IAI
Quality and Innovation

High-speed Cartesian Robot CT4

CT4
CARTESIAN4
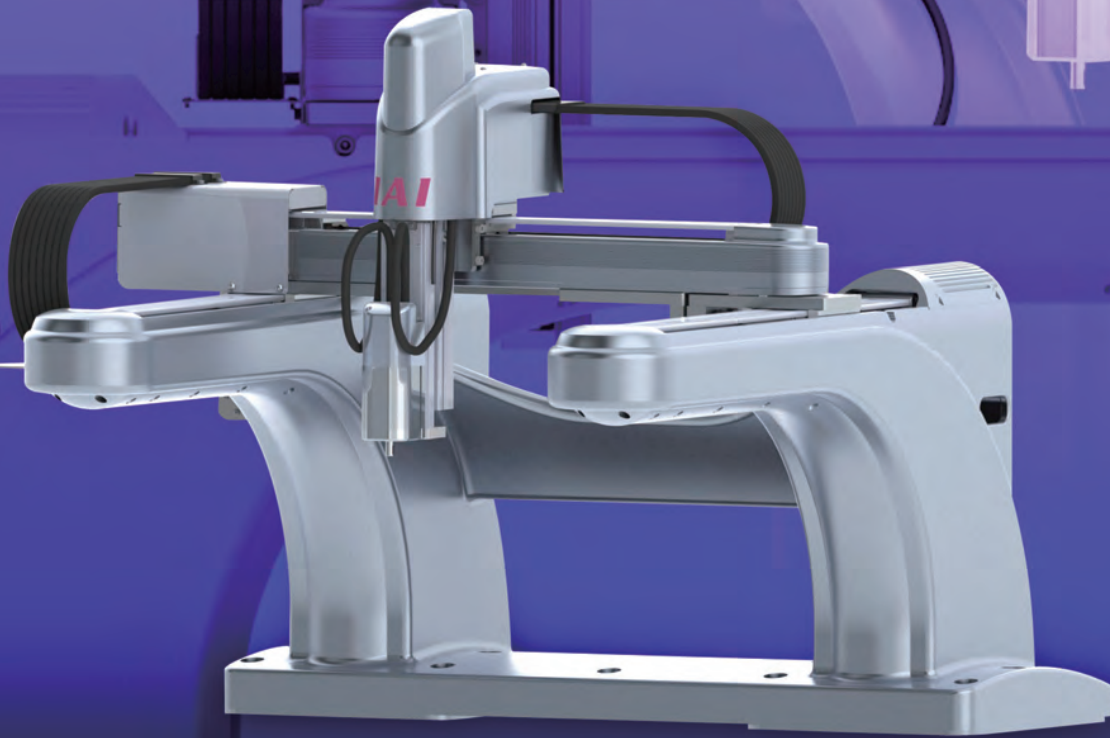
High-speed Cartesian Robot That Shortens Assembly/Inspection Cycle Times by Operating at High Speed, Ensuring High Rigidity and Demonstrating Excellent Straight Moving Performance

High-speed operation with commanded acceleration of up to 3.2 G
(maximum instantaneous acceleration: 4.8 G)
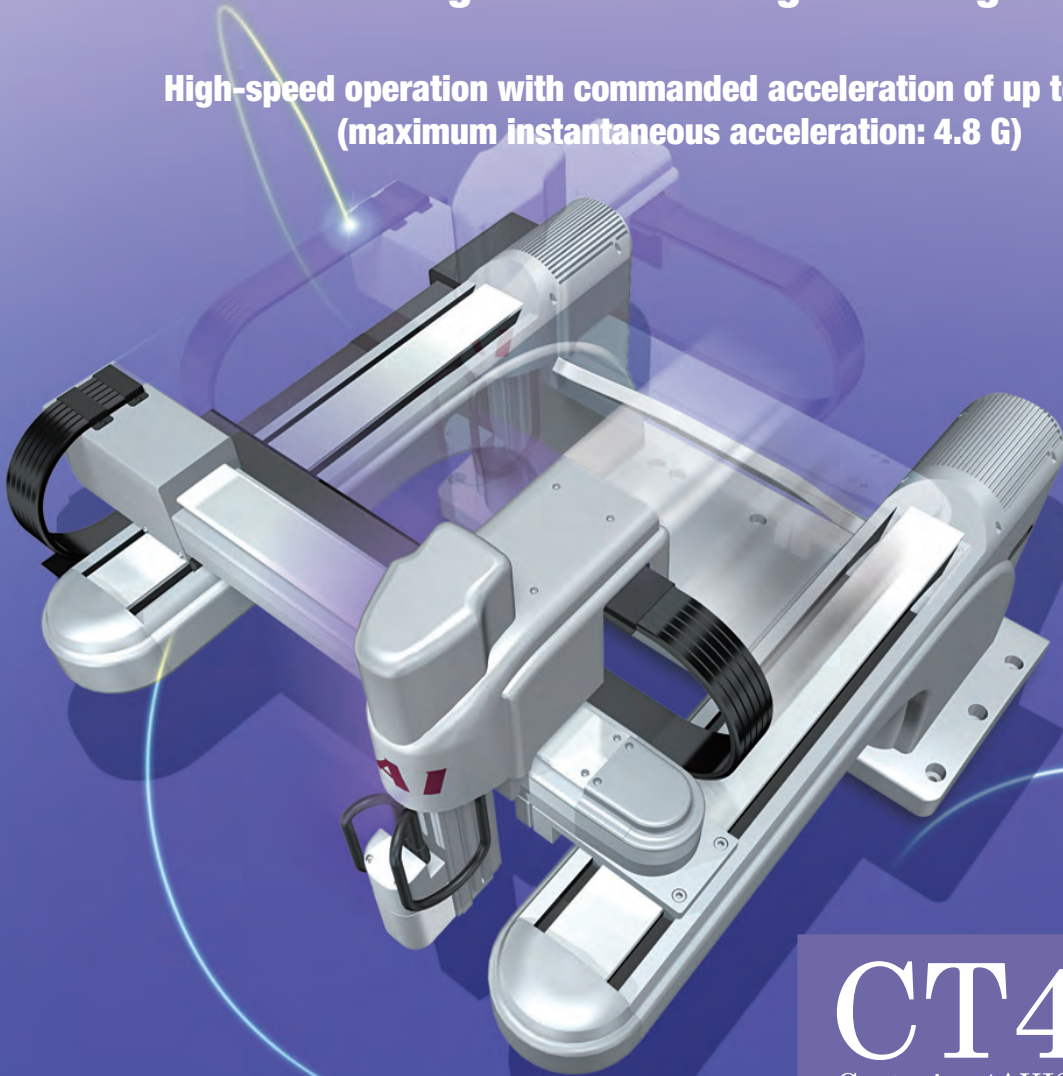
CT4
Cartesian4AXIS

Function Comparison Table of High-speed Cartesian Robot

|	High-speed Cartesian Robot CT4	Multi-jointed robot	Parallel-link robot
1. Speed, acceleration/deceleration	◎	○	◎
2. Rigidity	◎	○	○
3. Robot size and operating range	◎	○	○
4. Straight moving performance	◎	△	△

Note) The evaluations under "Multi-jointed robot" and "Parallel-link robot" are based on IAI's evaluations of standard robots.
◎: Good / ○: Average / △: Not very good

1 | Rotational Axis Specification: Newest Addition to the Series

You can now specify a CT4 robot having an ultra-compact rotational axis installed at the end of the vertical axis. The rotational axis lets you change the moving or aligning direction of the work, thereby expanding the scope of applications of the CT4 series further.
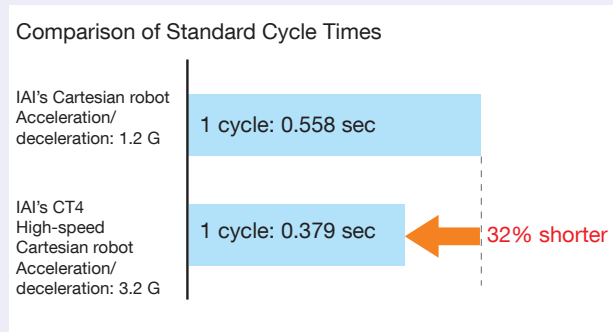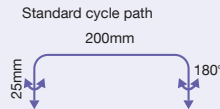
Rotational Axis
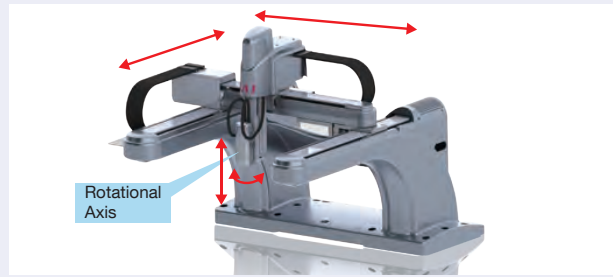
2 | High Speed & High Acceleration/Deceleration

Shorten the cycle time of your equipment by operating at the maximum speed of **2500 mm/s** and maximum acceleration of **3.2 G**.

> The standard cycle time (Note) is 32% less than a conventional Cartesian robot.

(Note) The standard cycle time represents the time required for going back and forth along the path shown to the right, consisting of a vertical movement of 25 mm, horizontal movement of 200 mm and turning of 180 degrees.

Standard cycle path
200mm
25mm
180°

Comparison of Standard Cycle Times

IAI's Cartesian robot Acceleration/deceleration: 1.2 G
1 cycle: 0.558 sec

IAI's CT4 High-speed Cartesian robot Acceleration/deceleration: 3.2 G
1 cycle: 0.379 sec ← 32% shorter

3 | Efficient Operation Range

A wide operation range of 400 mm (X-axis) x 300 mm (Y-axis) is ensured. Square operation ranges have no wasteful space and are more efficient compared to those of multi-jointed robots and parallel-link robots that can only operate in circles due to their structure.

Range of operation of the Cartesian robot CT4

Range of operation of the parallel-link robot

400mm
300mm
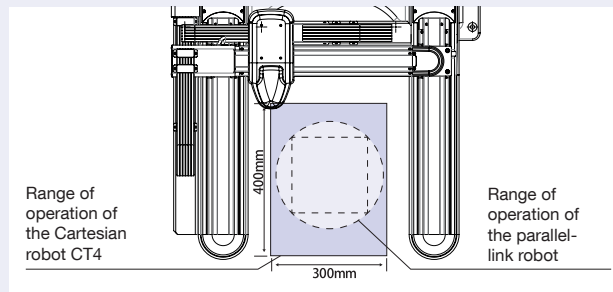
4 | High Rigidity, Easy to Install

Boasting high frame rigidity, the CT4 has great acceleration capabilities and is subject to less vibration. While the parallel-link robot is installed above the work part and thus normally requires a dedicated base, the CT4 can be installed easily on a plane at the same height as the work part.

Examples of Applications

Packing electronic components in boxes

High-speed Cartesian robot (rotational axis specification) + vision sensor

Screwing automobile parts

High-speed Cartesian robot (standard specification) + vision sensor

Feeding/taking out work parts to/from a part inspection machine

High-speed Cartesian robot (rotational axis specification)

2

CT4-G1RT-A-40-40-30-10B-36L-T2-☐

Orthogonal 4 Axes with Rotational Axis Specification

| ■ Model Specification Items | CT4
Series
CT4 : High-speed Cartesian Robot | — | G1RT
Type
G1RT: Gantry 4-axis with rotational axis | — | A
Encoder type
A : Absolute specification | — | 40
X1-axis stroke
40 : 400 mm | — | 40
X2-axis stroke
40 : 400 mm | 30
Y-axis stroke
30 : 300 mm | 10B
Z-axis stroke
10B: 100 mm With brake | — | 36L
Range of operation of R-axis
36L: 360 deg with limit switch | — | T2
Applicable controller
T2: XSEL-PCT XSEL-QCT | — | ☐
Cable length
3L : 3 m
5L : 5 m
☐L : Specified length |

X-axis 400 mm
Y-axis 300 mm
Z-axis 100 mm
R-axis 360°

⚠ **Caution**

(Note 1) In the model number, the stroke is indicated in cm (centimeters). The range of operation of the R-axis is indicated in units of 10 degrees.

(Note 2) The cable length indicates the length from the connection point on the actuator's connector to the controller.
The standard cable length is 3 m or 5 m, but any other length can be specified in units of meters. Lengths up to 30 m are supported.

Specifications

Model number			CT4-G1RT-A-40-40-30-10B-36L-T2-☐				
			X1 (master) axis	X2 (slave) axis	Y-axis	Z-axis	R-axis
Specifications of each axis	Axis type		Slider	Slider	Slider	Table	Rotational axis
	Stroke	(mm)	400	400	300	100	360°
	Maximum speed	(mm/sec)	2,500	2,500	2,500	833	4500°/s
Combination specifications	Structure		Orthogonal 4 axes (X-axis synchronized operation) + rotational axis				
	Degrees of freedom		4				
	Range of operation	X-Y-Z (mm)-R (deg)	400-300-100-360				
	Positioning repeatability	(mm)	X direction : ±0.02 (mm), Y direction : ±0.02 (mm) , Z direction : ±0.02 (mm), R direction : ±0.025 (deg)				
	Lost motion	(mm)	X direction: 0.05 or less, Y direction: 0.05 or less, Z direction: -, R direction: -				
	Payload	(kg)	0.5				
	Cycle time [arch motion]	Measured value	200st : 0.379 sec, 300st : 0.468 sec				
	(Operating conditions)		Sigmoid control, 2,500 mm/sec, 3.2 G command (4.8 G max. instantaneously). Refer to Fig. A below for the operation pattern.				
	Travel life	(km)	X/Y: 20,000, Z: 5,000 (90% probability of survival)				
	R-axis allowable load inertia	(kg·m²)	0.0002				
	R-axis allowable moment	(N·m)	1.2				
	Installation orientation		Limited to horizontal installation				
Ambient temperature/humidity			Temperature: 0 to 40°C, Humidity: 85%RH max. (non-condensing)				

Structure

Item	X1 (master) axis	X2 (slave) axis	Y-axis	Z-axis	R-axis
Motor	AC Servo motor (200 V)				
Home detection	Absolute				
Drive method	Ball screw + coupling				Integrated with motor output shaft
Brake	Not set	Not set	Not set	Standard equipment	Not set
C frame	Aluminum casting				
Robot weight	83.0 kg				

Cycle Time Operation Pattern (Fig. A)

(Note) The standard cycle time represents the time required for going back and forth along the path shown to the right, consisting of a vertical movement of 25 mm, horizontal movement of 200 mm and turning of 180 degrees.
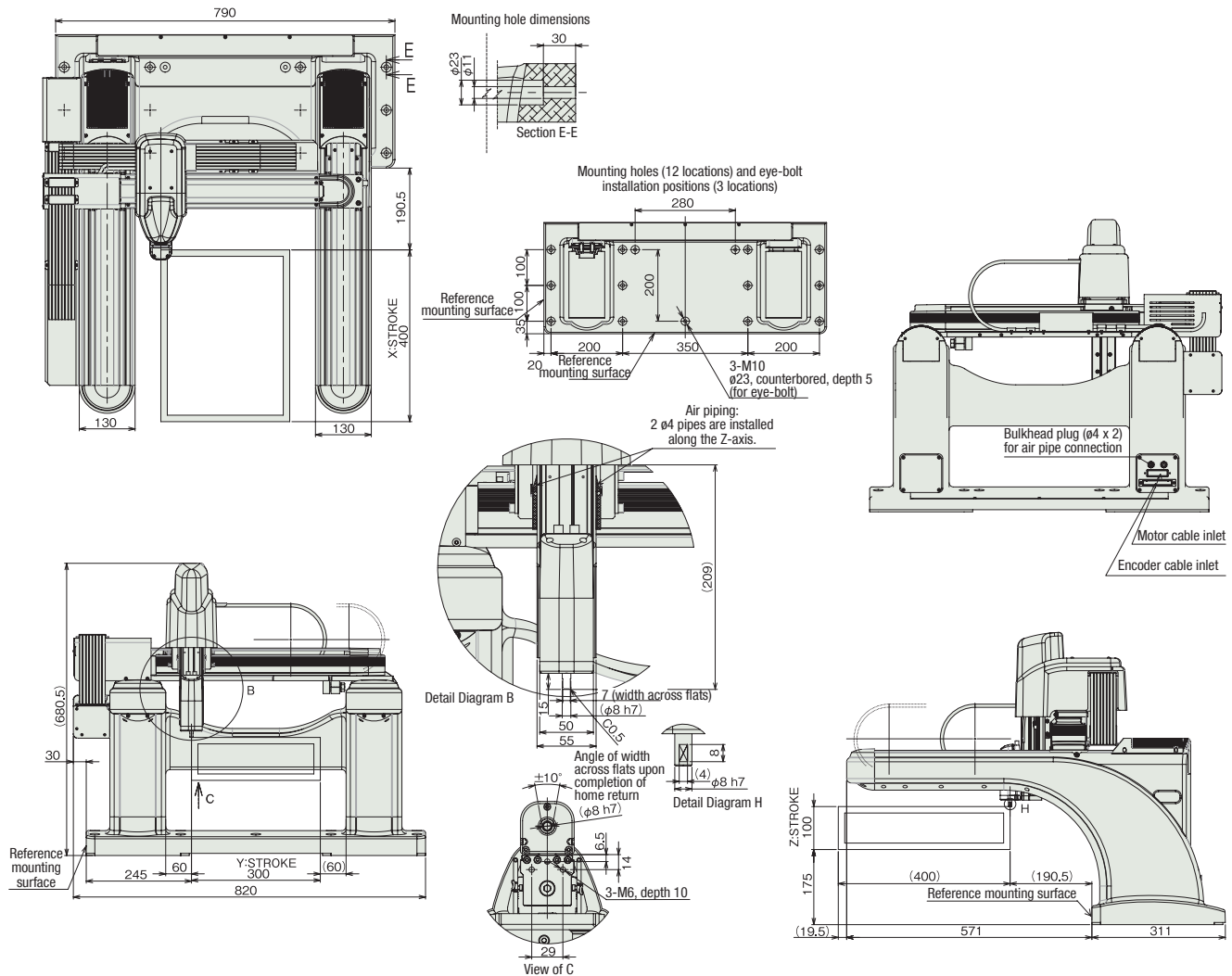
Standard cycle path

200mm

25mm
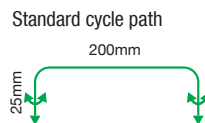
Dynamic Allowable Moment (R-axis)
Allowable moment of rotational axis 1.2 N·m

Direction of dynamic allowable moment

3

Dimensions

Mounting hole dimensions

Section E-E

Mounting holes (12 locations) and eye-bolt installation positions (3 locations)

Reference mounting surface

Reference mounting surface

3-M10 ø23, counterbored, depth 5 (for eye-bolt)

Air piping: 2 ø4 pipes are installed along the Z-axis.

Detail Diagram B

7 (width across flats) (φ8 h7)

Angle of width across flats upon completion of home return (φ8 h7)

Detail Diagram H

View of C

3-M6, depth 10

Bulkhead plug (ø4 x 2) for air pipe connection

Motor cable inlet

Encoder cable inlet

Reference mounting surface

Reference mounting surface

Applicable Controller

Applicable controller	Maximum number of controlled axes	Compatible encoder type	Number of programs	Number of positions	Power-supply voltage	Description
XSEL-PCT	6 axes	Absolute	128 programs	20,000 positions	3-phase, 200VAC	Dedicated standard controller for CT4
XSEL-QCT						Dedicated global controller for CT4 (Safety Category compliant)

[Rough Guide for Work Part Permitted on Rotational Axis]

Use the load inertia calculation formula below to check if the load inertia of the work part is equal to or less than the allowable value (0.0002 kg·m²).

$$J = 1/8 \times M \times D^2$$
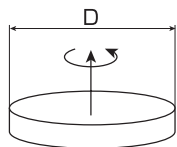
Center of rotation   Mass: M

$$J = 1/12 \times M \times (a^2 + b^2)$$
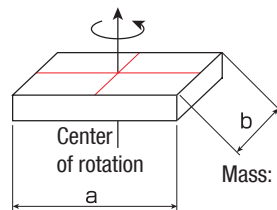
Center of rotation   Mass: M

<Example of Permitted Work Part>
If the work part weighs 0.1 kg and is 50 mm wide and 140 mm long, the load inertia is calculated as follows:
$1/12 \times 0.1 \times (0.14^2 + 0.05^2) \cong 0.00018$ kg·m²
Accordingly, this work part is permitted on the rotational axis.

※ Be careful not to let the center of gravity of the work part at the tip of the rotational axis be offset from the output shaft of the rotational axis.

Weight 0.1 kg

140mm   50mm

4

CT4-G1-A-40-40-30-10B-T2-☐ 4-axis Cartesian Specification

■ Model Specification Items	**CT4** Series	—	**G1** Type	—	**A** Encoder	—	**40** X1-axis stroke	—	**40** X2-axis stroke	—	**30** Y-axis stroke	—	**10B** Z-axis stroke	—	**T2** Applicable controller	—	☐ Cable length	—	☐ Option
	CT4 : High-speed Cartesian Robot		**G1** : Gantry 4-axis type		**A** : Absolute specification		40 : 400 mm		40 : 400 mm		30 : 300 mm		10B : 100 mm With brake		T2 : XSEL-PCT XSEL-QCT		3L : 3 m 5L : 5 m ☐L : Length designation		Blank: No option AC: Air pipe connection (Vacuum port)

X-axis 400 mm
Y-axis 300 mm
Z-axis 100 mm

⚠ **Note**

(Note 1) Strokes are indicated in cm (centimeters) in the model names.
(Note 2) The cable length is from the connection point on the robot connector to the controller.
The standard length is 3 m or 5 m, but other lengths can be specified in m.
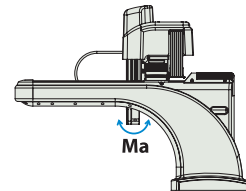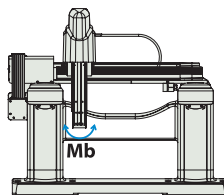Lengths up to 30 m are supported.

Specifications

Type			CT4-G1-A-40-40-30-10B-T2-☐			
			X1 (master) axis	**X2 (slave) axis**	**Y-axis**	**Z-axis**
Specifications of each axis	Axis type		Slider	Slider	Slider	Table
	Stroke	(mm)	400	400	300	100
	Maximum speed	(mm/sec)	2,500	2,500	2,500	833
Combination specifications	Structure		Orthogonal 4-axis (X-axis synchronizing operation)			
	Degrees of freedom		3			
	Operating range	X-Y-Z (mm)	400-300-100			
	Positioning repeatability	(mm)	X direction : ±0.02, Y direction : ±0.02, Z direction : ±0.02			
	Lost motion	(mm)	X direction : 0.05 or less, Y direction: 0.05 or less, Z direction : -			
	Payload	(kg)	1			
	Cycle time [arch motion] Measured value		200st : 0.379 sec, 300st : 0.468 sec			
	(Operating conditions)		Sigmoid control, 2,500 mm/sec, commanded acceleration up to 3.2 G (maximum instantaneous acceleration: 4.8 G)			
	Travel life	(km)	X/Y : 20,000, Z : 5,000 (90% survival probability)			
	Dynamic allowable moment (Note 1)	(N·m)	Ma = 6.4, Mb = 9.2, Mc = 14.2 (based on travel life of 5,000 km)			
	Overhang load length (Note 1)	(mm)	X direction : 50, Y direction : 50, Z direction : 50			
	Installation orientation		Limited to horizontal installation			
Ambient temperature/humidity			Temperature: 0 to 40ºC, humidity : 85% RH or less (non-condensing)			

(Note 1) Measured at the mounting point at the end of the Z-axis.

Structure

Item	X1 (master) axis	X2 (slave) axis	Y-axis	Z-axis
Motor	AC servo motor (200V)			
Home detection	Absolute			
Drive system	Ball screw + coupling			
Brake	Not set	Not set	Not set	Standard equipment
C type frame	Aluminum casting			
Robot weight	82.0 kg			

Dynamic allowable moment (Z-axis)

Mc

Mb

Ma

5

Dimensions

Mounting hole dimension

Section E-E

Mounting holes (12 locations) and eye-bolt mounting positions (3 locations)

Mounting reference surface

Mounting reference surface

3-M10
ø23 counterbored, depth 5 (for eye bolt)

Detail B

6-M5, depth 6
5 H7, depth 5
Ø5 H7, depth 5

Drawing view C

3-M6, depth 10

<Standard specification>

Motor cable inlet
Encoder cable inlet

<Vacuum port specification>

Bulkhead plug (ø4 x 2) for air pipe connection

Motor cable inlet

Encoder cable inlet

Mounting reference surface

Mounting reference surface

Without air pipe connection port: 805
With air pipe connection port: 820

Applicable Controller

Applicable controller	Maximum number of controlled axes	Compatible encoder type	Number of programs	Number of positions	Power-supply voltage	Description
XSEL-PCT	6 axes	Absolute	128 programs	20,000 positions	3-phase, 200VAC	Dedicated standard controller for CT4
XSEL-QCT						Dedicated global controller for CT4 (Safety Category compliant)

[Calculation of Dynamic Allowable Moment]

With the CT4, the dynamic allowable moment is calculated based on a travel life of 20,000 km for the X-axis/Y-axis and travel life of 5,000 km for the Z-axis (both at a survival probability of 90%).

6

System configuration

4-axis Cartesian type

Supplied with the robot
Motor Cable
Model CB-CT4-MA□□□
Standard: 3 m/5 m

External equipment
PLC, etc.

Option
Various Field Network Connections
• Device Net
• CC-Link
• PROFIBUS-DP
• Ethernet

Option
Teaching Pendant
Model: SEL-T
　　　SEL-TD

Serial Communication Port
Standard 2ch for RS232

Supplied with the robot
Encoder Cable
Model CB-CT4-PA □□□
Standard: 3 m/5 m

Supplied with the controller
I/O Flat Cable 2 m

Orthogonal 4 axes + rotational axis type

Supplied with the robot
Motor Cable
Model:CB-CT4R-MA□□□
Standard: 3 m/5 m

PC Software

Option
RS232 connection version
Model: IA-101-X-MW

USB connection version
Model: IA-101-X-USBMW

Supplied with the robot
Encoder Cable
Model:CB-CT4R-PA□□□
Standard: 3 m/5 m

Actuator
RCS2 series (*)/RCS3 series/single-axis robot
(Note) The total wattage of Axes 5 and 6 cannot be more than 100 W.
(*) Excluding the RCS2-RA7/SRA7 series

Supplied with the regenerative resistor unit
Regenerative unit cable 1 m

Option
Regenerative resistor unit
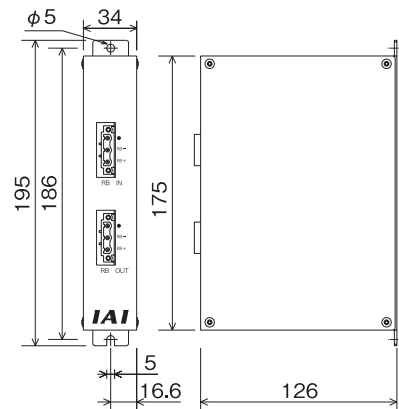* 2 regenerative resistor units are required.

Control Power Supply
Single-phase AC200V

Motor Drive Power Supply
3-phase AC200V

System I/O
• Emergency stop
• Enable
• System ready

Expansion I/O
• I/O board
• Multi-point board

Drive Power Shut-off Circuit
(Supplied by user)

* Required only for global type (Not required for the standard type)

Main Power Supply 3-phase AC200V
* When connecting the power, be sure to attach the filter listed below or equivalent:
• Noise Filter　　Recommended Model: 3-phase MC1320 (Manufacturer: TDK Lambda)
• Ring Core　　　Recommended Model: ESD-R-25 (Manufacturer: NEC TOKIN)
• Clamp Filter　　Recommended Models: ZCAT3035 -1330 for control power (Manufacturer: TDK)
　　　　　　　　　　　　　　　　　　RFC-H13 for motor power (Manufacturer: Kitagawa Kogyo Co., Ltd.)
• Surge Protector　Recommended Models: 3-phase R/A/V-781BXZ-4
　　　　　　　　　　　　　　　　　　(Manufacturer: Okaya Electric Industries)

Regenerative Resistance Unit

Model　　**REU-1**

* Order two regenerative resistor units together with the robot.

This unit converts to heat the regenerative current produced when the motor decelerates.
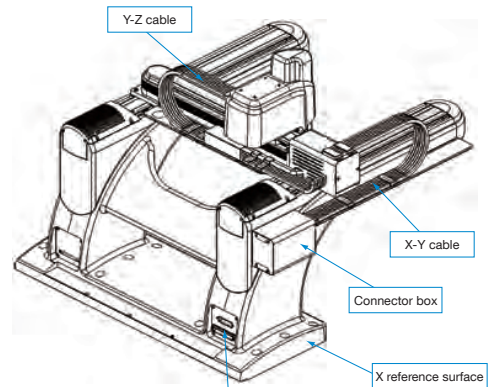
Two regenerative units are needed to operate the CT4.

Specifications

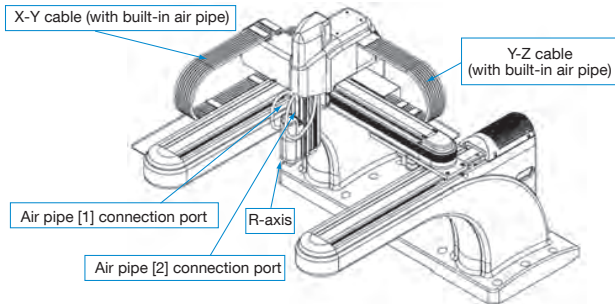| Item	Specifications
Main Unit dimensions	W34mm x H195mm x D126mm
Main Unit Weight	0.9kg
Built-in regenerative resistor	220Ω 80W
Accessory	Controller Connection Cable (Model No. CB-ST-REU010) 1m

φ5　34

195　186　175

5
16.6　126

7

Part Names

<4-axis Cartesian type>

Y-Z cable

Y-axis

Z-axis

X master axis

X slave axis

Frame

Y reference surface

X-Y cable

Connector box

X reference surface

Connector connection point

<Orthogonal 4 axes + rotational axis type>

X-Y cable (with built-in air pipe)

Y-Z cable (with built-in air pipe)
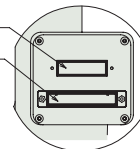
Air pipe [1] connection port

R-axis

Air pipe [2] connection port
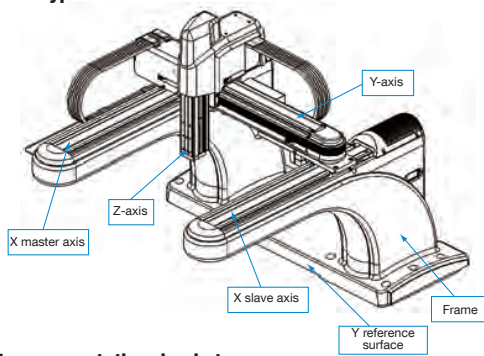
Detail of connector connection point

Motor cable inlet

Encoder cable inlet
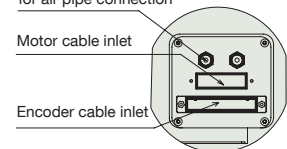
No air pipe specification

Bulkhead plug (ø4 x 2) for air pipe connection

Motor cable inlet

Encoder cable inlet

Specification with air pipes

<Air Pipe>
The orthogonal 4 axes + rotational axis type comes standard with an air pipe to the end of the Z-axis.
The orthogonal 4 axes type does not come standard with built-in air pipes, so specify the optional specification with air pipes (option code: AC) if necessary.

Notes

■ Installation Frame

- The mounting surface shall be a machined plane or flat plane of equivalent accuracy. The flatness shall be within 0.05 mm/m.
- The frame shall have a structure that allows the robot to be installed horizontally.
- The frame on which the robot is installed receives a large reactive force. The table below shows the maximum instantaneous reactive force (rough guide) received by each axis when the axis moves at the maximum speed and maximum acceleration carrying 1 kg of load.
  Provide a frame of sufficient rigidity. Secure the frame to the floor, etc., using anchor bolts, etc., so that the CT4 will not move as a result of robot operation.

Axis	Reactive force
X-axis	660N
Y-axis	235N
Z-axis	85N

- The natural vibration frequency of the frame shall be 75 Hz or more.

■ Example of the Installation Frame

An example of the installation frame is shown to the right. Fabricate the installation frame by referring to this example.

Use the hexagonal head bolt, as described below, for the mounting bolt, depending on the installation frame material.

Use high-strength bolts of ISO-10.9 or more.

<Frame Made of Steel>

Applicable bolt: M10 x 40 (effective engagement length: 10 or more), Applicable washer: M10 (10.5 x 18 x 2)

Tightening torque: 60 N·m

<Frame Made of Aluminum>

Applicable bolt: M10 x 50 (effective engagement length: 20 or more), Applicable washer: M10 (10.5 x 18 x 2)

Tightening torque: 60 N·m

□ 0.05/1000

25mm or more

800mm or less

□100 x 100mm x t6.0mm (square steel material)

900mm

500mm

⚠ **Danger** Use the specified type of bolt. Pay attention when selecting the bolt length. If bolts other than the specified type or of inappropriate lengths are used, the tapped holes may be damaged or sufficient mounting strength may not be achieved, potentially leading to noise/vibration, breakdown or shorter life. In the worst case, the CT4 may move suddenly and cause serious accidents such as damage to the work part and surrounding areas, injury or even death.

■ Operation Setting

When operating the high-speed Cartesian robot, the acceleration/deceleration setting for sigmoid motion, and vibration control, must be set in the program. For details, refer to the operation manual.

XSEL-PCT/QCT

Dedicated program controller for CT4 high-speed Cartesian robot

<Orthogonal 4 axes + rotational axis type>

X S E L – ☐ – ☐ – 400A – 400A – 400A – 60AB – 60AL – ☐ – ☐ – ☐ – ☐☐☐ – ☐ – 3

| | | | | | | | | | | | | | |
|Series|Type|Number of connected axes|Axis 1|Axis 2|Axis 3|Axis 4|Axis 5|Axis 6|Network|Standard I/O|Expansion I/O|I/O Cable Length|Power supply voltage|

Series / Type

PCT	Dedicated CT4 type
QCT	Dedicated CT4 global type (Safety Category compliant)

Axis 1 / Axis 2 / Axis 3

400A	400-watt motor, absolute
400A	400-watt motor, absolute
400A	400-watt motor, absolute

Number of connected axes

5	5-axis specification
6	6-axis specification

* Same as the 5-axis specification if only the CT4 is operating.

Axis 4

60AB	60-watt motor, absolute, with brake

Axis 5 / Axis 6

60AL	60-watt motor, absolute, with limit switch
12I	12-watt motor (incremental)
12A	12-watt motor (absolute)
20I	20-watt motor (incremental)
20A	20-watt motor (absolute)
30DI	RCS 30-watt motor (incremental)
30DA	RCS 30-watt motor (absolute)
30RI	RS 30-watt motor (incremental)
30RA	RS 30-watt motor (absolute)

* The maximum wattage of axis 6 is 30 W. (If the wattage is more than the above, the axis cannot operate due to the limitations of the power-supply capacity.)

Network

Blank	Not used
DV	DeviceNet connection board
CC	CC-Link connection board
PR	ProfiBus connection board
ET	Ethernet connection board

Standard I/O

E	Not used
N1	Input 32/Output 16 (NPN)
N2	Input 16/Output 32 (NPN)
N3	Input 48/Output 48 (NPN)
P1	Input 32/Output 16 (PNP)
P2	Input 16/Output 32 (PNP)
P3	Input 48/Output 48 (PNP)
S	With expansion I/O base

* If expansion I/O will not be used, enter E (Not used) for slots 2 to 4. If you are using expansion I/Os, enter the expansion I/O base specification code in the desired slot. If an expansion I/O is specified, the controller chassis will come with the expansion I/O base. If you will not be using the expansion I/O initially but will be adding it later, specify the chassis with I/O expansion board, but specify S for slots 2 to 4.

Power supply voltage

3	Three-phase 200 VAC

I/O Cable Length

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

* If "E" (not used) or "S" (with expansion I/O base) is specified for all of standard and expansion I/Os slots, the I/O cable length will become "0" (no cable).

<4-axis Cartesian type>

X S E L – ☐ – ☐ – 400A – 400A – 400A – 60AB – [☐ – ☐] – ☐ – ☐ – ☐☐☐ – ☐ – 3

| | | | | | | | | | | | | | |
|Series|Type|Number of connected axes|Axis 1|Axis 2|Axis 3|Axis 4|Axis 5|Axis 6|Network|Standard I/O|Expansion I/O|I/O Cable Length|Power supply voltage|

Series / Type

PCT	Dedicated CT4 type
QCT	Dedicated CT4 global type (safety category-compliant specification)

Axis 1 / Axis 2 / Axis 3

400A	400-watt motor, absolute
400A	400-watt motor, absolute
400A	400-watt motor, absolute

Number of connected axes

4	4-axis specification
5	5-axis specification
6	6-axis specification

Axis 4

60AB	60W motor, absolute, with brake

Axis 5 / Axis 6

12I	12W motor (Incremental)
12A	12W motor (Absolute)
20I	20W motor (Incremental)
20A	20W motor (Absolute)
30DI	30W motor for RCS (Incremental)
30DA	30W motor for RCS (Absolute)
30RI	30W motor for RS (Incremental)
30RA	30W motor for RS (Absolute)
60I	60W motor (Incremental)
60A	60W motor (Absolute)
100I	100W motor (Incremental)
100A	100W motor (Absolute)

* The total wattage of Axes 5 and 6 must not be more than 100 W. (Take note that if the above wattage is exceeded, the robot will not operate due to power-supply capacity limitations.)

Network

Blank	Not used
DV	DeviceNet board
CC	CC-Link board
PR	Profibus board
ET	Ethernet board

Standard I/O

E	Not used
N1	Input 32/Output 16 (NPN)
N2	Input 16/Output 32 (NPN)
N3	Input 48/Output 48 (NPN)
P1	Input 32/Output 16 (PNP)
P2	Input 16/Output 32 (PNP)
P3	Input 48/Output 48 (PNP)
S	With expansion I/O base

* If expansion I/O will not be used, enter E (not used) for slots 2 to 4. If you are using expansion I/O, enter the expansion I/O code in the desired slot. If an expansion I/O is specified, the controller chassis will come with the expansion I/O base. If you will not be using the expansion I/O initially but will be adding it later, specify the chassis with I/O expansion board, but specify S for slots 2 to 4.

Power supply voltage

3	Three-phase AC200V

I/O Cable Length

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

* If "E" (not used) or "S" (with expansion I/O base) is specified for all of standard and expansion I/O slots, the I/O cable length will become "0" (no cable).

9

Specifications

Model	Description					
Controller Series, Type	PCT (standard) type			QCT (global) type		
Connecting robots/actuators	CT4, RCS2, RCS3, single-axis robot					
Connectable motor output	CT4 + 100 W max.					
Number of Controlled Axes	4-axis	5-axis	6-axis	4-axis	5-axis	6-axis
Control power-supply input	200/230 AC, single-phase -15%, +10%					
Motor power-supply input	200/230 AC, three-phase -10%, +10%					
Power Supply Frequency	50/60Hz					
Insulation resistance	10 MΩ or more (between power-supply terminal and I/O terminal, or between all external terminals and case, at DC500V)					
Withstand voltage	AC1500V (1 minute)					
Power Supply Capacity (*1)	Max 4019VA	Max 4265VA	Max 4271VA	Max 4019VA	Max 4265VA	Max 4271VA
Position detection method	Incremental Encoder (serial encoder) Absolute encoder with a rotational data backup (serial encoder)					
Safety Circuit Configuration	Redundancy not supported			Redundancy supported		
Drive Source Breaker System	Cutoff by internal relay			External safety circuit		
Enable Input	Contact B input (internally powered)			Contact B input (externally powered, redundant)		
Speed setting	1 mm/sec or greater. The upper limit varies according to the actuator specification.					
Acceleration/Deceleration Setting	0.01 G or greater. The upper limit varies according to the actuator.					
Program language	Super SEL language					
Number of programs	128 Programs					
Number of program steps	9,999 Steps (total)					
Number of multi-tasking programs	16 Programs					
Number of Positions	20,000 Steps (total)					
Data memory device	Flash ROM + SRAM Battery Backup					
Data input method	Teaching pendant or PC software					
Standard Input/Output	48-I/O PIO board (NPN/PNP) or 96-I/O PIO board (NPN/PNP). Only 1 board can be installed.					
Expansion Input/Output	48-I/O PIO board (NPN/PNP) and/or 96-I/O PIO board (NPN/PNP). Up to 3 boards can be installed.					
Serial communication function	Teaching pendant port (D-sub 25-pin) + 2-channel RS232C port (D-sub, 9-pin x 2). Standard equipment.					
Protective function	Motor overcurrent, Overload, Motor driver temperature check, Overload check, Encoder open-circuit check, soft limit over, system error, battery error					
Ambient Operating Temperature / Humidity and Atmosphere	0 to 40ºC, 10 to 95% (non-condensing). Free from corrosive gases. In particular, there shall be no significant dust.					
Robot weight (*2)	5.2kg	5.7kg		4.5kg	5kg	
Accessory	I/O Flat Cable					

*1 When the connected axes represent the maximum wattage.
*2 Including the absolute-data backup battery, brake mechanism and expansion I/O box.

XSEL-PCT/QCT Controller

I/O Signal table

Standard I/O Signal Table (when N1 or P1 is selected)			
Pin No.	Classification	Port No.	Standard Settings
1		-	(J/P/Q type: 24V connection / K type: NC)
2		000	Program start
3		001	General Purpose Input
4		002	General Purpose Input
5		003	General Purpose Input
6		004	General Purpose Input
7		005	General Purpose Input
8		006	General Purpose Input
9		007	Program Specification (PRG No.1)
10		008	Program Specification (PRG No.2)
11		009	Program Specification (PRG No.4)
12		010	Program Specification (PRG No.8)
13		011	Program Specification (PRG No.10)
14		012	Program Specification (PRG No.20)
15		013	Program Specification (PRG No.40)
16		014	General Purpose Input
17	Input	015	General Purpose Input
18		016	General Purpose Input
19		017	General Purpose Input
20		018	General Purpose Input
21		019	General Purpose Input
22		020	General Purpose Input
23		021	General Purpose Input
24		022	General Purpose Input
25		023	General Purpose Input
26		024	General Purpose Input
27		025	General Purpose Input
28		026	General Purpose Input
29		027	General Purpose Input
30		028	General Purpose Input
31		029	General Purpose Input
32		030	General Purpose Input
33		031	General Purpose Input
34		300	Alarm Output
35		301	Ready Output
36		302	Emergency Stop Output
37		303	General Purpose Output
38		304	General Purpose Output
39		305	General Purpose Output
40		306	General Purpose Output
41		307	General Purpose Output
42	Output	308	General Purpose Output
43		309	General Purpose Output
44		310	General Purpose Output
45		311	General Purpose Output
46		312	General Purpose Output
47		313	General Purpose Output
48		314	General Purpose Output
49		315	General Purpose Output
50		-	(J/P/Q type: 0V connection / K type: NC)
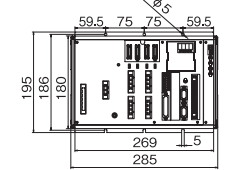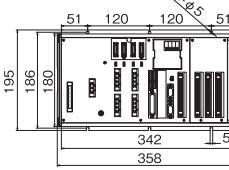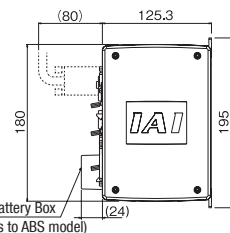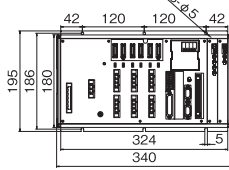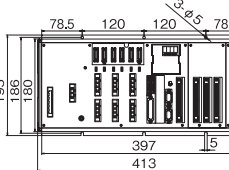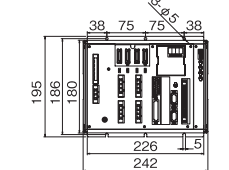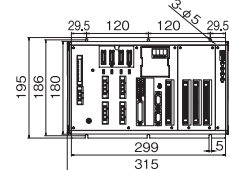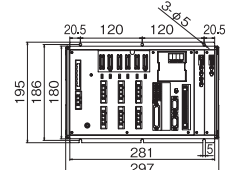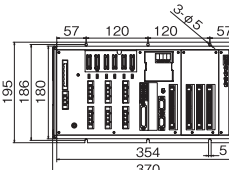
Extension I/O Signal Table (when N1 or P1 is selected)		
Pin No.	Classification	Standard Settings
1		(J/P/Q type: 24V connection / K type: NC)
2		General Purpose Input
3		General Purpose Input
4		General Purpose Input
5		General Purpose Input
6		General Purpose Input
7		General Purpose Input
8		General Purpose Input
9		General Purpose Input
10		General Purpose Input
11		General Purpose Input
12		General Purpose Input
13		General Purpose Input
14		General Purpose Input
15		General Purpose Input
16		General Purpose Input
17	Input	General Purpose Input
18		General Purpose Input
19		General Purpose Input
20		General Purpose Input
21		General Purpose Input
22		General Purpose Input
23		General Purpose Input
24		General Purpose Input
25		General Purpose Input
26		General Purpose Input
27		General Purpose Input
28		General Purpose Input
29		General Purpose Input
30		General Purpose Input
31		General Purpose Input
32		General Purpose Input
33		General Purpose Input
34		General Purpose Output
35		General Purpose Output
36		General Purpose Output
37		General Purpose Output
38		General Purpose Output
39		General Purpose Output
40		General Purpose Output
41		General Purpose Output
42	Output	General Purpose Output
43		General Purpose Output
44		General Purpose Output
45		General Purpose Output
46		General Purpose Output
47		General Purpose Output
48		General Purpose Output
49		General Purpose Output
50		(J/P/Q type: 0V connection / K type: NC)

Extension I/O Signal Table (when N2 or P2 is selected)		
Pin No.	Classification	Standard Settings
1		(J/P/Q type: 24V connection / K type: NC)
2		General Purpose Input
3		General Purpose Input
4		General Purpose Input
5		General Purpose Input
6		General Purpose Input
7		General Purpose Input
8		General Purpose Input
9	Input	General Purpose Input
10		General Purpose Input
11		General Purpose Input
12		General Purpose Input
13		General Purpose Input
14		General Purpose Input
15		General Purpose Input
16		General Purpose Input
17		General Purpose Input
18		General Purpose Output
19		General Purpose Output
20		General Purpose Output
21		General Purpose Output
22		General Purpose Output
23		General Purpose Output
24		General Purpose Output
25		General Purpose Output
26		General Purpose Output
27		General Purpose Output
28		General Purpose Output
29		General Purpose Output
30		General Purpose Output
31		General Purpose Output
32		General Purpose Output
33		General Purpose Output
34	Output	General Purpose Output
35		General Purpose Output
36		General Purpose Output
37		General Purpose Output
38		General Purpose Output
39		General Purpose Output
40		General Purpose Output
41		General Purpose Output
42		General Purpose Output
43		General Purpose Output
44		General Purpose Output
45		General Purpose Output
46		General Purpose Output
47		General Purpose Output
48		General Purpose Output
49		General Purpose Output
50		(J/P/Q type: 0V connection / K type: NC)

External Dimensions

Controller Type		Standard specification	With expansion I/O base	Side View
	Encoder	Absolute	Absolute	Common
	Brake	Yes	Yes	
	I/O	Standard only	Standard + Expansion	
PCT	4 axis Specification	59.5 / 75 / 75 / 59.5 · 195 / 186 / 180 · 269 / 285	51 / 120 / 120 / 51 · 195 / 186 / 180 · 342 / 358	(80) / 125.3 · 180 / 195 · Battery Box (Applies to ABS model) (24)
	5 to 6 axis Specification	42 / 120 / 120 / 42 · 195 / 186 / 180 · 324 / 340	78.5 / 120 / 120 / 78.5 · 195 / 186 / 180 · 397 / 413	
QCT	4 axis Specification	38 / 75 / 75 / 38 · 195 / 186 / 180 · 226 / 242	29.5 / 120 / 120 / 29.5 · 195 / 186 / 180 · 299 / 315	
	5 to 6 axis Specification	20.5 / 120 / 120 / 20.5 · 195 / 186 / 180 · 281 / 297	57 / 120 / 120 / 57 · 195 / 186 / 180 · 354 / 370	

11

Option

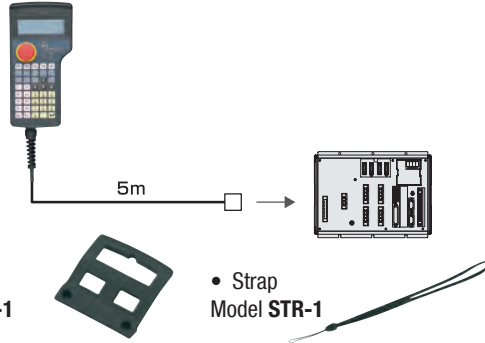### Teaching Pendant

A teaching device that has program/position input, test operation, monitoring function, etc.

Model

Model	Description
SEL-T	Standard type
SEL-TD	With deadman switch

Configuration

SEL-T
SEL-TD

66.6 110.0 55.0 218.3 39.0 46.9 89.6

SEL-T Option
• Wall-mounting hook Model **HK-1**
• Strap Model **STR-1**

5m
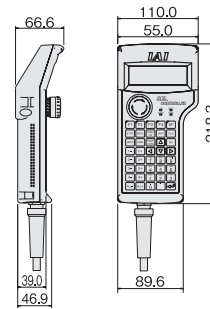
Specifications

Item	SEL-T	SEL-TD
3-position enable switch	Not available	Available
ANSI/UL standard	Not supported	Supported
CE mark	Supported	
Display	20 characters x 4 lines	
Ambient operating temperature/humidity	0 to 40ºC 10 to 90% RH (non-condensing)	
Protective structure	IP54	
Mass	Approx. 0.4 kg (cable excluded)	

PC software (Windows dedicated)

Features A startup support software program offering program/position input function, test operation function, monitoring function, and more.
The functions needed for debugging have been enhanced to help reduce the startup time.

<XSEL-P/PX/PCT Type>

Model **IA-101-X-MW** (with RS232C cable)

Configuration

PC Software (CD)

Applicable controller
XSEL-P/PX/PCT

5m

RS232C Cable
CB-ST-E1MW050-EB
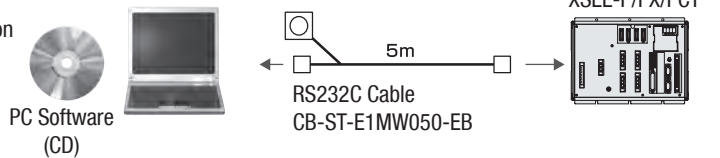
Model **IA-101-X-USBMW** (with USB Conversion Adapter + Cable)

Configuration

PC Software (CD)

USB Conversion Adapter
IA-CV-USB

3m

USB Cable
CB-SEL-USB030

5m

RS232C Cable
CB-ST-E1MW050-EB

Applicable controller
XSEL-P/PX/PCT

<XSEL-Q/QX/QCT Type>
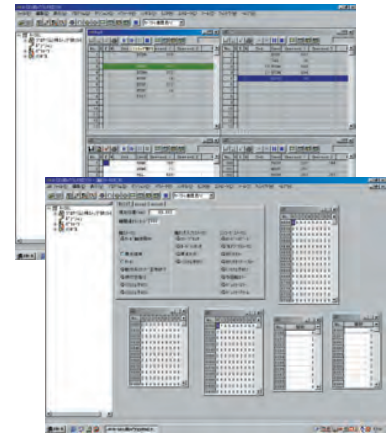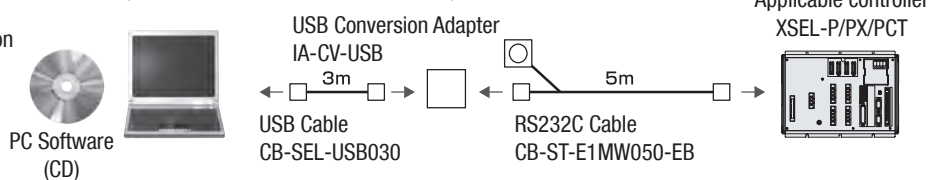
Model **IA-101-XA-MW** (with safety category 4-compliant cable)

Configuration

PC Software (CD)

5m

Safety category-compliant cable
CB-ST-A1MW050-EB

Applicable controller
XSEL-Q/QX/QCT
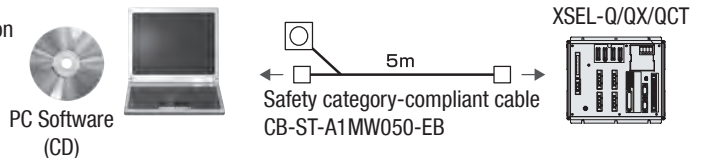
Note
Use the IA-101-X-MW or IA-101-X-USBMW for the XSEL-P/PX/PCT.
Use the IA-101-XA-MW for the XSEL-Q/QX/QCT.
Note that connecting a PC software cable to a controller not supporting the cable may damage the internal parts of the controller.

12

Motor Cable <Orthogonal 4 axes + rotational axis type>

Model: **CB-CT4R-MA** ☐ ☐ ☐

[Minimum bending radius]
Flexible cable:　51 mm
Fixed cable:　　34 mm

Enter the cable length (L) into ☐ ☐ ☐ (Maximum 30m). Ex.: 080 = 8m

CN 2

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 3

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 4

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 5

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 6

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 1

Pin no.	Signal name	Size
A01	U	
A02	V	
B01	W	
B02	PE	
A03	U	
A04	V	
B03	W	
B04	PE	
A05	U	
A06	V	AWG 18
B05	W	
B06	PE	
A07	U	
A08	V	
B07	W	
B08	PE	
A09	U	
A10	V	
B09	W	
B10	PE	

Encoder Cable <Orthogonal 4 axes + rotational axis type>

Model: **CB-CT4R-PA** ☐ ☐ ☐

[Minimum bending radius]
Flexible cable:　44 mm
Fixed cable:　　29 mm

Enter the cable length (L) into ☐ ☐ ☐ (Maximum 30m). Ex.: 080 = 8m

CN 2
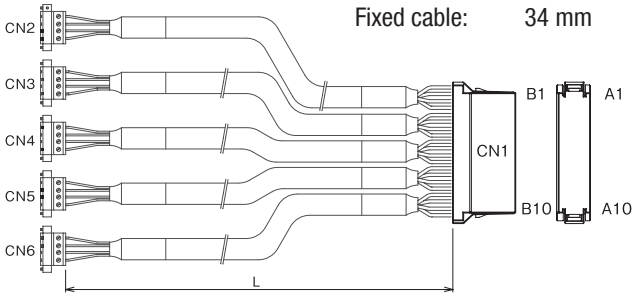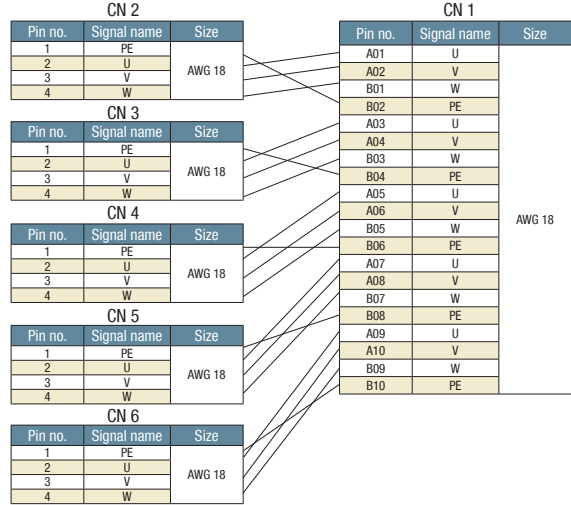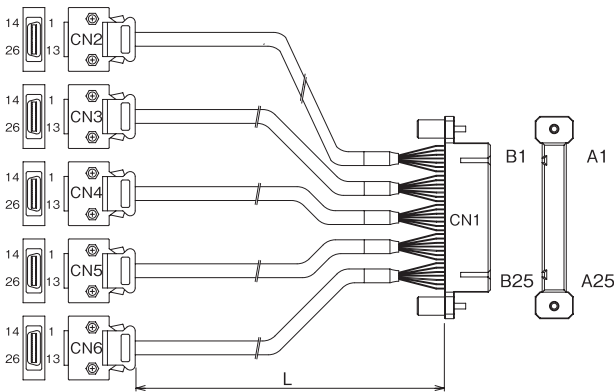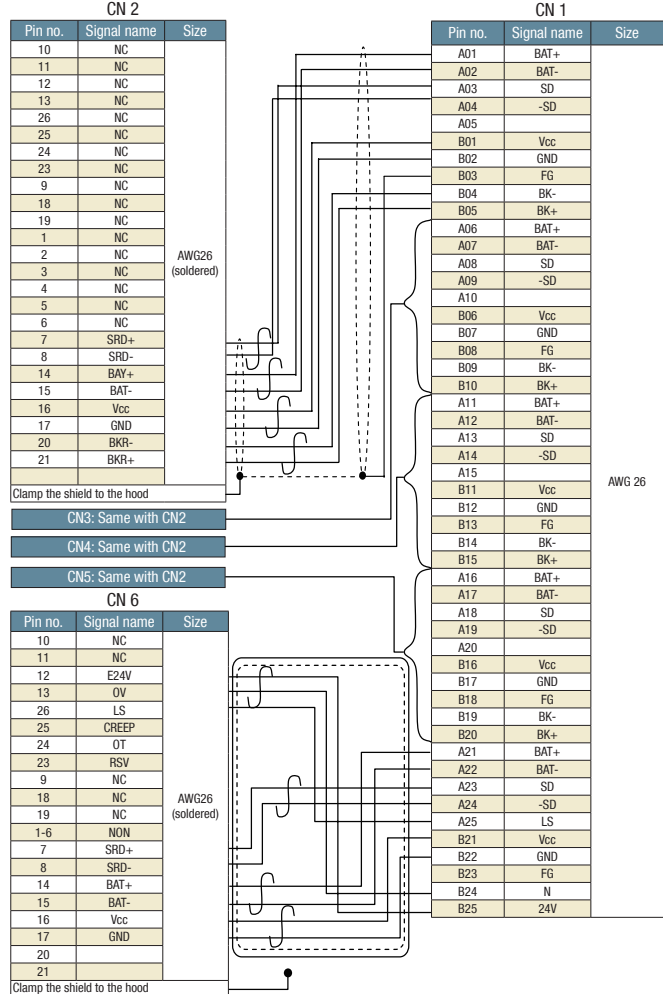
Pin no.	Signal name	Size
10	NC	
11	NC	
12	NC	
13	NC	
26	NC	
25	NC	
24	NC	
23	NC	
9	NC	
18	NC	
19	NC	
1	NC	
2	NC	AWG26 (soldered)
3	NC	
4	NC	
5	NC	
6	NC	
7	SRD+	
8	SRD-	
14	BAY+	
15	BAT-	
16	Vcc	
17	GND	
20	BKR-	
21	BKR+	

Clamp the shield to the hood

CN3: Same with CN2

CN4: Same with CN2

CN5: Same with CN2

CN 6

Pin no.	Signal name	Size
10	NC	
11	NC	
12	E24V	
13	0V	
26	LS	
25	CREEP	
24	OT	
23	RSV	
9	NC	
18	NC	
19	NC	
1-6	NON	
7	SRD+	AWG26 (soldered)
8	SRD-	
14	BAT+	
15	BAT-	
16	Vcc	
17	GND	
20		
21		

Clamp the shield to the hood

CN 1

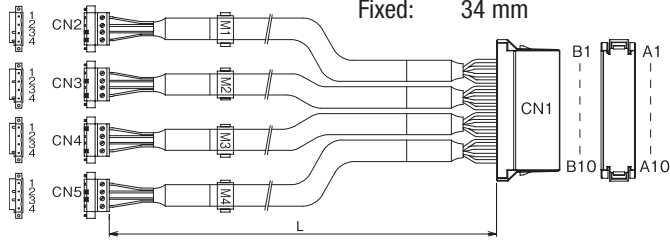| Pin no.	Signal name	Size
A01	BAT+	
A02	BAT-	
A03	SD	
A04	-SD	
A05		
B01	Vcc	
B02	GND	
B03	FG	
B04	BK-	
B05	BK+	
A06	BAT+	
A07	BAT-	
A08	SD	
A09	-SD	
A10		
B06	Vcc	
B07	GND	
B08	FG	
B09	BK-	
B10	BK+	
A11	BAT+	
A12	BAT-	
A13	SD	
A14	-SD	
A15		
B11	Vcc	AWG 26
B12	GND	
B13	FG	
B14	BK-	
B15	BK+	
A16	BAT+	
A17	BAT-	
A18	SD	
A19	-SD	
A20		
B16	Vcc	
B17	GND	
B18	FG	
B19	BK-	
B20	BK+	
A21	BAT+	
A22	BAT-	
A23	SD	
A24	-SD	
A25	LS	
B21	Vcc	
B22	GND	
B23	FG	
B24	N	
B25	24V	

13

Motor cable < 4-axis Cartesian type >

Model **CB-CT4-MA** ☐ ☐ ☐

[Minimum Bend Radius]
Movable: 51 mm
Fixed: 34 mm

Enter the cable length (L) into ☐ ☐ ☐ (Maximum 30m). Ex.: 080 = 8m

CN 2

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 3

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 4

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 5

Pin no.	Signal name	Size
1	PE	
2	U	AWG 18
3	V	
4	W	

CN 1

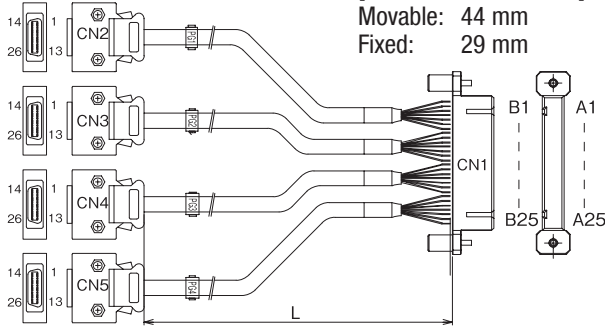| Pin no.	Signal name	Size
A01	U	
A02	V	
B01	W	
B02	PE	
A03	U	
A04	V	
B03	W	
B04	PE	
A05	U	
A06	V	AWG 18
B05	W	
B06	PE	
A07	U	
A08	V	
B07	W	
B08	PE	
A09	NC	
A10	NC	
B09	NC	
B10	NC	

Encoder cable < 4-axis Cartesian type >

Model **CB-CT4-PA** ☐ ☐ ☐

[Minimum Bend Radius]
Movable: 44 mm
Fixed: 29 mm

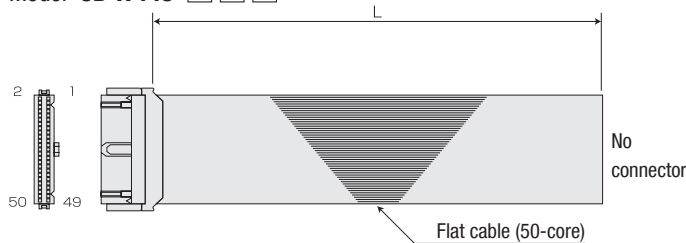Enter the cable length (L) into ☐ ☐ ☐ (Maximum 30m). Ex.: 080 = 8m

CN 2

Pin no.	Signal name	Size
10	NC	
11	NC	
12	NC	
13	NC	
26	NC	
25	NC	
24	NC	
23	NC	
9	NC	
18	NC	
19	NC	
1	NC	
2	NC	
3	NC	AWG18
4	NC	(soldered)
5	NC	
6	NC	
7	SRD+	
8	SRD-	
14	BAY+	
15	BAT-	
16	Vcc	
17	GND	
20	BJR+	
21	BKR-	

The shield is connected to the hood by a clamp.

| CN3: Same with CN2 |
| CN4: Same with CN2 |
| CN5: Same with CN2 |

CN 1

Pin no.	Signal name	Size
A01	BAT+	
A02	BAT-	
A03	SD	
A04	-SD	
A05		
B01	Vcc	
B02	GND	
B03	FG	
B04	BK-	
B05	BK+	
A06	BAT+	
A07	BAT-	
A08	SD	
A09	-SD	
A10		
B06	Vcc	
B07	GND	
B08	FG	
B09	BK-	
B10	BK+	
A11	BAT+	
A12	BAT-	
A13	SD	
A14	-SD	
A15		AWG 26
B11	Vcc	
B12	GND	
B13	FG	
B14	BK-	
B15	BK+	
A16	BAT+	
A17	BAT-	
A18	SD	
A19	-SD	
A20		
B16	Vcc	
B17	GND	
B18	FG	
B19	BK-	
B20	BK+	
A21		
A22		
A23		
A24		
A25		
B21		
B22		
B23		
B24		
B25		

I/O flat cable (for XSEL-J/K/P/Q)

Model **CB-X-PIO** ☐ ☐ ☐

Flat cable (50-core)

No connector

Enter the cable length (L) into ☐ ☐ ☐ (Maximum 10m). Ex.: 080 = 8m

Number	Color	Wire	Number	Color	Wire	Number	Color	Wire
1	Brown 1		18	Gray 2		35	Green 4	
2	Red 1		19	White 2		36	Blue 4	
3	Orange 1		20	Black 2		37	Purple 4	
4	Yellow 1		21	Brown-3		38	Gray 4	
5	Green 1		22	Red 3		39	White 4	
6	Blue 1		23	Orange 3		40	Black 4	
7	Purple 1		24	Yellow 3		41	Brown-5	
8	Gray 1	Flat cable crimped	25	Green 3	Flat cable crimped	42	Red 5	Flat cable crimped
9	White 1		26	Blue 3		43	Orange 5	
10	Black 1		27	Purple 3		44	Yellow 5	
11	Brown-2		28	Gray 3		45	Green 5	
12	Red 2		29	White 3		46	Blue 5	
13	Orange 2		30	Black 3		47	Purple 5	
14	Yellow 2		31	Brown-4		48	Gray 5	
15	Green 2		32	Red 4		49	White 5	
16	Blue 2		33	Orange 4		50	Black 5	
17	Purple 2		34	Yellow 4				

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