IAI Quality and Innovation

EtherNet/IP EtherCAT PROFINET

SCON-CA/CAL/CGAL/CB/CGB

First Step Guide Eighth Edition

Thank you for purchasing our product.
Make sure to read the Safety Guide and detailed Instruction Manual as well as this First Step Guide to ensure correct use.
This Instruction Manual is original.

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

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	~750W Motor	FMC1.5/4-ST-3.5	(Supplier : Phoenix Contact)	Applicable Cable Size 0.5mm² (AWG20)
		3000W~Motor	FMC1.5/6-ST-3.5	(Supplier : Phoenix Contact)	
3	Power Supply Plug for Brake		MC1.5/2-ST-3.5	(Supplier : Phoenix Contact)	
4	AC Power Supply plug	~750W Motor	MSTB2.5/6-STF-5.08	(Supplier : Phoenix Contact)	Applicable Cable Size 2.0mm² (AWG14)
		3000W~Motor	PC5/6-STF-7.62	(Supplier : Phoenix Contact)	Applicable Cable Size 3.3mm² (AWG12)
5	Absolute Battery		AB-5		Enclosed in Absolute Type (Excluded for battery-less absolute)
6	Dummy plug		DP-5		Enclosed in SCON-CGAL/CGB
7	External Regenerative Resistor Unit Connecting Plug		GIC2,5/2-STF-7.62	(Supplier : Phoenix Contact)	Recommended cable size 0.75mm² (AWG18)
8	Connector for Multi Function		Plug: 10114-3000PE, Shell: 10314-52F0 (Supplier : 3M)		Enclosed for Servo Press Type
9	First Step Guide		ME0277		
10	Safety Guide		M0194		

AC Power Supply Plug
~750W Motor 3000W~Motor

Brake Power Supply Plug

System I/O Plug
~750W Motor

Dummy Plug

Absolute Battery

3000W~Motor

Regenerative Resistor Unit Connecting Plug
3000W~Motor

Connector for Multi Function

CC-Link Terminal resistor

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 Pendant TB-02	TB-02
4	Touch Panel Teaching Pendant TB-02 (Dead-man switch Type)	TB-02D
5	Touch Panel Teaching Pendant TB-03	TB-03

3. Instruction Manuals Related to this Product

No.	Name	Manual No.
1	SCON-CA Controller Instruction Manual	ME0243
2	SCON-CB/CGB Controller Instruction Manual	ME0340
3	SCON-CB/CGB Controller Servo Press Function Instruction Manual	ME0345
4	EtherCAT® Instruction Manual	ME0273
5	EtherNet/IP Instruction Manual	ME0278
6	CC-Link Instruction Manual	ME0254
7	DeviceNet Instruction Manual	ME0256
8	PROFIBUS-DP Instruction Manual	ME0258
9	CompoNet Instruction Manual	ME0220
10	MECHATROLINK Instruction Manual	ME0221
11	MECHATROLINKⅢ Instruction Manual	ME0317
12	EtherCAT Motion Instruction Manual	ME0367
13	PROFINET-IO Instruction Manual	ME0333
14	PC Software RCM-101-MW/ RCM-101-USB Instruction Manual	ME0155
15	Touch Panel Teaching Pendant TB-02 Position Controller Instruction Manual	ME0355
16	Touch Panel Teaching Pendant TB-03 Position Controller Instruction Manual	ME0376

4. How to Read the Model Plate

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

5. How to Read the Model of the Controller

SCON-CA-20 I HA-NP-3-1-STO-DN-**

<Series>
<Type>
C : Standard Type CA : High Performance Type
CB : High Performance Type
CGB : Safety Category Compliant Type
CAL : Small Type CGAL: Safety Category Compliant Type
<Actuator Characteristics>
[Motor Type] * For SCON- CAL/CGAL, 200W or Less
12 : 12W 200S : 200W (LSA)
20 : 20W 300S : 300W (LSA)
30D : 30W (Excluding RS) 400 : 400W
30R : 30W (for RS) 600 : 600W
60 : 60W 750 : 750W
100 : 100W 750S : Equipped with loadcel RCS2-RA13R I
100S : 100W (LSA)
150 : 150W 3000 : 3000W
200 : 200W 3300 : 3300W
<Encoder Type>
I : Incremental A : Absolute G : Spurious Absolute(Note 1)
WAI : Battery-less Absolute (Incremental) (Note 3)
<Option>
No Indication : Standard Type I : Index Absolute Type (DD) (Note 1)
HA : High Acceleration/Deceleration Type
M : Multi-Rotation Absolute Type (DD) (Note 1)
F : Servo Pressing Type (dedicated for servo press actuators)
<I/O Type>
NP : NPN Specification (Sink Type) (Standard) ML : MECHATROLINK-Ⅰ/Ⅱ Connection Type(Note 2)
PN : PNP Specification (Source Type) ML3 : MECHATROLINK Connection-Ⅲ(Motion) Type(Note 1)
DV : DeviceNet Connection Type EC : EtherCAT Connection Type (Note 2)
CC : CC-Link Connection Type EP : EtherNet/IP Connection Type (Note 2)
PR : PROFIBUS-DP Connection Type PRT : PROFINET IO Connection Type (Note 2)
CN : CompoNet Connection Type (Note 2) ECM: EtherCAT Motion Connection Type (Note 3)
CIE: CC-Link IE Field Connection Type (Note 3) RC : RCON Connection Type (Note 3)
(Note 1) Specified only for SCON-CA/CB/CGB (Note 2) Except for SCON-C
(Note 3) Specified only for SCON-CB/CGB
<Type of Installation (dedicated for SCON-CAL/CGAL)>
Not Specified : Screw Attachment Type
DN : DIN Rail Mounting Type
<Safety Type>
Not Specified : Standard Type
STO : STO Type (Note 3)
SS : SS1-t Type (Note 3)
<Power-supply Voltage>
1 : Single-Phase 100V AC
2 : Single-Phase 200V AC
3 : Three-Phase 200V AC
<I/O Cable Length>
0 : Equipped with no cable 2 : 2m
3 : 3m (Standard) 5 : 5m
<Identification for IAI use only>
* There is no identification in some cases.

Basic Specifications

List of Specifications

Item		SCON-C/CA/CB/CGB Less than 400W	SCON-C/CA/CB/CGB 400 to 750W	SCON-C/CA/CB/CGB 3000 to 3300W	SCON-CAL/CGAL
Corresponding Motor Capacity		12W to 399W	400W to 750W	3000 to 3300W	12W to 200W
Power-supply Voltage (Power-supply Fluctuation ±10% or less)		Single-Phase 100 to 115V AC Single-Phase 200 to 230V AC	Single-Phase 200 to 230V AC	Three-Phase 200 to 230V AC	Single-Phase 100 to 115V AC Single-Phase 200 to 230V AC
Rush Current*1	Power-supply Voltage 100V AC	20A (Controller side), 70A (Drive side)			30A (Controller side), 80A (Drive side)
	Power-supply Voltage 200V AC		30A (Controller side), 80A (Drive side)	40A (Controller side), 40A (Drive side)	
Leak Current*2		3.0mA		3.5mA	3.0mA
		Primary side when noise filter is connected to power supply line			
Load Capacity, 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.)		24V DC±10% 0.1A (MAX.) (Note) Necessary to supply 1.5A (max.) to actuator separately	24V DC±10% 1A (MAX.)
Transient Power Cutoff Durability		SCON-C: 10ms (50Hz), 8ms (60Hz) SCON-CA/CB/CGB: 20ms (50Hz), 16ms (60Hz)			20ms (50Hz), 16ms (60Hz)
Motor Control System		Sine Wave PWM Vector Current Control			
Corresponding Encoder		• Incremental Serial • Absolute Serial • ABZ (UVW) Parallel • Battery-less Absolute			• Incremental Serial • Absolute Serial
Encoder Resolution		• Battery-less Absolute (ISB): 131072 pulse/rev • Battery-less Absolute (RCS2/3): 16384 pulse/rev * In any models other than above, refer to instruction manual of each actuator.			
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 (Each dedicated controller)	Field Network Specification	DeviceNet, CC-Link, PROFIBUS, CompoNet*, MECHATROLINK-Ⅰ/Ⅱ*, EtherCAT*, EtherNET/IP*, PROFINET IO*, MECHATROLINK-Ⅲ*, ECM* (*Some types cannot connect it.)			
Cable Length	PIO	MAX. 10m			
	RS485	Total cable length 100m or less.			
	Field Network	Refer to each Field Network specification			
Data Setting and Input		PC Software, Touch Panel Teaching, Teaching Pendant			
Data Retention Memory		C : Saves position data and parameters to non-volatile memory (There is 100,000 times in number of writing) CA/CB/CGB: Saves position data and parameters to non-volatile memory (There is no limitation in number of writing)			Saves position data and parameters to non-volatile memory (There is no limitation in number of writing)
Number of Positions		768 points (Changing on the selection in operation mode)			
Feedback Pulse (Dedicated for Servo Press Specifications)		CB/CGB Type: Differential System (Line Driver System) MAX. 2.5Mpps Common : Open Collector Type 500Kpps max. (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, WRG (orange): Warning generated (only CAL/CGAL Type)			
Electromagnetic Brake Compulsory Release Switch (mounted on Front Panel)		Switching NOM (standard)/BK RLS (compulsory release)			
Insulation Resistance		500V DC 10MΩ or more			
Insulation Strength		1500V AC for 1 min. (Note) Withstand voltage of force control loadcell is 50V DC			
Environment	Surrounding Air Temperature	0 to 40°C			
	Surrounding Humidity	5%RH to 85%RH (non-condensing)			
	Surrounding Environment	[Refer to Installation Environment]			
	Surrounding Storage Temperature	-20 to 70°C (non-condensing)			
	Surrounding Storage Humidity	5%RH to 85%RH (non-condensing)			
	Vibration Durability	XYZ Each direction 10 to 57Hz Pulsating amplitude 0.035mm (continuous) 0.075mm (intermittent) 57 to 150Hz 4.9m/s² (continuous) 9.8m/s² (intermittent)			

Mass	SCON-C: Approx. 800g SCON-CA/CB/CGB: Approx. 900g	SCON-C: Approx. 1100g SCON-CA/CB/CGB: Approx. 1200g	Approx. 2800g	Approx. 560g
Cooling Method	Natural air-cooling	Forced Air Cooling	Forced Air Cooling	Forced Air Cooling
External Dimensions [mm]	58W × 194H × 121D	72W × 194H × 121D	92.7W × 300H × 187.7D	49W × 158H × 116D

*1 In-rush current will flow for approximately 20msec after the power is turned on (at 40°C).
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 Field Network, ROBONET, 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
Peek Max. Power Capacity = Peek Max. Motor Power Capacity + Control Power Capacity

Actuator Motor Type	Motor Power Capacity [VA]	Peek Max. Motor Power Capacity [VA]	Control Power Capacity [VA]	Rated Power Capacity [VA]	Peek Max. Power Capacity [VA]	Heat Generation [W]
12	41	123	48	89	171	30
20	26	78		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
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	1032	37
200	421	1263		469	1311	38
200 (DD)	503	1509		551	1557	7.5
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
400 (RCS3-CT8)	1230	3690		1278	3738	47
600	1164	2328		1212	2376	56
600 (DD)	1462	4386		1510	4434	20.8
750	1521	3042		1569	3090	58
750S		4563			4611	
3000	5657	16970		5705	17018	180
3300	6014	18041		6062	18099	182

RS : Rotary Shaft LSA : Linear Actuator DD : Direct Drive Motor

Selection of Circuit Interrupter

- 3 times of the rated current may flow 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.

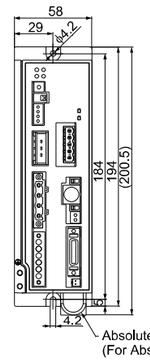
• For ~750W Motor
Rated Current for Circuit Interrupter > (Rated Motor Power Capacity [VA] + Control Power Capacity [VA]) / AC Input Voltage × Safety Margin (reference 1.2 to 1.4 times)

• For 3000~3300W Motor
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) / √3

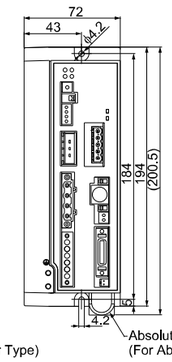
External Dimensions

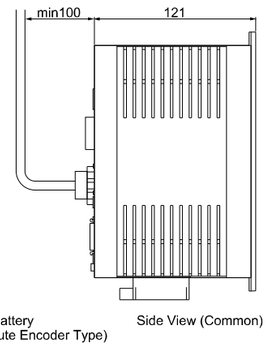
SCON-CA/CB/CGB

Less than 400W

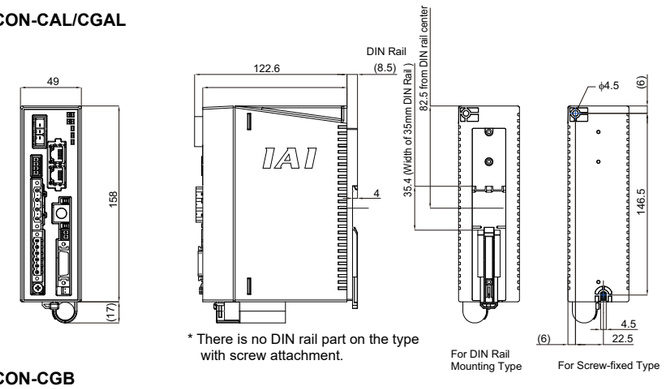


400 to 750W



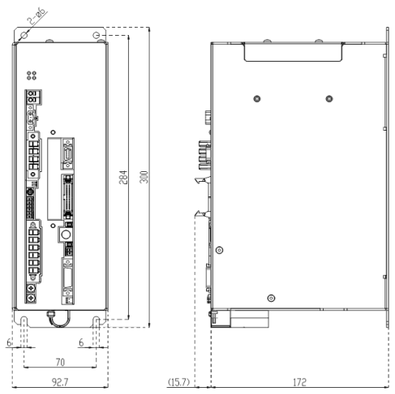


SCON-CAL/CGAL



* There is no DIN rail part on the type with screw attachment.

SCON-CGB
3000 to 3300W



Regenerative Resistor Unit (Option)

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

- RESU (D)-1, RESU (D)-2

[Specification]

Item			Specification
Body Size		RESU	W34mm × H154mm × D106.5mm
		RESUD	W34mm × H158mm × D115mm
Body Weight			0.4kg
Internal Regenerative Resistor			235Ω 80W
Accessories	First Unit	RESU-2 RESUD-2	Controller Connection Cable (Model Code CB-SC-REU010) 1m
	2nd unit or later	RESU-1 RESUD-1	Controller Connection Cable (Model Code CB-ST-REU010) 1m

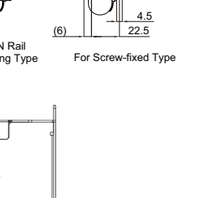
[Appearance]

Screw Attachment Type
RESU-1
RESU-2

[Reference Connectable Quantity]

Motor Wattage Horizontal Mount/Vertical Mount	Connectable Number of Regenerative Resistor Units
To 100W (Note 3)	Not Required
101 to 400W	1
401 to 750W	2

DIN rail Attachment Type
RESUD-1
RESUD-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 ratio 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 ratio 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

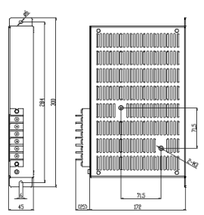
(Note 3) It is necessary to have one unit for LSA/LSAS-N10S Type.

- RESU-35T (For SCON 3000 to 3300W)

[Specification]

Item		Specification
Body Size		W45mm × H300mm × D197mm
Body Weight		1.8kg
Internal Regenerative Resistor		30Ω 450W
Built-in Temp. Sensor	Operation Temp.	130°C±5°C
	Contact Format	b Contact
	Contact Open-Close Capacity	DC30V, 200mA(MAX)

[Appearance]



[Guideline for number of units to be connected]
Servo Press Type : It is necessary to have one unit for RCS3-RA15R when the cycle time is at 2.5s or less.
: RCS3-RA20R requires two units at maximum depending on the cycle time.
Transfer Type : It depends on the operational condition (payload, transfer velocity, duty ratio).
[Refer to each instruction manual for details.]

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

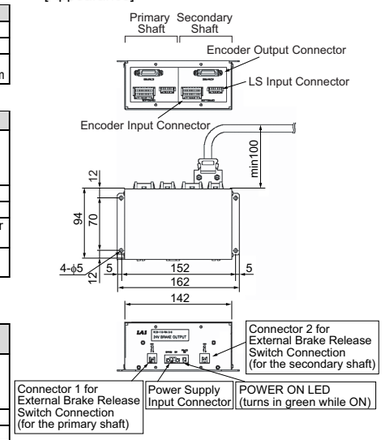
[24V Power Supply Connector]

Item	Specification		
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

[Appearance]



(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 (Dedicated Option for SCON-CA/CB/CGB)

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 or servo press.

[Specification]

Item	Specification						
Loadcell System	Strain Gauge						
Rated Capacity [N]	200	600	2000	6000	20000	30000	50000
Allowable Overload [%R.C*1]	200		200	200	200	200	200
Loadcell Accuracy [%R.C*1]	±1		±1	±1			
Applicable Temperature Range[°C]	0 to 40						

*1 R.C : Rated Capacity
[Refer to each actuator instruction manual for details of how to attach and the dimensions.]

Installation Environment

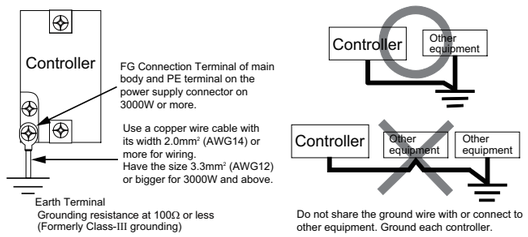
This product is capable for use in the environment of pollution degree 2*1 or equivalent.
*1 Pollution Degree 2 : Environment that may cause non-conductive pollution or transient conductive pollution by frost (IEC60664-1)

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 is out of the range between 5%RH and 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]

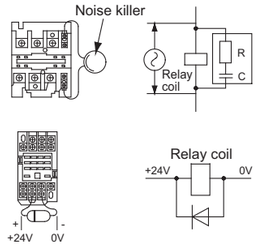
   When using the product in any of the locations specified below, provide a sufficient shield.
   - Location subject to electrostatic noise
   - Location where high electrical or magnetic field is present
   - Location with the mains or power lines passing nearby
2. Storage and Preservation Environment
   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 absorbency 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)



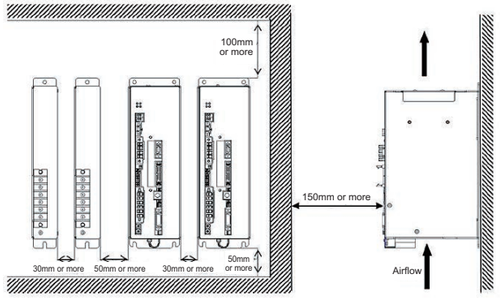
2. Precautions regarding wiring method
   1) Wire is to be twisted for the 24V DC power supply.
   2) Separate the signal and encoder lines from the power supply and power lines.
3. Noise Sources and Elimination
   Carry out noise elimination measures for power devices on the same power path and in the 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.



SCON-C/CA/CB/CGB (For ~750W Motor)

SCON-CAL/CGAL

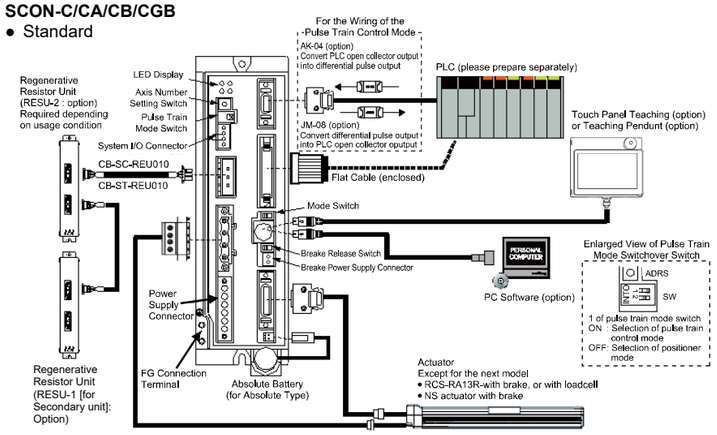
SCON-CGB (For 3000 to 3300W Motor)



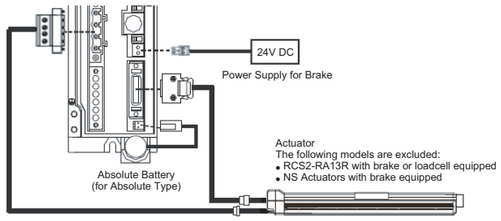
Connection Diagram

SCON-C/CA/CB/CGB

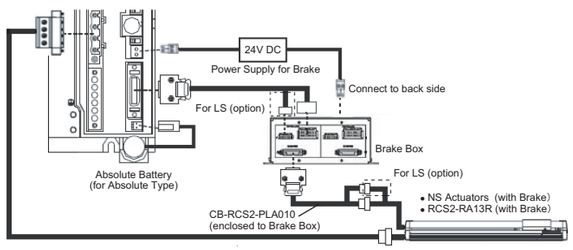
- Standard



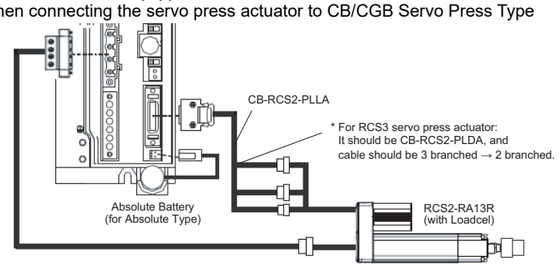
- For Models Equipped with brake Except for RCS2-RA13R and NS Actuators



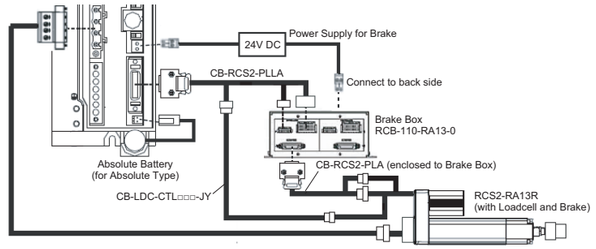
- RSC2-RA13R Equipped with Brake, with no Loadcell, or NS Actuators with Brake



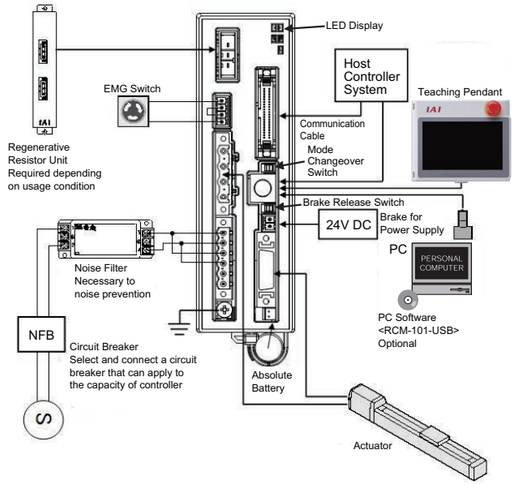
- For RCS2-RA13R equipped with no brake and with loadcell for SCON-CA/CB/CGB or for when connecting the servo press actuator to CB/CGB Servo Press Type



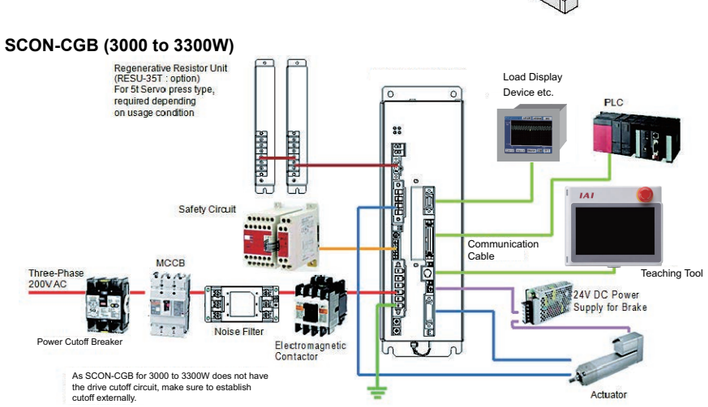
- RCS2-RA13R Equipped with Brake and Loadcell in SCON-CA/CB/CGB



SCON-CAL/CGAL

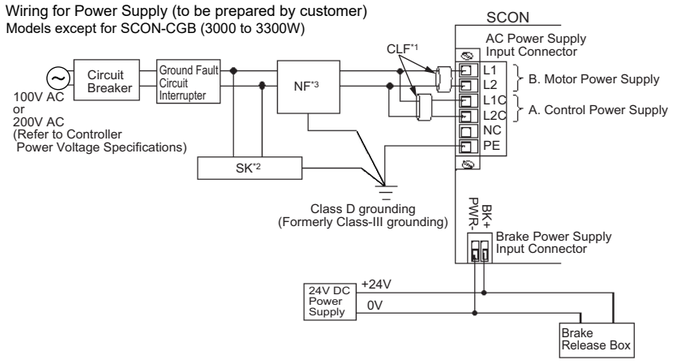


SCON-CGB (3000 to 3300W)

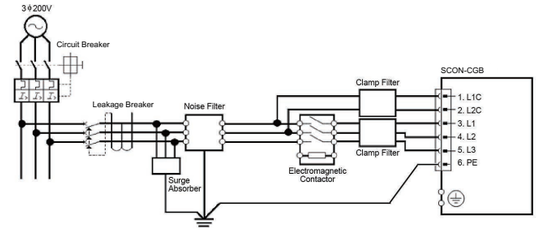


Power Supply and Emergency Stop Circuit

- Wiring for Power Supply (to be prepared by customer)
  Models except for SCON-CGB (3000 to 3300W)



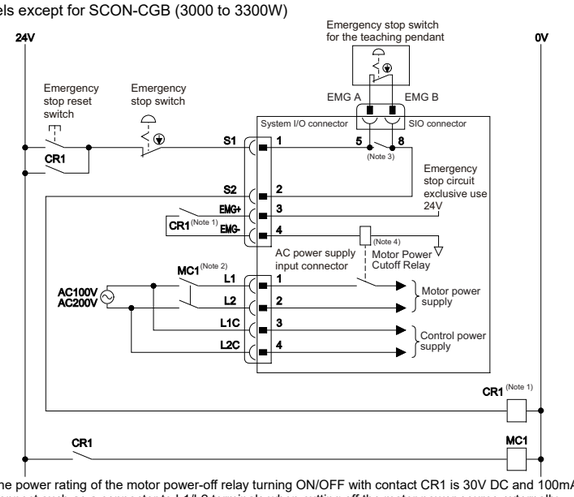
SCON-CGB (3000 to 3300W)



Power consumption 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. Use the “harmonic type” for the ground fault circuit interrupter. Also, check the leak current at the set points.

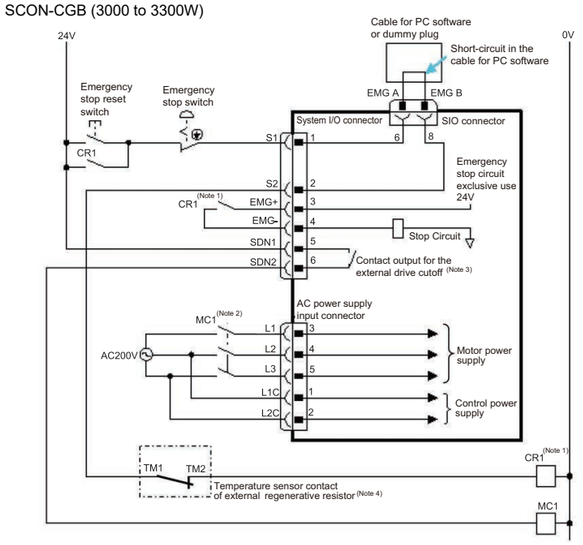
- Wiring for Emergency Stop Input
  The following diagram shows an example of how the emergency stop switch for the teaching pendant may be included in the emergency stop circuit you may construct.

Models except for SCON-CGB (3000 to 3300W)



Note 1 The power rating of the motor power-off relay turning ON/OFF with contact CR1 is 30V DC and 100mA or less.
Note 2 Connect such as a connector to L1/L2 terminals when cutting off the motor power source externally.
Note 3 CGB Type are not equipped with a relay to enable to automatically identify a teaching tool was inserted and switch the wiring layout. (The system I/O connector does not get short-circuited between S1 and S2 terminals even if a teaching tool is removed.) The controller on CB Type automatically identifies that a teaching tool was inserted. (Short-circuit is made between S1 and S2 terminals inside the controller once connection is detected.)
Note 4 Since there is no motor power cutoff relay in CGB Type, make sure to establish a cutoff relay externally.

SCON-CGB (3000 to 3300W)



Note 1 The power rating of the motor power-off relay turning ON/OFF with contact CR1 is 30V DC and 100mA or less.
Note 2 Connect such as a connector to L1/L2/L3 terminals when cutting off the motor power source externally.
(This controler not equipped with the drive cutoff relay mounted inside the controller.)
Note 3 It is the contact output to control the drive source breaker connected externally. The rating is 30V DC and 20mA or less.
Note 4 Connect a temperature sensor when an external regenerative resistor unit is connected.

Operation Modes and Functions

(Note) Refer to the Instruction Manual for the operation modes and features of MECHATROLINK-Ⅲ and EtherCAT Motion.

SCON-C Type is available for the operation of (1) Remote I/O Mode.
SCON-CA Type has modes from (1) to (9) to select from for operation.
SCON-CAL/CGAL Types have modes from (1) to (5) and (9) to select from for operation.
SCON-CB/CGB Types have all operation modes from (1) to (10) to select from for operation. ((10) is dedicated only for servo press type)

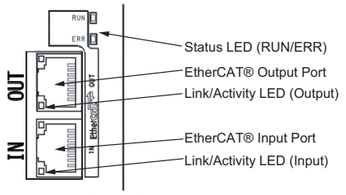
(1) Remote I/O Mode : This is the mode to perform operation by PIO (24V I/O) with Field Network.
(2) Position / Simple Direct Mode : This is the mode to perform operation by indicating the target position by inputting the value directly. The values of the position data already registered for the speed, acceleration/deceleration and positioning band are to be used in this mode.
(3) Semi-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) Semi-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) Semi-Direct Mode 3 : This is the mode that equips the vibration control function instead of the jog function in (3).
(10) Full Functional Mode : It is a mode dedicated for the servo press type.

EtherCAT®/EtherCAT Motion

- Specification

  Refer to the EtherCAT Instruction Manual [ME0273] and EtherCAT Motion Instruction Manual [ME0367]

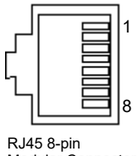
- Interface Section



- 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/OFF: 1000ms)	Synchronizing Event Error For EtherCAT motion connection type only
	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)

- EtherCAT® Connector



RJ45 8-pin
Modular Connector
(Controller Side)

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.

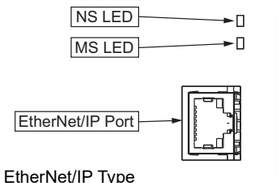
(Note) There is no need of setting Parameter No. 84 and 85 for the EtherCAT motion connection type.

EtherNet/IP

- Specification

  Refer to the EtherNet/IP Instruction Manual [ME0278]

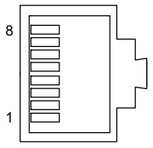
- Interface Section



- 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.	

- EherNet/IP Connector



RJ45 8-pin
Modular Connector
(Controller Side)

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.

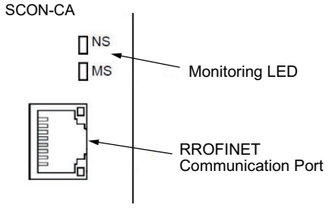
PROFINET IO

- Specification

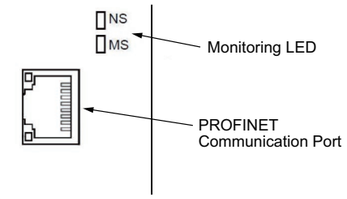
  Refer to the PROFINET IO Instruction Manual [ME0333]

- Interface Section

SCON-CA



SCON-CAL/CGAL

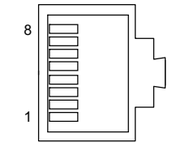


- Status LED Displays of PROFINET IO Type

Name	Indication Color	Description
NS	OFF	Power is OFF, or there is no connectable controller.
	GN (Illuminating)	Connection has been established and proper communication is in progress. (in RUN condition) Check the condition of the master unit.
	GN (Flashing)	Connection is established but communication is paused (in STOP condition: network in normal condition). Check the condition of the master unit.
MS	OFF	The power is turned OFF.
	GN (Illuminating)	Operation is normal.
	GN (Flashing)	Communication under diagnosis
	OR (Illuminating)	A hardware error is present. (in EXCEPTION condition) The board must be replaced. Please contact IAI.
	OR (Flashing 1)	There is an error in communication setting.
	OR (Flashing 2)	There is an error in IP address setting.
	OR (Flashing 3)	A wrong station name has been applied.
	OR (Flashing 4)	A hardware error is present. (Critical internal error) The board must be replaced. Please contact IAI.
Link/Activity (There is limitation in applicable models)	OFF	No link or activity
	GN (Illuminating)	Link established
	GN (Flashing)	In activity (communication)

Orange (Flashing 1): Repeating of off for 0.75s and on for 0.25s
Orange (Flashing 2): Repeating two times of pattern of off for 0.75s and on for 0.5s
Orange (Flashing 3): Repeating three times of pattern of off for 0.75s and on for 0.5s
Orange (Flashing 4): Repeating four times of pattern of off for 0.75s and on for 0.5s

- EherNet/IP Connector



RJ45 8-pin
Modular Connector
(Controller Side)

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

  It is not necessary to establish setting. It is fixed at 100Mbps.

- Node address setting

  It is not necessary to establish setting on the IAI controller side as it should be established on the master side.
  [Refer to the instruction manual of the host unit that the master unit is mounted in.]

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

MECHATROLINK-Ⅲ (Dedicated for SCON-CA/CB/CGB)

As MECHATROLINK-Ⅲ is applicable for the standard servo profile and not applicable for the standard I/O profile, it is not capable of performing in operation modes like other field network products do (such as full direct mode), or performing anti-vibration control, force control or servo pressing.

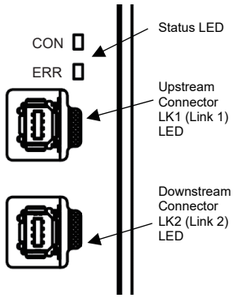
- Spacification

  Refer to the MECHATROLINK-Ⅲ Instruction Manual [ME0317]

- Status LED

LED	Color	Illumination Status	Explanation
CON	GN	Steady Light	CONNECT Received (connected with master)
	-	Off	Connection not established with master.
ERR	OR	Steady Light	Flushes when communication alarm or command alarm generated (except for warning). Turns off when alarm cancelled
	-	Off	In normal condition (alarm not generated)
LK1	GN	Steady Light	Turns on when physically connected to other MECHATROLINK-Ⅲ applicable devices (for checking purpose for e.g. line breakage)
LK2	GN	Steady Light	

● Interface Section



- Node Address Setting
  Node address can be set with the parameter.
  Set Parameter No. 85 “NADR : Fieldbus Node Address” with using the PC software for RC.
  Available range for Setting : 3 to 239 [hex] (setting at delivery : 3)
- Setting of Data Length
  Establish the setting in correspondence with the data length that uses Parameter No. 86 "FBRS: Fieldbus Communication Velocity" in the RC PC software.

Setting Value	Data Length	Baud Rate
0	32 bytes	100Mbps
1 (at the delivery)	48 bytes	

- Electronic Gear Ratio Setting
  Set Parameter No. 65 "CNUM: Electronic Gear Numerator" and No. 66 "CDEN: Electronic Gear Denominator" in the RC PC software.
  Establish the setting to satisfy the following condition;

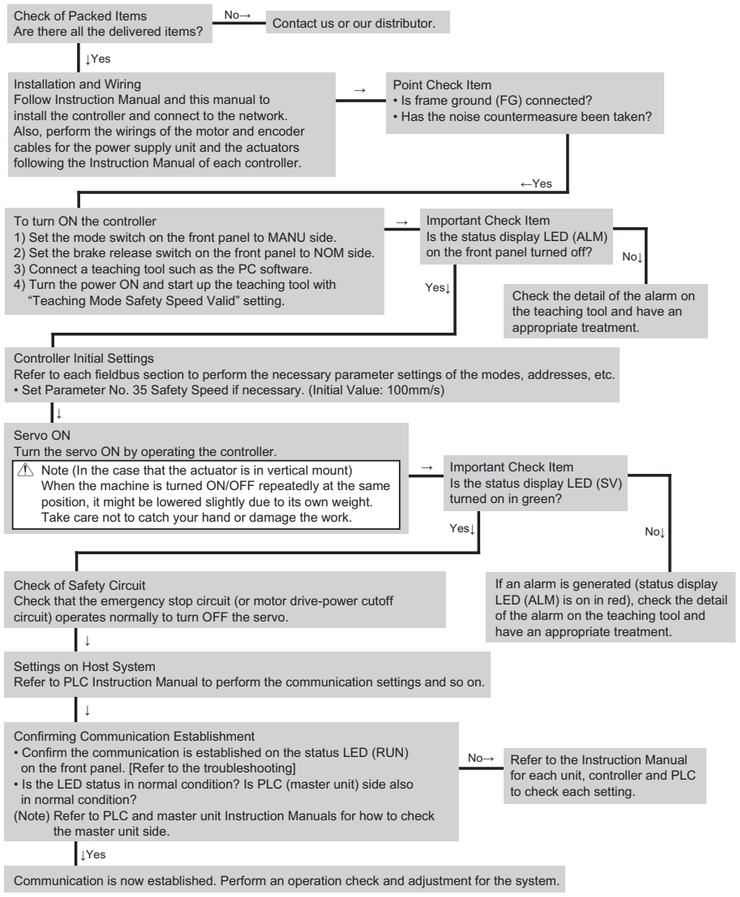
$$\frac{\text{Stroke [mm]}}{\text{Ball Screw Lead Length [mm]}} \times \text{Number of Encoder Pulses} \times \frac{\text{Electronic Gear Denominator}}{\text{Electronic Gear Numerator}} \leqq 2^{31}$$

- Setting of Pulse Count Direction
  Establish the Setting in the Parameter No. 62 "FPIO: Pulse Count Direction" in the RC PC software to make it match with the value in No. 5 "ORG: Home-Return Direction".
  (Note) Make sure to reboot the controller after the parameter setting is complete, and do not forget to turn the mode changeover switch to “AUTO” side.

● Wiring
Connect the dedicated cable for MECHATROLINK.

Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below
Refer to the instruction manual for the servo press type provided separately to start it up;
In this section, explains how to start up SCON complied with EtherCAT®, EtherNet/IP and PROFINET IO (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 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 Field Network. 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 Field Network 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

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