

Position Controller **S CON2**  
Functional Safety Unit **SU**



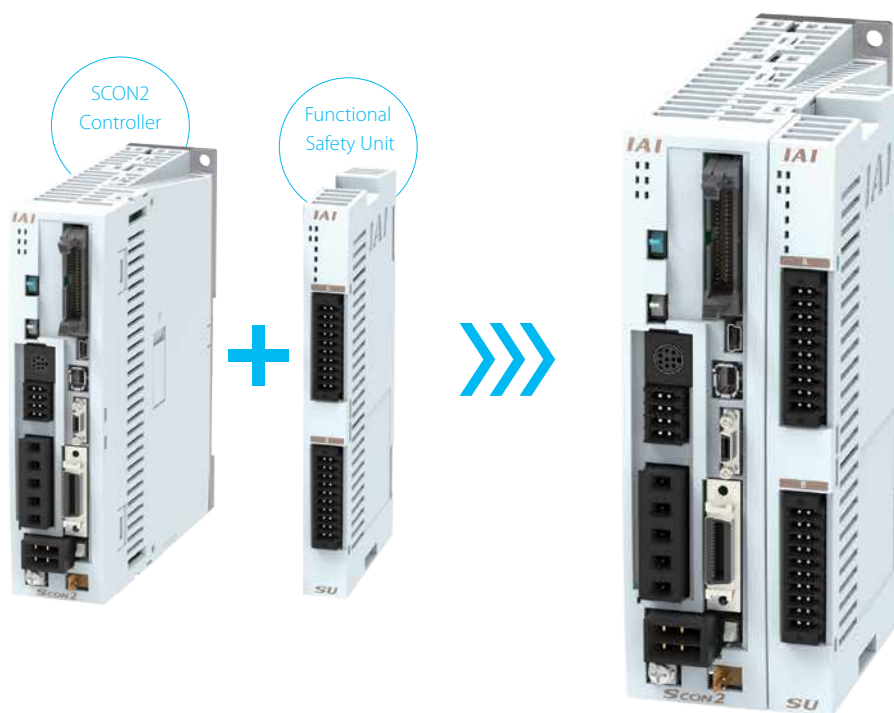
Newly released controller  
with safety monitoring function for safe control of single axis actuators

# SCON2/SU

## Supports safety functions

This controller enables the use of a single-axis actuator without a safety fence\*1 or a drive-source cutoff. Robots can work safely along with people without stopping production.

\*1 Supports risk reduction, NOT unconditional use without a fence



### Realizing Functional Safety with a Single Axis Actuator

Operation is simple.  
Equipment can be constructed at low cost.

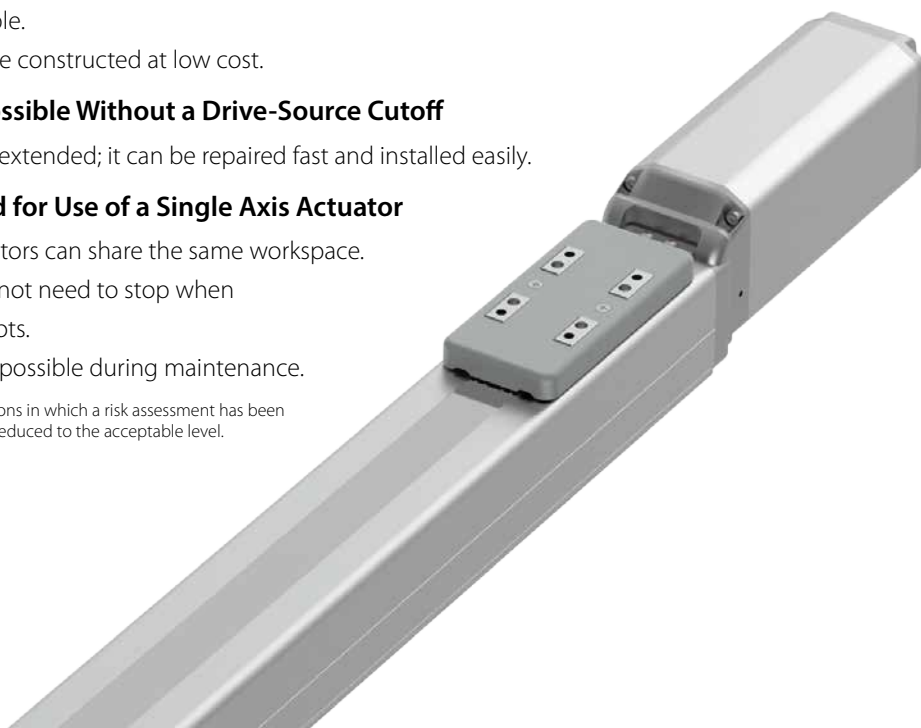
### Safe Stopping Possible Without a Drive-Source Cutoff

Equipment life is extended; it can be repaired fast and installed easily.

### No Fence Needed for Use of a Single Axis Actuator

People and actuators can share the same workspace.  
Production does not need to stop when approaching robots.  
Operation is also possible during maintenance.

\*Note that this is limited to situations in which a risk assessment has been conducted and risks have been reduced to the acceptable level.





Third-party certification obtained



## Equipped with 14 types of safety functions

Selected functions are introduced here based on application examples.  
Please refer to P.14 for more information on functions.

### Application Example 1

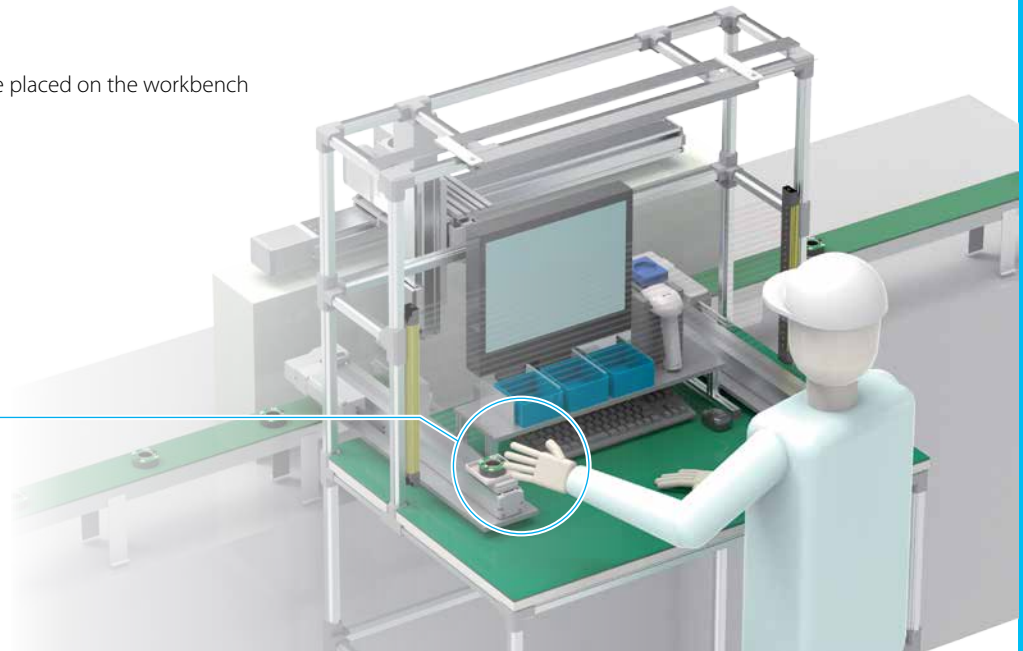
Parts conveyed by the single-axis actuator are placed on the workbench and sent to the next process after inspection.

#### Risks

Due to controller malfunctions, the actuator may run out of control and injure workers.

#### Safety functions

The use of SLS (safely-limited speed) enables stopping when the designated speed limit value is exceeded.



### Application Example 2

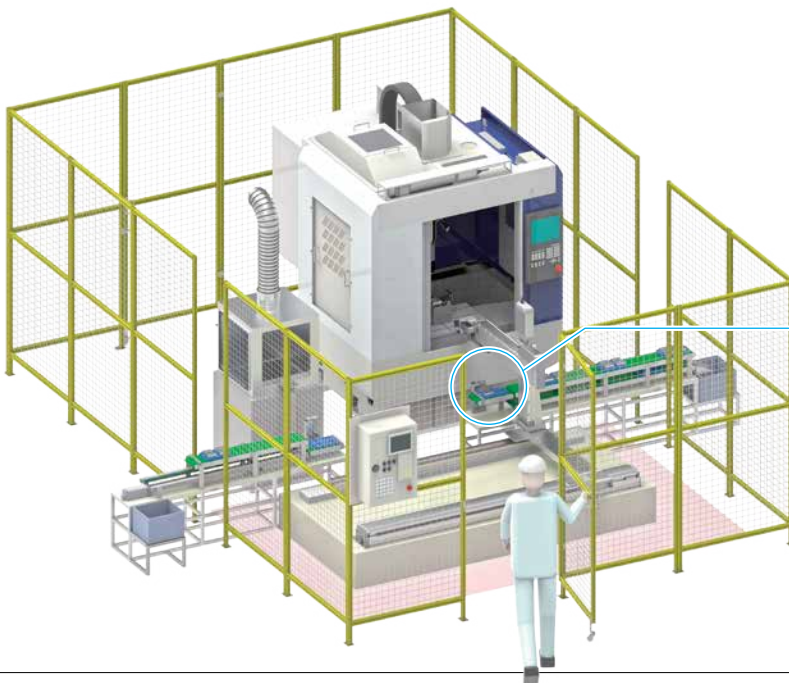
This is a transport loader for machine tools.  
A single axis actuator is used in the pre- and post-machining workpiece transport processes.

#### Risks

During maintenance, the actuator may run out of control and injure workers.

#### Safety functions

SS2-t (safe stop 2 time control) is used.  
During maintenance, monitoring makes sure the actuator does not operate in servo ON status.  
If it moves from the stop position, the drive source is cut off.



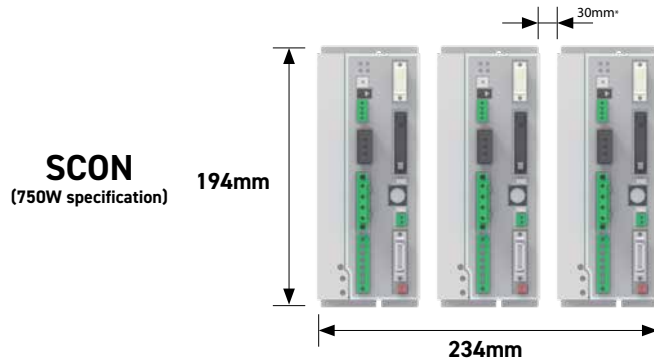
# SCON2 Controller Features

## Size

Can be connected to an actuator with a 200V servo motor mounted (60W to 750W).

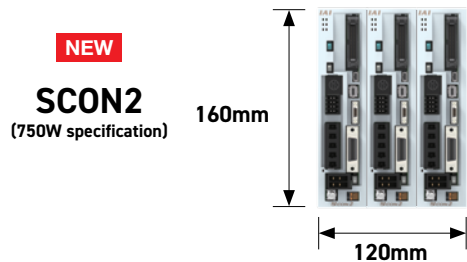
With a built-in fan, installation at a 1-mm interval (effectively zero) is possible, markedly reducing installation surface area within the control panel.

Comparison with conventional size | Comparison of 750W-spec controller size and installation interval (with 3 units installed)



Installation surface area  
**45,396mm<sup>2</sup>**

57%  
Reduced



Installation surface area  
**19,200mm<sup>2</sup>**

## Specifications

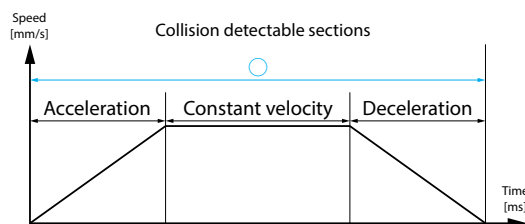
### Collision Detection Function

Collision is judged based on the two values below.

- Feedback current value
- Difference between virtual position and present position

Collision judgment is now possible in all acceleration/ deceleration sections as well as constant velocity sections.

\*Support planned as of 2024. Contact our sales personnel for details on the support schedule.



### Force Control Push Setting

Push force can now be input in N units for pushing with force control in the positioner mode.

\*For pushing with current control, only % units can be input.

Position data edit [Axis No.0 SCON2-CG] < >[COM2]

Update Save Transfer Print TEST

Select edit support function display Toggle display

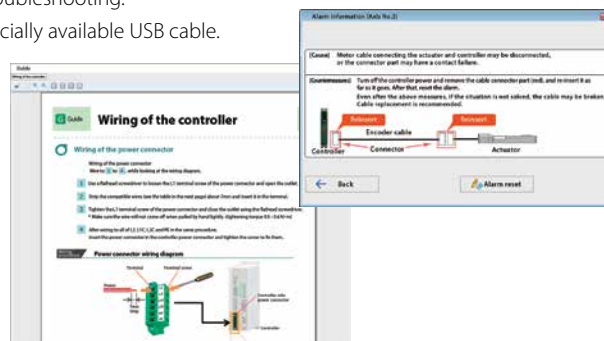
No.	Position [mm]	Speed [mm/s]	Acceleration [G]	Deceleration [G]	Motion type (Push force [N])	Load current threshold [A]
0	0.00	100.00	0.30	0.30	Push (6000N)	0
1	50.00	100.00	0.30	0.30	Push (6000N)	0
2	100.00	100.00	0.30	0.30	Push (6000N)	0
3						

### IA-OS Teaching Software for PC

IA-OS supports everything from startup to troubleshooting.

Connectable with computers with a commercially available USB cable.

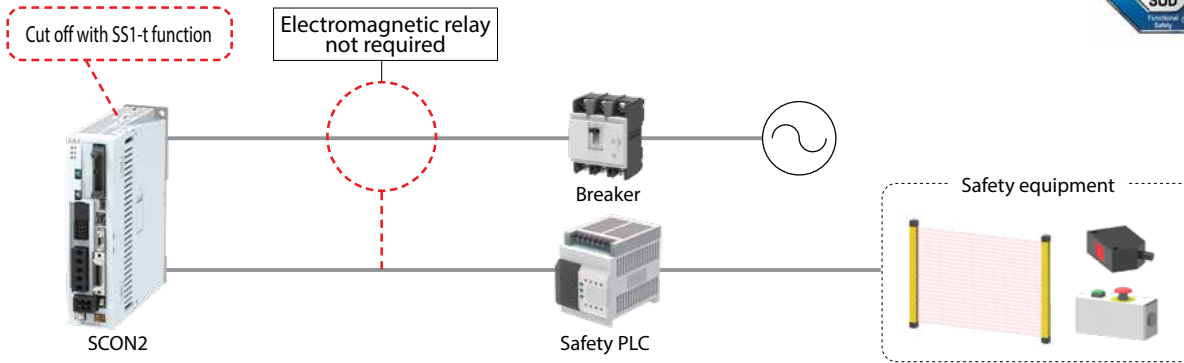
- Wiring procedure
- How to operate peripheral devices
- How to operate actuators
- Cycle time calculation
- Press programs
- Troubleshooting, etc.



## Safety Functions Supported

The SCON2 controller is equipped as standard with an SS1-t function.

As an electromagnetic relay is no longer required, this helps reduce installation space and extend equipment life.



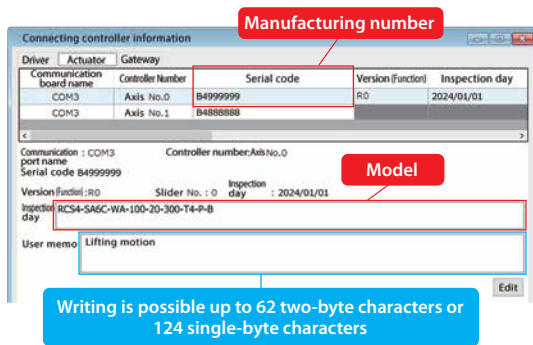
## Maintenance

### Actuator Recognition Function

Actuator information can now be confirmed with teaching tools.

As well, some areas permit customers to write in freely, with writing to the actuator also possible.

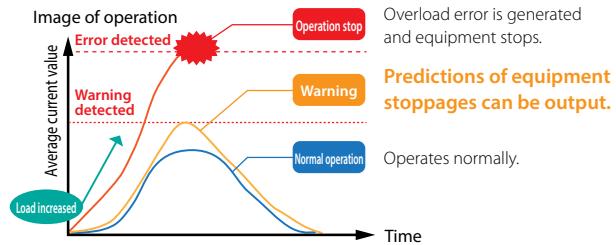
\*Applies to products with manufacturing dates of 2024 or later on the manufacturing number sticker, and to actuators with a Battery-less Absolute Encoder equipped.



Item name	Present value	Warning output timing
Total number of moves [times]	915	0
Total number of travel distance [km]	0.166	0.000
Total hours of FAN operation	0 00:00:00	-
Actuator replacement time	2020/01/20 17:17:23	-
Overload warning level [%]	-	100
Travel distance after lubrication [km]	0.166	-
Lubrication time	2020/01/20 16:44:10	-

### Predictive Maintenance (Motor Overload Warning)

Equipped with a function that monitors motor temperature changes and issues a warning when motor overload is detected. Maintenance can be done after the warning is output in order to prevent failures and malfunctions in advance.



### Drive Recorder Function

This function makes it possible to record actuator behavior when an alarm goes off, contributing to cause analysis and rapid equipment recovery.

Alarm list

Data name	Current value
Control command position [mm]	100.000
Control position [mm]	75.494
Planned motor speed [mm/s]	0.00
Current speed [mm/s]	0.00
Feedback current [A]	130.7
Current load [N]	0.00
Overload level [%]	9
DC bus voltage [V]	272.0
External regeneration discharge current [A]	1
PEB temperature [°C]	30

Date and time of alarm	Alarm code	Alarm name	Detail code	Address	Graph
1st time 2023/01/27 11:45:20	0008	Deviation counter overflow	.....	.....	Display
1st time 2023/01/27 11:45:08	00E7	Disconnection of A, B and Z phases	.....	.....	.....
2nd time 2023/01/27 11:45:04	00FF	Controller POWER ON (not an alarm)	.....	.....	.....
3rd time 2023/01/28 03:15:52	0008	Deviation counter overflow	.....	.....	.....
4th time 2023/01/28 23:10:11	0008	Deviation counter overflow	.....	.....	.....
5th time 2023/01/28 19:44:46	0008	Deviation counter overflow	.....	.....	.....
6th time 2023/01/28 18:21:40	00FF	Controller POWER ON (not an alarm)	.....	.....	.....
7th time 2023/01/28 13:20:43	00A1	Abnormal parameter	.....	000E	.....
8th time 2023/01/28 12:53:49	00A1	Abnormal parameter	.....	000E	.....



# Introduction to the field network function

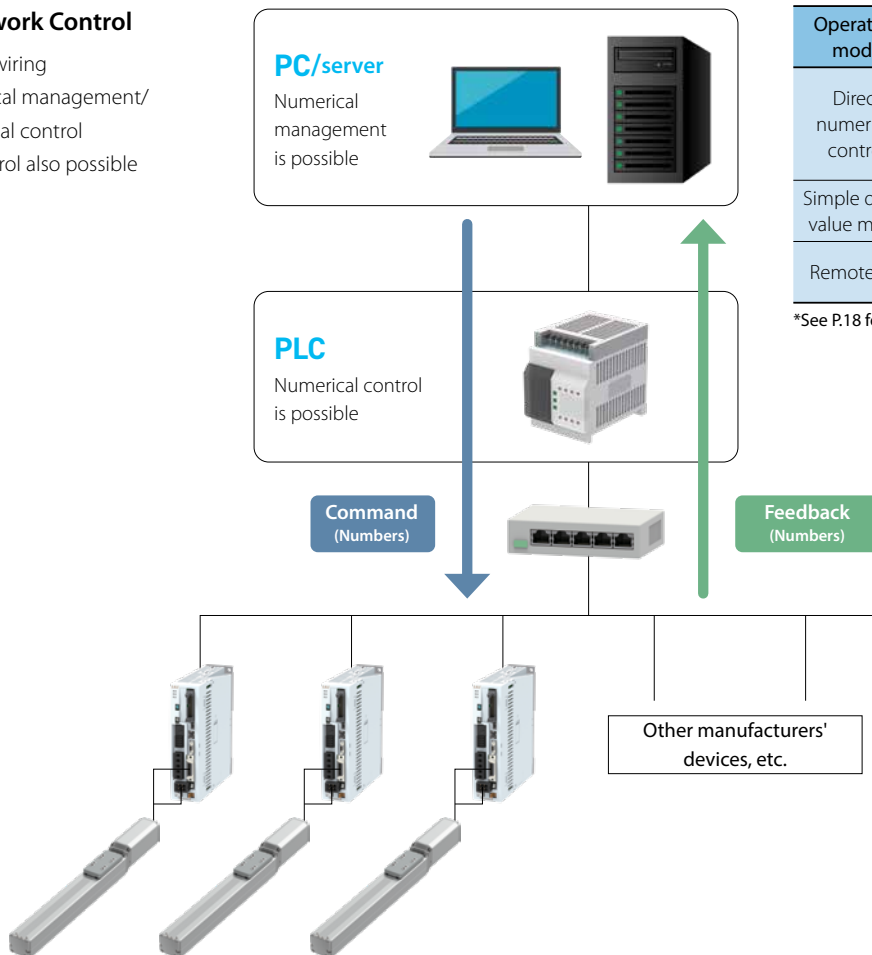
The SCON2 controller supports the major field networks.



## Network Construction Framework

### Network Control

- Simple wiring
- Numerical management/numerical control
- I/O control also possible



Operation mode	Features
Direct numerical control	Commands position, speed, acceleration/ deceleration, etc. numerically from the PLC.
Simple direct value mode	Commands only position numerically from the PLC.
Remote I/O	Controls with ON/OFF as in the PIO specification.

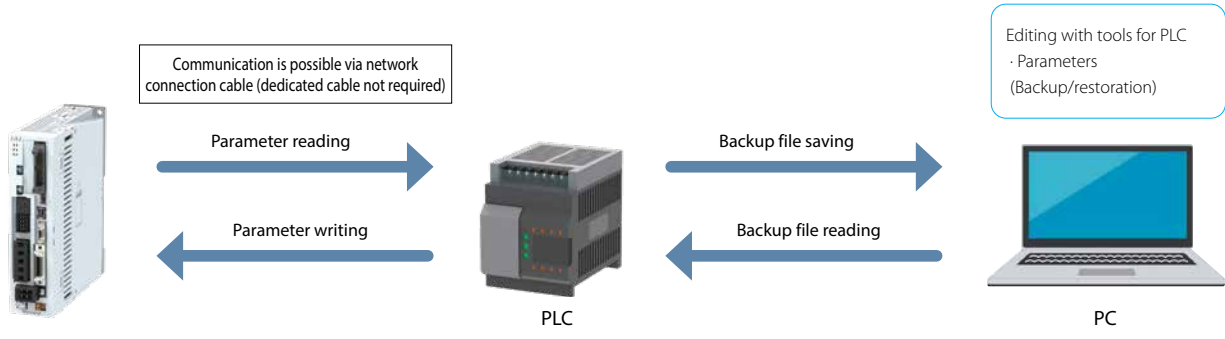
\*See P.18 for details on the operation mode

## Controller Data Backup

Parameter backup/restoration is possible via the field network, without using a dedicated cable or dedicated software. This makes management easier, enabling integration with other manufacturers' devices and management methods.

Compatible networks

CC-Link IE Field

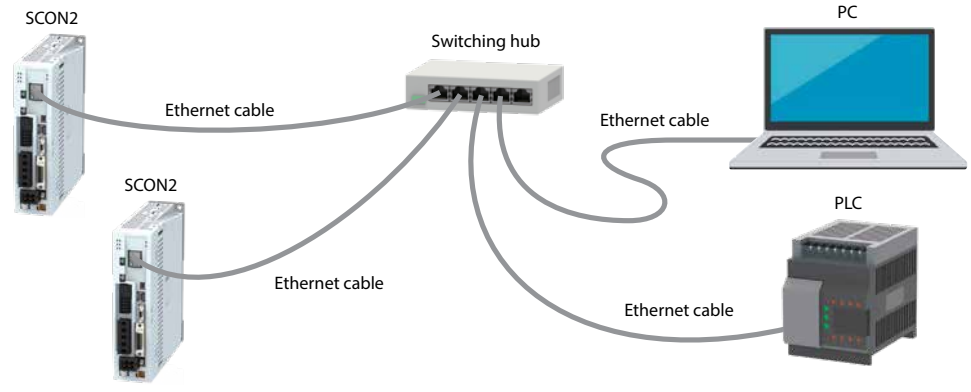


## Modbus TCP Communication

Using the field network communication port, communication with the teaching software for PC IA-OS is possible. No dedicated cable is required, making maintenance easier as cables do not have to be disconnected and plugged in again.

Compatible networks

EtherNet/IP™

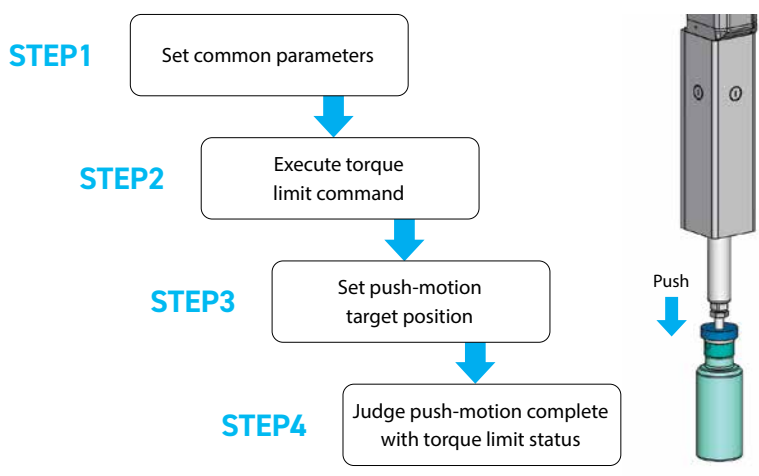


## Push Control with Motion

Push-motion operation, difficult with motion control, is now simple.

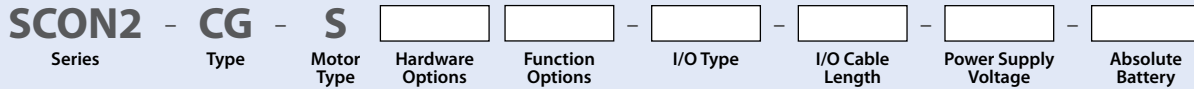
Compatible networks

MECHATROLINK  
\*Motion specifications



## Model Specification Items

### <SCON2 Controller>



CG	Safety category spec type
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S	200V servo
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(Blank)	No options
C	Multi-function With connector*1

\*When using in pulse-train control mode, select "C".  
 \*1 Not available when selecting "M" for function options or I/O type "RC".

(Blank)	No options
F	Press program*1
M	Motion*2

\*1 Not available when selecting I/O type "RC".  
 \*2 Available when selecting I/O type "ML3" or "EC".

NP	PIO (NPN) specification
PN	PIO (PNP) specification
DV	DeviceNet connection specification
CC	CC-Link connection specification
CIE	CC-Link IE Field connection specification
ML3	MECHATROLINK-III connection specification*3
EC	EtherCAT connection specification*3
EP	EtherNet/IP connection specification
PRT	PROFINET IO connection specification
RC	RCON/RSEL connection specification

\*3When selecting "Blank" or "F" for press program in the function options column, the specification will be Remote I/O; when selecting "M" for motion, the specification will be motion control.

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

\*When a field network specification is selected, the I/O cable length is "0" (No cable).

1	Single-phase 100VAC
2	Single phase 200VAC

\*Selectable power supply voltages differ by actuator motor wattage (W).

(Blank)	No absolute battery
AB	With absolute battery

\* When connecting an actuator with absolute specification, select "AB".

### <Functional Safety Unit>



S	For SCON2
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PN	PIO (PNP) specification
NP	PIO (NPN) specification



**Product Table**

**SCON2 Controller**

Model/Type			SCON2-CG							
I/O type	Standard specification		Field network type							
	PIO connection		DeviceNet	CC-Link	CC-Link IE Field	MECHATROLINK	EtherCAT	EtherNet/IP	PROFINET	RCON/RSEL connection specification
	NPN specification	PNP specification	DeviceNet connection specification	CC-Link connection specification	CC-Link IE Field connection specification	MECHATRO LINK-III connection specification	EtherCAT connection specification	EtherNet/IP connection specification	PROFINET IO connection specification	
NP	PN	DV	CC	CIE	ML3	EC	EP	PRT	RC	
Hardware options	C (With function connector)				✓					✓
Function options	F (Press program)				✓					✓
	M (Motion)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Absolute battery	AB (With battery)				✓					

**Functional Safety Unit**

Model/Type	SU-S	
I/O Type	PN	NP

**Connection Limits**

- The actuators below cannot be connected to SCON2.
  - Actuators with motor wattage (W) below 60W or above 750W
  - Motor network specifications (ML3, EC) rotational axis index mode
  - ZR
- The power supply voltage of the connected actuator and motor is limited.
 

Select a controller of connectable power supply voltage from the table below.

Actuator motor wattage (W)	Power supply voltage	
	Single-phase 100VAC	Single phase 200VAC
30W+ 60W~200W	○	○
100W (LSA/LSAS) 200W (DD/DDA/LSA/LSAS)	×	○
300W~750W	×	○

\*Only the models below can be connected  
 · RS (30W motor)

○: available  
 X: Unavailable

- For the functional safety unit, only actuators meeting the conditions below can be connected.
  - Actuators equipped with battery-less absolute encoders
  - Actuators with "R0" at the end of the serial number on the manufacturing number sticker, or with manufacturing dates of 2024 or later

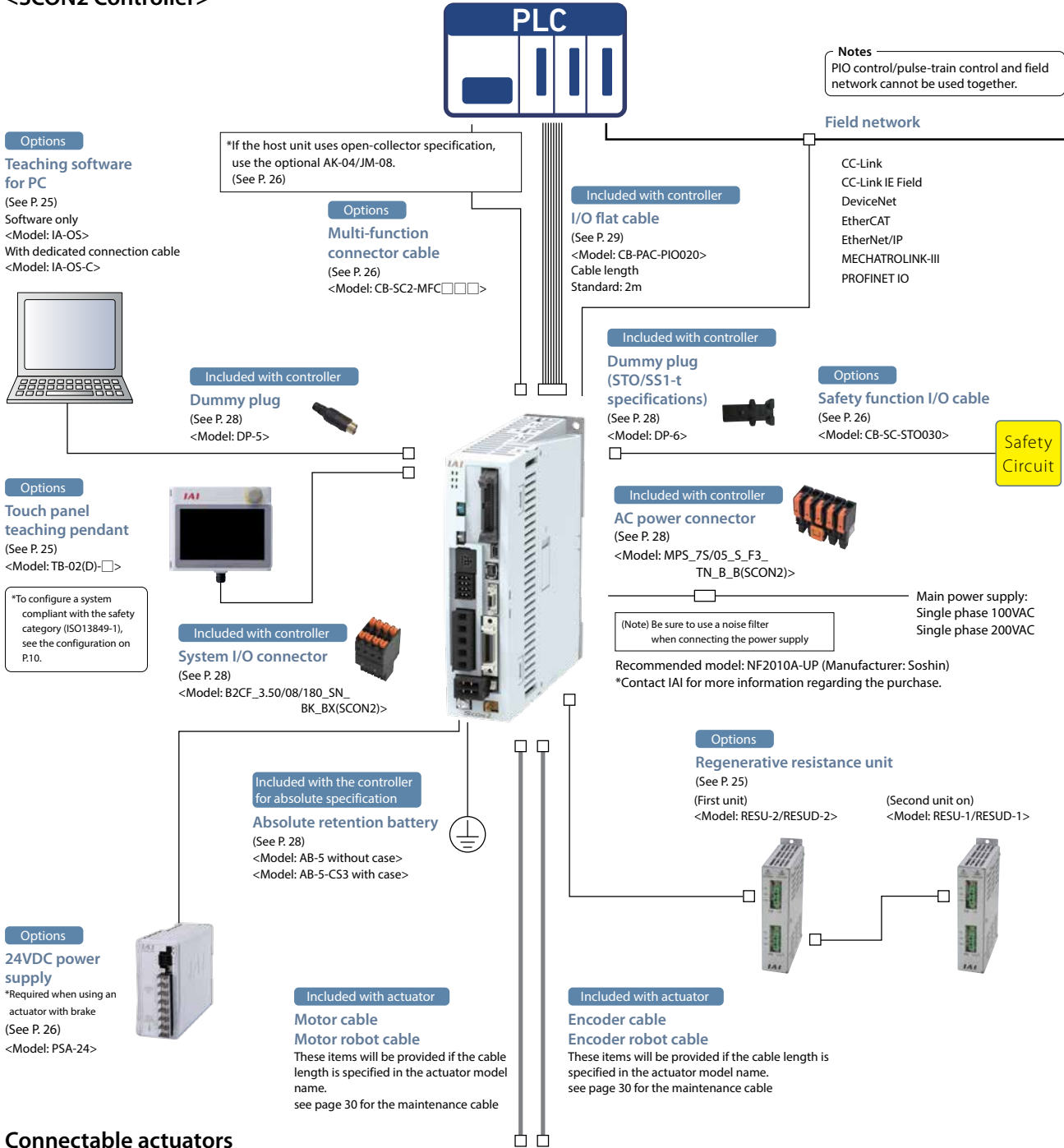
Ex. Nameplate sticker

Model: RCS4-SA4C-*** S/N: *****R0 MADE IN JAPAN	DATE: **/**/2023	<b>IAI Corporation</b>
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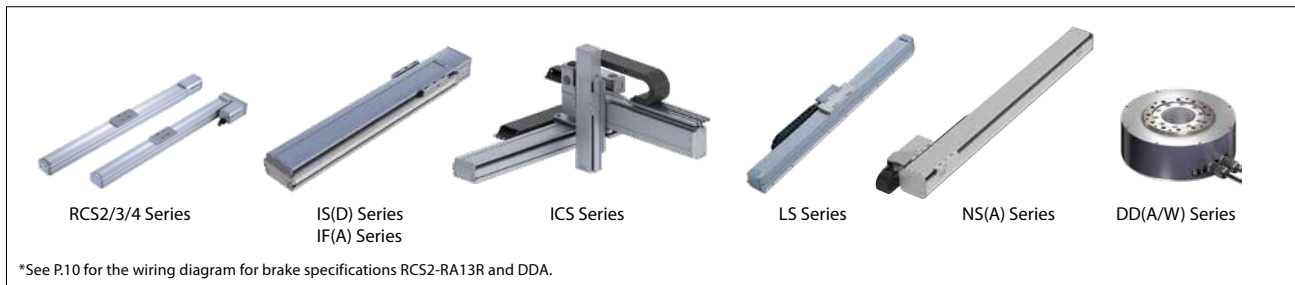
Model: RCS4-SA4C-*** S/N: ***** MADE IN JAPAN	DATE: **/**/2024	<b>IAI Corporation</b>
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## System Configuration

### <SCON2 Controller>



### Connectable actuators



#### [Caution]

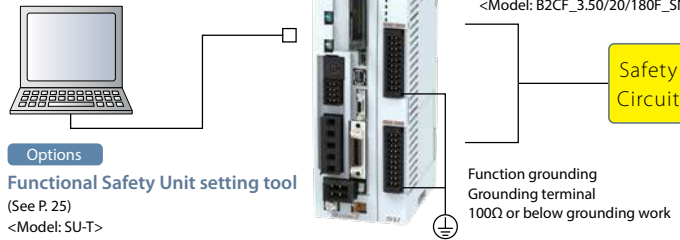
The SCON2 controller is not equipped with a relay which automatically recognizes the built-in teaching tool and switches the wiring. When a teaching tool is not connected, connect the dummy plug DP-5.

**System Configuration**

**<Functional Safety Unit>**

See P.9 for more information about the SCON2 controller configuration

(Caution)  
When using the Functional Safety Unit, do not connect the dummy plug (DP-6) included with the SCON2 controller.

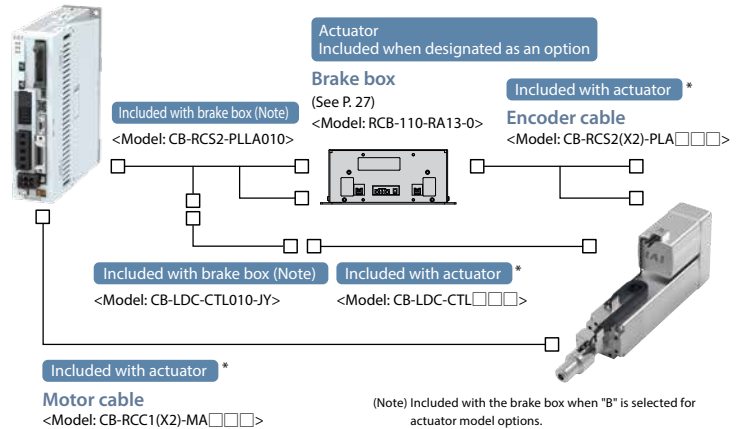
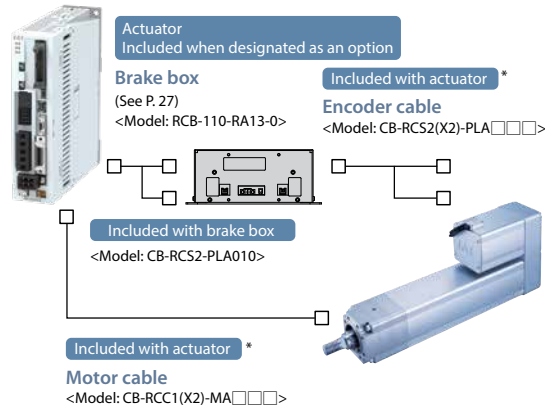


**<Connecting the SCON2 controller and RCS2-RA13R (brake specification)>**

\*These items will be provided if the cable length is specified in the actuator model name. See page 30 for the maintenance cable

(For actuator without load cell)

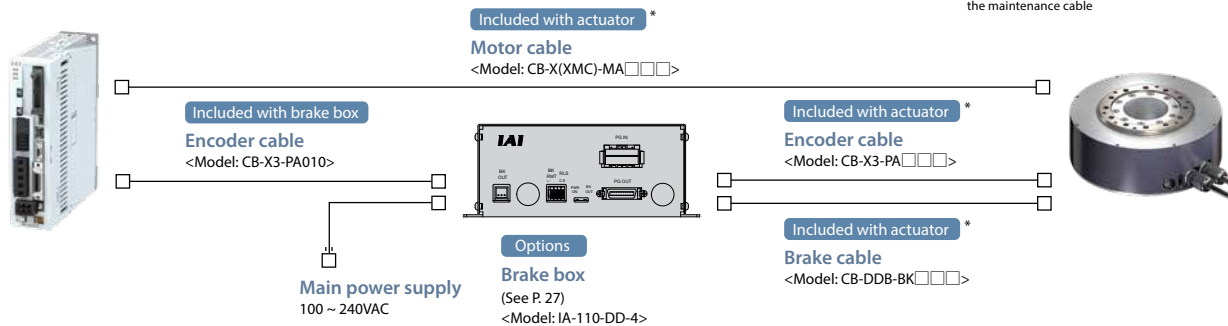
(For actuator with load cell)



(Note) Included with the brake box when "B" is selected for actuator model options. Separate provision is required when "BN" is selected for actuator model options. Separate provision is also required when providing the brake box individually, as it will not be included.

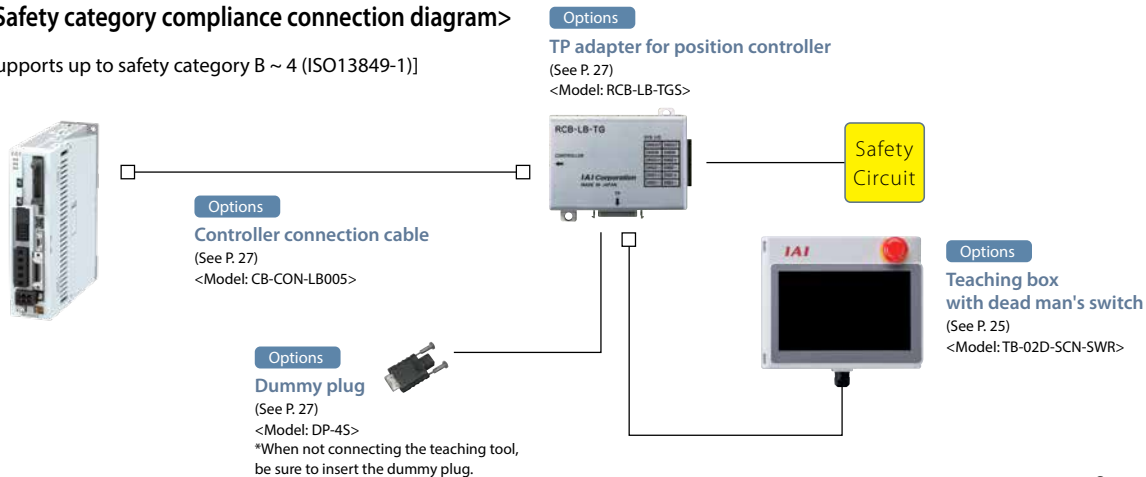
**<Connecting the SCON2 controller and DDA (brake specification)>**

\*These items will be provided if the cable length is specified in the actuator model name. see page 30 for the maintenance cable



**<Safety category compliance connection diagram>**

[Supports up to safety category B ~ 4 (ISO13849-1)]





## General Specifications

### <SCON2 Controller>

Item		SCON2	
Compatible motor capacity	Power supply voltage 100VAC	60~200W	
	Power supply voltage 200VAC	60~750W	
Power supply voltage		Single-phase 100~115VAC Single-phase 200~230VAC (Power supply fluctuations: within $\pm 10\%$ )	
Inrush current	Power supply voltage 100VAC	Control side: 30A (up to 25°C), 70A (up to 60°C) (Note 1) Drive side: 30A (up to 25°C), 80A (up to 60°C) (Note 1)	
	Power supply voltage 200VAC	Control side: 30A (up to 25°C), 60A (up to 60°C) (Note 1) Drive side: 30A (up to 25°C), 70A (up to 60°C) (Note 1)	
Leakage current (Note 2) (Primary side when a noise filter is connected on the power line)		3.5mA	
Load capacity, generated heat		See [Power capacity and generated heat]	
PIO power supply (Note 3)		24VDC $\pm 10\%$	
Electromagnetic brake power (For actuator with brake)		24VDC $\pm 10\%$ , 1A (Max.) (Supplied from the outside)	
Supported encoders		Incremental (includes ABZ/parallel) Absolute serial encoder Quasi-absolute serial encoder Battery-less Absolute Encoder	
Serial communication interface	SIO connector	RS-485: 1CH .. Modbus protocol RTU/ASCII compliant, speed: 9.6~230.4kbps	
	USB	Communication standard: USB2.0, speed: 12MHz, connector: mini-B	
External interface	PIO specification		24VDC dedicated signal input/output (NPN/PNP selection): Input max. 16 points, output max. 16 points
	Field network specification		DeviceNet, CC-Link, CC-Link IE Field, MECHATROLINK-III, EtherCat, EtherNet/IP, PROFINET IO
	Other		RCON/RSEL connection specification
	Multi-function connector	Input pulse frequency	Differential type (line-driver type): Max. 2.5Mpps Open collector method: Max. 200kpps (AK-04 option) Command pulse magnification (Electronic gear: A/B) Setting range of A and B (set by parameters): 1~99999999
Feedback pulse		Differential type (line-driver type): Max.2.5Mpps Open collector method: Max. 500kpps (JM-08 option)	
Analog output		1 system (load data) 4~20mA current output ( $\pm 1\%$ ) Load resistance 10~600 $\Omega$	
Data setting, input method		Teaching software for PC, teaching pendant	
Data retention memory		Position data and parameters are saved in non-volatile memory. (Unlimited rewrites)	
Operation mode		Positioner mode/pulse-train control mode/press program/motion	
Number of positioner-mode positions		Standard 64 points, max. 384 points (PIO specification), 384 points (field network specification) (Note) The number of positioning points changes depending on the PIO pattern and field network operation mode selection.	
Insulation resistance (between secondary and FG)		500VDC, 10M $\Omega$ or more (Note) Withstanding voltage of force control load cell is 50VDC	
Insulation withstanding voltage (between primary and FG)		1500VAC 1 min	
Ambient operating temperature		0~60°C	
Ambient operating humidity		5% RH ~ 85% RH (no condensation or freezing)	
Vibration resistance		Frequency 10~57Hz/Amplitude 0.035mm (continuous), 0.075mm (intermittent) Frequency 57~150Hz/Acceleration 4.9m/s <sup>2</sup> (continuous), 9.8m/s <sup>2</sup> (continuous) XYZ directions: Sweep time: 10 minutes, Number of sweeps: 10 times	
Impact resistance		Operation: Half sine wave amplitude/time: 50 m/s <sup>2</sup> (5G)/ 30ms	
Overvoltage category		III	
Mass		About 800g	
Cooling method		Forced air cooling	

(Note 1) Inrush current flows for approx. 20ms after the power is input.

Please note that the inrush current value varies depending on the impedance of the power line and the internal element temperature thermistor type (inrush current limit circuit).

(Note 2) As leakage current varies depending on the connected motor capacity, the cable length, and the surrounding environment, measure leakage current at the earth leakage breaker installation area for leakage protection.

Regarding the earth leakage breaker, select with attention to the purpose (fire prevention, injury prevention, etc.). Use a harmonics supported earth leakage breaker (for inverters).

(Note 3) When operating with a SIO transformer rather than PIO, a PIO power supply is not required. In this case, set parameter No. 74 "PIO power monitoring" to "1" (disabled).

Otherwise, alarm OCF "I/O 24V power abnormality" will be generated.

**General Specifications**

**Power Capacity and Generated Heat**

Actuator motor wattage (W)	Motor power capacity [VA]	Max. instantaneous motor power capacity [VA]	Control power capacity [VA]	Rated power capacity [VA]	Max. instantaneous power capacity [VA]	Generated heat [W]
30R (for RS)	138	414	48	186	462	33
60	138	414		186	462	33
60 (RCS3-CTZ5)	197	591		245	639	32
100	234	702		282	750	35
100S (LSA)	283	851		331	899	36
150	328	984		376	1,032	37
200	421	1,263		469	1,311	38
200 (DD)	503	1,509		551	1,557	36
200 (other than LSA(S)-N15H)	486	1,458		534	1,506	38
200 (LSA(S)-N15H)	773	2,319		821	2,367	56
300 (LSA)	662	1,986		710	2,034	40
400	920	2,760		968	2,808	45
400 (RCS3-CT8)	1,230	3,690		1,278	3,738	47
600	1,164	2,328		1,212	2,376	56
600 (DD)	1,462	4,386		1,510	4,434	49
750	1,521	3,042		1,569	3,090	58
750 (RCS2-RA13R with load cell)		4,563			4,611	

RS: Rotational axis; LSA: Linear actuator; DD: Direct drive motor

**Circuit Breaker Selection**

The controller current reaches a maximum of 3 times the rated value during acceleration and deceleration. Select a unit that will not trip when this current is flowing or during inrush current. Select a rated breaking current at which cut-off is certain even for short-circuit current.

Rated breaking current > Short-circuit current = Primary side current capacity ÷ Power supply voltage

**Selection calculation method**

<Circuit breaker rated current value>  
 [(Rated motor power + Control power) ÷ AC input voltage] x safety factor (guideline 1.2~1.4)

**Safety Parameters**

IAI products are equipment components, so when calculating the SIL/PL for the equipment as a whole, use the values on this page. Safety parameter values apply only when using the SCON2 individually.

Item	Standard	Performance level
Safety integrity level	IEC 61508	SIL3
	IEC 62061	SIL CL3
Probability of dangerous failure per hour	IEC 61508 IEC 62061	PFH = 2.4 × 10 <sup>-9</sup> [1/h]
Performance level	EN ISO 13849-1	PL e (Category 3)
Mean time to dangerous failure of each channel	EN ISO 13849-1	MTTFd: High (≥ 100 years) (788a)
Average diagnostic coverage	EN ISO 13849-1	DCavg: Medium(97.7%)
Stop category	IEC 60204-1	Stop category 1
Safety functions	IEC/EN 61800-5-2	SS1-t
Mission time	IEC 61508	20 years
Hardware fault tolerance HFT	IEC 61508	1
Category	EN ISO 13849-1	3

(Note) In order to satisfy the PL e in EN ISO 13849-1 and SIL3 in IEC 61508, EDM signal monitoring must be done by the upper-level equipment.

**Earth Leakage Breaker Selection**

Regarding the earth leakage breaker, select with attention to the purpose (fire prevention, injury prevention, etc.). As leakage current varies depending on the connected motor capacity, the cable length, and the surrounding environment, when conducting leakage protection, measure leakage current at the earth leakage breaker installation area. Use a high-frequency supported earth leakage breaker.

**Test conditions for safety certification**  
 The earth leakage breaker's normal operation has been confirmed under the following conditions.

**For TN**

Protective equipment			System voltage	Fault loop impedance
Model name	Rated current	Rated sensitivity current (IΔn)		
Fuji Electric EW32AAG-2P010B	10A	30mA	100-115V 200-230V	3Ω or less

**For TT**

Protective equipment			System voltage	Fault loop impedance
Model name	Rated current	Rated sensitivity current (IΔn)		
Fuji Electric EW32AAG-2P010B	10A	30mA	100-115V 200-230V	100Ω or less

<Functional Safety Unit>

Item		Specification
I/O specifications	Points	Input 6 points, output 8 points duplicated
	Voltage	24VDC ± 10%
	Power supply current	1.0A max. (with all input points ON and all output points at 50mA load)
Overseas standard compliance	CE Marking	MD: IEC/EN 61508, IEC/EN 61800-5-2, IEC/EN 62061, EN ISO 13849-1: 2015, ISO 13849-1: 2015 EMC: IEC/EN 61800-3, IEC/EN 61800-5-2, IEC/EN 61000-6-7, IEC/EN 61326-3-1 LVD: IEC/EN 61800-5-1
Ambient operating temperature		0 to 60°C (no condensation or freezing)
Ambient operating humidity		5% RH ~ 85% RH (no condensation or freezing)
Vibration resistance		Frequency 10~57Hz/Amplitude 0.035mm (continuous), 0.075mm (intermittent) · Frequency 57-150Hz / Acceleration 9.8m/s <sup>2</sup> XYZ directions: Sweep time: 10 minutes, Number of sweeps: 10
Ingress protection		IP20
Mass		About 120g

■ Safety Performance

Item	Specification	Value	
Safety integrity level	IEC 61508	SIL2	SIL3
	IEC 62061	SILCL2	SILCL3
Probability of dangerous failure per hour PFH (*1)	IEC 61508	3.6×10 <sup>-8</sup>	2.6×10 <sup>-9</sup>
	IEC 62061	[1/h]	[1/h]
Performance level	EN ISO 13849-1	PL d	PL e
Mean time to dangerous failure of each channel MTTFd	EN ISO 13849-1	High (≥ 100 years) (154a)	High (≥ 100 years) (187a)
Average diagnostic coverage DC	EN ISO 13849-1	Medium (94.30%)	Medium (95.50%)
Mission time	IEC 61508	20 [years]	
Hardware fault tolerance HFT	IEC 61508	1	1
Category	EN ISO 13849-1	3	3

\*1 When at least one SIL2 exists among the safety functions set with safety input, the safety functions will be SIL2.

■ Reaction Time

Item	Definition	Value	Range (initial value) that can be set with parameters
Reaction time	STO	From when STO demand is enabled to when energy to motor is cut off.	Parameter No.42 + within 8ms (*1) 8~12ms (12ms)
	SS1-t	From when SS1-t demand is enabled to when energy to motor is cut off.	Parameters No.42 + No. 9 + within 8ms (*2) 8~10011ms (412ms)
	SS2-t	From when SS2-t request is enabled until an internal SOS request is output and feedback speed and feedback position monitoring begins.	Parameters No.42 + No. 9 + within +8ms (*3) 8~10011ms (412ms)
	SOS	When monitoring with SOS function, from when the safety stop speed limit value or safety stop position limit range set with parameters is continually exceeded until an internal STO request cuts off energy to the motor.	Parameter No.12 + within 20ms 20~10019ms (120ms)
	SLS, SSM	From when safety monitoring function limit values have been continually exceeded until an internal SS1-t or internal SS2-t execution request is enabled.	Parameters No.21~23 + within 20ms 20~10019ms (120ms)
	SLT, STM		
	SLP, SPM		
	SDI-		
	SDI+		
	SBC	Invariably output within STO or SS1-t reaction time, so the reaction time is the same value as STO and SS1-t.	When executed from STO: Same as STO When executed from SS1-t: Same as SS1-t Time cannot be set
Safety mode input	From when safety mode input is enabled to when safety monitor function monitoring begins.	Parameters No.42 + No. 18~20 + within 8ms 8~10011ms (112ms)	
Safety mode output	The internal SS1-t or internal SS2-t execution demands for safety monitor functions such as SLS are safety mode stop control; simultaneously, safety mode output will be output. Therefore, their reaction times are included in the SLS, etc. reaction time.	Included in the SLS, etc. reaction time	Time cannot be set
Safety mode stop control			

(\*1) When executing internal STO with diagnostic functions, etc., the time set with parameter No. 42 will be omitted.

(\*2) When executing internal SS1-t as a result of exceeding the limit value of the safety monitor function, the reaction time will be parameter No. 9 + 8ms.

(\*3) When executing internal SS2-t as a result of exceeding the limit value of the safety monitor function, the reaction time will be the parameter No. 9 value only.

■ Safety I/O Functions

● Input signal (the signal which makes safety function operation requests)

Signal name	Signal status	Description
Safety input signal A	ON (conducting)	Cancels safety function execute request
	OFF (open)	Requests safety function execution
Safety input signal B	ON (conducting)	Cancels safety function execute request
	OFF (open)	Requests safety function execution

● Output signal (the signal which indicates the status of executed safety functions)

Signal name	Signal status	Description
Safety output signal A	ON (conducting)	Safety function not executing or not monitoring
	OFF (open)	Safety function executing or monitoring and within limit values (varies depending on safety output signal)
Safety output signal B	ON (conducting)	Safety function not executing or not monitoring
	OFF (open)	Safety function executing or monitoring and within limit values (varies depending on safety output signal)



<Functional Safety Unit function overview>

Safety functions		Function overview	Safety Integrity Level		
			SIL	PL	Cat
Stop function	Safe Torque Off (STO)	<ul style="list-style-type: none"> <li>· Drive energy is electronically cut off by the execution of the input signal or other safety functions.</li> <li>· Equivalent to stop category 0 of IEC/EN 60204- 1. (Use the STO function with the servo motor stopped)</li> </ul>	3	e	3
	Safe stop 1 time control (SS1-t)	<ul style="list-style-type: none"> <li>· By executing the input signal or other safety functions, deceleration (non-safety function) starts, and after the prescribed time has passed, drive energy is electronically cut off.</li> <li>· Equivalent to stop category 1 of IEC/EN 60204- 1.</li> </ul>	3	e	3
	Safe stop 2 time control (SS2-t)	<ul style="list-style-type: none"> <li>· By executing the input signal or other safety functions, deceleration (non-safety function) starts, and after the prescribed time has passed, actuator stop monitoring (SOS) is executed.</li> <li>· Equivalent to stop category 2 of IEC/EN 60204- 1.</li> </ul>	2	d	3
Monitor function	Safe Operation Stop (SOS)	<ul style="list-style-type: none"> <li>· The execution of other safety functions serves to monitor the motor, with energy supplied, to make sure it does not deviate beyond the designated range from its stop position. If it deviates, the STO function is executed.</li> </ul>	2	d	3
	Safely Limited Speed (SLS)	<ul style="list-style-type: none"> <li>· Speed monitor function.</li> <li>· Based on the input signal, speed monitoring starts and the stop function (SS1-t or SS2-t) is executed if the designated speed limit value is exceeded.</li> </ul>	2	d	3
	Safely Limited Torque (SLT)	<ul style="list-style-type: none"> <li>· Current monitor function.</li> <li>· Based on the input signal, current monitoring starts and the stop function (SS1-t or SS2-t) is executed if the designated current limit value is exceeded.</li> </ul>	3	e	3
	Safely Limited Position (SLP)	<ul style="list-style-type: none"> <li>· Position monitor function.</li> <li>· Based on the input signal, position monitoring starts and the stop function (SS1-t or SS2-t) is executed if the designated position limit value is exceeded.</li> </ul>	2	d	3
	Safe Speed Monitoring (SSM)	<ul style="list-style-type: none"> <li>· Signal is output when speed is within designated speed.</li> <li>· Executed automatically when SLS is selected.</li> </ul>	2	d	3
	Safe Torque Monitoring (STM)	<ul style="list-style-type: none"> <li>· Signal is output when current value is within designated current values.</li> <li>· Executed automatically when SLT is selected.</li> </ul>	3	e	3
	Safe Position Monitoring (SPM)	<ul style="list-style-type: none"> <li>· Signal is output when position is within designated position.</li> <li>· Executed automatically when SLP is selected.</li> </ul>	2	d	3
	Safe Direction - (SDI-)	<ul style="list-style-type: none"> <li>· Function which monitors when the motor moves in the wrong direction (negative direction).</li> <li>· Based on the input signal, monitoring of the travel amount in the designated direction starts and the stop function (SS1-t or SS2-t) is executed if the designated travel amount is exceeded.</li> </ul>	2	d	3
	Safe Direction + (SDI+)	<ul style="list-style-type: none"> <li>· Function which monitors when the motor moves in the wrong direction (positive direction).</li> <li>· Based on the input signal, monitoring of the travel amount in the designated direction starts and the stop function (SS1-t or SS2-t) is executed if the designated travel amount is exceeded.</li> </ul>	2	d	3
Output function	Safe Brake Control (SBC)	<ul style="list-style-type: none"> <li>· Safety output signal intended to control the electromagnetic brake installed in the actuator. Prevents hazards such as vertical axis falls.</li> <li>· This signal is linked with the STO and SS1-t functions for control.</li> </ul>	3	e	3
Complex function	Safety mode	<p>Function which combines and executes safety functions. Includes the elements below.</p> <ul style="list-style-type: none"> <li>● Safety mode input</li> <li>· Function which assigns safety functions to safety mode input 1~3 and executes them.</li> <li>· Select safety functions from SLS, SLT, SLP, SDI-, and SDI+. Multiple functions can be selected.</li> <li>● Safety mode output</li> <li>· Outputs status for the safety functions assigned to safety mode output 1~3.</li> <li>● Safety mode stop control</li> <li>· When a request for stop control comes from the safety functions, this function selects the stop method (SS1-t or SS2-t).</li> </ul>	3	e	3

## Control Method

Control methods for the SCON2 controller can be selected from six specifications.

No.	Specification	Controller specifications	Description	Description page
①	Positioner specifications	Specifications other than (3)~(6)	· Designate positioner number externally · Travel commands with direct values	P15
②	Pulse-train control specification	I/O type: NP, PN Hardware option: C	· Control via pulse input	
③	Press program	Function option: F	· Control via press program	P19
④	Field network (remote I/O specification)	I/O type: Other than (2) and (6) Function options: None	· Control via remote I/O specification (ML3 supports Standard I/O Profile)	P18/P20
⑤	Field network (motion specification)	I/O types: ML3, EC Function option: M	· Control via motion network (EC supports EtherCat CiA402 Drive Profile)	-
⑥	RCON/RSEL connection specification	I/O type: RC	· Connect to R-unit (RCON/RSEL) · Control via RCON/RSEL specification field network (for details, see R-unit)	-

## Operation Mode \*Positioner/pulse-train

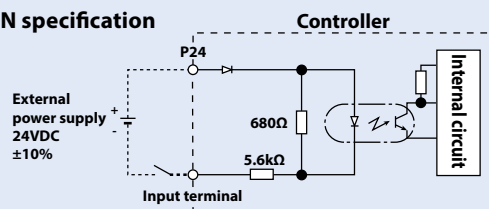
Mode	PIO pattern	Number of positioning points	Features	
Positioner mode	Positioning mode	0	64 points	Standard mode set as of shipping from the factory. Externally designate the number of the positioner to be moved in order to operate it.
	Teaching mode	1	64 points	In this mode, the slider (rod) can be moved with external signals and the stop position can be registered as position data.
	256-point mode	2	256 points	This mode expands the positioning mode number of positioning points to 256.
	384-point mode	3	384 points	This mode expands the positioning mode number of positioning points to 384.
	Solenoid valve mode 1	4	7 points	As with the air cylinder solenoid valve, this mode enables movement with signal ON/OFF alone.
	Solenoid valve mode 2	5	3 points	This solenoid valve mode renders the output signal the same as the air cylinder automatic switch.
	Force control mode 1	6	32 points	This mode enables operation with positioning mode of position movement during force control. (Max. 32 positioning points)
Force control mode 2	7	5 points	This mode enables operation with solenoid valve mode of position movement during force control. (Max. 5 positioning points)	
Pulse-train control mode	Pulse-train control mode for incremental	0	—	Position data input into the controller is not required; operation follows the pulses transmitted.
	Pulse-train control mode for absolute	1		

## PIO I/O Interface

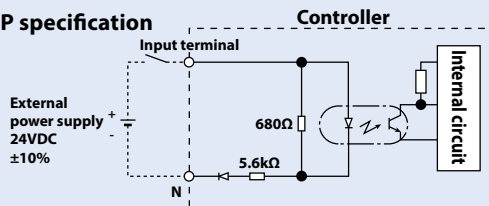
### Input External input specification

Item	Specification
Input voltage	24VDC $\pm 10\%$
Input current	4mA/1 circuit
ON/OFF voltage	ON voltage: Min. 18.0VDC OFF voltage Max. 6.0VDC
Isolation method	Photocoupler

#### NPN specification



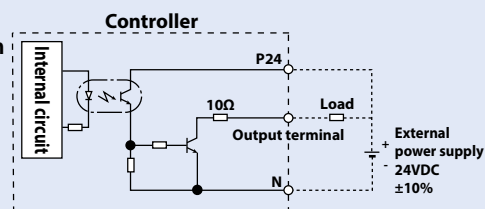
#### PNP specification



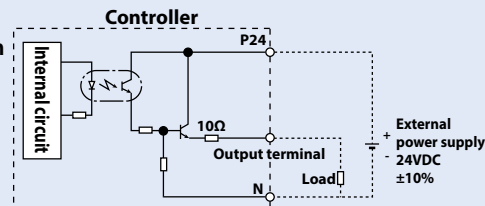
### Output External output specification

Item	Specification
Load voltage	24VDC
Maximum load current	50mA/1 point
Leakage current	Max. 0.1mA/1 point
Isolation method	Photocoupler

#### NPN specification



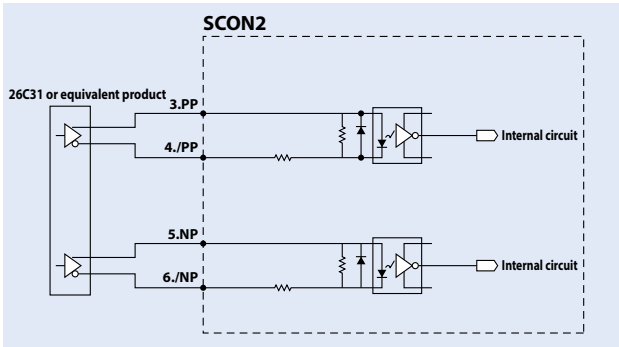
#### PNP specification



Pulse-train Type I/O Specification (differential line driver specification)

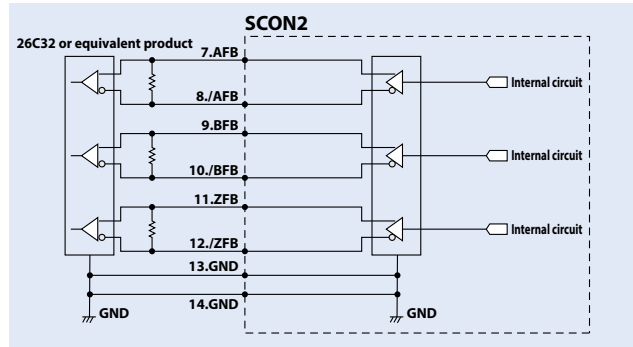
Input Part

Max. input pulse count: Line driver interface 2.5Mpps  
Isolation method: Photocoupler isolation



Output Part

Max. output pulse count: Line driver interface 2.5Mpps  
Isolated/non-isolated: Non-isolated



Pulse-train Type I/O Specification (open collector specification)

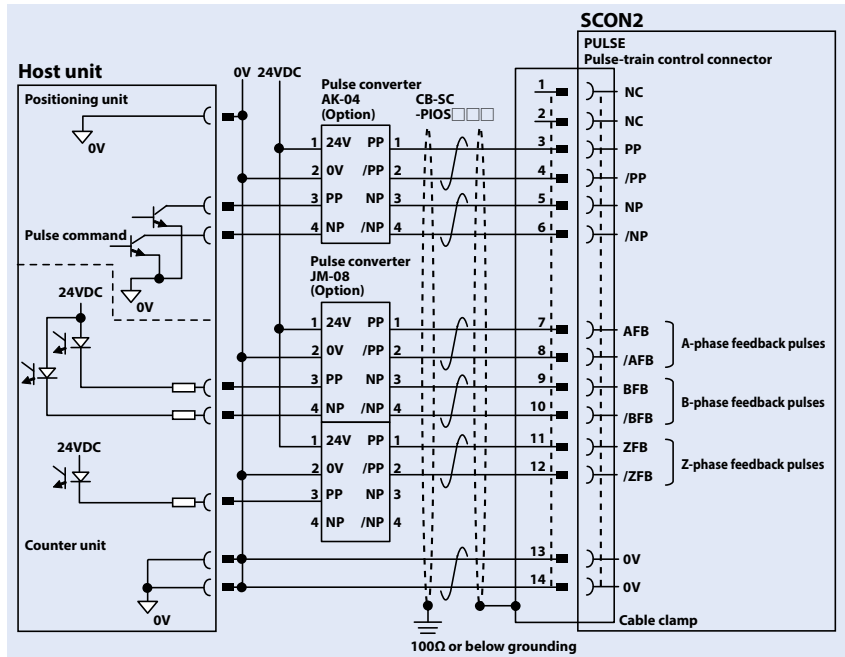
When the host (PLC) is open collector, the AK-04 (optional) is needed for pulse-train input. The JM-08 (optional) is needed for pulse-train output.

Max. input pulse count: 200kpps (AK-04 required)  
Max. output pulse count: 500kpps (JM-08 required)

- \*The 24VDC power supply to be connected to the AK-04 should be common with the PIO interface power supply.
- \*Keep the cables between the pulse output unit (PLC) and AK-04/JM-08 as short as possible.
- As well, keep the cables between the AK-04/JM-08 and pulse-train control connector within 2m in length.

Notes

Use the same power supply for open collector input/output to/from the host and for the AK-04 and JM-08.



Command Pulse Input Patterns

Command pulse-train pattern		Input terminal	Forward	Reverse	
Negative logic	Forward pulse-train	PP./PP			
	Reverse pulse-train	NP./NP			
	Forward pulse-train indicates the amount of motor rotation in the forward direction, while reverse pulse-train indicates the amount of motor rotation in the reverse direction.				
	Pulse-train	PP./PP			
	Sign	NP./NP	Low	High	
	The command pulses indicate the amount of motor rotation, while the sign indicates the rotating direction.				
Positive logic	Phase A/B pulse-train	PP./PP			
		NP./NP			
	Command phases A and B pulses with a 90° phase difference (multiplier is 4) indicate the amount of motor rotation and the rotating direction.				
	Forward pulse-train	PP./PP			
	Reverse pulse-train	NP./NP			
	Pulse-train	PP./PP			
	Sign	NP./NP	High	Low	
	Phase A/B pulse-train	PP./PP			
		NP./NP			



I/O Signal Table \*Select from 9 types of I/O signal allocation. Positioner/pulse-train

Pin No.	Category	Number of positioning points	Parameter (PIO pattern) selection									
			0	1	2	3	4	5	6 (Note)	7 (Note)	0/1	
			Positioning mode	Teaching mode	256-point mode	384-point mode	Solenoid valve mode 1	Solenoid valve mode 2	Force control mode 1	Force control mode 2	Pulse-train mode	
			64 points	64 points	256 points	384 points	7 points	3 points	32 points	5 points	—	
1A	24V		P24									P24
2A	24V		P24									P24
3A	—		NC									NC
4A	—		NC									NC
5A	Input	IN0	PC1	PC1	PC1	PC1	ST0	ST0	PC1	ST0	SON	
6A		IN1	PC2	PC2	PC2	PC2	ST1	ST1(JOG+)	PC2	ST1	RES	
7A		IN2	PC4	PC4	PC4	PC4	ST2	ST2(-)	PC4	ST2	HOME	
8A		IN3	PC8	PC8	PC8	PC8	ST3	—	PC8	ST3	TL	
9A		IN4	PC16	PC16	PC16	PC16	ST4	—	PC16	ST4	CSTP	
10A		IN5	PC32	PC32	PC32	PC32	ST5	—	—	—	DCLR	
11A		IN6	—	MODE	PC64	PC64	ST6	—	—	—	BKRL	
12A		IN7	—	JISL	PC128	PC128	—	—	—	—	RMOD	
13A		IN8	—	JOG+	—	PC256	—	—	CLBR	CLBR	RSTR (Note 1)	
14A		IN9	BKRL	JOG—	BKRL	BKRL	BKRL	BKRL	BKRL	BKRL	—	
15A		IN10	RMOD	RMOD	RMOD	RMOD	RMOD	RMOD	RMOD	RMOD	—	
16A		IN11	HOME	HOME	HOME	HOME	HOME	—	HOME	HOME	—	
17A		IN12	*STP	*STP	*STP	*STP	*STP	—	*STP	*STP	—	
18A		IN13	CSTR	CSTR/PWRT	CSTR	CSTR	—	—	CSTR	—	—	
19A		IN14	RES	RES	RES	RES	RES	RES	RES	RES	—	
20A	IN15	SON	SON	SON	SON	SON	SON	SON	SON	—		
1B	Output	OUT0	PM1	PM1	PM1	PM1	PE0	LSO	PM1	PE0	PWR	
2B		OUT1	PM2	PM2	PM2	PM2	PE1	LS1(TRQS)	PM2	PE1	SV	
3B		OUT2	PM4	PM4	PM4	PM4	PE2	LS2(-)	PM4	PE2	INP	
4B		OUT3	PM8	PM8	PM8	PM8	PE3	—	PM8	PE3	HEND	
5B		OUT4	PM16	PM16	PM16	PM16	PE4	—	PM16	PE4	TLR	
6B		OUT5	PM32	PM32	PM32	PM32	PE5	—	TRQS	TRQS	*ALM	
7B		OUT6	MOVE	MOVE	PM64	PM64	PE6	—	LOAD	LOAD	*EMGS	
8B		OUT7	ZONE1	MODES	PM128	PM128	ZONE1	ZONE1	CEND	CEND	RMDS	
9B		OUT8	PZONE/ZONE2	PZONE/ZONE1	PZONE/ZONE1	PM256	PZONE/ZONE2	PZONE/ZONE2	PZONE/ZONE1	PZONE/ZONE1	ALM1	
10B		OUT9	RMDS	RMDS	RMDS	RMDS	RMDS	RMDS	RMDS	RMDS	ALM2	
11B		OUT10	HEND	HEND	HEND	HEND	HEND	HEND	HEND	HEND	ALM4	
12B		OUT11	PEND	PEND/WEND	PEND	PEND	PEND	—	PEND	PEND	ALM8	
13B		OUT12	SV	SV	SV	SV	SV	SV	SV	SV	*ALML	
14B		OUT13	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	*EMGS	REND (Note 2)	
15B		OUT14	*ALM	*ALM	*ALM	*ALM	*ALM	*ALM	*ALM	*ALM	ZONE1	
16B	OUT15	*ALML	*ALML	*ALML	*ALML	*ALML	*ALML	*ALML	*ALML	ZONE2		
17B	—		—									—
18B	—		—									—
19B	0V		N									N
20B	0V		N									N

\*Parentheses in the above symbol names indicate functions before home return.  
 \*The \* symbol above means the signal is OFF during operation.  
 (Note 1) Mode supporting actuators with load cells.  
 (Note 2) Usable only with pulse-train control mode PIO pattern 1.

**Field Network Specifications Operation Mode Explanation (Excludes MECHATROLINK-III and EtherCAT motion specifications)**

If the SCON2 is controlled via a field network, select one of the following nine modes to operate the actuator.  
Please note that the data areas required on the PLC side will vary depending on the mode.

**Mode Description**

Mode	Description
0 Remote I/O mode	Similarly to the PIO specification, this mode operates by directing bytes to ON/OFF via a network. The number of positioning points and functions vary depending on the operation patterns (PIO patterns) set by the controller's parameters.
1 Position/simple direct value mode	The target position value is directly input, while all other operational conditions (speed, acceleration, etc.) are set by indicating the position number corresponding to the desired operating conditions from the position data table.
2 Half direct value mode	The actuator is operated by directly inputting values for speed, acceleration/deceleration rate and push current, as well as the target position.
3 Full direct value mode	The actuator is operated by directly inputting values for the target position, speed, acceleration/deceleration rate, push current limit value, etc. In addition, current position, current speed, command current value, etc. can be read.
4 Remote I/O mode 2	This mode is the same as the remote I/O mode above, with the added functionality of reading current position and the command current value.
5 Position/simple direct value mode 2	This mode includes a force control function in place of the teaching and zone functions of the position/simple direct mode above.
6 Half direct value mode 2	Instead of the command current reading which is a function of the half direct value mode above, load cell data reading is possible. Also supports the force control function.
7 Remote I/O mode 3	This mode is the same as the remote I/O mode above, with the added functionality of current position and load cell data reading.
8 Half direct value mode 3	This mode supports a vibration control function in place of the jog function of the half direct value mode above.

**Required Data Size for Each Network**

Mode	DeviceNet	CC-Link	CC-Link IE Field (Note 1)	MECHATROLINK-III (Note 2)	EtherCAT	EtherNet/IP	PROFINET IO
0 Remote I/O mode	2 bytes	1 station	4 words	16, 32, 48 byte modes	2 bytes	2 bytes	2 bytes
1 Position/simple direct value mode	8 bytes	1 station	4 words	16, 32, 48 byte modes	8 bytes	8 bytes	8 bytes
2 Half direct value mode	16 bytes	2 station	8 words	32,48 byte modes	16 bytes	16 bytes	16 bytes
3 Full direct value mode	32 bytes	4 station	16 words	48 byte modes	32 bytes	32 bytes	32 bytes
4 Remote I/O mode 2	12 bytes	1 station	4 words	16, 32, 48 byte modes	12 bytes	12 bytes	12 bytes
5 Position/simple direct value mode 2	8 bytes	1 station	4 words	16, 32, 48 byte modes	8 bytes	8 bytes	8 bytes
6 Half direct value mode 2	16 bytes	2 station	8 words	32,48 byte modes	16 bytes	16 bytes	16 bytes
7 Remote I/O mode 3	12 bytes	1 station	4 words	16, 32, 48 byte modes	12 bytes	12 bytes	12 bytes
8 Half direct value mode 3	16 bytes	2 station	8 words	32,48 byte modes	16 bytes	16 bytes	16 bytes

(Note 1) The remote register region is as shown in the table, occupying 32 points in the remote I/O region for all modes.  
(Note 2) Shows the supported byte mode.

**List of Functions by Operation Mode**

	Remote I/O mode	Position/simple direct value mode	Half direct value mode	Full direct value mode	Remote I/O mode 2	Position/simple direct value mode 2	Half direct value mode 2	Remote I/O mode 3	Half direct value mode 3
Number of positioning points	384 points	384 points	Unlimited	Unlimited	384 points	384 points	Unlimited	384 points	Unlimited
Operates by direct assignment of position data	×	○	○	○	×	○	○	×	○
Direct assignment of speed/acceleration	×	×	○	○	×	×	○	×	○
Push-motion operation	○	○	○	○	○	○	○	○	○
Current position read	×	○	○	○	○	○	○	○	○
Current speed read	×	×	○	○	×	×	○	×	○
Operation by position number input	○	○	×	×	○	○	×	○	×
Completed position number read	○	○	×	×	○	○	×	○	×
Force control	△ (Note 1)	×	×	○	△ (Note 1)	○	○	△ (Note 1)	×
Vibration control	○	○	×	○	○	○	×	○	○
Servo gain switching	○	○	○	○	○	○	×	○	○

\* ○ indicates that the operation is supported, and X indicates that it is not supported.  
(Note 1) Usable when setting PIO patterns to 6 or 7.

## Operation Modes \*For press program only

Set when using the dedicated press program.

There are 8 types of press motion modes to select from

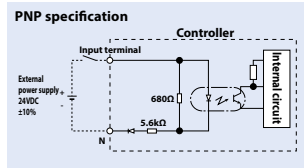
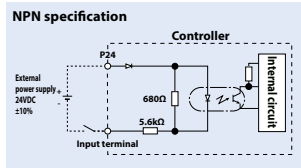
<b>Speed control</b> After press motion is complete, stops while maintaining the <b>position</b> arrived at.	Position stop
	Distance stop
	Load stop
	Incremental load stop
<b>Force control</b> After press motion is complete, stops while maintaining the <b>force</b> arrived at.	Position stop/position stop 2
	Distance stop
	Load stop
	Incremental load stop



## PIO I/O Interface

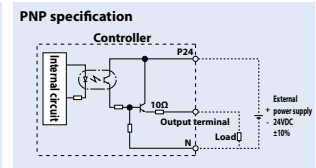
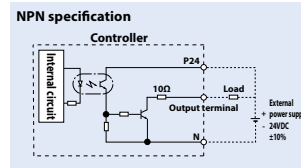
### Input External input specification

Item	Specification
Input voltage	24VDC ±10%
Input current	4mA/1 circuit
ON/OFF voltage	ON voltage: Min. 18.0VDC OFF voltage Max. 6.0VDC
Isolation method	Photocoupler



### Output External output specification

Item	Specification
Load voltage	24VDC
Maximum load current	50mA/1 point
Leakage current	Max. 0.1mA/1 point
Isolation method	Photocoupler



## I/O Signal Table \*For press program only

Pin No.	Category	Signal	Symbol	Name
1A	24V		P24	Power supply (+24V) for I/O
2A	24V		P24	Power supply (+24V) for I/O
3A	-		NC	-
4A	-		NC	-
5A	Input	IN0	PC1	Command program No. 1
6A		IN1	PC2	Command program No. 2
7A		IN2	PC4	Command program No. 4
8A		IN3	PC8	Command program No. 8
9A		IN4	PC16	Command program No. 16
10A		IN5	PC32	Command program No. 32
11A		IN6	PSTR	Program start
12A		IN7	PHOM	Move to program home position
13A		IN8	ENMV	Enable axis to move
14A		IN9	FPST	Forcibly stop program from running
15A		IN10	CLBR	Load cell calibration command
16A		IN11	BKRL	Forced brake release
17A		IN12	RMOD	Operation mode switching
18A		IN13	HOME	Home return
19A		IN14	RES	Alarm reset
20A	IN15	SON	Servo ON command	
1B	Output	OUT0	PCMP	Program normally completed
2B		OUT1	PRUN	Program running
3B		OUT2	PORG	Program home position
4B		OUT3	APRC	Approaching
5B		OUT4	SERC	Searching
6B		OUT5	PRSS	In press motion
7B		OUT6	PSTP	Stop pressing
8B		OUT7	MPHM	Moving to program home position
9B		OUT8	JDOK	Overall judgment OK
10B		OUT9	JDNG	Overall judgment NG
11B		OUT10	CEND	Load cell calibration completed
12B		OUT11	RMD5	Operation mode status
13B		OUT12	HEND	Home return complete
14B		OUT13	SV	Servo ON status
15B		OUT14	*ALM	Alarm (Negative logic)
16B	OUT15	*ALML	Minor failure alarm (Negative logic)	
17B	-		-	-
18B	-		-	-
19B	0V		N	Power supply (0V) for I/O
20B	0V		N	Power supply (0V) for I/O

**Field Network Specification: Explanation of Operation Modes** \*For press program only

If the SCON2 is controlled via a field network, select one of the following three modes to operate the actuator.  
Please note that the data areas required on the PLC side will vary depending on the mode.

**Mode Description**

Mode		Description
0	Remote I/O mode	Similarly to the PIO specification, this mode operates by directing bytes to ON/OFF via a network. The number of positioning points and functions vary depending on the operation patterns (PIO patterns) set by the controller's parameters.
1	Full function mode	In addition to press program startup and servo press functions such as judgment results reading, this mode supports all functions, including travel with direct values and current load data reading.
2	Press direct value mode	This operation mode designates the press program "press motion stage" with direct values. Press direct value operation and positioning direct value operation are possible.

**Required Data Size for Each Network**

Mode	DeviceNet	CC-Link	CC-Link IE Field (Note 1)	MECHATROLINK-III (Note 2)	EtherCAT	EtherNet/IP	PROFINET IO
0 Remote I/O mode	2 bytes	1 station	4 words	16, 32, 48 byte modes	2 bytes	2 bytes	2 bytes
1 Full function mode	32 bytes	4 station	16 words	48 byte modes	32 bytes	32 bytes	32 bytes
2 Press direct value mode	32 bytes	4 station	16 words	48 byte modes	32 bytes	32 bytes	32 bytes

(Note 1) The remote register region is as shown in the table, occupying 32 points in the remote I/O region for all modes.  
(Note 2) Shows the supported byte mode.

**List of Functions by Operation Mode**

	Remote I/O mode	Full function mode	Press direct value mode
Position data designation operation	×	○	○
Speed and acceleration/ deceleration direct designation	×	○	○
Press motion load direct designation	×	×	○
Current position read	×	○	○
Current speed read	×	○	○
Program No. designation operation	○	○	×
Judgment results read	○	○	○
Current load data read	×	○	○
Overload bell monitor	× (*1)	○ (*1)	○
Servo gain switching	○	○	○

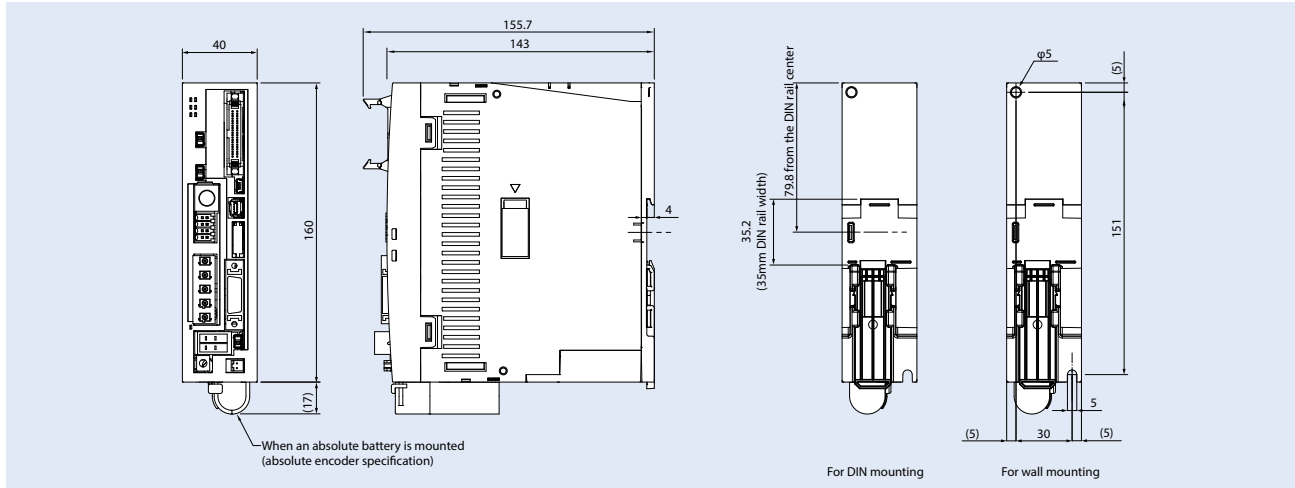
(\*1) For servo gain, 1 servo gain can be registered for 1 press program.

○ Available  
× Unavailable



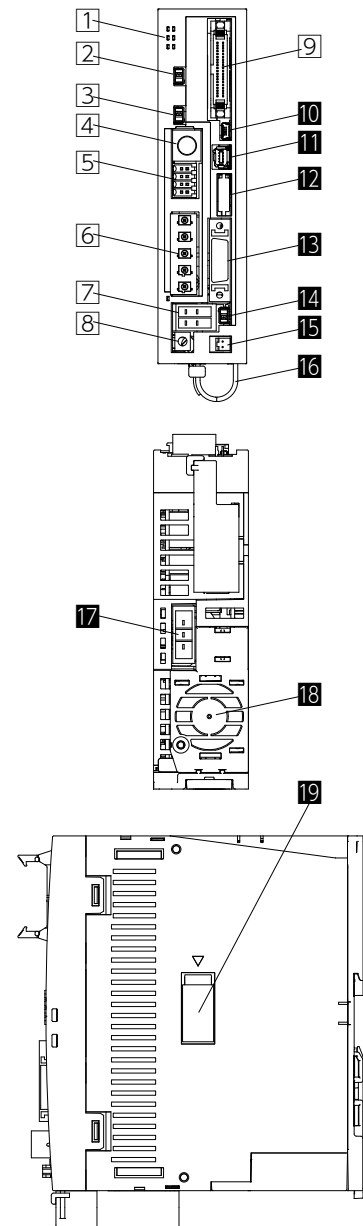
## External Dimensions

### <SCON2 Controller>



## Name of Each Component

### <SCON2 Controller>



#### 1 Status display LED

Shows controller status.

LED Name	Color	Description
PWR	Green	Lights when controller normal operation is launched
SV	Green	Lights at servo ON
ALM	Orange	Lights up on alarm
WRG	Orange	Lights in warning status
STOP	Red	Lights in stop status
SAFE	Red	Lights in safety function status

#### 2 Jog switch

Switch for jog operation.

Switch setting	Description
JOG+	Jog motion in + direction (opposite direction from home)
JOG-	Jog motion in - direction (home direction)

#### 3 Operation mode setting switch

Switches between AUTO and MANU modes.

Name	Description
AUTO	Ready to accept commands from PIO.
MANU	Does not accept commands from PIO.

#### 4 SIO connector

Connector for teaching pendant or PC communication cable.

#### 5 System I/O connector

Connector for emergency stop switch, enable switch, etc.

#### 6 Power connector

Connector supplying control power and motor drive power.

#### 7 Motor connector

Connector for motor cable.

#### 8 FG ground terminal

Screw for protective grounding. Be sure to ground.

#### 9 PIO connector or field network connector

Connector for PIO or field network connectors selected with I/O type. Refer to P.22 for the details of the cable and connector.

#### 10 USB connector

Connector for cable connecting teaching software for PC.

#### 11 Safety function I/O connector

Connector realizing the SS1-t function which includes external safety request signal (SRI) input and external detection signal (EDM). Cannot be used when Functional Safety Unit is connected. Refer to P.22 for I/O signals.

#### 12 Multi-function connector

Connector used for pulse-train input, feedback pulse output, and analog output of load cell load data. Refer to P.22 for signals.

#### 13 Encoder connector

Connector for encoder.

#### 14 Brake release switch

Switch used to forcibly release the brake of the actuator with brake.

**WARNING:** Be sure to set on NOM side during normal operation. If left on RLS side, the brake will not operate even in servo OFF status. For vertical mounting, the movable parts may fall, leading to injury and/or workpiece damage.

#### 15 Absolute battery connector

Connector for the battery when using absolute specification.

#### 16 Absolute battery holder

Battery holder for installing the absolute data backup battery.

#### 17 Regenerative resistance unit connector

Connector for the external regenerative resistance unit.

#### 18 Fan unit

Unit for dissipating the internal controller heat.

#### 19 Safety unit connector cover

Covers the connector mounting the Functional Safety Unit. When mounting the Functional Safety Unit, remove the cover to connect.

Part Details

Network connection cables/connectors

PIO (NP/PN) connection specification

Accessory: PIO cable (Model: CB-PAC-PIO□□□□)  
 \*When purchasing network options NP or PN specifications, a cable of the designated length is included.  
 Refer to P. 29 for the details of the cables.

DeviceNet connection specification

Network connection cable

Pin No.	Signal name (coloring)	Description	Compatible wire diameter
1	V- (black)	Power cable - side	DeviceNet dedicated cable
2	CAN L (blue)	Communication data low side	
3	-	Drain (shield)	
4	CAN H (white)	Communication data high side	
5	V+ (red)	Power cable + side	

Accessory: Network connector  
 (Model: MSTB2.5/5-STF-5.08 AUM)

RCON connection specification

Accessory: SCON connection cable (Model: CB-RE-CTL002)  
 \*When purchasing network option RC specification, a cable is included.  
 Refer to P. 29 for the details of the cables.

CC-Link connection specification

Network connection cable

Pin No.	Signal name (coloring)	Description	Compatible wire diameter
1 (6)	DA (blue)	Communication line A	CC-Link dedicated cable
2 (7)	DB (white)	Communication line B	
3 (8)	DG (yellow)	Digital ground	
4 (9)	SLD	Connects shield cable's shield (Connects 5-pin FG and control power connector, 1-pin FG and interior)	
5	FG	Frame ground (Connects 4-pin SLD and control power connector, 1-pin FG and interior)	

Accessory: Network connector  
 (Model: MSTB2.5/5-STF-5.08 AU with terminal resistance 110 Ω / 130 Ω)

CC-Link IE Field connection specification

Network connection cable

Pin No.	Signal name	Description	Compliant wire diameter/cable connector model
1	TPO+	Data 0+	For the Ethernet cable, use a straight STP cable of Category 5e or higher.  Ethernet ANSI/TIA/EIA-568-B Category 5e or higher shielded 8P8C modular plug (RJ-45)
2	TP0-	Data 0-	
3	TP1+	Data 1+	
4	TP2+	Data 2+	
5	TP2-	Data 2-	
6	TP1-	Data 1-	
7	TP3+	Data 3+	
8	TP3-	Data 3-	

MECHATROLINK-III connection specification

Network connection cable

Pin No.	Signal name	Description	Compliant wire diameter/cable connector model
1	TXD+	Transmitting data +	Use a MECHATROLINK-III dedicated cable.  Industrial mini I/O plug
2	TXD-	Transmitting data -	
3	RXD+	Receiving data +	
4	-	Not used	
5	-	Not used	
6	RXD-	Receiving data -	
7	-	Not used	
8	-	Not used	

EtherCAT<sup>®</sup> connection specification

Network connection cable

Pin No.	Signal name	Description	Compliant wire diameter/cable connector model
1	TD+	Transmitting data +	For the Ethernet cable, use a straight STP cable of Category 5 or higher.  Ethernet ANSI/TIA/EIA-568-B Category 5 or higher shielded 8P8C modular plug (RJ-45)
2	TD-	Transmitting data -	
3	RD+	Receiving data +	
4	-	Not used	
5	-	Not used	
6	RD-	Receiving data -	
7	-	Not used	
8	-	Not used	

EtherNet/IP / PROFINET IO connection specification

Network connection cable

Pin No.	Signal name	Description	Compliant wire diameter/cable connector model
1	TD+	Transmitting data +	For the Ethernet cable, use a straight STP cable of Category 5 or higher.  Ethernet ANSI/TIA/EIA-568-B Category 5 or higher shielded 8P8C modular plug (RJ-45)
2	TD-	Transmitting data -	
3	RD+	Receiving data +	
4	-	Not used	
5	-	Not used	
6	RD-	Receiving data -	
7	-	Not used	
8	-	Not used	

Safety function I/O connector

PCB side connector: 2294417- 1 (TE Connectivity)  
 Opposite side connector: 2013595- 1 (TE Connectivity)

Pin No.	Signal name	Name	Description
1	NC	-	Do not wire.
2	NC	-	Do not wire.
3	/SRI1-	Safety request input signal 1	Inputs safety request input signal. ON (conducting): Cancels safety function operation request OFF (open): Requests safety function operation
4	/SRI1+		
5	/SRI2-	Safety request input signal 2	Inputs safety request input signal. ON (conducting): Cancels safety function operation request OFF (open): Requests safety function operation
6	/SRI2+		
7	EDM-	External device monitor output signal	Output signal that indicates that the safety function is operating without failure.
8	EDM+		

Multi-function connector

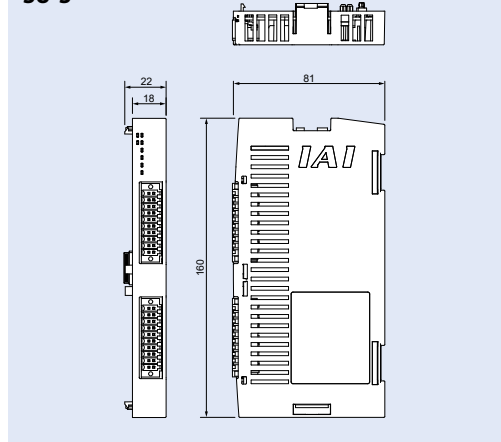
PCB side connector: HDR-EC14LFDTN-SLD+ (Honda Tsushin Kogyo)  
 Opposite side connector: HDR-E14MSG1+ (Honda Tsushin Kogyo)

Pin No.	Signal name	Description
1	IOUT	Outputs load data detected via the load cell as analog data (current)
2	GND	
3	PP	Command pulse-train input (PP)
4	/PP	Command pulse-train input (/PP)
5	NP	Command pulse-train input (NP)
6	/NP	Command pulse-train input (/NP)
7	AFB	Feedback pulse (+A)
8	/AFB	Feedback pulse (-A)
9	BFB	Feedback pulse (+B)
10	/BFB	Feedback pulse (-B)
11	ZFB	Feedback pulse (+Z)
12	/ZFB	Feedback pulse (-Z)
13	GND	0V
14	GND	0V

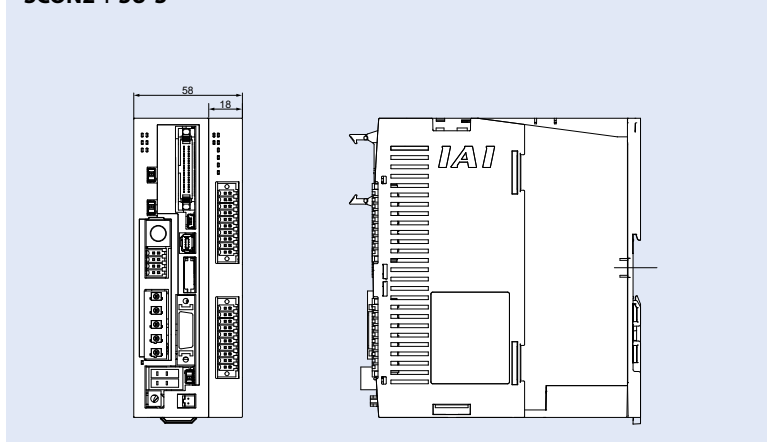
## External Dimensions

### <Functional Safety Unit>

#### SU-S

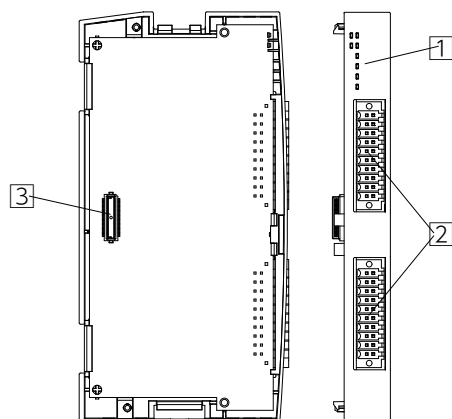


#### SCON2 + SU-S



## Name of Each Component

### <Functional Safety Unit>



#### 1 LED display

Displays the operation status of the Functional Safety Unit.

LED Name	Color	Light ON conditions	Light OFF conditions	Blinking conditions
PWR	Green	Initializing complete	No power supply	-
ALM	Red	Incorrect parameters Abnormality detected	No power supply Normal operation in progress	-
STO	Green	STO request in progress	No STO request	-
SS1	Green	SS1-t request in progress	No SS1-t request	-
SS2	Green	SS2-t request in progress	No SS2-t request	-
SM1	Green	Safety mode 1 request in progress	No safety mode 1 request	SS1-t or SS2-t request: Blinks
SM2	Green	Safety mode 2 request in progress	No safety mode 2 request	SS1-t or SS2-t request: Blinks
SM3	Green	Safety mode 3 request in progress	No safety mode 3 request Abnormality detected	SS1-t or SS2-t request: Blinks

#### 2 Safety I/O connectors A/B

Connectors for sending and receiving safety unit I/O signals.

No.	Signal name	Function	No.	Signal name	Function
1	STO_IN_A/B	STO input	2	STO_OUT_A/B	STO output
3	NC	(Not used)	4	SBC_OUT_A/B	SBC output
5	SS1_IN_A/B	SS1-t input	6	SS1_OUT_A/B	SS1-t output
7	SS2_IN_A/B	SS2-t input	8	SS2_OUT_A/B	SS2-t output
9	NC	(Not used)	10	SOS_OUT_A/B	SOS output
11	SM1_IN_A/B	Safety mode 1 input	12	SM1_OUT_A/B	Safety mode 1 output
13	SM2_IN_A/B	Safety mode 2 input	14	SM2_OUT_A/B	Safety mode 2 output
15	SM3_IN_A/B	Safety mode 3 input	16	SM3_OUT_A/B	Safety mode 3 output
17	IN_COM_A/B	Input common	18	OUT_COM_A/B	Output common
19	FG	Frame ground	20	FG	Frame ground

#### 3 SCON2 connector

Connector for the SCON2.

Safety I/O signal details

■ Safety Input Signals

Function Name	Signal Name (Pin No.)	Description
STO input	STO_IN_A (A.1) STO_IN_B (B.1)	Input signal which activates the STO function. ·ON (conducting) : Cancels STO function operation request ·OFF (open) : Requests STO function operation
SS1-t input	SS1_IN_A (A.5) SS1_IN_B (B.5)	Input signal which activates the SS1-t function. ·ON (conducting) : Cancels SS1-t function operation request ·OFF (open) : Requests SS1-t function operation
SS2-t input	SS2_IN_A (A.7) SS2_IN_B (B.7)	Input signal which activates the SS2-t function. ·ON (conducting) : Cancels SS2-t function operation request ·OFF (open) : Requests SS2-t function operation
Safety mode 1 input	SM1_IN_A (A.11) SM1_IN_B (B.11)	Input signal which activates the safety mode 1 function. Safety functions are set with parameters. ·ON (conducting) : Cancels safety function operation request ·OFF (open) : Requests safety function operation
Safety mode 2 input	SM2_IN_A (A.13) SM2_IN_B (B.13)	Input signal which activates the safety mode 2 function. Safety functions are set with parameters. ·ON (conducting) : Cancels safety function operation request ·OFF (open) : Requests safety function operation
Safety mode 3 input	SM3_IN_A (A.15) SM3_IN_B (B.15)	Input signal which activates the safety mode 3 function. Safety functions are set with parameters. ·ON (conducting) : Cancels safety function operation request ·OFF (open) : Requests safety function operation

■ Safety Output Signals

Function Name	Signal Name (Pin No.)	Description
STO output	STO_OUT_A (A.2) STO_OUT_B (B.2)	Output signal that indicates that the STO function is activated. ·ON (conducting) : STO function not activated ·OFF (open) : STO function activated
SBC output	SBC_OUT_A (A.4) SBC_OUT_B (B.4)	Output signal that indicates that the SBC function is activated. ·ON (conducting) : SBC function not activated ·OFF (open) : SBC function activated
SS1-t output	SS1_OUT_A (A.6) SS1_OUT_B (B.6)	Output signal that indicates that the SS1-t function is activated. ·ON (conducting) : SS1-t function not activated ·OFF (open) : SS1-t function activated
SS2-t output	SS2_OUT_A (A.8) SS2_OUT_B (B.8)	Output signal that indicates that the SS2-t function is activated. ·ON (conducting) : SS2-t function not activated ·OFF (open) : SS2-t function activated
SOS output	SOS_OUT_A (A.10) SOS_OUT_B (B.10)	Output signal that indicates that the SOS function is activated. ·ON (conducting) : SOS function not activated ·OFF (open) : SOS function activated
Safety mode 1 output	SM1_OUT_A (A.12) SM1_OUT_B (B.12)	Output signal that indicates that the safety mode 1 function is activated. Safety functions are set with parameters. ·ON (conducting) : Safety function not activated ·OFF (open) : Safety function activated
Safety mode 2 output	SM2_OUT_A (A.14) SM2_OUT_B (B.14)	Output signal that indicates that the safety mode 2 function is activated. Safety functions are set with parameters. ·ON (conducting) : Safety function not activated ·OFF (open) : Safety function activated
Safety mode 3 output	SM3_OUT_A (A.16) SM3_OUT_B (B.16)	Output signal that indicates that the safety mode 3 function is activated. Safety functions are set with parameters. ·ON (conducting) : Safety function not activated ·OFF (open) : Safety function activated

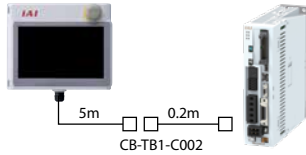


## Options

### Touch panel teaching pendant

CAD drawings can be downloaded from our website. [www.intelligentactuator.com](http://www.intelligentactuator.com) **2D CAD** **3D CAD**

- Features** A teaching device equipped with functions such as position teaching, trial operation, and monitoring.
- Model** (standard specification) **TB-02-C**  
(dead man's switch specification) **TB-02D-C-SWR**
- Configuration**



Please contact IAI for the current supported versions.

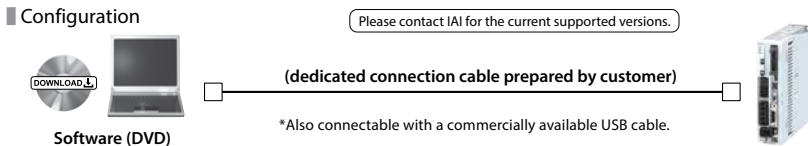
\*For safety category compliance, a separate TP adapter and dummy plug are required. Please refer to P.10 for more information.

### Specifications

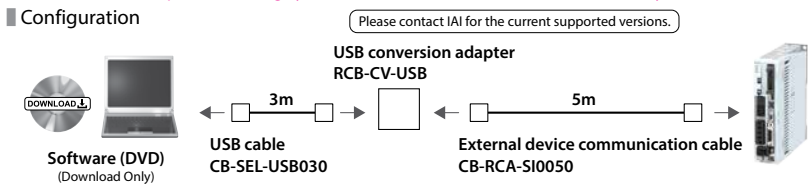
Rated voltage	24VDC
Power consumption	3.6W or less (150mA or less)
Ambient operating temperature	0 to 40°C
Ambient operating humidity	5% RH ~ 85% RH (no condensation or freezing)
Ingress protection	IP20
Mass	470g (TB-02 unit only)

### Teaching software for PC (Windows only)

- Features** Start-up support software which comes equipped with functions such as position teaching, trial operation, and monitoring. A complete range of functions needed for making adjustments contributes to shortened start-up time.
- Model** **IA-OS** (software only; for those already equipped with a dedicated connection cable)  
\* Please purchase through your distributor and a download link will be sent to your valid email address.



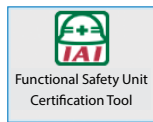
- Model** **IA-OS-C** (with external device communication cable + USB conversion adapter + USB cable)  
\* Please purchase through your distributor and a download link will be sent to your valid email address.



### Functional Safety Unit setting tool

- Features** Functional Safety Unit dedicated setting tool. Required when setting safety parameters.
- Model** **SU-T**

\*The software is included in teaching software for PC IA-OS(-C). Check the IA-OS supported versions for setting tool support.



### Regenerative resistance unit

CAD drawings can be downloaded from our website. [www.intelligentactuator.com](http://www.intelligentactuator.com) **2D CAD** **3D CAD**

- Features** This unit converts the regenerative current which is generated when the motor decelerates into heat. Check the wattage of the actuator to be operated in the table below, and prepare one if regenerative resistance is required.
- Model** **RESU-1/2** (standard specification)  
**RESUD-1/2** (DIN rail mounting specification)

[Precautions for preparation and connection]  
 · For direct connection with SCON2, prepare the RESU(D)-2.  
 · For the second unit on, when connecting regenerative resistance units, prepare the RESU(D)-1.  
 · Up to 4 regenerative resistance units can be connected.

### Specifications

Connection	Direct connection with SCON2		Connection between regenerative resistance units	
	RESU-2	RESUD-2	RESU-1	RESUD-1
Model	RESU-2	RESUD-2	RESU-1	RESUD-1
Unit weight	About 0.4kg			
Built-in regenerative resistance value	235Ω 80W			
Body mounting method	Screw mount	DIN rail mount	Screw mount	DIN rail mount
Attached cable	CB-SC-REU010		CB-ST-REU010	

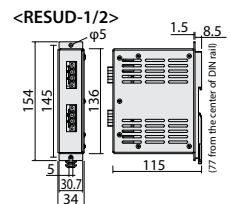
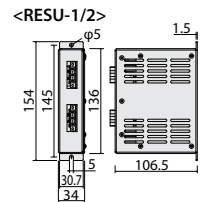
Number of units connected	Horizontal		Vertical		DD/DDA/DDW
	RCS2-RA13R		RCS2-RA13R		
0 units (not required)	Up to 200W (Note)	Lead 1.25	Up to 200W (Note)	-	-
1	300W ~ 400W (including LS-L)	Lead 2.5	300W ~ 400W (including LS-L)	Lead 1.25 Lead 2.5	LT18□
2	600W ~ 750W	-	600W ~ 750W	-	LH18□

(Note) One unit is required for the LSA/LSAS-N10S type.

\*According to operating conditions such as operating duty over 50%, more regenerative resistance units may be required than shown in the above table. An alarm will be generated when the regenerative resistance is insufficient.

The Calculator software can be used to confirm the optimal number of regenerative resistance units.  
 \*The Calculator software comes with the IA-OS software.

### External Dimensions

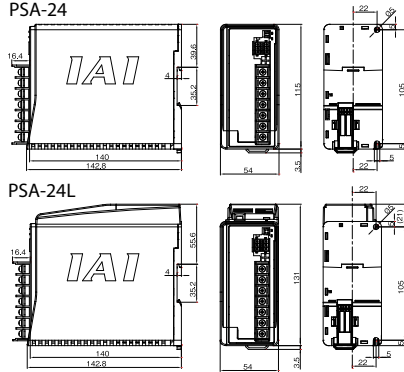


**24 V power supply**

CAD drawings can be downloaded from our website.  
www.intelligentactuator.com **2D CAD** **3D CAD**

- Features Compact power supply.
- Model **PSA-24 (no fan)**
- Model **PSA-24L (with fan)**

■ External Dimensions



■ Specifications

Item	Specification	
	For 100VAC input	For 200VAC input
Power input voltage range	100VAC ~ 230VAC ±10%	
Input power current	3.9A or less	1.9A or less
Power capacity	No fan: 250VA With fan: 390VA	No fan: 280VA With fan: 380VA
Inrush current *1	No fan: 17A (typ) With fan: 27.4A (typ)	No fan: 34A (typ) With fan: 54.8A (typ)
Generated heat	33W (204W at continuous rating) 54W (300W at continuous rating)	23W (204W at continuous rating) 37 W (330W at continuous rating)
Output voltage range *2	24V ±10%	
Continuous rated output	No fan: 8.5A (204W), with fan: 13.8A (330W)	
Peak output	17A (408W)	
Efficiency	86% or above	90% or above
Parallel connection *3	Max. 5 units	

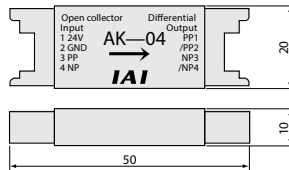
- (\*1) Pulse width with inrush current is 5ms or below.
- (\*2) In order to enable parallel operation, this power supply includes the property of fluctuating output voltage in response to load. Therefore, the power supply is dedicated for IAI controller use only.
- (\*3) Parallel connection in the conditions below is not possible.
  - Parallel connection of PSA-24 (specification without fan) and PSA-24L (specification with fan)
  - Parallel connection with a power unit other than this one
  - Parallel connection with PS-24

**Pulse converter**

- Features Converts open collector specification pulse into differential format. Use this converter if the host controller uses open-collector specification output pulse.

■ Model **AK-04**

■ External Dimensions



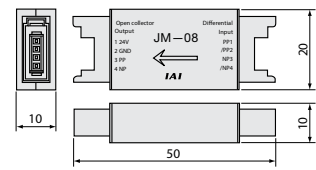
■ Specifications

Item	Specification
Input power	24VDC ±10% (Max. 50mA)
Input pulse	Open collector (collector current max. 12mA)
Input frequency	200kHz or less
Output pulse	Differential output (max. 10mA) (equivalent to 26C31)
Mass	10g or less (not including cable connectors)
Accessories	37104-3122-000FL (e-CON connector) x 2 made by 3M Suitable power line AWG 24~26

- Features Converts differential pulse to open collector specification. Use this converter if the host controller uses open-collector specification pulse input.

■ Model **JM-08**

■ External Dimensions



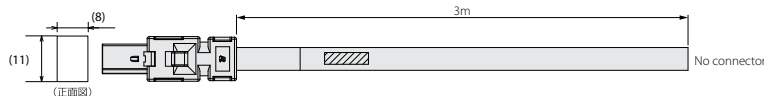
■ Specifications

Item	Specification
Input power	24VDC ±10% (Max. 50mA)
Input pulse	Differential input (Max 10mA) (RS-422 compliant)
Input frequency	500kHz or less
Output pulse	24VDC open collector (collector current max. 25mA)
Mass	10g or less (not including cable connectors)
Accessories	37104-3122-000FL (e-CON connector) x 2 made by 3M Suitable power line AWG 24~26

**Safety function I/O cable**

- Features Cable for connecting the safety function I/O connector and the safety device.

■ Model **CB-SC-STO 030**



3013595-1 (TB)

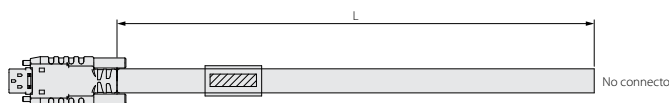
Wire	Color	Signal	No.
-	-	-	1
-	-	-	2
Black	/SR1-	3	3
Black/White	/SR1+	4	4
Red	/SR2-	5	5
Red/White	/SR2+	6	6
Green	EDM-	7	7
Green/White	EDM+	8	8

Shield is connected to cable clamp

**Multi-function connector cable**

- Features Cable for performing pulse-train control and analog output with the multi-function connector.

■ Model **CB-SC2-MFC** □ □ □



HDR-E14MSG1+

Wire	Color	Signal	No.
Orange/Red 1	/OUT1	1	1
Orange/Black 1	GND	2	2
Light gray/Red 1	PP	3	3
Light gray/Black 1	PG	4	4
White/Red 1	NP	5	5
White/Black 1	NG	6	6
Yellow/Red 1	/AFB	7	7
Yellow/Black 1	/AFB	8	8
Pink/Red 1	/BFB	9	9
Pink/Black 1	/BFB	10	10
Orange/Red 2	/ZFB	11	11
Orange/Black 2	/ZFB	12	12
Light gray/Red 2	GND	13	13
Light gray/Black 2	GND	14	14

Shield is connected to cable clamp

## Brake box

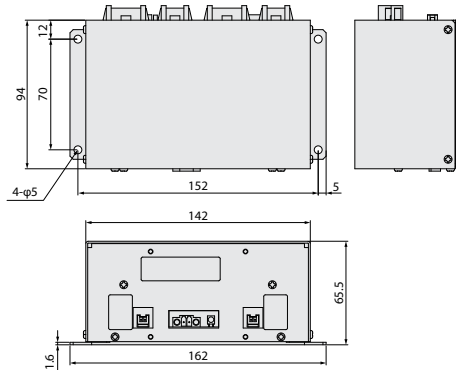
- Features Required when connecting to the RCS2-RA13R actuator.

■ Model **RCB-110-RA13-0**

### Specifications

Item	Specification
Power supply voltage, current	24VDC ± 10% 1A
Connection cable (included)	Encoder cable (Model CB-RCS2-PLA010) 1m
Number of controlled axes	2

### External Dimensions



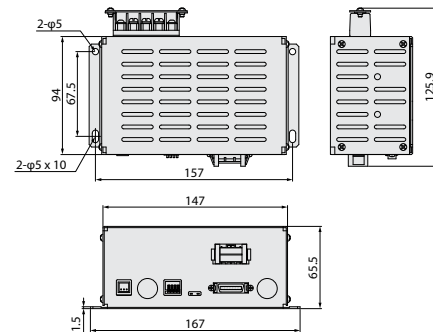
- Features Required when connecting to the DDA actuator with brake.

■ Model **IA-110-DD-4**

### Specifications

Item	Specification	
Input power supply voltage	100VAC ~ 240VAC ± 10%	
Input power current	Rated excitation	100VAC: 0.25A/200VAC: 0.15A
	Over-excitation	100VAC: 0.6A/200VAC: 0.3A
Generated heat	6.0W (rated excitation)/10.0W (over-excitation)	
Over-excitation time	1.2s ± 0.2s	
Connection cable (included)	Encoder cable (Model CB-X3-PA010) 1m	
Environment	Ambient operating temperature	0 to 40°C
	Ambient operating humidity	5~85% RH or less (no condensation or freezing)
	Ingress protection	IP20
Mass	About 0.4kg	

### External Dimensions

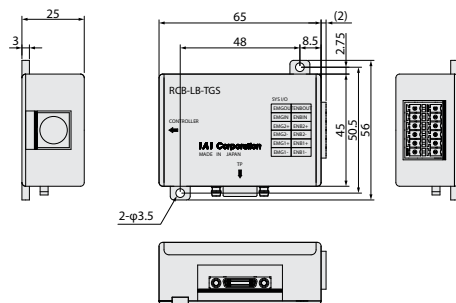


## TP adapter for position controller

- Features When constructing a safety category (ISO12100-1) compliant system, this is required to connect the teaching pendant and the controller.

■ Model **RCB-LB-TGS**

### External Dimensions



## Dummy plug

- Features When not connecting the teaching pendant while constructing a safety category system, connect to the TP adapter.

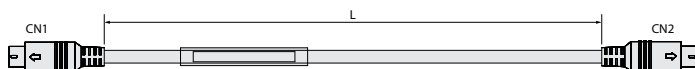
■ Model **DP-4S**



## Controller adapter connection cable

- Features When constructing a safety category system, this cable connects the teaching pendant and the controller.

■ Model **CB-CON-LB005**



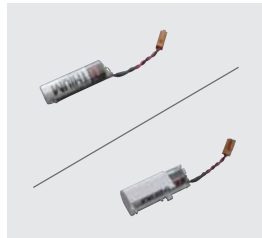
**Maintenance Parts**

Normally attached with each unit; when needed due to loss, etc., purchase as a single product.

For SCON2 controller

**Absolute data storage battery**

- Features Absolute data storage battery for operating an absolute specification actuator.
- Model **AB-5 (battery only)**
- Model **AB-5-CS3 (with case)**



**Fan unit**

- Model **SCON2-FU**



**Dummy plug**

- Features Required when teaching tool is not used with SIO connector.
- Model **DP-5**



**Dummy plug <STO/SS1-t specifications>**

- Features Required for operation when STO/SS1-t functions are not used.
- Model **DP-6**



**AC power connector**

- Model **MPS\_7S/05\_S\_F3\_TN\_B\_B(SCON2)**



**System I/O connector**

- Model **B2CF\_3.50/08/180\_SN\_BK\_BX(SCON2)**



**Network connector**

For DeviceNet

- Model **MSTB2.5/5-STF-5.08 AUM**



For CC-Link Terminal resistance with 110Ω/130Ω

- Model **MSTB2.5/5-STF-5.08 AU**



**Safety unit connector cover**

- Model **SCON2-COV**



For Functional Safety Unit

**Safety I/O connector**

- Model **B2CF\_3.50/20/180F\_SN\_BK\_BX(SU)**

\*Two main units are required





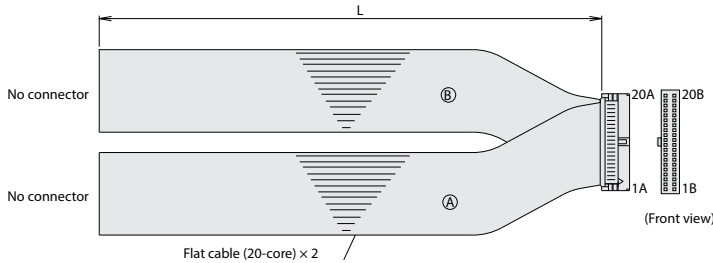
## Maintenance Parts

For SCON2 controller

**PIO cable** \*When purchasing network options NP or PN specifications, a cable of the designated length is included.

Model **CB-PAC-PIO**

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



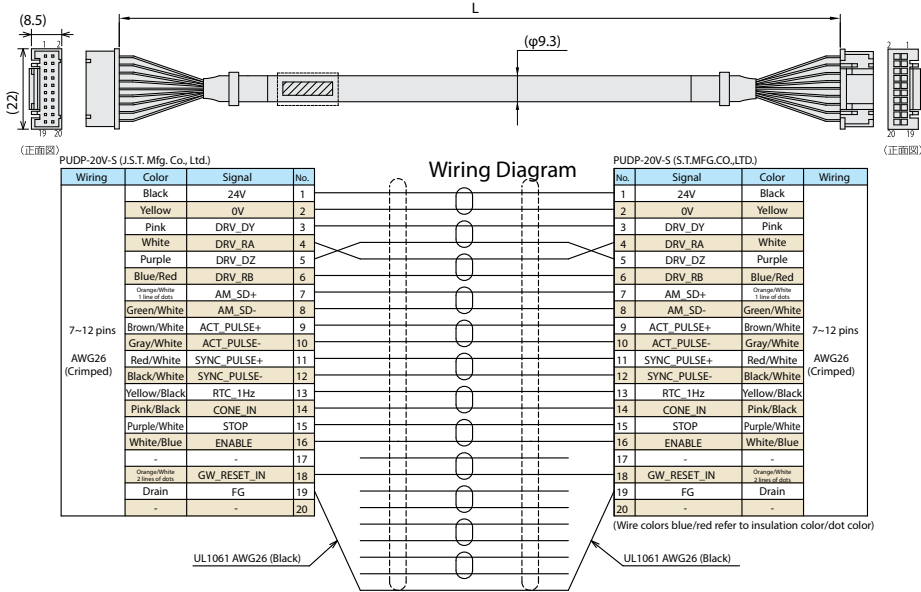
HIF6-40D-1.27R (HIROSE ELECTRIC CO., LTD.)

No.	Signal name	Cable color	Wiring	No.	Signal name	Cable color	Wiring
1A	24V	Brown-1	Flat cable (pressure-welded) ④	1B	OUT0	Brown-3	Flat cable (pressure-welded) ⑤ AWG28
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	0V	White-4	
20A	IN15	Black-2		20B	0V	Black-4	

**SCON connection cable** \*When purchasing network option RC with RCON/RSEL connection specification, an 0.2m cable is included.

Model **CB-RE-CTL**

\* Please indicate the cable length (L) in    
, e.g.) 030 = 3m, maximum 3m



Wiring Diagram

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
1	Black	24V	1	1	24V	Black	1
2	Yellow	0V	2	2	0V	Yellow	2
3	Pink	DRV_DY	3	3	DRV_DY	Pink	3
4	White	DRV_RA	4	4	DRV_RA	White	4
5	Purple	DRV_DZ	5	5	DRV_DZ	Purple	5
6	Blue/Red	DRV_RB	6	6	DRV_RB	Blue/Red	6
7	Orange/White	AM_SD+	7	7	AM_SD+	Orange/White	7
8	Green/White	AM_SD-	8	8	AM_SD-	Green/White	8
9	Brown/White	ACT_PULSE+	9	9	ACT_PULSE+	Brown/White	9
10	Gray/White	ACT_PULSE-	10	10	ACT_PULSE-	Gray/White	10
11	Red/White	SYNC_PULSE+	11	11	SYNC_PULSE+	Red/White	11
12	Black/White	SYNC_PULSE-	12	12	SYNC_PULSE-	Black/White	12
13	Yellow/Black	RTC_1Hz	13	13	RTC_1Hz	Yellow/Black	13
14	Pink/Black	CONE_IN	14	14	CONE_IN	Pink/Black	14
15	Purple/White	STOP	15	15	STOP	Purple/White	15
16	White/Blue	ENABLE	16	16	ENABLE	White/Blue	16
17	-	-	17	17	-	-	17
18	Orange/White	GW_RESET_IN	18	18	GW_RESET_IN	Orange/White	18
19	Drain	FG	19	19	FG	Drain	19
20	-	-	20	20	-	-	20

(Wire colors blue/red refer to insulation color/dot color)

**Maintenance Parts (Cables)**

When placing an order for the replacement cable, please use the model name shown below.

Refer to P. 31 for the details of the cables.

We recommend the cable model search system!

<https://www.intelligentactuator.com/iai-cables-search-tool/>



■ Table of Compatible Cables

No.	Actuator		Maximum cable length	Connection cable (Note 1)				
	Series	Type		Motor cable	Motor robot cable	Encoder cable	Encoder robot cable	
①	RCS4 RCS4CR		20m	CB-RCC1-MA □□□	CB-X2-MA □□□	-	CB-X1-PA □□□	
②	RCS3(P) RCS3(P)CR	CTZ5C CT8C	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	-	CB-X1-PA □□□	
③		RA4R RA6R RA7R RA8R	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PLDA□□□	CB-RCS2-PLDA□□□-RB	
④		Other than (2) and (3)	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PA □□□	CB-X3-PA □□□	
⑤		RCS2	RTC □, LRT6	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PLA □□□	CB-X2-PLA □□□
⑥	RCS2CR RCS2W	Other than (5)	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PA □□□	CB-X3-PA □□□	
⑦	RCS2	RA13R	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PLA □□□	CB-X2-PLA □□□	
⑧		No load cell	RA13R With brake (With brake box)	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	[Actuator ~ brake box] CB-RCS2-PLA □□□ [Brake box ~ controller] CB-RCS2-PLA □□□	[Actuator ~ brake box] CB-X2-PLA □□□ [Brake box ~ controller] CB-X2-PLA □□□
⑨			RA13R With brake (No brake box)	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	[Actuator ~ brake box] CB-RCS2-PLA □□□	[Actuator ~ brake box] CB-X2-PLA □□□
⑩		With load cell	RA13R With brake (With brake box)	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PLA□□□ *For controller ~ brake box, CB-RCS2-PLLA□□□ *For load cell ~ controller, CB-LDC-CTL□□□-JY	CB-X2-PLA□□□ *For controller ~ brake box, CB-RCS2-PLLA□□□-RB
⑪			RA13R Without brake (No brake box)	20m	CB-RCC1-MA □□□	CB-X2-MA □□□	CB-RCS2-PLLA□□□	CB-RCS2-PLLA□□□-RB
⑫	IS(P)B IS(P)DB IS(P)DBCR	(When not selecting Option: Limit switch)	30m	-	CB-X2-MA □□□	-	CB-X1-PA □□□ *For cable length 21 m or longer, use the cable below CB-X1-PA □□□ -AWG24	
⑬		(When selecting Option: Limit switch)	30m	-	CB-X2-MA □□□	-	CB-X1-PLA □□□ *For cable length 21 m or longer, use the cable below CB-X1-PLA □□□ -AWG24	
⑭	IS(P)A IS(P)DA IS(P)DACR SSPA SSPDACR IF/IFA FS RS	(When not selecting Option: Limit switch)	30m	-	CB-X2-MA □□□	-	CB-X1-PA □□□	
⑮		(When selecting Option: Limit switch)	30m	-	CB-X2-MA □□□	-	CB-X1-PLA □□□	
⑯	NSA		30m	-	CB-X2-MA □□□	-	CB-X1-PA □□□	
⑰	NS	(When not selecting Option: Limit switch)	30m	-	CB-X2-MA □□□	-	CB-X3-PA □□□	
⑱		(When selecting Option: Limit switch)	30m	-	CB-X2-MA □□□	-	CB-X2-PLA □□□	
⑲	DD	T18 □, LT18 □	30m	-	CB-X2-MA □□□	-	CB-X3-PA □□□	
⑳	DDCR DDW DDA DDACR	H18 □, LH18 □	30m	-	CB-XMC1-MA □□□	-	CB-X3-PA □□□	
㉑	LSA	W □□□	20m	-	CB-XMC1-MA □□□	-	CB-X2-PLA □□□	
㉒		Other than W □□□	20m	-	CB-X2-MA □□□	-	CB-X3-PA □□□	
㉓	LSAS		20m	-	CB-X2-MA □□□	-	CB-X1-PA □□□	
㉔	ISWA ISPWA		30m	-	CB-XEU1-MA □□□	-	CB-X1-PA □□□ -WC	

(Note 1) Max. cable length varies by series.

For details, check the cable table in the product specifications of the actuator to be connected.

Catalog search/download page is available on our website.

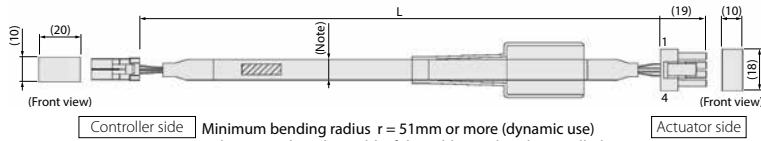
Catalog Search

## Motor cable

Model **CB-RCC1-MA**  / **CB-X2-MA**

\*CB-X2-MA  is equipped with a robot cable as standard.

\*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



Minimum bending radius  $r = 51\text{mm}$  or more (dynamic use)  
\* Please use the robot cable if the cable needs to be installed through the cable track.

(Note)  $\varnothing 7.6$  cable diameter applies for non-robot cables and  $\varnothing 8.5$  for robot cables.

F35FDC-04V-K (S.T.MFG.CO.,LTD.)

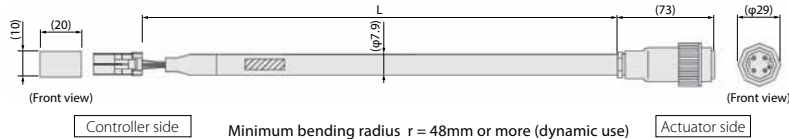
Wiring	Color	Signal	No.
0.75sq (Crimped)	Red	U	B1
	White	V	B2
	Black	W	A1
	Green	PE	A2

SLP-04V (S.T.MFG.CO.,LTD.)

No.	Signal	Color	Wiring
1	U	Red	0.75sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Model **CB-XEU1-MA**

\*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



Minimum bending radius  $r = 48\text{mm}$  or more (dynamic use)  
\* Only the robot cable is available for this model.

F35FDC-04V-K (S.T.MFG.CO.,LTD.)

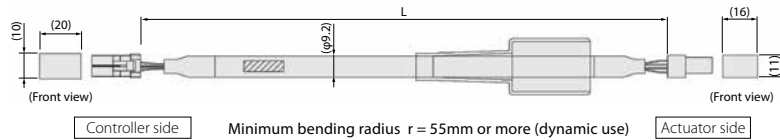
Wiring	Color	Signal	No.
0.75sq (Crimped)	Black with white text1	U	B1
	Black with white text2	V	B2
	Black with white text3	W	A1
	Green/Yellow	PE	A2

99-4222-00-04 (binder)

No.	Signal	Color	Wiring
1	U	Black with white text1	0.75sq (Crimped)
2	V	Black with white text2	
3	W	Black with white text3	
④	PE	Green/Yellow	

Model **CB-XMC1-MA**

\*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



Minimum bending radius  $r = 55\text{mm}$  or more (dynamic use)  
\* Only the robot cable is available for this model.

F35FDC-04V-K (S.T.MFG.CO.,LTD.)

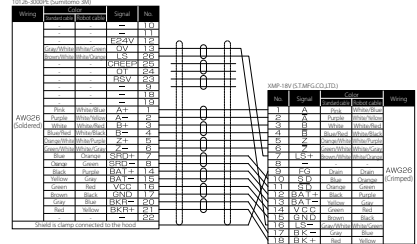
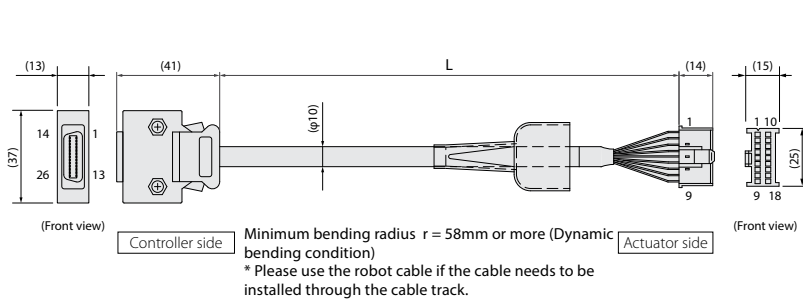
Wiring	Color	Signal	No.
1.25sq (Crimped)	Red	U	B1
	White	V	B2
	Black	W	A1
	Green	PE	A2

SLP-04V (S.T.MFG.CO.,LTD.)

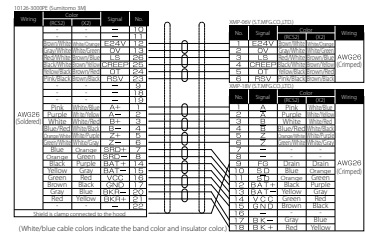
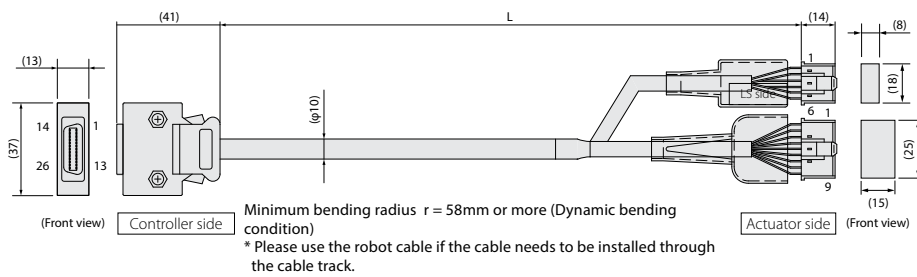
No.	Signal	Color	Wiring
1	U	Red	1.25sq (Crimped)
2	V	White	
3	W	Black	
4	PE	Green	

Encoder cable

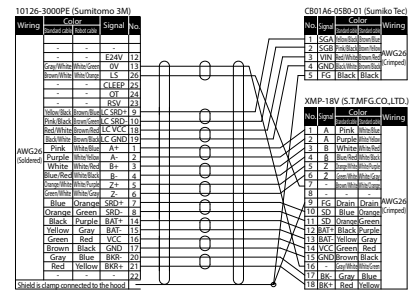
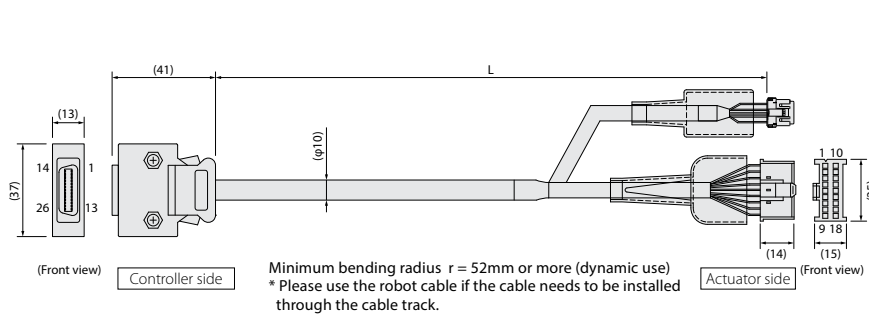
Model **CB-RCS2-PA**  (for RCS2/RCS3)/**CB-X3-PA**  (for NS/RCS2/RCS3) \*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



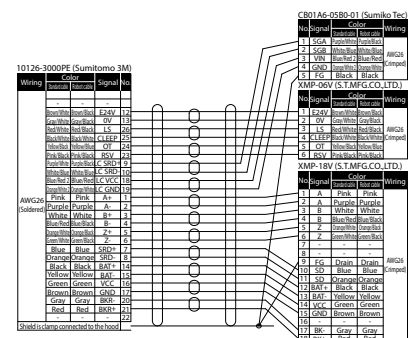
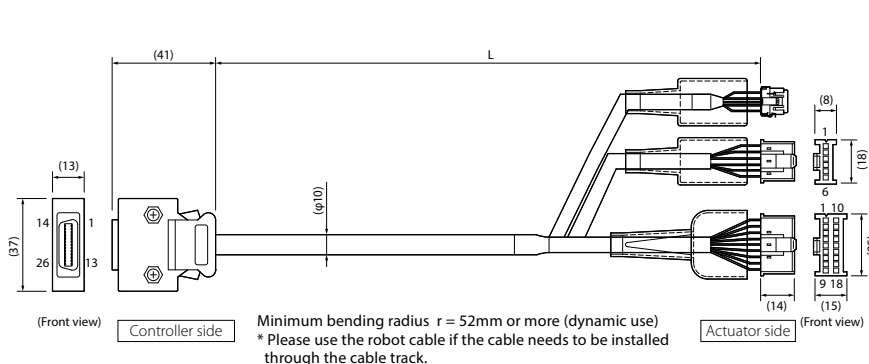
Model **CB-RCS2-PLA**  (for RCS2 rotary)/**CB-X2-PLA**  (for specifications with NS Ls/for/RCS2 rotary) \*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



Model **CB-RCS2-PLDA**  /**CB-RCS2-PLDA**  -RB \*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



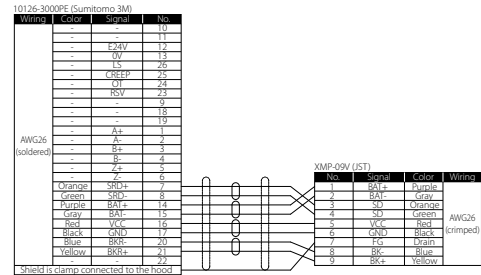
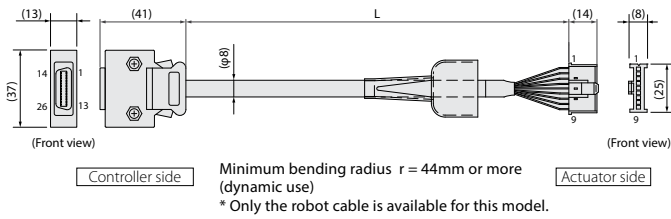
Model **CB-RCS2-PLLA**  /**CB-RCS2-PLLA**  -RB \*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m





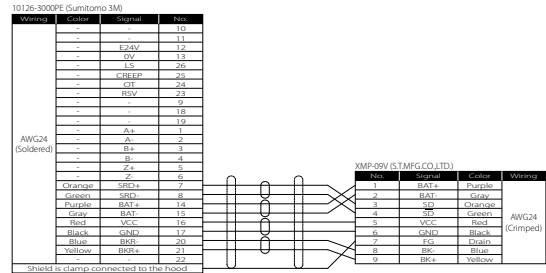
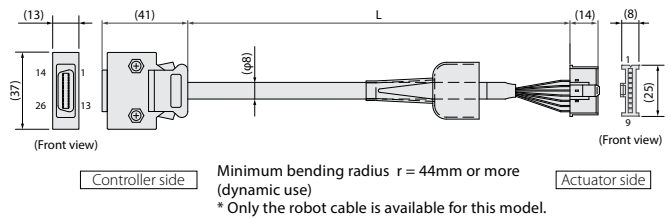
## Model CB-X1-PA □□□□

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



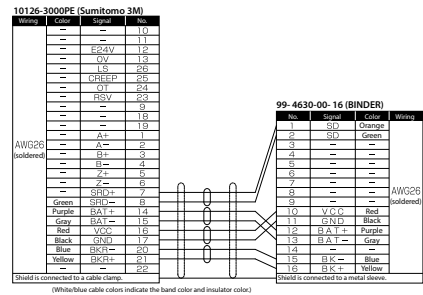
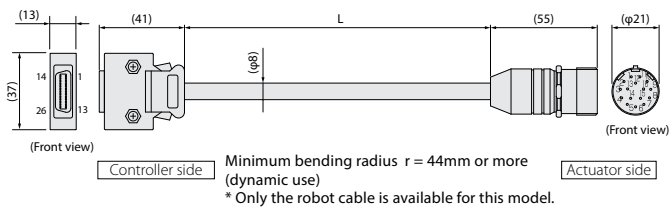
## Model CB-X1-PA □□□□ -AWG24

\*Please indicate the cable length (L) in □□□□, e.g.) 210 = 21m, maximum 30m



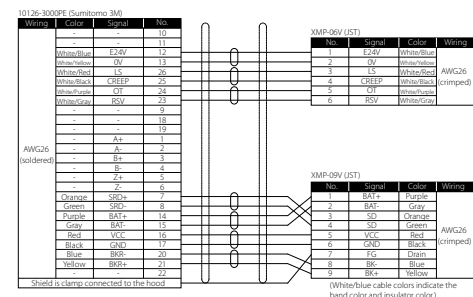
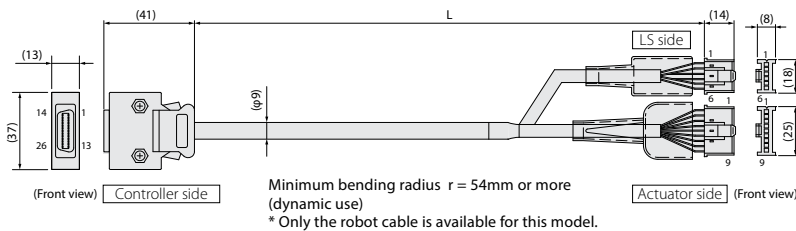
## Model CB-X1-PA □□□□ -WC

\*Please indicate the cable length (L) in □□□□, e.g.) 080 = 8m, maximum 30m



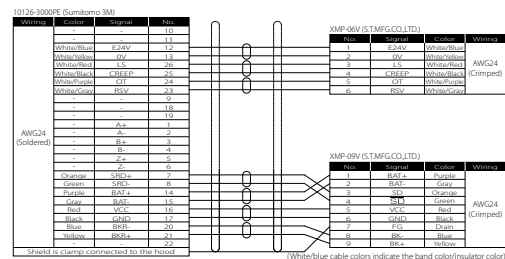
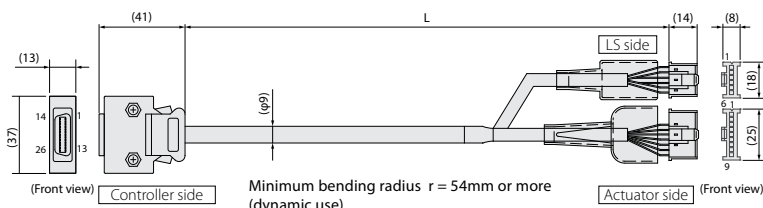
## Model CB-X1-PLA □□□□

\*Please indicate the cable length (L) in □□□□, e.g.) 080 = 8m, maximum 30m



## Model CB-X1-PLA □□□□ -AWG24

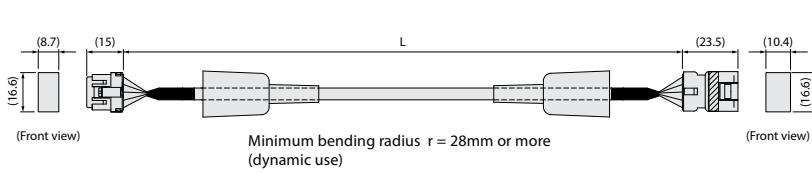
\*Please indicate the cable length (L) in □□□□, e.g.) 210 = 21m, maximum 30m



Load cell ~ controller connection cable

Model **CB-LDC-CTL**  **-JY**

\*Please indicate the cable length (L) in , e.g.) 080 = 8m, maximum 30m



CB01A6-05B0-01

No.	Signal	Color
1	SGA	Red
2	SGB	Gray
3	VIN	Green
4	GND	Brown
5	FG	Shield/Black

CB01A5-05B0-01

No.	Signal	Color
1	SGA	Red
2	SGB	Gray
3	VIN	Green
4	GND	Brown
5	FG	Shield/Black

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The information contained in this product brochure may change without prior notice due to product improvements.

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