

X-SEL Multi-point DIO Board

(K-Type Controller Expansion Slot /
J-Type Controller Standard Slot)

Operating Manual

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This board is a multi-point DIO board equipped with 48 input points and 48 output points for use with an X-SEL controller.

1. Overview

1.1 Features

- [1] 96 I/O points in one board
One board provides 48 input points and 48 output points, thus effectively adding to the I/O control capability of your X-SEL controller.
- [2] DIO interface supporting both NPN and PNP
Just like the current I/O board, the DIO interface is also available in the NPN or PNP specification.
- [3] Overcurrent and I/O-power monitor function
The DIO board detects overcurrent in the DO port and monitors the I/O power-supply voltage. If an out-of-spec current or voltage is detected, the DO output will be cut off. Note, however, that the overcurrent detection value of the DIO board is 400 mA per 24 points, which is different from the threshold specification of the current I/O board (400 mA per 8 points).

1.2 Board Variations

This board comes in the variations listed in the table below.

Table 1-1 Board Variations

Multi-point DIO Board for Expansion Slot of K-Type Controller

Model	Name
IA-IO-3204-NP	X-SEL expansion multi-point DIO board, NPN specification
IA-IO-3204-PN	X-SEL expansion multi-point DIO board, PNP specification

Multi-point DIO Board for Standard Slot of J-Type Controller

Model	Name
IA-IO-3205-NP	X-SEL standard multi-point DIO board, NPN specification
IA-IO-3205-PN	X-SEL standard multi-point DIO board, PNP specification

2. Configuration

2.1 System Configuration

This board is installed in an expansion I/O slot of an X-SEL K-Type controller, or in a standard I/O slot of a J-Type controller, for use in signal communication with external DIO devices.

Fig. 2-1 Connection Example 1

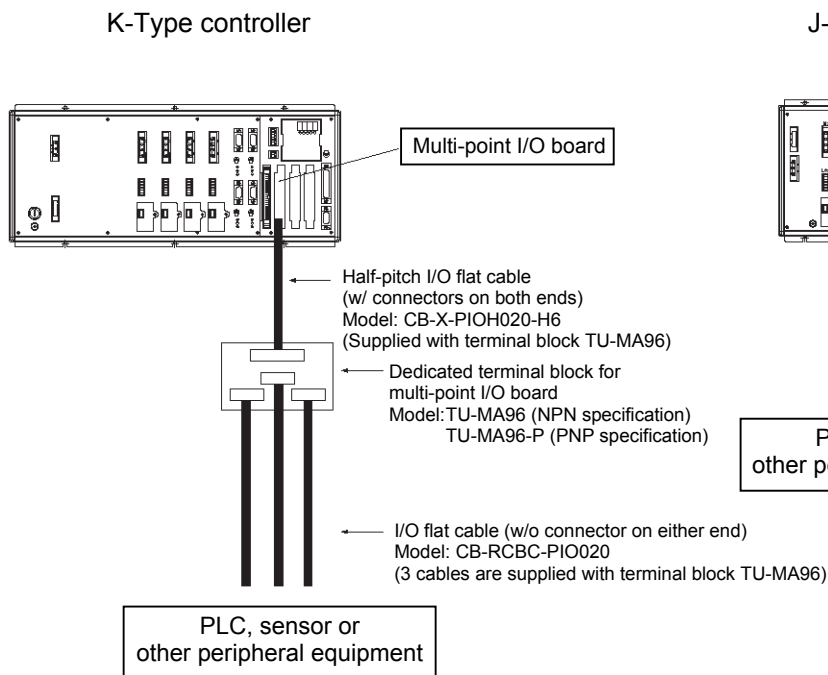
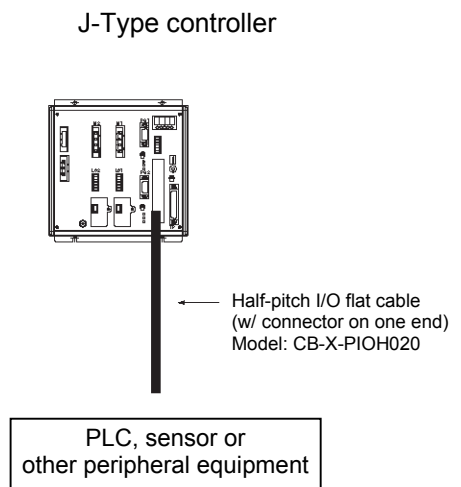


Fig. 2-2 Connection Example 2





3. Specifications

3.1 I/O Specifications

Table 3-1 I/O Specifications

Item	Specification
Numbers of I/O points	48 input points, 48 output points
External power-supply voltage	24 VDC $\pm$ 10%
Input insulation	Photocoupler insulation
Input current	Max. 7 mA/point
Input leak current	Max. 1 mA/point
Output insulation	Photocoupler insulation
Output element	Transistor
Maximum output load current	50 mA/point (400 mA/24 points)
Output leak current	Max. 0.1 mA/point

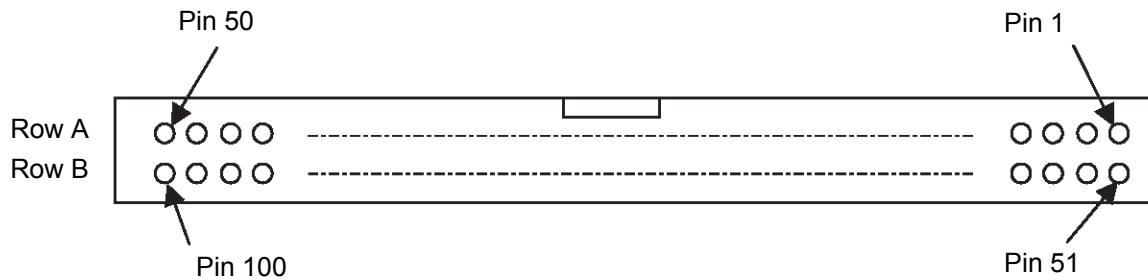
4. External Interface Specifications

4.1 Terminal Assignments for External DIO Interface

Table 4-1 Overview of Multi-point DIO Interface Specifications

Item	Overview	Remarks
Connector	100-pin half-pitch flat connector	HIF6-100PA-1.27DS (by Hirose)
Connector name	External DIO connector	
External power supply	24 VDC $\pm$ 10%	A separate power supply is used for each group of 24 DIs/24 DOs.
DI	48 points	
DO	48 points	

Pin layout (connector fitting surface)



Note: In the case of the K-Type expansion DIO board, the external power-supply terminals for IN024 to 047/OUT324 to 347 (pin 26 (24 V), pin 100 (0 V)) are connected internally to the IO24V power-supply connector on the panel board.



The table below lists the terminal assignments for the DIO interface.

Row	Pin No.	Category	Remarks (Note 1)	Row	Pin No.	Category	Remarks (Note 1)
A	1	Input	External power supply (24 VDC) for IN000 to 023, OUT300 to 323	B	51	Output	300
	2		000		52		301
	3		001		53		302
	4		002		54		303
	5		003		55		304
	6		004		56		305
	7		005		57		306
	8		006		58		307
	9		007		59		308
	10		008		60		309
	11		009		61		310
	12		010		62		311
	13		011		63		312
	14		012		64		313
	15		013		65		314
	16		014		66		315
	17		015		67		316
	18		016		68		317
	19		017		69		318
	20		018		70		319
	21		019		71		320
	22		020		72		321
	23		021		73		322
	24		022		74		323
	25		023		75		External power supply (0 VDC) for IN000 to 023, OUT300 to 323
A	26	Input	External power supply (24 VDC) (Note 2) for IN024 to 047, OUT324 to 347	B	76	Output	324
	27		024		77		325
	28		025		78		326
	29		026		79		327
	30		027		80		328
	31		028		81		329
	32		029		82		330
	33		030		83		331
	34		031		84		332
	35		032		85		333
	36		033		86		334
	37		034		87		335
	38		035		88		336
	39		036		89		337
	40		037		90		338
	41		038		91		339
	42		039		92		340
	43		040		93		341
	44		041		94		342
	45		042		95		343
	46		043		96		344
	47		044		97		345
	48		045		98		346
	49		046		99		347
	50		047		100		External power supply (0 VDC) (Note 2) for IN024 to 047, OUT324 to 347

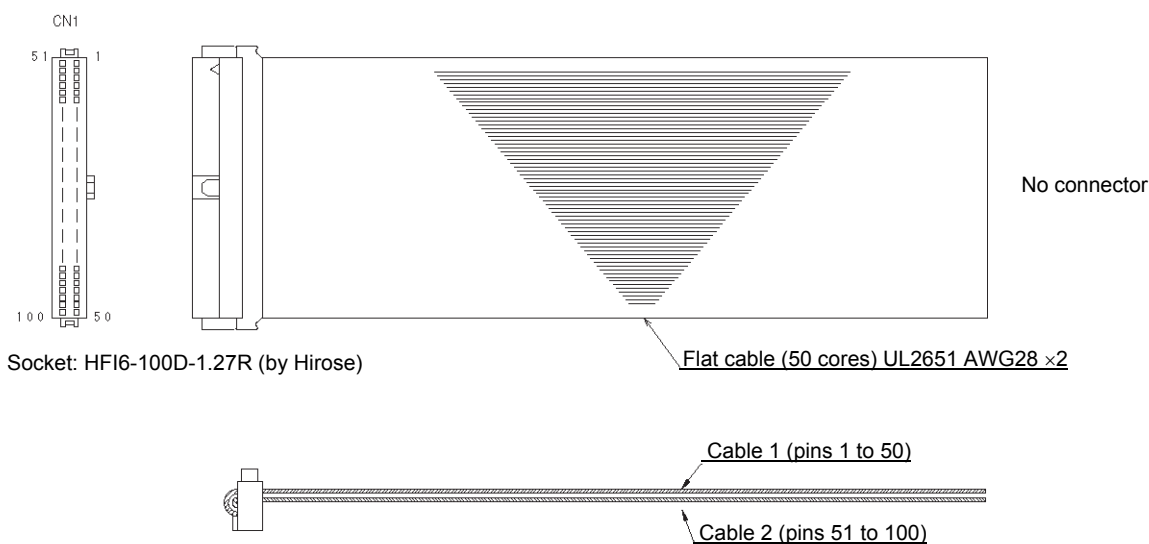
Note 1: With a J-Type controller, the values in the Remarks column (000 to 047, 300 to 347) indicate port numbers.

Note 2: In the case of the expansion DIO board for K-Type controller, the external power-supply terminals for IN024 to 047/OUT324 to 347 (pin 26 (24 V), pin 100 (0 V)) are connected internally to the IO24V power-supply connector on the panel board.



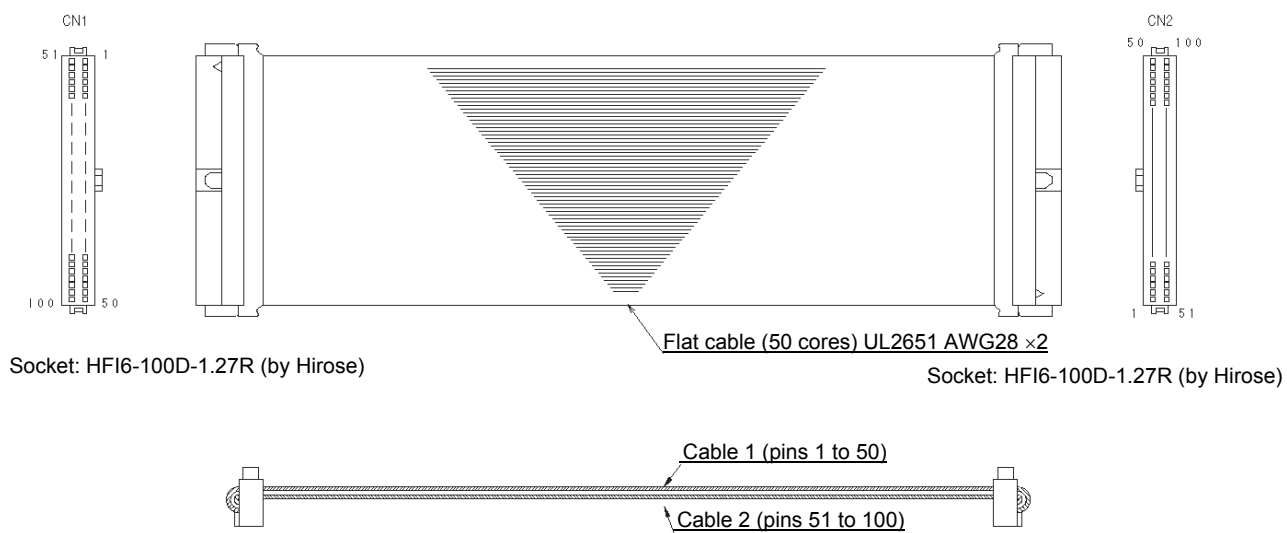
Multi-point I/O board connection cable

- Cable w/ connector on one end Model: CB-X-PIOH020



- Cable w/ connectors on both ends Model: CB-X-PIOH020-H6

This cable is used to connect a multi-point DIO board and an optional terminal block unit.





4.2 IO24V Power Input

The power supply for IN000 to 023/OUT300 to 323 is insulated from the power supply for IN024 to 047/OUT324 to 347. Connect an external power supply for each power-supply terminal. The power supply for IN024 to 047/OUT324 to 347 on the multi-point DIO board for K-Type controller's expansion slot is also connected to the IO24V power-supply connector on the controller's panel board.

This board also detects I/O power-supply errors through the following monitor functions:

1. Monitor the external I/O power-supply voltage (+24 V)
2. Monitor the output current for each 24-point group

5. I/O Circuits

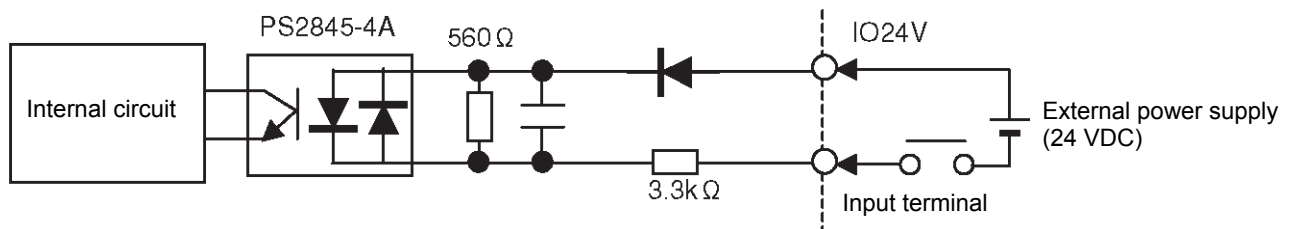
5.1 Input

Table 5-1 Specifications of Input Part

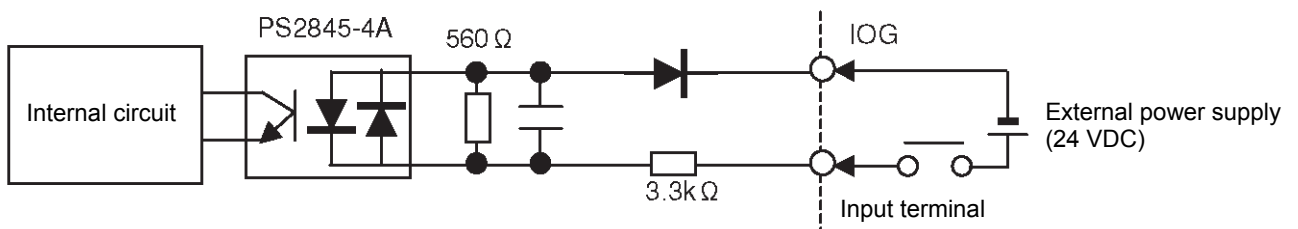
Item	Specification (Common to PNP and NPN specifications)
External power-supply voltage	24 VDC $\pm$ 10%
Input current	Max. 7 mA/point
Leak current	Max. 1 mA/point

Fig. 5-1 Circuit of Input Part

- NPN specification



- PNP specification



5.2 Output

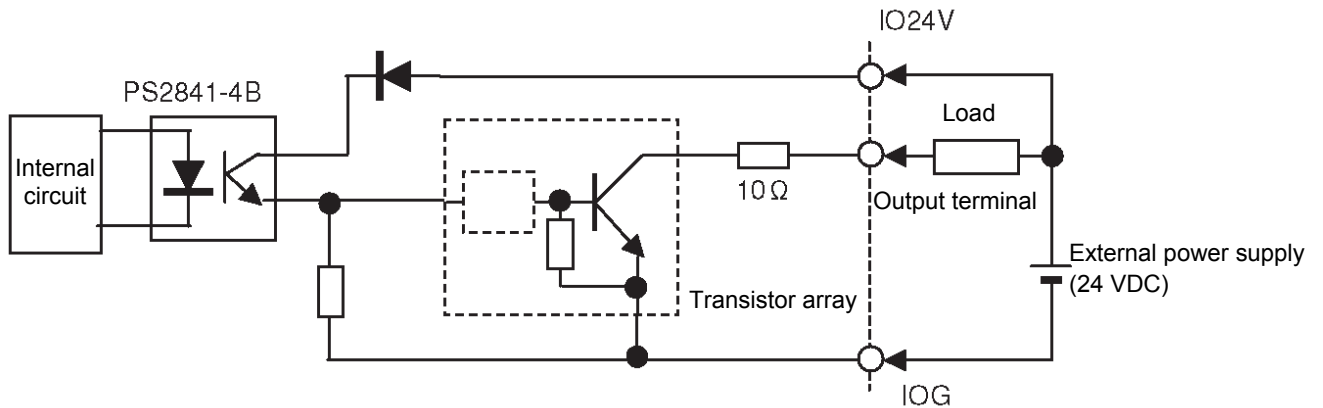
Table 5-2 Specifications of Output Part

	Specification
Output element	Transistor array NPN specification: TD62084AF by Toshiba PNP specification: TD62784AF by Toshiba
External power-supply voltage	24 VDC $\pm$ 10%
Maximum load current	Max. 50 mA/point (Max. 400 mA/ 24 points) : *1
Leak current	Max. 0.1 mA/point

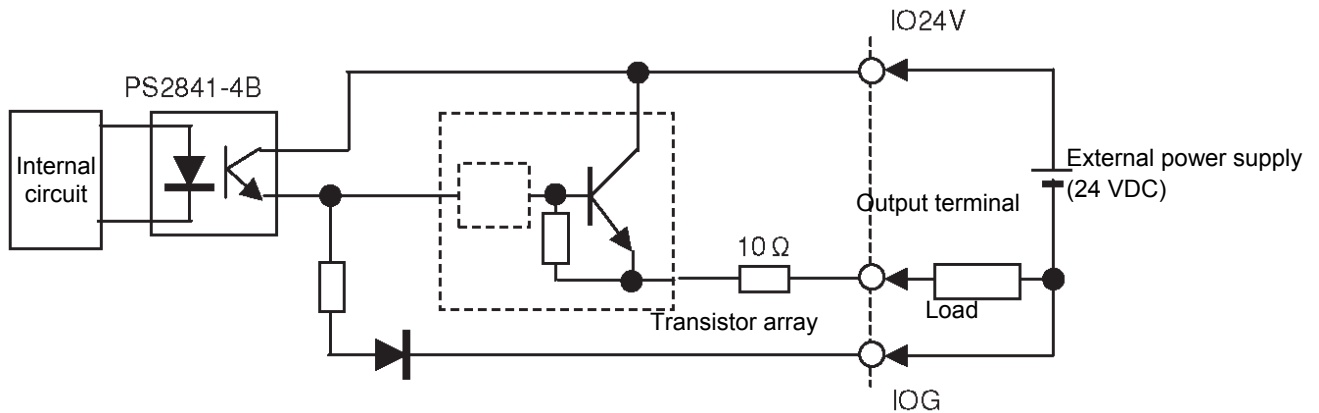
*1: The maximum load current of 400 mA indicates the total of output currents for each

Fig. 5-2 Circuit of Output Part

- NPN specification



- PNP specification





6. Examples of Interface

Example of interface list 1 (cable w/ connector on one end)

J-Type controller

The interface can be installed in standard slot 1 (I/O1) of the type-J controller.

The Function column indicates the factory settings.

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



Example of interface list 2 (cable w/ connector on one end)

Multi-point DIO board for K-Type controller, first board

The interface can be installed in expansion slot 1 (I/O2) or any subsequent expansion slot of the type-K controller.

The interface list below assumes that the first multi-point DIO board is installed in expansion slot 1 (I/O2).

I/O parameter No. 1 = "1" (Automatic assignment)

Note) The IO24V power supply on the controller's panel board is connected to pin Nos. 26 and 100.

Pin No. 26: 24 VDC Pin No. 100: 0 V (power supply for pin Nos. 27 to 50/76 to 99)

Cable 1					Cable 2				
Category	Pin No.	Color	Port No.	Function	Category	Pin No.	Color	Port No.	Function
–	1	Brown-1	–	External power supply (24 VDC) for pin Nos. 2 to 25/51 to 74		51	Brown-1	316	User Output
Input	2	Red-1	032	User Input	Output	52	Red-1	317	User Output
	3	Orange-1	033	User Input		53	Orange-1	318	User Output
	4	Yellow-1	034	User Input		54	Yellow-1	319	User Output
	5	Green-1	035	User Input		55	Green-1	320	User Output
	6	Blue-1	036	User Input		56	Blue-1	321	User Output
	7	Purple-1	037	User Input		57	Purple-1	322	User Output
	8	Gray-1	038	User Input		58	Gray-1	323	User Output
	9	White-1	039	User Input		59	White-1	324	User Output
	10	Black-1	040	User Input		60	Black-1	325	User Output
	11	Brown-2	041	User Input		61	Brown-2	326	User Output
	12	Red-2	042	User Input		62	Red-2	327	User Output
	13	Orange-2	043	User Input		63	Orange-2	328	User Output
	14	Yellow-2	044	User Input		64	Yellow-2	329	User Output
	15	Green-2	045	User Input		65	Green-2	330	User Output
	16	Blue-2	046	User Input		66	Blue-2	331	User Output
	17	Purple-2	047	User Input		67	Purple-2	332	User Output
	18	Gray-2	048	User Input		68	Gray-2	333	User Output
	19	White-2	049	User Input		69	White-2	334	User Output
	20	Black-2	050	User Input		70	Black-2	335	User Output
	21	Brown-3	051	User Input		71	Brown-3	336	User Output
	22	Red-3	052	User Input		72	Red-3	337	User Output
	23	Orange-3	053	User Input		73	Orange-3	338	User Output
	24	Yellow-3	054	User Input		74	Yellow-3	339	User Output
	25	Green-3	055	User Input	–	75	Green-3	–	External power supply (0 VDC) for pin Nos. 2 to 25/51 to 74
–	26	Blue-3	–	Note) (24 VDC)	Output	76	Blue-3	340	User Output
Input	27	Purple-3	056	User Input		77	Purple-3	341	User Output
	28	Gray-3	057	User Input		78	Gray-3	342	User Output
	29	White-3	058	User Input		79	White-3	343	User Output
	30	Black-3	059	User Input		80	Black-3	344	User Output
	31	Brown-4	060	User Input		81	Brown-4	345	User Output
	32	Red-4	061	User Input		82	Red-4	346	User Output
	33	Orange-4	062	User Input		83	Orange-4	347	User Output
	34	Yellow-4	063	User Input		84	Yellow-4	348	User Output
	35	Green-4	064	User Input		85	Green-4	349	User Output
	36	Blue-4	065	User Input		86	Blue-4	350	User Output
	37	Purple-4	066	User Input		87	Purple-4	351	User Output
	38	Gray-4	067	User Input		88	Gray-4	352	User Output
	39	White-4	068	User Input		89	White-4	353	User Output
	40	Black-4	069	User Input		90	Black-4	354	User Output
	41	Brown-5	070	User Input		91	Brown-5	355	User Output
	42	Red-5	071	User Input		92	Red-5	356	User Output
	43	Orange-5	072	User Input		93	Orange-5	357	User Output
	44	Yellow-5	073	User Input		94	Yellow-5	358	User Output
	45	Green-5	074	User Input		95	Green-5	359	User Output
	46	Blue-5	075	User Input		96	Blue-5	360	User Output
	47	Purple-5	076	User Input		97	Purple-5	361	User Output
	48	Gray-5	077	User Input		98	Gray-5	362	User Output
	49	White-5	078	User Input		99	White-5	363	User Output
	50	Black-5	079	User Input	–	100	Black-5	–	Note) (0 VDC)



Example of interface list 3 (cable w/ connector on one end)

Multi-point DIO board for K-Type controller, second board

The interface list below assumes that the second multi-point DIO board is installed in expansion slot 2 (I/O3).

(When one multi-point DIO board is added to the condition in the previous example)

I/O parameter No. 1 = "1" (Automatic assignment)

Note) The IO24V power supply on the controller's panel board is connected to pin Nos. 26 and 100.

Pin No. 26: 24 VDC Pin No. 100: 0 V (power supply for pin Nos. 27 to 50/76 to 99)

Cable 1					Cable 2				
Category	Pin No.	Color	Port No.	Function	Category	Pin No.	Color	Port No.	Function
–	1	Brown-1	–	External power supply (24 VDC) for pin Nos. 2 to 25/51 to 74		51	Brown-1	364	User Output
Input	2	Red-1	080	User Input	Output	52	Red-1	365	User Output
	3	Orange-1	081	User Input		53	Orange-1	366	User Output
	4	Yellow-1	082	User Input		54	Yellow-1	367	User Output
	5	Green-1	083	User Input		55	Green-1	368	User Output
	6	Blue-1	084	User Input		56	Blue-1	369	User Output
	7	Purple-1	085	User Input		57	Purple-1	370	User Output
	8	Gray-1	086	User Input		58	Gray-1	371	User Output
	9	White-1	087	User Input		59	White-1	372	User Output
	10	Black-1	088	User Input		60	Black-1	373	User Output
	11	Brown-2	089	User Input		61	Brown-2	374	User Output
	12	Red-2	090	User Input		62	Red-2	375	User Output
	13	Orange-2	091	User Input		63	Orange-2	376	User Output
	14	Yellow-2	092	User Input		64	Yellow-2	377	User Output
	15	Green-2	093	User Input		65	Green-2	378	User Output
	16	Blue-2	094	User Input		66	Blue-2	379	User Output
	17	Purple-2	095	User Input		67	Purple-2	380	User Output
	18	Gray-2	096	User Input		68	Gray-2	381	User Output
	19	White-2	097	User Input		69	White-2	382	User Output
	20	Black-2	098	User Input		70	Black-2	383	User Output
	21	Brown-3	099	User Input		71	Brown-3	384	User Output
	22	Red-3	100	User Input		72	Red-3	385	User Output
	23	Orange-3	101	User Input		73	Orange-3	386	User Output
	24	Yellow-3	102	User Input		74	Yellow-3	387	User Output
	25	Green-3	103	User Input		75	Green-3	–	External power supply (0 VDC) for pin Nos. 2 to 25/51 to 74
–	26	Blue-3	–	Note) (24 VDC)		76	Blue-3	388	User Output
Input	27	Purple-3	104	User Input	Output	77	Purple-3	389	User Output
	28	Gray-3	105	User Input		78	Gray-3	390	User Output
	29	White-3	106	User Input		79	White-3	391	User Output
	30	Black-3	107	User Input		80	Black-3	392	User Output
	31	Brown-4	108	User Input		81	Brown-4	393	User Output
	32	Red-4	109	User Input		82	Red-4	394	User Output
	33	Orange-4	110	User Input		83	Orange-4	395	User Output
	34	Yellow-4	111	User Input		84	Yellow-4	396	User Output
	35	Green-4	112	User Input		85	Green-4	397	User Output
	36	Blue-4	113	User Input		86	Blue-4	398	User Output
	37	Purple-4	114	User Input		87	Purple-4	399	User Output
	38	Gray-4	115	User Input		88	Gray-4	400	User Output
	39	White-4	116	User Input		89	White-4	401	User Output
	40	Black-4	117	User Input		90	Black-4	402	User Output
	41	Brown-5	118	User Input		91	Brown-5	403	User Output
	42	Red-5	119	User Input		92	Red-5	404	User Output
	43	Orange-5	120	User Input		93	Orange-5	405	User Output
	44	Yellow-5	121	User Input		94	Yellow-5	406	User Output
	45	Green-5	122	User Input		95	Green-5	407	User Output
	46	Blue-5	123	User Input		96	Blue-5	408	User Output
	47	Purple-5	124	User Input		97	Purple-5	409	User Output
	48	Gray-5	125	User Input		98	Gray-5	410	User Output
	49	White-5	126	User Input		99	White-5	411	User Output
	50	Black-5	127	User Input		100	Black-5	–	Note) (0 VDC)



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