

X-SEL Controller P/Q Type

First Step Guide Ninth Edition

Controller for Single-Axis Robots and Cartesian Robots: XSEL-P/Q/PCT/QCT

Controller for SCARA robot: XSEL-PX/QX

DeviceNet, CC-Link, PROFIBUS, EtherNet/IP

Thank you for purchasing our product.

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

Warning : Read the instruction manual carefully and follow the instruction manual when handling this equipment. Please download the user's manual from our website. You can download it free of charge. User registration is required for first time users.
URL: www.iai-robot.co.jp/data_d/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.

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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 (Options are excluded.)

No.	Part Name	Model	P/PCT	PX	Q/QCT	QX
1	Controller	Refer to "How to read the model plate" and "How to read the model of the controller".				
Accessories						
2	I/O Flat cable	CB-X-PIO*** ***indicates the cable length	○	○	○	○
3	Battery for the Absolute Data Maintenance	AB-5	○	○	○	○
4	System I/O plug	FMC1.5/9-ST-3.5 2 Units (Maker : PHOENIX CONTACT)	○	○	○	○
5	AC Power Supply plug	GMSTB2.5/6-STF-7.62 (Maker : PHOENIX CONTACT)	○	○	○	○
6	Brake Power Input Plug*1	MC1.5/2-ST-3.5 (Maker : PHOENIX CONTACT)	○	○	○	○
7	Dummy Plug	DP-1	×	×	○	○
8	For DeviceNet specification	SMSTB2.5/5-ST-5.08AU (Maker : PHOENIX CONTACT) Terminal Resistance : 121Ω	○	○	○	○
9	For CC-Link specification	MSTB2.5/5-ST-5.08AU (Maker : PHOENIX CONTACT) Terminal Resistance : 130Ω/12W for FANC-SBH cable 110Ω/12W for FANC-SB cable	○	○	○	○
10	First Step Guide	ME0230	○	○	○	○
11	Safety Guide	MO194	○	○	○	○

*1 This is attached in the case of the unit with the brake.

2. Teaching Tool (Option)

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

No.	Part Name	Model	Applicable Controller			
			P/PCT	PX	Q/QCT	QX
1	PC Software (with RS232C Cable + Emergency Stop Box)	IA-101-X-MW	○	○	×	×
2	PC Software (with USB Conversion Adapter + RS232C Cable + Emergency Stop Box)	IA-101-X-USBMW	○	○	×	×
3	PC Software (with the cable complying with Safety Category Class 4 specifications + the Emergency Stop Box)	IA-101-XA-MW	×	×	○	○
4	Teaching pendant	SEL-T	○	○	○	○
5	Teaching pendant (with deadman switch)	SEL-TD	○	○	○	○
6	Teaching pendant (with deadman switch + TP adapter (IA-LB-TG))	SEL-TG	○	○	○	○
7	Teaching pendant	IA-T-X	○	○	×	×
8	Teaching pendant (with deadman switch)	IA-T-XD	○	○	×	×

3. Operation manuals related to this product

No.	Name	Manual No.
1	XSEL-P/Q/PCT/QCT Controller Operation Manual	ME0148
2	XSEL-PX/QX Controller Operation Manual	ME0152
3	XSEL Controller P/Q/PX/QX RC Gateway Function Operation Manual	ME0188
4	XSEL-P/Q Controller Electronic Cam Control System Operation Manual	ME0246
5	PC software IA-101-X-MW/ IA-101-X-USBMW Operation Manual	ME0154
6	Teaching pendant SEL-T/TD Operation Manual	ME0183
7	Teaching pendant IA-T-X/XD Operation Manual	ME0160
8	DeviceNet Operation Manual	ME0124
9	CC-Link Operation Manual	ME0123
10	PROFIBUS-DP Operation Manual	ME0153
11	Ethernet Operation Manual (including Ethernet/IP)	ME0140

4. How to read the model plate

- Those with UL/cUL mark in the name plate are complied with UL/cUL standards. Refer to the instruction manual for detail.

Model	MODEL XSEL-Q-4-100I-100I-200I-200I-N1-EEE-2-3
Serial number	S/N 800004119
UL/cUL marking	INPUT : 3φ, 200-230V, 50/60Hz, 25A (F.L.C) OUTPUT : 3φ, 0-230V, 0-333Hz, 5A (1Axis)
	CE  MADE IN JAPAN

5. How to read the model of the controller
Controller for Single-Axis actuator and Cartesian actuator XSEL-P/Q,
Controller for High-Speed Orthogonal Actuator (CT4) XSEL-PCT/QCT

<u>XSEL</u>	<u>-</u>	<u>P</u>	<u>-</u>	<u>3</u>	<u>-</u>	<u>400A</u>	<u>-</u>	<u>200ACL</u>	<u>-</u>	<u>60ABL</u>	<u>-</u>	<u>DV</u>	<u>-</u>	<u>N1</u>	<u>-</u>	<u>EEE</u>	<u>-</u>	<u>2</u>	<u>-</u>	<u>3</u>
①		②		③		④ (Axis 1)		④ (Axis 2)		④ (Axis 3)		⑤		⑥		⑦		⑧		⑨

Model table

① Series	② Controller type	③ *4 Number of axes	④ Details of axis 1 to axis 6 *2, *3							⑤ Network (Dedicated Slot)	⑥ Standard I/O (Slot 1)	⑦ Expansion I/O slots			⑧ I/O Flat cable length	⑨ Power- supply voltage
			Motor Output	Encoder type	Brake	Creep	High Accel/ Decel Specifi- cations	Home Sensor (LS)	Synchro- nization Designa- tion			Slot 2	Slot 3	Slot 4		
XSEL	P (Standard)	1 (1-axis)	12 (12W) 20 (20W) 30D (30W for RS2)	WAI (Battery- less absolute / Incre- mental)	Not Specified (w/o brake)	Not Specified (w/o creep)	Not Specified (Standard type)	Not Specified (w/o home sensor)	Not Specified (No synchro- nization)	Not Specified (w/o network)	E (Not used)	E (Not used)	E (Not used)	E (Not used)	2 : 2m (Standard)	2 (Single- phase 200V)
	Q*1 (Complying with Safety Category)	2 (2-axis)	30R (30W for RS)								DV (DeviceNet 256/256 board)	N1 Expansion I/O (NPN32/16)	N1 Expansion I/O (NPN32/16)	N1 Expansion I/O (NPN32/16)		
	2 (2-axis)	60 (60W)	CC (CC-Link 256/256 board)								N2 Expansion I/O (NPN16/32)	N2 Expansion I/O (NPN16/32)	N2 Expansion I/O (NPN16/32)			
	3 (3-axis)	100 (100W)	PR (PROFIBUS 256/256 board)								N3 Expansion I/O (NPN48/48)	N3 Expansion I/O (NPN48/48)	N3 Expansion I/O (NPN48/48)			
	4 (4-axis)	150 (150W) 200 (200W)	ET (Ethernet Data communication board)								P1 Expansion I/O (PNP32/16)	P1 Expansion I/O (PNP32/16)	P1 Expansion I/O (PNP32/16)			
	5 (5-axis)	300 (300W) 400 (400W) 600 (600W) 750 (750W) 1000 (1000W)	S (Slave- axis designa- tion)								P2 Expansion I/O (PNP16/32)	P2 Expansion I/O (PNP16/32)	P2 Expansion I/O (PNP16/32)			
	6 (6-axis)		A (Absolute)	B (w/ brake)	C (w/ creep)	HA (High Accel/ Decel type)	L (w/ home sensor)		EP (EtherNet/IP 256/256 board)	P3 Expansion I/O (PNP48/48)	P3 Expansion I/O (PNP48/48)	P3 Expansion I/O (PNP48/48)	P3 Expansion I/O (PNP48/48)			
											MC Pulse I/O Board	MC Pulse I/O Board	MC Pulse I/O Board			
											S*4 (With the Expanded I/O Base)	S*5 (With the Expanded I/O Base)	S*5 (With the Expanded I/O Base)			

*1 In this type, the safety circuit can be configured with the motor driving power source separated.

*2 Any of the RCS2-R**7 series, RCS-RB75 series unit, RCS-G20, RCS-R* or the linear motor actuator (LSA) is not connected to the No. 5 axis or No. 6 axis.

*3 Because the one axis of the large size linear actuator (W21H□) with high thrust, uses as much space as that used by two axes of the usual type, take care about the number of axes being used.

*4 ③ shows the number of connected axes regardless of the above *3.

*5 "S" shows the case where the expanded I/O is not used at first but added later. In this case, the expanded I/O base uses the empty slot.

Controller for SCARA robot XSEL-PX, QX

<u>XSEL</u>	<u>-</u>	<u>PX6</u>	<u>-</u>	<u>NNN5020</u>	<u>-</u>	<u>750AL</u>	<u>-</u>	<u>750ABL</u>	<u>-</u>	<u>DV</u>	<u>-</u>	<u>N1</u>	<u>-</u>	<u>EEE</u>	<u>-</u>	<u>2</u>	<u>-</u>	<u>3</u>
①		②		③		④		⑤		⑥		⑦		⑧		⑨		⑩

Model table

① Series	② Controller type	③ IX Robot Model	④, ⑤ Details of axis 5 to axis 6*2, *3						⑥ Network (Dedicated Slot)	⑦ Standard I/O (Slot 1)	⑧ Expansion I/O slots			⑨ I/O Flat cable length	⑩ Power supply voltage	
			Motor Output	Encoder type	Brake	Creep	HighAccel Decel Specifi- cations	Home Sensor (LS)			Synchro- nization Designa- tion	Slot 2	Slot 3			Slot 4
XSEL		NNN1205/1505/1805 NNN3515(H)/2515(H) NNN50□□(H)/60□□(H) /70□□(H)/80□□(H) (Standard type)								E (Not used)	E (Not used)	E (Not used)	E (Not used)			
	PX4 (Large capacity 4-axis type)	NNN1205B/1505B/1805B (Standard type with the brake (option))	20 (20W)						Not Specified (w/o network)	N1 32 inputs/ 16 outputs (NPN board)	N1 Expansion I/O (NPN32/16)	N1 Expansion I/O (NPN32/16)	N1 Expansion I/O (NPN32/16)			
	PX5 (Large capacity 5-axis type)	NNN5015(H)/6016(H) (High-speed type)	30D (30W for RS2) 30R						DV DeviceNet 256/256 board	N2 16 inputs/ 32 outputs (NPN board)	N2 Expansion I/O (NPN16/32)	N2 Expansion I/O (NPN16/32)	N2 Expansion I/O (NPN16/32)			
	PX6 (Large capacity 6-axis type)	NNW3515(H)/2515(H) NNW50□□(H)/60□□(H) /70□□(H)/80□□(H) (Dustproof/Splash proof type)	30W for RS) 60 (60W) 100 (100W) 150 (150W) 200 (200W)	WAI (Battery- less absolute / Incremen- tal)	Not Specified (w/o brake)	Not Specified (w/o creep)	Not Specified (Stand- ard type)	Not Specified (w/o home sensor)	No synchroni- zation)	N3 48 inputs/ 48 outputs (NPN board)	N3 Multipoint I/O (NPN48/48)	N3 Multipoint I/O (NPN48/48)	N3 Multipoint I/O (NPN48/48)	2 : 2m (Standard)	2 (Single phase 200V)	
	QX4*1 (4-axis type complying with Safety Category Specifications)	TNN(UNN)3515(H) /2515(H) (Wall-mount type, Wall-mount Inverse type)	300 (300W) 400 (400W) 600 (600W) 750 (750W)		B (w/ brake)	C (w/ creep)	HA (High Accel Decel type)	L (w/ home sensor)	M Master-axis designa- tion)	P1 32 inputs/ 16 outputs (PNP board)	P1 Expansion I/O (PNP32/16)	P1 Expansion I/O (PNP32/16)	P1 Expansion I/O (PNP32/16)	3 : 3m	3 (3-phase 200V)	
	QX5*1 (5-axis type complying with Safety Category Specifications)	HNN(INN)50□□(H) /60□□(H)/70□□(H) /80□□(H) (Ceiling-mount type, Ceiling-mount Inverse type)	300 (300W) 400 (400W) 600 (600W) 750 (750W)	A (Absolute)					S (Slave-axis designa- tion)	P2 16 inputs/ 32 outputs (PNP board)	P2 Expansion I/O (PNP16/32)	P2 Expansion I/O (PNP16/32)	P2 Expansion I/O (PNP16/32)	5 : 5m	3 (3-phase 200V)	
	QX6*1 (6-axis type complying with Safety Category Specifications)	NNC1205/1505/1805 NNC3515(H)/2515(H) NNC50□□(H)/60□□(H) /70□□(H)/80□□(H) (Clean room type)								P3 48 inputs/ 48 outputs (PNP board)	P3 Expansion I/O (PNP48/48)	P3 Expansion I/O (PNP48/48)	P3 Expansion I/O (PNP48/48)	0 : None	3 (3-phase 200V)	
		NNN1205B/1505B/1805B (Clean type with the brake (option))								EP EtherNet/IP 256/256 board						
											S*4 (With the Expanded I/O Base)	S*4 (With the Expanded I/O Base)	S*4 (With the Expanded I/O Base)			

*1 In this type, the safety circuit can be configured with the motor driving power source separated.

*2 The maximum number of the added axes is shown in the following table.

Type	Model	Maximum number of the added axes	
		3-phase 200V design	Single-phase 200V Type
Standard type	NNN1205/1505/1805 NNN3515/2515 NNN50□□/60□□	2	2 However, the total motor wattage including that for the SCARA robot should be up to 1600 W.
Standard type with brake (Option)	NNN1205B/1505B/1805B		
Dustproof/Splash proof type	NNN3515/2515 NNN50□□/60□□		
Wall-mount type, Wall-mount Inverse type	TNN(UNN)3515/2515		
Ceiling-mount type, Ceiling-mount Inverse type	HNN(INN)50□□/60□□		
Clean room type	NNC1205/1505/1805 NNC3515/2515 NNC50□□/60□□	1	0
Clean room type with brake (Option)	NNN1205B/1505B/1805B		
Standard type	NNN70□□/80□□		
Dustproof/Splash proof type	NNN70□□/80□□		
Ceiling-mount type, Ceiling-mount Inverse type	HNN(INN)70□□/80□□		
Clean room type	NNC70□□/80□□	0	0
High-speed type	NSN5016/6016		

*3 Any of the RCS2-R**7 series, RCS-RB75 series unit, RCS-G20, RCS-R* or the linear motor actuator (LSA) is not connected to the No. 5 axis or No. 6 axis.

*4 "S" shows the case where the expanded I/O is not used at first but added later. In this case, the expanded I/O base uses the empty slot.

*5 No H on end of the model code: current products, With H on end: new releases (applicable for high-speed type)

Basic Specifications

Specifications

Specification Item		XSEL-P/PCT	XSEL-PX	XSEL-Q/QCT	XSEL-QX
Max. No. of Connectable Axes*1, *2		6-axis	A maximum of 2-axis, are added to 4-axis for the SCARA Robot.*2	6-axis	A maximum of 2-axis, are added to 4-axis for the SCARA Robot.*2
Max. Connected Axis Output*5	Single-phase type	1600W			
	3-phase type	2400W			
Control Power Capacity		Single-phase 200VAC to 230V ±10%			
Motor Driving Source Voltage	Single-phase type	Single-phase 200VAC to 230V ±10%			
	3-phase type	3-phase 200VAC to 230V ±10%			
Power supply frequency		50Hz/60Hz			
Rush current*3	Control Power Supply	50A			
	Less than 1200W of Motor Driving Power Supply	60A (Max)			
	1200W or more of Motor Driving Power Supply	120A (Max)			
Leakage Current*3 (Excluding Higher Harmonic Component)	Control Power Supply	0.4mA		0.2mA	
	Motor Driving Power Supply	2mA or less			
Momentary Power Interruption Tolerance		50Hz : 10msec, 60Hz : 8msec			
Insulation Strength		10MΩ or more (Between power terminal and I/O terminal and also all external terminals and case at the power supply of 500VDC)			
Insulation Resistance		1500VAC for 1 min (actuator the time of connection 1000VAC for 1min.)			
Axis Control System		AC Full -digital Servo			
Position detection method		Incremental Encoder or Absolute Encoder			
Battery for Backup		For Absolute Date Backup : AB-5 manufactured by our company For System Memory Backup : CR2032 manufactured by Toshiba Battery			
Program language		Super SEL language			
Max. Number of program steps		9999 steps			
Max. Number of position		20000 positions			
Max. Number of programs		128 programs			
Max. Number of multitask programs		16 programs			
Data storage device		Flash ROM + SRAM battery backup			
Data input method		Teaching pendant or PC software			
Standard I/O Interface		32 Input Points (Total of Dedicated Input Points + Universal Input Points) 16 Output Points (Total of Dedicated Output Points + Universal Output Points) 16 Input Points (Total of Dedicated Input Points + Universal Input Points) 32 Output Points (Total of Dedicated Output Points + Universal Output Points)			
Expanded I/O Interface		(Refer to the Item describing How to read the model of the controller)			
Teaching Port RS232C(Special Protocol)		D-sub25 pin			
Serial communication function RS232C	Port 1	D-sub9 pin			
	Port 2	D-sub9 pin (Connector in using the RC gateway function)			
Serial communication cable length		RS232C 15m or less			
System I/O		Various safety circuit I/O including the emergency stop input, safety gate input, system ready output, etc.			
Protective functions		Motor overcurrent, overload, motor driver temperature check, overload check, encoder open circuit detection, soft limit over, system abnormality, battery abnormality etc.			
Drive-source cutoff method		Internal relay		External Safety Circuit	
Environ-ment	Surrounding air temperature	0 to +40°C			
	Surrounding humidity	10% to 95% RH (non-condensing)			
	Surrounding environment	(Refer to Installation Environment)			
	Surrounding storage temperature	-25 to 70°C			
	Surrounding storage humidity	10% to 95% RH (non-condensing)			
	Vibration resistance	10 to 57Hz in XYZ directions/Pulsating amplitude 0.035mm (continuous), 0.075mm (intermittent) 57 to 150Hz 4.9m/s ² (continuous) 9.8m/s ² (intermittent)			
	Pollution degree	Pollution degree 2			
Protection class		IP20			
Cooling method		Forced air-cooling			
Weight	Axis 1 to axis 4 : 5.2kg		Axis 1 to axis 4 : 4.5kg		
	Axis 5 to axis 6 : 5.7kg		Axis 5 to axis 6 : 5.0kg		
External dimensions		(Refer to the Item for the External Dimensions)			

1. P/Q/PCT/QCT Type

[Power Capacity and Heating Value]

Rated Power Capacity [VA] = Motor Drive Power Supply [VA] *1 + Control Power Capacity [VA] *2

Heating Value [W] = Sum Total of Output Loss [W] *3 + (Inner Power Demand [VA] *4 × 0.7 (Efficiency) × 0.6 (Power Factor))

*1 For the Motor Drive Power Factor [VA], select it from Table 1. However, the Motor Drive Power in acceleration or deceleration reaches a maximum of three times or more than the normal value (Motor wattage of 600W: In the case of 700W, it reaches a maximum of two times more than the normal value).

*2 For the Control Power Capacity [VA], select the components which are being placed, from the column of "Control Power (Internal Consumption, External Consumption) in Table 2 and calculate it using the formula "Power × Quantity of the Placement Component".

*3 For the Total Output Loss [W], select the output losses for all the actuators to be connected from the Table 1 and calculate it.

*4 For the inner power demand (VA) for calculating the heating value (W) in the control unit, select the components which are being placed, from the columns of Control Power Supply (Internal Consumption) and External Power Supply (Internal Consumption) in Table 2 and calculate it using the formula "Power × Quantity of the Placement Component".

Table1 : Motor Drive Power Factor and Output Loss (for P/Q/PCT/QCT Type)

Actuator Motor Capacity [W]	Motor Drive Power Factor [VA]	Output Loss [W]
20	26	1.58
30	46	2.07
60	138	3.39
60(RCS3-CT8C-□-60)	197	3.6
100	234	6.12
150	328	8.30
200	421	9.12
400	796	19.76
400(RCS3-CT8C-□-400)	1230	18.0
600	1164	27.20
750	1521	29.77
100 (Linear Actuator S6SS)	101	3.74
100 (Linear Actuator S8SS)	159	4.07
100 (Linear Actuator S8HS)	216	3.84
200 (Linear Actuator S10SS)	343	5.35
200 (Linear Actuator S10HS)	417	5.01
200 (Linear Actuator H8SS)	189	5.38
200 (Linear Actuator H8HS)	376	5.38
200 (Linear Actuator L15SS)	189	5.38
300 (Linear Actuator N19SS)	662	11.58
400 (Linear Actuator W21SS)	920	16.68
1000 (Linear Actuator W21HS)	1581	36.50
DD Motor	1462	20.8

Table2 : Power Demand (for P/Q/PCT/QCT Type) in the Control Unit

		Control Power Supply		External Power Source		Quantity
		Internal Consumption [VA]	External Consumption [VA]	Internal Consumption [VA]	External Consumption [VA]	
Base Unit		31.4				1
Driver	Per board	6.26				1 to 3*5
	Encoder Unit	2.38	3.57			1 to 6
Axis Sensor		5.71				0 to 6
Fan Unit	Per fan	4.57				3 to 6*6
	DIO card	5.95		14.52		0 to 4
Network Module	DIO (48 points)	8.33		26.81		0 to 4
	DIO (96 points)	8.33		26.81		0 to 4
	DeviceNet	2.38		1.71		0 to 1
	CC-Link	2.38		1.19		0 to 1
	PROFIBUS-DP	4.17				0 to 1
Teaching pendant	Ethernet	5.36				0 to 1
	IA-T-X, XD		3.57			0 to 1
	SEL-T, TD		6.67			0 to 1
Brake	Per axis			5.95	13.81	0 to 1
	CT4 Pick & Rotary Axis			5.95	4 (max)	1

*5 One axis of the large size linear actuator (W21H□) with high thrust uses as much space as that used by two axes of the usual type. One axis uses one driver board.

*6 The quantity of fan to be used is shown in the following table.

		P-type Quantity to be used	Q-type Quantity to be used
Axis 1 to axis 4	Expanded I/O Absent	4	3
	Expanded I/O Present	5	4
Axis 5 to axis 6	Expanded I/O Absent	5	4
	Expanded I/O Present	6	5

*7 Dedicated for CT4 Pick & Rotary Axis: Supply 24V DC to the supplemental power input connector on the front panel of the controller.

2. PX/QX Type

[Power Capacity and Heating Value]

Rated Power Capacity [VA] = Motor Drive Power Supply [VA] *1 for the SCARA robot + Motor Drive Power Supply [W] *1 for the Added Axis + Control Power Capacity [VA] *2

Heating Value [W] = Sum Total of Output Loss [W] *3 + (Inner Power Demand [VA] *4 × 0.7 (Efficiency) × 0.6 (Power Factor))

*1 For the Motor Drive Power Factor [W] for the SCARA robot and added axis, select them from Table 3. However, the Motor Drive Power Factor in acceleration or deceleration reaches a maximum of three times more than the normal value.

*2 For the Control Power Capacity [VA], select the components which are being placed, from the column of "Control Power (Internal Consumption, External Consumption) in Table 4 and calculate it using the formula "Power × Quantity of the Placement Component".

*3 For the Total Output Loss [W], select the output losses for all the actuators to be connected from the Table 3 and calculate it.

*4 For the inner power demand (VA) for calculating the heating value (W) in the control unit, select the components which are being placed, from the columns of Control Power Supply (Internal Consumption) and External Power Supply (Internal Consumption) in Table 4 and calculate it using the formula "Power × Quantity of the Placement Component".

Table3 : Motor Drive Power Factor and Output Loss (for PX/QX Type)

SCARA Robot Type and Added Axis Actuator Capacity [W]		Motor Drive Power Factor [VA]	Output Loss [W]
SCARA Robot	NN□1205/1505/1805	216.3	8.13
	□N□2515/3515, □NN3015	1118	24.75
	□N□50□□/60□□	1963	44.12
	□N□70□□/80□□	3625	78.41
	NSN5016/6016	3228	72.21
	NN□2515H/3515H TNN3015H/3515H UNN3015H/3515H	1863.1	44.8
	NN□50□□H/60□□H HNN5020H/6020H INN5020H/6020H	3696.7	69.7
	NN□70□□H/80□□H HNN7020H/8020H INN7020H/8020H	6467.7	93.2
	NSN5016H/6016H	6838.1	95.2
	Added Axis		
Added Axis	20	26	1.58
	30	46	2.07
	60	138	3.39
	100	234	6.12
	150	328	8.30
	200	421	9.12
	400	796	19.76
	600	1164	27.20
	750	1521	29.77

Table4 : Power Demand in the Control Unit (for PX/QX Type)

		Control Power Supply		External Power Source		Quantity
		Internal Consumption [VA]	External Consumption [VA]	Internal Consumption [VA]	External Consumption [VA]	
Base Unit		31.4				1
Driver	Per board	6.26				2 to 3*5
	Encoder Unit	2.38	3.57			4 to 6
Axis Sensor for the Added Axis		5.71				0 to 2
Fan Unit	Per fan	4.57				3 to 6*6
	DIO card	5.95		14.52		0 to 4
DIO card	DIO (48 points)	8.33		26.81		0 to 4
	DIO (96 points)	8.33		26.81		0 to 4
	DeviceNet	2.38		1.71		0 to 1
	CC-Link	2.38		1.19		0 to 1
Network Module	PROFIBUS-DP	4.17				0 to 1
	Ethernet	5.36				0 to 1
	IA-T-X, XD		3.57			0 to 1
Teaching pendant	SEL-T, TD		6.67			0 to 1
	Per axis			5.95	13.81	0 to 4*7

*5 The driver board quantity to be used is shown in the following table.

	Quantity
NN□1205/1505/1805	2
□N□2515(H)/3515(H) □NN3015(H)	2
□N□50□□(H)/60□□(H)	2
□N□70□□(H)/80□□(H)	3
NSN5016(H)/6016(H)	3

When any axis is to be added to the controller of the SCARA robot except for □N□70□□/80□□ and NSN5016/6016, one more board is added to the driver board.

*6 The fan quantity to be used is shown in the following table.

		P Type	Q Type
SCARA Robot without Added Axis	Expanded I/O Absent	4	3
	Expanded I/O Present	5	4
SCARA Robot with Added Axis	Expanded I/O Absent	5	4
	Expanded I/O Present	6	5

*7 The number of brakes is shown in the following table.

	Quantity
NN□1205/1505/1805	1 (In the case of option attached)
□N□2515(H)/3515(H) □NN3015(H)	1
□N□50□□(H)/60□□(H)	2
□N□70□□(H)/80□□(H)	2
NSN5016(H)/6016(H)	2

External Dimensions

Controller Specifications	Single Axis/ Cartesian-type Robots	Encoder/ Brake	Incremental Type		Absolute Type		Incremental Type		Absolute Type	
		I/O	None	Present	None	Present	None	Present		
			Only for Standard Type	Only for Standard Type	Standard + Expansion	Standard + Expansion				
SCARA robot	Brake	IX-NNN1205/1505/1805 Standard type (w/o brake)	IX-NNN 1205/1505/1805 Model except for Standard type (w/o brake)		IX-NNN 1205/1505/1805 Standard type (w/o brake)		IX-NNN 1205/1505/1805 Model except for Standard type (w/o brake)			
	I/O	Only for Standard Type	Only for Standard Type		Standard + Expansion		Standard + Expansion			
P Type PX Type PCT Type	Single Axis/ Cartesian-type Robots Axis 1 to axis 4									
	SCARA robot added axis absent									
Q Type QX Type QCT Type	Single Axis/ Cartesian-type Robots Axis 5 to axis 6									
	SCARA robot added axis present									
Q Type QX Type QCT Type	Single Axis/ Cartesian-type Robots Axis 1 to axis 4									
	SCARA robot added axis absent									
3-phase 200VAC	Single Axis/ Cartesian-type Robots Axis 5 to axis 6									
	SCARA robot added axis present									
Side View										

Note: The front panel in the figure shows the condition when the controller for the actuator XSEL-P or Q for the single-axis robots and Cartesian robots is used.

Regeneration Resistor Unit (Option) : REU-1

Regenerative Resistor Unit: This unit converts the regenerative current brought at the time of the motor deceleration into heat.

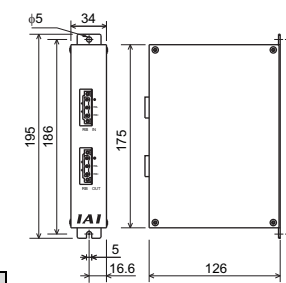
[Installation Standards]

When it is used horizontally

Connected Actuator Motor Capacity Total	Added Axis for XSEL-P/Q, PX/QX, PCT/QCT
0 to 100W	Not required
to 600W	1 Units
to 1200W	2 Units
to 1800W	3 Units
to 2400W	4 Units

When it is used vertically

Connected Actuator Motor Capacity Total	Added Axis for XSEL-P/Q, PX/QX, PCT/QCT
0 to 100W	Not required
to 600W	1 Units
to 1000W	2 Units
to 1400W	3 Units
to 2000W	4 Units
to 2400W	5 Units



When there are both horizontal use and vertical use axes, the required quantity is the total of the horizontal use axes and vertical use axes based on the sum total of the motor capacity for each use.

[Specification]

Item	Specification
Dimensions	W34mm × H195mm × D126mm
Weight	0.9kg
Built-in regeneration resistor	220Ω 80W
Accessories	Controller link cable (Model : CB-ST-REU010) 1m

[Reference for the Number of Connectable Regenerative Units]

ROBO Cylinder High-Speed Type, High-Speed Orthogonal Robot, SCARA axis, DD Motor

Model	External Regenerative Unit
CT4, DD Motor (High-Torque Type)	2
RCS3-CT8C-□-400, DD Motor (Standard Type)	1 (per 1 axis)
IX-NNN2515H/3515H, IX-NNN2515H/3515H, TNN(UNN)3015H/3515H, IX-NNC2515H/3515H	1
IX-NNN50□□H/60□□H, IX-NNW50□□H/60□□H, IX-HNN(INN)50□□H/60□□H, IX-NNC50□□H/60□□H	3
IX-NNN70□□H/80□□H, IX-NNW70□□H/80□□H, IX-HNN(INN)70□□H/80□□H, IX-NNC70□□H/80□□H	4
IX-NSN5016/6016	3

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 smaller than 10% or larger than 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

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

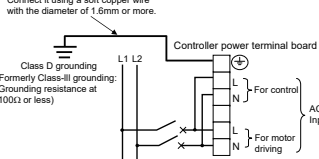
- Location subject to electrostatic noise
- Location where high electrical or magnetic field is present
- Location with the mains or power lines passing nearby

Installation and Noise Elimination

1. Protective Ground

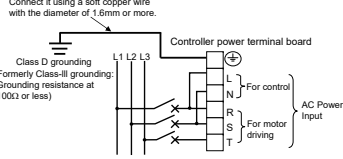
[Single-phase 200V Type]

Connect it using a soft copper wire with the diameter of 1.6mm or more.



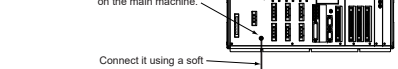
[3-phase 200V Type]

Connect it using a soft copper wire with the diameter of 1.6mm or more.

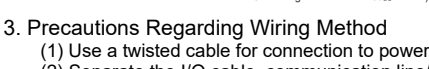


2. Noise Elimination Grounding (Frame Ground)

Attach the grounding cable to the FG terminal on the main machine.



Connect it using a soft copper wire or stand with 2.0mm² (AWG 16).



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



3. Precautions Regarding Wiring Method

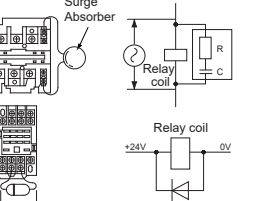
- (1) Use a twisted cable for connection to power supply.
- (2) Separate the I/O cable, communication line/encoder line, and power/driving cable each other.

4. 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.

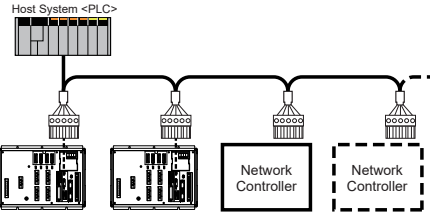


5. Heat Radiation and Installation

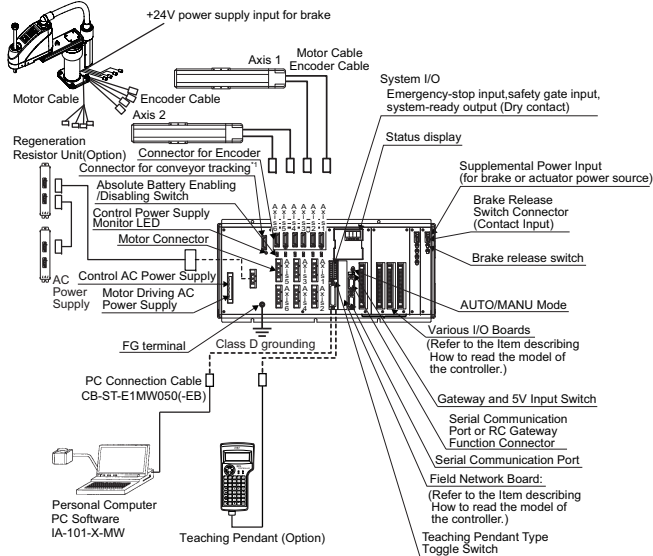
Conduct design and manufacture in consideration of the control box size, controller layout and cooling in such a way that the temperature around the controller will be 40°C or less.

Connection Diagram

[System Diagram]



[XSEL-P, PX, PCT]

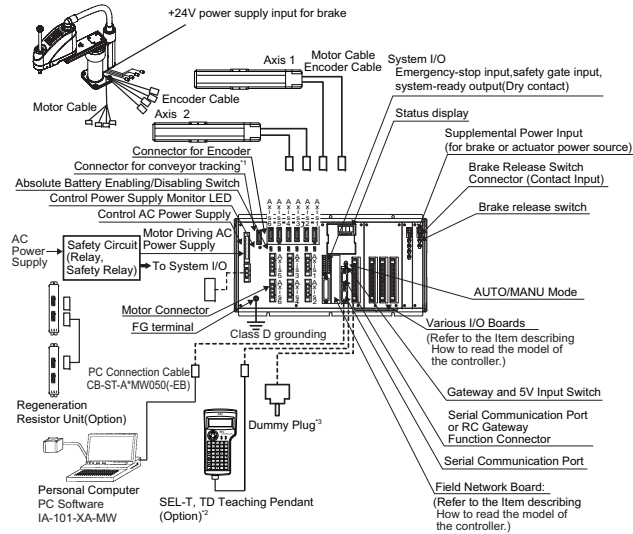


*1 Conveyor Encoder Connector used for Conveyor Tracking

The figure shows the built-in relay interrupting using the controller for Single-Axis Robots and Cartesian Robots: XSEL-P. For the connection between the SCARA robot and the added axis XSEL-PX controller, the same wiring arrangement as for the first to forth axis for the XSEL-P is applied.

Note: For the SCARA robots except for IX-NNN1205/1505/1805, the power supply of +24V for the main machine and the controller is required.

[XSEL-Q, QX, QCT]



*1 Conveyor Encoder Connector used for Conveyor Tracking

*2 For the Q/QX/QCT type controllers, use the SEL-T or TD teaching pendant. The IX-T-X or XD teaching pendant can not be used for them.

*3 When the unit is not connected to the personal computer or teaching pendant, connect the dummy plug (DP-1).

The figure shows the built-in relay interrupting using the controller for Single-Axis Robots and Cartesian Robots: XSEL-Q. For the connection between the SCARA robot and the added axis XSEL-QX controller, the same wiring arrangement as for the first to forth axis for the XSEL-Q is applied.

Note: For the SCARA robots except for IX-NNN1205/1505/1805, the power supply of +24V for the main machine and the controller is required.

CAUTION: In the case of ICSA, ICSPA (Cartesian-type robot) and SCARA robot, each cable has its number. Connect the cable to the controller connector so that the cable is connected to the connector of the same number. For the actuator regarded as that for single-axis robot, the connector Nos. are not indicated. In such case, give a number to each connector to avoid any mistake. If the cable is not correctly connected, it might cause a damage to or malfunction of the motor or PC board.

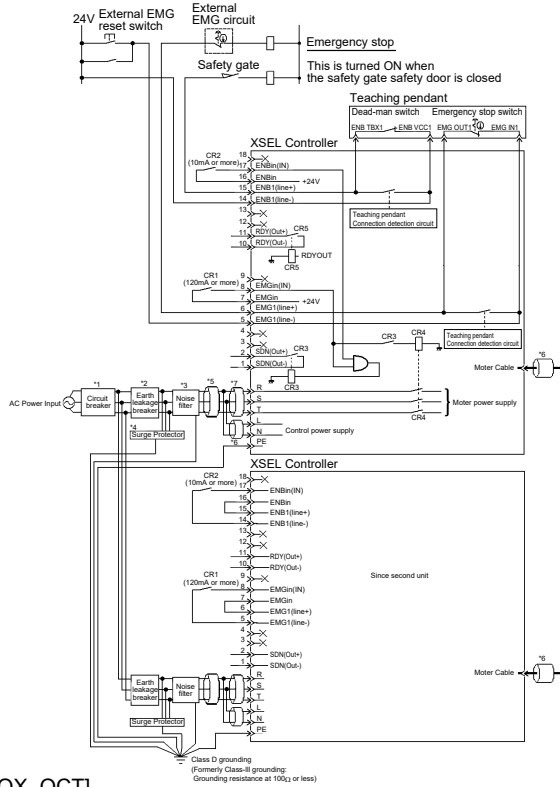
WARNING: The internal components of the controller may burn if the standard cable CB-ST-E1MW050(-EB): Black enclosed in the PC software IA-101-X-MW is used to connect XSEL-Q/QX/QCT to a computer. Even though the PC software can be used, make sure to use the cable CB-ST-A1MW050(-EB): Gray or CB-ST-A2MW050(-EB): Black with Yellow Line.

Power Supply and Emergency Stop Circuit

[XSEL-P, PX, PCT]

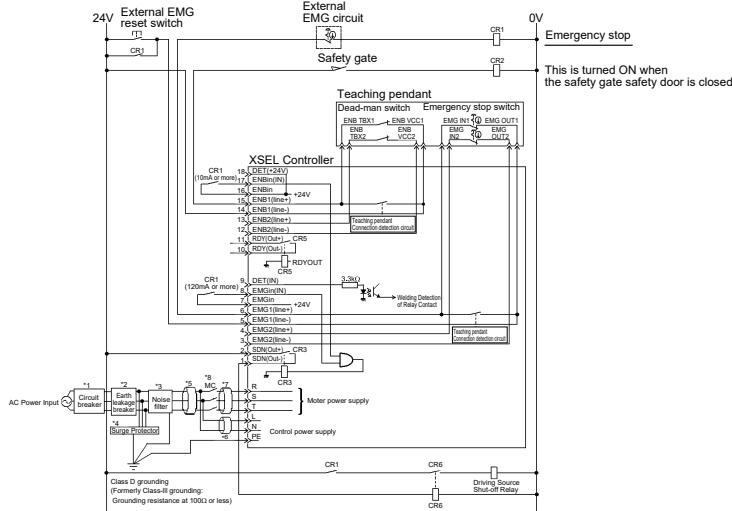
This shows the example of emergency stop for two or more machines, using the emergency stop circuit for the entire machine.

To improve the noise resistance performance, it is recommended to mount components *4 to *7.



[XSEL-Q, QX, QCT]

To improve the noise resistance performance, it is recommended to mount components *4 to *7.



[Refer to the Operation Manual for the connection when putting the circuit to the system with Category 3 or 4.]

- *1 For the selection of the circuit breaker, perform it according to the following items.
Breaker Rated Current Value > Power Capacity ÷ AC Input Voltage (For the power capacity, refer to the items describing the power capacity and heating value).
Select a breaker that does not trip with the rush current described in the basic specification.
The current might pass through the controller three times more of the rated current at the acceleration and deceleration.
Select the breaking current value for the circuit breaker leaving some margin. [Refer to the performance characteristic curve graph described in the manufacturer's catalog.]
- *2 When the leakage breaker is to be installed, it is required to select it with the purpose clarified such as protection from the fire or human body protection.
For the leakage breaker, measure the leakage current at the location where the leakage breaker is installed to select the suitable one.
Use the "applicable to higher harmonics type" leakage breaker.
- *3 Make sure to install the noise filter and install it within 0.3m of XSEL. (The closer it is, the more the effectiveness is.)

Recommended Noise Filter Model

Source Voltage Specifications	Supplier	Model
3-phase 200VAC	DENSEI-LAMBDA	MC1320

- *4 It is recommended to connect the surge protector.
Recommended Surge Protector Model No.

Source Voltage Specifications	Supplier	Model
3-phase 200VAC	OKAYA Electric Industries Co., Ltd.	R-A-V781BXZ-4

- *5 It is recommended to install the ring core.

Recommended Ring Core Model No.

Supplier	Model
NEC TOKIN	ESD-R-25

- *6 It is recommended to install the clamp filter on the control power AC cable and motor cables of all the connected axes.
Recommended Clamp Filter Model No.

Supplier	Model
TDK	ZCAT3035-1330

- *7 It is recommended to install the clamp filter on the motor power AC cable.
Recommended Clamp Filter Model No.

Supplier	Model
Kitagawa Industries Co., Ltd.	RFC-H13

The length of all the cables connecting to the controller should be 30m or less.

- *8 Select the MC capacity based on the same calculation as for the motor driving power supply.

CAUTION: Take care of the following points, otherwise, it may burnout the motor.

- Do not turn ON and OFF the motor driving AC power with the control AC power turned OFF.
- Do not turn ON and OFF the motor driving AC power repeatedly.
- When the power is to be connected, connect the power 5 seconds after the power is turned OFF.
- When the controller detects the cold start level error, remove the cause and then connect the power. Repeating to connect the power without removing the cause may burn out the motor.

In the case of an overload error, connect the power again after a sufficient interval (at least one minute or more).

I/O Port on X-SEL

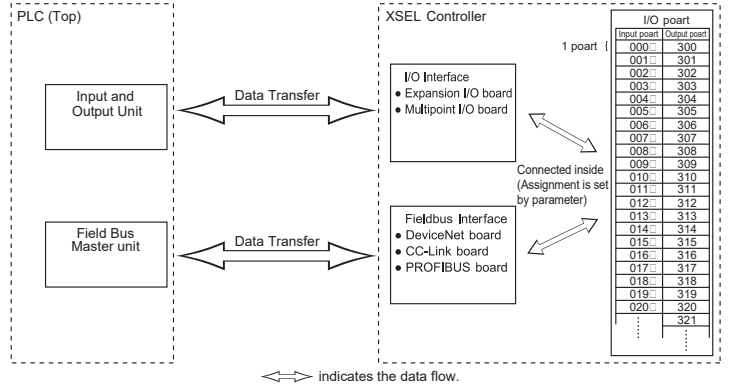
I/O port is the area that the data inside the XSEL controller is transferred from.

Data of 1 contact (1 bit) can be transferred in 1 port.

Data is transferred via PIO (24V input and output) or the fieldbus.

Either PIO or fieldbus can be connected to one port.

Set the parameter whether PIO or fieldbus is to be used.



- I/O Map
Shown below is the list of I/O port numbers and their functions of XSEL controller at the delivery.
XSEL port number and the function assignment can be changed with the I/O parameter.
[Refer to the "XSEL Controller Operation Manual" for the details.]

	Port No.	Functions	Port No.	Functions
Input	000	Program start	300	Alarm Output
	001	Universal Input	301	Ready Output
	002	Universal Input	302	Emergency-stop Output
	003	Universal Input	303	Universal Output
	004	Universal Input	304	Universal Output
	005	Universal Input	305	Universal Output
	006	Universal Input	306	Universal Output
	007	Program appointment (PRG No.1)	307	Universal Output
	008	Program appointment (PRG No.2)	308	Universal Output
	009	Program appointment (PRG No.4)	309	Universal Output
	010	Program appointment (PRG No.8)	310	Universal Output
	011	Program appointment (PRG No.10)	311	Universal Output
	012	Program appointment (PRG No.20)	312	Universal Output
	013	Program appointment (PRG No.40)	313	Universal Output
	014	Universal Input	314	Universal Output
	015	Universal Input	315	Universal Output
	...	...	...	...
	...	...	...	...

Note) Number of input and output ports is:

Input 000 to 299 (MAX, 300 Point)

Output 300 to 599 (MAX, 300 Point)

Be careful with the number of input and output ports when using a fieldbus board and I/O board together.

Initial Settings (I/O Parameters)

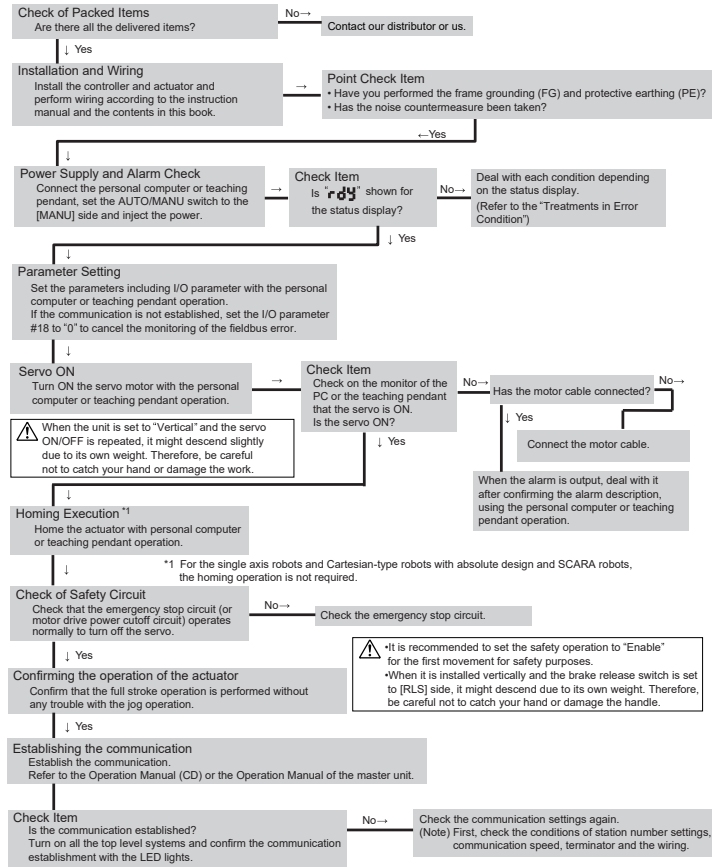
No.	Parameter Name	Initial Value (Reference)	Input Range	Remarks
1	I/O port assignment type	1	0, 1	0: Fixed assignment 1: Automatic assignment (Priority: fieldbus board → standard I/O board (slot 1) to
14	Number of ports using network I/F card remote input	64	0 to 256	Multiple of 8 Enter the number of input ports that are used for the fieldbus. For the numbers 14 and 15, input the same number that is bigger than the other between the two.
15	Number of ports using network I/F card remote output	64	0 to 256	Multiple of 8 Enter the number of input ports that are used for the fieldbus. For the numbers 14 and 15, input the same number that is bigger than the other between the two.
16	Input port start number with fixed network I/F module assignments	0	-1, 0 to 299	Multiple of 8 (A negative value is invalid) Enter from which input port the fieldbus is used.
17	Output port start number with fixed network I/F module assignments	300	-1, 300 to 599	Multiple of 8 (A negative value is invalid) Enter from which output port the fieldbus is used.
18	Network I/F module error monitor	1	0 to 5	0: Not to monitor 1: Monitor

* Refer to the Operation Manual for each fieldbus when using fieldbus and PIO together.

* The occupied address on PLC is determined depending on the number of used inputs and outputs.
Refer to the Operation Manual or the Operation Manual of the master unit for the details.

Starting Procedures

When using this product for the first time, make sure to avoid mistakes and incorrect wiring by referring to the procedure below.



Set-up for operation is complete. (Start adjusting the system operation.)

Troubleshooting

For X-SEL, the operation status can be checked with the status LEDs on the front panel.

● For DeviceNet

○: Lighting ●: OFF ⊙: Flashing

Monitor LED				Status	Treatment
MS		NS			
GN	RD	GN	RD		
○	—	○	—	In normal operation	
○	—	●	●	Waiting for master to finish node address duplication check	● Confirm that the communication speed of the mater and all the slaves are set the same. - After correcting the settings, reboot the system. ● Confirm that the connectors are connected correctly.
○	—	⊙	—	Waiting for the completion of connection with the master	● Confirm if the master is operating with no abnormality. ● Confirm that the controller is registered in the scan list on the master.
—	○	●	●	Hardware error	● Please contact us.
—	⊙	●	●	Error in DIP switch setting	● Confirm that the communication speed is set the same as the master setting. ● Confirm if the configuration setting is established correctly.
○	—	—	○	Node addresses are duplicated or busoff (communication stop caused by data error being repeated) is detected.	● Correct the node address, and then reboot the system. ● Check the influence of noise, e.g. check if there is a source of noise nearby, or if the communication cable is laid parallel to a power line.
○	—	—	⊙	Communication timeout	● Confirm that the communication speed is set the same as the master setting.
NS repeats to light in green and flash in green. Or, NS repeats to flash in red and green.				Communication error	● Confirm that the controller is registered in the scan list on the master. ● Confirm that the I/O area is not duplicated with another slave. ● Confirm that the I/O area is not exceeded over the master unit allowable area (for fixed assignment).

● For CC-Link

○: Lighting ●: OFF ⊙: Flashing

STATUS 1	STATUS 0	Status
○	○	This status does not exist
○	●	● Error occurred (CRC error, station number setting error or communication speed setting error) ● From the power being on or software reset to the completion of CC-Link initializing
●	○	Data exchanged in normal condition
●	●	Short in power supply system, broken remote station power supply or short of communication cable
⊙	○	This status does not exist
⊙	●	Setting of station number or communication speed is changed during a communication

● For PROFIBUS

LED	Color	Display condition	Description (meaning of indication)
STATUS 1	GN	Lighting	On the fieldbus line and communication in normal condition
		Flashing	Off the fieldbus line
	OR	Flashing	Communication error occurred
STATUS 0	GN	Lighting	In normal operation
		Flashing	Preparing the operation
	OR	Lighting	Error is detected in communication related hardware while preparing the operation.

Troubleshooting

The following alarm displays are frequently generated at the start-up operation. Take the measure referring to the following description. When any of the other alarms is output, refer to the operation manual.

Status display	Status contents	Cause and Remedy
	During emergency-stop	It is not an alarm. - It is generated when the emergency stop switch in the teaching pendant or the personal computer application software is not cancelled. In such case, cancel it. - It is generated when the personal computer cable is not connected to the emergency stop box. - Check the emergency stop circuit.
	Safety gate remains open. Deadman switch OFF	It is not an alarm. - It is generated when the system I/O ENB signal is opened. Check the ENB signal. (It is generated when the safety gate is open. Close the safety gate.) - It is generated when the AUTO/MANU switch has been set to "MANU" and the personal computer or the teaching pendant is not connected. Connect the personal computer or the teaching pendant or set the AUTO/MANU switch to "AUTO". - When the actuator is to be started up, hold the deadman switch on the teaching pendant to turn it on.
	AC Power Interruption Momentary Power Failure Power Voltage Drop	It is generated when the power voltage is not supplied. It will be generated, for example, in the case that the 100VAC is supplied to the controller with 200VAC specified. Check the power supply.
	Absolute Data Backup Battery Voltage Error	It will be generated in the case that the battery has not been attached, or the battery voltage is dropped. In the case of the actuator for the single-axis robots or Cartesian robots with the absolute data specifications, it is generated when the power is connected for the first time. Perform the absolute reset.
	Encoder Disconnection Error	It is generated when the cable is broken or the encoder cable is not connected to the controller. Check the wiring.
	Encoder Reception Time Out	It is generated when the encoder is broken, the cable is broken or the encoder cable is not connected to the controller. Check the wiring.
	24V I/O error DO output current error	It is generated when the +24V power for I/O is not supplied. Check the power supply. (How to start up the controller without connecting the I/O 24V power) Set the I/O parameter No. 10 to No. 13 corresponding to the standard or extended I/O board to "0".
	FieldBus Error	It is generated when the field bus link connection is not established. Check the link cable connection, I/O parameter and PLC parameter settings. (How to start up the controller without connecting the field bus) Set the I/O parameter No. 10 to No. 13 corresponding to the standard or extended I/O board to "0".
	RC Gateway Serious Breakdown Error	When the RC gateway is used and an error occurs in the controller connected SIO (serial communication), it is generated. The following causes are possible. - All effective RC axes are missing (not recognized). → A cable disconnection or broken wire is possible. Check the wiring. - The power switch on the main CPU shows 0V. → Set the +5V power switch to right side (+5V supply side). - The DPRAM access right can not be obtained for one hour or more in the connected SIO. → Check the parameters for the X-SEL or RC controller. - A serious error such as a CPU error is caused in the connected SIO. → It is caused by the hardware breakdown. Contact IAI.

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