



SCON-CA

First Step Guide First Edition

Thank you for purchasing our product.

Make sure to read the Safety Guide and detailed Instruction Manual (CD/DVD) included with the product in addition to this First Step Guide to ensure correct use.

This Instruction Manual is original.

Warning : Operation of this equipment requires detailed installation and operation instructions which are provided on the CD/DVD Manual included in the box this device was packaged in. It should be retained with this device at all times.
A hardcopy of the Manual can be requested by contacting your nearest IAI Sales Office listed at the back cover of the Instruction Manual or on the First Step Guide.

- Using or copying all or part of this Instruction Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.
- EtherCAT® is a registered mark of Beckoff Automation GmbH.
- EtherNet/IP is a trademark used under the license of ODVA.

Product Check

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

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

1. Parts

No.	Part Name	Model	Reference
1	Controller Main Body	Refer to "How to read the model plate", "How to read the model of the controller".	
Accessories			
2	System I/O Plug	FMC1.5/4-ST-3.5 (Supplier : Phoenix Contact)	Applicable Cable Size
3	Power Supply Plug for Brake	MC1.5/2-ST-3.5 (Supplier : Phoenix Contact)	0.5mm ² (AWG20)
4	AC Power Supply plug	MSTB2.5/6-STF-5.08 (Supplier : Phoenix Contact)	Applicable Cable Size 2.0mm ² (AWG14)
5	Absolute Battery	AB-5	Enclosed in Absolute Type
6	First Step Guide		
7	Instruction Manual (CD/DVD)		
8	Safety Guide		

2. Teaching Tool (to be purchased separately)

A teaching tool such as PC software is necessary when performing the setup for position setting, parameter setting, etc. that can only be done on the teaching tool.

Please prepare either of the following teaching tools such as PC software.

No.	Part Name	Model
1	PC Software (RCS232C converter adapter + external equipment communication cable are included)	RCM-101-MW
2	PC Software (USB converter adapter + USB cable + external equipment communication cable are included)	RCM-101-USB
3	Touch Panel Teaching	CON-PT
4	Touch Panel Teaching (Dead-man Switch is included)	CON-PD
5	Touch Panel Teaching (Dead-man Switch + TP Adapter (RCB-LB-TG) are included)	CON-PG
6	Teaching Pendant	CON-T
7	Teaching Pendant (Dead-man Switch + TP Adapter (RCB-LB-TG) are included)	CON-TG
8	Simplified Teaching Pendant	RCM-E
9	Data Setter	RCM-P

* Instruction manuals related to this product, which are contained in the Instruction manual (CD/DVD).

No.	Name	Manual No.
1	SCON-CA Controller Instruction Manual	ME0243
2	EtherCAT® Instruction Manual	ME0273
3	EtherNet/IP Instruction Manual	ME0278
4	CC-Link (High Performance Type) Instruction Manual	ME0254
5	DeviceNet (High Performance Type) Instruction Manual	ME0256
6	PROFIBUS-DP (High Performance Type) Instruction Manual	ME0258
7	CompoNet (High Performance Type) Instruction Manual	ME0220
8	MECHATROLINK (High Performance Type) Instruction Manual	ME0221
9	PC Software RCM-101-MW/ RCM-101-USB Instruction Manual	ME0155
10	Touch Panel Teaching CON-PT/PD/PG Instruction Manual	ME0277
11	Teaching Pendant CON-T/TG Instruction Manual	ME0178
12	Simplified Teaching Pendant RCM-E Instruction Manual	ME0174
13	Data Setter RCM-P Instruction Manual	ME0175

* How to read the model plate

Model → MODEL SCON-CA-60A-EC-2-1
Serial number → SERIAL No. 800056144 L11 MADE IN JAPAN

* How to read the model of the controller

SCON-CA-20 I HA-EC-2-1

<Series> _____
<Type> CA : High Performance Type
<Motor Type>
20 : 20W 200 : 200W
30D : 30W (Excluding RS) 200S : 200W (LSA)
30R : 30W (for RS) 300S : 300W (LSA)
60 : 60W 400 : 400W
100 : 100W 600 : 600W
100S : 100W (LSA) 750 : 750W
150 : 150W 750S : Equipped with loadcell
RCS2-RA13R
<Encoder Type>
I : Incremental
A : Absolute
<Power-supply Voltage>
1 : Single-Phase 100V AC
2 : Single-Phase 200V AC
<I/O Cable Length>
0 : Equipped with no cable 3 : 3m
2 : 2m 5 : 5m
<I/O Type>
NP : NPN Specification (Sink Type) (Standard)
PN : PNP Specification (Source Type)
EC : EtherCAT® Connection Type
DV : DeviceNet Connection Type
CC : CC-Link Connection Type
PR : PROFIBUS Connection Type
CN : CompoNet Connection Type
ML : MECHATROLINK Connection Type
EP : EtherNet/IP Connection Type
<Option>
No Indication : Standard Type
HA : High Acceleration/Deceleration Type

Basic Specifications

List of Specifications

Item	Less than 400W	400W or more
Corresponding Motor Capacity	20W to 399W	400W to 750W
Power-supply Voltage	Single-Phase 100 to 115V AC (Power fluctuation within ±10%) Single-Phase 200 to 230V AC (Power fluctuation within ±10%)	Single-Phase 200 to 230V AC (Power fluctuation within ±10%)
Rush Current ¹	Power-supply Voltage 100V AC Power-supply Voltage 200V AC	20A (Controller side), 70A (Drive side)
Load Capacity	Refer to Power Capacity and Heat Generation	
Leak Current ²	3.0mA Primary side when noise filter is connected to power supply line	
Heat Generation	Refer to Power Capacity and Heat Generation	
Power Supply Frequency	50/60Hz	
PIO Power Supply ³	24V DC±10%	
Power Supply for Electromagnetic Brake (for actuator equipped with brake)	24V DC±10% 1A (MAX.) (supplied from external equipment)	
Transient Power Cutoff Durability	20ms (50Hz), 16ms (60Hz)	
Motor Control System	Sine Wave PWM Vector Current Control	
Corresponding Encoder	Incremental Serial Encoder, Absolute Serial Encoder, ABZ (UVW) Parallel Encoder	
Actuator Cable Length	MAX. 20m	
Serial Communication Interface	RS485 : 1CH ... based on Modbus Protocol RTU/ASCII Speed : 9.6 to 230.4Kbps Control available with serial communication in the modes other than the pulse train	
External Interface	PIO Specifications Fieldbus Specification	Signal I/O dedicated for 24V DC (selected from NPN/PNP) ... Input 16 ports max., output 16 ports max. EtherCAT® / EtherNet/IP / DeviceNet / CC-Link / PROFIBUS / CompoNet / MECHATROLINK ... Each dedicated controller [Refer to each Fieldbus Instruction Manual]
Cable Length	PIO RS485 Fieldbus	MAX. 10m Total cable length 100m or less. Refer to each Fieldbus specification
Data Setting and Input	PC Software, Touch Panel Teaching, Teaching Pendant	
Data Retention Memory	Saves position data and parameters to non-volatile memory (There is no limitation in number of writing)	
Operation Mode	Positioner Mode/Pulse Train Control Mode (selected by Pulse Train Mode Changeover Switch on Front Panel)	
Number of Positions in Positioner Mode	Standard 64 points, maximum 512 points (PIO Type), 768 points (only for Fieldbus Type) (Note) Number of positions differs depending on the selection in PIO pattern and fieldbus operation mode.	
Pulse Train Control Mode (Dedicated for PIO Specifications)	Input Pulse Frequency Command Pulse Multiplying Factor (Electrical Gear : A/B)	Differential System (Line Driver System) : MAX. 2.5Mpps Open Collector Type : MAX. 200Kpps (under condition AK-04 is used) 1/50 < A/B < 50/1 Setting Range of A and B (set to parameter) : 1 to 4096
Feedback Pulse (Dedicated for PIO Specifications)	Differential System (Line Driver System) : MAX. 2.5Mpps Open Collector Type : MAX. 500Kpps (under condition JM-08 is used)	
LED Display (mounted on Front Panel)	PWR (green) : Controller in normal condition, SV (green) : Servo ON, ALM (orange) : Alarm generated, EMG (red) : Emergency Stop	
Electromagnetic Brake Compulsory Release Switch (mounted on Front Panel)	Switching NOM (standard)/BK RLS (compulsory release)	
Insulation Resistance	500V DC 100MΩ or more	
Insulation Strength	1,500V AC for 1 min. (Note) Withstand voltage of force control loadcell is 50V DC	
Environment	Surrounding air temperature Surrounding humidity Surrounding environment Surrounding storage temperature Surrounding storage humidity Vibration Durability	0 to 40°C 85%RH or less (non-condensing) [Refer to Installation Environment] -10 to 65°C 90%RH or less (non-condensing) XYZ Each direction 10 to 57Hz Pulsating amplitude 0.035mm (continuous) 0.075mm (intermittent) 57 to 150Hz 4.9m/s ² (continuous) 9.8m/s ² (intermittent)
Protection Class	IP20	
Weight	Approx. 800g	Approx. 1100g
Cooling Method	Natural air-cooling	Forced Air Cooling
External Dimensions	58W × 194H × 121D [mm]	72W × 194H × 121D [mm]

- *1 In-rush current will flow for approximately 20msec after the power is turned on (at 40°C).
Note that the value of in-rush current differs depending on the impedance of the power supply line.
- *2 Leak current varies depending on the capacity of connected motor, cable length and the surrounding environment.
Measure the leak current at the point where a ground fault circuit interrupter is to be installed when leakage protection is conducted.
A ground fault circuit interrupter needs to be selected carefully considering the purposes of prevention of fire and protection of human.
Use the harmonic type (for inverter) for the ground fault circuit interrupter.
- *3 It is not necessary to supply power to PIO when operating with using Fieldbus (EtherCAT®, EtherNet/IP, DeviceNet, CC-Link, PROFIBUS, CompoNet or MECHATROLINK), ROBOTNET, Gateway Unit or SIO Converter without using PIO. In this case, set the parameter No. 74 (PIO Power Supply Monitor) to "1" (Invalid). It will generate the error code No. 0CF (I/O 24V Power Supply Error) if the setting is not done.

Power Capacity and Heat Generation

Rated Power Capacity = Motor Power Capacity + Control Power Capacity

Peak Max. Power Capacity = Peak Max. Motor Power Capacity + Control Power Capacity

Actuator Motor Type	Motor Power Capacity [VA]	Peak Max. Motor Power Capacity [VA]	Control Power Capacity [VA]	Rated Power Capacity [VA]	Peak Max. Power Capacity [VA]	Heat Generation [W]
20	26	78	48	74	126	30
30D (Excluding RS)	46	138		94	186	31
30R (for RS)	138	414		186	462	33
60	138	414		186	462	33
100	234	702		282	750	35
100S (LSA)	283	851		331	899	36
150	328	984		376	1032	37
200	421	1263		469	1311	38
200S (LSA excluding LSA-N15H)	486	1458		534	1506	38
200S (LSA-N15H)	773	2319		821	2367	56
300S (LSA)	662	1986		710	2034	40
400	920	2760		968	2808	45
600	1164	2328		1212	2376	56
750		3042			3090	
750S	1521	4563		1569	4611	58

RS : Rotary Shaft LSA : Linear Actuator

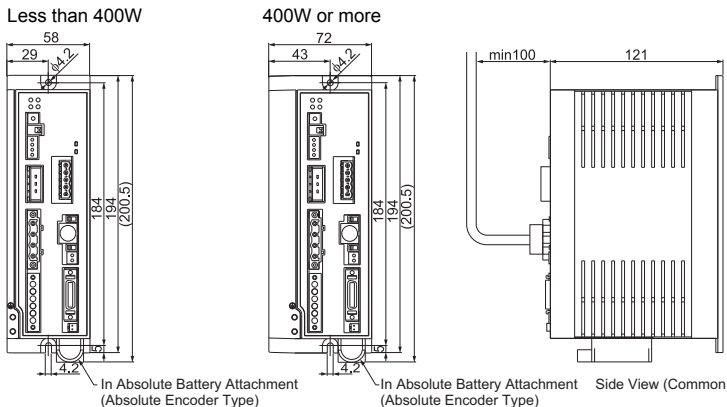
Selection of Circuit Interrupter

- 3 times of the rated current flows to the controller during the acceleration/deceleration. Select an interrupter that does not trip with this value of current. If a trip occurs, select an interrupter that possesses the rated current of one grade higher. [Refer to the operation characteristics curves in the product catalog.]
- Select an interrupter that does not trip with the in-rush current. [Refer to the operation characteristics curves in the product catalog.]
- Consider the current that enables to cutoff the current even when a short circuit current is flown for the rated cutoff current.
Rated Interrupting Current > Short Circuit Current = Primary Power Capacity / Power Voltage
Consider margin for the rated current on the circuit breaker.

Rated Current for Circuit Interrupter > (Rated Motor Power Capacity [VA] + Control Power Capacity [VA]) / AC Input Voltage × Safety Margin (reference 1.2 to 1.4 times)

External Dimensions

Shown below are the dimensions for EtherCAT® type. The dimensions for EtherNet/IP should also be the same.



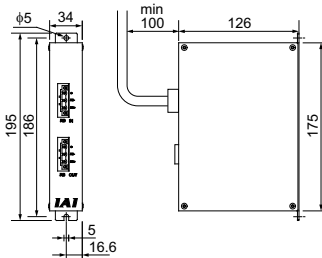
Regenerative Resistor Unit (Option) : REU-1, REU-2

This is a unit that converts the regenerative current to heat when the motor decelerates.

[Specification]

Item	Specification
Body Size	W34mm × H195mm × D126mm
Body Weight	0.9kg
Internal Regenerative Resistor	235Ω 80W
Accessories	REU-1 (2nd unit or later) REU-2 (First Unit)
	Controller Connection Cable (Model Code CB-ST-REU010) 1m Controller Connection Cable (Model Code CB-SC-REU010) 1m

[Appearance]



[Reference Connectable Quantity]

Motor Wattage	Connectable Number of Regenerative Resistor Units
Horizontal Mount/Vertical Mount	
to 99W	Not Required
100 to 399W, 100 to 300S	1
400 to 750W	2

(Note 1) This is a reference for the case when the actuator is ran forward and backward on 1,000mm stroke with the operation duty 50% under the rated acceleration/deceleration speed and rated load.

(Note 2) It is necessary to have the regenerative resistor listed above when the operation duty is above 50%.

The maximum quantity of the external regenerative resistor units that can be connected is as stated below:
• 2 units for less than 400W • 4 units for 400W or more

Brake Box (Option) : RCB-110-RA13-0

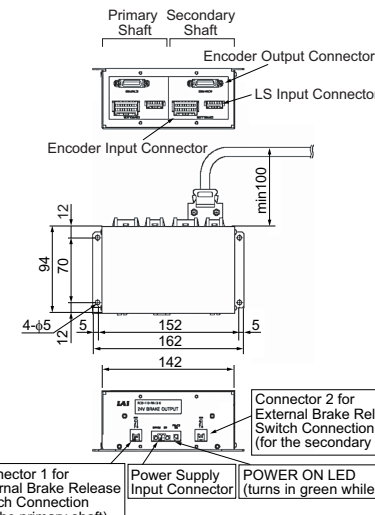
This is applied on NS Actuator and RCS-RA13R with brake.

1 unit of Brake Box possesses brakes for 2 shafts.

[Specification]

Item	Specification
Body Size	W162 × H94 × D65.5mm
Power Voltage and Current	24V DC±10% 1A
Connection Cable	Encoder Cable (Model Code CB-RCS2-PLA010) 1m

[Appearance]



[24V Power Supply Connector]

Connector on Cable Side (Enclosed in standard package)	MC1.5/2-STF-3.5 (Phoenix Contact)
Applicable Cable	AWG28 to 16
Terminal Assignment	Pin No. Signal Explanation
	1 0V Power Supply Grounding for Brake Excitation
	2 24VIN For Brake Excitation and 24V Power Supply

[Connectors 1 and 2 for external brake release switch connection]

Connected Equipment	Brake Release Switch
Connector on Cable Side (Please prepare separately)	XAP-02V-1 (Contact BXA-001T-P0.6) (JST)
Switch Rating	30V DC Minimum Current 1.5mA
Terminal Assignment	Pin No. Signal Explanation
	1 BKMRL Brake Release Switch Input
	2 COM Power Supply Output for Brake Release Switch Input

(Note) Short circuit of pin No. 1 and 2 of this connector releases the brake compulsorily.
Same as the brake release switch on SCON main unit, it is possible to release the brake.
Do not keep the compulsory release condition while in automatic operation.

Loadcell

This is the pressing force measurement unit that is used for the force control.
This is used by connecting to the actuator corresponding to the force control.

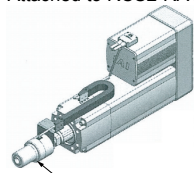
[Specification]

Item	Specification
Loadcell System	Strain Gauge, Hollowed Cylindrical Type
Rated Capacity	20000N
Allowable Overload	200%R.C ^{*1}
Loadcell Accuracy	±1%R.C ^{*1}
Temperature Drift	Zero ±0.2%R.C/10°C Output ±0.1%R.C/10°C
Applicable Temperature Range	0 to 40°C

^{*1} R.C : Rated Capacity

[Refer to RCS2-RA13R Instruction Manual for details of how to attach and the dimensions.]

Attached to RCS2-RA13R



Installation Environment

This product is capable for use in the environment of pollution degree 2¹ or equivalent.

^{*1} Pollution Degree 2 : Environment that may cause non-conductive pollution or transient conductive pollution by frost (IEC60664-1)

1. Installation Environment

Do not use this product in the following environment

- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- Location exposed to corrosive gases or combustible gases
- Location exposed to significant amount of dust, salt or iron powder
- Location subject to direct vibration or impact
- Location exposed to direct sunlight
- Location where the product may come in contact with water, oil or chemical droplets
- Environment that blocks the air vent [Refer to Installation and Noise Elimination]

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

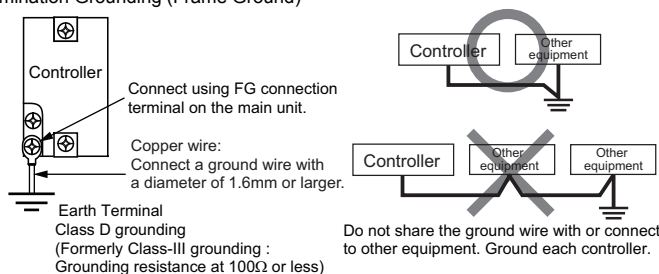
- Location subject to electrostatic noise
- Location where high electrical or magnetic field is present
- Location with the mains or power lines passing nearby

2. Storage and Preservation Environment

- The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no dew condensation forms. Unless specially specified, moisture absorbcency protection is not included in the package when the machine is delivered. In the case that the machine is to be stored and preserved in an environment where dew condensation is anticipated, take the condensation preventive measures from outside of the entire package, or directly after opening the package.

Installation and Noise Elimination

1. Noise Elimination Grounding (Frame Ground)



2. Precautions regarding wiring method

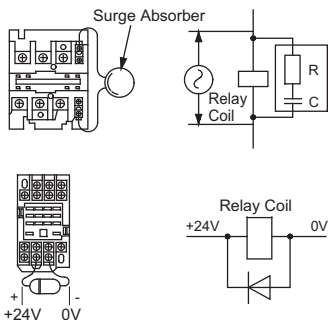
- 1) Wire is to be twisted for the 24V DC power supply.
- 2) Separate the signal and encoder lines from the power supply and power lines.

3. Noise Sources and Elimination

Carry out noise elimination measures for power devices on the same power path and in the same equipment.

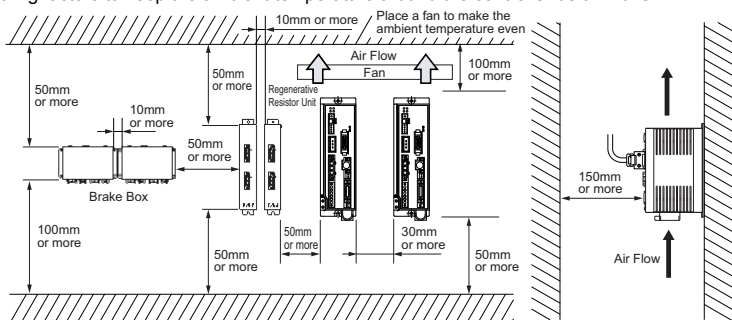
The following are examples of measures to eliminate noise sources.

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



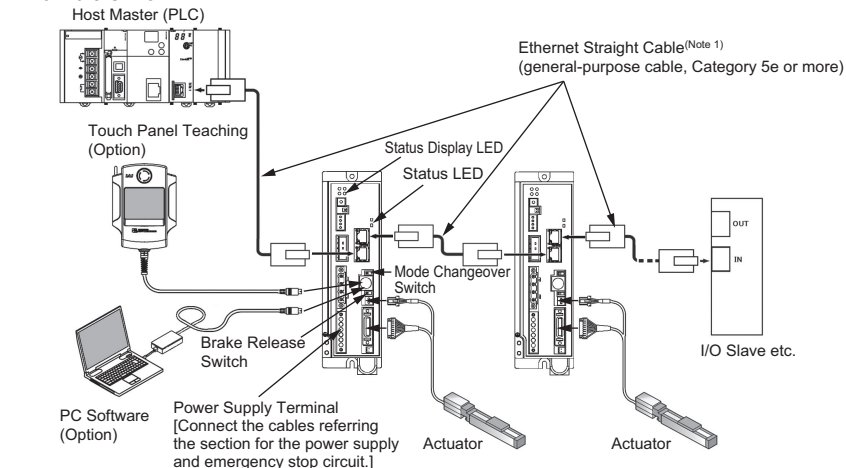
4. Heat Radiation and Installation

Design and Build the system considering the size of the controller box, location of the controller and cooling factors to keep the ambient temperature around the controller below 40°C.



Connection Diagram

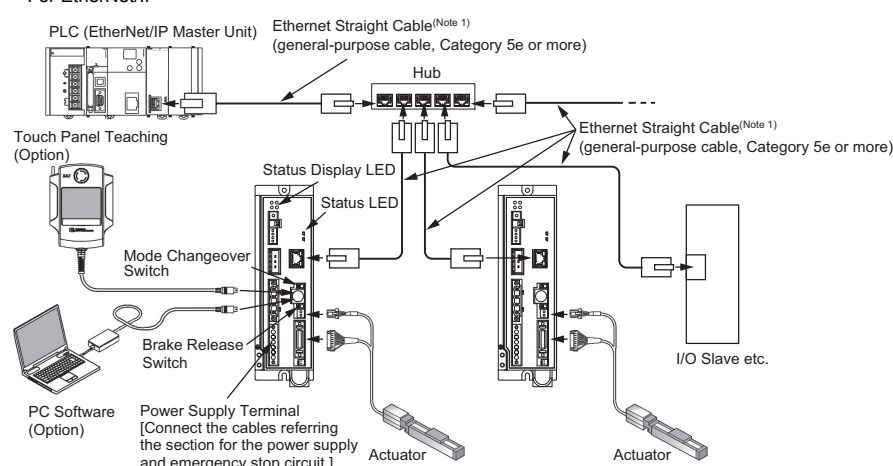
• Standard For EtherCAT®



(Note 1) STP (with shield) is recommended for Ethernet cable.

(Note 2) It is necessary to prepare a power supply cable and the cables for the emergency stop circuit wiring as well as this cable. [Refer to power supply and emergency stop circuit.]

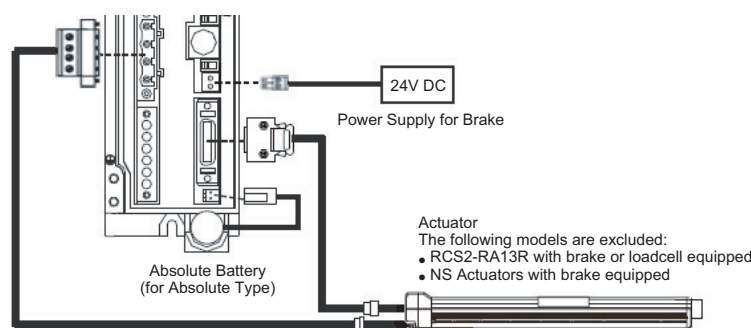
For EtherNet/IP



(Note 1) STP (with shield) is recommended for Ethernet cable.

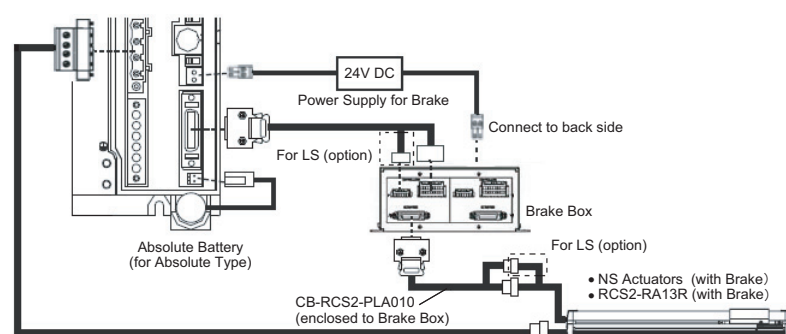
(Note 2) It is necessary to prepare a power supply cable and the cables for the emergency stop circuit wiring as well as this cable. [Refer to power supply and emergency stop circuit.]

• For Models Equipped with brake Except for RCS2-RA13R and NS Actuators

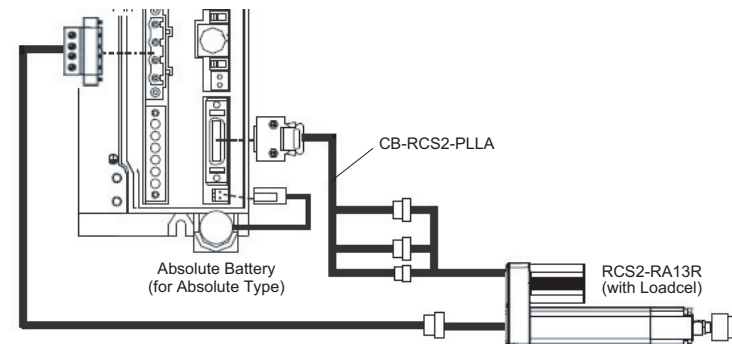


Actuator
The following models are excluded:
• RCS2-RA13R with brake or loadcell equipped
• NS Actuators with brake equipped

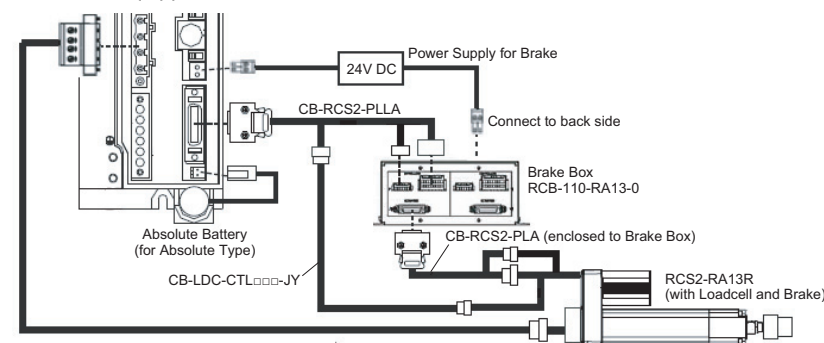
• RCS2-RA13R Equipped with Brake, with no Loadcell, or NS Actuators with Brake



• RCS2-RA13R Equipped with no Brake, with Loadcell in SCON-CA

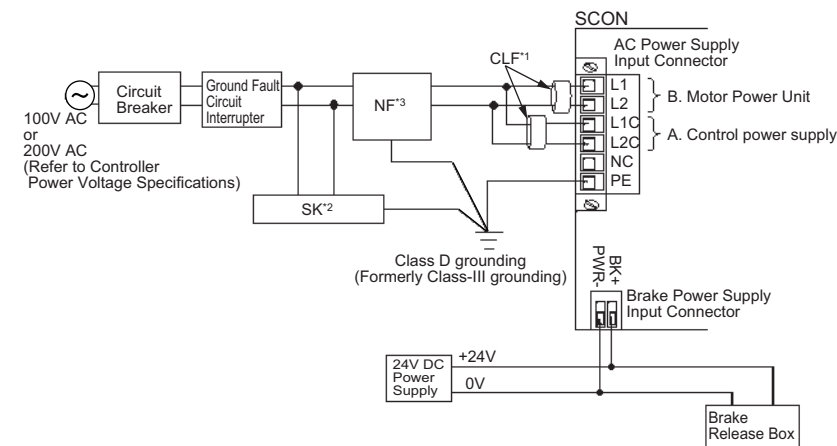


• RCS2-RA13R Equipped with Brake and Loadcell in SCON-CA



Power Supply and Emergency Stop Circuit

• Wiring for Power Supply (to be prepared by customer)



Power consumption of SCON varies depending on the connected actuator, etc. Select the circuit breaker that suits to the specification.

[Refer to Basic Specifications]

A ground fault circuit interrupter needs to be selected carefully considering the purposes of prevention of fire and protection of human.

Have a measurement of the leak current where a ground fault circuit interrupter is to be installed.

Use the "harmonic type" for the ground fault circuit interrupter.

^{*1} CLF : Clamp Filter ... It is recommended to attach it to improve noise immunity.

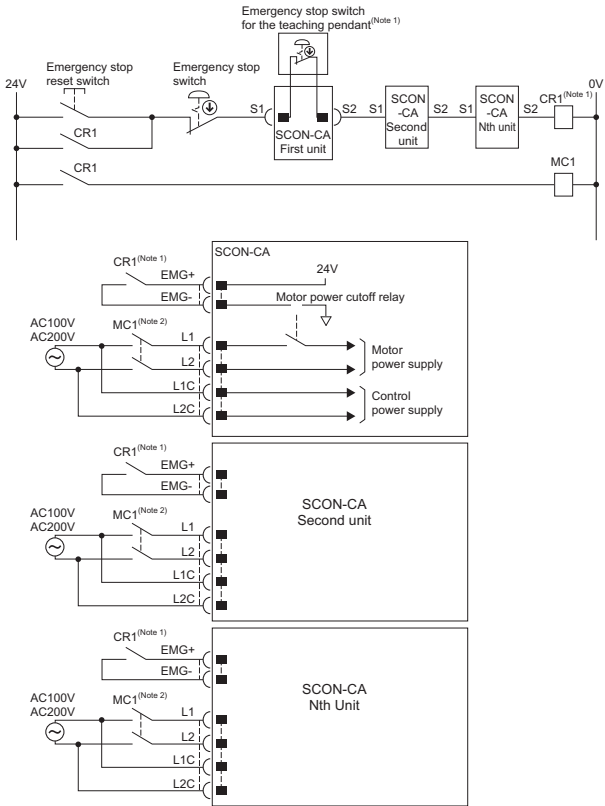
^{*2} SK : Surge Killer ... It is recommended to attach it to improve noise immunity.

^{*3} NF : Noise Filter ... Make sure to install it. It is recommended to have it installed within 0.3m of the cable length from SCON.

Parts Name	Maker	Model
CLF	Clamp Filter	TDK ZCAT3035-1330
SK	Surge Protector	Okaya ELECTRIC CO.,LTD R-A-V-781BWZ-2A
NF	Noise Filter	SOSHIN ELECTRIC CO.,LTD NF2010A-UP
		DENSEI-LAMBDA MC1210

• Wiring for Emergency Stop Input

The following diagram shows an example of how the emergency stop switch for the teaching pendant may be included in the emergency stop circuit you may construct.



- Note 1 When the teaching pendant is not connected, S1 and S2 become short-circuited inside the controller.
- Note 2 Connect a contactor to L1 and L2 terminals for external power cutoff by the emergency stop if the motor power is required to be cut off externally to comply with the Safety Categories.
- Note 3 The rating for the emergency stop signal to turn ON/OFF at contact CR1 is 24V DC and 10mA.
- Note 4 For CR1, select the one with coil current 0.1A or less.

Operation Modes and Functions (in common for each Fieldbus)

The following operation modes are available to select for the operation.

- (1) Remote I/O Mode : This is the mode to perform operation by PIO (24V I/O) with Fieldbus.
- (2) Position / Simple Direct Mode : This is the mode to perform operation by indicating the target position by inputting the value directly. The values of the position data already registered for the speed, acceleration/deceleration and positioning band are to be used in this mode.
- (3) Half Direct Mode : This is the operation mode to indicate the speed, acceleration/deceleration and pressing current, as well as the target position, by inputting the values directly.
- (4) Full Direct Mode : This is the operation mode to indicate all related to the position control by inputting the values directly.
- (5) Remote I/O Mode 2 : This is the mode that the function to read the current position and the current speed is added to Remote I/O.
- (6) Position / Simple Direct Mode 2 : This is the mode corresponding to the force control function instead of the teaching and zone functions in (2).
- (7) Half Direct Mode 2 : This is the mode that enables to read the loadcell data instead of reading the command current value in (3).
- (8) Remote I/O Mode 3 : This is the mode that the function to read the current position and loadcell data is added to (1) functions.
- (9) Half Direct Mode 3 : This is the mode that equips the vibration control function instead of the jog function in (3).

Operation Modes and Main Functions

Main Functions	Remote I/O Mode	Position / Simple Direct Mode	Half Direct Mode	Full Direct Mode	Remote I/O Mode 2	Position / Simple Direct Mode 2	Half Direct Mode 2	Remote I/O Mode 3	Half Direct Mode 3
Occupied Bytes	2	8	16	32	12	8	16	12	16
Position No. Designated Operation	○	○	×	×	○	○	×	○	×
Position Data Designated Operation	×	○(Note 1)	○	○	×	○(Note 1)	○	×	○
Speed, Acceleration and Deceleration Direct Designation	×	×	○	○	×	×	○	×	○
Pressing Operation	○	○	○	○	○	○	○	○	○
Current Position Reading	×	○	○	○	○	○	○	○	○
Current Speed Reading	×	×	○	○	×	×	○	×	○
Completed Position No. Reading	○	○	×	×	○	○	×	○	×
Max. Number of Position Tables	512	768	Not Applicable	Not Applicable	512	768	Not Applicable	512	Not Applicable
Force Control	△(Note 2)	×	×	○	△(Note 2)	○	○	△(Note 2)	×
Vibration Control	○	○	×	○	○	○	×	○	○
Servo Gain Changeover	○	○	○	○	○	○	×	○	○

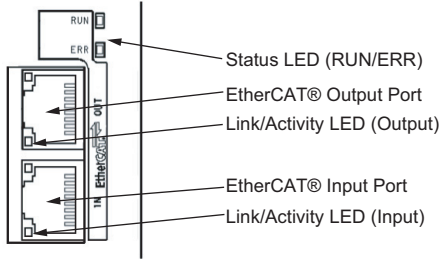
- (Note 1) Operation is to be performed with designating the position No. for the position data except for Position Data.
- (Note 2) It is available when the PIO pattern is set on either 6 or 7.

EtherCAT®

• Specification

Item	Specification
Communication protocol	IEC61158Type12
Physical layer	100BASE-TX (IEEE802.3)
Communication Speed	Automatically follows the Master
Communication cable length	Depends on EtherCAT® Specification (Distance between each node: 100m max.)
Slave type	I/O slave
Applicable node address	0 to 127 (17 to 80 : When connected to the master (CJ1W-NC*82) manufactured by OMRON)
Communication cable	Category 5e or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 2pcs (Input × 1, Output × 1)
Connection	Daisy chain only

• Interface Section



(Note) Refer to the troubleshooting or the Instruction Manual for the details of LED displays.

• EtherCAT® Connector

Pin No.	Signal Name	Abbreviated Code
1	Data sending +	TD+
2	Data sending –	TD–
3	Data receiving +	RD+
4	Not used	
5	Not used	
6	Data receiving –	RD–
7	Not used	
8	Not used	
Connector Hood	Security grounding	FG

• Operation Mode Setting and Address Allocation

The operation mode is set using the parameters. Set the mode change switch on the controller front panel to “MANU” side and set the parameter No. 84 “FMOD: Field Bus Operation Mode” using the teaching tool such as PC software for RC. [Refer to the Instruction Manual for the details]

• Node address setting

The node address is set using specific parameters. Set the parameter No. 85 “NADR: Field Bus Node Address” using the teaching tool such as PC software for RC. Settable Range : 0 to 127 (It is set to 17 which is the I/O slave top address of EtherCAT® at the delivery.)

• Communication Speed Setting

It is not necessary to do any settings because it automatically follows the communication settings applied to the master for the communication frequency.

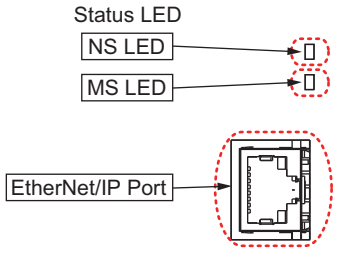
(Note) After parameter setting, reset the controller mode change witch to “AUTO” side, and then cycle the controller power.

EtherNet/IP

• Specification

Item	Specification
Communication protocol	IEC61158 (IEEE802.3)
Communication Speed	10BASE-T/100BASE-T (Autonegotiation setting is recommended)
Communication cable length	Depends on EtherNet/IP Specification (Distance between hub and each node : 100m or less)
Number of Connection	Depends on the master unit
Applicable node address	0.0.0.0 to 255.255.255.255
Communication cable	Category 5e or more (Double shielded cable braided with aluminum foil recommended)
Connector	RJ45 Connector × 1pc

• Interface Section



(Note) Refer to the troubleshooting or the Instruction Manual for the details of LED displays.

• EherNet/IP Connector

Pin No.	Signal Name	Abbreviated Code
1	Data sending +	TD+
2	Data sending –	TD–
3	Data receiving +	RD+
4	Not used	
5	Not used	
6	Data receiving –	RD–
7	Not used	
8	Not used	
Connector Hood	Security grounding	FG

• Operation Mode Setting and Address Allocation

The operation mode is set using the parameters. Set the mode change switch on the controller front panel to “MANU” side and set the parameter No. 84 “FMOD: Field Bus Operation Mode” using the teaching tool such as PC software for RC. [Refer to the Instruction Manual for the details]

• Communication Speed Setting

The Communication speed can be set with the parameter. A special setting is not necessary since it is set to automatic negotiation when the product is delivered. However, when a fixed speed is required, change the setting to the desired speed in the parameter No. 86 “FBRS: Fieldbus Communication Speed” using the teaching tool such as PC software for RC. [Refer to the Instruction Manual for the details]

• IP Address Setting

IP Address can be set with the parameter. Set the parameter No. 140 “IPAD: IP Address” using the teaching tool such as PC software for RC. Settable Range : 0.0.0.0 to 255.255.255.255 (It is set to “192.168.0.1” when the machine is delivered from the factory.)

• Settings for Subnet Mask

Subnet Mask can be set with the parameter. Set the parameter No. 141 “SNMK: Subnet Mask” using the teaching tool such as PC software for RC. Settable Range : 0.0.0.0 to 255.255.255.255 (It is set to “255.255.255.0” when the machine is delivered from the factory.)

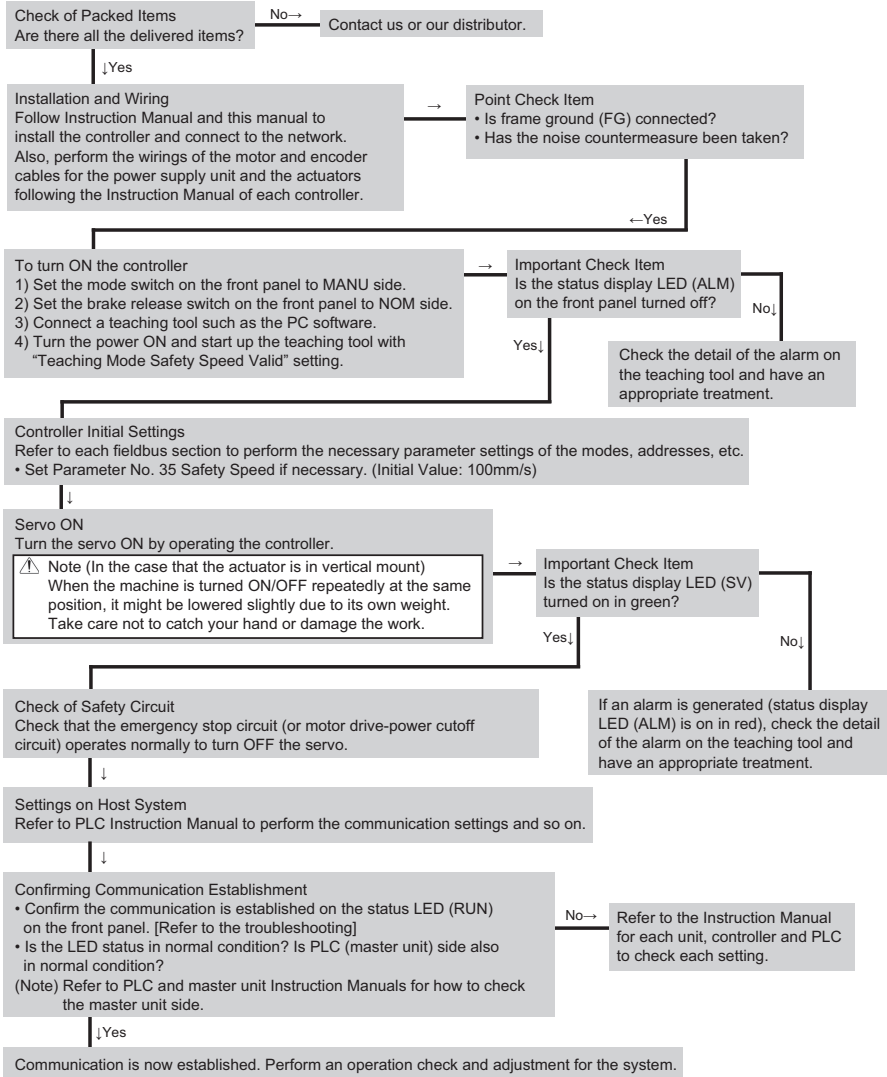
• Settings for Default Gateway

Default Gateway can be set with the parameter. Set the parameter No. 142 “DFGW: Default Gateway” using the teaching tool such as PC software for RC. Settable Range : 0.0.0.0 to 255.255.255.255 (It is set to “0.0.0.0” when the machine is delivered from the factory.)

(Note) After parameter setting, reset the controller mode change witch to “AUTO” side, and then cycle the controller power.

Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below
In this section, explains how to start up SCON complied with EtherCAT® and EtherNet/IP (described as the “controller” in the following diagram). Refer to each Instruction Manual for the installation and wiring of the equipment, controller, actuator and all other devices that are connected to the network.



Trouble Shooting

In a case an error has occurred, it is possible to check the operation condition on the status LEDs on the front panel.

• Status LED Displays of EtherCAT® Type

Name	Indication Color	Description
RUN	OFF	Initial condition (EtherCAT® communication in "INIT" condition) or the power is OFF
	GN (Illuminating)	In normal operation (EtherCAT® communication in "OPERATION" condition)
	GN (Flashing) (ON:200ms/OFF:200ms)	(EtherCAT® communication in "PRE-OPERATION" condition)
	GN (Flashing) (ON:200ms/OFF:1000ms)	(EtherCAT® communication in "SAFE-OPERATION" condition)
	OR (Illuminating)	Communication component (module) error
ERR	OFF	No abnormality or the power is OFF
	OR (Flashing) (ON:200ms/OFF:200ms)	Construction information (settings) error (Information received from the master cannot be set)
	OR (Flashing) (ON:200ms × 2 times /OFF:1000ms)	Communication section circuit error (Watchdog timer timeout)
	OR (Illuminating)	Communication component (module) error
Link/ Activity	OFF	Link status not detected or the power is OFF
	GN (Illuminating)	Linked (No network congestion)
	GN (Flashing) (ON:50ms/OFF:50ms)	Linked (Network in congestion)

• Status LED Displays of EtherNet/IP Type

Name	Indication Color	Description	
NS	OFF	Power is OFF or IP addresses are not set	
	GN (Illuminating)	Connection is established and the communication under normal condition.	
	GN (Flashing)	Online but network connection is not yet established. Communication Stop (Network is normal). Check the conditions of master unit.	
	RD (Illuminating)	Communication Error. Communication cannot be established due to the error detection such as IP address duplication.	Check the conditions of IP address settings, communication line, the power of hub units, noise prevention, etc.
	RD (Flashing)	Communication Error. (Communication Time-out Detection)	
MS	OFF	Power OFF	
	GN (Illuminating)	The machine is in the normal operation. The machine is under the control of the scanner (master)	
	GN (Flashing)	The connection with the scanner (master) is not established. Check the construction information settings. Check if the scanner (master) is in the idle condition.	
	RD (Illuminating)	Hardware Error. The replacement of the board is required. Please contact us.	
	RD (Flashing)	There is an error occurred but is not critical such like a user setting error or configuration error. It can be recovered with a rebuild of the settings.	

In the case an error is occurred, check the operation status on the LED display on the front panel [Refer to Each Fieldbus Section], and also, check the status monitor by connecting a teaching tool such as PC software for RC.

Either of the following alarms will be shown for Fieldbus. Please refer to the Instruction Manual of the controller for other alarms to perform an appropriate treatment.

Code	Error Name	ID (*1)	RES (*2)	Cause / Treatment
0F2	Fieldbus Module Error	05	×	Cause : An error is detected on Fieldbus module Treatment : Check on the parameter
0F3	Fieldbus Module Not Detected	04	×	Cause : Module cannot be detected Treatment : Turn the power off and reboot. Please contact us if the problem is not solved with this action.

(*1) ID → Simple alarm code

(*2) RES → Alarm reset available/unavailable ○: Alarm reset available / ×: Alarm reset unavailable



IAI Corporation

Head Office: 577-1 Obane Shimizu-KU Shizuoka City Shizuoka 424-0103, Japan
TEL +81-54-364-5105 FAX +81-54-364-2589
website: www.iai-robot.co.jp/

Technical Support available in USA, Europe and China

IAI America, Inc.

Head Office: 2690 W, 237th Street Torrance, CA 90505
TEL (310) 891-6015 FAX (310) 891-0815
Chicago Office: 1261 Hamilton Parkway Itasca, IL 60143
TEL (630) 467-9900 FAX (630) 467-9912
Atlanta Office: 1220 Kennestone Circle Suite 108 Marietta, GA 30066
TEL (678) 354-9470 FAX (678) 354-9471
website: www.intelligentactuator.com

IAI Industrieroboter GmbH

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany
TEL 06196-88950 FAX 06196-889524

IAI (Shanghai) Co., Ltd.

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China
TEL 021-6448-4753 FAX 021-6448-3992
website: www.iai-robot.com