

Table Top Type Robot TTA

First Step Guide Seventh Edition

Thank you for purchasing our product.

Make sure to read the Safety Guide and detailed Instruction Manual as well as this First Step Guide to ensure correct use.

This Instruction Manual is original.

Warning : Read the instruction manual carefully and follow the instruction manual when handling this equipment.
 Please download the user's manual from our website.
 You can download it free of charge. User registration is required for first time users.
 URL:www.iai-robot.co.jp/data_dl/CAD_MANUAL/
 Keep a printout of the introduction manual near the equipment in which this product is installed so that it can be checked at all times, or display it on your computer, tablet terminal, etc. so that you can check it immediately.
 If you need a bound copy of the instruction manual, order it from the nearest sales office listed in the First Step Guide or at the end of the instruction manual. It will be provided for a fee.

- Using or copying all or part of this Instruction Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

Product Check

This product is comprised of the following parts if it is of standard configuration.

If you find any fault in the contained model or any missing parts, contact us or our distributor.

1. Parts

No.	Part Name	Model	Quantity	Reference
1	Robot Main Unit (with built-in controller)	Refer to "How to read the model plate", "How to read the model"	1	
Accessories				
2	Power Supply Plug	AP-400-C	1	Enclosed in PU
3	I/O Flat Cable	CB-PAC-PIO020	1 to 3	Length depends on indication of I/O cable length
4	System I/O Connector	DFMC1.5/6-ST-3.5 (Supplier : Phoenix Contact)	1	
5	Motor Power Connector For the AC Servo Motor Type	B2L 3.50/04/180 SN OR BX (Supplier : Weidmüller)	1	
	Motor Power Connector For the Pulse Motor Type	FKIC2.5HC/2-ST-5.08 (Supplier : Phoenix Contact)	1	
6	CC-Link Connector	MSTB2.5/5-STF-5.08 AU (Supplier : Phoenix Contact)	1 or 2	Enclosed in CC
7	DeviceNet Connector	MSTB2.5/5-STF-5.08 AU M (Supplier : Phoenix Contact)	1 or 2	Enclosed in DV
8	Dummy Plug	DP-2	1	Enclosed in global specification TTA-A□□G and TTA-C□□G
9	Power Cable For the AC100V Power Cable For the AC200V		1	Enclosed in 100V AC type Enclosed in 200V AC type
10	Main Unit Installation Bracket For the X-axis stroke 20/30 Main Unit Installation Bracket For the X-axis stroke 40/50	TTA-FT-4 TTA-FT-6	4 6	Enclosed to main unit installation bracket option FT4 Enclosed to main unit installation bracket option FT6
11	First Step Guide	ME0321	1	
12	Safety Guide	M0194	1	

2. Teaching Tool (Option)

The personal computer application software or teaching pendant is required for the operations including program creation and setup such as position setting and parameter setting with teaching. Use either of them.

No.	Part Name	Model	Reference
1	PC Software (with RS232C cable + Emergency stop box)	IA-101-X-MW	RS232C→RS232C ^{*1}
2	PC Software (USB conversion adapter + RS232C cable + Cable and emergency stop box)	IA-101-X-USBMW	USB→RS232C ^{*1}
3	PC Software (with USB Cable + Dummy plug)	IA-101-TTA-USB	USB→USB ^{*1}
4	Touch panel teaching pendant (with deadman switch)	TB-01(D/DR)	—
5	Touch panel teaching pendant (with deadman switch)	TB-02(D)	—
6	Touch panel teaching pendant	TB-03	—
7	Teaching pendant (with deadman switch)	SEL-T (SEL-TD)	—

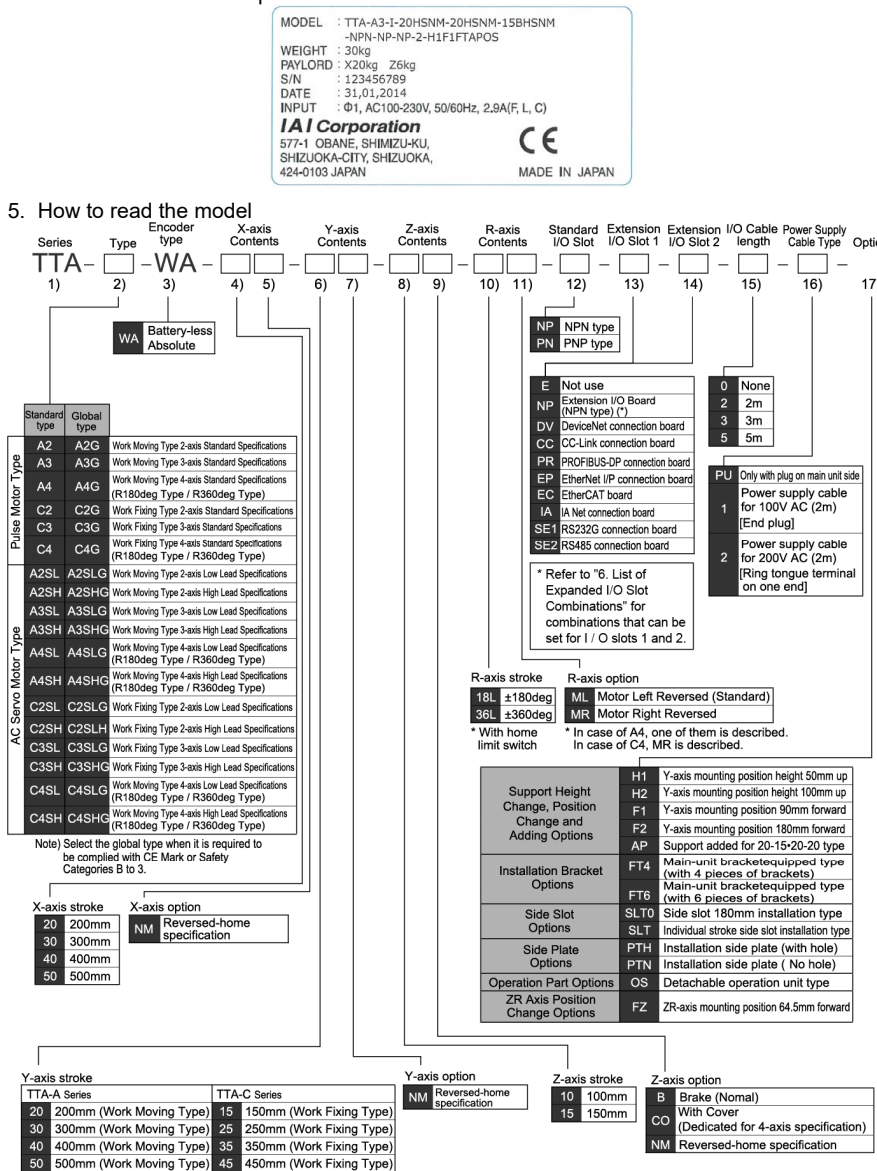
^{*1} The communication port on the left is for the personal computer and on the right is for the TTA.

3. Instruction Manuals related to this product

No.	Name	Manual No.
1	Table Top Type Robot TT Instruction Manual	ME0320
2	PC software IA-101-X-MW Instruction Manual	ME0154
3	Touch panel teaching pendant TB-01, TB-01D, TB-01DR Instruction Manual	ME0325
4	Touch panel teaching pendant TB-02, TB-02D Instruction Manual	ME0356
5	Touch panel teaching pendant TB-03 Instruction Manual	ME0377
6	Teaching pendant SEL-T/TD Instruction Manual ^{*1}	ME0183
7	DeviceNet Instruction Manual	ME0124
8	CC-Link Instruction Manual	ME0123
9	PROFIBUS-DP Instruction Manual	ME0153
10	EtherNet/IP Instruction Manual	ME0308
11	EtherCAT Instruction Manual	ME0309
12	Applicable for IA Net Instruction Manual	ME0339

^{*1} Applicable in Ver.1.16 and later with hardware revision "2"

4. How to read the model plate



6. List of Expanded I/O Slot Combinations

○: Selectable ×: Unavailable to Select

		I/O Slot 2										
		E	DV	CC	PR	EP	EC	IA	SE1	SE2	NP	PN
I/O Slot 1	E	○	×	×	×	×	×	×	×	×	×	×
	DV	○	○	○	○	○	○	○	○	○	○	○
	CC	○	○	○	○	○	○	○	○	○	○	○
	PR	○	○	○	○	○	○	○	○	○	○	○
	EP	○	×	×	×	×	×	×	×	×	×	×
	EC	○	○	○	○	○	○	○	○	○	○	○
	IA	○	×	×	×	×	×	×	×	×	×	×
	SE1	○	○	○	○	○	○	○	○	○	○	○
	SE2	○	○	○	○	○	○	○	○	○	○	○
	NP	○	○	○	○	○	○	○	○	○	○	○
	PN	○	○	○	○	○	○	○	○	○	○	○

Basic Specifications

[Common Specifications]

• Pulse Motor Type

Item	Specifications
Surrounding air temperature/humidity	0 to 40°C, Room Humidity 20 to 85% or less
Motor Type	Stepping Motor (Servo Control)
Position detection method	Battery-less Absolute Encoder or Incremental Encoder
Driving System	Ball Screw (X, Y-axis : φ12mm Z-axis : φ10mm Rolled C10) Ball Screw Lead X, Y-axis : 24 or equivalent, Z-axis : 12mm
Positioning Repeatability	± 0.02mm (X, Y, Z-axis), ± 0.015deg (R-axis) (Standard Specifications) ± 0.01mm (X, Y, Z-axis), ± 0.010deg (R-axis) (High Resolution Specifications)
Backlash	0.1mm or less (X, Y, Z-axis), 0.06deg or less (R-axis) (Standard Specifications) 0.05mm or less (X, Y, Z-axis), 0.06deg or less (R-axis) (High Resolution Specifications)
Guide	Direct Driven Infinite Circulation Type
Allowable Load Moment * Values assumed for life of 5000km run	X-axis: Ma:15.9N·m Mb: 15.9N·m Mc: 32.0N·m (Gate-shaped Type) Y-axis: Ma:12.6N·m Mb: 12.6N·m Mc: 37.4N·m Z-axis: Ma: 9.7N·m Mb: 9.7N·m Mc: 20.5N·m ZR-axis: Ma: 9.7N·m Mb: 9.7N·m Mc: 20.5N·m

• AC Servo Motor Type

Item	Specifications
Surrounding air temperature/humidity	0 to 40°C, Room Humidity 20 to 85% or less
Motor Type	AC Servo Motor
Position detection method	Battery-less Absolute Encoder or Incremental Encoder
Driving System	Ball Screw (X, Y-axis : φ12mm Z-axis : φ10mm Rolled C10 C5 or equivalent) Ball Screw X, Y-axis : 8mm Z-axis : 3mm (Low Lead Specifications) Ball Screw X, Y-axis : 16mm Z-axis : 6mm (High Lead Specifications)
Positioning Repeatability	± 0.005mm (X, Y, Z-axis), ± 0.015deg (R-axis) (Battery-less Absolute) ± 0.005mm (X, Y, Z-axis), ± 0.010deg (R-axis) (Absolute)
Backlash	0.025mm or less (X, Y, Z-axis), 0.06deg or less (R-axis) (Battery-less Absolute) (Low Lead) 0.040mm or less (X, Y, Z-axis), 0.06deg or less (R-axis) (Battery-less Absolute) (High Lead) 0.02mm or less (X, Y, Z-axis), 0.03deg or less (R-axis) (Absolute)
Guide	Direct Driven Infinite Circulation Type
Allowable Load Moment * Values assumed for life of 5000km run	X-axis: Ma:18.8N·m Mb: 18.8N·m Mc: 37.8N·m (Gate-shaped Type) Y-axis: Ma:14.9N·m Mb: 14.9N·m Mc: 44.3N·m Z-axis: Ma: 11.5N·m Mb: 11.5N·m Mc: 24.3N·m ZR-axis: Ma: 11.5N·m Mb: 11.5N·m Mc: 24.3N·m

[Individual Mechanism Specifications]

• Work Moving Type Pulse Motor Type

Type	Stroke [mm]				Max. Speed for Each Axes [mm/sec]				Max. acceleration/deceleration speed [G]	Max. Load Capacity [kg] ^{*1}			Weight [kg]	Model
	X Axis	Y Axis	Z Axis	R Axis	X Axis	Y Axis	Z Axis	R Axis		X Axis	Y Axis	Z Axis		
2-Axis	200	200	—	—	800	800	—	—	X, Y axis : 0.4 Z axis : 0.2	20	10	6	24.0	TTA-A2-*2020
	300	300	—	—			—	—					31.0	TTA-A2-*3030
	400	400	—	—			—	—					37.0	TTA-A2-*4040
	500	500	—	—			—	—					44.0	TTA-A2-*5050
3-Axis	200	200	—	—	800	800	—	—	X, Y axis : 0.4 Z axis : 0.2	20	10	6	27.0	TTA-A3-*2020
	300	300	—	—			—	—					34.0	TTA-A3-*3030
	400	400	—	—			—	—					40.0	TTA-A3-*4040
	500	500	—	—			—	—					47.0	TTA-A3-*5050
4-Axis	200	200	100/150	—	800	800	400	—	±180 / ±360 [deg]	20	10	6	28.0	TTA-A4-*2020
	300	300	—	—			—	—					35.0	TTA-A4-*3030
	400	400	—	—			—	—					41.0	TTA-A4-*4040
	500	500	—	—			—	—					48.0	TTA-A4-*5050

^{*1} X Axis : 0.2G, Stroke 300mm or less, Y Axis : 0.4G, Stroke 700mm or less,
Z Axis : 0.2G, Stroke 50mm or less

• Work Fixing Type Pulse Motor Type

Type	Stroke [mm]				Max. Speed for Each Axes [mm/sec]				Max. acceleration/deceleration speed [G]	Max. Load Capacity [kg] ^{*2}			Weight [kg]	Model
	X Axis	Y Axis	Z Axis	R Axis	X Axis	Y Axis	Z Axis	R Axis		X Axis	Y Axis	Z Axis		
2-Axis	200	150	—	—	600	540	—	—	0.2	10	10	—	24.0	TTA-C2-*2015
	300	250	—	—	700	640	—	—					31.0	TTA-C2-*3025
	400	350	—	—	800	800	—	—					37.0	TTA-C2-*4035
	500	450	—	—	—	—	—	—					44.0	TTA-C2-*5045
3-Axis	200	150	—	—	600	540	—	—	0.2	6	6	6	27.0	TTA-C3-*2015
	300	250	—	—	700	640	—	—					34.0	TTA-C3-*3025
	400	350	—	—	800	800	—	—					40.0	TTA-C3-*4035
	500	450	—	—	—	—	—	—					47.0	TTA-C3-*5045
4-Axis	200	150	100/150	—	600	540	400	—	±180 / ±360 [deg]	6	6	6	28.0	TTA-C4-*2015
	300	250	—	—	700	640	—	—					35.0	TTA-C4-*3025
	400	350	—	—	800	800	—	—					41.0	TTA-C4-*4035
	500	450	—	—	—	—	—	—					48.0	TTA-C4-*5045

^{*2} [2-Axis type] X Axis : 0.2G, Stroke 600mm or less, Y Axis : 0.2G, Stroke 700mm or less
[3, 4-Axis type] X Axis : 0.2G, Stroke 400mm or less, Z Axis : 0.2G, Stroke 50mm or less

● Work Moving Type Servo Motor Low Lead Specifications

Type	Stroke [mm]				Max. Speed for Each Axes [mm/sec]				Max. acceleration/ deceleration speed [G]	Max. Load Capacity [kg] *2			Weight [kg]	Model
	X Axis	Y Axis	Z Axis	R Axis	X Axis	Y Axis	Z Axis	R Axis		X Axis	Y Axis	Z Axis		
2-Axis	200	200	—	—	600	600	170	1500 [deg/sec]	X, Y axis : 0.5 Z axis : 0.3	30	20	15	24.0	TTA-A2SL-*2020
	300	300	—	—									31.0	TTA-A2SL-*3030
	400	400	—	—									37.0	TTA-A2SL-*4040
	500	500	—	—									44.0	TTA-A2SL-*5050
3-Axis	200	200	100/150	—	600	600	170	1500 [deg/sec]	X, Y axis : 0.5 Z axis : 0.3	30	20	15	27.3	TTA-A3SL-*2020
	300	300		—									34.3	TTA-A3SL-*3030
	400	400		—									40.3	TTA-A3SL-*4040
	500	500		—									47.3	TTA-A3SL-*5050
4-Axis	200	200	100/150	±180 / ±360 [deg]	600	600	170	1500 [deg/sec]	X, Y axis : 0.5 Z axis : 0.3	30	20	15	29.3	TTA-A4SL-*2020
	300	300											36.3	TTA-A4SL-*3030
	400	400											42.3	TTA-A4SL-*4040
	500	500											49.3	TTA-A4SL-*5050

● Work Fixing Type Servo Motor Low Lead Specifications

Type	Stroke [mm]				Max. Speed for Each Axes [mm/sec]				Max. acceleration/ deceleration speed [G]	Max. Load Capacity [kg] *2			Weight [kg]	Model
	X Axis	Y Axis	Z Axis	R Axis	X Axis	Y Axis	Z Axis	R Axis		X Axis	Y Axis	Z Axis		
2-Axis	200	150	—	—	600	600	170	1500 [deg/sec]	X axis : 0.2 Y, Z axis : 0.3	30	20	15	25.0	TTA-C2SL-*2015
	300	250	—	—									33.0	TTA-C2SL-*3025
	400	350	—	—									40.0	TTA-C2SL-*4035
	500	450	—	—									47.0	TTA-C2SL-*5045
3-Axis	200	150	100/150	—	600	600	170	1500 [deg/sec]	X axis : 0.2 Y, Z axis : 0.3	30	20	15	29.3	TTA-C3SL-*2015
	300	250		—									37.3	TTA-C3SL-*3025
	400	350		—									44.3	TTA-C3SL-*4035
	500	450		—									51.3	TTA-C3SL-*5045
4-Axis	200	150	100/150	±180 / ±360 [deg]	600	600	170	1500 [deg/sec]	X axis : 0.2 Y, Z axis : 0.3	30	20	15	31.3	TTA-C4SL-*2015
	300	250											39.3	TTA-C4SL-*3025
	400	350											46.3	TTA-C4SL-*4035
	500	450											53.3	TTA-C4SL-*5045

● Work Moving Type Servo Motor High Lead Specifications

Type	Stroke [mm]				Max. Speed for Each Axes [mm/sec]				Max. acceleration/ deceleration speed [G]	Max. Load Capacity [kg] *2			Weight [kg]	Model
	X Axis	Y Axis	Z Axis	R Axis	X Axis	Y Axis	Z Axis	R Axis		X Axis	Y Axis	Z Axis		
2-Axis	200	200	—	—	1000	1000	400	1500 [deg/sec]	X, Y axis : 0.7 Z axis : 0.5	15	11	7	24.0	TTA-A2SH-*2020
	300	300	—	—	1200	1200							31.0	TTA-A2SH-*3030
	400	400	—	—	1200	1200							37.0	TTA-A2SH-*4040
	500	500	—	—	1200	1200							44.0	TTA-A2SH-*5050
3-Axis	200	200	100/150	—	1000	800	400	1500 [deg/sec]	X, Y axis : 0.7 Z axis : 0.5	15	11	7	27.3	TTA-A3SH-*2020
	300	300		—	1000	1000							34.3	TTA-A3SH-*3030
	400	400		—	1200	1200							40.3	TTA-A3SH-*4040
	500	500		—	1200	1200							47.3	TTA-A3SH-*5050
4-Axis	200	200	100/150	±180 / ±360 [deg]	1000	700	400	1500 [deg/sec]	X, Y axis : 0.7 Z axis : 0.5	15	11	7	29.3	TTA-A4SH-*2020
	300	300			900	900							36.3	TTA-A4SH-*3030
	400	400			1050	1050							42.3	TTA-A4SH-*4040
	500	500			1200	1200							49.3	TTA-A4SH-*5050

● Work Fixing Type Servo Motor High Lead Specifications

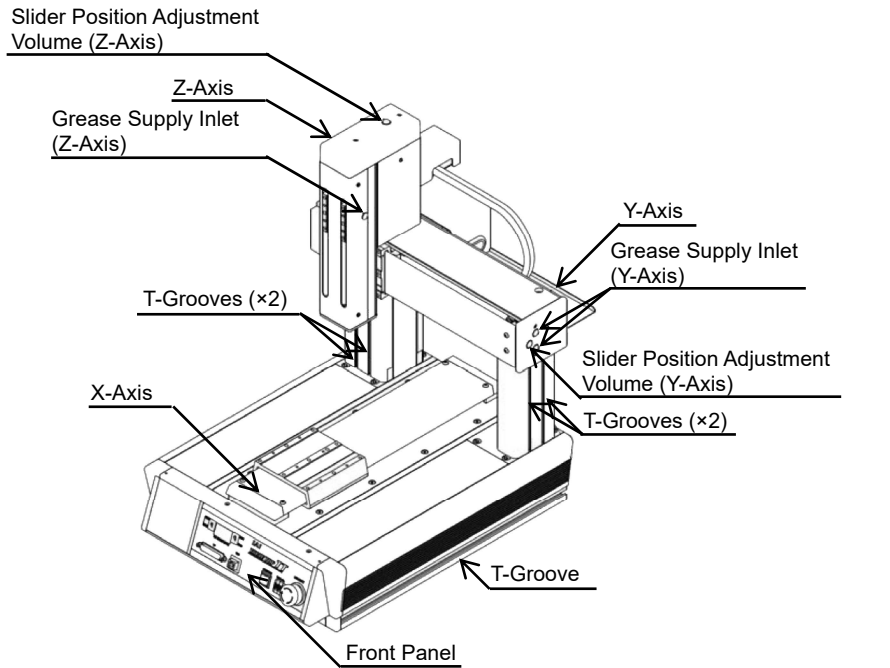
Type	Stroke [mm]				Max. Speed for Each Axes [mm/sec]				Max. acceleration/ deceleration speed [G]	Max. Load Capacity [kg] *2			Weight [kg]	Model
	X Axis	Y Axis	Z Axis	R Axis	X Axis	Y Axis	Z Axis	R Axis		X Axis	Y Axis	Z Axis		
2-Axis	200	150	—	—	700	600	400	1500 [deg/sec]	X, Y axis : 0.3 Z axis : 0.5	22	12	7	25.0	TTA-C2SH-*2015
	300	250	—	—	900	800							33.0	TTA-C2SH-*3025
	400	350	—	—	1000	1000							40.0	TTA-C2SH-*4035
	500	450	—	—	1000	1000							47.0	TTA-C2SH-*5045
3-Axis	200	150	100/150	—	600	600	400	1500 [deg/sec]	X, Y axis : 0.3 Z axis : 0.5	22	12	7	29.3	TTA-C3SH-*2015
	300	250		—	750	800							37.3	TTA-C3SH-*3025
	400	350		—	850	1000							44.3	TTA-C3SH-*4035
	500	450		—	1000	1000							51.3	TTA-C3SH-*5045
4-Axis	200	150	100/150	±180 / ±360 [deg]	600	600	400	1500 [deg/sec]	X, Y axis : 0.3 Z axis : 0.5	22	12	7	31.3	TTA-C4SH-*2015
	300	250			750	800							39.3	TTA-C4SH-*3025
	400	350			850	1000							46.3	TTA-C4SH-*4035
	500	450			1000	1000							53.3	TTA-C4SH-*5045

[Controller Specifications]

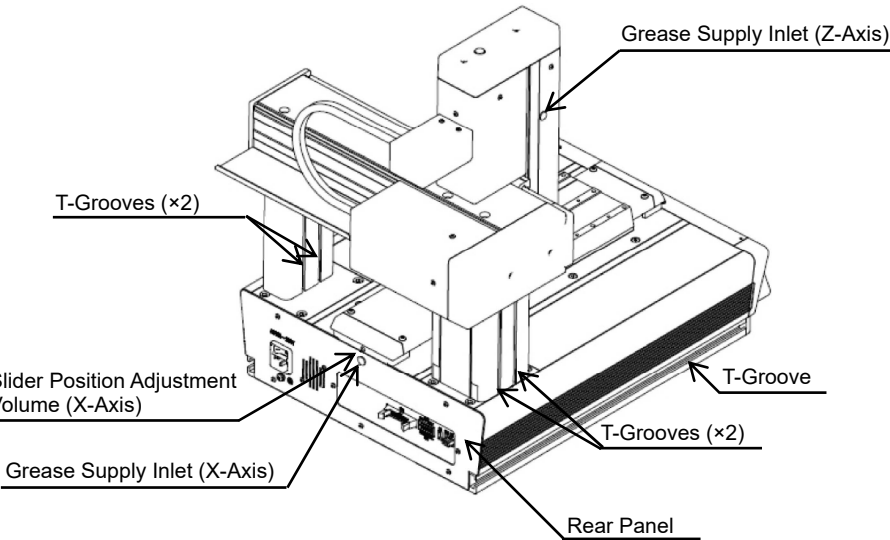
Item	Specifications		
	Number of axes	2-axis	3-axis 4-axis
Supply voltage	AC100 to 230V ±10%		
Power frequency	50Hz/60Hz ±5%		
Current Consumption	1.2A		
Rush Current	15A (AC100V), 30A (AC200V)		
Leakage Current	0.75mA or less		
Insulation Strength	1500V AC for 1min.		
Momentary Power Interruption	20ms or more		
Program language	Super SEL language		
Number of programs (Number	255 programs (16 programs)		
Number of program steps	9999 steps		
Number of positions	30000 positions (10000 points for system memory backup)		
Program Startup	Special Digital Switch + Special Start Switch		
Data storage device	Flash ROM + SRAM		
Standard I/O Board	16 Input Points / 16 Output Points		
Applicable Field Network	DeviceNet, CC-Link, PROFIBUS, EtherNet/IP, EtherCAT		

Names of the Parts

<Front Side>



< Rear Side>



Refer to Catalog or Instruction Manual for the dimensions and profile.

Installation Environment

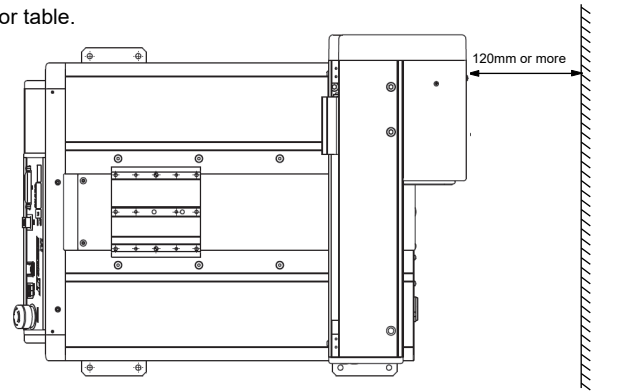
- Do not use this product in the following environment.
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
 - Location where condensation occurs due to abrupt temperature changes
 - Location where relative humidity exceeds 85%RH
 - Location exposed to corrosive gases or combustible gases
 - Location exposed to significant amount of dust, salt or iron powder
 - Location subject to direct vibration or impact
 - Location exposed to direct sunlight
 - Location where the product may come in contact with water, oil or chemical droplets
 - Environment that blocks the air vent [Refer to Installation and Noise Elimination Section]

When using the product in any of the locations specified below, provide a sufficient shield.

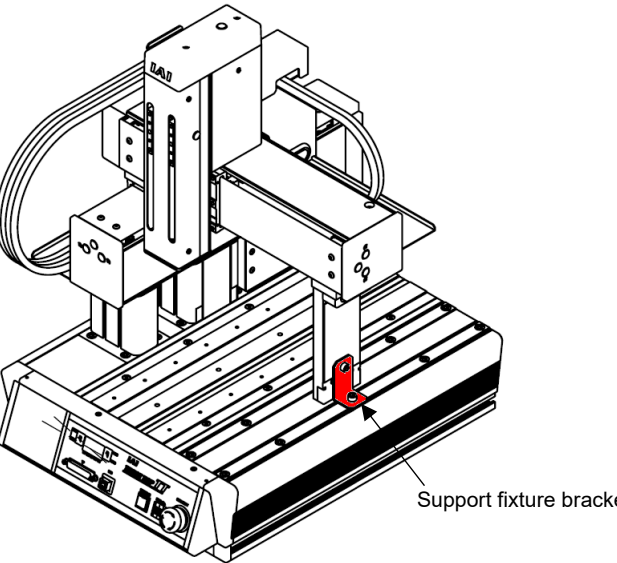
- Location subject to electrostatic noise
- Location where high electrical or magnetic field is present
- Location with the mains or power lines passing nearby

Installation and Noise Elimination

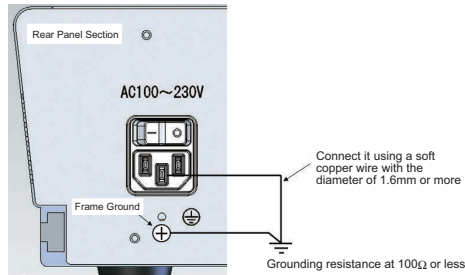
1. There is a cooling vent hole on the main body's rear panel section. Do not close the vent hole when the main body is installed.
2. When it required to fix the main body, fix it as follows using the optional mounting brackets (Model TT-FT: 4 sets with secure bolts and nuts). User supplied bolts to secure the brackets to the mounting surface or table.



⚠ Caution : TTA-C-30/40/50 should have a support fixture bracket highlighted in red supporting the prop on the tip of the Y-axis during transportation. Remove this bracket during operation. Otherwise it may cause damage on the main axis or drop of product life.

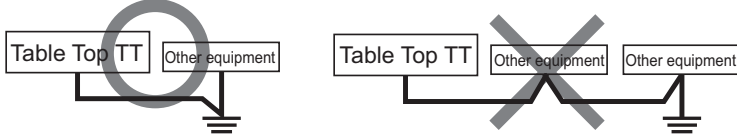


3. Protective Ground



4. Noise Elimination Grounding (Frame Ground)

Connect it using a soft copper wire with the diameter of 1.6 mm or more to the frame ground on the main body (Refer to the above figure).
Do not share the ground wire with or connect to other equipment. Ground each controller.
The same procedure is applied for the protective ground.



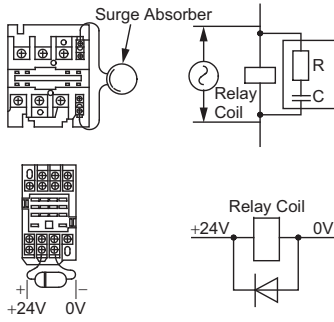
5. Precautions Regarding wiring Method

Separate the I/O cable, communication line and power / driving cable each other

6. Noise Sources and Elimination

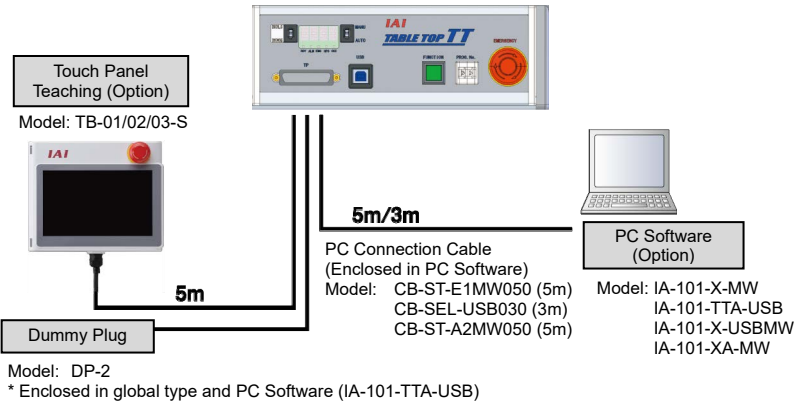
Carry out noise elimination measures for power devices on the same power path and in the same equipment. The following are examples of measures to eliminate noise sources:

- 1) AC solenoid valves, magnet switches and relays
[Measure] Install a Surge Absorber parallel with the coil.
- 2) DC solenoid valves, magnet switches and relays
[Measure] Install a diode parallel with the coil. Use a DC relay with a built-in diode.

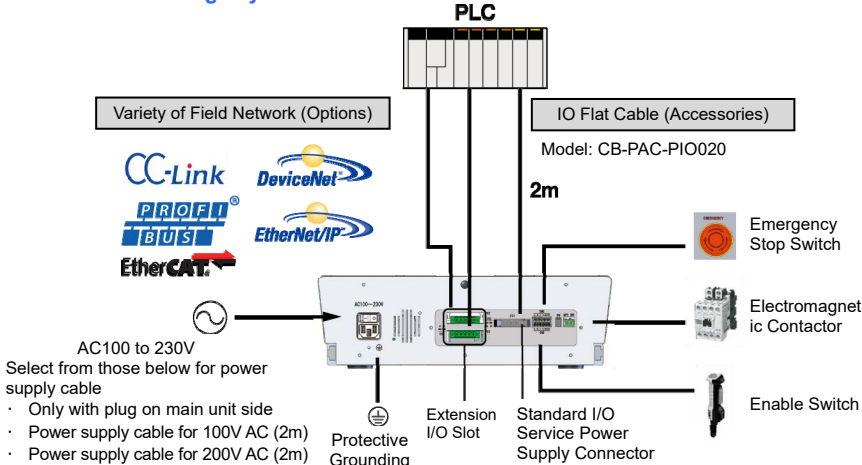


Wiring Diagram

Front Panel Wiring Layout



Back Panel Wiring Layout



* Emergency stop switch, enable switch, electromagnetic contactor and other considered devices are to be in layout if necessary. Operation is available with the settings at delivery (short-circuit treatment).

I/O Signal

Input

Reference			
It is set to general-purposed input at delivery, and input function can be changed in I/O parameter settings.			
Pin No.	Electric wire color	Port No.	Function at Standard Setting (when delivered)
1A	Brown 1	—	I/O power supply+24V
2A	Red 1	—	I/O power supply+24V
3A	Orange 1	—	
4A	Yellow 1	—	
5A	Green 1	016	General-purpose input
6A	Blue 1	017	General-purpose input
7A	Purple 1	018	General-purpose input
8A	Gray 1	019	General-purpose input
9A	White 1	020	General-purpose input
10A	Black 1	021	General-purpose input
11A	Brown 2	022	General-purpose input
12A	Red 2	023	General-purpose input
13A	Orange 2	024	General-purpose input
14A	Yellow 2	025	General-purpose input
15A	Green 2	026	General-purpose input
16A	Blue 2	027	General-purpose input
17A	Purple 2	028	General-purpose input
18A	Gray 2	029	General-purpose input
19A	White 2	030	General-purpose input
20A	Black 2	031	General-purpose input

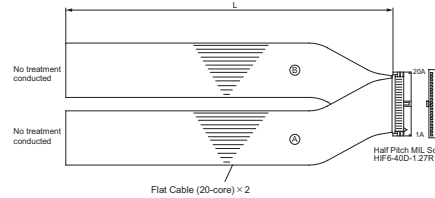
Reference		
It is set to general-purposed input at delivery, and input function can be changed in I/O parameter settings.		
Parameter ¹ No.	Parameter name	Function
30	Input function selection 000 ^{#2}	0: General-purpose input 1: Program start signal (ON edge) (007 to 014, BCD-specified program number) 2: Program start signal (ON edge) (007 to 014, Binary-specified program number)
31	Input function selection 001	0: General-purpose input 1: Software reset signal
32	Input function selection 002	0: General-purpose input 1: Servo ON signal
33	Input function selection 003	0: General-purpose input 1: Program Automatic Start runs with power-on reset / software reset in AUTO Mode 2: Auto-start program signal
34	Input function selection 004	0: General-purpose input 1: All servo axis soft interlock (OFF level)
35	Input function selection 005	0: General-purpose input 1: Operation-pause reset (ON edge)
36	Input function selection 006	0: General-purpose input 1: Operation-pause reset signal (OFF level)
37	Input function selection 007 ^{#3}	0: General-purpose input 1: Program number specification (LSB)
38	Input function selection 008 ^{#3}	0: General-purpose input 1: Program number specification (Bit 2)
39	Input function selection 009 ^{#3}	0: General-purpose input 1: Program number specification (Bit 3)
40	Input function selection 010 ^{#3}	0: General-purpose input 1: Program number specification (Bit 4)
41	Input function selection 011 ^{#3}	0: General-purpose input 1: Program number specification (Bit 5)
42	Input function selection 012 ^{#3}	0: General-purpose input 1: Program number specification (Bit 6)
43	Input function selection 013 ^{#3}	0: General-purpose input 1: Program number specification (MSB: Bit 7) 2: Error reset (ON edge)
44	Input function selection 014	0: General-purpose input 2: Program number specified for program start
45	Input function selection 015	0: General-purpose input 1: Home return of all valid axes (ON edge) 2: Home return of all valid incremental axes (ON edge)

Output

Pin No.	Electric wire color	Port No.	Function at Standard Setting (when delivered)	Parameter ⁴ No.	Parameter name	Function
1B	Brown 3	316	General-purpose output	46 331	Output function selection 300 ^{#5} Output function selection 300 (area 2)	0: General-purpose output 1: Output error of operation-cancellation level or higher (ON) 2: Output error of operation-cancellation level or higher (OFF) 3: Output error of operation-cancellation level or higher + emergency stop (ON) 4: Output error of operation-cancellation level or higher + emergency stop (OFF) 7: Output error of maintenance information alert related message level (Error No. 231 to 232) (ON) 8: Output error of maintenance information alert related message level (Error No. 231 to 232) (OFF)
2B	Red 3	317	General-purpose output			
3B	Orange 3	318	General-purpose output			
4B	Yellow 3	319	General-purpose output	47 332	Output function selection 301 ^{#5} Output function selection 301 (area 2)	0: General-purpose output 1: READY output (PIO trigger program can be run) 2: READY output (PIO trigger program can be run and error of operation-cancellation level or higher is not present) 3: READY output (PIO trigger program can be run and error of cold-start level or higher is not present)
5B	Green 3	320	General-purpose output			
6B	Blue 3	321	General-purpose output			
7B	Purple 3	322	General-purpose output	48 333	Output function selection 302 ^{#5} Output function selection 302 (area 2)	0: General-purpose output 1: Emergency stop output (ON) 2: Emergency stop output (OFF)
8B	Gray 3	323	General-purpose output	49 334	Output function selection 303 ^{#5} Output function selection 303 (area 2)	0: General-purpose output 1: AUTO mode output 2: Output during automatic operation (Other parameter No. 12)
9B	White 3	324	General-purpose output	50 335	Output function selection 304 ^{#5} Output function selection 304 (area 2)	0: General-purpose output 1: Output if all valid axes are at home (= 0) 2: Output if all valid axes completed home return (coordinates confirmed) 3: Output if all valid axes are at preset home coordinates
10B	Black 3	325	General-purpose output	51 336	Output function selection 305 Output function selection 305 (area 2)	0: General-purpose output 1: Axis 1 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-1 servo is ON (systemmonitored task output)
11B	Brown 4	326	General-purpose output	52 337	Output function selection 306 Output function selection 306 (area 2)	0: General-purpose output 1: Axis 2 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-2 servo is ON (systemmonitored task output)
12B	Red 4	327	General-purpose output	53 338	Output function selection 307 Output function selection 307 (area 2)	0: General-purpose output 1: Axis 3 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-3 servo is ON (systemmonitored task output)
13B	Orange 4	328	General-purpose output	54 339	Output function selection 308 Output function selection 308 (area 2)	0: General-purpose output 1: Axis 4 in-position output (OFF if the work part is missed during push-motion operation) 2: Output when axis-4 servo is ON (systemmonitored task output)
14B	Yellow 4	329	General-purpose output	55 340	Output function selection 309 Output function selection 309 (area 2)	0: General-purpose output
15B	Green 4	330	General-purpose output	56 341	Output function selection 310 Output function selection 310 (area 2)	0: General-purpose output
16B	Blue 4	331	General-purpose output	57 342	Output function selection 311 Output function selection 311 (area 2)	0: General-purpose output
17B	Purple 4	–		58 343	Output function selection 312 Output function selection 312 (area 2)	0: General-purpose output
18B	Gray 4	–		59 344	Output function selection 313 Output function selection 313 (area 2)	0: General-purpose output
19B	White 4	–	I/O power supply 0V	60 345	Output function selection 314 Output function selection 314 (area 2)	0: General-purpose output (AC Servo Motor Type) 1: At absolute data backup battery voltage drop warning level or below (OR check on all axes. Latched to power-on reset/software reset after error level detected.)
20B	Black 4	–	I/O power supply 0V	61 346	Output function selection 315 Output function selection 315 (area 2)	0: General-purpose output

- *1 Set the input function in I/O Parameters 30 to 45 (input function select 000 to 015), set the port numbers that each set function is to be assigned in I/O Parameters 283 to 298.
- *2 The start switch on the front panel would not function if Input Function Select 000 (Program Start) is assigned to any port except for Port No. 000.
- *3 The program select switch on the front panel would not function if Input Function Select 007 to 013 (Program Select Switch) is assigned to any port except for Port No. 007 to No. 013.Output
- *4 Set the input function in I/O Parameters 46 to 61 (output function select 300 to 315), set the port numbers that each set function is to be assigned in I/O Parameters 299 to 314. Also, it is available to set the output function in I/O Parameters 331 to 346 (Output Function Select 300 Area 2 to 315 Area 2), and set the port numbers to assign each set function in I/O Parameters 315 to 330.
In case of outputting the system output to I/O in the table above, use Output Function Select Area 2.
- *5 LEDs would not function in case that Parameters 46 to 50 are set as general-purposed output, or change is made to the port number assignment in Parameters 299 to 303 as Output Function Select 300 to 304 are assigned to the LEDs on the panel window.

I/O Flat Cable (Accessories) CB-PAC-PIO020



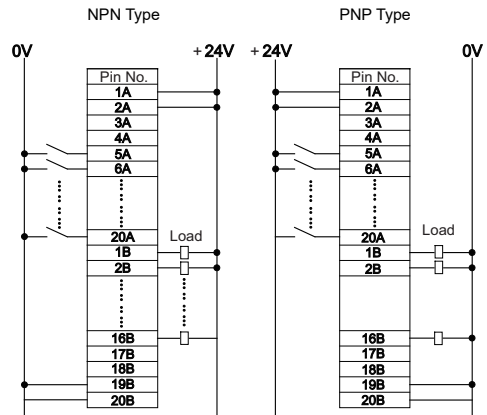
No.	Signal Name	Cable Color	Wiring	No.	Signal Name	Cable Color	Wiring
1A	24V	Brown-1		1B	OUT0	Brown-3	
2A	24V	Red-1		2B	OUT1	Red-3	
3A	-	Orange-1		3B	OUT2	Orange-3	
4A	-	Yellow-1		4B	OUT3	Yellow-3	
5A	IN0	Green-1		5B	OUT4	Green-3	
6A	IN1	Blue-1		6B	OUT5	Blue-3	
7A	IN2	Purple-1		7B	OUT6	Purple-3	
8A	IN3	Gray-1		8B	OUT7	Gray-3	
9A	IN4	White-1		9B	OUT8	White-3	
10A	IN5	Black-1		10B	OUT9	Black-3	
11A	IN6	Brown-2		11B	OUT10	Brown-4	
12A	IN7	Red-2		12B	OUT11	Red-4	
13A	IN8	Orange-2		13B	OUT12	Orange-4	
14A	IN9	Yellow-2		14B	OUT13	Yellow-4	
15A	IN10	Green-2		15B	OUT14	Green-4	
16A	IN11	Blue-2		16B	OUT15	Blue-4	
17A	IN12	Purple-2		17B	-	Purple-4	
18A	IN13	Gray-2		18B	-	Gray-4	
19A	IN14	White-2		19B	OV	White-4	
20A	IN15	Black-2		20B	OV	Black-4	

Input and Output Type

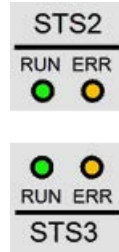
Type	Input Section		Output Section	
	Item	Type	Item	Type
NPN	Input Voltage	24V DC ±10%	Load Voltage	24V DC
	Input Current	7mA / per output	MAX. load current	100mA/1 point 400mA/8 points ^{*6}
PNP	ON/OFF Voltage	NPN ON Voltage :MIN. DC16V OFF Voltage :MAX. DC5V PNP ON Voltage :MIN. DC8V OFF Voltage :MAX. DC19V	Leakage Current	MAX. 0.1mA/1 point
	^{*6} The maximum load current total becomes 400mA for every 8 ports from Output Port No. 316.			

Input and output are the equivalent circuit that shows the logic.

I/O Circuit diagrams



Extension I/O Status LED



Monitoring LED

LED	Color	Indication Status	Indication Description
RUN	Green	○	It illuminates after initializing is complete. In the normal operation.
ERR	Orange	○	PIO power supply (24V DC) voltage drop error

DeviceNet

[Refer to the instruction manuals for DeviceNet]

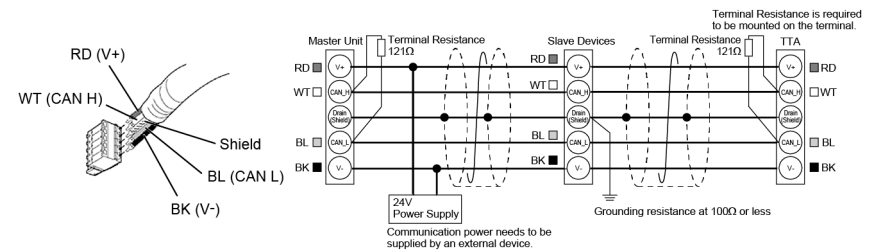


Connector Name	DeviceNet Connector	
Cable Side	MSTB2.5/5-STF-5.08 AU M	Enclosed in standard package (Manufactured by PHOENIX CONTACT)
Controller Side	MSTB2.5/5-GF-5.08 AU	

Pin No.	Signal Name (Color)	Description	Applicable cable diameter
1	V- (BK)	Power Supply Cable Negative Side	Dedicated cable for DeviceNet
2	CAN L (BL)	Communication Data Low Side	
3	Shield (None)	Shield	
4	CAN H (WT)	Communication Data High Side	
5	V+ (RD)	Power Supply Cable Positive Side	

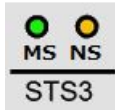
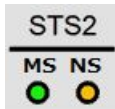
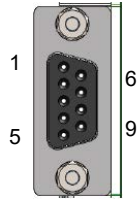
Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
MS	Green	○	Normal Operation
		☆	There is no configuration information. Or it is imperfect.
	Orange	○	Malfunction (recovery impossible)
		☆	Malfunction (recovery possible)
NS	Green/Orange	☆	In self-diagnosis process
		(Blink by turn)	
	Green	○	Online
		☆	Online (No connection established)
		○	Error
NS	Orange	☆	One or more connection(s) in timeout
		☆	In self-diagnosis process
NS	Green/Orange	☆	In self-diagnosis process
		(Blink by turn)	



PROFIBUS-DP

[Refer to the instruction manuals for PROFIBUS-DP]

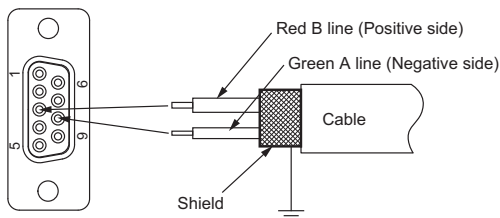


Connector Name	PROFIBUS-DP Connector	
Cable Side	9-pin D-sub Connector (Male)	Please prepare separately
Controller Side	9-pin D-sub Connector (Female)	

Pin No.	Signal Name	Description	Applicable cable diameter
1	NC	Not connected	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	NC	Not connected	
3	B-Line	Communication Line B (RS485)	
4	RTS	Request for Sending	
5	GND	Signal ground (Insulation)	
6	+5V	+5V Output (Insulation)	
7	NC	Not connected	
8	A-Line	Communication Line A (RS485)	
9	NC	Not connected	

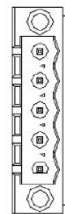
Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
MS	Green	○	Initializing complete
		☆	Initializing complete (with network diagnosis event)
	Orange	○	An error occurred (exceptional error)
NS	Green	○	Online
		☆	Online (cleared)
	Orange	○	An error occurred (Parameterizing error or PROFIBUS configuration error)



CC-Link

[Refer to the instruction manuals for CC-Link]

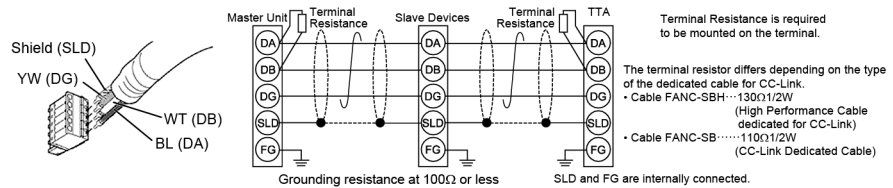


Connector Name	CC-Link Connector	
Cable Side	MSTB2.5/5-STF-5.08 AU	Enclosed in standard package (Manufactured by PHOENIX CONTACT)
Controller Side	MSTB2.5/5-GF-5.08 AU	

Pin No.	Signal Name (Color)	Description	Applicable cable diameter
1	DA (BL)	Communication Line A	Dedicated cable for CC-Link
2	DB (WT)	Communication Line B	
3	DG (YW)	Digital GND	
4	SLD	Connect the shield of the shielded cable	
5	FG	Frame Ground	

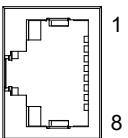
Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
RUN	Green	○	Refresh & polling received in normal condition after joining to network. Or refresh received in normal condition
		○	An error occurred (CRC error / Station number setting error / Baud rate setting error)
ERR	Orange	○	An error occurred (CRC error / Station number setting error / Baud rate setting error)
		☆	Value has changed from those of station number and baud rate setting at reset release

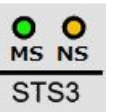
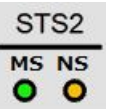


EtherNet/IP

[Refer to the instruction manuals for EtherNet/IP]



Controller Side
Connector Front View



Connector Name	EtherNet/IP Connector	
Cable Side	8P8C Module Plug	Please prepare separately
Controller Side	8P8C Module Jack	

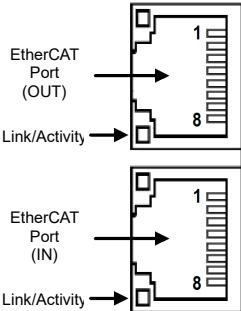
Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data transmitted +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data transmitted -	
3	RD+	Data received +	
4	-	Not connected	
5	-	Not connected	
6	RD-	Data received -	
7	-	Not connected	
8	-	Not connected	

Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
MS	Green	○	In operational condition and under control of scanner (master)
		☆	Construction information setting incomplete Or scanner (master) in idle condition
	Orange	○	Critical malfunction (exceptional condition or critical error)
		☆	Light malfunction possible to recover
NS	-	×	Power OFF
		○	Online (one or more connection(s) established)
	Green	☆	Online (connection unestablished)
		○	IP address duplicated. Critical error
	Orange	☆	One or more connection(s) in timeout
		×	Power OFF. IP address unset

EtherCAT

[Refer to the instruction manuals for EtherCAT]



Connector Name	EtherCAT Connector	
Cable Side	8P8C modular plug	Please prepare separately
Controller Side	8P8C modular jack	

Pin No.	Signal Name	Description	Applicable cable diameter
1	TD+	Data transmitted +	For Ethernet cable, use a straight STP cable that possesses the performance of Category 5 or more.
2	TD-	Data transmitted -	
3	RD+	Data received +	
4	-	Not connected	
5	-	Not connected	
6	RD-	Data received -	
7	-	Not connected	
8	-	Not connected	

Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
ERR	Orange	○	Error impossible to recover
		☆ 0.2sec cycle	Network construction error
		☆ ON 0.2sec 2times / OFF 1sec	Communication error (Watch dock time-out)
RUN	Green	×	No power supply / No error
		○	Communication in normal condition (in OPERATION condition)
		☆ 0.2sec cycle	Configuration condition (in PRE-OPERATION condition)
	Orange	☆ ON 0.2sec / OFF 1sec	Configuration complete condition (in SAFE-OPERATION condition)
		○	Error impossible to recover
		×	In initialized condition (in INIT condition) / No power supply
Link/ Activity	Green	○	Linked (Communication traffic not detected)
		☆ 0.05sec cycle	Linked (Communication traffic detected)
Link/ Activity	-	×	No link / No power supply

IA-NET

[Refer to the instruction manuals for Remote I/O Unit]



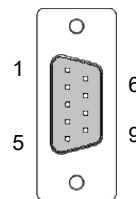
Connector Name	EtherCAT Connector	
Cable Side	8P8C modular plug	Please prepare separately
Controller Side	8P8C modular jack	

Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
MCARE	Orange	☆	Reduction in number of stations, Communication error
		○	IA Net communication in normal condition (Note 1)
MON	Green	○	IA Net link unestablished
		×	IA Net link unestablished

Note 1) It turns on if communication with controllers and remote I/O units is completed to be established. It does not show that the communication with all the controllers and remote I/O units subject to connection is established.

RS232C/RS485



Connector Name	SIO Connector	
Cable Side	9-pin D-sub Connector (Female)	Please prepare separately
Controller Side	9-pin D-sub Connector (Male)	

Pin No.	RS232C		RS485	
	Signal Name	Description	Signal Name	Description
1	NC	Not connected	SRD+	Sent and received data + (Note 1)
2	RXD	Received data	SRD-	Sent and received data - (Note 2)
3	TXD	Sent data	SRD+	Sent and received data + (Note 2)
4	NC	Not connected	E	Terminal resistors
5	SG	Signal ground	SG	Signal ground
6	NC	Not connected	NC	Not connected
7	NC	Not connected	SRD-	Sent and received data
8	NC	Not connected	NC	Not connected
9	NC	Not connected	NC	Not connected
Shell	FG	Frame ground	FG	Frame ground

Note 1) This pin and 3 pin are internally short-circuited.

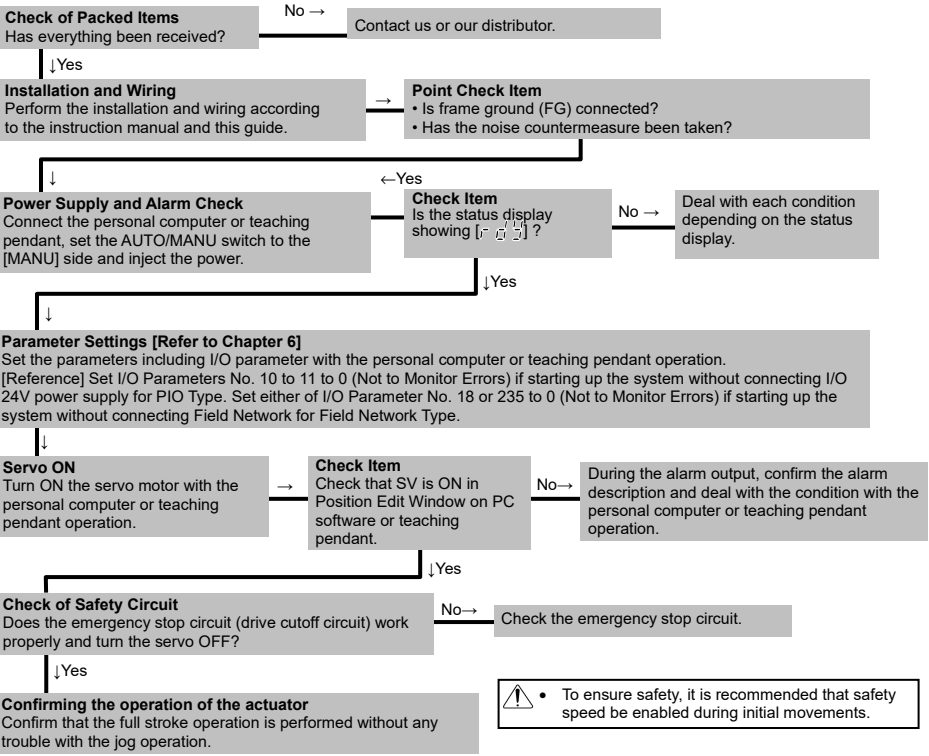
Note 2) This pin and 7 pin are internally short-circuited.

Monitoring LED ○ : Illuminated, × : OFF, ☆ : Flashing

LED	Color	Indication Status	Indication Description
RUN	Green	○	Serial communication (Sent or received)

Starting Procedures

When using this product for the first time, pursue work while making sure to avoid omission and incorrect wiring by referring to the procedure below.



Set-up for operation is complete.
Establish the setting that suits to your operation patterns.

Troubleshooting

The following alarm displays are frequently generated at the start-up operation.
Deal with each of them referring to the following table.

Status display	Status contents	Cause and Remedy
	During Emergency-stop	It is not an alarm. • It is caused when the emergency stop button is not cleared on the front panel. Clear it. • It is generated when the emergency stop switch in the teaching pendant or the personal computer application software is not cancelled. In such case, cancel it. • It is generated when the personal computer cable is not connected to the emergency stop box.
	Deadman switch OFF	It is not an alarm. • It generated when the AUTO/MANU switch has been set to "MANU" and the personal computer or the teaching pendant is not connected. Connect the personal computer or the teaching pendant or set the AUTO/MANU switch to "AUTO". • When the actuator is to be started up, hold the deadman switch on the teaching pendant to turn it on.
	AC Power Interruption Momentary Power Failure Power Voltage Drop	It is generated when the power voltage is not supplied. Check the power supply.
	24V I/O Error	It is generated when the +24V power for I/O is not supplied. Check the power supply. (Procedure for starting up I/O 24V power unit without connection) Set both the I/O parameter No. 10 and No. 12 to "0". In this case, the I/O connection is invalid.
	Field Bus Error (Field Network Error)	It is generated when the field network link connection is not established. Check the link cable connection, I/O parameter and PLC parameter settings. (How to start up the controller without connecting the field network) Set both the I/O parameter No. 10 and No. 12 to "0".



IAI Corporation

Head Office: 1210 Iharacho Shimizu-KU Shizuoka City Shizuoka 424-0114, Japan
TEL +81-54-364-5105 FAX +81-54-364-2589
website: www.iai-robot.co.jp/

IAI America, Inc.

Head Office: 2690 W. 237th Street, Torrance, CA 90505
TEL +1-310-891-6015 FAX +1-310-891-0815
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173
TEL +1-847-908-1400 FAX +1-847-908-1399
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066
TEL +1-678-354-9470 FAX +1-678-354-9471
website: www.intelligentactuator.com

Technical Support available in Europe

IAI Industrieroboter GmbH

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany
TEL +49(0)6196-88950 FAX +49(0)6196-889524
website: www.iai-automation.com

Technical Support available in Great Britain



Duttons Way, Shadsworth Business Park, Blackburn, Lancashire, BB1 2QR, United Kingdom
TEL +44(0)1254-685900
website: www.lcautomation.com

IAI (Shanghai) Co., Ltd.

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China
TEL +86-21-6448-4753 FAX +86-21-6448-3992
website: www.iai-robot.com

IAI Robot (Thailand) Co., Ltd.

825 PhairojKijja Tower 7th Floor, Debaratana RD., Bangna-Nuea, Bangna, Bangkok 10260, Thailand
TEL +66-2-361-4458 FAX +66-2-361-4456
website: www.iai-robot.co.th