

Program Controller
XSEL Series **XSEL-RA/SA**



A single controller can operate up to 40 axes. Greater capacity as compared with the conventional XSEL controller

1

■ Corresponds to actuators with built-in battery-less absolute encoders as standard.

Corresponds to actuators with built-in battery-less absolute encoders as standard. No battery maintenance is required since there is no battery. Since home-return operation is not required at start up or after emergency stop or malfunction, this reduces your operation time, resulting in reduced production costs.

The advantages of battery-less

1. Periodic replacement of the battery is not required.
2. No installation space for battery required.
3. Battery-related errors do not occur.



Battery-less Absolute Encoder

No Battery, No Maintenance,
No Homing, and No Price Increase.
No Going Back to Incremental.



2

■ Shortening of program processing time

The processing capacity has been enhanced due to the improved performance of on-board CPU. This increases the SEL language instruction processing speed, which allows the program processing time to be shortened.

(Example)

Instruction words	Controller	Instruction processing time (ms)
Division instruction DIV (Local integer)	Conventional models	
	RA/SA	Approx. 1/15 reduced
Output processing instruction BTON	Conventional models	
	RA/SA	Approx. 1/5 reduced

3

■ Improved functions

The data capacity has been significantly expanded as compared with the conventional XSEL controller.

	RA/SA		R/S	P/Q
No. of programs	255	2 times	128	128
No. of steps	20,000	2 times	9,999	9,999
No. of position data	25,384 (8-axis)	1.5 times	16,000 (8-axis)	20,000 (6-axis)

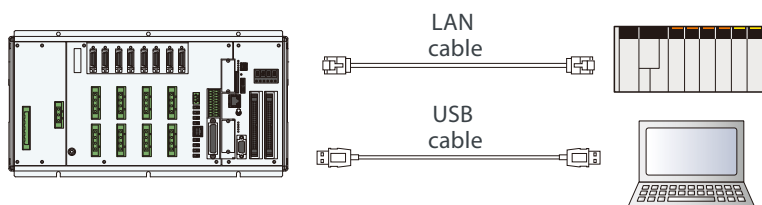
More advanced XSEL-RA/SA is now available!

4

Compliant with Ethernet/USB as standard

Equipped with Ethernet and USB port as the PC software interface and general message communication interface.

	Controller side connector	Communication speed
Ethernet	10/100/1,000BASE-T (RJ-45)	10/100/1,000Mbps
USB	USB2.0 (Mini-B)	480M (High speed) 12Mbps (Full speed)



5

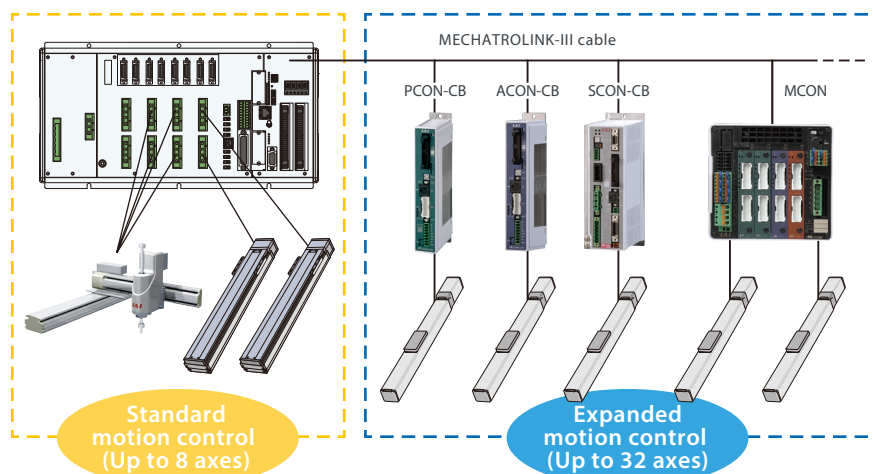
Expanded motion control

Up to 32 axes of IAI position controller with MECHATROLINK III can be connected to perform program control using the XSEL controller.

[Connectable controllers: PCON-CB, ACON-CB, DCON-CB, SCON-CB, MCON, MECHATROLINK III specifications]

Up to 40 axes can be operated and controlled using a single controller in combination with up to 8 connected axes of the XSEL controller. Capable of operating at the positioner function and synchronization control function (*).

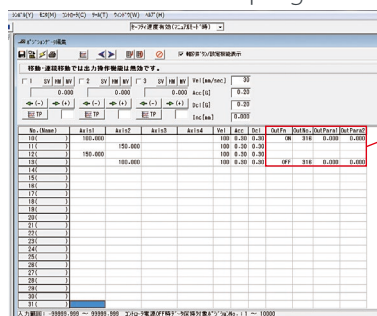
* The SCARA robot controller cannot use the synchronization control function.



6

External equipment can be controlled easily

Output operation data field has been added to the positioning data. Signals for controlling external equipment can be easily output for each target position. This eliminates the conventionally required time to create a program to send the signal.



OutFn	OutNo.	OutPara1	OutPara2
ON	316	0.000	0.000
OFF	316	0.000	0.000

Output operation data item

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Extensive network compatible

Option

"DeviceNet", "CC-Link" or "PROFIBUS" can be used simultaneously with "EtherNet/IP (*)" or "EtherCAT".

* Capable of Ethernet communication.



Positioning data editing screen



X-SEL

Program Controller for Single-axis Robot, Cartesian Robot, Linear Servo, RCS3/RCS2 Series and SCARA Robot



List of Models


Multi-axis program controller that can operate servo motor type actuators. Allows simultaneous control of up to 8 axes.

Type Name	RA	SA
Name	High-function type	High-function type (Safety category compatible type)
External view		
Type	Standard specification	Safety category specification
Max. no. of connected axes	8 axes	
No. of programs	255 points	
No. of program steps	20,000 steps	
No. of positions (*1)	1-axis: 55,000; 3-axis: 41,250; 5-axis: 33,000; 7-axis: 27,500 2-axis: 47,142; 4-axis: 36,666; 6-axis: 30,000; 8-axis: 25,384	
Total no. of connectable W (*2)	Single-phase 1,600W/Three-phase 2,400W	
Motor power	Single-phase 200VAC/Three-phase 200VAC	
Control power supply	Single-phase 200VAC	
Safety category (*3)	B	Safety category 4 compatible
Safety standard	CE compliant	

(*1) The number of positions varies by the number of axes supported by the controller.

(*2) In vertical motion, the maximum output per axis will be limited to under 600W.

(*3) To comply to the safety category, the customer will need to install a safety circuit outside the controller.

Type Name	RAX	SAX	RAXD8	SAXD8
Name	SCARA 1-unit, single-axis and cartesian specification		SCARA 2-unit specification	
External view				
Type	Standard specification	Safety category specification	Standard specification	Safety category specification
Max. no. of connected axes	8 axes			
No. of programs	255 points			
No. of program steps	20,000 steps			
No. of positions (*1)	1-axis: 55,000; 3-axis: 41,250; 5-axis: 33,000; 7-axis: 27,500 2-axis: 47,142; 4-axis: 36,666; 6-axis: 30,000; 8-axis: 25,384			
Total no. of connectable W (*2)	Three-phase 2,400W			
Motor power	Three-phase 200VAC			
Control power supply	Single-phase 200VAC			
Safety category (*3)	B	Safety category 4 compatible	B	Safety category 4 compatible
Safety standard	CE compliant			

(*1) The number of positions varies by the number of axes supported by the controller.

(*2) In vertical motion, the maximum output per axis will be limited to under 600W.

(*3) To comply to the safety category, the customer will need to install a safety circuit outside the controller.

Model

■ Single-axis and cartesian specifications XSEL-RA/SA type

Note: When selecting more than one option, please write in alphabetical order. (Example: brake + home sensor -> BL)

(Details of the 1st axis) (Details of the 2nd~8th axis)

XSEL - [] - [] - [] [] [] [] - ([] [] []) - [] [] - [] [] - [] [] - [] []

Series Type Number of Connected Axes Motor Type Encoder Type Options Motor Type Encoder Type Options Network Dedicated Slots (Slot 1) (Slot 2) I/O Slots (Slot 1) (Slot 2) I/O Cable Length Power Supply Voltage

RA	Standard specification	
SA	Safety category specification	

1	1-axis	5	5-axis
2	2-axis	6	6-axis
3	3-axis	7	7-axis
4	4-axis	8	8-axis

12	12W servo motor	150	150W servo motor
20	20W servo motor	200	200W servo motor
30D	30W servo motor for RCS2	200S	For LSA-S10/N15
30R	30W servo motor for RS	400	400W servo motor
60	60W servo motor	600	600W servo motor
100	100W servo motor	750	750W servo motor
100S	For LSAS-N10		

WAI	Battery-less abs. Incremental
A	Absolute
G	Quasi absolute
AI	Index absolute
AM	Multi-rotation abs.

E	Not used	E	Not used
EP	EtherNet/IP	DV	DeviceNet
EC	EtherCAT	CC	CC-Link
		PR	PROFIBUS-DP

0	No cable
2	2m (Standard)
3	3m
5	5m

B	Brake equipped specification
C	Creep sensor specification
HA	Hi-accel./decel. specification
L	Home sensor/LS compatible
M	Master axis specified
S	Slave axis specified

E	Not used	P1	Input 32/Output 16 (PNP)
N1	Input 32/Output 16 (NPN)	P2	Input 16/Output 32 (PNP)
N2	Input 16/Output 32 (NPN)	P3	Input 48/Output 48 (PNP)
N3	Input 48/Output 48 (NPN)		

(*) Selectable boards are fixed for the network dedicated slot. Select one among the options and enter symbol.
 (*) The network dedicated slot and I/O slot can be used together.

2	Single-phase 200V
2L	Dedicated linear single-phase 200V
3	Three-phase 200V
3L	Dedicated linear three-phase 200V

(*) 2L/3L is selected when LSAS is connected

* Notes when single-axis robot and cartesian robot are selected
 The total wattage of the single-axis robot and cartesian robot that can be connected to XSEL-RA/SA is 2,400W for the three-phase specification and 1,600W for the single-phase specification.
 Although the maximum wattage per axis is 750W, please make sure that the total wattage of each axis does not exceed the specified wattage.

■ Actuators that cannot be connected

Please note that the following models cannot be operated with XSEL-RA/SA.

- LSA series (excluding LSAS Series) · RCS2-SRA7/SRGS7/SRGD7 Series · RCS3-CTZ5C/CT8C
- RCS2-RA13R (With load cell) · RCS3-RA4R/RA6R/RA7R/RA8R/RA10R/RA15R/RA20R
- Incremental types of following models
 RCS2-□□5N Series NS-SXM□/SZM□

■ The maximum connectable actuators when connecting LSAS (linear servo actuator)

When connecting the LSAS series to the single-phase specification, please calculate the total wattage based on the "Output value for controller wattage calculation" in the table below.
 In addition, make sure that the total wattage of LSAS and actuators other than LSAS is equal to or less than 1,600W.

LSAS motor wattage conversion table in single-phase specification

Actuator type	Applicable driver output [W]	No. of sliders [pcs]	Output value for controller wattage calculation [W]
N10SS	100	1	300
N10SM	100	2	600
N15SS	200	1	600
N15SM	200	2	1,200
N15HS	200	1	600
N15HM	200	2	1,200

■ The maximum connectable actuators when connecting direct drive motor

When connecting the DD/DDA motor series, please calculate the total wattage based on the "Output value for controller wattage calculation" in the table below and make sure it does not exceed the maximum number of connected units.
 In addition, make sure that the total wattage of DD/DDA Series and actuators other than DD/DDA Series is equal to or less than 1,600W.

DD/DDA motor wattage conversion table in single-phase specification connection

Actuator type	Applicable driver output [W]	Max. no. of connected units of DD/DDA motor [unit]	Output value for controller wattage calculation [W]
T18S/T18CS	200	2	600
LT18S/LT18CS	200	2	600
H18S/H18CS	600	1	1,200
LH18S/LH18CS	600	1	1,200

DD/DDA motor wattage conversion table in three-phase specification connection

Actuator type	Applicable driver output [W]	Max. no. of connected units of DD/DDA motor [unit]	Output value for controller wattage calculation [W]
T18S/T18CS	200	8	200
LT18S/LT18CS	200	8	200
H18S/H18CS	600	2	600
LH18S/LH18CS	600	2	600

■ SCARA, single-axis and cartesian specifications

XSEL-RAX□/SAX□ type

XSEL - [] - [] - (Details of the 5th~8th axis) - [] [] - [] [] - [] [] - [] []

Series Type SCARA Type Motor Type Encoder Type Options Network Dedicated Slots (Slot 1) (Slot 2) I/O Slots (Slot 1) (Slot 2) I/O Cable Length Power Supply Voltage

RAX4	SCARA 1 unit
RAX5	SCARA +1-axis
RAX6	SCARA +2-axis
RAX7	SCARA +3-axis
RAX8	SCARA +4-axis
SAX4	SCARA 1-unit global spec.
SAX5	SCARA +1-axis global spec.
SAX6	SCARA +2-axis global spec.
SAX7	SCARA +3-axis global spec.
SAX8	SCARA +4-axis global spec.

WAI	Battery-less abs. Incremental
A	Absolute
G	Quasi absolute
AI	Index absolute
AM	Multi-rotation abs.

B	Brake equipped specification
C	Creep sensor specification
HA	Hi-accel./decel. specification
L	Home sensor/LS compatible
M	Master axis specified
S	Slave axis specified

E	Not used
DV	DeviceNet
CC	CC-Link
PR	PROFIBUS-DP

E	Not used
EP	EtherNet/IP
EC	EtherCAT

E	Not used
N1	Input 32/Output 16 (NPN)
N2	Input 16/Output 32 (NPN)
N3	Input 48/Output 48 (NPN)
P1	Input 32/Output 16 (PNP)
P2	Input 16/Output 32 (PNP)
P3	Input 48/Output 48 (PNP)

(*) Selectable boards are fixed for the network dedicated slot.
 (*) The network dedicated slot and I/O slot can be used together.

NNN1205~8040H	Standard type	TNN3015H~3515H	Wall-mounting type
NNN1205B~1805B	Standard ultra-compact type with brake	UNN3015H~3515H	Wall-mounting inverse type
NSN5016H~6016H	High-speed type	HNN5020H~8040H	Ceiling-mounting type
NNC1205~8040H	Clean room type	INN5020H~8040H	Inverse type
NNC1205B~1805B	Clean room ultra-compact type with brake		
NNW2515H~8040H	Splash-proof type		

Note: When the brake option is selected with IX-NNN or NNC 1205/1505/1805, be sure to specify the model number of the IX type with the brake option (1205B/1505B/1805B).

12	12W servo motor	150	150W servo motor
20	20W servo motor	200	200W servo motor
30D	30W servo motor for RCS2	200S	For LSA-S10/N15
30R	30W servo motor for RS	400	400W servo motor
60	60W servo motor	600	600W servo motor
100	100W servo motor	750	750W servo motor
100S	For LSAS-N10		

0	No cable
2	2m (Standard)
3	3m
5	5m

3 Three-phase 200V

XSEL - [] - [] - [] - [] [] - [] [] - [] [] - [] []

Series Type SCARA Type 1 SCARA Type 2 Network Dedicated Slots (Slot 1) (Slot 2) I/O Slots (Slot 1) (Slot 2) I/O Cable Length Power Supply Voltage

RAXD8	SCARA 2-unit specification
SAXD8	SCARA 2-unit global specification

E	Not used
DV	DeviceNet
CC	CC-Link
PR	PROFIBUS-DP

E	Not used
EP	EtherNet/IP
EC	EtherCAT

E	Not used
N1	Input 32/Output 16 (NPN)
N2	Input 16/Output 32 (NPN)
N3	Input 48/Output 48 (NPN)
P1	Input 32/Output 16 (PNP)
P2	Input 16/Output 32 (PNP)
P3	Input 48/Output 48 (PNP)

0	No cable
2	2m (Standard)
3	3m
5	5m

3 Three-phase 200V

Note: When the brake option is selected with IX-NNN or NNC 1205/1505/1805, be sure to specify the model number of the IX type with the brake option (1205B/1505B/1805B).

■ Actuators that cannot be connected

Please note that the following models cannot be operated with the 5th~8th axis of XSEL-RAX/SAX.

· LSA Series (excluding LSAS Series) · RCS2-SRA7/SRG57/SRGD7 Series · RCS3-CTZ5C/CT8C · RCS2-RA13R (with load cell) · RCS3-RA4R/RA6R/RA7R/RA8R/RA10R/RA15R/RA20R

· Incremental types of following models

RCS2-□□5N Series NS-SXM□/SZM□

■ The limit of connectable additional axis actuators when connecting to XSEL-RAX/SAX

For SCARA controllers, there is a limit to the total wattage of the additional axis actuator motor that can be connected besides SCARA robots. Make sure that it does not exceed the "total wattage and number of connectable axes" in the following table.

SCARA type		Total wattage and number of connectable axes	
		Three-phase specification	
Ultra-compact	NN*1205 / NN*1505 / NN*1805	1,500W	4 axes (Up to 750W per axis)
Compact	NN*2515H / TNN3015H / UNN3015H NN*3515H / TNN3515H / UNN3515H	1,500W	4 axes (Up to 750W per axis)
Medium	NN*50□□H / HNN5020H / INN5020H NN*60□□H / HNN6020H / INN6020H	600W	4 axes (Up to 600W per axis)
Large	NN*70□□H / HNN70□□H / INN70□□H NN*80□□H / HNN80□□H / INN80□□H	No	
High-speed	NSN5016H / NSN6016H	No	

■ The limit of connectable SCARA robots when connecting to XSEL-RAXD/SAXD

Up to 2 SCARA robots can be connected to the SCARA controller, but there is a limit to the combination. Select the connectable combinations.

SCARA type for SCARA 2-unit specification			
First unit		Second unit	
Ultra-compact	NN*1205 / NN*1505 / NN*1805	Ultra-compact	Medium
Compact	NN*2515H / NN*3515H TNN3015H / UNN3015H TNN3515H / UNN3515H		Compact
Medium	NN*50□□H / NN*60□□H HNN5020H / INN5020H HNN6020H / INN6020H		
Large	NN*70□□H / NN*80□□H HNN70□□H / INN70□□H HNN80□□H / INN80□□H	No	
High-speed	NSN5016H / NSN6016H	No	

System Configuration

XSEL-RA/SA Type

Option

PC software

● RS232 connection

(See P.13)

<Model IA-101-X-MW> (For RA)

<Model IA-101-X-USBMW> (For RA)

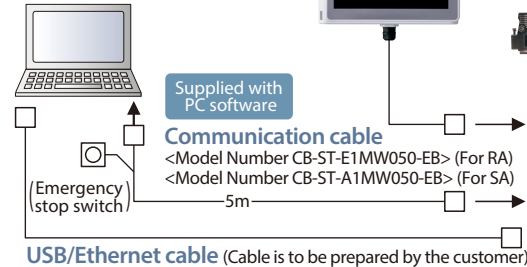
<Model IA-101-XA-MW> (For SA)

● USB/Ethernet connection

(See P.14)

<Model Number IA-101-N>

* Ver. 13.00.00.00 or later



USB/Ethernet cable (Cable is to be prepared by the customer)

Supplied with actuator

Motor cable
Motor robot cable
Encoder cable
Encoder robot cable

These items will be provided if the cable length is specified in the actuator model number. (See P.15~18)

Connectable actuators

<Single-axis Robot, Cartesian Robot, Linear Servo, RCS2/RCS3 Series>

XSEL-RAX/RAXD/SAX/SAXD Type

Option

PC software

● RS232 connection

(See P.13)

<Model Number IA-101-X-MW> (For RAX/RAXD)

<Model Number IA-101-X-USBMW> (For RAX/RAXD)

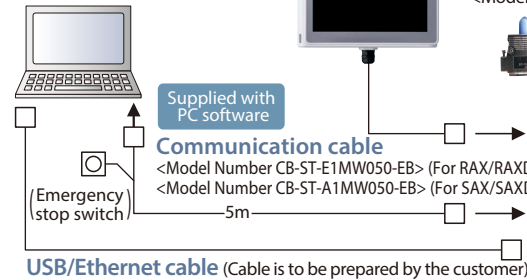
<Model Number IA-101-XA-MW> (For SAX/SAXD)

● USB/Ethernet connection

(See P.14)

<Model Number IA-101-N>

* Ver. 13.00.00.00 or later



USB/Ethernet cable (Cable is to be prepared by the customer)

Supplied with actuator

RAX/SAX
Motor cable
Motor robot cable
Encoder cable
Encoder robot cable

These items will be provided if the cable length is specified in the actuator model number. (See P.15~18)

Connectable actuators (5th~8th axis)

<Single-axis Robot, Cartesian Robot, Linear Servo, RCS2/RCS3 Series>

RAX/SAX
● 1st~4th axis:
IX Series
RAXD/SAXD
● 1st~8th axis:
IX Series (2 units)

Notes

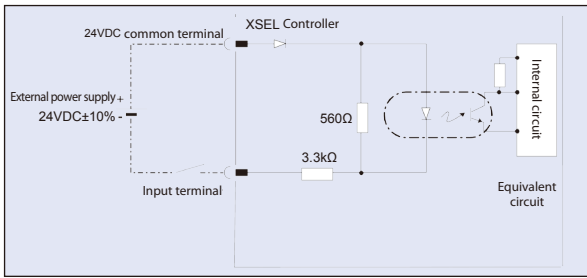
The motor cable and encoder cable of the SCARA robot depends on the type of SCARA. Please see the SCARA robot specification for more information.

(Note 1) When connecting an actuator with brake, the brake power supply +24V is required.

I/O Wiring Diagram

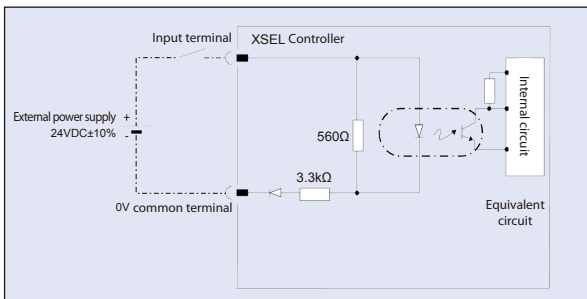
Input External input specification (NPN specification)

Item	Specification
Input voltage	24VDC ± 10%
Input current	7mA, 1 circuit
ON/OFF voltage	ON voltage: min. 16.0VDC; OFF voltage: max. 5.0VDC
Isolation method	Photocoupler isolation



Input External input specification (PNP specification)

Item	Specification
Input voltage	24VDC ± 10%
Input current	7mA, 1 circuit
ON/OFF voltage	ON voltage: min. 8VDC; OFF voltage: max. 19VDC
Isolation method	Photocoupler isolation

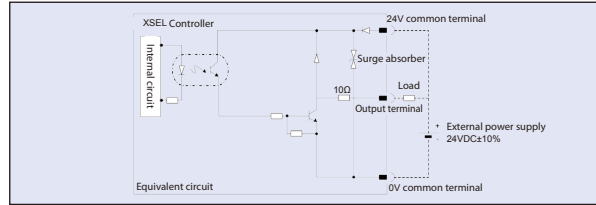


Output External input specification (NPN specification)

Item	Specification
Load voltage	24VDC
Maximum load current	100mA/1 point 400mA/8 ports. (Note)
Leakage current	Max. 0.1mA/1 contact
Isolation method	Photocoupler isolation

TD62084 (equivalent) used

Note: The maximum load current will be 400mA per 8 ports from the output port No.300. (The maximum load current between the output port No.300 + n and No.300 + n + 7 is 400mA. n = 0 or multiple of 8.)

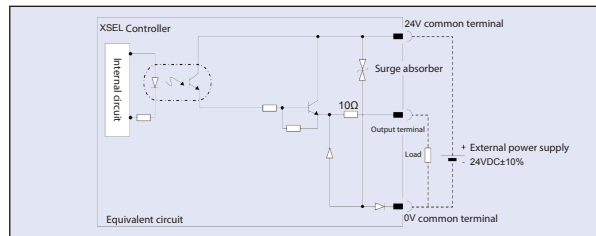


Output External input specification (PNP specification)

Item	Specification
Load voltage	24VDC
Maximum load current	100mA/1 point 400mA/8 ports. (Note)
Leakage current	Max. 0.1mA/1 contact
Isolation method	Photocoupler isolation

TD62784 (equivalent) used

Note: The maximum load current will be 400mA per 8 ports from the output port No.300. (The maximum load current between the output port No.300 + n and No.300 + n + 7 is 400mA. n = 0 or multiple of 8.)



I/O Signal Table

Standard I/O signal table (When N1 or P1 is selected)

Pin No.	Category	Port No.	Standard setting
1		-	24V connection
2		000	Program start
3		001	General-purpose input
4		002	General-purpose input
5		003	General-purpose input
6		004	General-purpose input
7		005	General-purpose input
8		006	General-purpose input
9		007	Program No. (PRG No.1)
10		008	Program No. (PRG No.2)
11		009	Program No. (PRG No.4)
12		010	Program No. (PRG No.8)
13		011	Program No. (PRG No.10)
14		012	Program No. (PRG No.20)
15		013	Program No. (PRG No.40)
16		014	General-purpose input
17	Input	015	General-purpose input
18		016	General-purpose input
19		017	General-purpose input
20		018	General-purpose input
21		019	General-purpose input
22		020	General-purpose input
23		021	General-purpose input
24		022	General-purpose input
25		023	General-purpose input
26		024	General-purpose input
27		025	General-purpose input
28		026	General-purpose input
29		027	General-purpose input
30		028	General-purpose input
31		029	General-purpose input
32		030	General-purpose input
33		031	General-purpose input
34		300	Alarm output
35		301	Ready output
36		302	Emergency stop output
37		303	General-purpose output
38		304	General-purpose output
39		305	General-purpose output
40		306	General-purpose output
41		307	General-purpose output
42	Output	308	General-purpose output
43		309	General-purpose output
44		310	General-purpose output
45		311	General-purpose output
46		312	General-purpose output
47		313	General-purpose output
48		314	General-purpose output
49		315	General-purpose output
50		-	0V connection

Expanded I/O signal table (When N1 or P1 is selected)

Pin No.	Category	Standard setting
1		24V connection
2		General-purpose input
3		General-purpose input
4		General-purpose input
5		General-purpose input
6		General-purpose input
7		General-purpose input
8		General-purpose input
9		General-purpose input
10		General-purpose input
11		General-purpose input
12		General-purpose input
13		General-purpose input
14		General-purpose input
15		General-purpose input
16		General-purpose input
17	Input	General-purpose input
18		General-purpose input
19		General-purpose input
20		General-purpose input
21		General-purpose input
22		General-purpose input
23		General-purpose input
24		General-purpose input
25		General-purpose input
26		General-purpose input
27		General-purpose input
28		General-purpose input
29		General-purpose input
30		General-purpose input
31		General-purpose input
32		General-purpose input
33		General-purpose input
34		General-purpose output
35		General-purpose output
36		General-purpose output
37		General-purpose output
38		General-purpose output
39		General-purpose output
40		General-purpose output
41		General-purpose output
42	Output	General-purpose output
43		General-purpose output
44		General-purpose output
45		General-purpose output
46		General-purpose output
47		General-purpose output
48		General-purpose output
49		General-purpose output
50		0V connection

Expanded I/O signal table (When N2 or P2 is selected)

Pin No.	Category	Standard setting
1		24V connection
2		General-purpose input
3		General-purpose input
4		General-purpose input
5		General-purpose input
6		General-purpose input
7		General-purpose input
8		General-purpose input
9	Input	General-purpose input
10		General-purpose input
11		General-purpose input
12		General-purpose input
13		General-purpose input
14		General-purpose input
15		General-purpose input
16		General-purpose input
17		General-purpose input
18		General-purpose output
19		General-purpose output
20		General-purpose output
21		General-purpose output
22		General-purpose output
23		General-purpose output
24		General-purpose output
25		General-purpose output
26		General-purpose output
27		General-purpose output
28		General-purpose output
29		General-purpose output
30		General-purpose output
31		General-purpose output
32		General-purpose output
33		General-purpose output
34	Output	General-purpose output
35		General-purpose output
36		General-purpose output
37		General-purpose output
38		General-purpose output
39		General-purpose output
40		General-purpose output
41		General-purpose output
42		General-purpose output
43		General-purpose output
44		General-purpose output
45		General-purpose output
46		General-purpose output
47		General-purpose output
48		General-purpose output
49		General-purpose output
50		0V connection

Standard multi-point I/O signal table (When N3 or P3 is selected)

Pin No.	Category	Port No.	Standard setting
1	-	-	External power supply (24VDC) for the pin No. 2~25, 51~74
2	-	000	Program start
3	-	001	General-purpose input
4	-	002	General-purpose input
5	-	003	General-purpose input
6	-	004	General-purpose input
7	-	005	General-purpose input
8	-	006	General-purpose input
9	-	007	Program No. (PRG No.1)
10	-	008	Program No. (PRG No.2)
11	-	009	Program No. (PRG No.4)
12	-	010	Program No. (PRG No.8)
13	Input	011	Program No. (PRG No.10)
14	-	012	Program No. (PRG No.20)
15	-	013	Program No. (PRG No.40)
16	-	014	General-purpose input
17	-	015	General-purpose input
18	-	016	General-purpose input
19	-	017	General-purpose input
20	-	018	General-purpose input
21	-	019	General-purpose input
22	-	020	General-purpose input
23	-	021	General-purpose input
24	-	022	General-purpose input
25	-	023	General-purpose input
26	-	-	External power supply (24VDC) for the pin No. 27~50, 76~99
27	-	024	General-purpose input
28	-	025	General-purpose input
29	-	026	General-purpose input
30	-	027	General-purpose input
31	-	028	General-purpose input
32	-	029	General-purpose input
33	-	030	General-purpose input
34	-	031	General-purpose input
35	-	032	General-purpose input
36	-	033	General-purpose input
37	-	034	General-purpose input
38	-	035	General-purpose input
39	Input	036	General-purpose input
40	-	037	General-purpose input
41	-	038	General-purpose input
42	-	039	General-purpose input
43	-	040	General-purpose input
44	-	041	General-purpose input
45	-	042	General-purpose input
46	-	043	General-purpose input
47	-	044	General-purpose input
48	-	045	General-purpose input
49	-	046	General-purpose input
50	-	047	General-purpose input
51	-	300	Alarm output
52	-	301	Ready output
53	-	302	Emergency stop output
54	-	303	General-purpose output
55	-	304	General-purpose output
56	-	305	General-purpose output
57	-	306	General-purpose output
58	-	307	General-purpose output
59	-	308	General-purpose output
60	-	309	General-purpose output
61	-	310	General-purpose output
62	Output	311	General-purpose output
63	-	312	General-purpose output
64	-	313	General-purpose output
65	-	314	General-purpose output
66	-	315	General-purpose output
67	-	316	General-purpose output
68	-	317	General-purpose output
69	-	318	General-purpose output
70	-	319	General-purpose output
71	-	320	General-purpose output
72	-	321	General-purpose output
73	-	322	General-purpose output
74	-	323	General-purpose output
75	-	-	External power supply (0V) for the pin No. 2~25, 51~74
76	-	324	General-purpose output
77	-	325	General-purpose output
78	-	326	General-purpose output
79	-	327	General-purpose output
80	-	328	General-purpose output
81	-	329	General-purpose output
82	-	330	General-purpose output
83	-	331	General-purpose output
84	-	332	General-purpose output
85	-	333	General-purpose output
86	-	334	General-purpose output
87	Output	335	General-purpose output
88	-	336	General-purpose output
89	-	337	General-purpose output
90	-	338	General-purpose output
91	-	339	General-purpose output
92	-	340	General-purpose output
93	-	341	General-purpose output
94	-	342	General-purpose output
95	-	343	General-purpose output
96	-	344	General-purpose output
97	-	345	General-purpose output
98	-	346	General-purpose output
99	-	347	General-purpose output
100	-	-	External power supply (0V) for the pin No. 27~50, 76~99

Expanded multi-point I/O signal table (When N3 or P3 is selected)

Pin No.	Category	Port No.	Standard setting
1	-	-	External power supply (24VDC) for the pin No. 2~25, 51~74
2	-	-	General-purpose input
3	-	-	General-purpose input
4	-	-	General-purpose input
5	-	-	General-purpose input
6	-	-	General-purpose input
7	-	-	General-purpose input
8	-	-	General-purpose input
9	-	-	General-purpose input
10	-	-	General-purpose input
11	-	-	General-purpose input
12	-	-	General-purpose input
13	Input	-	General-purpose input
14	-	-	General-purpose input
15	-	-	General-purpose input
16	-	-	General-purpose input
17	-	-	General-purpose input
18	-	-	General-purpose input
19	-	-	General-purpose input
20	-	-	General-purpose input
21	-	-	General-purpose input
22	-	-	General-purpose input
23	-	-	General-purpose input
24	-	-	General-purpose input
25	-	-	General-purpose input
26	-	-	External power supply (24VDC) for the pin No. 27~50, 76~99
27	-	-	General-purpose input
28	-	-	General-purpose input
29	-	-	General-purpose input
30	-	-	General-purpose input
31	-	-	General-purpose input
32	-	-	General-purpose input
33	-	-	General-purpose input
34	-	-	General-purpose input
35	-	-	General-purpose input
36	-	-	General-purpose input
37	-	-	General-purpose input
38	-	-	General-purpose input
39	Input	-	General-purpose input
40	-	-	General-purpose input
41	-	-	General-purpose input
42	-	-	General-purpose input
43	-	-	General-purpose input
44	-	-	General-purpose input
45	-	-	General-purpose input
46	-	-	General-purpose input
47	-	-	General-purpose input
48	-	-	General-purpose input
49	-	-	General-purpose input
50	-	-	General-purpose input
51	-	-	General-purpose output
52	-	-	General-purpose output
53	-	-	General-purpose output
54	-	-	General-purpose output
55	-	-	General-purpose output
56	-	-	General-purpose output
57	-	-	General-purpose output
58	-	-	General-purpose output
59	-	-	General-purpose output
60	-	-	General-purpose output
61	-	-	General-purpose output
62	Output	-	General-purpose output
63	-	-	General-purpose output
64	-	-	General-purpose output
65	-	-	General-purpose output
66	-	-	General-purpose output
67	-	-	General-purpose output
68	-	-	General-purpose output
69	-	-	General-purpose output
70	-	-	General-purpose output
71	-	-	General-purpose output
72	-	-	General-purpose output
73	-	-	General-purpose output
74	-	-	General-purpose output
75	-	-	External power supply (0V) for the pin No. 2~25, 51~74
76	-	-	General-purpose output
77	-	-	General-purpose output
78	-	-	General-purpose output
79	-	-	General-purpose output
80	-	-	General-purpose output
81	-	-	General-purpose output
82	-	-	General-purpose output
83	-	-	General-purpose output
84	-	-	General-purpose output
85	-	-	General-purpose output
86	-	-	General-purpose output
87	Output	-	General-purpose output
88	-	-	General-purpose output
89	-	-	General-purpose output
90	-	-	General-purpose output
91	-	-	General-purpose output
92	-	-	General-purpose output
93	-	-	General-purpose output
94	-	-	General-purpose output
95	-	-	General-purpose output
96	-	-	General-purpose output
97	-	-	General-purpose output
98	-	-	General-purpose output
99	-	-	General-purpose output
100	-	-	External power supply (0V) for the pin No. 27~50, 76~99

Specification Table

Item		Description			
Controller type		RA	SA	RAX/RAXD	SAX/SAXD
Compatible motor output		20W~750W		12W~750W	
Number of controlled axes		1~8 axes		1~4 axes: SCARA robot 5~8 axes: SCARA robot or additional axes	
Max. output of connected axes		[Three-phase] Up to 2,400W [Single-phase] Up to 1,600W		[Three-phase] Up to 2,400W	
Motor input power-supply voltage		[Three-phase] 200/230VAC ±10% [Single-phase] 200/230VAC ±10%		[Three-phase] 200/230VAC ±10%	
Control power input		Single-phase 200/230VAC ±10%			
Power frequency		50/60Hz			
Insulation resistance		Not less than 10MΩ (Between the power supply terminal and I/O terminal, and between the external terminal batch and case, at 500VDC)			
Insulation withstanding voltage		1,500VAC (1 min)			
Power capacity (max)		5,094VA (at max. output of connected axes)			
Position detection method		Incremental, absolute, battery-less absolute			
Safety circuit configuration		Duplication not possible	Duplication possible	Duplication not possible	Duplication possible
Drive-source cutoff method		Internal relay cut-off	External safety circuit	Internal relay cut-off	External safety circuit
Emergency stop input		Normally-closed input (Internal power supply)	Normally-closed input (External power supply, duplication possible)	Normally-closed input (Internal power supply)	Normally-closed input (External power supply, duplication possible)
Enable input		Normally-closed input (Internal power supply)	Normally-closed input (External power supply, duplication possible)	Normally-closed input (Internal power supply)	Normally-closed input (External power supply, duplication possible)
Speed setting		1mm/s~ Upper limit depends on the actuator specification			
Acceleration/ deceleration setting		0.01G~ Upper limit depends on the actuator specification			
Programming language		Super SEL language			
No. of programs		255 programs			
No. of program steps		20,000 steps (total)			
No. of multi-tasking programs		16 programs			
No. of positions		Varies by the number of controlled axes 1-axis: 55,000; 3-axis: 41,250; 5-axis: 33,000; 7-axis: 27,500 2-axis: 47,142; 4-axis: 36,666; 6-axis: 30,000; 8-axis: 25,384			
Data recording element		Flash ROM + non-volatile RAM (FRAM): system battery (button battery) not required			
Data input method		Teaching pendant or PC software			
Standard I/O		I/O 48-point PIO board (NPN/PNP), I/O 96-point PIO board (NPN/PNP) 2 boards attachable			
Serial communication function		Teaching port (D-sub25 pin), USB port (Mini-B) 1ch RS232C port (D-sub 9 pin), Ethernet (RJ-45)			
Fieldbus communication function		DeviceNet, CC-Link, PROFIBUS-DP, EtherNet/IP, EtherCAT (EtherNet/IP, EtherCAT and DeviceNet, CC-Link, PROFIBUS-DP can be simultaneously attached)			
Clock function		Retention time: about 10 days Charging time: about 100 hours			
Regenerative resistance		Built-in 1kΩ/20W regenerative resistor (Can be expanded by external regenerative resistance unit connection)			
Absolute battery		AB-5 (built into the controller)			
Protection function		Motor overcurrent, overload, motor driver temperature check, overload check, encoder disconnection detection, soft limit over, system malfunction, absolute battery abnormality, etc.			
Weight	Without absolute battery unit	[4-axis] about 4.4kg [8-axis] about 5.3kg	[4-axis three-phase] about 3.8kg [4-axis single phase] about 4.4kg [8-axis three-phase] about 4.7kg [8-axis single phase] about 5.3kg	[4-axis] about 4.4kg [8-axis] about 5.3kg	[4-axis] about 3.8kg [8-axis] about 4.7kg
	With absolute battery unit	[4-axis] about 5.0kg [8-axis] about 6.0kg	[4-axis three-phase] about 4.4kg [4-axis single phase] about 5.0kg [8-axis three-phase] about 5.4kg [8-axis single phase] about 6.0kg	[4-axis] about 5.0kg [8-axis] about 6.0kg	[4-axis] about 4.4kg [8-axis] about 5.4kg
Ambient temperature, humidity and environment		0 ~ 40°C, 85% RH or less (non-condensing), avoid corrosive gas and excessive dust			

* For the power supply capacity etc., please refer to the operation manual or contact IAI.

Specification Table

■ XSEL-RA/SA

	Controller Spec.		Front View		Side View
			Battery-less absolute spec./Incremental spec./Quasi absolute spec./Index absolute spec.	Absolute spec./Multi-rotation absolute spec.	
RA	Single-phase/ Three-phase spec.	1~4-axis spec.			
		5~8-axis spec.			
SA	Single-phase spec.	1~4-axis spec.			<p>(Battery-less absolute/ Incremental spec./ Quasi absolute spec./ Index absolute spec.)</p>
		5~8-axis spec.			
	Three-phase spec.	1~4-axis spec.			
		5~8-axis spec.			

* If absolute specification is included for more than 1 connected actuator, the external dimensions will be that of the absolute specification.

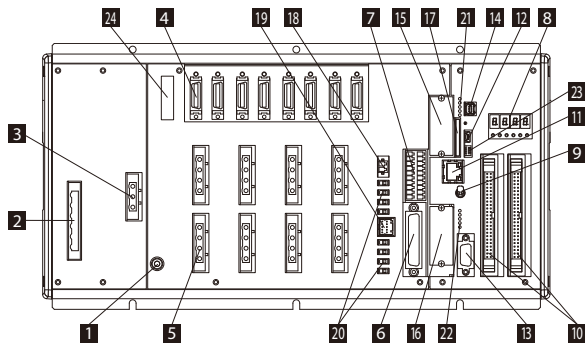
■ XSEL-RAX/RAXD/SAX/SAXD

	Controller Spec.		Front View		Side View
			Battery-less absolute spec./Incremental spec./Quasi absolute spec./Index absolute spec.	Absolute spec./Multi-rotation absolute spec.	
RAX RAXD	Three-phase spec.	4-axis spec.			
		5~8-axis spec.			
SAX SAXD	Three-phase spec.	4-axis spec.			
		5~8-axis spec.			

* If absolute specification is included for more than 1 connected single actuator, the external dimensions will be that of the absolute specification. However, when only connecting the SCARA robot, the external dimensions will be that of the incremental specification as the battery will be attached to the SCARA. Controllers for large type (arm length 700/800) and high-speed type will have the controller size of the 8-axis specification.

Names of Each Part

XSEL RA



1 FG connection terminal

It is the connection end for connecting the housing FG (Frame ground). Be sure to ground properly for the protection against noise.

2 AC power input connector

A connector for 200VAC three-phase input. It consists of 6 terminals of the motor power terminal, control power supply terminal and PE terminal. It only standardly comes with the terminal block.

Caution Do not touch the connector while power is supplied to avoid an electric shock.

3 External regenerative resistance unit connector

A connector for connecting a regenerative resistor unit that's connected when the capacity is insufficient with the built-in regenerative resistor at high acceleration/high-load, etc. The necessity of an external regenerative resistance unit depends on the application such as the axis configuration.

4 Encoder/axis sensor connector

A connector for connecting an encoder of the actuator and axis sensors such as LS, CREEP, and OT. *: LS, CREEP and OT are optional.

5 Motor connector

A connector for driving the motor of the actuator.

6 Teaching connector

The teaching interface is to be connected to IAI teaching pendant or PC (PC software) for the operation and setting of the controller.

7 System I/O connector

An I/O connector that controls the safety operations of the controller. In the safety category specification, it is possible to configure the safety circuits of up to category 4 with this connector and external safety circuit.

8 Panel window

It consists of 7 segment LEDs with 4 digits and 6 LED lamps that indicate the status of the controller.

9 Mode switch

This switch is used to specify the mode of operation of the controller. It is a lever lock type toggle switch for preventing wrong operation that can be operated by pulling toward the user.

Switch position		Function
MANU (Manual mode)	Top	Teaching tool can be used.
AUTO (Automatic mode)	Bottom	Teaching tool cannot be used. (Note) Be sure to attach the supplied dummy plug to the teaching connector. If not, the emergency stop cannot be released.

10 Standard I/O connector

48-point I/O or 96-point DIO board (option) is mounted.

11 EtherNet connector

Communication port for connecting the EtherNet communication device.

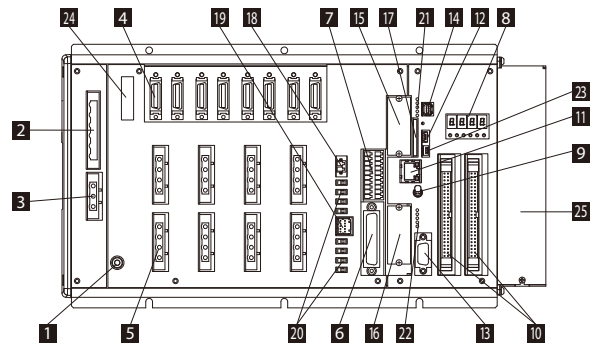
12 USB connector

USB device connector for connecting to a PC.

13 General RS232C port connector

A port for connecting general RS232C devices.

XSEL SA (Three-phase, with absolute unit)



14 Expanded motion control connector

A connector for IAI controllers (MECHATROLINK III specification).

15 Field network board (optional) mounting position 1

Equipped with the field network board (option) for EtherNet/IP or EtherCAT.

16 Field network board (optional) mounting position 2

Equipped with the field network board (option) for CC-Link, DeviceNet or PROFIBUS-DP.

17 SD card slot connector

A connector to be used for system update. Not used in normal operation.

18 Brake power connector

A power supply connector for the brake of the actuator. External 24VDC power supply is required. If this power is not supplied, the brake of the actuator cannot be released. Make sure to use a power supply for axes with brake.

19 Brake release switch connector

A connector for connecting the switch for releasing the brake of the actuator from the outside of the controller. When short-circuiting the COM terminal and BKMRL* terminal of the connector, the brake will be released. Used for moving the actuator by hand in case of power failure or abnormality of the controller.

20 Brake release switch

A switch to be used to release the brake of the actuator with brake forcibly (released by supplying power). When starting up the device or moving the actuator by hand during teaching or in case of abnormality, switch to the RLS side to force the brake to be released. As long as it is not required, keep the switch to the NOM side.

Switch position		Function
RLS (Brake release)	Left	The brake is forcibly released.
NOM (Automatic mode)	Right	The brake is automatically controlled by the controller. Servo ON: Brake release Servo OFF: Brake enabled

The switch is not available for the axes with brake of some SCARA robots for the SCARA controllers.

21 System operational status LED lamp 1

Status LED lamps that indicate system operating status (Motion control master, SD card) and the operating status of the network interface 1.

22 System operational status LED lamp 2

Status LED lamps that indicate system operating status (Main CPU) and the operating status of the network interface 2.

23 System operation setting switch

4-pole DIP switch for setting the system operation mode.

24 Conveyor tracking connector

A connector for the conveyor tracking encoder. Standardly equipped for the SCARA controller.

25 Absolute battery unit

The unit will be attached in the absolute specification.

Option

■ Regenerative resistance unit

Model RESU-1 (Standard specification)
RESUD-1 (DIN rail mounting specification)

Specification

Model	RESU-1	RESUD-1
Weight	About 0.4kg	
Built-in regenerative resistance value	235Ω 80W	
Unit mounting method	Screw mount	DIN rail mount
Attached cable	CB-ST-REU010	

Description

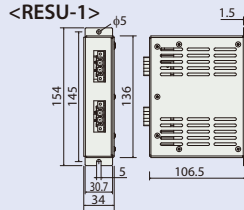
Unit that converts the regenerative current generated in motor deceleration to heat. Although the controller is equipped with a regenerative resistance inside, an additional regenerative unit may be necessary if the load in the vertical axis is large and the capacity is insufficient.

<When connecting a single-axis robot>

Installation criteria Determined by the total motor wattage of connected axes.

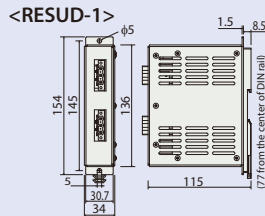
Horizontal specification

Total motor wattage	Required number of regenerative resistances
100W	0
~600W	1
~1,200W	2
~1,800W	3
~2,400W	4



Vertical specification

Total motor wattage	Required number of regenerative resistances
100W	0
~600W	1
~1,000W	2
~1,400W	3
~2,000W	4
~2,400W	5



<When connecting a SCARA robot>

Estimated installation criteria

Model Number	Required number of regenerative resistances
1205	0
1505	
1805	
NNN	1
NNW	
TNN	
3015H	
UNN	3
HNN	
50**H	
INN	4
60**H	
70**H	
80**H	
10040	3
12040	
5016H	
NSN	6016H

* The required number is for a single SCARA robot. When connecting a single-axis robot as an additional axis, be sure to add regenerative resistances for the single-axis robot.

Examples: When operating IX-NNN2515H and ISA-MXM (200W).
IX-NNN2515H 1 unit required
ISA-MXM (200W) ... 1 unit required
Therefore, 2 regenerative resistances are required.

■ Absolute data backup battery

Model AB-5

Features Absolute data storage battery for operating an actuator of the absolute specification.



■ Dummy plug

Model DP-2

Features A dummy plug to be attached to the teaching connector when a PC or teaching pendant is not connected.

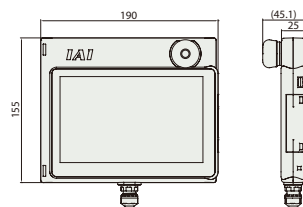


Touch panel teaching pendant

Features A teaching device equipped with functions such as position teaching, trial operation, and monitoring.

Model TB-02-□

External dimensions



Specification

Rated voltage	24VDC
Power consumption	3.6W or less (150mA or less)
Ambient operating temperature	0~40°C
Ambient operating humidity	20~85% RH (Non-condensing)
Environmental resistance	IP20
Weight	470g (TB-02 unit only)

PC software (For XSEL-RA/RXA/RXAD)

Model IA-101-X-MW

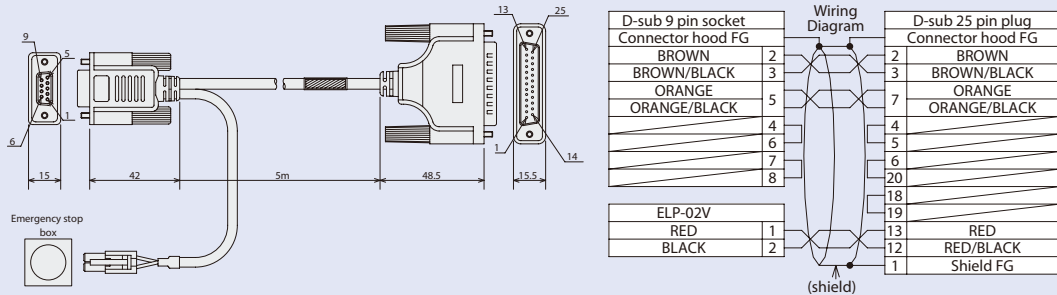
Features This is start-up support software which comes equipped with functions such as program/position input, trial operation and monitoring.
The functions required for debugging has been significantly improved to reduce the start-up time.

Description Software (CD-ROM), supported Windows: XP SP2 or later/Vista/7/8

(Accessories) PC connection cable 5m + emergency stop box (Model CB-ST-E1MW050-EB)

Notes

- * When using a Safety Category 4 compliant controller, please use IA-101-XA-MW.
- * It cannot be used for XSEL-SA/SAX/SAXD.
- * When separately ordering a PC connection cable for maintenance, the model number will be CB-ST-E1MW050 for the cable only and CB-ST-E1MW050-EB when set with an emergency stop box.



Safety category 4 compliant PC software (for XSEL-SA/SAX/SAXD)

Model IA-101-XA-MW * Only for XSEL-SA/SAX/SAXD.

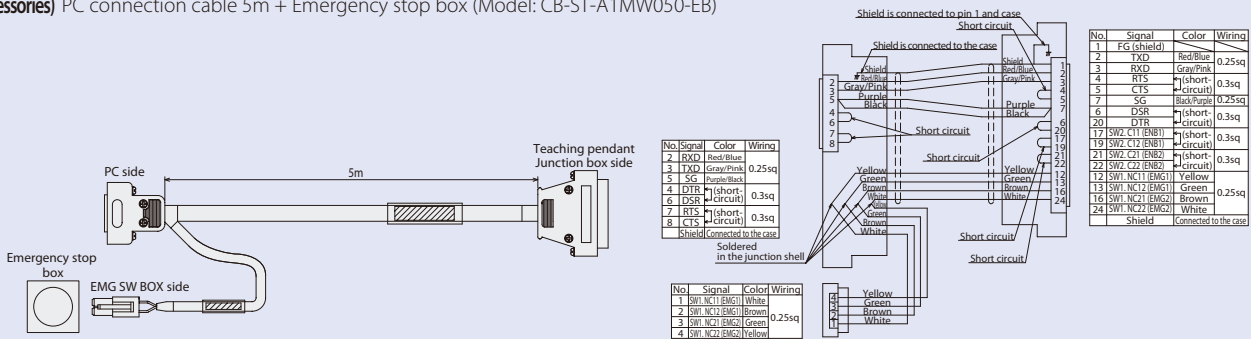
Features This is start-up support software which comes equipped with functions such as program/position input, trial operation and monitoring.
The functions required for debugging has been significantly improved to reduce the start-up time.
In addition, the PC connection cable has a duplex circuit for emergency stop to comply to the Safety Category 4.

Description Software (CD-ROM), supported Windows: XP SP2 or later/Vista/7/8

(Accessories) PC connection cable 5m + Emergency stop box (Model: CB-ST-A1MW050-EB)

Notes

- When separately ordering a PC connection cable for maintenance, the model number will be CB-ST-A1MW050 for the cable only and CB-ST-A1MW050-EB when set with an emergency stop box.
- If you do not use a teaching tool, connect the dummy plug DP-2 that comes with the controller to the teaching connector.



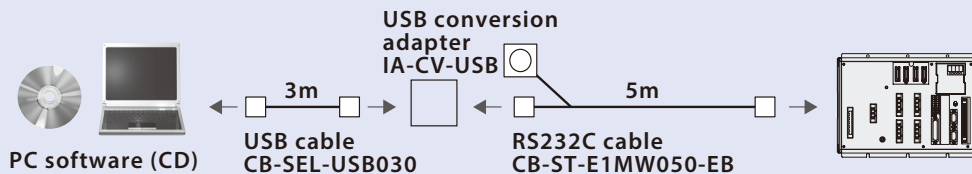
USB compliant PC software (For XSEL-RA/RXA/RXAD)

Model IA-101-X-USBMW

Features A USB adapter is mounted on the RS232C cable to allow the use on a PC's USB port.

Description Software (CD-ROM), supported Windows: XP SP2 or later/Vista/7/8

(Accessories) PC connection cable 5m + emergency stop box + USB adapter + USB cable 3m



PC software (no cable)

Model IA-101-N

Features It only comes with the PC software (CD-ROM). If you want to connect both the controller and PC side with a USB cable or Ethernet cable, only the software needs to be purchased. A cable that meet the following specifications is to be prepared by the customer.

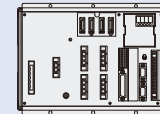
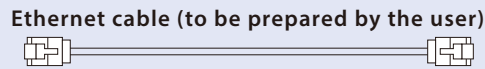
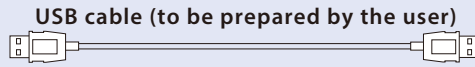
Description Software (CD-ROM), supported Windows: XP SP2 or later/Vista/7/8

Notes
 When operating the actuator by USB connection, be sure to connect the stop switch to the system I/O connector.
 If an emergency switch is not available, use the emergency stop-equipped model "IA-101-X-USBMW".

	Controller side connector	Maximum cable length
USB cable specification	USB Mini-B	5m
Ethernet cable specification	10/100/1000BASE-T (RJ-45)	5m



PC software (CD)



Maintenance Parts

When placing an order for the replacement cable, please use the model number shown below.

■ Table of compatible cables

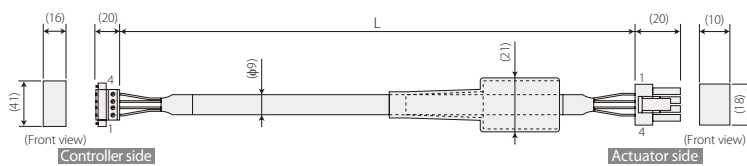
Model number		Motor cable	Motor robot cable	Encoder cable	Encoder robot cable
①	RCS2 (CR/W) RCS3 (CR)	CB-RCC-MA□□□□	CB-RCC-MA□□□□-RB	CB-RCS2-PA□□□□	CB-X3-PA□□□□
②	Models other than ② ~ ④ RT			CB-RCS2-PLA□□□□	CB-X2-PLA□□□□
③	RA13R (Without load cell/ without brake)			CB-RCS2-PLA□□□□	CB-X2-PLA□□□□
④	RA13R (Without load cell/ with brake)			CB-RCS2-PLA□□□□ [Between the controller and brake] CB-RCS2-PLA□□□□	CB-X2-PLA□□□□ [Between the controller and brake] CB-X2-PLA□□□□
⑤	NS	Without LS	-	-	CB-X3-PA□□□□
⑥		With LS	-	-	CB-X2-PLA□□□□
⑦	LSAS	N	-	-	CB-X1-PA□□□□
⑧	DD DDA DDCR DDACR DDW	T18□/ LT18□	-	CB-X-MA□□□□	CB-X3-PA□□□□
⑨		H18□/ LH18□	-	CB-XMC-MA□□□□	
⑩	ISWA	-	CB-XEU-MA□□□□	-	CB-X1-PA□□□□-WC
⑪	ZR	-	CB-X-MA□□□□	-	Z-axis: CB-X1-PA□□□□ R-axis: CB-X1-PLA□□□□ [Between the controller and brake box] CB-RCS2-PLA□□□□
⑫	Models other than ① ~ ⑪	-	CB-X-MA□□□□	-	CB-X1-PA□□□□ (For 20m or less) *
⑬		Models other than ① ~ ⑪ with LS		-	-
⑭	IX (Joint cable specification)	-	CB-X-MA□□□□	-	CB-X1-PLA□□□□ (For 20m or less) *
		-		-	CB-X1-PLA□□□□-AWG24 (For 21m or more)

* Those that do not have the battery-less absolute specification will also be CB-X1-PA□□□□/CB-X1-PLA□□□□ for over 20m.

Model number	PIO flat cable
⑮	CB-X-PIO□□□□
	Multipoint PIO flat cable
	CB-X-PIOH□□□□

Model Number **CB-RCC-MA□□□□ / CB-RCC-MA□□□□-RB**

* Please indicate the cable length (L) in □□□, maximum 30m, Eg.) 080 = 8m



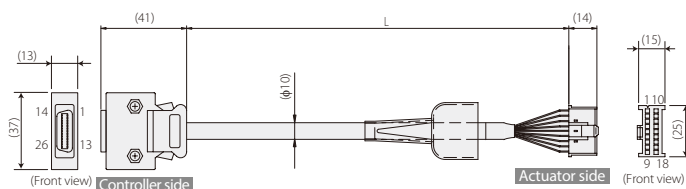
Wiring	Signal	No.	No.	Signal	Wiring
0.75sq	PE	1	1	U	0.75sq (Crimped)
	U	2	2	V	
	V	3	3	W	
	W	4	4	PE	

Minimum bending radius $r = 50\text{mm}$ or more (Dynamic bending condition)

* Please use the robot cable if the cable has to be installed through the cable track.

Model Number **CB-RCS2-PA□□□□ / CB-X3-PA□□□□**

* Please indicate the cable length (L) in □□□, maximum 30m, Eg.) 080 = 8m



Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
-	-	-	10	1	A	Pink	AWG26 (Crimped)
-	-	-	11	2	X	Purple	
-	E24V	-	12	3	B	White	
Gray/White	0V	-	13	4	B	Blue/Red	
Brown/White	LS	-	26	5	Z	Orange/White	
-	CREEP	-	25	6	Z	Green/White	
-	OT	-	24	7	LS+	Brown/White	
Blue	RSV	-	23	8	-	-	
-	-	-	9	9	FG	Drain	
-	-	-	18	10	SD	Blue	
-	-	-	19	11	SD	Orange	
Pink	A+	1	1	12	BAT+	Black	
Purple	A-	2	2	13	BAT+	Yellow	
White	B+	3	3	14	VCC	Green	
Blue/Red	B-	4	4	15	GND	Brown	
Orange/White	Z+	5	5	16	LS-	Gray/White	
Green/White	Z-	6	6	17	BK-	Gray	
Blue	SRD+	7	7	18	BK+	Red	
Orange	SRD-	8	8				
Black	BAT+	14					
Yellow	BAT-	15					
Green	VCC	16					
Brown	GND	17					
Gray	BKR	20					
Red	BKR+	21					
-	-	-	22				

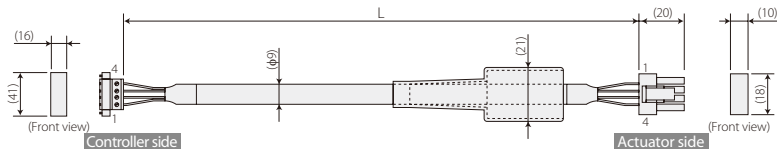
Shield is clamp connected to the hood
Drain wire and braided shield

Minimum bending radius $r = 50\text{mm}$ or more (Dynamic bending condition)

* Please use the robot cable if the cable has to be installed through the cable track.

Model Number **CB-X-MA** □ □ □

* Please indicate the cable length (L) in □ □ □, maximum 30m, E.g.) 080 = 8m

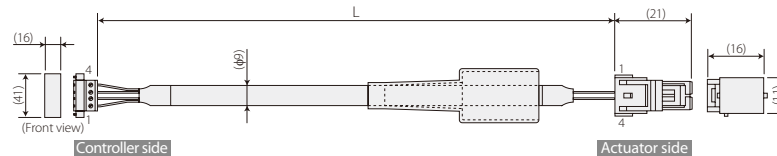


Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
0.75sq	Green	PE	1	1	U	Red	0.75sq (Crimped)
	Red	U	2	2	V	White	
	White	V	3	3	W	Black	
	Black	W	4	4	PE	Green	

Minimum bending radius $r = 51\text{mm}$ or more (Dynamic bending condition)
 * Only robot cable is available for this model.

Model Number **CB-XMC-MA** □ □ □

* Please indicate the cable length (L) in □ □ □, maximum 30m, E.g.) 080 = 8m

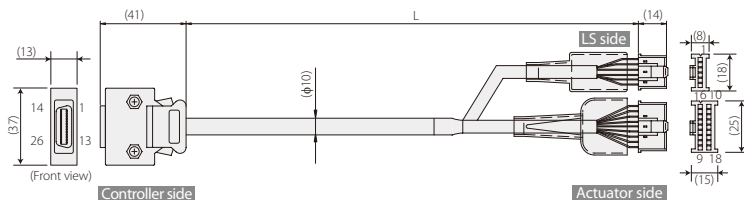


Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
1.25sq	Green	PE	1	1	U	Red	1.25sq (Crimped)
	Red	U	2	2	V	White	
	White	V	3	3	W	Black	
	Black	W	4	4	PE	Green	

Minimum bending radius $r = 55\text{mm}$ or more (Dynamic bending condition)
 * Only robot cable is available for this model.

Model Number **CB-RCS2-PLA** □ □ □ / **CB-X2-PLA** □ □ □

* Please indicate the cable length (L) in □ □ □, maximum 30m, E.g.) 080 = 8m



[Encoder cable]

Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
-	-	-	10	1	E24V	Brown/White	AWG26 (Crimped)
-	-	-	11	2	OV	Gray/White	
Brown/White	E24V	LS	12	3	LS	Red/White	
Gray/White	OV	CREEP	13	4	CREEP	Black/White	
Red/White	LS	OT	24	5	OT	Yellow/Black	
Black/White	CREEP	RSV	25	6	RSV	Pink/Black	
Yellow/Black	OT	-	24	-	-	-	AWG26 (Crimped)
Pink/Black	RSV	-	23	-	-	-	
-	-	-	9	-	-	-	
-	-	-	18	-	-	-	
-	-	-	19	-	-	-	
Pink	A+	-	1	1	A	Pink	
Purple	A-	-	2	2	A	Purple	
White	B+	-	3	3	B	White	
Blue/Red	B-	-	4	4	B	Blue/Red	
Orange/White	Z+	-	5	5	Z	Orange/White	
Green/White	Z-	-	6	6	Z	Green/White	
Blue	SRD+	-	7	7	-	-	
Orange	SRD-	-	8	8	-	-	
Black	BAT+	-	14	9	FG	Drain	
Blue	BAT-	-	15	10	SD	Blue	
Green	VCC	-	16	11	SD	Orange	
Brown	GND	-	17	12	BAT+	Black	
Gray	BKR-	-	20	13	BAT-	Blue	
Red	BKR+	-	21	14	VCC	Green	
-	-	-	22	15	GND	Brown	
-	-	-	-	16	-	-	
-	-	-	-	17	BK-	Gray	
-	-	-	-	18	BK+	Red	

Shield is clamp connected to the hood
 (White/blue cable colors indicate the band color/insulator color)

[Encoder robot cable]

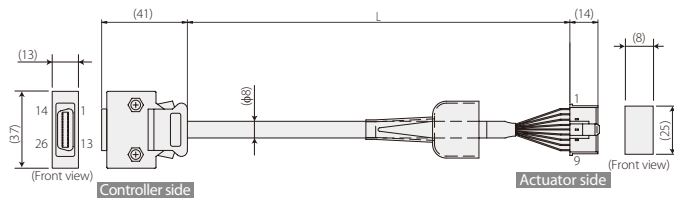
Wiring	Color	Signal	No.	No.	Signal	Color	Wiring
-	-	-	10	1	E24V	White/Orange	AWG26 (Crimped)
-	-	-	11	2	OV	White/Green	
White/Orange	E24V	LS	12	3	LS	Brown/Blue	
White/Green	OV	CREEP	13	4	CREEP	Brown/Yellow	
Brown/Blue	LS	OT	24	5	OT	Brown/Red	
Brown/Yellow	CREEP	RSV	25	6	RSV	Brown/Black	
Brown/Red	OT	-	24	-	-	-	AWG26 (Crimped)
Brown/Black	RSV	-	23	-	-	-	
-	-	-	9	-	-	-	
-	-	-	18	-	-	-	
-	-	-	19	-	-	-	
White/Blue	A+	-	1	1	A	White/Blue	
White/Yellow	A-	-	2	2	A	White/Yellow	
White/Red	B+	-	3	3	B	White/Red	
White/Black	B-	-	4	4	B	White/Black	
White/Orange	Z+	-	5	5	Z	White/Orange	
White/Gray	Z-	-	6	6	Z	White/Gray	
Orange	SRD+	-	7	7	-	-	
Green	SRD-	-	8	8	-	-	
Purple	BAT+	-	14	9	FG	Drain	
Gray	BAT-	-	15	10	SD	Orange	
Red	VCC	-	16	11	SD	Green	
Black	GND	-	17	12	BAT+	Purple	
Blue	BKR-	-	20	13	BAT-	Gray	
Yellow	BKR+	-	21	14	VCC	Red	
-	-	-	22	15	GND	Black	
-	-	-	-	16	-	-	
-	-	-	-	17	BK-	Blue	
-	-	-	-	18	BK+	Yellow	

Shield is clamp connected to the hood
 (White/blue cable colors indicate the band color/insulator color)

Minimum bending radius $r = 50\text{mm}$ or more (Dynamic bending condition)
 * Please use the robot cable if the cable has to be installed through the cable track.

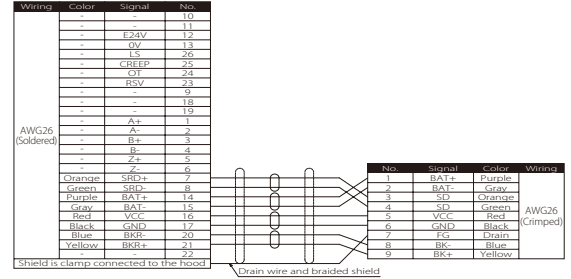
Model Number **CB-X1-PA**□□□

* Please indicate the cable length (L) in □□□, maximum 30m, E.g.) 080 = 8m



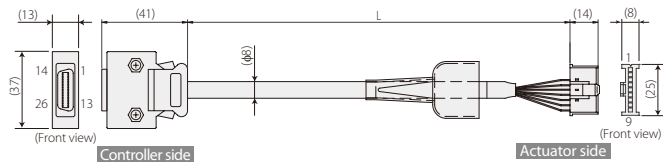
Minimum bending radius $r = 44\text{mm}$ or more (Dynamic bending condition)
* Only robot cable is available for this model.

* If you require ISB/ISDB (encoder type is battery-less absolute) with the cable of 21m or longer, select the CB-X1-PA□□□-AWG24.

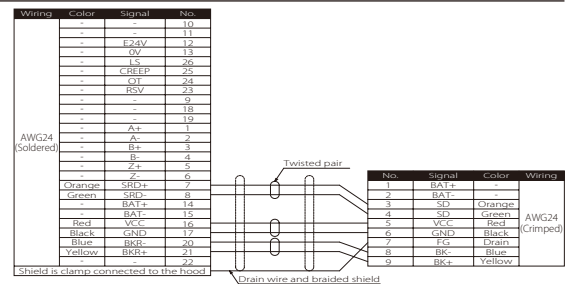


Model Number **CB-X1-PA**□□□-AWG24

* Please indicate the cable length (L) in □□□, maximum 30m, E.g.) 210 = 21m

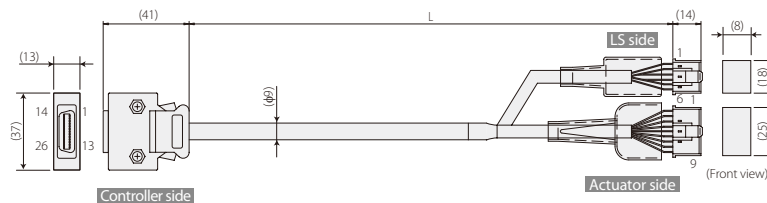


Minimum bending radius $r = 44\text{mm}$ or more (Dynamic bending condition)
* Only robot cable is available for this model.



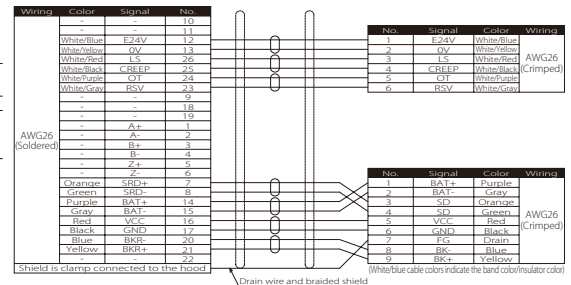
Model Number **CB-X1-PLA**□□□

* Please indicate the cable length (L) in □□□, maximum 30m, E.g.) 080 = 8m



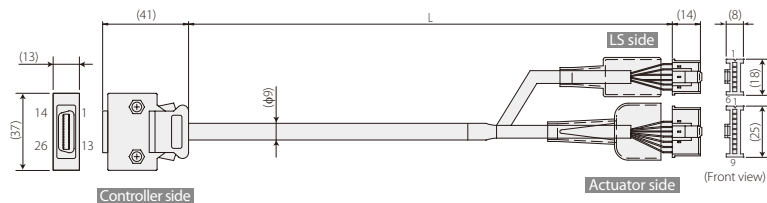
Minimum bending radius $r = 54\text{mm}$ or more (Dynamic bending condition)
* Only robot cable is available for this model.

* If you require ISB/ISDB (encoder type is battery-less absolute) with the cable of 21m or longer, select the CB-X1-PLA□□□-AWG24.

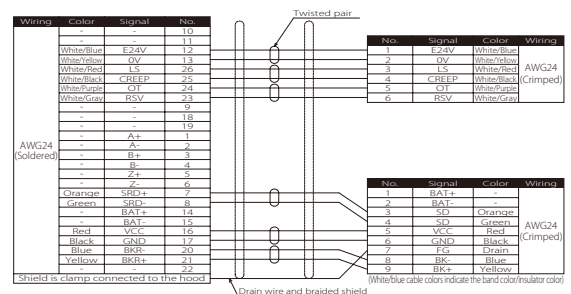


Model Number **CB-X1-PLA**□□□-AWG24

* Please indicate the cable length (L) in □□□, maximum 30m, E.g.) 210 = 21m



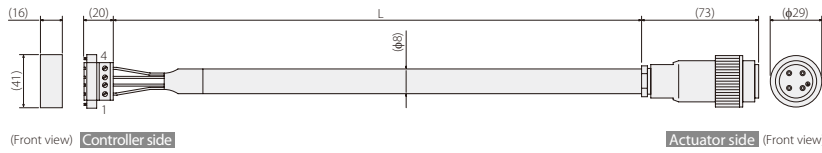
Minimum bending radius $r = 54\text{mm}$ or more (Dynamic bending condition)
* Only robot cable is available for this model.



Maintenance Parts

Model Number **CB-XEU-MA** □ □ □

* Please indicate the cable length (L) in □ □ □, maximum 30m, E.g.) 080 = 8m

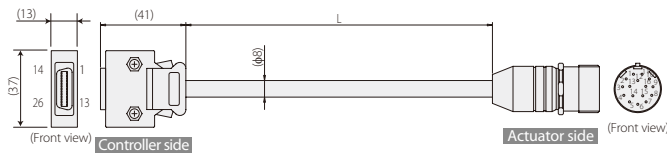


Plug GIC2.5/4-STF-7.62 (Phoenix)		Plug connector 99-4222-00-04 (BINDER)	
Wiring	Signal No.	No.	Signal Wiring
	PE	1	PE
0.75sq	U	2	U
	V	3	V
	W	4	W

Minimum bending radius $r = 48\text{mm}$ or more (Dynamic bending condition)
 * Only robot cable is available for this model.

Model Number **CB-X1-PA** □ □ □ -WC

* Please indicate the cable length (L) in □ □ □, maximum 30m, E.g.) 080 = 8m



Wiring	Color	Signal	No.
-	-	-	10
-	-	E24V	12
-	-	OV	13
-	-	L5	26
-	-	CREEP	25
-	-	OT	24
-	-	RSV	23
-	-	-	9
-	-	-	18
-	-	-	19
-	-	A+	2
-	-	B+	3
-	-	B-	4
-	-	Z+	5
-	-	Z-	6
-	-	SRD+	7
Green	-	SRD-	8
Purple	-	BAT+	14
Gray	-	BAT-	15
Red	-	VCC	16
Black	-	GND	17
Blue	-	BKR-	20
Yellow	-	BKR+	21
-	-	-	22

No.	Signal	Color	Wiring
1	SD	Orange	-
2	SD	Green	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-
10	VCC	Red	-
11	GND	Black	-
12	BAT+	Purple	-
13	BAT-	Gray	-
14	-	-	-
15	BK-	Blue	-
16	BK+	Yellow	-

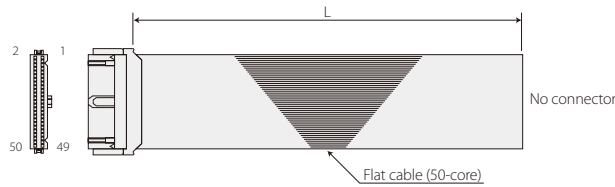
Shield is clamp connected to the hood. Drain wire and braided shield. Shield is connected to the earth sleeve.

(White/blue cable colors indicate the band color/insulator color)

Minimum bending radius $r = 38\text{mm}$ or more (Dynamic bending condition)
 * Only robot cable is available for this model.

Model Number **CB-X-PIO** □ □ □

* Please indicate the cable length (L) in □ □ □, maximum 10m, E.g.) 080 = 8m

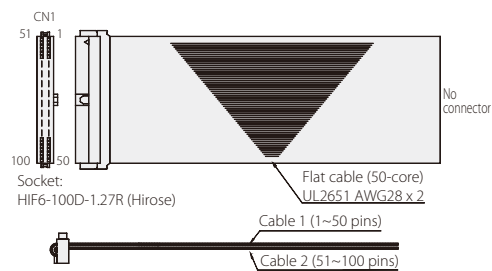


No.	Color	Wiring	No.	Color	Wiring	No.	Color	Wiring
1	Brown 1	-	18	Gray 2	-	35	Green 4	-
2	Red 1	-	19	White 2	-	36	Blue 4	-
3	Orange 1	-	20	Black 2	-	37	Purple 4	-
4	Yellow 1	-	21	Brown 3	-	38	Gray 4	-
5	Green 1	-	22	Red 3	-	39	White 4	-
6	Blue 1	-	23	Orange 3	-	40	Black 4	-
7	Purple 1	-	24	Yellow 3	-	41	Brown 5	-
8	Gray 1	-	25	Green 3	-	42	Red 5	-
9	White 1	-	26	Blue 3	-	43	Orange 5	-
10	Black 1	-	27	Purple 3	-	44	Yellow 5	-
11	Brown 2	-	28	Gray 3	-	45	Green 5	-
12	Red 2	-	29	White 3	-	46	Blue 5	-
13	Orange 2	-	30	Black 3	-	47	Purple 5	-
14	Yellow 2	-	31	Brown 4	-	48	Gray 5	-
15	Green 2	-	32	Red 4	-	49	White 5	-
16	Blue 2	-	33	Orange 4	-	50	Black 5	-
17	Purple 2	-	34	Yellow 4	-	-	-	-

Flat cable (pressure-welded). Flat cable A (pressure-welded). Flat cable (pressure-welded).

Model Number **CB-X-PIOH** □ □ □

* Please indicate the cable length (L) in □ □ □, maximum 10m, E.g.) 080 = 8m



Cable 1					Cable 2						
Pin No.	Color	Port No.	Function	Pin No.	Color	Port No.	Function	Pin No.	Color	Port No.	Function
1	Brown 1	-	External power supply (OV/DC for the pin No. 2-25, 51-74)	26	Blue 3	-	External power supply (OV/DC for the pin No. 27-50, 76-99)	51	Brown 1	300	Alarm output
2	Red 1	000	Program start	27	Purple 3	024	General-purpose input	52	Red 1	301	Ready output
3	Orange 1	001	General-purpose input	28	Gray 3	025	General-purpose input	53	Orange 1	302	Emergency stop output
4	Yellow 1	002	General-purpose input	29	White 3	026	General-purpose input	54	Yellow 1	303	General-purpose output
5	Green 1	003	General-purpose input	30	Black 3	027	General-purpose input	55	Green 1	304	General-purpose output
6	Blue 1	004	General-purpose input	31	Brown 4	028	General-purpose input	56	Blue 1	305	General-purpose output
7	Purple 1	005	General-purpose input	32	Red 4	029	General-purpose input	57	Purple 1	306	General-purpose output
8	Gray 1	006	General-purpose input	33	Orange 4	030	General-purpose input	58	Gray 1	307	General-purpose output
9	White 1	007	Program No. (PRG No.1)	34	Yellow 4	031	General-purpose input	59	White 1	308	General-purpose output
10	Black 1	008	Program No. (PRG No.2)	35	Green 4	032	General-purpose input	60	Black 1	309	General-purpose output
11	Brown 2	009	Program No. (PRG No.4)	36	Blue 4	033	General-purpose input	61	Brown 2	310	General-purpose output
12	Red 2	010	Program No. (PRG No.8)	37	Purple 4	034	General-purpose input	62	Red 2	311	General-purpose output
13	Orange 2	011	Program No. (PRG No.10)	38	Gray 4	035	General-purpose input	63	Orange 2	312	General-purpose output
14	Yellow 2	012	Program No. (PRG No.20)	39	White 4	036	General-purpose input	64	Yellow 2	313	General-purpose output
15	Green 2	013	Program No. (PRG No.40)	40	Black 4	037	General-purpose input	65	Green 2	314	General-purpose output
16	Blue 2	014	General-purpose input	41	Brown 5	038	General-purpose input	66	Blue 2	315	General-purpose output
17	Purple 2	015	General-purpose input	42	Red 5	039	General-purpose input	67	Purple 2	316	General-purpose output
18	Gray 2	016	General-purpose input	43	Orange 5	040	General-purpose input	68	Gray 2	317	General-purpose output
19	White 2	017	General-purpose input	44	Yellow 5	041	General-purpose input	69	White 2	318	General-purpose output
20	Black 2	018	General-purpose input	45	Green 5	042	General-purpose input	70	Black 2	319	General-purpose output
21	Brown 3	019	General-purpose input	46	Blue 5	043	General-purpose input	71	Brown 3	320	General-purpose output
22	Red 3	020	General-purpose input	47	Purple 5	044	General-purpose input	72	Red 3	321	General-purpose output
23	Orange 3	021	General-purpose input	48	Gray 5	045	General-purpose input	73	Orange 3	322	General-purpose output
24	Yellow 3	022	General-purpose input	49	White 5	046	General-purpose input	74	Yellow 3	323	General-purpose output
25	Green 3	023	General-purpose input	50	Black 5	047	General-purpose input	75	Green 3	-	External power supply (OV) for the pin No. 27-50/76-99
-	-	-	-	-	-	-	-	100	Black 5	-	External power supply (OV) for the pin No. 27-50/76-99

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www.intelligentactuator.com

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