IAI
Quality and Innovation

X-SEL Controller J/K Type
First Step Guide Fourth Edition

Controller for Single-Axis Robots and Cartesian Robots: XSEL-J, K, KE, KT, KET
Controller for SCARA Robot: XSEL-JX, KX, KETX

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 (Options are excluded.)

No.	Part Name	Remarks	J	JX	K	KE	KT	KET	KX	KETX
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.	One unit is attached per installed PIO board.							
3	Battery for the Absolute Data Maintenance	IA-XAB-BT	○		○	○	○	○		
4	Connector terminal	IA-LB-KT					○	○		○
5	Connector terminal dummy plug						○	○		○
6	Connector terminal cable	Length : 1 m					○	○		○
7	Noise filter	MXB-1210-33(Maker : DENSEI-LAMBDA)					○	○		○
8	System I/O plug	MC1.5/6-ST-3.5 (Maker : PHOENIX CONTACT)	○	○	○	○	○	○	○	○
9	AC Power Supply plug	GMSTB2.5/3-STF-7.62 (Maker : PHOENIX CONTACT)	○	○	○	○	○	○	○	○
10	I/O24V Power Supply plug	MC1.5/2-ST-3.5 (Maker : PHOENIX CONTACT)			○	○	○	○	○	○
11	AC Power Supply plug for Motor drive						○	○		○
12	First Step Guide	ME0204	○	○	○	○	○	○	○	○
13	Safety Guide	M0194	○	○	○	○	○	○	○	○

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.

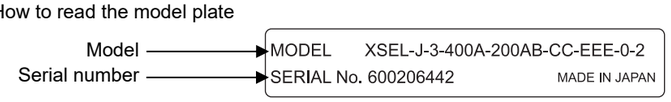
No.	Part Name	Model
1	PC Software (with RS232C Cable + Emergency Stop Box)	IA-101-X-MW
2	PC Software (with USB Conversion Adapter + RS232C Cable + Emergency Stop Box)	IA-101-X-USBMW
3	PC Software (for XSEL-KT, KET, KETX RS232C Cable + Emergency Stop Box)	IA-101-XA-MW
4	Teaching pendant	SEL-T *1
5	Teaching pendant (with deadman switch)	SEL-TD *1
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

*1: The SEL-T/TD Teaching Pendant can not be used with the XSEL-J/JX controller.

3. Operation manuals related to this product

No.	Name	Manual No.
1	XSEL-J/K Controller Operation Manual	ME0116
2	XSEL-JX/KX Controller Operation Manual	ME0119
3	PC Software IA-101-X-MW/ IA-101-X-USBMW Operation Manual	ME0154
4	Teaching pendant SEL-T/TD/TG Operation Manual	ME0183
5	Teaching pendant IA-T-X/XD Operation Manual	ME0160
6	DeviceNet Operation Manual	ME0124
7	CC-Link Operation Manual	ME0123
8	PROFIBUS Operation Manual	ME0153
9	X-SEL Ethernet Operation Manual	ME0140
10	Multi-Point I/O Board Operation Manual	ME0138
11	Multi-Point I/O Board Dedicated Terminal Board Operation Manual	ME0139

4. How to read the model plate



5. How to read the model of the controller

Controller for Single-Axis actuator and Cartesian actuator XSEL-J, K, KE, KT, KET

XSEL – K – 3 – 400A – 200ACL – 60ABL – N1 – EEE – 2 – 2
❶ ❷ ❸ ❹(Axis 1) ❹(Axis 2) ❹(Axis 3) ❺ ❻ ❼ ❽

Model table

❶ Series	❷ Controller type	❸ Number of axes	❹ Details of axis 1 to axis 4: Motor Output	Encoder type	Brake	Creep	Home Sensor (LS)	Synchro-nization Desig-nation	❺ Standard I/O (Slot 1)	❻ Expansion I/O slots: Slot 2	Slot 3	Slot 4	❼ I/O Flat cable length	❽ Power-supply voltage
XSEL	J (Compact type) K (General-Purpose type) KE (CE-compliant) KT (*1) KET (CE-compliant) *1	1 (1-axis) 2 (2-axis) 3 (3-axis) 4 (4-axis)	20 (20W) 30D (30W for DS) 30R (30W for RS) 60 (60W) 100 (100W) 150 (150W) 200 (200W) 300 (300W) 400 (400W) 600 (600W) 750 (750W)	I (Incre-mental) A (Abso-lute)	Not Specified (w/o brake) B (w/ brake)	Not Specified (w/o creep) C (w/ creep)	Not Specified (w/o home sensor) L (w/ home sensor)	Not Specified (No synchro-nization) M (Master-axis designation) S (Slave-axis designation)	N1 32 inputs/ 16 outputs NPN board N3 48 inputs/ 48 outputs NPN board P1 48 inputs/ 48 outputs PNP board P3 48 inputs/ 48 outputs PNP board DV DeviceNet 256/256 board CC CC-Link 256/256 board PR PROFIBUS 256/256 board ET Ethernet Data communication board	E (Not used) C CC-Link connection 16/16 board N1 Expansion I/O NPN32/16 N2 Expansion I/O NPN16/32 N3 Expansion I/O NPN48/48 P1 Expansion I/O PNP32/16 P2 Expansion I/O PNP16/32 P3 Multipoint I/O PNP48/48 SA Expansion I/O Type A SB Expansion I/O Type B SC Expansion I/O Type C	E (Not used) C CC-Link connection 16/16 board N1 Expansion I/O NPN32/16 N2 Expansion I/O NPN16/32 N3 Expansion I/O NPN48/48 P1 Expansion I/O PNP32/16 P2 Expansion I/O PNP16/32 P3 Multipoint I/O PNP48/48 SA Expansion I/O Type A SB Expansion I/O Type B SC Expansion I/O Type C	E (Not used) C CC-Link connection 16/16 board N1 Expansion I/O NPN32/16 N2 Expansion I/O NPN16/32 N3 Expansion I/O NPN48/48 P1 Expansion I/O PNP32/16 P2 Expansion I/O PNP32/32 P3 Multipoint I/O PNP48/48 SA Expansion I/O Type A SB Expansion I/O Type B SC Expansion I/O Type C	2 : 2m (Standard) 3 : 3m 5 : 5m 0 : None	1: Single-phase 100V 2: Single-phase 200V

Controller for SCARA robot XSEL-JX, KX, KETX

XSEL – KX – NNN5020 – N1 – EEE – 2 – 2
❶ ❷ ❸ ❹ ❺ ❻ ❼

Model table

❶ Series	❷ Controller type	❸ IX Robot Model	❹ Standard I/O: Slot 1	❺ Expansion I/O slots: Slot 2	Slot 3	Slot 4	❻ I/O Flat cable length	❼ Power supply voltage
XSEL	JX (Compact type) KX (General-Purpose type) KETX (CE-compliant) *1	NNN2515 to 8040 (Standard type) NSN5016 to 6016 (High-speed type) NNW2515 to 8040 (Dustproof/ Splash proof type) TNN3015 to 3515 (Wall-mount type) UNN3015 to 3515 (Wall-mount Inverse type) HNN5020 to 8040 (Ceiling-mount type) INN5020 to 8040 (Ceiling-mount Inverse type) NNC2515 to 8040 (Clean room type)	N1 32 input/16 output NPN board N3(*3) 48 input/48 output NPN board P1 32 input/16 output PNP board P3(*2) 48 input/48 output PNP board DV DeviceNet 256/256 board CC CC-Link 256/256 board PR PROFIBUS 256/256 board ET Ethernet Data communication board	E (Not used) C CC-Link connection 16/16 board N1 Expansion I/O NPN32/16 N2 Expansion I/O NPN16/32 N3(*3) Multipoint I/O NPN 48/48 P1 Expansion I/O PNP32/16 P2 Expansion I/O PNP16/32 P3(*3) Multipoint I/O PNP48/48 SA(*4) Expansion SIO type A SB(*4) Expansion SIO type B SC(*4) Expansion SIO type C	E (Not used) C CC-Link connection 16/16 board N1 Expansion I/O NPN32/16 N2 Expansion I/O NPN16/32 N3(*3) Multipoint I/O NPN 48/48 P1 Expansion I/O PNP32/16 P2 Expansion I/O PNP16/32 P3(*3) Multipoint I/O PNP48/48 SA(*4) Expansion SIO type A SB(*4) Expansion SIO type B SC(*4) Expansion SIO type C	E (Not used) C CC-Link connection 16/16 board N1 Expansion I/O NPN32/16 N2 Expansion I/O NPN16/32 N3(*3) Multipoint I/O NPN 48/48 P1 Expansion I/O PNP32/16 P2 Expansion I/O PNP32/32 P3(*3) Multipoint I/O PNP48/48 SA(*4) Expansion SIO type A SB(*4) Expansion SIO type B SC(*4) Expansion SIO type C	2 : 2m 3 : 3m 5 : 5m 0 : None	2: Single-phase 200V

*1 In this type, the safety circuit can be configured with the motor driving power source separated.
*2 N3 and P3 that can be inserted into the standard I/O (slot 1), are used for J and JX types.
*3 N3 and P3 that can be inserted into the extended I/O (slots 2 to 4), are used for K, KE, KT, KET, KX and KETX types.
*4 SA, SB and SC can not be used for J or JX type.

Basic Specifications

Controller for Single-Axis actuator and Cartesian actuator Specifications

Specification Item		XSEL-J	XSEL-K	XSEL-KE	XSEL-KT	XSEL-KET
Max. No. of Connectable Axes		4-axis				
Max. Connected Axis Output	100VAC Type	400W	800W			
	200VAC Type	800W *1	1600W			
Supply voltage	100VAC Type	Single-phase 100V to 115V ±10 %				
	200VAC Type	Single-phase 200V to 230V ±10 %				
Power frequency		50Hz/60Hz				
Rush Current *2		90A (MAX)	180A (MAX)			
Leakage Current *3 (Excluding Higher Harmonic Content)		1-axis the time of connection : 0.7mA 2-axis the time of connection : 1.0mA 3-axis the time of connection : 1.3mA 4-axis the time of connection : 1.6mA				
Momentary Power Interruption Tolerance		50Hz : 10msec, 60Hz : 8msec				
Insulation Resistance		10MΩ or more (Between power terminal and I/O terminal and also all external terminals and case at the power supply of 500VDC).				
Insulation Strength		1500VAC for 1 min. (Note 1) (actuator the time of connection 1000VAC for 1 min.)				
Axis Control System		AC Full – digital Servo				
Position detection method		Incremental Encoder or Absolute Encoder				
Battery for Backup		For Absolute Data Backup: IA-XAB-BT manufactured by our company				
		For System Memory Backup: CR2032				
Program language		Super SEL language				
Max. Number of program steps		6000 steps				
Max. Number of position		3000 positions				
Max. Number of programs		64 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)				
Expanded I/O Interface		(Refer to the Item for the How to read the model of the controller)				
Teaching Port RS232C (Special Protocol)		D-sub 25 Pin				
Serial communication function RS232C			D-sub 9 Pin			
Expanded serial communication function RS232C, RS485, RS422			Addition of Expansion I/O slots available (Refer to the Item for the Product Check).			
Serial communication cable length	RS232C	15 m or less				
	RS485	100m or less				
	RS422	100m or less				
System I/O		Emergency-stop input, enable input, system ready output				
Protective functions		Motor overcurrent, overload, motor driver temperature check, encoder open circuit detection, soft limit over, system abnormality, battery abnormality etc.				
Drive-source cutoff method		Internal Semiconductor	Internal relay		External Cut off	
Circuit protector for power supply		None	None	Internal	None	Internal
Environment	Surrounding air temperature	0 to +40°C				
	Surrounding humidity	30% to 85%RH (non-condensing)				
	Surrounding environment	(Refer to the Item for the Installation Environment).				
	Surrounding storage temperature	-10 to 65°C				
	Surrounding storage humidity	90%RH or less (non-condensing)				
	Vibration resistance	10 to 57 Hz in XYZ directions/Pulsating amplitude 0.035 mm (continuous), 0.075 mm (intermittent) 57 to 150 Hz in XYZ directions/4.9 m/s² (continuous), 9.8 m/s² (intermittent)				
Protection class		IP10				
Cooling method		Forced air cooling				
Weight		For 1-axis : 2.6kg	For 1, 2-axis : 6.0kg			
		For 2-axis : 3.3kg	For 3, 4-axis : 7.0kg			
		For 3, 4-axis : 5.0kg				
External dimensions		(Refer to the Item for the External Dimensions).				

*1 When the vertical type actuator is included, the watt amount of the vertical type actuator should be smaller than 500W in total.
*2 Rush current at the power connection continues for about 20msec. Consider the safety rate at the time when rush current passes. Take the greatest care because the rush current value varies depending on the impedance in the power.
*3 The leakage current is shown as the value indicated in the controller connected to the actuator.
The leakage current from controller power cable or noise filter is not included.
The leakage current varies depending on the surrounding environments. When the leakage protective measure is taken, measure the leakage current at the leakage breaker installation location.

Table 1: Motor Drive Power Factor and Output Loss

Actuator Motor Capacity [W]	Motor Drive Power Factor [W]	Output Loss [W]
20	15.6	1.58
30	27.6	2.07
60	83.0	3.93
100	140.1	6.12
150	196.9	8.30
200	252.6	9.12
400	477.5	19.76
600	698.2	27.20
750	912.8	29.77

Table 2: Control Power Capacity*4

Brake	None	1-axis	2-axis	3-axis	4-axis
1-axis controller [W]	17.5	27.3	-	-	-
2-axis controller [W]	23.4	33.2	42.9	-	-
3-axis controller [W]	29.3	39.1	48.8	58.6	-
4-axis controller [W]	35.3	45.0	54.8	64.5	74.3

*4 For the control power capacity, the amount as much as for the total number of connectable axes is required even when some axes are not connected to the controller.

[Power Capacity and Heating Value]

Rated Power Capacity [VA] = (Motor Drive Power Factor [W] *1 + Control Power Capacity [W] *2) ÷ 0.6 [Power Factor]

Heating Value [W] = Total Output Loss [W] *3 + Control Power Capacity [W] *2

*1 Select the Motor Drive Power Factor [W] from the Table 1. However, at the time of acceleration or deceleration, the motor driving power reaches max. three times more of the regular level.
*2 The Control Power Capacity [W] is determined based on the number of connectable axes and the number of brake axes in the controller. Select it from the table 2.
*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.

Controller for SCARA robot Specifications

Specification Item		XSEL-JX	XSEL-KX	XSEL-KETX
Max. No. of Connectable Axes		1 unit of SCARA Robot		
Max. Connected Axis Output		450W	1750W	
Supply voltage	200VAC Type	Single-phase 200V to 230V ±10%		
Power frequency	200VAC Type	50Hz/60Hz		
Rush Current*1		90A (MAX)	180A (MAX)	
Leakage Current*2 (Excluding Higher Harmonic Content)		1.6mA		
Momentary Power Interruption Tolerance		50Hz : 10msec, 60Hz : 8msec		
Insulation Resistance		10MΩ or more (Between power terminal and I/O terminal and also all external terminals and case at the power supply of 500VDC).		
Insulation Strength		1500VAC for 1 min. (SCARA robot the time of connection 1000VAC for 1 min.)		
Axis Control System		AC Full –digital Servo		
Position detection method		Absolute Encoder		
Battery for Backup		For Absolute Data Backup: AB-3 manufactured by our company (built-in the main SCARA robot)		
		For System Memory Backup: CR2032		
Program language		Super SEL language		
Number of program steps		6000 steps		
Number of position		3000 positions		
Number of programs		64 programs		
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)		
Expanded I/O Interface		(Refer to the Item for the How to read the model of the controller).		
Teaching Port RS232C (Special Protocol)		D-sub 25 Pin		
Serial communication function	RS232C		D-sub 9 Pin	
Expanded serial communication function RS232C, RS485, RS422			Addition of Expansion I/O slots available (Refer to the Item for the Product Check).	
Serial communication	RS232C	15m or less		
	RS485	100m or less		
	RS422	100m or less		
System I/O		Emergency-stop input, enable input, system ready output		
Protective functions		Motor overcurrent, overload, motor-driver temperature check, encoder-open detection, soft limit over, system error, etc.		
Drive-source cutoff method		Internal Semiconductor	Internal relay	External Cutoff
Circuit protector for power supply		None	None	Internal
Environment	Surrounding air temperature	0 to +40°C		
	Surrounding humidity	30% to 85%RH (non-condensing)		
	Surrounding environment	(Refer to the Item for the Installation Environment).		
	Surrounding storage temperature	-10 to 65°C		
	Surrounding storage humidity	90%RH or less (non-condensing)		
	Vibration resistance	10 to 57 Hz in XYZ directions/Pulsating amplitude 0.035 mm (continuous), 0.075 mm (intermittent) 57 to 150 Hz in XYZ directions/4.9 m/s² (continuous), 9.8 m/s² (intermittent)		
Protection class		IP10		
Cooling method		Forced air cooling		
Weight		5.0kg	7.0kg	
External dimensions		(Refer to the Item for the External Dimensions).		

*1 Rush current at the power injection continues for 20msec. Consider the safety rate at the time when rush current passes. Take the greatest care because the rush current value varies depending on the impedance in the power line.

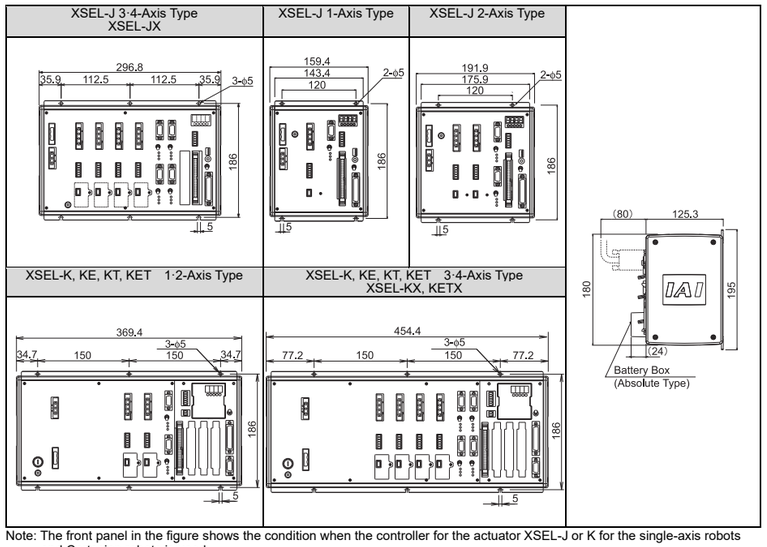
*2 The leakage current is shown as the value indicated in the controller connected to the actuator. The leakage current from controller power cable or noise filter is not included. The leakage current varies depending on the surrounding environments. When the leakage protective measure is taken, measure the leakage current at the leakage breaker installation location.

[Power Capacity and Heating Value]

Model	Power Capacity [VA] *3	Heating Value [W]
IX-NNN70□□/IX-NNN80□□,IX-HNN70□□/IX-HNN80□□ IX-INN70□□/IX-INN80□□,IX-NNW70□□/IX-NNW80□□ IX-NNC70□□/IX-NNC80□□	3625	133
IX-NNN50□□/IX-NNN60□□,IX-HNN5020/IX-HNN6020 IX-INN5020/IX-INN6020,IX-NNW50□□/IX-NNW60□□ IX-NNC50□□/IX-NNC60□□	1963	99
IX-NSN5016/IX-NSN6016	3228	121
IX-NNN2515/IX-NNN3515,IX-TNN3015/IX-TNN3515 IX-UNN3015/IX-UNN3515,IX-NNW2515/IX-NNW3515 IX-NNC2515/IX-NNC3515	1118	81

*3 However, at the time of acceleration or deceleration, the motor driving power reaches max. three times more of the regular level.

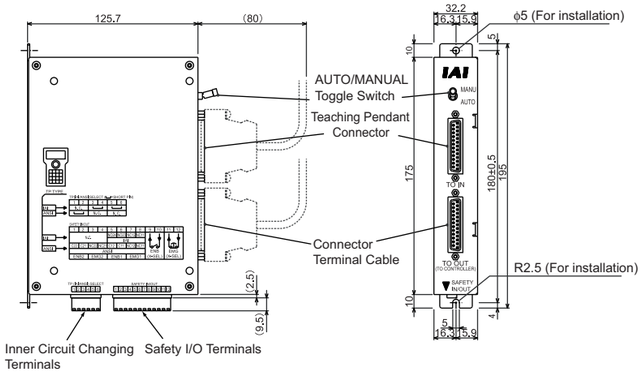
External Dimensions



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

Connector terminal for XSEL-KT/KET/KETX IA-LB-KT

The connector terminal is the unit required for shutdown the motor driving power for XSEL-KT/KET/KETX, using the emergency stop button (Deadman Switch) on the teaching pendant.



Regeneration Resistor Unit (Option) : REU-1

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

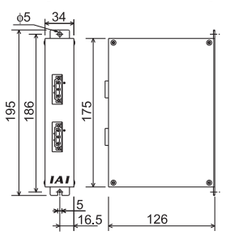
The regenerative resistance is not required for the SCARA robot controller XSEL-JX, KX and KETX.

[Installation Standards]
It is not required when it is used horizontally.

When it is used vertically:

Connected Actuator Motor Capacity Total	XSEL-J	XSEL-K/KE/KT/KET
0 to 200W	Not required	Not required
to 400W	1 Unit	Not required
to 600W	1 Unit	1 Unit
to 800W	2 Units	1 Unit
to 1200W	-	2 Units
to 1600W	-	3 Units

[External Dimensions]



[Specifications]

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

Installation Environment

Do not use this product in the following environment:

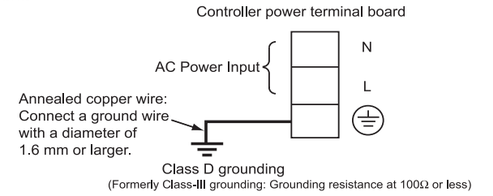
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity smaller than 30% or larger than 85%RH
- Location exposed to corrosive gases or combustible gases
- Location exposed 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.

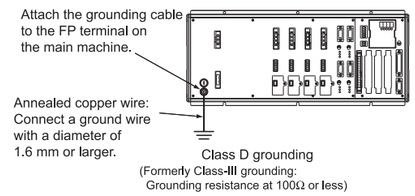
- Location subject to electrostatic noise
- Location where high electrical or magnetic field is present
- Location with the mains or power lines passing nearby

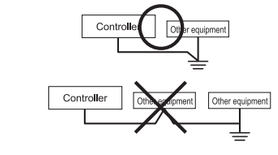
Installation and Noise Elimination

1. Protective Ground



2. Noise Elimination Grounding (Frame Ground)





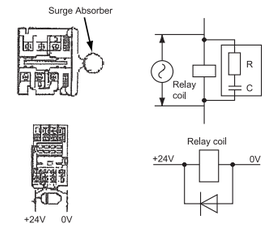
Do not share the ground wire with or connect to other equipment.
Ground each controller.

3. Precautions Regarding Wiring Method
① Use a twisted cable for connection to the 24VDC power supply.
② Separate the I/O cable, communication line/encoder line, and power/driving cable each other.

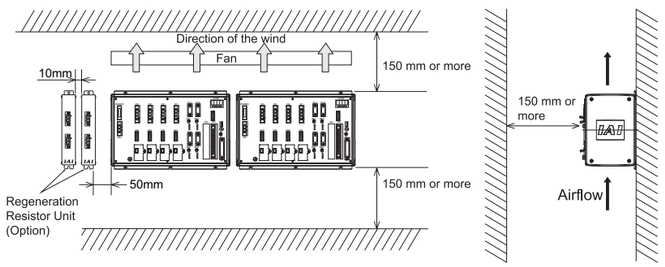
4. Noise Sources and Elimination

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.

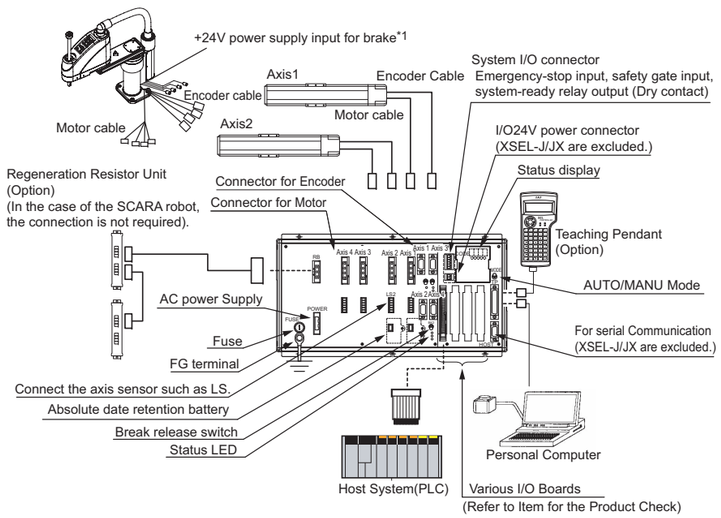


5. Heat Radiation and Installation
Conduct design and manufacture in consideration of the control box size, controller layout and cooling in such a way that the temperature around the controller will be 40°C or less.



Connection Diagram

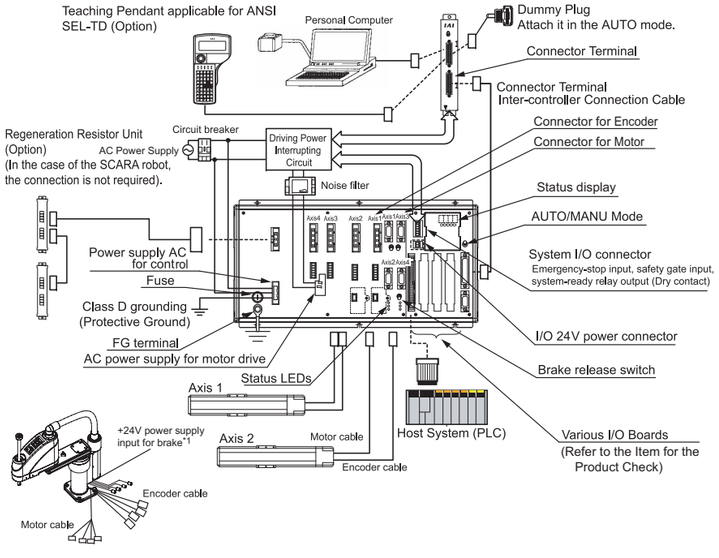
[XSEL-J, K, KE, JX, KX]



The figure shows the built-in relay interrupting using the controller for Single-Axis Robots and Cartesian Robots: XSEL-K. For XSEL-J and KE, the same wire arrangement is applied.
The SCARA robot controller XSEL-KX are applicable for four axes. For XSEL-K, the same wire arrangement is applied.

*1 In the case of SCARA robot, the supply of the power +24V for the brake is required for the robot main body.

[XSEL-KT, KET, KETX]



The figure shows the built-in relay interrupting using the controller for Single-Axis Robots and Cartesian Robots: XSEL-K. For XSEL-KET, the same wire arrangement is applied.
The SCARA robot controller XSEL-KX are applicable for four axes. For XSEL-K, the same wire arrangement is applied.

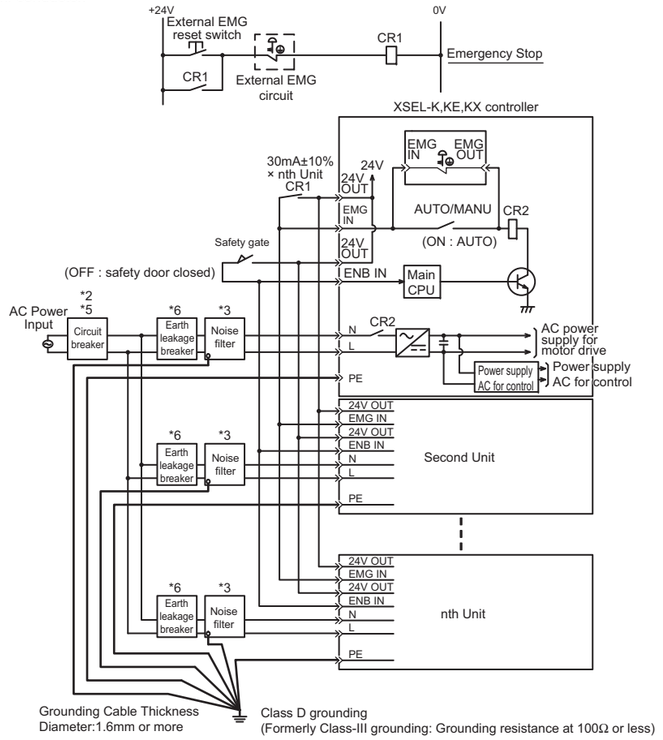
*1 In the case of SCARA robot, the supply of the power +24V for the brake is required for the robot main body.

CAUTION : In the case of ICSA, ICSPA (Orthogonal Robot) and SCARA robot, a number is Attached to each cable. Connect it according to the controller connector number.
If any of them is connected incorrectly, it might cause a damage to or malfunction of the motor or PC board.
If any of them is connected incorrectly, it might cause a burning or malfunction of the motor or PC board.

Wiring for the Power/Emergency Stop Circuit and Brake Forced Release Switch

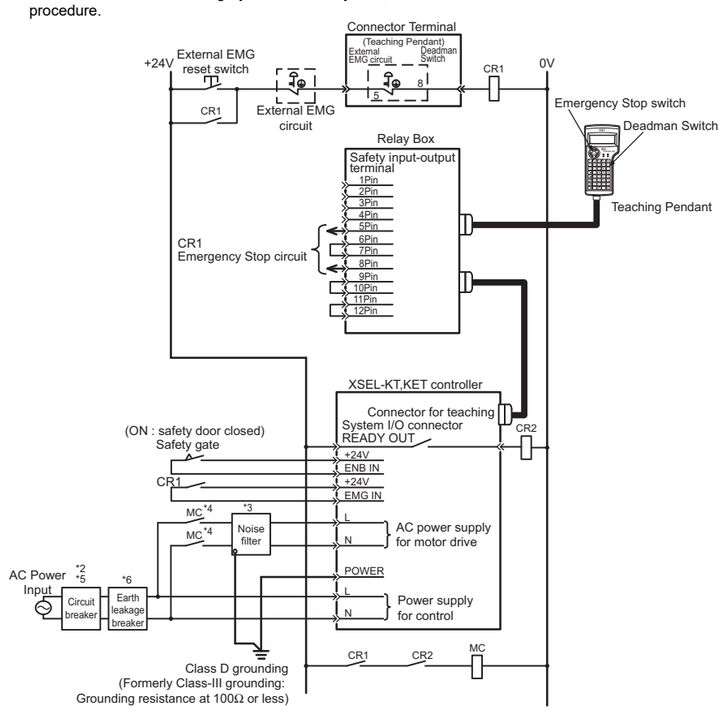
[XSEL-K, KE, KX, J, JX]

Shown is an example when two or more controllers on the whole system emergency stop circuit, are stopped in an emergency.
The figure shows the built-in relay interrupting using the XSEL-K, KE or KX controller.
The XSEL-J or JX controller motor driving power is supplied through the interruption of built-in semi-conductor.



[XSEL-K, KE, KX, J, JX]

When it is installed into category 3 or 4 of the system, refer to the instruction manual for the connection procedure.



*1 Use IEC60947-5-1 or its equivalent as the emergency stop switch.
IEC60947-5-1: Refer to Section 1 "Electrical Machine Control Circuit Equipment" in the Vol. 5 "Control Circuit Equipment and Switches" in the "Low Pressure Switch and Control Unit".
Complied JIS Standards: JIS C 8201-5-1

*2 For the selection of the circuit breaker, perform it according to the following items.
Breaker Teaching pendant Value > Power Capacity ÷ AC Input Voltage
(For the Power Capacity, refer to the Item for the Power Capacity and Heating Value).
·The current might pass through the controller three times more of the rated current at the acceleration. Select one that does not trip when the above current passes. When it trips, select the breaker with a rated current one rank above. Select the breaker that does not trip with the rush current.(Refer to the performance characteristic curve graph described in the manufacturer's catalog.)
·For the rated breaking current, select the current value which can break the current even when a short circuit occurs.
Breaking current > A short circuit occurs = Primary Power Supply Capacity ÷ Power-Supply voltage
Select the breaking current value for the circuit breaker leaving some margin.

*3 Make sure to install the noise filter.
Select the noise filter with the same calculation as that for the circuit breaker.

Recommended Noise Filter Model (Manufacturer: Densei-Lambda)

Actuator type	Current value	Parts
Actuator for other than SCARA robot	10A or less	MXB-1210-33
	10 to 20A or less	MXB-1220-33
SCARA Robot Arm Length : 700/800 Type, High-speed type	10 to 20A or less	MXB-1220-33
SCARA Robots other than the above	10A or less	MXB-1210-33

*4 For the MC capacity, select it with the same calculation as that for the circuit breaker.

*5 The circuit protector is built in the XSEL-KE, KET and KETX. However, the short-circuit breaking capacity is 500A. When the breaking capacity is not enough, install the external breaker with the required breaking capacity to protect from short-circuit and for grounding.

Built-in Circuit Protector SER-F-11-62-10A-BWT (Manufacturer: Sanken-Airpax)

Specification Item	Performance
Rated Voltage, Rated Current	250V 10A
Short-Circuit Braking Capacity	500A

*6 When the leakage breaker is to be installed, it is required to select it with the purpose clarified such as protection from fire or human body protection.
For the leakage breaker, measure the leakage current at the location where the leakage breaker is installed, and select it. Use the "applicable to higher harmonics type" leakage breaker.

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.
- Inject the motor driving AC power after the READY signal is turned ON.
- Do not turn ON and OFF the motor driving AC power repeatedly.
  When the power is to be connected, connect the power 5 or more seconds after the power is turned OFF.
- When the controller detects the cold start level error, remove the cause and then connect the power.
  In the case of an overload error, connect the power again after a sufficient interval (at least one minute or more).

I/O Signals

[Standard PIO Input 32 Points/Output 16 Points I/O Board: When N1 or P1 is selected:]
Input

Pin No.	Wire color	Port No.	Standard Setting (At the delivery) (Changeable with I/O parameters)	I/O Parameters	
1	BN-1		K, KX Type: Connection Not Required J, JZ Type: +24V Input		
2	RD-1	000	Program start	No.30	0: Universal Input 1: Program Start (BCD Appointment) 2: Program Start (Binary Setup)
3	OR-1	001	Universal Input	No.31	0: Universal Input 1: Soft Reset Signal
4	YW-1	002	Universal Input	No.32	0: Universal Input 1: Servo ON signal
5	GN-1	003	Universal Input	No.33	0: Universal Input 1: Program automatically started when the power ON is reset in AUTO mode and software is reset 2: Automatic Starting Program Signal
6	BL-1	004	Universal Input	No.34	0: Universal Input 1: All servo axes soft interlock (OFF level)
7	PL-1	005	Universal Input	No.35	0: Universal Input 1: Operation Pause Cancellation (ON Edge)
8	GY-1	006	Universal Input	No.36	0: Universal Input 1: Movement pause signal (OFF level)
9	WT-1	007	Program No. appointment (MSB)	No.37	0: Universal Input 1: Program No. appointment (MSB)
10	BK-1	008	Program No. appointment (The second bit)	No.38	0: Universal Input 1: Program No. appointment(The second bit)
11	BN-2	009	Program No. appointment (The third bit)	No.39	0: Universal Input 1: Program No. appointment(The third bit)
12	RD-2	010	Program No. appointment (The fourth bit)	No.40	0: Universal Input 1: Program No. appointment(The fourth bit)
13	OR-2	011	Program No. appointment (The fifth bit)	No.41	0: Universal Input 1: Program No. appointment(The fifth bit)
14	YW-2	012	Program No. appointment (The sixth bit)	No.42	0: Universal Input 1: Program No. appointment(The sixth bit)
15	GN-2	013	Program No. appointment (LSB : The seventh bit)	No.43	0: Universal Input 1: Program No. appointment(LSB : The seventh bit)
16	BL-2	014	Universal Input	No.44	0: Universal Input 1. Driving Power Interruption Cancellation Input (ON Edge)
17	PL-2	015	Universal Input	No.45	0: Universal Input For the following items, the settings are available only in XSEL-J/K. 1: All Effective Axes Homing (ON Edge) 2: All Increment Effective Axes Homing(ON Edge)
18	GY-2	016	Universal Input		
19	WT-2	017	Universal Input		
20	BK-2	018	Universal Input		
21	BN-3	019	Universal Input		
22	RD-3	020	Universal Input		
23	OR-3	021	Universal Input		
24	YW-3	022	Universal Input		
25	GN-3	023	Universal Input		
26	BL-3	024	Universal Input		
27	PL-3	025	Universal Input		
28	GY-3	026	Universal Input		
29	WT-3	027	Universal Input		
30	BK-3	028	Universal Input		
31	BN-3	029	Universal Input		
32	RD-3	030	Universal Input		
33	OR-3	031	Universal Input		

Output

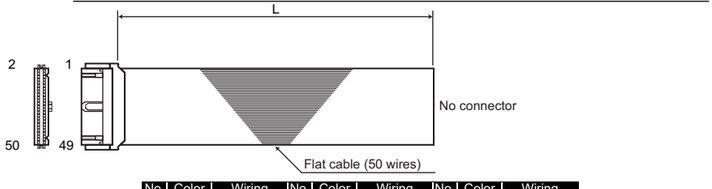
Pin No.	Wire color	Port No.	Standard Setting (At the delivery) (Changeable with I/O parameters)	I/O Parameters	
34	YW-4	300	Error Output at the Operation Cancellation Level or more (OFF)	No.46	0: Universal Output 1: Error output at the operation cancellation level or more (ON) 2: Error output at the operation cancellation level or more (OFF) 3: Error Output at the operation cancellation level or more + emergency stop output (ON) 4: Error Output at the operation cancellation level or more + emergency stop output (OFF)
35	GN-4	301	READY Output (PIO Trigger Program Operation Available, and without occurrence of any error at the cold start level or more) (Main Application Ver. 0.20 or later)	No.47	0: Universal Output 1: READY Output (PIO Trigger Program Operation Available) 2: READY Output (PIO Trigger Program Operation Available) and without occurrence of any error at the operation cancellation level or more (Main Application Ver. 0.20 or later) 3: READY Output (PIO Trigger Program Operation Available) and READY Output (PIO Trigger Program Operation Available, and without occurrence of any error at the cold start level or more or more level or more (Main Application Ver. 0.20 or later)
36	BL-4	302	Emergency-stop output(OFF)	No.48	0: Universal Output 2: Emergency-stop output(ON) 3: Emergency-stop output(OFF)
37	PL-4	303	Universal Output	No.49	0: Universal Output 1: AUTO Mode Output 2: Output during the Automatic Operation (In addition, when the parameter No. 12 is set to “1”)
38	GY-4	304	Universal Output	NO.50	0: Universal Output For the following items, the settings only in XSEL-J/K are available. 1. Output at the time of “All Effective Axes Homing (=0)” 2. Output when all the effective axes homing is completed 3. Output when all the effective axes home preset coordinates are set (Main Application Ver. 0.21 or later) * When the actuator applicable to the absolute encoder is moved to the coordinates “0” or home preset coordinates, use “MOVE” order, not “HOME” order.
39	WT-4	305	Universal Output	NO.51	0: Universal Output 2: Output during the first axis servo ON (Main Application Ver. 0.44 or later)
40	BK-4	306	Universal Output	NO.52	0: Universal Output 2: Output during the second axis servo ON (Main Application Ver. 0.44 or later)
41	BN-5	307	Universal Output	NO.53	0: Universal Output 2: Output during the third axis servo ON (Main Application Ver. 0.44 or later)
42	RD-5	308	Universal Output	NO.54	0: Universal Output 2: Output during the fourth axis servo ON (Main Application Ver. 0.44 or later)
43	OR-5	309	Universal Output	NO.55	
44	YW-5	310	Universal Output	NO.56	
45	GN-5	311	Universal Output	NO.57	
46	BL-5	312	Universal Output	NO.58	
47	PL-5	313	Universal Output	NO.59	0: Universal Output 1: System Memory･Backup Battery Low Voltage Alarm Level or less
48	GY-5	314	Universal Output	NO.60	0: Universal Output 1: Absolute Battery Backup Battery Low Voltage Alarm Level or less All axes OR check: Error level detection is maintained until power ON reset and software reset) (Main Application Ver. 0.28 or later)
49	WT-5	315	Universal Output	NO.61	
50	BK-5		K, KX Type: Connection Not Required J, JZ Type: 0V Input		

BR: Brown, RD: Red, OR: Orange, YW: Yellow, GN: Green, BL: Blue, PL: Purple, GY: Gray, WT: White, BK: Black

I/O Flat Cable

Model: CB-X-PIO□□□

* Enter the cable length (L) in □□□ (up to 10 m)
Example) 080 = 8 m



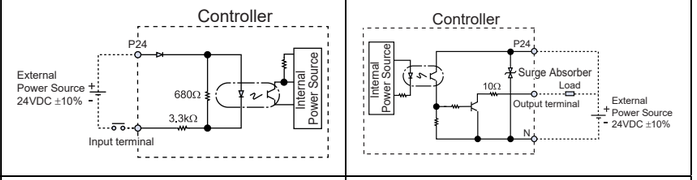
No.	Color	Wiring	No.	Color	Wiring	No.	Color	Wiring
1	BR1	Flat Cable Crimped	18	GY2	Flat Cable Crimped	35	GN4	Flat Cable Crimped
2	RD1		19	WT2		36	BL4	
3	OR1		20	BK2		37	PL4	
4	YW1		21	BR-3		38	GY4	
5	GN1		22	RD3		39	WT4	
6	BL1		23	OR3		40	BK4	
7	PL1		24	YW3		41	BR-5	
8	GY1		25	GN3		42	RD5	
9	WT1		26	BL3		43	OR5	
10	BK1		27	PL3		44	YW5	
11	BR-2		28	GY3		45	GN5	
12	RD2		29	WT3		46	BL5	
13	OR2		30	BK3		47	PL5	
14	YW2		31	BR-4		48	GY5	
15	GN2		32	RD4		49	WT5	
16	BL2		33	OR4		50	BK5	
17	PL2		34	YW4				

BR: Brown, RD: Red, OR: Orange, YW: Yellow, GN: Green, BL: Blue, PL: Purple, GY: Gray, WT: White, BK: Black

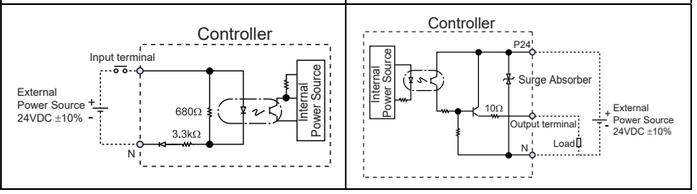
Specifications

Input section			Output section	
Item		Specification	Item	Specification
Input voltage		24VDC ±100%	Load voltage	24VDC
Input current		7mA 1 circuit	Peak load electric current	100mA/1 point 400mA/8 points *1
ON/OFF Voltage	NPN	ON Voltage : Min 16.0VDC OFF Voltage : MAX 5.0VDC	Leak current	MAX 0.1A/1 point
	PNP	ON Voltage : Min 8.0VDC OFF Voltage : MAX 19.0VDC	*5 The total of lead current reaches max. 400mA every 8 ports from output port No. 300.	

NPN

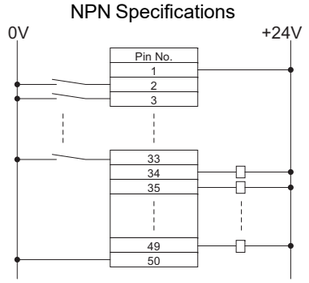


PNP

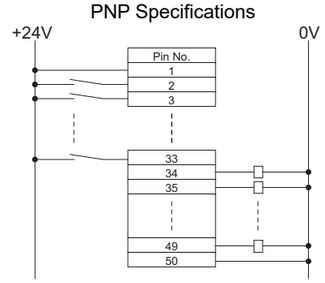


The I/O circuit is an equivalent circuit expressing the logic.

NPN Specifications

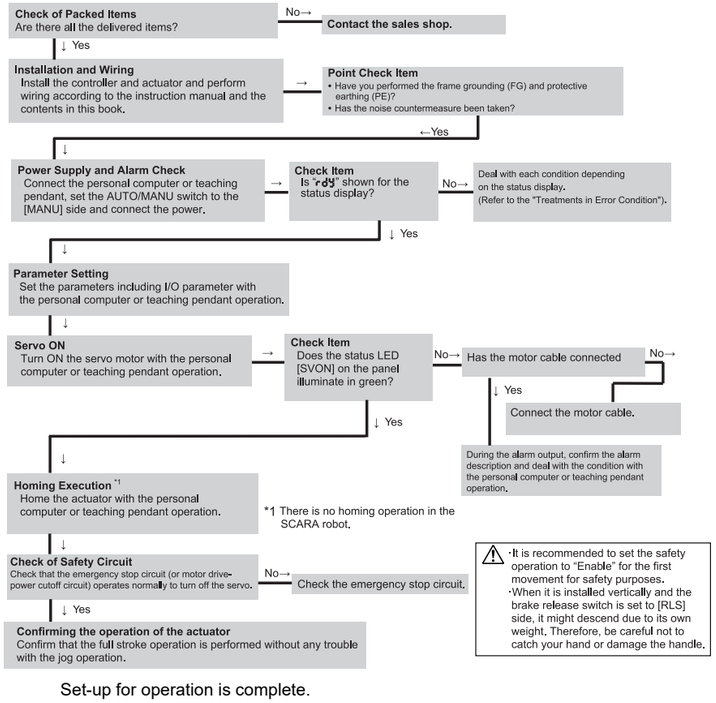


PNP Specifications



Starting Procedures

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



Set-up for operation is complete.

Troubleshooting

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

Status display	Status contents	Cause and Remedy
ErG	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.
oPG	Safety gate remains open.	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 standard personal computer cable or the teaching pendant is connected to the XSEL-KT, KET or KETX controller. Use the personal application software (IX-101-XA-MW) r the teaching pendant (SEL-TD) applicable to the XSEL-KT, KET and KETX controller.
dSF	Deadman switch OFF	It is not an alarm. • 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.
ACF	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.
ECA1	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.
Ed12	Encoder Disconnection Error	It is generated when the cable is broken or the encoder cable is not connected to the controller. Check the wiring.
Ed19	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.
EE69 EE6C	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”.
EdS□	FieldBus Error	It is generated when the fieldbus 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. 18 to “0”.

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