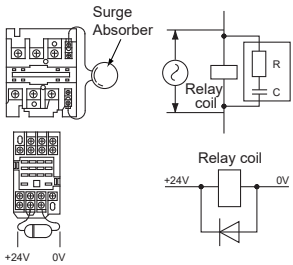


4. Noise Sources and Elimination

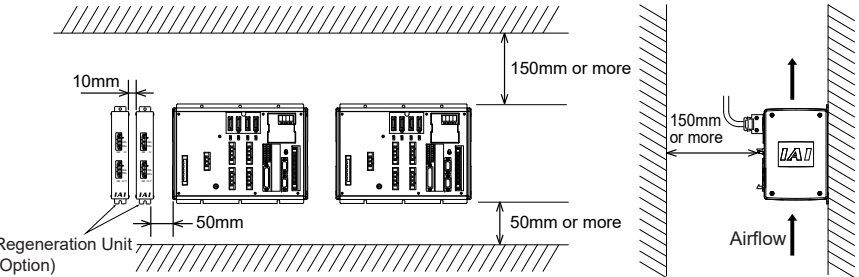
Carry out noise elimination measures for power devices on the same power path and in the same equipment. The following are examples of measures to eliminate noise sources.

- (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.



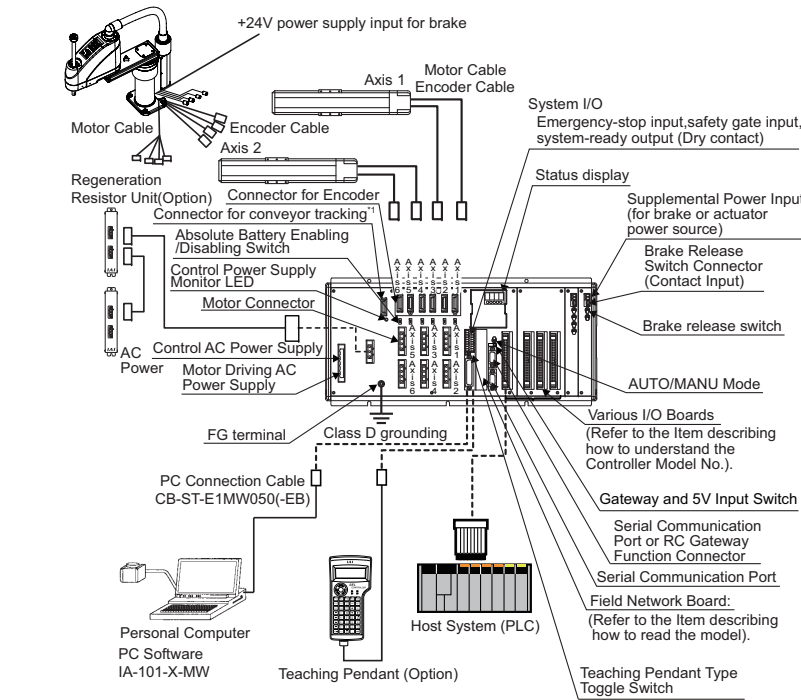
5. Heat Radiation and Installation

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-P, PX, PCT]

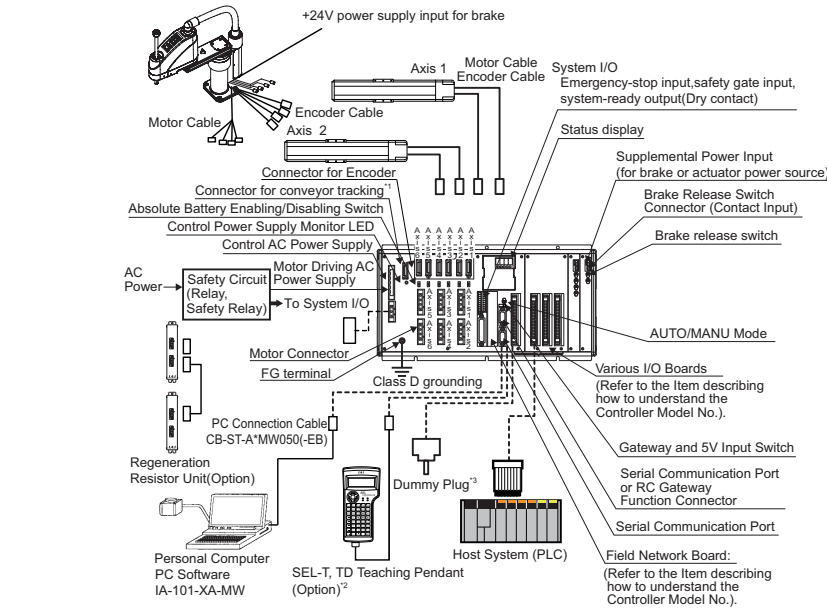


*1 Conveyor Encoder Connector used for Conveyor Tracking

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-2).

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.

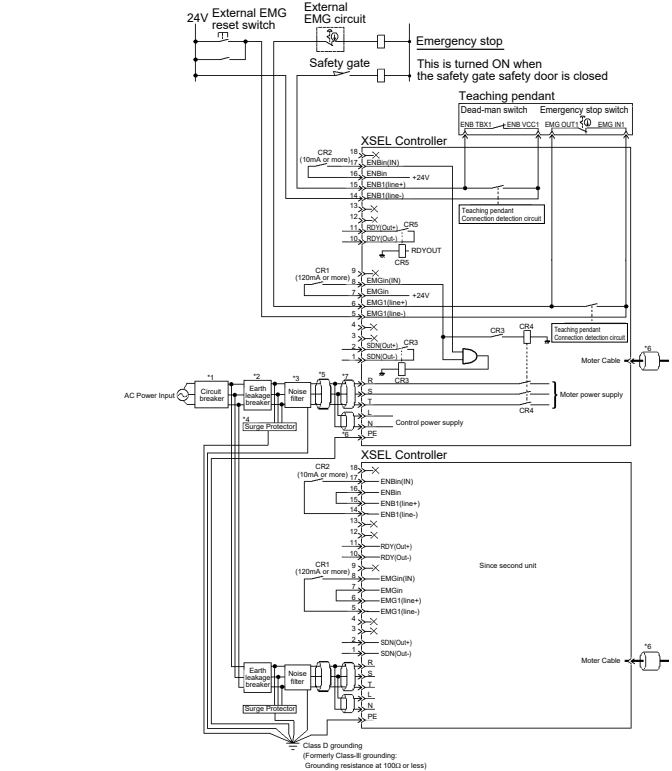
WARNING: The internal components of the controller may burn if the standard cable CB-ST-E1MW050(-EB): Black enclosed in the PC software IA-101-X-MW is used to connect XSEL-Q/QX/QCT to a computer. Even though the PC software can be used, make sure to use the cable CB-ST-A1MW050(-EB): Grey or CB-ST-A2MW050(-EB):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

Power Supply and Emergency Stop Circuit

[XSEL-P, PX, PCT]

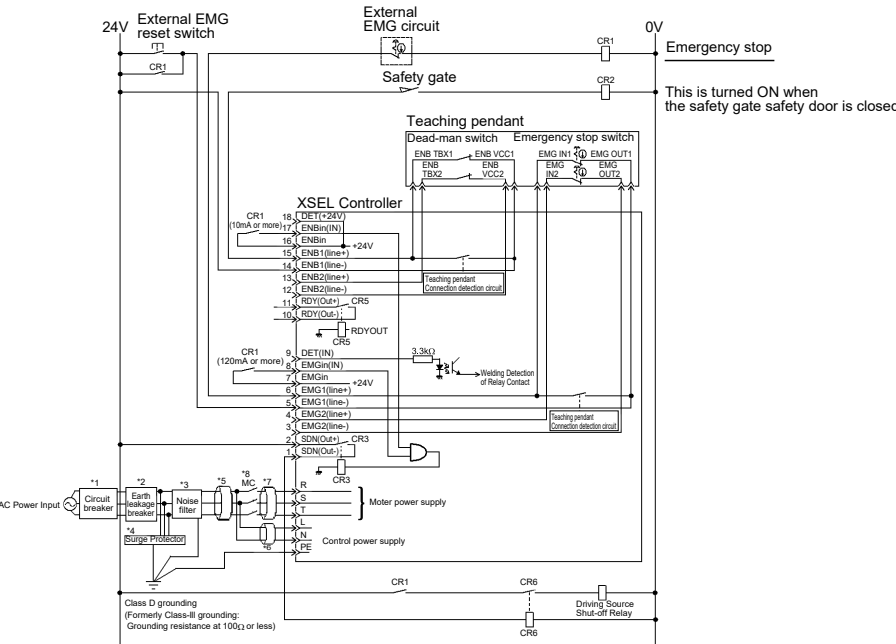
This shows the example of emergency stop for two or more machines, using the emergency stop circuit for the entire machine.

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 signals

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

Input (XSEL - P/Q/PCT/QCT Type)

Pin No.	Wire color	Port No.	Standard Setting (in the delivery) Function	Remarks
				When the unit is delivered, the input is set as shown in the table. However, the input function can be changed using the I/O parameter setting.
1	BR-1	/	+24V Input	Parameter No. *1
2	RD-1	000	Program Start	No.30 Input Function Selection 000 0: Universal Input 1: Program Start (Input Ports 007 to 013BCD Designation) 2: Program Start (Input Ports 007 to 013, Binary Setup) 3: Program Start (Input Ports 008 to 014BCD Designation) 4: Program Start (Input Ports 008 to 014, Binary Setup)
3	OR-1	001	Universal Input	No.31 Input Function Selection 001 0: Universal Input 1: Software Reset
4	YW-1	002	Universal Input	No.32 Input Function Selection 002 0: Universal Input 1: Servo ON signal
5	GN-1	003	Universal Input	No.33 Input Function Selection 003 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 Input Function Selection 004 0: Universal Input 1: All servo-axes soft interlock (OFF level)
7	PL-1	005	Universal Input	No.35 Input Function Selection 005 0: Universal Input 1: Pause Release (ON edge)
8	GY-1	006	Universal Input	No.36 Input Function Selection 006 0: Universal Input 1: Pause Signal (OFF level)
9	WT-1	007	Program No. appointment (MSB)	No.37 Input Function Selection 007 0: Universal Input 1: Program No. appointment (MSB)
10	BK-1	008	Program No. appointment (The second bit)	No.38 Input Function Selection 008 0: Universal Input 1: Program No. appointment (The second bit)
11	BR-2	009	Program No. appointment (The third bit)	No.39 Input Function Selection 009 0: Universal Input 1: Program No. appointment (The third bit)
12	RD-2	010	Program No. appointment (The fourth bit)	No.40 Input Function Selection 010 0: Universal Input 1: Program No. appointment (The fourth bit)
13	OR-2	011	Program No. appointment (The fifth bit)	No.41 Input Function Selection 011 0: Universal Input 1: Program No. appointment (The fifth bit)
14	YW-2	012	Program No. appointment (The sixth bit)	No.42 Input Function Selection 012 0: Universal Input 1: Program No. appointment (The sixth bit)
15	GN-2	013	Program No. appointment (LSB: The seventh bit)	No.43 Input Function Selection 013 0: Universal Input 1: Program No. appointment (LSB: The seventh bit)
16	BL-2	014	Universal Input	No.44 Input Function Selection 014 0: Universal Input 1: Driving Power Interruption Cancellation Input (ON Edge)
17	PL-2	015	Universal Input	No.45 Input Function Selection 015 0: Universal Input 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	BR-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	BR-4	029	Universal Input	
32	RD-4	030	Universal Input	
33	OR-4	031	Universal Input	

*1 Set the input functions using the I/O parameter Nos. 30 to 45 (Input Function Selection 000 to 015) and set the port Nos. that assign each of the set functions, using the I/O parameter Nos. 283 to 298.

Output (XSEL - P/Q/PCT/QCT Type)

Pin No.	Wire color	Port No.	Standard Setting (in the delivery) Function	Remarks
				When the unit is delivered, the output is set as shown in the table. However, the output function can be changed using the I/O parameter setting.
34	YW-4	300	Error Output at the Operation Cancellation Level or more (OFF)	Parameter No. *1 No.46 Output Function Selection 300 (Area 2) 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 Output Function Selection 301 (Area 2) 0: Universal Input 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 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
36	BL-4	302	Emergency-stop output (OFF)	No.48 Output Function Selection 302 (Area 2) 0: Universal Input 2: Emergency-stop output (ON) 3: Emergency-stop output (OFF)
37	PL-4	303	Universal Input	No.49 Output Function Selection 303 (Area 2) 0: Universal Input 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 Input	No.50 Output Function Selection 304 (Area 2) 0: Universal Input 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 * 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 Input	No.51 Output Function Selection 305 (Area 2) 0: Universal Input 2: Output during the first axis servo ON

40	BK-4	306	Universal Input	No.52 Output Function Selection 306 (Area 2) 0: Universal Input 2: Output during the second axis servo ON
41	BR-5	307	Universal Input	No.53 Output Function Selection 307 (Area 2) 0: Universal Input 2: Output during the third axis servo ON
42	RD-5	308	Universal Input	No.54 Output Function Selection 308 (Area 2) 0: Universal Input 2: Output during the fourth axis servo ON
43	OR-5	309	Universal Input	No.55 Output Function Selection 309 (Area 2) 0: Universal Input 2: Output during the fifth axis servo ON
44	YW-5	310	Universal Input	No.56 Output Function Selection 310 (Area 2) 0: Universal Input 2: Output during the sixth axis servo ON
45	GN-5	311	Universal Input	No.57 Output Function Selection 311 (Area 2)
46	BL-5	312	Universal Input	No.58 Output Function Selection 312 (Area 2)
47	PL-5	313	Universal Input	No.59 Output Function Selection 313 (Area 2) 0: Universal Input 1: System MemoryBackup Battery Low Voltage Alarm Level or less
48	GY-5	314	Universal Input	No.60 Output Function Selection 314 (Area 2) 0: Universal Input 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)
49	WT-5	315	Universal Input	No.61 Output Function Selection 315 (Area 2)
50	BK-5	/	0V Input	

*1 Set the output functions using the I/O parameter Nos. 46 to 61 (Output Function Selection 300 to 315) and set the port Nos. that assign each of the set functions, using the I/O parameter Nos. 299 to 314. Also, setting the output functions using the I/O parameter Nos. 46 to 61 (Output Function Selection 300 Area 2 to 315 Area 2) and setting the Port Nos. that assign each of the set functions, using the I/O parameter Nos. 315 to 330, are available.

Input (XSEL - PX/QX Type)

Pin No.	Wire color	Port No.	Standard Setting (in the delivery) Function	I/O Parameter
1	BR-1	/	+24V Input	
2	RD-1	000	Program Start	0: Universal Input 1: Program Start (Input Ports 007 to 013BCD Designation) 2: Program Start (Input Ports 007 to 013, Binary Setup) 3: Program Start (Input Ports 008 to 014BCD Designation) 4: Program Start (Input Ports 008 to 014, Binary Setup)
3	OR-1	001	Universal Input	0: Universal Input 1: Software Reset
4	YW-1	002	Universal Input	0: Universal Input 1: Servo ON signal
5	GN-1	003	Universal Input	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	0: Universal Input 1: All servo-axes soft interlock (OFF level)
7	PL-1	005	Universal Input	0: Universal Input 1: Pause Release (ON edge)
8	GY-1	006	Universal Input	0: Universal Input 1: Pause Signal (OFF level)
9	WT-1	007	Program No. appointment (MSB)	0: Universal Input 1: Program No. appointment (MSB)
10	BK-1	008	Program No. appointment (The second bit)	0: Universal Input 1: Program No. appointment (The second bit)
11	BR-2	009	Program No. appointment (The third bit)	0: Universal Input 1: Program No. appointment (The third bit)
12	RD-2	010	Program No. appointment (The fourth bit)	0: Universal Input 1: Program No. appointment (The fourth bit)
13	OR-2	011	Program No. appointment (The fifth bit)	0: Universal Input 1: Program No. appointment (The fifth bit)
14	YW-2	012	Program No. appointment (The sixth bit)	0: Universal Input 1: Program No. appointment (The sixth bit)
15	GN-2	013	Program No. appointment (LSB: The seventh bit)	0: Universal Input 1: Program No. appointment (LSB: The seventh bit)
16	BL-2	014	Universal Input	0: Universal Input 1: Driving Power Interruption Cancellation Input (ON Edge)
17	PL-2	015	Universal Input	0: Universal Input 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	BR-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	BR-4	029	Universal Input	
32	RD-4	030	Universal Input	
33	OR-4	031	Universal Input	

*1 The assignment of I/O port input function for X-SEL PX/QX type controllers is fixed and cannot be changed.

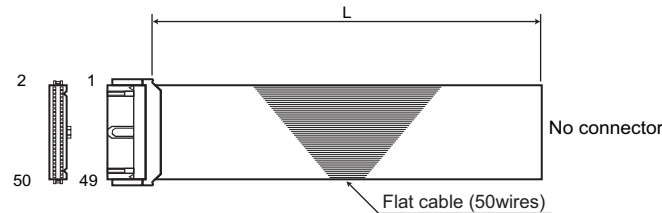
Output (XSEL - PX/QX Type)

Pin No.	Wire color	Port No.	Standard Setting (in the delivery) Changeable with I/O parameter	
34	YW-4	300	Error Output at the Operation Cancellation Level or more (OFF)	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)	0: Universal Input 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 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
36	BL-4	302	Emergency-stop output (OFF)	0: Universal Input 2: Emergency-stop output (ON) 3: Emergency-stop output (OFF)
37	PL-4	303	Universal Input	0: Universal Input 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 Input	0: Universal Input 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 * 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 Input	0: Universal Input 2: Output during the first axis servo ON
40	BK-4	306	Universal Input	0: Universal Input 2: Output during the second axis servo ON
41	BR-5	307	Universal Input	0: Universal Input 2: Output during the third axis servo ON
42	RD-5	308	Universal Input	0: Universal Input 2: Output during the fourth axis servo ON
43	OR-5	309	Universal Input	0: Universal Input 2: Output during the fifth axis servo ON
44	YW-5	310	Universal Input	0: Universal Input 2: Output during the sixth axis servo ON
45	GN-5	311	Universal Input	
46	BL-5	312	Universal Input	
47	PL-5	313	Universal Input	0: Universal Input 1: System MemoryBackup Battery Low Voltage Alarm Level or less
48	GY-5	314	Universal Input	0: Universal Input 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)
49	WT-5	315	Universal Input	
50	BK-5	/	0V Input	

*1 The assignment of I/O port output function for X-SEL PX/QX type controllers is fixed and cannot be changed.

I/O Flat cable

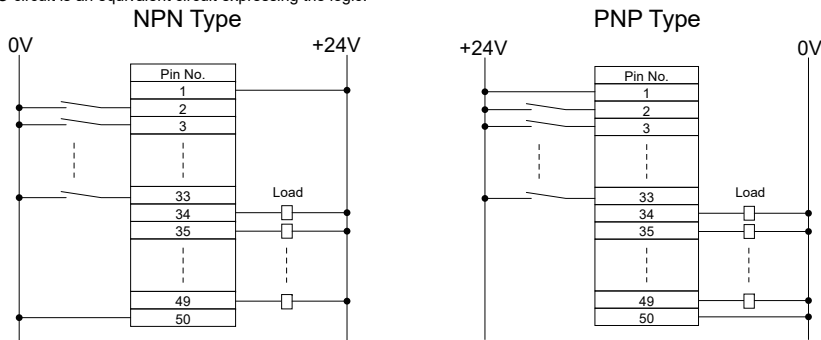
Model: CB-X-PIO□□□□ * Enter the cable length (L) in □□□ (up to 10m)
Example) 080 = 8m



No.	Color	Wiring	No.	Color	Wiring	No.	Color	Wiring
1	BR 1		18	GY 2		35	GN 4	
2	RD 1		19	WT 2		36	BL 4	
3	OR 1		20	BK 2		37	PL 4	
4	YW 1		21	BR-3		38	GY 4	
5	GN 1		22	RD 3		39	WT 4	
6	BL 1		23	OR 3		40	BK 4	
7	PL 1		24	YW 3		41	BR-5	
8	GY 1		25	GN 3		42	RD 5	
9	WT 1	Flat cable (Crimped)	26	BL 3	Flat cable (Crimped)	43	OR 5	Flat cable (Crimped)
10	BK 1		27	PL 3		44	YW 5	
11	BR 2		28	GY 3		45	GN 5	
12	RD 2		29	WT 3		46	BL 5	
13	OR 2		30	BK 3		47	PL 5	
14	YW 2		31	BR-4		48	GY 5	
15	GN 2		32	RD 4		49	WT 5	
16	BL 2		33	OR 4		50	BK 5	
17	PL 2		34	YW 4				

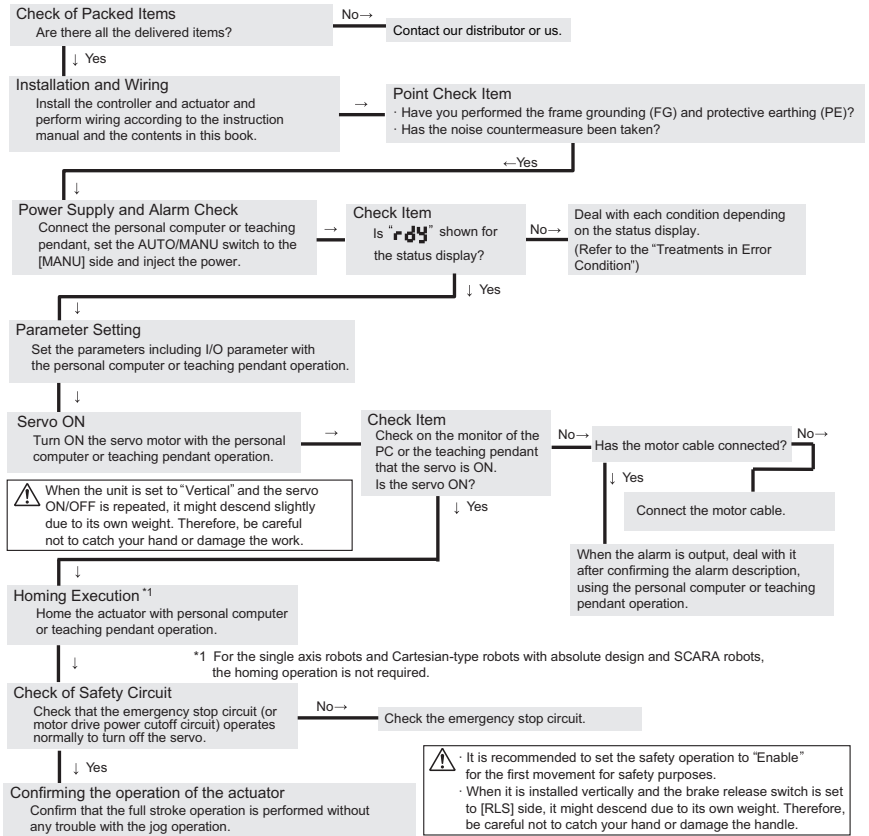
Specifications	Input section		Output section	
	Item	Specification	Item	Specification
	Input voltage	24VDC ±10%	Load voltage	24VDC
	Input current	7mA	Peak load electric	100mA/1 point 400mA/8 point*2
ON/OFF Voltage	NPN	ON Voltage : MIN. 16.0VDC OFF Voltage : MAX. 5.0VDC	Leak current	MAX. 0.1mA
	PNP	ON Voltage : MIN. 8.0VDC OFF Voltage : MAX. 19.0VDC	*1 The total of lead current reaches max. 400mA every 8 points from output port No.300.	
NPN				
PNP				

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



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

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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TEL 01254-685900
website: www.lcautomation.com

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