IAI
Quality and Innovation

SCON2
First Step Guide First 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.

- 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.

Installation Environment, Storage 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 60°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 Environment
Storage environment follows the installation environment. Especially in a long-term storage, consider to avoid condensation of surrounding air.
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 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.

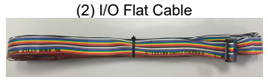
Product Check

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"	
Accessories			
2	I/O Flat Cable	CB-PAC-PIO***	*** shows the cable length
3	System I/O Plug	B2CF 3.50/08/180 SN BK BX (Supplier: Weidmüller)	Applicable Cable Size 1.25mm² to 0.5mm² (AWG16 to 20)
4	AC Power Supply plug	MPS 7S/05 S F3 TN B B (Supplier: Weidmüller)	Applicable Cable Size Controller: 0.75mm² (AWG18) Motor: 2.0mm² (AWG14)
5	Absolute Battery	AB-5	Enclosed in Absolute Type (Excluded for battery-less absolute)
6	Dummy plug	DP-5	
7	Dummy plug	DP-6	
8	CC-Link Connector	MSTB2.5/5-STF-5.08 AU (Manufactured by PHOENIX CONTACT)	Enclosed in CC-Link Type Enclosed with Terminal Register (1pc each of 130Ω/110Ω) Recommended cable size 0.3mm² (AWG22)
9	DeviceNet Connector	MSTB2.5/5-STF-5.08 AU M (Manufactured by PHOENIX CONTACT)	Enclosed in DeviceNet Type Recommended cable size 0.3mm² (AWG22)
10	Connection Cable (Between R-Unit and SCON, Between SCON and SCON)	CB-RE-CTL002	Enclosed for R-Unit Connection Type
11	First Step Guide	ME0468	This Manual
12	Safety Guide	M0194	
Option (To be prepared separately)			
13	Multi Function Connector Cable	CB-SC2-MFC***	*** shows the cable length

(2) I/O Flat Cable



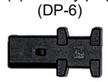
(3) System I/O Plug

(4) AC Power Supply plug

(5) Absolute Battery

(6) Dummy plug (DP-5)

(7) Dummy plug (DP-6)



(8) CC-Link Connector

(9) DeviceNet Connector

(10) Connection Cable

Basic Specifications

1. List of Specifications

Item		SCON2-CG
Corresponding Motor Capacity		Power Supply Voltage 100V AC: 60 to 200W, 200V AC: 60 to 750W
Power-supply Voltage		Single-Phase 100 to 115V AC Single-Phase 200 to 230V AC (Power-supply Fluctuation±10% or less)
Rush Current	Power-supply Voltage 100V AC	Controller side: 30A (to 25°C), 70A (to 60°C) (*1) Drive side: 30A (to 25°C), 80A (to 60°C) (*1)
	Power-supply Voltage 200V AC	
Leak Current*2		3.5mA
		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.) (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 • Absolute Serial • ABZ (UVW) Parallel • Battery-less Absolute
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	RS-485	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
	USB port	Communication System: USB2.0 Baud Rate: 12Mbps
External Interface (Each the dedicated controller)	PIO Specifications	Signal I/O dedicated for 24V DC (selected from NPN/PNP) … Input 16 ports max., output 16 ports max.
	Field network Specifications	CC-Link, CC-Link IE Field, DeviceNet, EtherCAT, EtherNet/IP, PROFINET IO, MECHATROLINK-Ⅲ
	Other	R-Unit Connection Type
Cable Length	PIO Specifications	MAX. 10m
	RS485	Total cable length 100m or less.
	Field network	Refer to each Field network specification
	Other	R-Unit Connection Type: 3m Max. Between Devices, Total Cable Length 10m Max.
Data Setting and Input		PC Teaching Software, Touch Panel 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/Press Program/Motion
Number of Positioner Mode Positions (Excluding Servo Press Specifications)		Standard 64 points, MAX. 384 points (PIO Type, Field network Type) (Note) Number of positions differs depending on the selection in PIO pattern and Field network operation mode.
Pulse Train Control Mode Input Pulse Frequency		Differential System (Line Driver System): MAX. 2.5Mpps Open Collector Type: MAX. 200Kpps (under condition AK-04 is used) Command Pulse Multiplying Factor (Electronic Gear: A/B) Setting Range for A and B (Set to Parameter): 1 to 99999999
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)
Analog Output		1system (load data) 4 to 20mA Current Output (±1%) Load resistance 10 to 600Ω
LED Display (Mounted on Front Panel)		PWR (Green): Controller in normal condition, SV (Green): Servo ON, ALM (Orange): Alarm generated, STOP (Red): During Stop, SAFE (Red): During Safety Stop, WRG (Orange): Warning generated
Electromagnetic Brake Compulsory Release Switch (mounted on Front Panel)		Switching NOM (standard)/BK RLS (compulsory release)
Insulation Resistance		500V DC 10MΩ or more
Insulation Durability		1,500V AC for 1 min. (Note) Withstand voltage of force control loadcell is 50V DC
Environment	Environment of Use	Pollution Degree 2
	Surrounding Air Temperature	0 to 60°C (0 to 55°C when absolute battery to be connected)
	Surrounding Humidity	5%RH to 85%RH (Should be no-condensing or freezing)
	Surrounding Environment	Refer to [Installation Environment]
	Surrounding Storage Temperature	-20 to 70°C (Should be no-condensing or freezing)
	Surrounding Storage Humidity	5%RH to 85%RH (Should be no-condensing or freezing)
	Vibration Durability	Frequency 10 to 57Hz / Swing width: 0.035mm (continuous), 0.075mm (intermittent) Frequency 57 to 150Hz / Acceleration: 4.9m/s² (continuous), 9.8m/s² (intermittent) XYZ directions Sweep time: 10 minutes Number of sweep: 10 times
Mass		Approx. 800g
Cooling Method		Forced Air Cooling
External Dimensions (mm)		40W×160H×143D

*1 In-rush current will flow for approximately 20ms after the power is turned on (at 60°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 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.

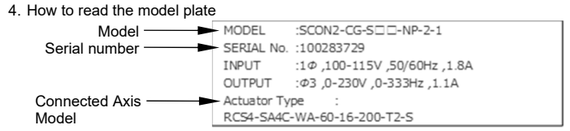
2. Teaching Tool (to be purchased separately)
A teaching tool is necessary when performing the setup such as the position setting and parameter setting that requires teaching. Prepare either of the following teaching tools.

No.	Part Name	Model
1	PC Teaching Software (software only)	IA-OS
2	PC Teaching Software (USB converter adapter, USB cable and external equipment communication cable are included)	IA-OS-C
3	Touch Panel Teaching Pendant TB-02 (Standard/with dead-man switch)	TB-02/TB-02D
4	Touch Panel Teaching Pendant TB-03	TB-03

3. Instruction manuals related to this product

No.	Name	Manual No.
1	SCON2 Controller Instruction Manual	ME0458
2	SCON2 Controller Servo Pressing Function Instruction Manual	ME0470
3	SCON2 Field Network Instruction Manual Remote I/O Edit	ME0469
4	SCON2 Motion Field Network Instruction Manual MECHATROLINK-Ⅲ Edit	ME0471
5	SCON2 Motion Field Network Instruction Manual EtherCAT Edit	ME0472
6	R-Unit System Instruction Manual	ME0384
7	PC Teaching Software IA-OS First Step Guide	ME0391
8	Touch Panel Teaching Pendant TB-02 Applicable for Position Controller Instruction Manual	ME0355
9	Touch Panel Teaching Pendant TB-03 Wired Link Applicable for Position Controller Instruction Manual	ME0376

4. How to read the model plate



5. How to read controller model

S C O N 2 - C G - S _ _ - NP - 0 - 2 - _

<Series>
<Type>
CG : Safety Category Compliant Type (Note 1)
<Motor Type>
S : 200V AC servo motor (Note 2)
<Hardware Option>
No Indication : With no option
C (Note 3) : Equipped with multi function connector
<Feature Option>
No Indication : With no option
F : Press Program
M (Note 4) : Motion
<I/O Type>
NP : NPN Specification (Sink Type) (Standard)
PN : PNP Specification (Source Type)
CC : CC-Link Connection Type CIE : CC-Link Field Connection Type
DV : DeviceNet Connection Type EC : EtherCAT Connection Type (Note 5)
EP : EtherCAT Connection Type
ML3: MECHATROLINK-Ⅲ Connection Type (Note 5)
PRT: PROFINET IO Connection Type
RC : R-Unit Connection Type
<I/O Cable Length>
0 : Equipped with no cable
2 : 2m (Standard)
3 : 3m
5 : 5m
<Power-supply Voltage>
1 : Single-Phase 100V AC
2 : Single-Phase 200V AC
<Absolute Battery>
No Indication : None
AB : Enclosed with absolute battery

Note 1 For Safety Category complied types only
Note 2 The wattage of the applicable motor should be 60W to 750W
Note 3 Select this when necessary to conduct pulse train control
Note 4 Selectable when I/O type is either "EC" or "ML3"
Note 5 It should be the remote I/O type when "no description" or the pressing program "F" is selected in the feature option, and should be the motion type when the motion "M" is selected

6. 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

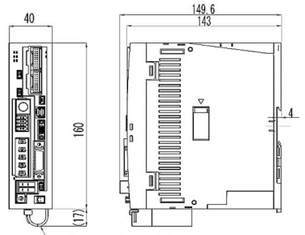
Actuator Motor Type	Motor Power Capacity (VA)	Peek Max. Motor Power Capacity (VA)	Control Power Capacity (VA)	Rated Power Capacity (VA)	Peek Max. Power Capacity (VA)	Heat Generation (W)
30R (for RS)	138	414	48	186	462	33
60	138	414		186	462	33
60 (RCS3-CTZ5)	197	591		245	639	32
100	234	702		282	750	35
100S (LSA)	283	851		331	899	36
150	328	984		376	1032	37
200	421	1263		469	1311	38
200 (DD/DDA)	503	1509		551	1557	36
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/DDA)	1462	4386		1510	4434	49
750	1521	3042		1569	3090	58
750S		4563			4611	

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

Selection of Circuit Breaker
- 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.

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)

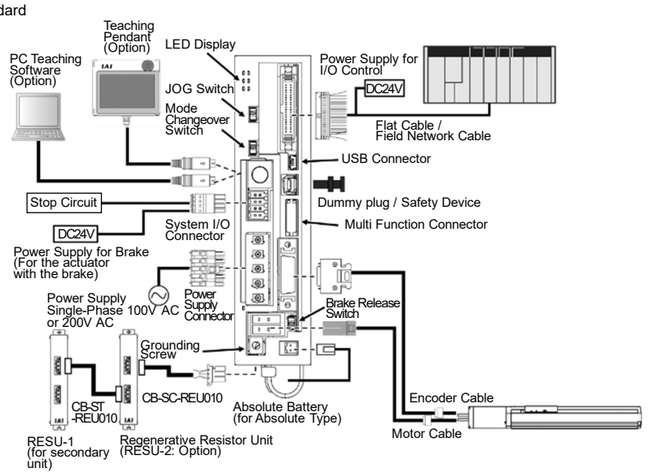
External Dimensions



Connection Diagram

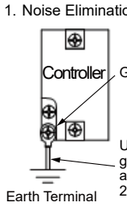
Refer to [R-Unit System Instruction Manual (ME0384)] for R-Unit Connection Type.

●Standard

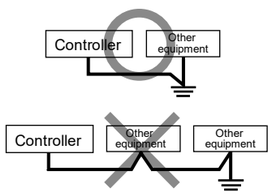


Installation and Noise Elimination

1. Noise Elimination Grounding (Frame Ground)



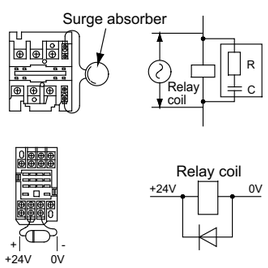
Class D grounding
(Formerly Class-III grounding: Grounding resistance at 100Ω or less



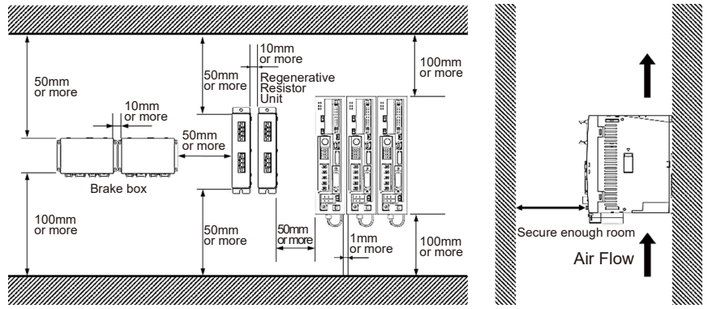
Do not share the ground wire with or connect to other equipment. Ground each controlle r.

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] Mount the windings and diodes in parallel.
      Select a diode built-in type for the DC relay

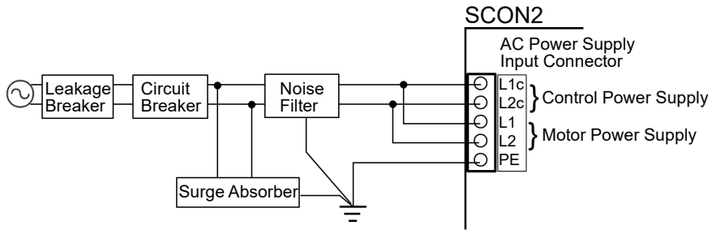


4. Heat Radiation and Installation
   Design and Build the system considering the size of the controller box, location of the controller and cooling factors to keep the ambient temperature around the controller below 40°C. Apply screws sized M4 × 10mm when attaching the product with screws.



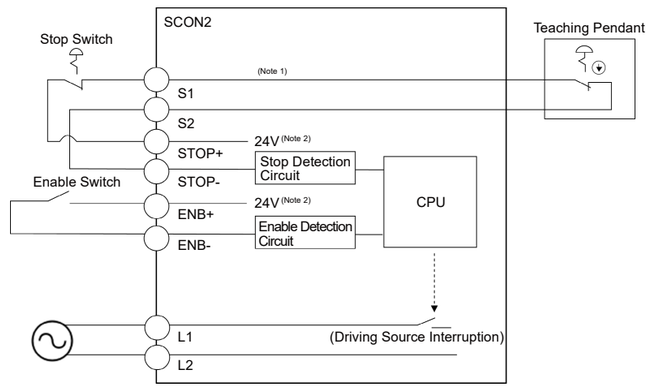
Power Supply and Emergency Stop Circuit

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



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.
Refer to the instruction manual for the recommended models for the noise filter and surge absorber.

- 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 SCON2 is not equipped with a relay to enable to automatically identify a teaching tool was inserted and switch the wiring layout.
(It does not get short-circuited between S1 and S2 terminals even if not connected.)
Connect the dummy plug DP-5 when a teaching tool is not connected.

Note 2 For STOP-/ENB- terminals, make sure to construct a circuit using the built-in 24V (STOP+/ENB+ terminals) outputs.

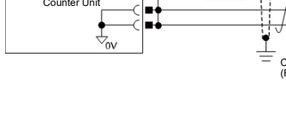
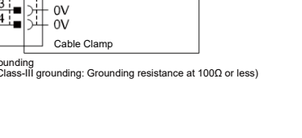
PIO Specification

Explanation of I/O Signal Functions
* Refer to instruction manual for not described signals and details.

Category	Signal Abbreviation	Signal Name	Function Description
Input	CSTR	Start Signal (PTP Strobe)	Starts moving toward the position set in Command Position No.
	PC1 to PC256	Command Position No.	To input position No. desired to move (binary input)
	SON	Servo ON	Turn the signal ON to servo ON, turn the OFF to Servo OFF.
	HOME	Home return	Perform the home-return operation with the signal rising edge (OFF → ON).
	ST0 to ST6	Start Signal 0 to 6	The actuator moves to the commanded position with this signal ON during the electromagnetic valve mode. (CSTR signal is not required)
	RSTR*	Datum Position Movement Command	Movement is made to the position set in Parameter No. 167 when the signal is turned ON.
Output	PEND/INP	Position Completion	Turns ON in the positioning band range after actuator operation. PEND signal will not turn OFF once it turns ON until the next operation even if the actuator goes OFF the range of positioning band. INP will turn OFF. PEND and INP can be switched over by the parameter.
	PM1 to PM256	Completion Position No.	Outputs (binary output) the position No. that is reached at the same time the positioning is complete.
	PZONE	Position Zone	Turns ON when the current actuator position gets into the range set to the position data during the move towards the position. It can be utilized together with ZONE 1, however, PZONE is effective only when moving towards the set position.
	*EMGS	Emergency Stop Output	Turns ON when the controller emergency stop is cancelled, and OFF during the emergency stop (regardless of alarms).
	PE0 to PE6	Current Position Number	Turns ON when moving to the target position is complete in Electromagnetic Valve Mode.
	LS0 to LS2	Limit Switch Output	Turns ON when the current actuator position is within the range of positioning band (±) of the target position. It is output even before the movement command and the servo is OFF if the home-return operation is completed.
	*ALML	Light Error Alarm	This turns OFF when any of the absolute battery alarm, overload alarm or message level alarm is occurred.
	REND*	Datum Position Movement Complete	Turns ON when movement to the datum position set in Parameter No. 167 is finished.

* Used in Pulse Train Control PIO Pattern 1

PIO Input and Output Interface

		Input section		Output section	
Specification		Input voltage	24V DC±10%	Load voltage	24V DC
		Input current	4mA 1 circuit :	Peak load electric current	50mA 1 circuit :
		ON/OFF voltage	ON voltage MIN. 18V DC OFF voltage MAX. 6V DC	Leak Current	MAX.0.1mA/1 point
SCON2	NPN				
	PNP				

Pulse Train Control Type

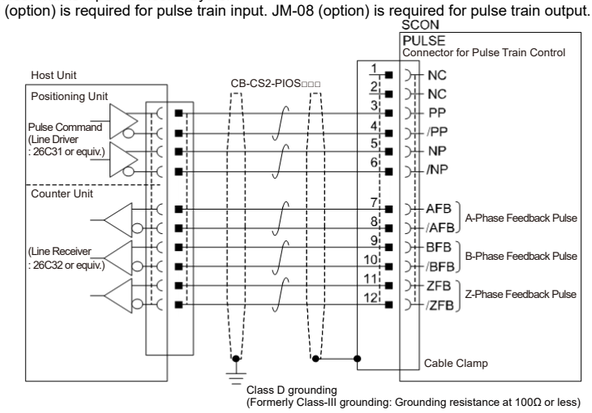
Use the multi function connector cable in the option.

Pulse Train Input and Output Interface

Category	Abbreviated Code	Signal Name	Contents of Functions
Input	PP, /PP	Command Pulse Input	Inputs the command pulse train. Input pulse frequency differs depending on the type. Refer to [Basic Specifications]
	NP, /NP		
Output	AFB, /AFB	Feedback Pulse Output	Outputs the feedback pulse train. Input pulse frequency differs depending on the type. Refer to [Basic Specifications]
	BFB, /BFB		
	ZFB, /ZFB		

- When Host Unit is Differential System

- When Host Unit is Open Collector System
  AK-04 (option) is required for pulse train input. JM-08 (option) is required for pulse train output.



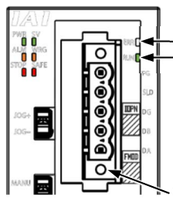
Multi Function Connector (Pulse Train Control / Dedicated for Servo Press Type)

Lay out the multi function connector cable (model code: CB-SC2-MFC***) to the host controller.

Wiring	Color	Signal	No.	Contents
AWG28	Orange/Red1	IOUT	1	Output loadcell load data as analog data (current 4 to 20mA)
	Orange/Black1	GND	2	
	Light gray/Red1	PP	3	Command Pulse Train Input (PP)
	Light gray/Black1	PG	4	Command Pulse Train Input (PG)
	White/Red1	NP	5	Command Pulse Train Input (NP)
	White/Black1	NG	6	Command Pulse Train Input (NG)
	Yellow/Red1	AFB	7	Feedback pulse (+A)
	Yellow/Black1	/AFB	8	Feedback pulse (-A)
	Pink/Red1	BFB	9	Feedback pulse (+B)
	Pink/Black1	/BFB	10	Feedback pulse (-B)
	Orange/Red2	ZFB	11	Feedback pulse (+Z)
	Orange/Black2	/ZFB	12	Feedback pulse (-Z)
	Light gray/Red2	GND	13	0V
	Light gray/Black2	GND	14	

CC-Link

- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Interface Area



- Station Number Setting (Pay attention not to duplicate)
  Station number is set with parameter.
  Set Parameter No. 85 “Fieldbus Node Address” with using the PC teaching software.
  Available range for Setting : 1 to 64 (setting at delivery : 1)
- Baud Rate Setting
  Set Parameter No. 86 “Fieldbus Baud Rate Setting” with using the PC teaching software.

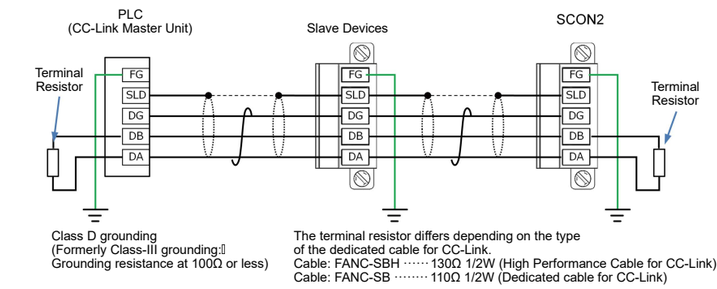
Setting Value	Baud Rate
0 (at the delivery)	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

- Operation Mode Setting and Address Assignment
  Please refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Status LED

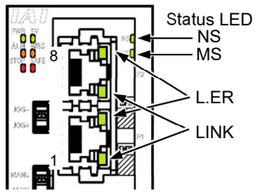
LED	Color	Illumination Status	Contents of display (Detailed Explanation)
STATUS 1 ERR	Orange	Steady Light	• An error occurred (CRC Error, Station Number Switch Setting Error, Baud Rate Switch Setting Error) • Since turning the power on or software reset till completion of CC-Link initialization
		Off	• Communication in normal condition
		Blinking	• The station number setting or the baud rate setting is changed during the communication
STATUS 0 RUN	Green	Steady Light	• Communicating
		Off	• Not in communication

- Wiring



CC-Link IE Field

- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Interface Area



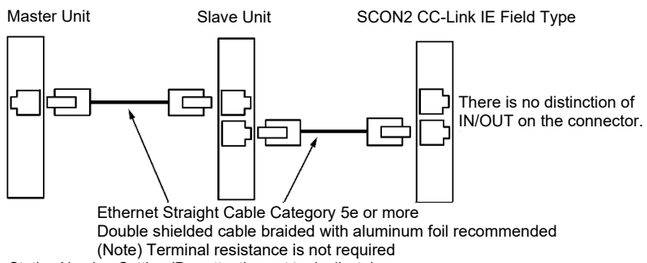
Connector Name	CC-Link IE Field Connector	Remarks
Cable Side	Ethernet ANSI/TIA/EIA-568-B Category 5e and above 8P8C modular plug equipped with shield (RJ-45)	It is to be prepared by the customer.
Controller Side	Ethernet ANSI/TIA/EIA-568-B Category 5e and above 8P8C modular Jack equipped with shield (RJ-45)	

Pin No.	Signal Name	Contents	Applicable cable diameter
1	TP0+	Data 0+	It is recommended to prepare a straight STP cable in Category 5e or above for the Ethernet cable.
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-	

- Status LED

LED	Color	Illumination Status	Explanation
NS	Green: D LINK	Steady Light	Cyclic transmission in process
		Blinking	Cyclic transmission paused
		Off	Cyclic transmission not conducted, parallel off, Power not supplied
	Red: L ERR	Steady Light	Received data in error
		Off	Received data in normal conditions, Power not supplied
MS	Green: RUN	Steady Light	Operation in normal conditions
		Off	Hardware error occurred, Power not supplied
	Red: ERR	Steady Light	Error being occurred (Node Error / Station Number Setting Error)
		Off	Operation in normal conditions, Power not supplied
LINK	Green	Steady Light	Linkup in process
		Off	Link-down in process, Power not supplied
L.ER	Orange	Steady Light	Received data in error
		Off	Received data in normal conditions, Power not supplied

- Wiring

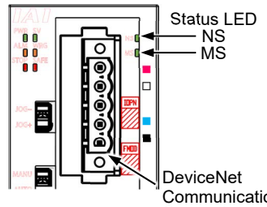


- Station Number Setting (Pay attention not to duplicate)
  Station number is set with parameter.
  Set Parameter No. 85 “Fieldbus Node Address” with using the PC teaching software.
  Available range for Setting : 1 to 120 (setting at delivery : 1)
- Operation Mode Setting and Address Assignment
  The operation mode is set using the parameters.
  Set the parameter No.84 “Fieldbus Operation Mode” using the Teaching tool.
  Refer to [SCON2 Field Network Instruction Manual (ME0469)] for details.

(Note) Reboot the power supply to the controller after parameter setting, and make sure to set the mode toggle switch on the front panel of the controller to the AUTO side.

DeviceNet

- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Interface Area



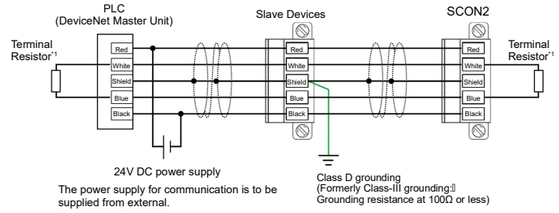
- Station Number Setting (Pay attention not to duplicate)
  Station number is set with parameter.
  Set Parameter No. 85 “Fieldbus Node Address” with using the Teaching tool.
  Available range for Setting : 0 to 63 (setting at delivery : 63)
- Baud Rate Setting
  The setting for the communication speed is not required because it automatically follows the master’s communication speed.

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

- Operation Mode Setting and Address Assignment
  Please refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Status LED

LED	Color	Illumination Status	Explanation
NS	Green	Steady Light	Connection is established and the communication under normal condition.
		Blinking	Online but network connection is not yet established. Communication Stop. (Network is normal)
	Orange	Steady Light	Node address is duplicated or Busoff is detected. Communication Unavailable.
		Blinking	Communication Error. (Communication Time-out Detection)
	-	Off	The machine is not on-line. The power to the DeviceNet is not supplied.
MS	Green	Steady Light	The machine is in the normal operation.
		Blinking	Hardware Error. It might be recovered with reconnect of the power.
	Orange	Steady Light	Hardware Error. The replacement of the board is required.
		Blinking	It is a minor error such as a user setting error or configuration error. It can be recovered by re-setting, etc.
	-	Off	The DeviceNet is being initialized, or the power is not supplied.

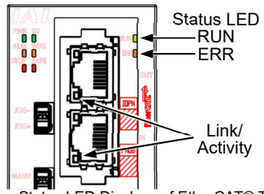
- Wiring



* The terminal resistor should be 121Ω. It is not enclosed in SCON2.

EtherCAT®/EtherCAT Motion

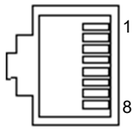
- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)], [SCON2 EtherCAT Motion Instruction Manual (ME0472)]
- Interface Area



- Status LED Displays of EtherCAT® Type

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

- EtherCAT® Connector



RJ-45 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

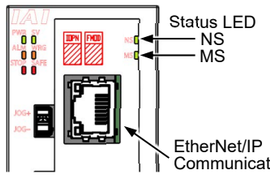
- Operation Mode Setting and Address Assignment
  The operation mode is set using the parameters.
  Set the mode change switch on the controller front panel to “MANU” side and set the parameter No. 84 “Field Bus Operation Mode” using the teaching tool. Refer to the [Instruction Manual] for the details
- Node address setting
  The node address should be determined by setting StationAlias on the master side.
- Baud Rate 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) Reboot the power supply to the controller after parameter setting, and make sure to set the mode toggle switch on the front panel of the controller to the AUTO side.

* There is no need of setting Parameter No. 84 for the EtherCAT motion connection type.

EtherNet/IP

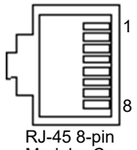
- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Interface Area



- Status LED Displays of EtherNet/IP Type

Name	Indication Color	Explanation	
NS	OFF	Power is OFF or IP addresses are not set	
	Green (Illuminating)	Connection is established and the communication under normal condition.	
	Green (Flashing)	Online but network connection is not yet established. Communication Stop (Network is normal). Check the conditions of master unit.	
	Orange (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.
	Orange (Flashing)	Communication Error. (Communication Time-out Detection)	
MS	OFF	Power OFF	
	Green (Illuminating)	The machine is in the normal operation. The machine is under the control of the scanner (master)	
	Green (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.	
	Orange (Illuminating)	Hardware Error. The replacement of the board is required. Please contact us.	
	Orange (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



RJ-45 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

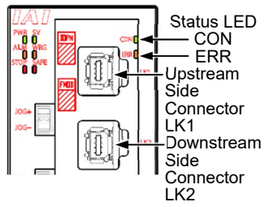
- Operation Mode Setting and Address Assignment
  The operation mode is set using the parameters.
  Set the mode change switch on the controller front panel to “MANU” side and set the parameter No. 84 “Field Bus Operation Mode” using the teaching tool.
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)] for details
- Baud Rate 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 “Fieldbus Communication Speed” using the teaching tool. Refer to the [SCON2 Field Network Instruction Manual (ME0469)] for details
- IP Address Setting
  IP Address can be set with the parameter.
  Set the parameter No. 140 “IP Address” using the teaching tool.
  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 “Subnet Mask” using the teaching tool.
  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 “Default Gateway” using the teaching tool.
  Settable Range : 0.0.0.0 to 255.255.255.255 (It is set to “192.168.0.0” when the machine is delivered from the factory.)

(Note) Reboot the power supply to the controller after parameter setting, and make sure to set the mode toggle switch on the front panel of the controller to the AUTO side.

MECHATROLINK-Ⅲ

MECHATROLINK-Ⅲ is applicable for the standard I/O profile and the standard servo profile. When the standard servo profile is to be used, select the functional option “M”.

- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)], [SCON2 MECHATROLINK-Ⅲ Instruction Manual (ME0471)]
- Interface Area



- Node address setting
  Node address can be set with the parameter.
  Set Parameter No. 85 “Fieldbus Node Address” with using the Teaching tool.
  Available range for Setting : 3 to 239 [hex] (setting at delivery : 3)
- Data Length Setting
  Establish the setting in Parameter No. 86 “Fieldbus Communication Speed” in Teaching tool considering the data length to be used.

• For Remote I/O

Setting Value	Data Length	Baud Rate
0	16 bytes	100Mbps
1	32 bytes	
2 (at the delivery)	48 bytes	

• For Motion Type

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

- Electronic Gear Ratio Setting

Set the electronic gear numerator in Parameter No. 65 “Electronic Gear Numerator” and the electronic gear denominator in No. 66 “Electronic Gear Denominator” in the Teaching tool.
Establish the settings to satisfy the following condition:

$$\frac{\text{Stroke (mm)}}{\text{Ball Screw Lead Length (mm)}} \times \text{No. of Encoder Pulses} \times \frac{\text{Electronic Gear Ratio Denominator}}{\text{Electronic Gear Ratio Numerator}} \leqq 2^{31}$$

- Pulse Count Direction Setting

Set the value in Parameter No. 62 “Pulse Count Direction” to be the same as what is set in No. 5 “Home-Return Direction” in the Teaching tool.

(Note) After the parameter setting, cycle the control power, and return the mode toggle switch on the front of the controller to “AUTO” side.

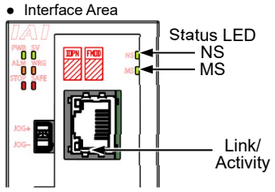
- Status LED

LED	Color	Illumination Status	Explanation
CON	Green	Steady Light	Receiving CONNECT (connected to master)
	-	Off	Connection is not established to master
ERR	Orange	Steady Light	Illumination flashes when communication alarm or command alarm is generated (warning excepted). Illumination turned off when alarm is cancelled
	-	Off	In normal condition (no alarm generated)
LK1	Green	Steady Light	Illumination turns on when physically connected to another device applicable for MECHATROLINK-Ⅲ (for cable breakage check purpose)
LK2	Green	Steady Light	

- Wiring
  Connect the dedicated cable for MECHATROLINK.

PROFINET IO

- Specification
  Refer to the [SCON2 Field Network Instruction Manual (ME0469)]
- Interface Area

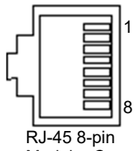


- Status LED Displays of PROFINET IO Type

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

- PROFINET IO Connector



RJ-45 8-pin
Modular Connector
(Controller Side)

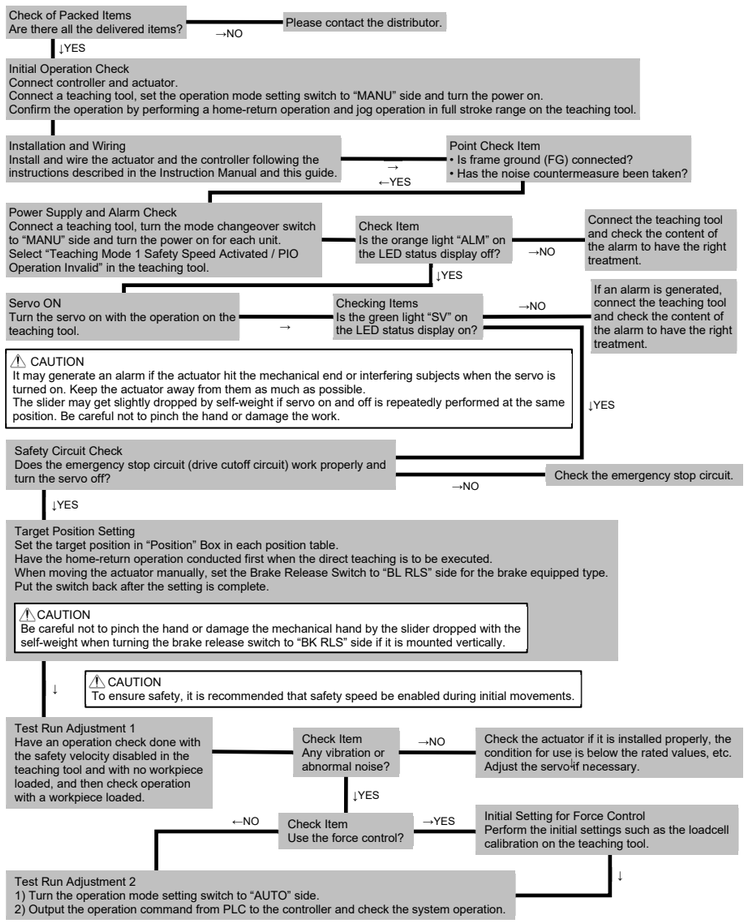
Pin No.	Signal Name	Abbreviated Code
1	Data sending+	TD+
2	Data sending-	TD-
3	Data receiving+	RD+
4	Not used	
5	Not used	
6	Data receiving-	RD-
7	Not used	
8	Not used	
Connector Hood	Security grounding	FG

- Operation Mode Setting and Address Assignment
  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 “Field Bus Operation Mode” using the teaching tool. Refer to the [SCON2 Field Network Instruction Manual (ME0469)] for the details.
- Baud Rate 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) Reboot the power supply to the controller after parameter setting, and make sure to set the mode toggle switch on the front panel of the controller to the AUTO side.

Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below. “PC” stated in this section means “IA-OS”.
* Refer to instruction manuals for the servo-press type and R-Unit Connection Type for startup.



● Action to Take When Error Occurred

It is an alarm that may occur during startup. Have an appropriate treatment following the instructions below.
Please refer to the Instruction Manual for other alarms.

Error Code	Error Description	Cause and Treatment
069	Real Time Clock Operation Stop Detection	It indicates the calendar function has stopped and the current time data has lost. Have the clock settings again from the teaching tool.
0A5	Electromagnetic Brake Release Failure Error	Brake could not be released for the electromagnetic brake equipped type. Check the 24V power supply for electromagnetic brake.
0CF	I/O 24V Power Supply Error	An error is occurred in 24V power supply for PIO. Check the voltage of the 24V power supply for PIO.
0E5	Encoder Receive Error	This error code appears when the right signal was not received from the encoder side to the controller command. Check if any wire breakage on a connector and the condition of wire connections. If no error is generated under the condition that the power to all the peripheral equipment is shut and operate only this controller and the actuator, noise can be considered as the cause of the problem.
0E7	A-, B- and Z-Phases Breakage Error	It is the condition that the encoder signal is not properly detected. Check if any wire breakage on a connector and the condition of wire connections.
0EE	Absolute Encoder Error Detection 2	This error code appears when the absolute encoder PCB cannot detect the position information properly. The voltage for the absolute data battery is dropped. Check the battery alarm output on PIO, and if it is OFF, replace the battery. Perform Absolute Reset after the replacement. Check the encoder cable connection.
20A	Servo OFF While in Operation	It shows the operation command was generated in the condition that the servo is OFF. Resume the operation after turning the servo ON.

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Quality and Innovation

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