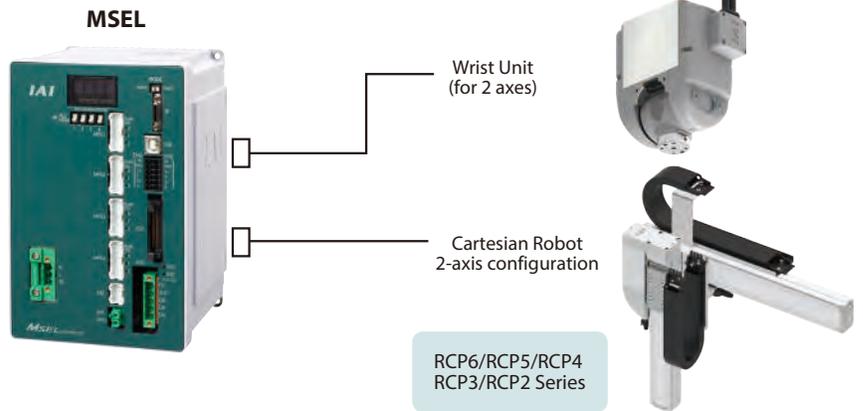
This device affixes labels to bottles. Adjusts the angle to the labeling surface on the B-axis and rotates the label on the T-axis to change the orientation.



**Controller connection example**

"Wrist Unit + ROBO Cylinder 2-axis configuration" can be controlled with a single MSEL controller.

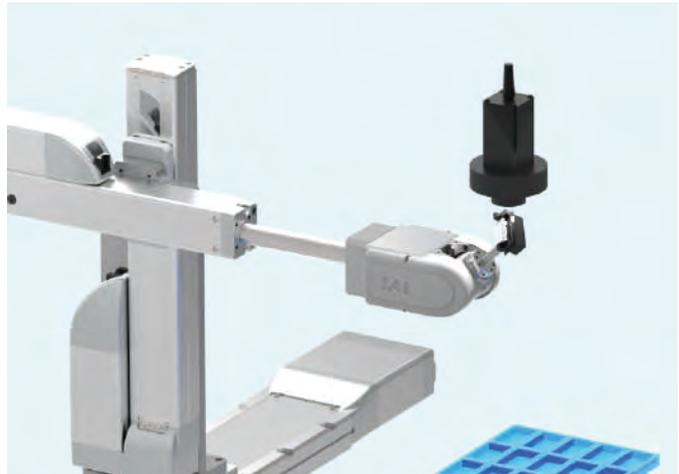
Please refer to P.17 for more information.



**Automotive connector inspection equipment**

This device inspects the external view of connectors for automobiles, using a camera.

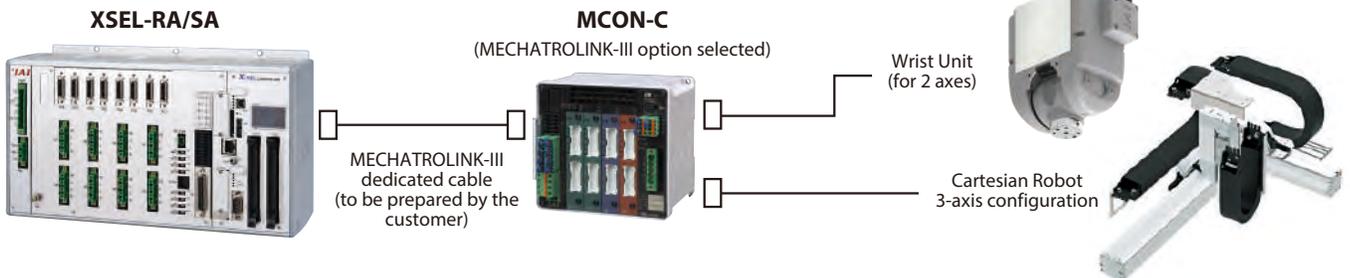
The Wrist Unit rotates the connector for inspection from various angles.



**Controller connection example**

"Wrist Unit + ROBO Cylinder 3-axis configuration" can be controlled with the MCON controller, using XSEL-RA/SA expanded motion control.

Please refer to P.19 for more information.



WU Series List

Type	Compact type		Medium type		
Model	WU-S		WU-M		
External view					
Axis configuration	B-axis (wrist swing)	T-axis (wrist rotation)	B-axis (wrist swing)	T-axis (wrist rotation)	
Operation range	±100 deg.	±360 deg.	±105 deg.	±360 deg.	
Max. torque *1	0.65N·m	0.65N·m	1.65N·m	1.65N·m	
Max. allowable moment of inertia *2	0.0085kgm <sup>2</sup>	0.0075kgm <sup>2</sup>	0.015kgm <sup>2</sup>	0.0165kgm <sup>2</sup>	
Max. load weight	1kg		2kg		
Max. speed *3	Independent operation	750 deg/s	1200 deg/s	900 deg/s	1200 deg/s
	Simultaneous operation of the B- and T-axes	600 deg/s	600 deg/s	600 deg/s	600 deg/s
Max. acceleration/ deceleration	Without load torque *4	0.7 G (6865 deg/s <sup>2</sup> )	0.7 G (6865 deg/s <sup>2</sup> )	0.7 G (6865 deg/s <sup>2</sup> )	0.7 G (6865 deg/s <sup>2</sup> )
	With load torque *4	0.3 G (2942 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )
Motor type	28□ Stepper motor	28□ Stepper motor	35□ Stepper motor	35□ Stepper motor	
Unit weight	1.6kg		2.8kg		
Reference page	P.13		P.15		

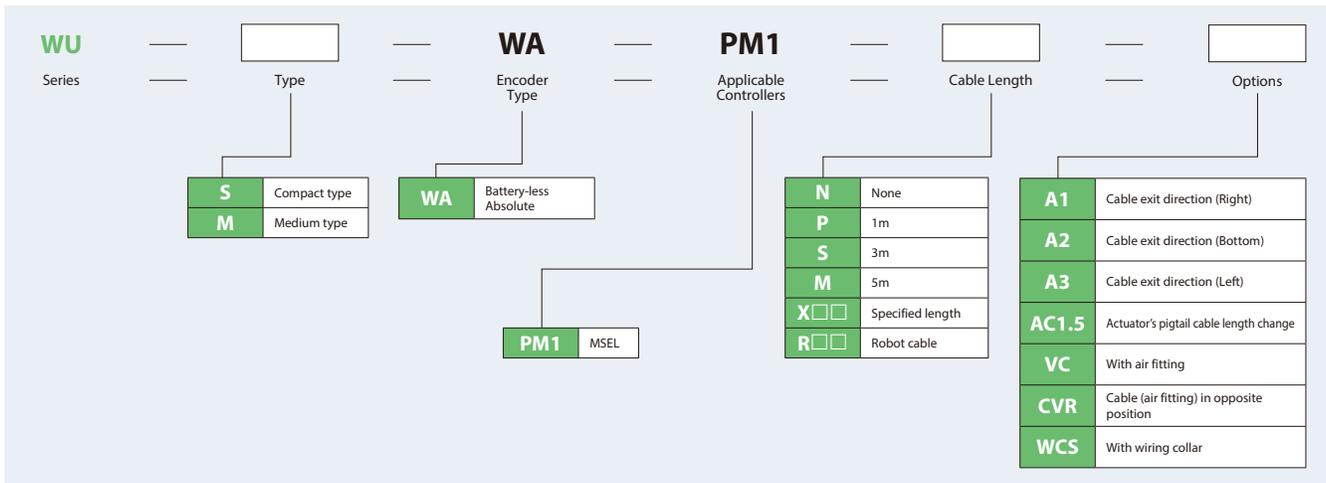
\*1 Indicates the maximum torque at low speed. The output torque varies with the speed.

\*2 Indicates the maximum moment of inertia in rotation. Value when the acceleration is 0.3 G.

\*3 Maximum set speed with no load.

\*4 When the rotational axes of the B-axis and T-axis are horizontal with respect to the floor surface or when the center of gravity of the transported object is offset from the rotational axis, the unit will be subject to load torque due to the weight of the object. The allowable moment of inertia decreases when load torque is present. Please refer to "Model Selection Process (P.7 on)" for more information.

Model Specification Items



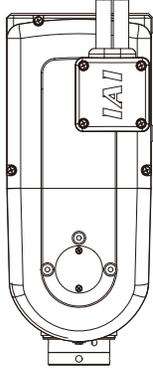
**Options**

**Cable exit direction**

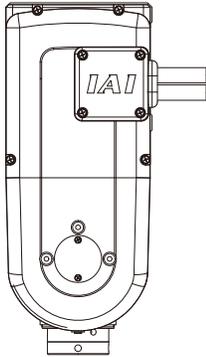
**Model** **A1 / A2 / A3**

**Description** Specify when changing the Actuator's pigtail cable exit direction.

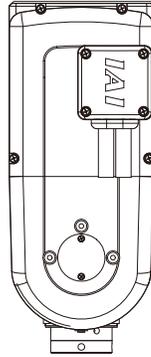
**Top direction exit (standard)**  
 ■ No option specified (blank)



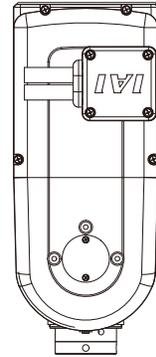
**Exit to right side**  
 ■ Option specified: A1



**Exit to bottom**  
 ■ Option specified: A2



**Exit to left side**  
 ■ Option specified: A3



**Actuator's pigtail cable length change**

**Model** **AC1.5**

**Description** This option extends the length of the Actuator's pigtail cable exiting the actuator body to 1.5 m. (Standard length is 0.2 m) When this option is selected, the maximum cable length between the actuator and controller will be 18 m (X18, R18).

**With air fitting**

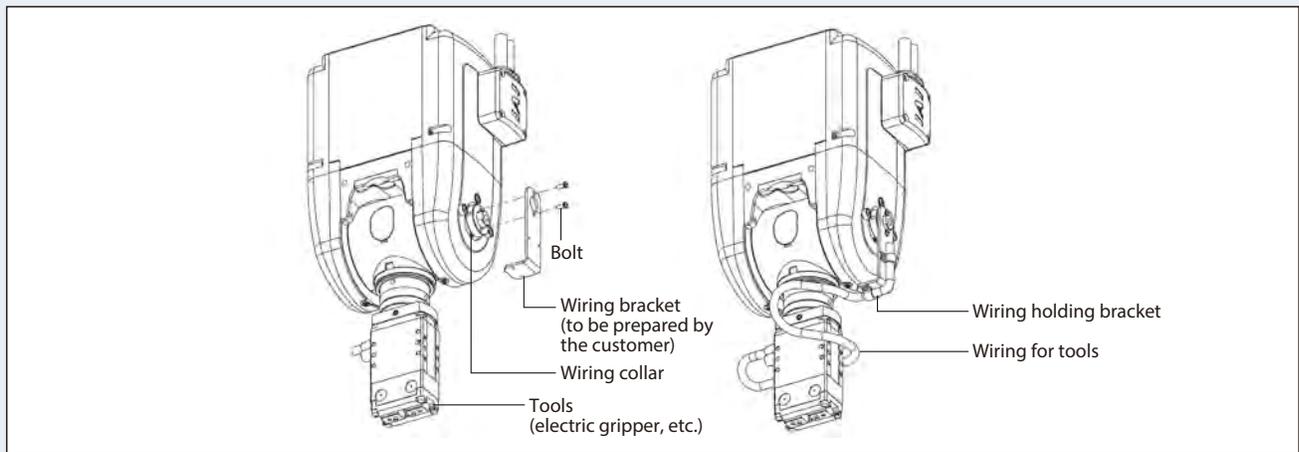
**Model** **VC**

**Description** This option allows attachment of an air fitting (φ6) for connecting pneumatic devices such as vacuum pads to the side of the main body. It is mounted on the same side as the Actuator's pigtail cable outlet. Please refer to the dimensions on the product pages. (WU-S: P.14, WU-M: P.16)

**With wiring collar**

**Model** **WCS**

**Description** When using electric grippers or similar wiring is made easy by using the wiring collar. Use the wiring collar as the base to which the wiring bracket (to be prepared by the customer) is to be attached. Please refer to the dimensions on the product pages. (WU-S: P.14, WU-M: P.16)



**Cable (air fitting) in opposite position**

**Model** **CVR**

**Description** This option allows the Actuator's pigtail cable outlet, air fitting, and wiring collar (optional) to be mounted on the other side (opposite position). Please refer to the dimensions on the product pages. (WU-S: P.14, WU-M: P.16)

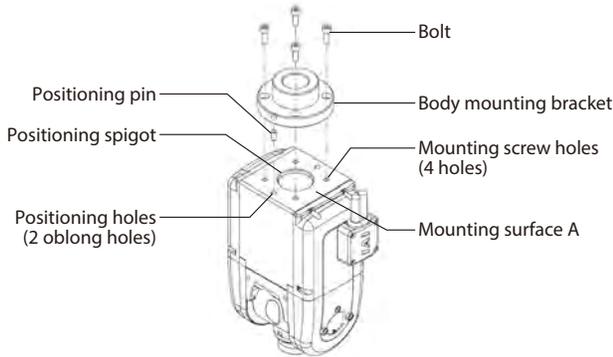
Reference Data

# Mounting Method

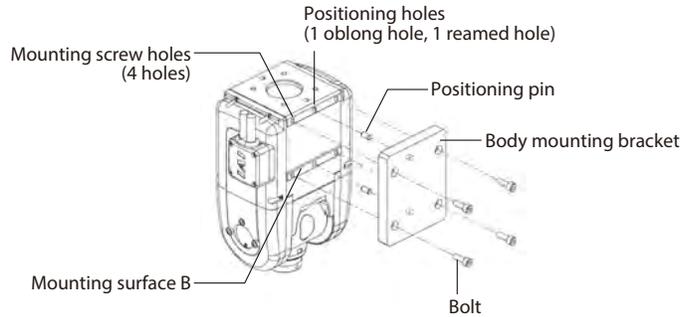
## Body mounting method

The body mounting surface should be a machined surface or a plane with similar accuracy. The actuator has screw holes and positioning holes for body mounting on the top (mounting surface A) and side (mounting surface B). For details on positions and dimensions, refer to the product pages.

(1) When using mounting surface A  
(Thread depth WU-S: M4 through (screw depth: 6) / WU-M: M5 through (screw depth: 10))

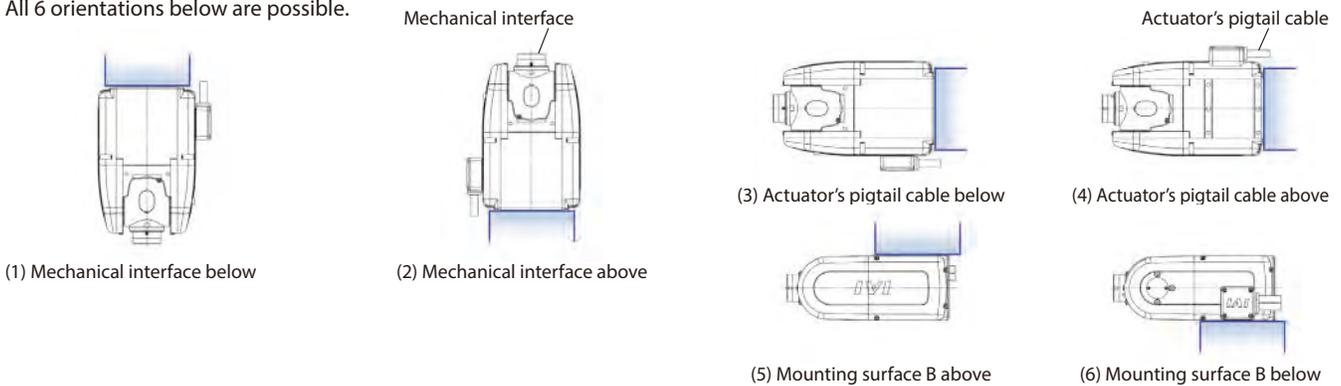


(2) When using mounting surface B  
(Thread depth WU-S: M4 depth 8 / WU-M: M5 depth 10)



## Body installation orientation

All 6 orientations below are possible.

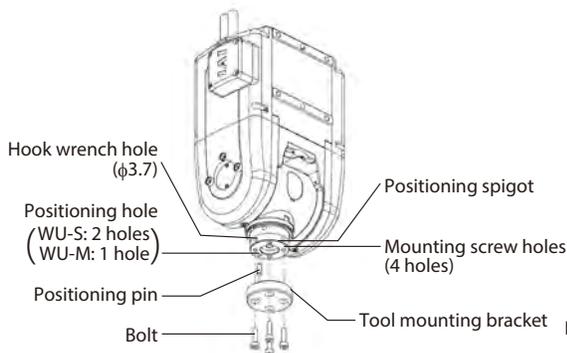


## Tool mounting method

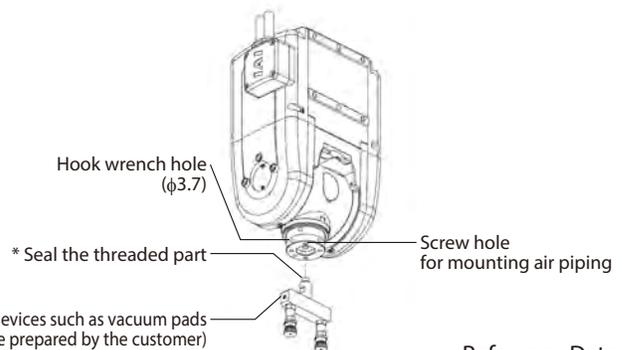
The unit is provided with screw holes for bracket mounting to the body tip (mechanical interface), screw holes for air piping mounting, and positioning holes. Refer to the dimensions (WU-S: P.12, WU-M: P.14) for details regarding the position and dimensions.

Do not apply excessive force to the output shaft when tightening bolts or air piping threads. The mechanical interface is provided with holes for a hook wrench. Use these to fix the output shaft in the rotating direction.

(1) When using bracket mounting screws  
(Thread depth WU-S: M4 depth 6 / WU-M: M4 through (screw depth: 6))



(2) When using air piping mounting screws  
Seal the threaded part of the air piping with sealing tape, etc.  
(Thread depth WU-S: M6 through (screw depth: 4.5) / WU-M: M6 through (screw depth: 4.5))

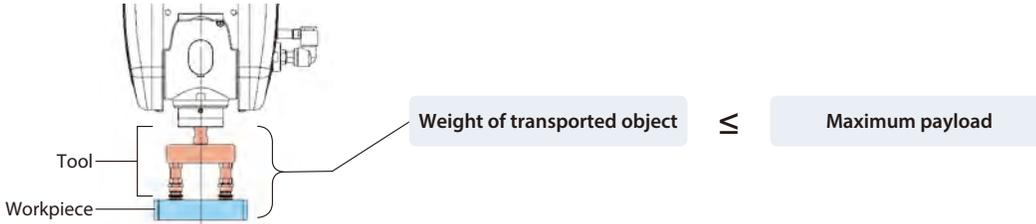


# Model Selection Process

Follow steps 1 through 4. For a selection example, refer to the following pages.

## Step 1

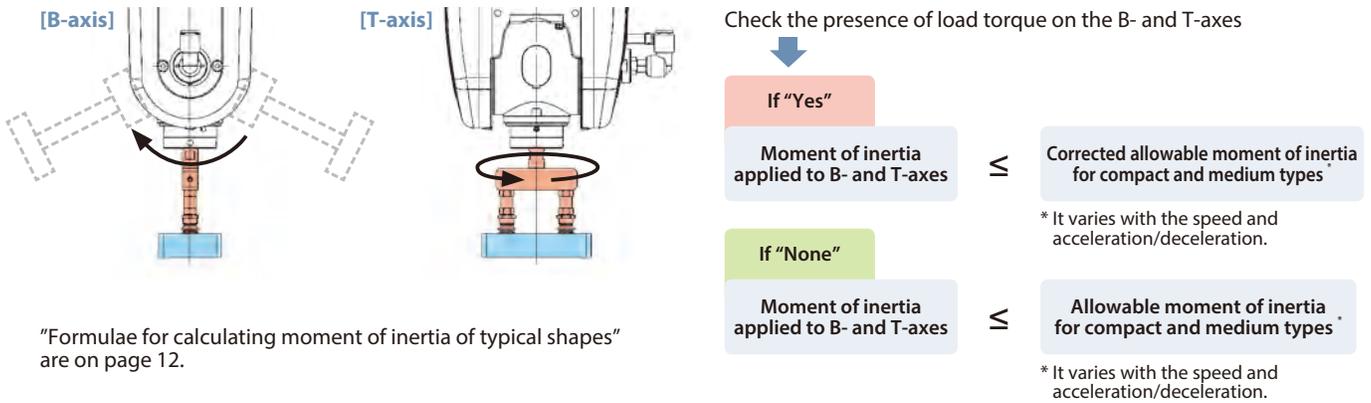
### Check the weight of the transported object



## Step 2

### Check the moment of inertia

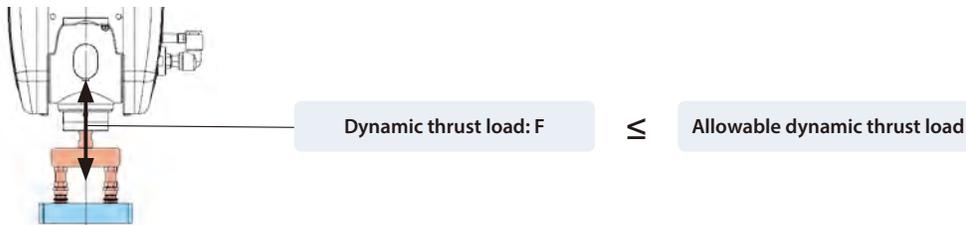
The allowable moment of inertia of the Wrist Unit decreases to the extent that load torque is applied to the B- and T-axes. First, calculate the load torque and obtain the corrected allowable moment of inertia.



## Step 3

### Check the allowable dynamic thrust load

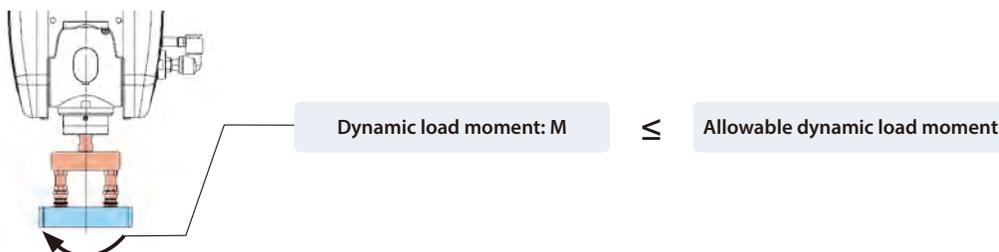
Make sure that the thrust load (load perpendicular to the mounting surface) does not exceed the allowable dynamic thrust load.



## Step 4

### Check the allowable dynamic load moment

Make sure that the load moment does not exceed the allowable dynamic moment.



# WU-S

Battery-less Absolute

Compact type

24v Stepper Motor

Model Specification Items

<b>WU</b>	—	<b>S</b>	—	<b>WA</b>	—	<b>PM1</b>	—	<input type="checkbox"/>	—	<input type="checkbox"/>
Series	—	Type	—	Encoder Type	—	Applicable Controllers	—	Cable Length	—	Options
		S: Compact Type		WA: Battery-less Absolute		PM1: MSEL		N: None P: 1m S: 3m M: 5m X <input type="checkbox"/> : Specified Length R <input type="checkbox"/> : Robot Cable		Refer to Options table below.

\* Does not include a controller  
\* Please refer to P.4 for more information about the model specification items.



\* Please refer to P.6 for more information on the installation method and orientation.



**POINT Selection Notes**

When making a selection, it is necessary to calculate the moment of inertia of the operating conditions and to use a model that allows that moment of inertia. Calculate the moment of inertia of the transported object for the B- and T-axes respectively. Please refer to "Model Selection Process (P.7 on)" for more information.

(Note 1) Shows maximum set speed with no load.  
(Note 2) When the rotational axes of the B-axis and T-axis are horizontal with respect to the floor surface or when the center of gravity of the transported object is offset from the rotational axis, the unit will be subject to load torque due to the weight of the object. The allowable moment of inertia decreases when load torque is present. Please refer to "Model Selection Process (P.7 on)" for more information.

### Actuator Specifications

Model	Axis configuration	Operation range (deg.)	Max. speed <sup>(Note 1)</sup> (deg/s)		Max. payload (kg)	Max. acceleration/deceleration (G)	
			Independent operation	Simultaneous operation of the B- and T-axes		Without load torque <sup>(Note 2)</sup>	With load torque <sup>(Note 2)</sup>
WU-S-WA-PM1-①-②	B-axis (wrist swing)	±100	750	600	1	0.7 G (6865 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )
	T-axis (wrist rotation)	±360	1200	600		0.7 G (6865 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )

Legend: ① Cable length ② Options

\*1 G = 9807 deg/s<sup>2</sup>

### ② Options

Name	Option code	Reference page
Cable exit direction (Right)	<b>A1</b>	See P.5, P.14
Cable exit direction (Bottom)	<b>A2</b>	See P.5, P.14
Cable exit direction (Left)	<b>A3</b>	See P.5, P.14
Actuator's pigtail cable length change	<b>AC1.5</b>	See P.5, P.14
Cable (air fitting) in opposite position	<b>CVR</b>	See P.5, P.14
With air fitting	<b>VC</b>	See P.5, P.14
With wiring collar	<b>WCS</b>	See P.5, P.14

### ① Cable Length <per axis \*1>

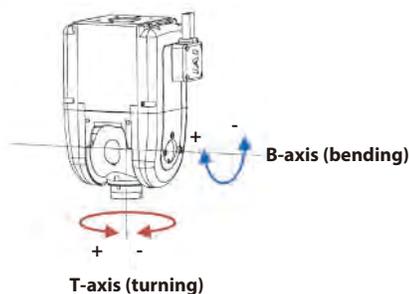
Type	Cable code
Standard type	<b>P</b> (1m)
	<b>S</b> (3m)
	<b>M</b> (5m)
Specified length	<b>X06</b> (6m) to <b>X10</b> (10m)
	<b>X11</b> (11m) to <b>X15</b> (15m)
	<b>X16</b> (16m) to <b>X20</b> (20m) *2
Robot cable	<b>R01</b> (1m) to <b>R03</b> (3m)
	<b>R04</b> (4m) to <b>R05</b> (5m)
	<b>R06</b> (6m) to <b>R10</b> (10m)
	<b>R11</b> (11m) to <b>R15</b> (15m)
	<b>R16</b> (16m) to <b>R20</b> (20m) *2

Cable between actuator and controller.

\*1 Required for both B- and T-axes. Select the cable length in the model name to have 2 cables attached.

\*2 When Actuator's pigtail cable length change "AC1.5" is selected as an option, 18 m (X18, R18) will be the maximum length.

### Name and Coordinates of Each Axis



### Actuator Specifications

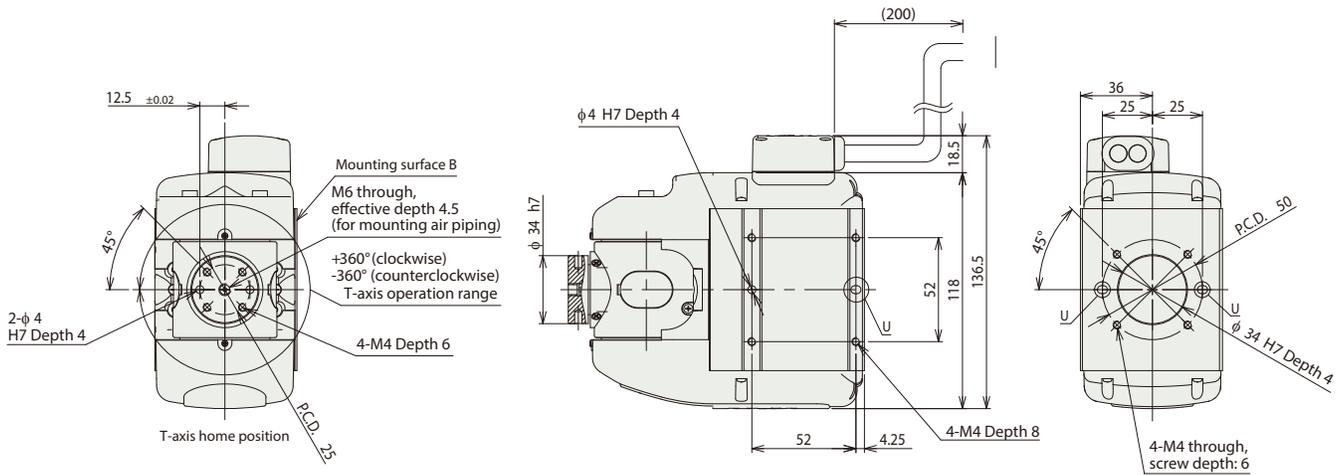
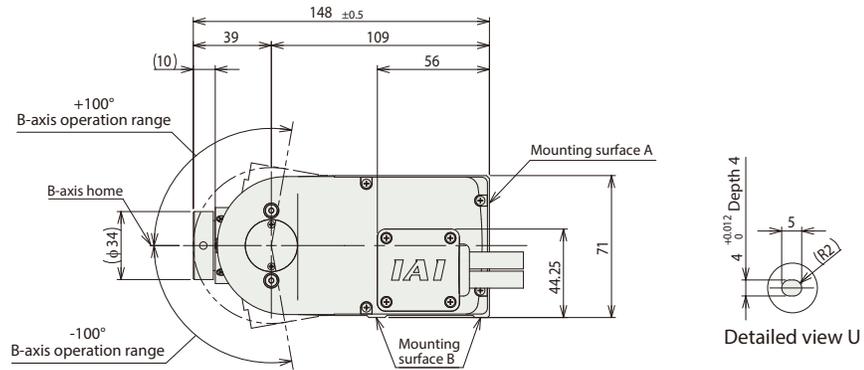
Item	Description	
	B-axis (wrist swing)	T-axis (wrist rotation)
Drive system	Stepper motor + timing belt	Stepper motor + timing belt + bevel gear
Positioning repeatability	±0.015 deg.	±0.15 deg.
Lost motion	0.06 degrees	0.4 degrees
Allowable dynamic thrust load *1	330N	
Allowable dynamic load moment *1	1.4N-m	
Unit weight	1.6kg	
Brake retaining torque *2	0.96N-m	0.96N-m
Ambient operating temperature, humidity	0~40°C, 85% RH or less (Non-condensing)	

\*1 Using the unit with a load exceeding the values above leads to reduced service life and/or damage.

\*2 Equipped with brake as standard.

Dimensions

CAD drawings can be downloaded from our website.  
www.intelligentactuator.com



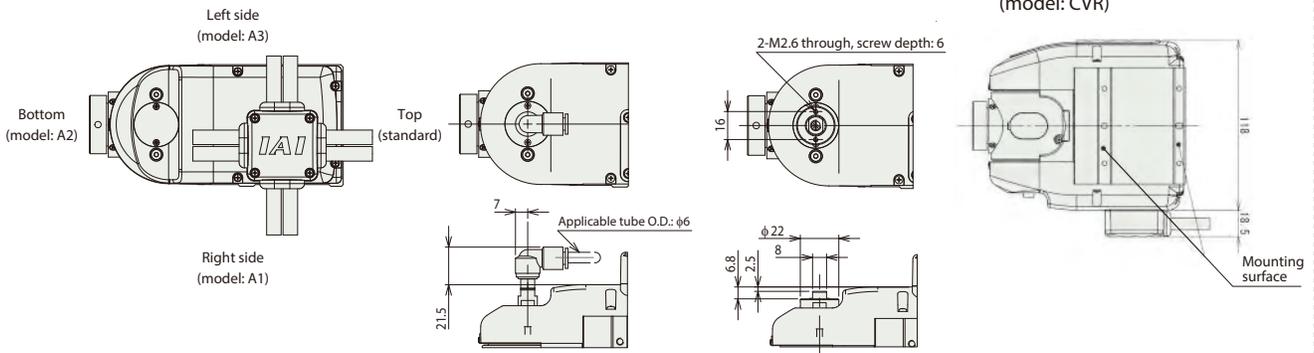
Options

■ Cable exit direction

■ Air fitting (model: VC)

■ Wiring collar (model: WCS)

■ Cable (air fitting) opposite position (model: CVR)



Applicable Controllers

Name	External view	Max. number of connectable axes	Power supply voltage	Control method				Maximum number of positioning points	Reference page
				Positioner	Pulse-train	Program	Network * selection		
MSEL-PC/PG		4	Single phase 100 to 230 V AC	-	-	●		30000	See P.15

\* Please contact our sales representative for control using expanded motion control with the XSEL-RA/SA controller. (See P. 19)

# WU-M

Battery-less Absolute

Medium type

24v Stepper Motor

Model Specification Items

**WU**  
Series

**M**  
Type

**WA**  
Encoder Type

**PM1**  
Applicable Controllers

Cable Length

Options

M: Medium Type

WA: Battery-less Absolute

PM1:MSEL

N: None  
P: 1m  
S: 3m  
M: 5m

Refer to Options table below.

\* Does not include a controller

\* Please refer to P.4 for more information about the model specification items.

X□□ : Specified Length  
R□□ : Robot Cable



\* Please refer to P.6 for more information on the installation method and orientation.



**POINT Selection Notes**

When making a selection, it is necessary to calculate the moment of inertia of the operating conditions and to use a model that allows that moment of inertia. Calculate the moment of inertia of the transported object for the B- and T-axes respectively. Please refer to "Model Selection Process (P.7 on)" for more information.

(Note 1) Shows maximum set speed with no load.  
(Note 2) When the rotational axes of the B-axis and T-axis are horizontal with respect to the floor surface or when the center of gravity of the transported object is offset from the rotational axis, the unit will be subject to load torque due to the weight of the object. The allowable moment of inertia decreases when load torque is present. Please refer to "Model Selection Process (P.7 on)" for more information.

### Actuator Specifications

Model	Axis configuration	Operation range (deg.)	Max. speed <sup>(Note 1)</sup> (deg/s)		Max. payload (kg)	Max. acceleration/deceleration (G)	
			Independent operation	Simultaneous operation of the B- and T-axes		Without load torque <sup>(Note 2)</sup>	With load torque <sup>(Note 2)</sup>
WU-M-WA-PM1-①-②	B-axis (wrist swing)	±105	900	600	2	0.7 G (6865 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )
	T-axis (wrist rotation)	±360	1200	600		0.7 G (6865 deg/s <sup>2</sup> )	0.3 G (2942 deg/s <sup>2</sup> )

Legend: ① Cable length ② Options

\*1 G = 9800 deg/s<sup>2</sup>

### ② Options

Name	Option Code	Reference page
Cable exit direction (Right)	<b>A1</b>	See P.5, P.14
Cable exit direction (Bottom)	<b>A2</b>	See P.5, P.14
Cable exit direction (Left)	<b>A3</b>	See P.5, P.14
Actuator's pigtail cable length change	<b>AC1.5</b>	See P.5, P.14
Cable (air fitting) in opposite position	<b>CVR</b>	See P.5, P.14
With air fitting	<b>VC</b>	See P.5, P.14
With wiring collar	<b>WCS</b>	See P.5, P.14

### ① Cable Length <per axis \*1>

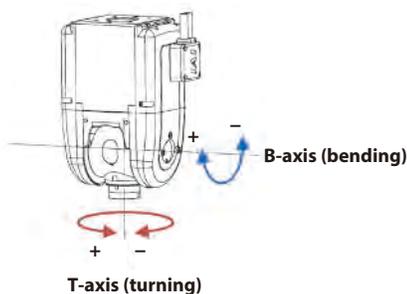
Type	Cable code
Standard type	<b>P</b> (1m)
	<b>S</b> (3m)
	<b>M</b> (5m)
Specified length	<b>X06</b> (6m) to <b>X10</b> (10m)
	<b>X11</b> (11m) to <b>X15</b> (15m)
	<b>X16</b> (16m) to <b>X20</b> (20m) *2
Robot cable	<b>R01</b> (1m) to <b>R03</b> (3m)
	<b>R04</b> (4m) to <b>R05</b> (5m)
	<b>R06</b> (6m) to <b>R10</b> (10m)
	<b>R11</b> (11m) to <b>R15</b> (15m)
	<b>R16</b> (16m) to <b>R20</b> (20m) *2

Cable between actuator and controller.

\*1 Required for both B- and T-axes. Select the cable length in the model name to have 2 cables attached.

\*2 When Actuator's pigtail cable length change "AC1.5" is selected as an option, 18 m (X18, R18) will be the maximum length.

### Name and Coordinates of Each Axis



### Actuator Specifications

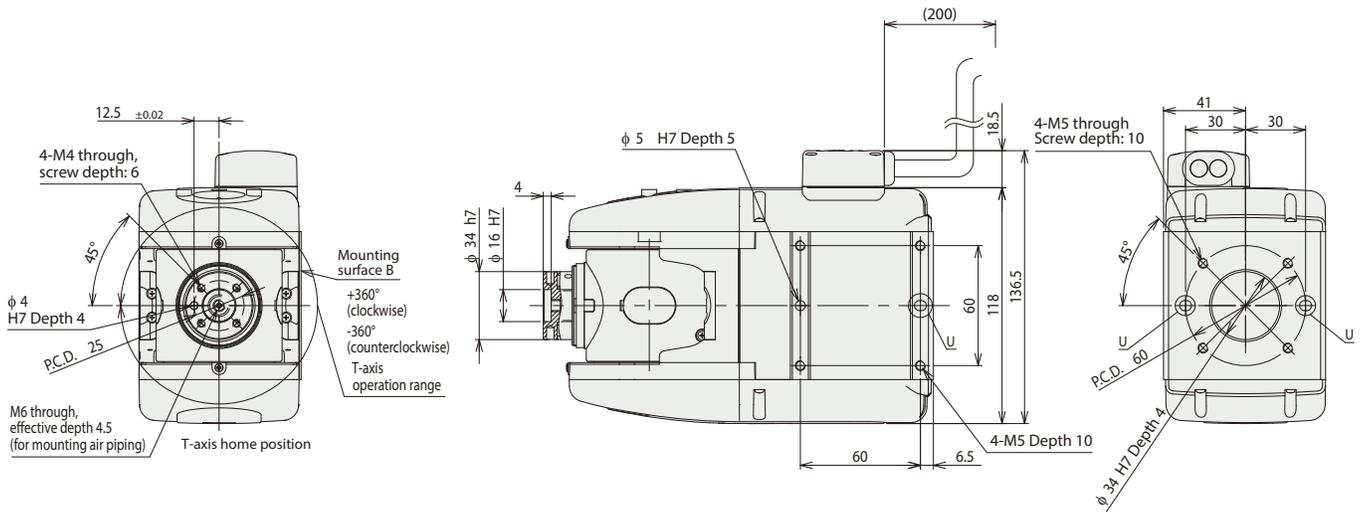
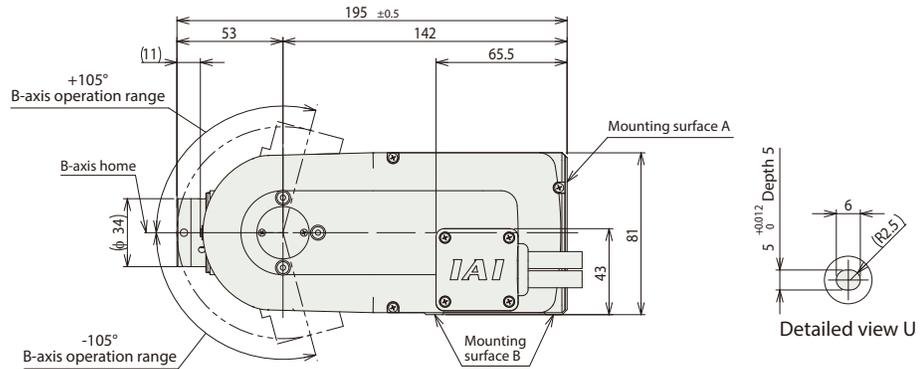
Item	Description	
	B-axis (wrist swing)	T-axis (wrist rotation)
Drive system	Stepper motor + timing belt	Stepper motor + timing belt + bevel gear
Positioning repeatability	±0.015 deg.	±0.15 deg.
Lost motion	0.06 degrees	0.4 degrees
Allowable dynamic thrust load *1	450N	
Allowable dynamic load moment *1	4.2N-m	
Unit weight	2.8kg	
Brake retaining torque *2	2.8N-m	2.8N-m
Ambient operating temperature/humidity	0~40°C, 85% RH or less (Non-condensing)	

\*1 Using the unit with a load exceeding the values above leads to reduced service life and/or damage.

\*2 Equipped with brake as standard.

Dimensions

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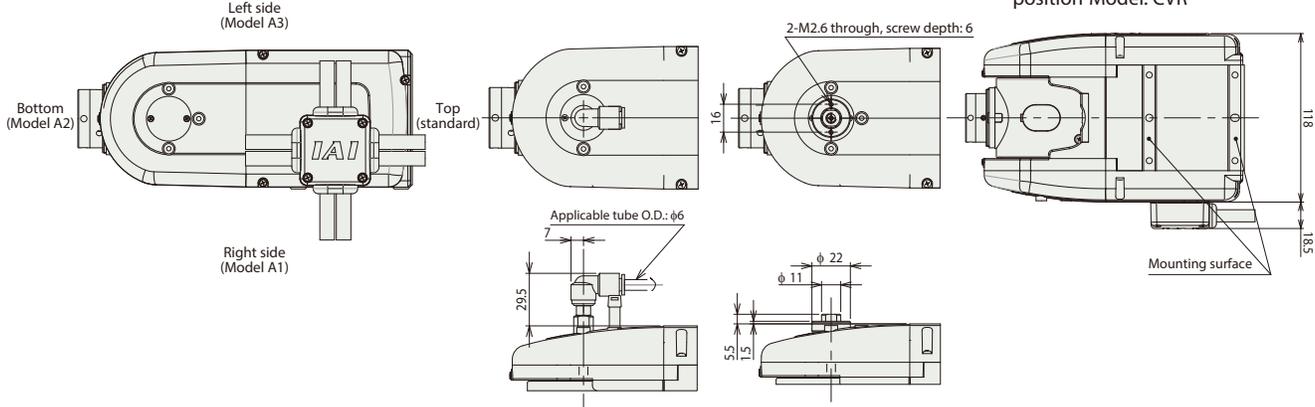
Options

■ Cable exit direction

■ Air fitting (model: VC)

■ Wiring collar (model: WCS)

■ Cable (air fitting) in opposite position Model: CVR



Applicable Controllers

Name	External view	Max. number of connectable axes	Power supply voltage	Control method				Maximum number of positioning points	Reference page
				Positioner	Pulse-train	Program	Network * selection		
MSEL-PC/PG		4	Single phase 100 to 230 V AC	-	-	●		30000	See P.15

\* Please contact our sales representative for control using expanded motion control with the XSEL-RA/SA controller. (See P. 19)