IAI
Quality and Innovation

PowerCON SCARA IXP Series

PowerCON SCARA Program Controllers MSEL-PCX/PGX

www.intelligentactuator.com

Introducing the Cost-effective Pulse Motor Type IXP to the IX Series of SCARA Robots

All models come standard with battery-less absolute encoders.

1 More Affordable Due to Pulse Motors

By adopting pulse motors…

…the IXP costs around 1/2 a conventional model.

* Compared against an IAI robot based on an arm length of 350mm.

The IXP achieves a payload equivalent to that of a conventional model by adopting high-output drivers.

2 All Models Come Standard with Battery-less Absolute Encoders

All IXP models come standard with battery-less absolute encoders that does not require batteries. Since battery replacement is no longer necessary, maintenance man-hours are reduced.

Advantages of Battery-less Absolute Encoders

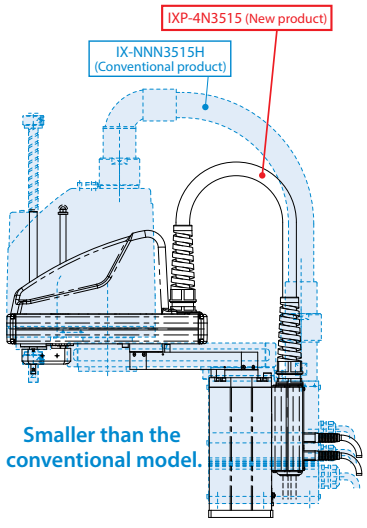
- The machine will not stop due to battery errors (low voltage, etc.)
- No cost of battery replacement
- No need for absolute reset or other physical tasks associated with battery replacement

3 Lighter than a Conventional Model

The robot weighs approx. 30% less.
(Compared to: IX-NNN3515)

The lightweight robot can be easily assembled into your equipment.

Model	IX-NNN3515H (Conventional product)		**IXP-4N3515** (New product)
Mass	18kg	−5kg	**13kg**



4 Added 3-axis Specification and 4-axis* Gripper Specification

The 3-axis specification has no rotational axis for greater allowable inertial load moment. It can be combined with a dedicated gripper to constitute a transfer robot with ease.

* The gripper type has four axes including three SCARA robot axes and one gripper axis.

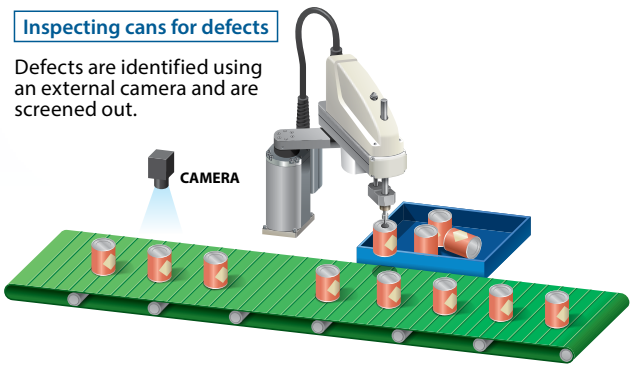
4-axis gripper specification

Use Examples of the 3-axis Specification

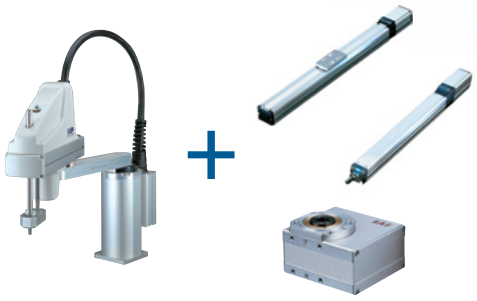
● Work processes that require only three axes
➔ Pickup and placement of circular parts, non-directional transfer, etc.

Inspecting cans for defects

Defects are identified using an external camera and are screened out.



● Connecting an actuator as the fourth axis
A ROBO Cylinder of a rotary type, rod type, slider type, etc., can be connected to a SCARA robot 3-axis specification as its fourth axis.



5 Product Lineup

Arm length		350mm		450mm	
SCARA type		3 axes	4 axes (with rotational axis)	3 axes	4 axes (with rotational axis)
Gripper	None	 IXP-3N3515 Controller: MSEL, 3-axis specification	 IXP-4N3515 Controller: MSEL, 4-axis specification	 IXP-3N4515 Controller: MSEL, 3-axis specification	 IXP-4N4515 Controller: MSEL, 4-axis specification
	Medium gripper type RCP4-GRSML	 IXP-3N3515GM Controller: MSEL, 4-axis specification	—	 IXP-3N4515GM Controller: MSEL, 4-axis specification	—
	Large gripper type RCP4-GRSLL	 IXP-3N3510GL Controller: MSEL, 4-axis specification	—	 IXP-3N4510GL Controller: MSEL, 4-axis specification	—

Introducing the PowerCON SCARA Robot Program Controller **MSEL** with High-output Driver (PowerCON)

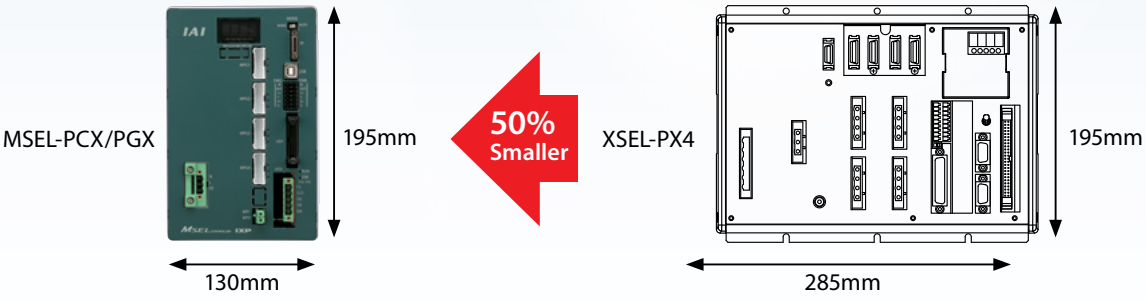
1 Accommodating Significantly More Programs and Positions

The greater storage capacity accommodates significantly more programs and positions.

	XSEL-PX (Conventional product)	**MSEL** (New product)
Number of programs	128	**255**
Number of positions	20,000	**30,000**

2 Smaller Size

Having a size of 130mm in width x 195mm in height, the MSEL is significantly smaller than a conventional controller and saves space in your control panel.
The MSEL can be installed with screws or using a DIN rail.

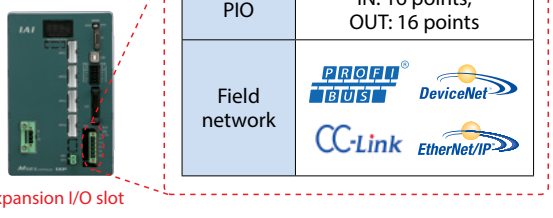


3 Safety Category Compliant

By building an appropriate external circuit, the MSEL meets the safety circuit requirements of any of Safety Categories 1 to 3.

4 Supporting Diverse I/O Interfaces

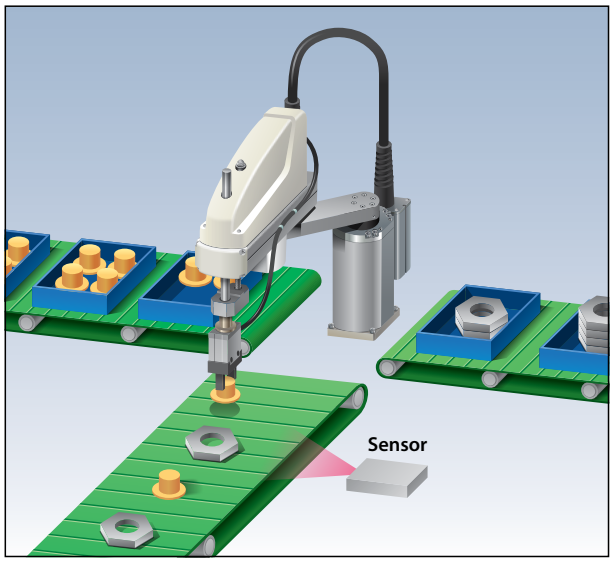
Standard PIOs (IN: 16 points, OUT: 16 points) and one expansion I/O slot are available.
For the expansion I/O slot, PIOs (IN: 16 points, OUT: 16 points) or field network (CC-Link, DeviceNet, PROFIBUS-DP or EtherNet/IP) can be selected.



Applications

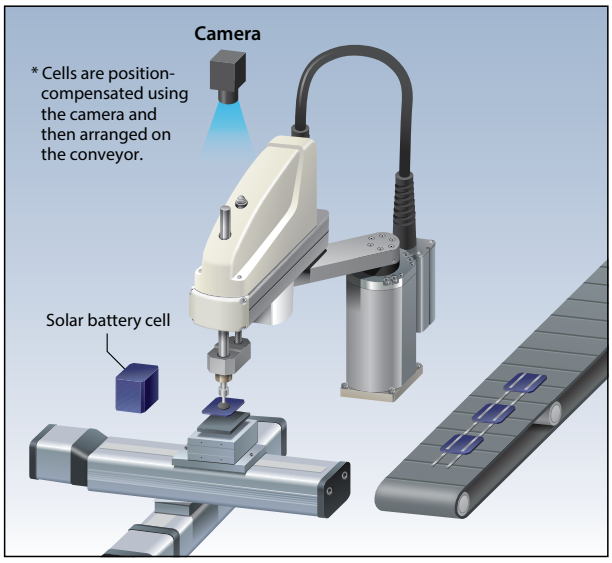
Part Screening

Parts of two different sizes are discriminated using a sensor and sorted into different boxes.



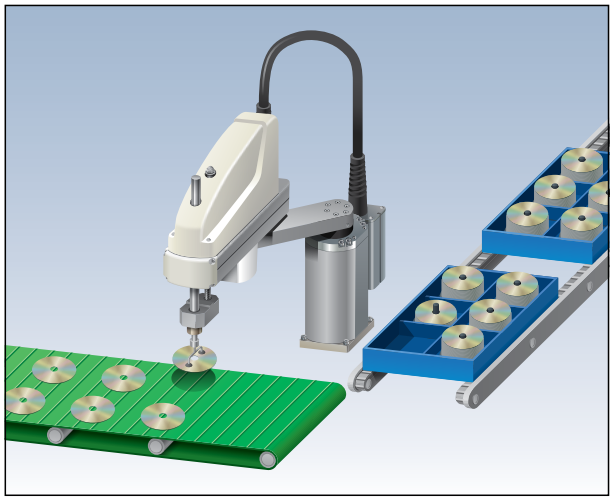
Solar Battery Module Tab Solder

Solar battery module cells are transferred while position-compensated so that electrodes can be soldered onto the cells.



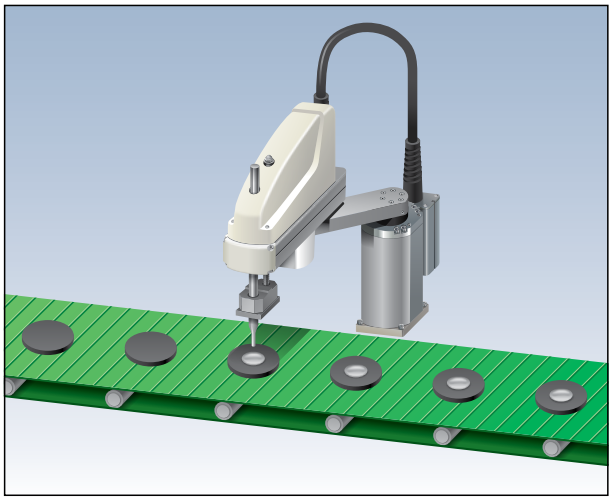
DVD-R Packing

DVD-Rs are picked up from the conveyor and placed.



Adhesive Application

Adhesive is applied onto circular parts.



Cautionary Notes

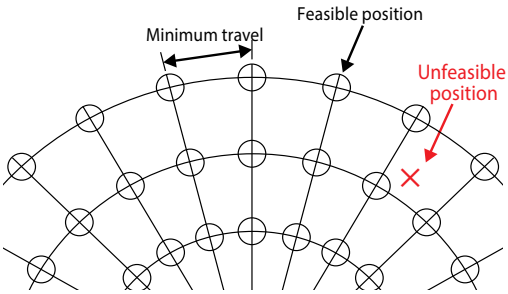
*1 Positioning Repeatability

Positioning repeatability refers to the degree to which the robot can repeat the same positioning when operated at the same speed and acceleration/deceleration using the same arm system between two points including the start position and target position. (The values were measured at a constant ambient temperature of 20°C). Note that the positioning repeatability may be out of specification if the arm is changed, if the positioning is from multiple different positions to a single set position, or if the operating conditions, such as the operating speed and acceleration/deceleration settings, are changed.

Notes on the Low-resolution Encoders

Since the IXP is equipped with low-resolution encoders, feasible positioning points of the robot are wider apart and positioning to a specific command position may not be possible. Also note that the target position cannot be finely adjusted by less than the minimum travel.

			IXP-3N3515 3N3510	IXP-3N4515 3N4510	IXP-4N3515	IXP-4N4515
Minimum travel	In the horizontal plane (Arm 1 + Arm 2)	mm	0.202 (MAX)	0.179 (MAX)	0.202 (MAX)	0.179 (MAX)
	Vertical axis	mm	0.009	0.009	0.009	0.009
	Rotational axis	Degree	—	—	0.113	0.113



<In the horizontal plane (J1-axis + J2-axis)>

*2 Maximum Operating Speed for PTP Operation

The maximum operating speed in the specification table assumes PTP command operation.
The speed is limited for CP operation command (interpolation) operation. For details, refer to “CP Operation” under “Rough Guide for SCARA Robot Acceleration/Deceleration Setting” on P. 18. Also note that the speed/acceleration must be reduced as deemed appropriate when operating the vertical axis at the bottom end.

*3 Payload

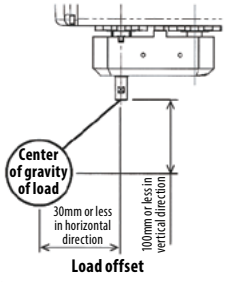
The payload may be the rated payload or the maximum payload.
The rated payload is the maximum mass that can be transferred at the maximum speed and maximum acceleration. The maximum payload is the maximum mass the actuator can transfer at a reduced speed/acceleration.
When transferring a mass greater than the rated payload, set the load mass and inertial moment in the program, and an optimal speed/acceleration will be applied automatically.

*4 Standard Cycle Time

The standard cycle time refers to the time required to cycle back and forth at maximum speed under the following conditions. This is a general estimate of the high-speed performance.
(Arm length: 350 to 450), 1 kg load, vertical distance: 25mm; horizontal distance: 300mm

*5 Allowable Inertial Moment at the Tip of the Vertical Axis

The allowable inertial moment at the tip of the vertical axis represents an equivalent allowable inertial moment at the tip of the vertical axis of a SCARA robot (measured at the center of the guide shaft in the case of a 3-axis specification, or center of the rotating axis in the case of a 4-axis specification).
Keep the offset from the center of rotation of the tip of the vertical axis to the center of gravity of the load to 30mm or less in the horizontal direction or 100mm or less in the vertical direction.
If the center of gravity of the tool is away from the center of the tip of the vertical axis, the speed/acceleration must be reduced as deemed appropriate.



Work Envelope

When changing the arm, be careful that no peripheral objects will obstruct the arm when it fully extends.

Acceleration/Deceleration Setting

For the setting of acceleration/deceleration, refer to “Reference for SCARA Robot Acceleration/Deceleration Settings” on P. 18.

*1 to *5 above correspond to the numbers on the main text pages (P. 7, P. 9).

Explanation of the Model Items

IXP — [ ] — **WA** — [ ] — **P3**

Series | Type | Encoder type | Cable length | Applicable controller

WA	Battery-less absolute specification

N	None
P	1m
S	3m
M	5m
X□□	Specified length
R□□	Robot cable

(Up to 20m)

P3	MSEL

3N3515	3-axis type / Arm length 350mm / Vertical axis 150mm
3N4515	3-axis type / Arm length 450mm / Vertical axis 150mm
3N3515GM	3-axis type / Arm length 350mm / Vertical axis 150mm; RCP4-GRSML installed at the tip of the vertical axis
3N3510GL	3-axis type / Arm length 350mm / Vertical axis 100mm; RCP4-GRSLL installed at the tip of the vertical axis
3N4515GM	3-axis type / Arm length 450mm / Vertical axis 150mm; RCP4-GRSML installed at the tip of the vertical axis
3N4510GL	3-axis type / Arm length 450mm / Vertical axis 100mm; RCP4-GRSLL installed at the tip of the vertical axis
4N3515	4-axis type / Arm length 350mm / Vertical axis 150mm
4N4515	4-axis type / Arm length 450mm / Vertical axis 150mm

(Example) **IXP** — **3** **N** **35** **15** **GM** — **WA** — **S** — **P3**

- 3: Number of axes: 3 axes
- 35: Arm length: 350mm
- 15: Vertical axis stroke: 150mm
- GM: Tip of vertical axis: RCP4-GRSML installed
- WA: Encoder type: Battery-less absolute specification
- S: Cable length: 3m
- P3: Controller: MSEL

IXP-3N3515 / 4N3515
IXP-3N3510 / 4N3515

Arm length 350mm
Vertical axis 100mm/150mm

■Model Specification Items

IXP	—	☐	N	35	☐	—	WA	—	☐	—	P3
Series	—	Number of axes		Arm length	Vertical axis stroke	Gripper	—	Encoder type	—	Cable length	—	Applicable controller

- Number of axes: 3: 3 axes; 4: 4 axes
- Arm length: 35: 350mm
- Vertical axis stroke / Gripper: 15 : 150mm, no gripper; 15GM: 150mm, medium gripper installed; 10GL : 100mm, large gripper installed
  * Refer to "Component Axes" for the gripper types.
- Encoder type: WA: Battery-less absolute specification
- Cable length: N: None; P: 1m; S: 3m; M: 5m; X☐☐: Specified length; R☐☐: Robot cable
- Applicable controller: P3: MSEL

* The photograph shows a 4-axis specification.

POINT — Notes on selection

Refer to P. 5 for *1 through *5.
- The vertical axis has no brake.
  The unique structure holds the load in place even when the servo is turned off.
- The vertical axis does not support push-motion control.
- If a tool is installed or a spring or other buffer is provided for push-motion, the allowable push force is 60 N or less.
- Refer to P. 5 for the work envelope, and P. 18 for the notes on acceleration/deceleration setting.

Robot Specifications

Axis configuration		Arm length (mm)	Work envelope	Positioning repeatability *1	Maximum operating speed in PTP mode *2			Payload (kg) *3	
					No gripper	With medium gripper (GM)	With large gripper (GL)	Rated	Maximum
Axis 1	Arm 1	160	±127°	±0.03mm	2,726mm/s (Composite speed)	2,726mm/s (Composite speed)	1,908mm/s (Composite speed)	1	3
Axis 2	Arm 2	190	±127°						
Axis 3	Vertical axis	—	150mm *	±0.02mm	270mm/s	270mm/s	189mm/s		
Axis 4	Rotating axis	—	±360°	±0.02°	1000°/s	—	—		
	Medium gripper GM	—	14mm (Both fingers)	±0.01mm	—	94mm/s (One finger)		Refer to the catalog of the gripper "RCP4-GR☐"	
	Large gripper GL	—	22mm (Both fingers)	±0.01mm	—	125mm/s (One finger)			

* When the large gripper is installed, the work envelope of the vertical axis becomes 100mm.

Robot Specifications

		3-axis specification	4-axis specification	3-axis specification	
		No gripper		With medium gripper (GM)	With large gripper (GL)
Encoder type		Battery-less absolute encoder			
User wiring		AWG24x6, AWG26x5P (shielded) * User cables are sold separately. Refer to the operation manual for detail.		User wiring is not supported because the gripper wiring is used.	
User piping		Air tube (O.D. ø4, I.D. ø2.5) x 3 (Normal working pressure 0.8 MPa)			
Standard cycle time *4 (sec)	SCARA	0.69		0.69	1.08
	Gripper (full stroke)	—		0.51	0.56
Allowable torque (Axis 4) (N • m)		—	1.4	—	
Allowable moment (N • m)		2.9		Ma 1.9 Mb 2.7 Mc 2.9	Ma 2.9 Mb 2.9 Mc 2.9
Allowable inertial moment of tip axis *5 (kg • m²)		Rated: 0.003 Maximum: 0.01	Rated: 0.003 Maximum: 0.003	0.002	0.009
Ambient temperature/humidity		Temperature: 0~40°C, humidity: 20-85% RH or less (Non-condensing)			
Unit weight (kg)		12	13	12.5	13

Component Axes

IXP-3N3515GM	The medium gripper RCP4-GRSML is installed at the tip of the vertical axis.
IXP-3N3510GL	The large gripper RCP4-GRSLL is installed at the tip of the vertical axis.

Price List

Gripper	SCARA 3-axis specification	Standard price
None	IXP-3N3515	—
Medium gripper	IXP-3N3515GM	—
Large gripper	IXP-3N3510GL	—

Gripper	SCARA 4-axis specification (with rotating axis)	Standard price
None	IXP-4N3515	—

Cable Length <Per Axis*>

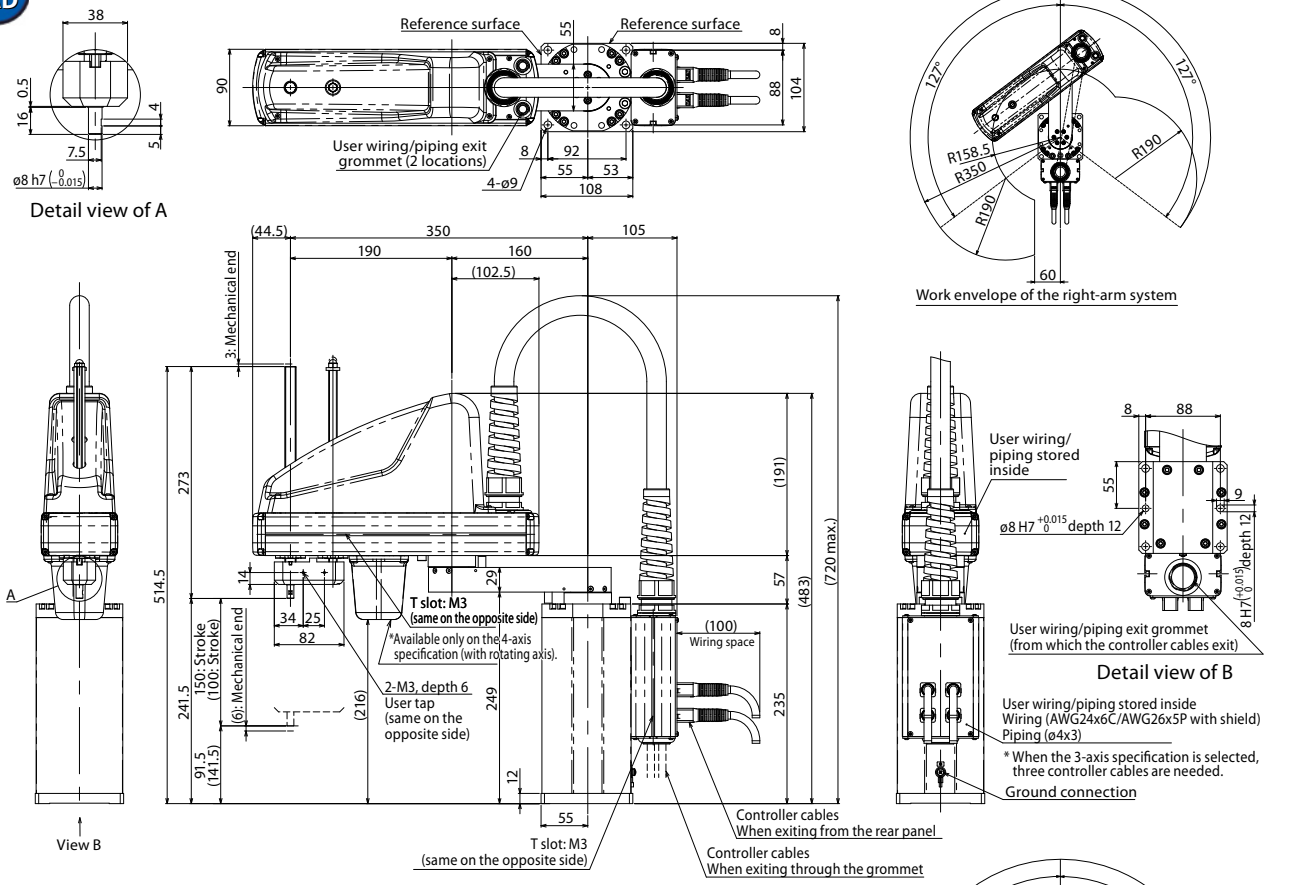
Type	Cable code	Standard price
Standard type	P (1m)	—
	S (3m)	—
	M (5m)	—
Special length	X06 (6m)~X10 (10m)	—
	X11 (11m)~X15 (15m)	—
	X16 (16m)~X20 (20m)	—
Robot cable	R01 (1m)~R03 (3m)	—
	R04 (4m)~R05 (5m)	—
	R06 (6m)~R10 (10m)	—
	R11 (11m)~R15 (15m)	—
	R16 (16m)~R20 (20m)	—

* The 3-axis specification requires three cables, while the gripper specification and 4-axis specification require four cables.

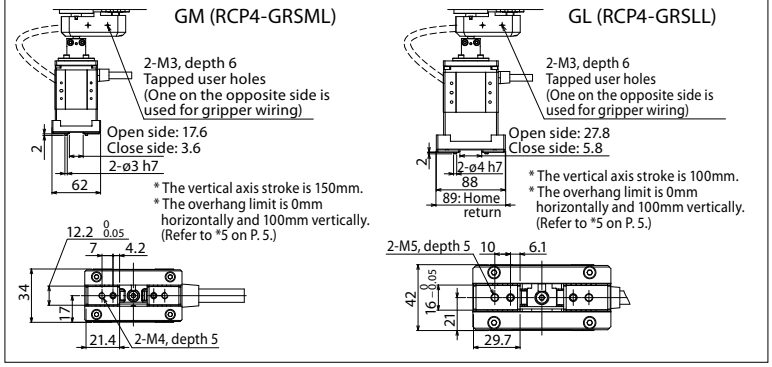
Dimensions

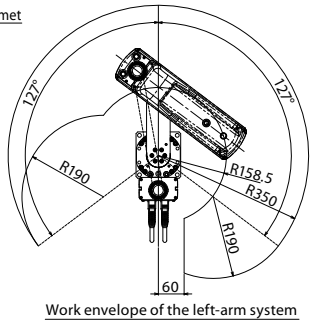
2D CAD

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



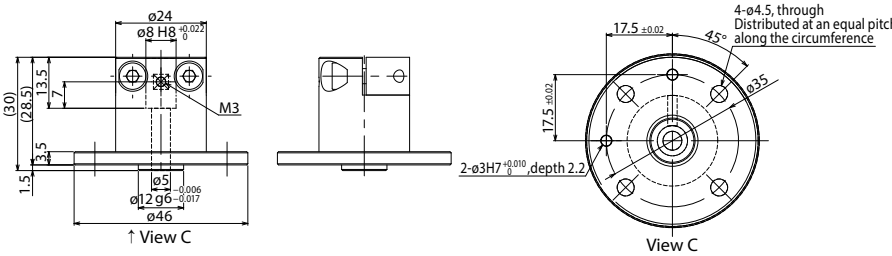
<Gripper Specification>





<Flange Dimensions>
An optional flange is available.
Use a flange when installing a tool, etc., at the tip of the vertical axis.

Model type	Standard price	Weight
IXP-FL-2	—	121.95g



Applicable Controller Specifications

Name	External view	Applicable controller	Features	Standard I/O points (input/output)	Power-supply voltage	Reference page
PowerCON SCARA controller		MSEL	Up to 4 axes	16 points/ 16 points	AC100V~230V	P. 11

IXP- 3N4515 / 4N4515
3N4510

Arm length 450mm
Vertical axis 100mm/150mm

■Model Specification Items

IXP	—		N	45		—	WA	—		—	P3
Series	—	Number of axes		Arm length	Vertical axis stroke	Gripper	—	Encoder type	—	Cable length	—	Applicable controller
		3: 3 axes 4: 4 axes		45: 450mm	15 : 150mm, no gripper 15GM: 150mm, medium gripper installed 10GL : 100mm, large gripper installed * Refer to "Component Axes" for the gripper types.			WA: Battery-less absolute specification		N: None X□□: Specified length P: 1m R□□: Robot cable S: 3m M: 5m		P3: MSEL

CE RoHS

* The photograph shows a 4-axis specification.

POINT
Notes on selection

Refer to P. 5 for *1 through *5.
- The vertical axis has no brake.
  The unique structure holds the load in place even when the servo is turned off.
- The vertical axis does not support push-motion control.
- If a tool is installed or a spring or other buffer is provided for push-motion, the allowable push force is 60 N or less.
- Refer to P. 5 for the work envelope, and P. 18 for the notes on acceleration/deceleration setting.

Robot Specifications

Axis configuration		Arm length (mm)	Work envelope	Positioning repeatability *1	Maximum operating speed in PTP mode *2			Payload (kg) *3	
					No gripper	With medium gripper (GM)	With large gripper (GL)	Rated	Maximum
Axis 1	Arm 1	260	±127°	±0.03mm	2,438mm/s (Composite speed)	2,438mm/s (Composite speed)	2,060mm/s (Composite speed)	1	3
Axis 2	Arm 2	190	±127°						
Axis 3	Vertical axis	—	150mm *	±0.02mm	270mm/s	270mm/s	189mm/s		
Axis 4	Rotating axis	—	±360°	±0.02°	1,000°/s	—	—		
	Medium gripper GM	—	14mm (Both fingers)	±0.01mm	—	94mm/s (One finger)		Refer to the catalog of the gripper "RCP4-GR□"	
	Large gripper GL	—	22mm (Both fingers)	±0.01mm	—	125mm/s (One finger)			

* When the large gripper is installed, the work envelope of the vertical axis becomes 100mm.

Robot Specifications

		3-axis specification	4-axis specification	3-axis specification	
		No gripper		With medium gripper (GM)	With large gripper (GL)
Encoder type		Battery-less absolute encoder			
User wiring		AWG24x6, AWG26x5P (shielded) * User cables are sold separately. Refer to the operation manual for detail.		User wiring is not supported because the gripper wiring is used.	
User piping		Air tube (O.D. ø4, I.D. ø2.5) x 3 (Normal working pressure 0.8 MPa)			
Standard cycle time *4 (sec)	SCARA	0.67		0.67	0.95
	Gripper (full stroke)	—		0.51	0.56
Allowable torque (Axis 4) (N • m)		—	1.4	—	
Allowable moment (N • m)		2.9		Ma 1.9 Mb 2.7 Mc 2.9	Ma 2.9 Mb 2.9 Mc 2.9
Allowable inertial moment of tip axis *5 (kg • m2)		Rated: 0.003 Maximum: 0.01	Rated: 0.003 Maximum: 0.003	0.002	0.009
Ambient temperature/humidity		Temperature: 0~40°C, humidity: 20-85% RH or less (Non-condensing)			
Unit weight (kg)		13	14	132.5	14

Component Axes

IXP-3N4515GM	The medium gripper RCP4-GRSML is installed at the tip of the vertical axis.
IXP-3N4510GL	The large gripper RCP4-GRSLL is installed at the tip of the vertical axis.

Price List

Gripper	SCARA 3-axis specification	Standard price
None	IXP-3N4515	—
Medium gripper	IXP-3N4515GM	—
Large gripper	IXP-3N4510GL	—

Gripper	SCARA 4-axis specification (with rotating axis)	Standard price
None	IXP-4N4515	—

Cable Length <Per Axis*>

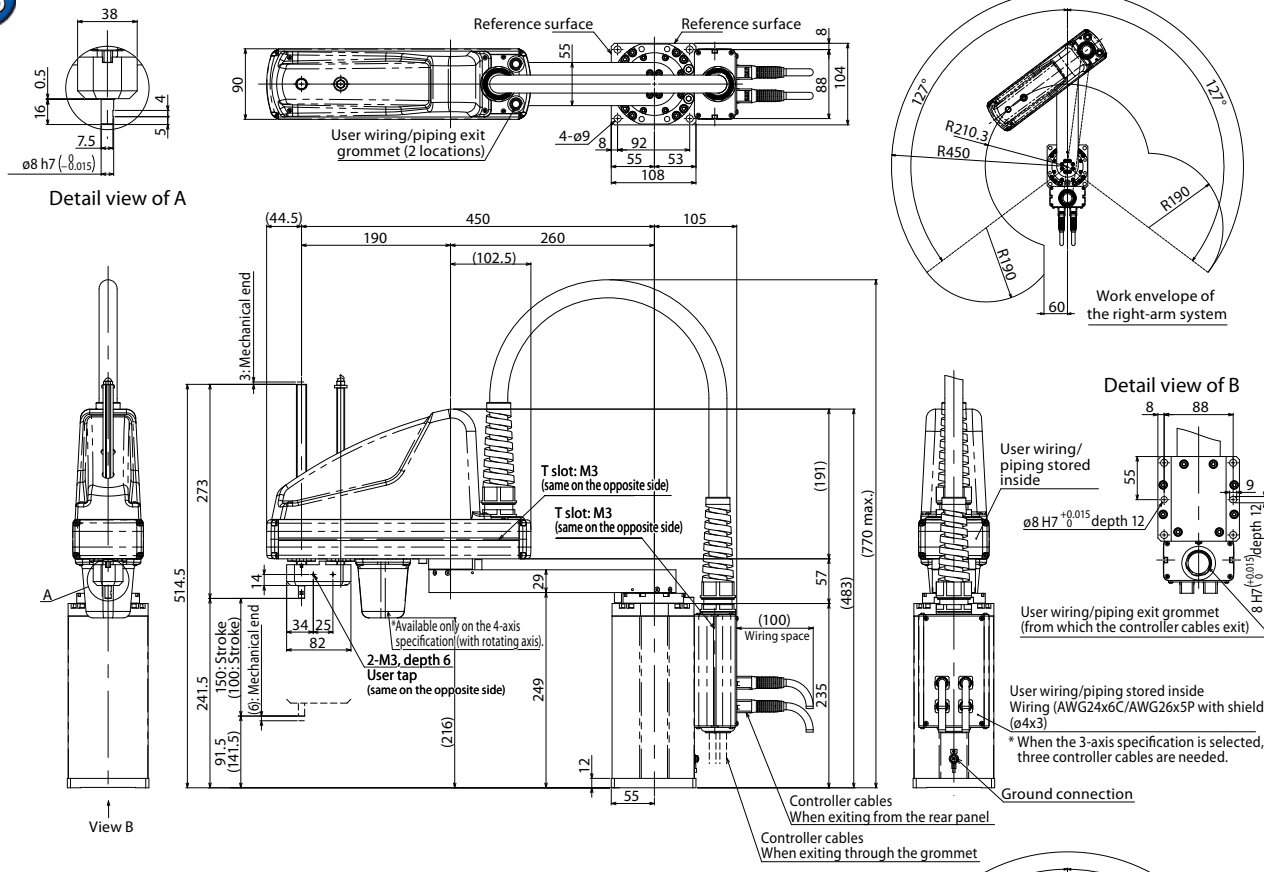
Type	Cable code	Standard price
Standard type	P (1m)	—
	S (3m)	—
	M (5m)	—
Special length	X06 (6m)~X10 (10m)	—
	X11 (11m)~X15 (15m)	—
	X16 (16m)~X20 (20m)	—
Robot cable	R01 (1m)~R03 (3m)	—
	R04 (4m)~R05 (5m)	—
	R06 (6m)~R10 (10m)	—
	R11 (11m)~R15 (15m)	—
	R16 (16m)~R20 (20m)	—

* The 3-axis specification requires three cables, while the gripper specification and 4-axis specification require four cables.

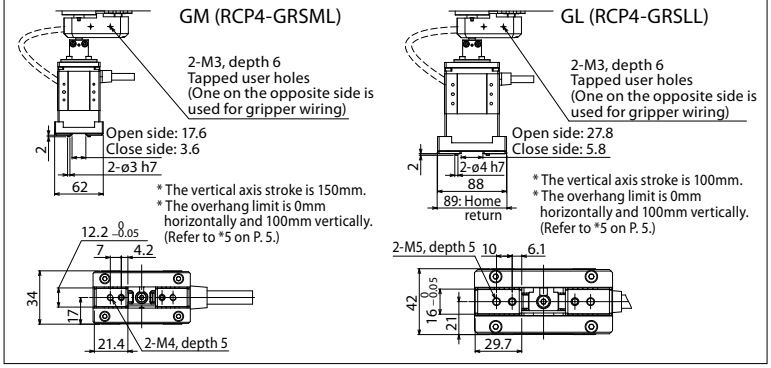
Dimensions

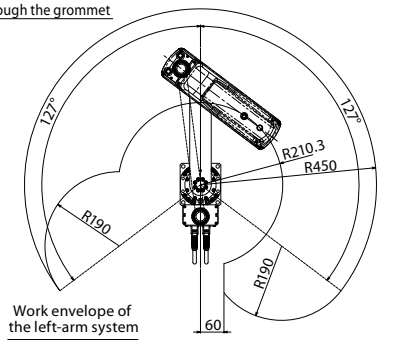
2D CAD

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



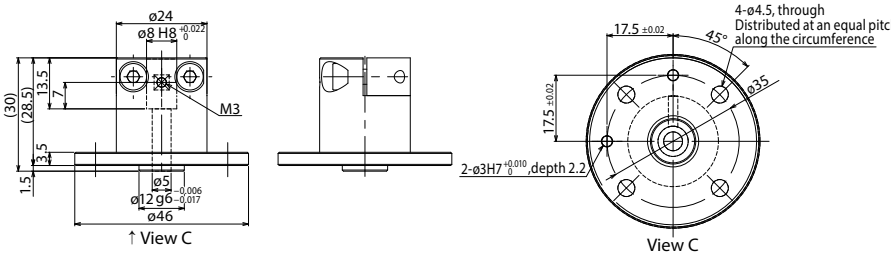
<Gripper Specification>





<Flange Dimensions>
An optional flange is available.
Use a flange when installing a tool, etc., at the tip of the vertical axis.

Model type	Standard price	Weight
IXP-FL-2	—	121.95g



Applicable Controller Specifications

Name	External view	Applicable controller	Features	Standard I/O points (input/output)	Power-supply voltage	Reference page
PowerCON SCARA controller		MSEL	Up to 4 axes	16 points/ 16 points	AC100V~230V	P. 11

MSEL

MSEL-PCX/PGX
Program Controllers for PowerCON SCARA

Model List

Name	PowerCON SCARA controller			
External view				
Type name	PCX3	PGX3 CE	PCX4	PGX4 CE
Type	3-axis standard specification	3-axis safety category specification	4-axis standard specification	4-axis safety category specification
Standard price	—	—	—	—
Safety category (*1)	B	Can be made compliant with category 3	B	Can be made compliant with category 3
Connected actuator	IXP 3-axis specification		IXP 3-axis specification + additional axis IXP 3-axis gripper specification IXP 4-axis specification (with rotating axis)	
Standard I/Os	NPN, PNP(16IN/16OUT)			
Expansion I/Os	NPN, CC-Link, DeviceNet, PROFIBUS-DP, EtherNet/IP			
Number of programs	255			
Number of program steps	9,999			
Number of positions	30,000			
Power-supply voltage	Single-phase 100 to 230 VAC			

*1: Meeting this safety category requires the customer to install a safety circuit externally to the controller.

Model

SCARA — Additional axis

* An additional axis can be selected only when the controller is of the 4-axis type and SCARA robot is of the 3-axis type (without gripper).

MSEL – [Controller type] – [SCARA] – WAI – [Motor type] – WAI – [Options] – [Standard I/O type] – [Expansion I/O type] – [PIO cable type] – 4 – [Actuator mounting specification]

Controller type

PCX3	3-axis standard specification
PGX3	3-axis safety category specification
PCX4	4-axis standard specification
PGX4	4-axis safety category specification

SCARA

3N3515	3-axis type / Arm length 350mm / Vertical axis 150mm
3N4515	3-axis type / Arm length 450mm / Vertical axis 150mm
3N3515GM	3-axis type / Arm length 350mm / Vertical axis 150mm; RCP4-GRSML installed at the tip of the vertical axis
3N3510GL	3-axis type / Arm length 350mm / Vertical axis 100mm; RCP4-GRSLL installed at the tip of the vertical axis
3N4515GM	3-axis type / Arm length 450mm / Vertical axis 150mm; RCP4-GRSML installed at the tip of the vertical axis
3N4510GL	3-axis type / Arm length 450mm / Vertical axis 100mm; RCP4-GRSLL installed at the tip of the vertical axis
4N3515	4-axis type / Arm length 350mm / Vertical axis 150mm
4N4515	4-axis type / Arm length 450mm / Vertical axis 150mm

Motor type

20P	20 square pulse motor
20SP	20 square pulse motor (for RA2C, RA2BC)
28P	28 square pulse motor
28SP	28 square pulse motor (for RA3C)
35P	35 square pulse motor
42P	42 square pulse motor
42SP	42 square pulse motor (for RCP4W-RA6 high-thrust specification)
56P	56 square pulse motor

Options

(None)	No option
B	Brake
HS	Home check sensor (*)

* The home check sensor can be selected only when an incremental additional axis is used with the 3N3515 or 3N4515.

Standard I/O type

NP	NPN specification
PN	PNP specification

Expansion I/O type

E	Not used
NP	Expansion PIO board (NPN specification)
DV	DeviceNet board
DV2	DeviceNet board (with 2-way connector)
CC	CC-Link board
CC2	CC-Link board (with 2-way connector)
PR	PROFIBUS-DP board
EP	EtherNet/IP board

* If CC2 or DV2 is selected, a 2-way connector is supplied for branch wiring.

PIO cable type

0	No cable
2	2m (standard)
3	3m
5	5m

Power-supply voltage

4	AC100~230V

Actuator mounting specification

(None)	Screw fixing specification
DN	DIN rail mounting specification

System Configuration

Supplied with the SCARA robot

Integrated motor-encoder cable
(Refer to P. 17)
<Model number: CB-CAN-MPA□□□>
Standard: 1m / 3m / 5m

Standard accessory/option

Dummy plug
(Refer to P. 16)
<Model number: DP-4S>
(Supplied with the MSEL-PGX / Supplied with the IA-101-X-USBS)

Option

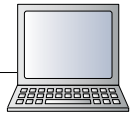
Teaching pendant
(Refer to P. 16)
<Model number: TB-01-SJ>
* The MSEL-PCX/PGX are supported only by Ver. 1.02 or later.

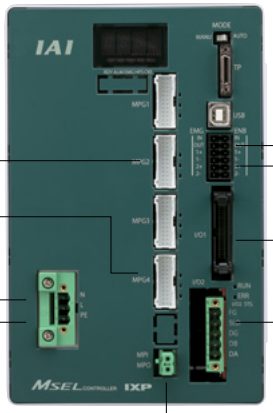
Standard accessory/option

Connector conversion cable
(Refer to P. 16)
<Model number: CB-SEL-SJS002>
(Supplied with the TB-01-SJ/ IA-101-X-MW-JS)

Option

PC compatible software
(Refer to P. 16)
<Model number: IA-101-X-MW-JS>
(RS232C cable + Connector conversion cable)
<Model number: IA-101-X-USBS>
(USB cable + Dummy plug)
* The MSEL-PCX/PGX are supported only by Ver. 11.00.00.00 or later.





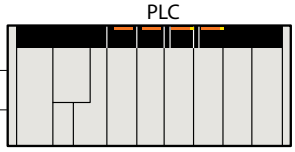
Emergency stop switch

Enable switch

AC100~230V

Standard accessory

PIO flat cable
(Refer to P. 18)
<Model number: CB-PAC-PIO020>
Standard: 2m



PLC

Protective grounding

Electromagnetic contactor

Expansion PIOs/various field networks

Supplied with expansion PIO specification

PIO flat cable
(Refer to P. 18)
<Model number: CB-PAC-PIO020>
Standard: 2m

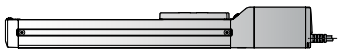
PROFIBUS DeviceNet CC-Link EtherNet/IP

* Wire the emergency stop switch, enable switch, electromagnetic contactor, etc., as necessary. The same applies to the factory settings (shorting).

<Actuator for Additional Axis>

(Can be connected to a SCARA robot of 3-axis specification)

Integrated motor-encoder cable
(Refer to P. 17)
<Model number: CB-PSEP-MPA□□□>
Standard: 1m / 3m / 5m
Supplied with the actuator



Actuator RCP2 series

Integrated motor-encoder cable
(Refer to P. 18)
<Model number: CB-RPSEP-MPA□□□>
Standard: 1m / 3m / 5m
Supplied with the actuator

Actuator, RCP2 small rotary

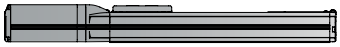
Integrated motor-encoder cable
(Refer to P. 17)
<Model number: CB-APSEP-MPA□□□>
Standard: 1m / 3m / 5m
Supplied with the actuator

Actuator RCP3 series

Integrated motor-encoder cable
(Refer to P. 17)
<Model number: CB-CA-MPA□□□>
<Model number: CB-CA-MPA□□□-RB>
Standard: 1m / 3m / 5m
Supplied with the actuator

Actuator RCP4 series

Integrated motor-encoder cable
(Refer to P. 17)
<Model number: CB-CAN-MPA□□□>
<Model number: CB-CAN-MPA□□□-RB>
Standard: 1m / 3m / 5m
Supplied with the actuator



Actuator RCP5 series

Basic Controller Specifications

Specification item			Contents
Power-supply input voltage			Single-phase 100 to 230 VAC±10%
Power-supply current			2.9A typ. (AC100V), 1.4A typ. (AC200V), 1.2A typ. (AC230V)
Power-supply frequency range			50/60Hz±5%
Motor type			Pulse motor (servo control)
Supported encoder			Incremental encoder / Battery-less absolute encoder
Data storage device			FlashROM/FRAM
Number of program steps			9,999
Number of positions			30,000
Number of programs			255
Number of multitasks			16
Operation mode	Serial communications		○
	Program		○
SIO interface	Communication method		RS232 (asynchronous communications)
	Baud rate		9.6, 19.2, 38.4, 57.6, 76.8, 115.2kbps
	Live wire connection	TP port	×
		USB	○
Standard PIO interface	Input Specification	Number of input points	16 points
		Input voltage	DC24V±10%
		Input current	7mA/circuit
		ON voltage	Min.DC16V
		OFF voltage	Max.DC5V
		Leak current	Allowable leak current: 1 mA max.
		Insulation method	Photocoupler insulation
	Output specification	Number of output points	16 points
		Load voltage	DC24V±10%
		Maximum current	100mA per point, 400mA per 8 points Note 1
		Saturated voltage	Max.3V
		Leak current	Max.0.1mA
		Insulation method	Photocoupler insulation
Compliant expansion I/O interface			Expansion PIO NPN specification (16IN/16OUT)
			CC-Link (remote device station)
			DeviceNet
			PROFIBUS-DP
			EtherNet/IP
Calendar/clock function	Retention time		Approx. 10 days
	Charge time		Approx. 100 hours (fully charged) * Data can be retained even when the batteries are not fully charged.
Protective functions			Overcurrent, abnormal temperature, fan speed low monitoring, encoder disconnection, etc.
Operating temperature range			0~40°C
Operating humidity range			85% RH max. (non-condensing, non-freezing)
Installation	Installation direction		Installed vertically (exhaust side up)
	Installation method		Mounted with screws or using a DIN rail
Rush current			15A typ. (100 V AC), 30A typ. (200 V AC): 5ms max. (Ambient temperature 25°C/ No cycling of the power)
Air cooling method			Forced air cooling
External dimensions			Width 130mm x Height 195mm x Depth 125mm
Mass			Approx. 1,400g

Note 1: The total load current shall be 400mA for every eight points from standard I/O No. 316. (The maximum current per point shall be 100mA.)

PIO Signal Chart

Pin Layouts for Standard PIO Connector/Expansion PIO Connector

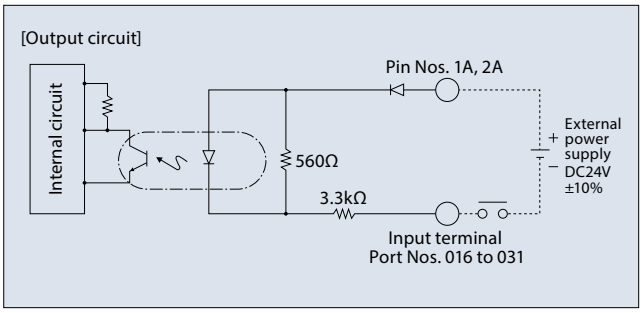
Pin No.	Category	Assignment	Pin No.	Category	Assignment
1A	24V	P24	1B	Output	OUT0
2A	24V	P24	2B		OUT1
3A	—	—	3B		OUT2
4A	—	—	4B		OUT3
5A	Input	IN0	5B		OUT4
6A		IN1	6B		OUT5
7A		IN2	7B		OUT6
8A		IN3	8B		OUT7
9A		IN4	9B		OUT8
10A		IN5	10B		OUT9
11A		IN6	11B		OUT10
12A		IN7	12B		OUT11
13A		IN8	13B		OUT12
14A		IN9	14B		OUT13
15A		IN10	15B		OUT14
16A		IN11	16B		OUT15
17A		IN12	17B	—	—
18A		IN13	18B	—	—
19A		IN14	19B	0V	N
20A		IN15	20B	0V	N

Internal Circuits for Standard I/Os (NPN Specifications)

[Input section] External input specifications (NPN specifications)

Item	Specifications
Input voltage	DC24V ±10%
Input current	7mA/circuit
On/Off voltage	On voltage…Min. 16.0 VDC, Off voltage…Max. 5.0 VDC
Insulation method	Photocoupler insulation

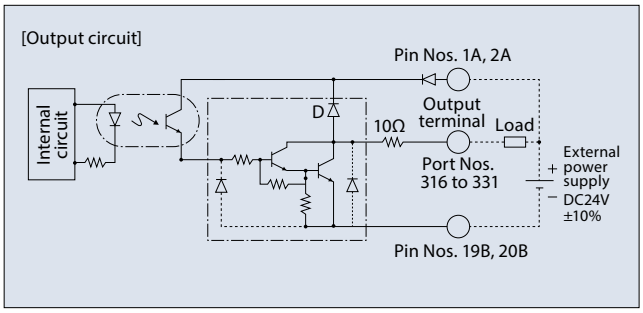
* The port numbers in the circuit diagram below represent the factory-set port numbers.
* When the input is off, the allowable leak current is 1mA max.



[Output section] External output specifications (NPN specifications)

Item	Specifications	
Load voltage	DC24V ±10%	Uses TD62084 (or equivalent).
Maximum load current	100mA/point, 400mA/8 points Note)	
Leak current	Max. 0.1mA/point	
Insulation method	Photocoupler insulation	

* The port numbers in the circuit diagram below represent the factory-set port numbers.
Note: The total load current shall be 400 mA for every eight points from standard I/O No. 316. (The maximum current per point shall be 100mA.)

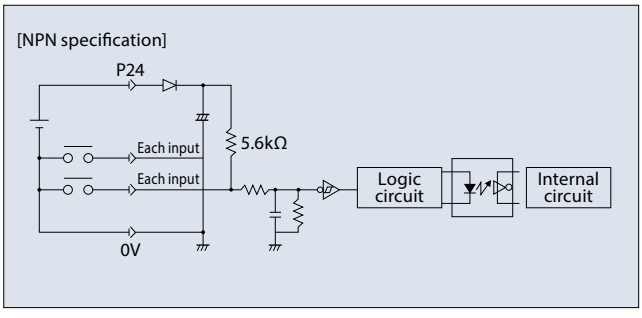


* For the standard IOs (PNP specifications), refer to the operation manual.

Internal Circuits for Expansion I/Os (NPN Specifications)

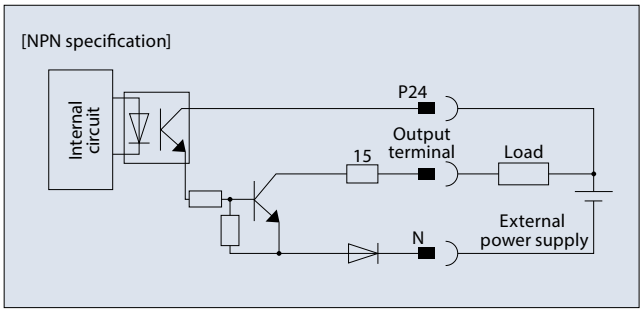
[Input section] External input specifications

Item	Specifications
Number of input points	16 points
Input voltage	DC24V ±10%
Input current	4mA/circuit
On/Off voltage	On voltage…Min. 18 VDC (3.5mA) Off voltage…Max. 6.0 VDC (1mA)
Insulation method	Photocoupler insulation

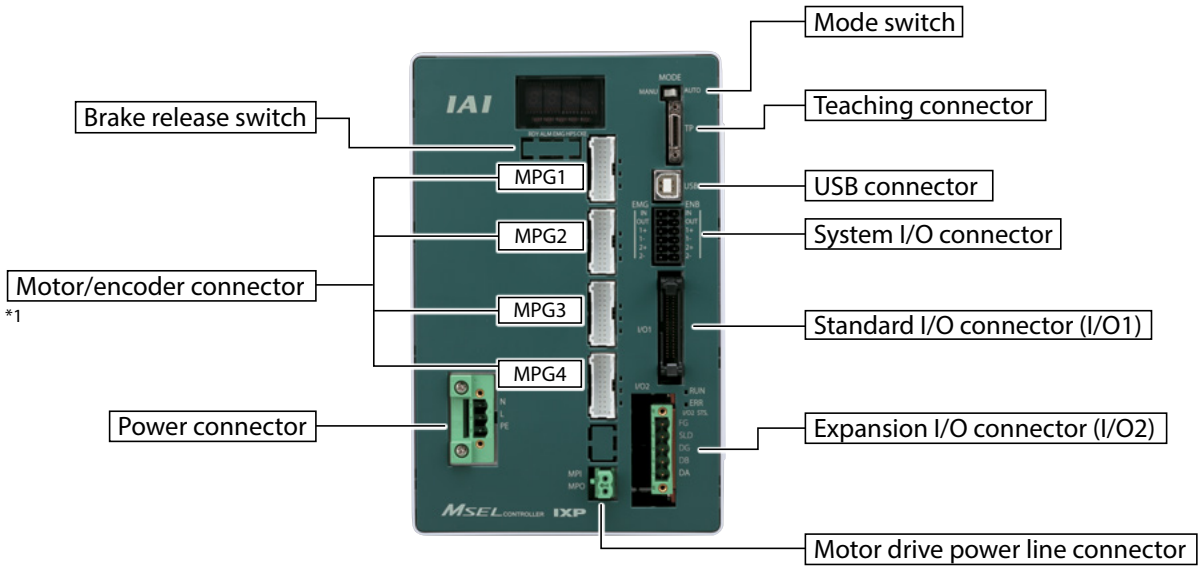


[Output section] External output specifications

Item	Specifications
Number of output points	16 points
Rated load current	DC24V ±10%
Maximum current	50mA/circuit
Insulation method	Photocoupler insulation



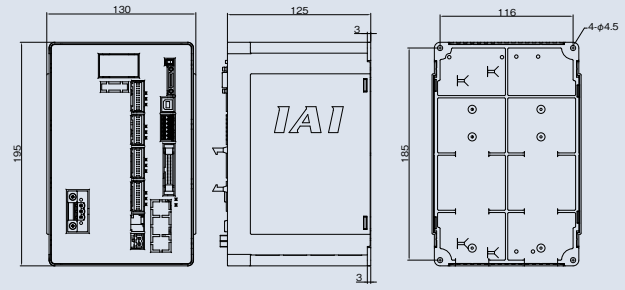
Name of Each Part



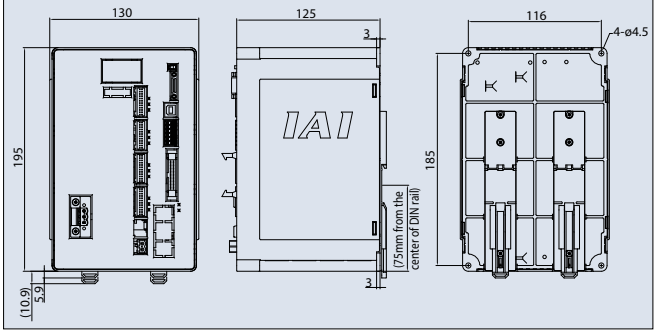
*1: Do not connect a wrong motor to the MPG1, MPG2, MPG3 or MPG4 connector. It may cause malfunction or failure.

External dimensions

Screw fixing specification



DIN rail mounting specification



Options

Teaching Pendant

Features

A teaching device offering program/position input, trial operation, and monitoring functions.

Model number **TB-01-SJ**

* This model is the standard specification with connector conversion cable. If you are interested in the deadman switch specification, specify the model number of the applicable teaching pendant (TB-01D-N/TB-01DR-N) and that of the cable (CB-TB1-X050-JS).

Configuration

The MSEL-PCX/PGX are supported by Ver. 1.02 or later.

Dummy Plug

Features

This plug is required for the safety category specification (MSEL-PGX) and when the MSEL is operated using a USB cable. (The MSEL-PGX type and PC compatible software IA-101-X-USBS come with this dummy plug.)

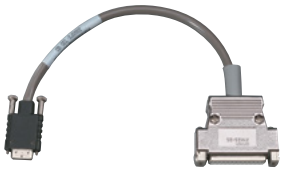
Model number **DP-4S**

Connector Conversion Cable

Features

This cable is used to convert the D-sub 25-pin connector of the teaching pendant or RS232C cable to the MSEL teaching connector. (The TB-01-SJ and IA-101-X-MW-JS come with this connector conversion cable.)

Model number
CB-SEL-SJS002



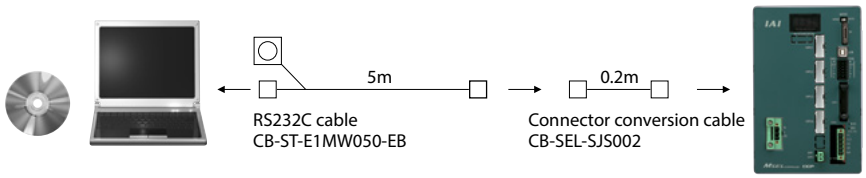
PC Compatible Software (Windows Only)

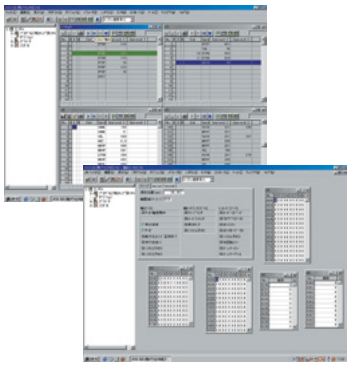
Features

The startup support software provides program/position input, test operation and monitoring functions, among others. With its enhanced functions required for debugging, this software helps shorten the startup time.

Model number **IA-101-X-MW-JS** (RS232C cable + Connector conversion cable)

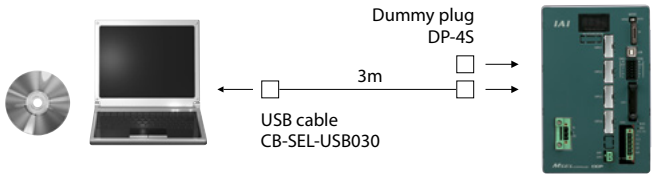
Configuration





Model number **IA-101-X-USBS** (USB cable + Dummy plug)

Configuration



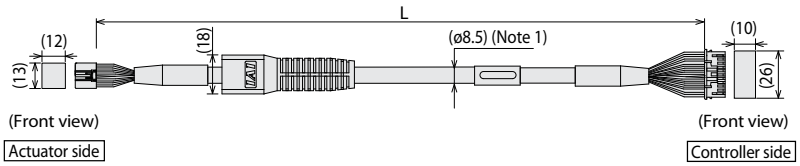
The MSEL-PCX/PGX are supported by Ver. 11.00.00.00 or later.

The CB-ST-E1MW050-EB cannot be used when "Building an enable system that uses a system I/O connector and external power supply" or "Building a redundant safety circuit." (The CB-ST-A1MW050-EB must be used instead.)

Service Parts

Model Number			
CB-CAN-MPA□□□	Integrated Motor-Encoder Cable	for RCP4-SA3/RA3/RCP5 as Additional 4th Axis
CB-CAN-MPA□□□-RB	Integrated Motor-Encoder Robot Cable	

* Please indicate cable length (L) in □□□, maximum 20m. e.g.) 080 = 8m



Minimum bending radius 5m or less length R = 68mm or more (Dynamic bending condition)
Longer than 5m R = 73mm or more (Dynamic bending condition)

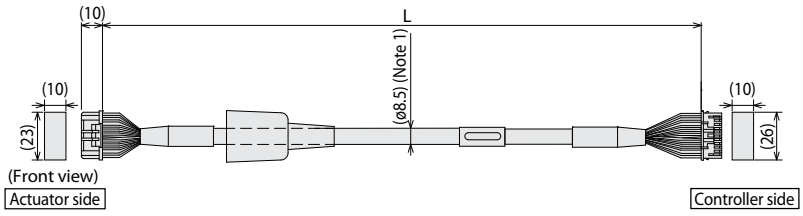
* The robot cable is designed for flex-resistance: Please use the robot cable if the cable has to be installed through a cable track.

(Note 1) If the cable is 5m or longer, ø9.1 cable diameter applies for a non-robot cable and ø10 for a robot cable.

Pin No.	Signal name	Pin No.	Signal name
3	øA/U	1	øA/U
5	VMM/V	2	VMM/V
10	ø A/W	3	ø A/W
9	øB/–	4	øB/–
4	VMM/–	5	VMM/–
15	ø B/-	6	ø B/–
8	LS+/BK+	7	LS+/BK+
14	LS–/BK–	8	LS-/BK–
12	–/A+	11	–/A+
17	–/A-	12	–/A-
1	A+/B+	13	A+/B+
6	A–/B-	14	A–/B-
11	B+/Z+	15	B+/Z+
16	B–/Z-	16	B–/Z-
20	BK+/LS+	9	BK+/LS+
2	BK–/LS-	10	BK–/LS-
21	LS_GND	17	LS_GND
7	VPS	19	VPS
15	VCC	15	VCC
13	GND	20	GND
19	—	22	—
22	BAT+	21	BAT+
23	—	23	—
24	FG	24	FG

Model Number			
CB-CA-MPA□□□	Integrated Motor-Encoder Cable	for RCP4 as Additional 4th Axis (*Except RCP4-SA3/RA3)
CB-CA-MPA□□□-RB	Integrated Motor-Encoder Robot Cable	

* Please indicate cable length (L) in □□□, maximum 20m. e.g.) 080 = 8m



Minimum bending radius 5m or less length R = 68mm or more (Dynamic bending condition)
Longer than 5m R = 73mm or more (Dynamic bending condition)

* The robot cable is designed for flex-resistance: Please use the robot cable if the cable has to be installed through a cable track.

(Note 1) If the cable is 5m or longer, ø9.1 cable diameter applies for a non-robot cable and ø10 for a robot cable.

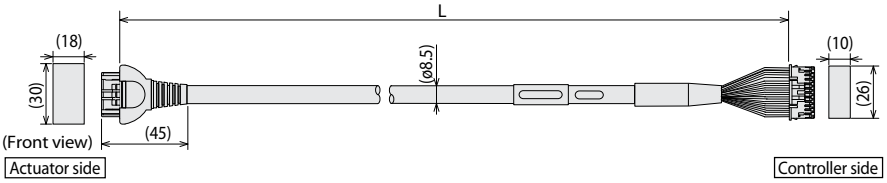
Actuator side
1-1827863-1
(AMP)

Controller side
PADP-24V-1-S
(JST)

Pin No.	Signal name	Pin No.	Signal name
A1	øA/U	1	øA/U
B1	VMM/V	2	VMM/V
A2	ø A/W	5	ø A/W
B2	øB/–	3	øB/–
A3	VMM/–	4	VMM/–
B3	ø B/–	6	ø B/–
A4	LS+/BK+	7	LS+/BK+
B4	LS–/BK-	8	LS–/BK-
A6	–/A+	11	–/A+
B6	–/A-	12	–/A-
A7	A+/B+	13	A+/B+
B7	A–/B-	14	A–/B-
A8	B+/Z+	15	B+/Z+
B8	B–/Z–	16	B-/Z-
A5	BK+/LS+	9	BK+/LS+
B5	BK–/LS-	10	BK–/LS–
A9	LS_GND	20	LS_GND
B9	VPS	18	VPS
A10	VCC	17	VCC
B10	GND	19	GND
A11	—	21	—
B11	FG	22	—
		23	—
		24	FG

Model Number			
CB-APSEP-MPA□□□-LC	Integrated Motor-Encoder Cable	for RCP3/RCA2, etc. as Additional 4th Axis
CB-APSEP-MPA□□□	Integrated Motor-Encoder Robot Cable	

* Please indicate cable length (L) in □□□, maximum 20m. e.g.) 080 = 8m



Minimum bending radius R = 68mm or more (Dynamic bending condition)

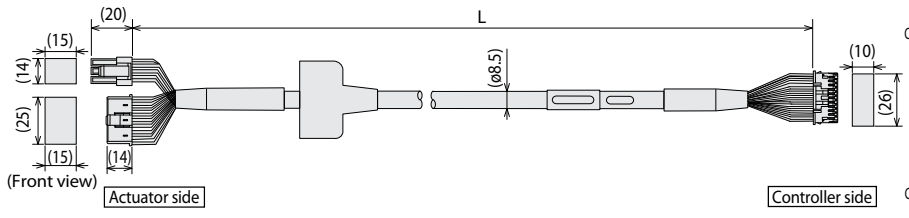
* The robot cable is designed for flex-resistance: Please use the robot cable if the cable has to be installed through a cable track.

Actuator side Pin No.		Controller side Pin No.
A1	[PCON] (ACON)	1
B1	[øA] (U)	2
A2	[VMM] (V)	5
B2	[ø/A] (W)	3
A3	[øB] (–)	4
B3	[VMM] (–)	6
A4	[ø/B] (–)	7
B4	[LS+] (BK+)	8
A6	[LS–] (BK-)	11
B6	[–] (A+)	12
A7	[–] (A-)	13
B7	[A+] (B+)	14
A8	[A–] (B-)	15
B8	[B+] (Z+)	16
A5	[B–] (Z–)	9
B5	[BK+] (LS+)	10
A9	[BK–] (LS–)	20
B9	[GNDLS] (GNDLS)	18
A10	[VPS] (VPS)	17
B10	[VCC] (VCC)	19
A11	[GND] (GND)	21
B11	NC	24
	Shield [FG] (FG)	22
	NC	23
	NC	

Model Number			
CB-PSEP-MPA□□□	Integrated Motor-Encoder Robot Cable	for RCP2 as Additional 4th Axis

*Only robot cable is available for this model.

* Please indicate cable length (L) in □□□, maximum 20m. e.g.) 080 = 8m



Minimum bending radius R = 68mm or more (Dynamic bending condition)

Actuator side Pin No.		Controller side Pin No.
1	[øA]	1
2	[VMM]	2
4	[øB]	3
5	[VMM]	4
3	[ø/A]	5
6	[ø/B]	6
16	[BK+]	9
17	[BK–]	10
5	NC	11
6	NC	12
13	[LS+]	7
14	[LS–]	8
1	[A+]	13
2	[A–]	14
3	[B+]	15
4	[B–]	16
10	[VCC]	17
11	[VPS]	18
9	[GND]	19
12	[(Spare)]	20
15	NC	21
7	NC	22
8	NC	23
18	Shield [FG]	24

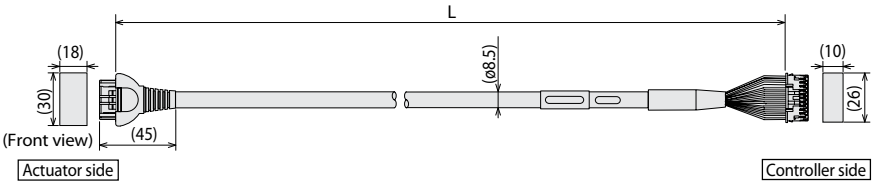
1st Connector

2nd Connector

Model Number	CB-RPSEP-MPA□□□	Integrated Motor-Encoder Robot Cable	for RCP2-RTBS/RTBSL/RTCS/RTCSL as Additional 4th Axis

*Only robot cable is available for this model.

* Please indicate cable length (L) in □□□, maximum 20m. e.g.) 080 = 8m

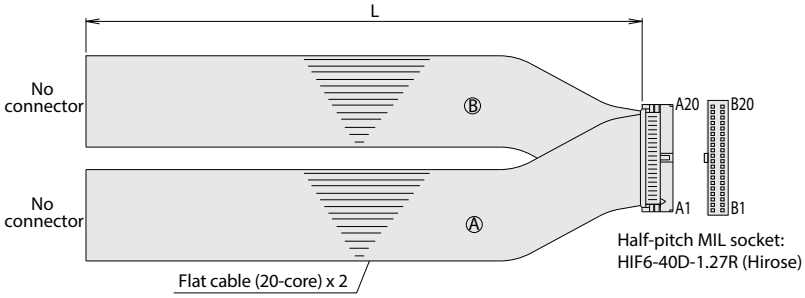


Minimum bending radius R = 68mm or more (Dynamic bending condition)

Actuator side Pin No.		Controller side Pin No.
A1	[øA]	1
B1	[VMM]	2
A2	[ø/A]	5
B2	[øB]	3
A3	[VMM]	4
B3	[ø/B]	6
A6	[LS+]	7
B6	[LS−]	8
A7	[A+]	13
B7	[A−]	14
A8	[B+]	15
B8	[B−]	16
A4	NC	—
B4	NC	—
A5	[BK+]	9
B5	[BK−]	10
A9	[GNDLS]	20
B9	[VPS]	18
A10	[VCC]	17
B10	[GND]	19
A11	NC	21
B11	Shield[FG] (FG)	24
	NC	22
	NC	23

Model Number	CB-PAC-PIO□□□	PIO Flat Cable	for MSEL/PCON-CA/MSEP-LC

* Please indicate cable length (L) in □□□, maximum 10m. e.g.) 080 = 8m



HIF6-40D-1.27R

No.	Signal name	Cable color	Wiring
A1	24V	Brown-1	Flat cable Ⓐ (crimped) AWG28
A2	24V	Red-1	
A3	—	Orange-1	
A4		Yellow-1	
A5	IN0	Green-1	
A6	IN1	Blue-1	
A7	IN2	Purple-1	
A8	IN3	Gray-1	
A9	IN4	White-1	
A10	IN5	Black-1	
A11	IN6	Brown-2	
A12	IN7	Red-2	
A13	IN8	Orange-2	
A14	IN9	Yellow-2	
A15	IN10	Green-2	
A16	IN11	Blue-2	
A17	IN12	Purple-2	
A18	IN13	Gray-2	
A19	IN14	White-2	
A20	IN15	Black-2	

No.	Signal name	Cable color	Wiring
B1	OUT0	Brown-3	Flat cable Ⓑ (crimped) AWG28
B2	OUT1	Red-3	
B3	OUT2	Orange-3	
B4	OUT3	Yellow-3	
B5	OUT4	Green-3	
B6	OUT5	Blue-3	
B7	OUT6	Purple-3	
B8	OUT7	Gray-3	
B9	OUT8	White-3	
B10	OUT9	Black-3	
B11	OUT10	Brown-4	
B12	OUT11	Red-4	
B13	OUT12	Orange-4	
B14	OUT13	Yellow-4	
B15	OUT14	Green-4	
B16	OUT15	Blue-4	
B17	—	Purple-4	
B18		Gray-4	
B19	0V	White-4	
B20	0V	Black-4	

Reference for SCARA Robot Acceleration/Deceleration Settings

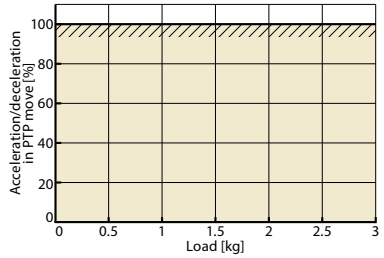
If the robot must be operated continuously, make sure its operations fall within the ranges of the reference graphs for acceleration/deceleration setting and duty cycle setting.

PTP Move

The maximum speed and acceleration/deceleration at which the robot can operate carrying the applicable load are applied as 100% (optimal speed & optimal acceleration/deceleration function). Make adjustments so that the target speed and acceleration/deceleration can be achieved.

Notes

- The optimal speed & optimal acceleration/deceleration function does not guarantee robot operation in all operation patterns.
- If significant vibration generates, reduce the speed and/or acceleration/deceleration because the robot may fail or die prematurely.



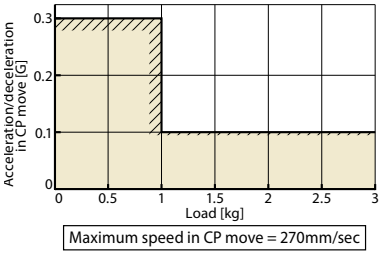
Maximum speed in PTP move= 100%

CP Move

Set the speed and acceleration/deceleration at or below the applicable values according to the graph on the right.

Notes

- If significant vibration generates, reduce the speed and/or acceleration/deceleration because the robot may fail or die prematurely.



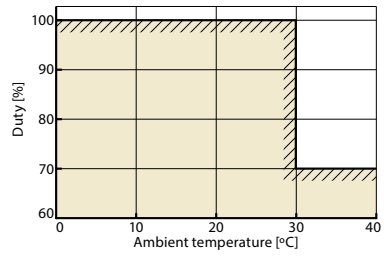
Maximum speed in CP move = 270mm/sec

Duty Cycle Setting

The duty cycle refers to a utilization ratio expressed by the percentage of the robot operating time per cycle.
For this robot, the duty cycle is limited according to the ambient temperature in order to suppress heat generation from the motor unit and reduction gears. In both PTP move and CP move, the maximum value according to the graph on the right must not be exceeded. Also remember to complete a continuous operation within 30 minutes.

Notes

- The duty cycle must not exceed the maximum limit, as it may significantly reduce the life of the motor unit or reduction gears.



IAI America, Inc.

Headquarters: 2690 W. 237th Street, Torrance, CA 90505 (800) 736-1712
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173 (800) 944-0333
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066 (888) 354-9470

www.intelligentactuator.com

IAI Industrieroboter GmbH
Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany

IAI Robot (Thailand), CO., Ltd.
825 PhairojKijja Tower 12th Floor, Bangna-Trad RD.,
Bangna, Bangna, Bangkok 10260, Thailand