X-SEL Multi-point DIO
96-point Terminal Block Unit

Operating Manual

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This unit connects to a multi-point DIO board for X-SEL controller type K (general-purpose type) and divides the power supply into multiple external interface circuits. This unit cannot be used with X-SEL controller type J (compact type).
Separate interface circuits are provided for six DI/DO groups (each group consisting of eight points). This allows for separate wiring of interface power supplies for external I/O equipment.

1. Overview

1.1 Features

[1] Dividing the DIO interface power supply (24 VDC) into 12 groups
This unit has built-in insulated DIO interface circuits for six input groups (each group consisting of eight points) and six output groups (each group consisting of eight points).
[2] Conversion from one half-pitch flat connector to three MIL flat connectors
A multi-point DIO connector for 48 DIs/48 DOs can be divided into three I/O connectors each providing 16 DIs/16 DOs.
[3] Support of DO large-current output specification
This unit has a transistor buffer circuit to support an output current of 500 mA per point (0.8 A per eight points).
[4] Support of NPN and PNP DIO interfaces
Both NPN and PNP-type DIO interfaces are supported (the supported interface specification is set before shipment). With both the NPN and PNP units, the connected controller DIO board must be of NPN type.

1.2 Unit Variations

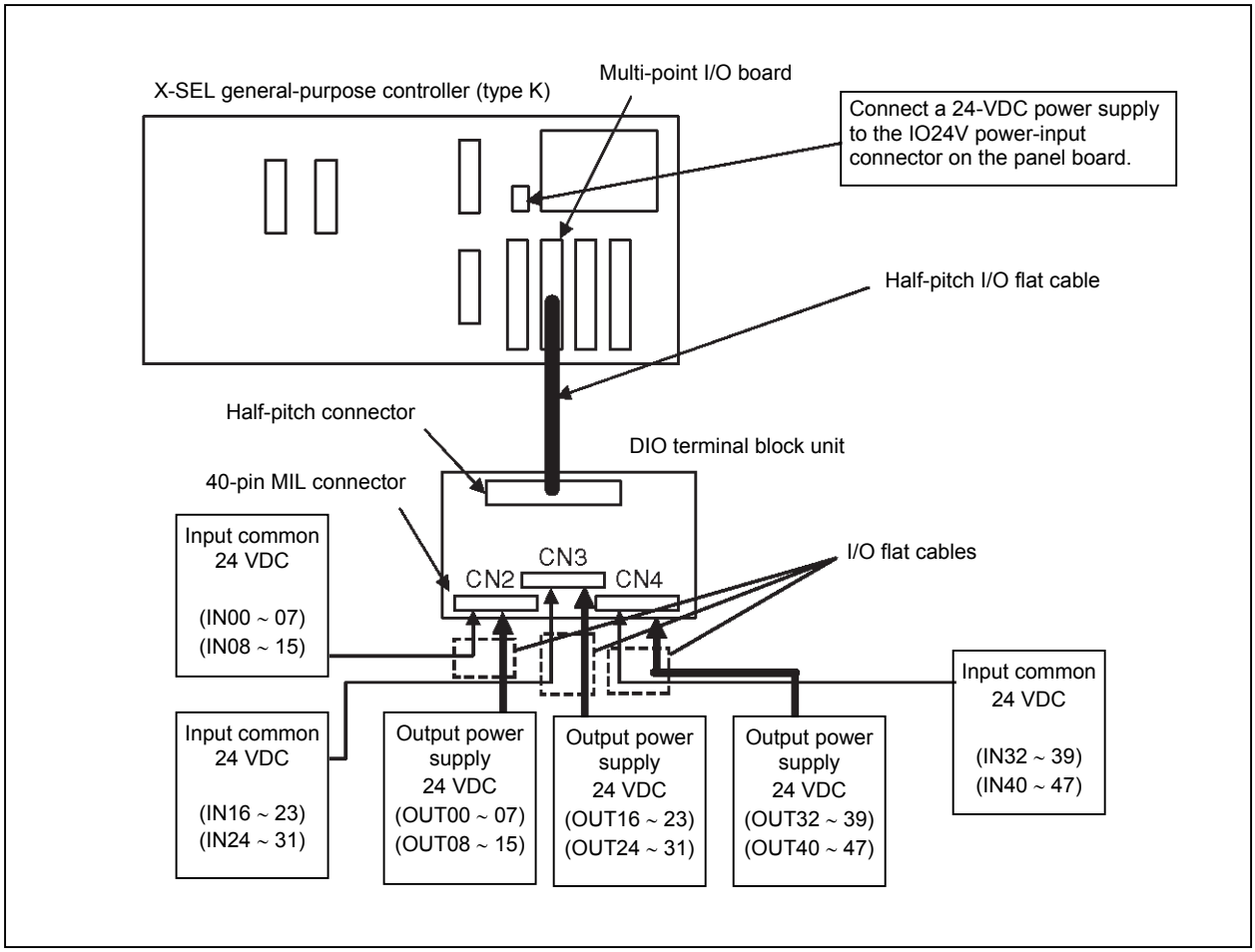
Table 0-1 Variation List for 96-point Terminal Block Unit for X-SEL Multi-point DIO

Model	Name	Overview
IATU3204-NP1	96-point terminal block unit for X-SEL multi-point DIO, NPN specification	A unit with large-current output circuit (NPN)
IATU3204-PN1	96-point terminal block unit for X-SEL multi-point DIO, PNP specification	A unit with large-current output circuit (PNP)

2. Configuration

2.1 System Configuration

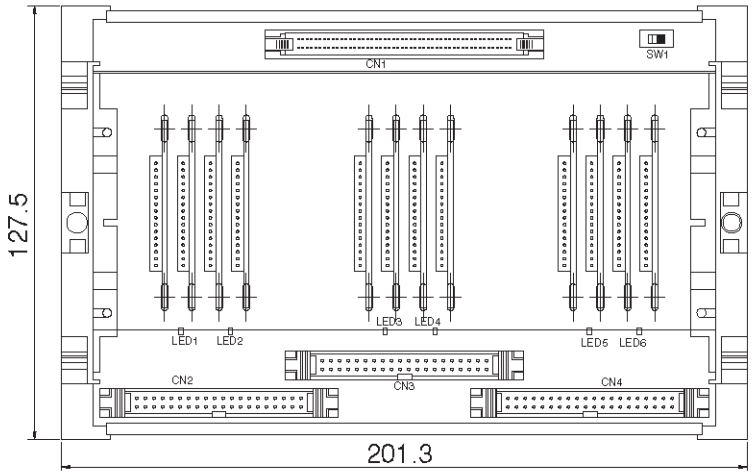
Fig. 2-1 Connection Example



Model	Name	Connection
Half-pitch I/O flat cable (w/ connectors on both ends)	CB-X-PIOH020-H6	For connection between the controller's multi-point DIO board and the DIO terminal block unit.
I/O flat cables (w/ connector on one end)	CB-RCBC-PIO020	For connection between the DIO terminal block unit and peripheral equipment.

2.2 External View of 96-point Terminal Block Unit for Multi-point DIO

Fig. 2-2 External View



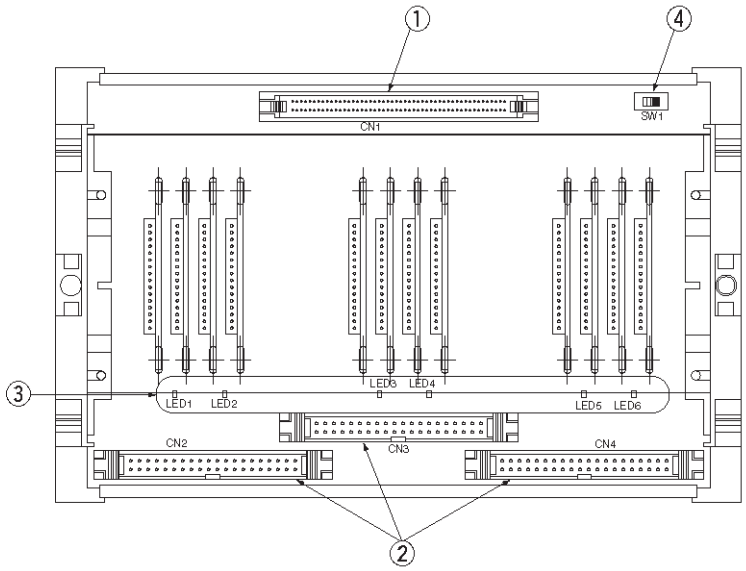
3. Specifications

3.1 Unit Specifications

Table 3-1 Unit Specifications

Item	Specification
Numbers of connectable I/O points	48 input points, 48 output points
Controller connector	100-pin half-pitch flat connector
External I/O equipment connector	40-pin MIL flat connector
External power-supply voltage	24 VDC ± 10% (Internal consumption: 7.2 W)
	Power supply for DIO board: 24 VDC ±10% (Internal consumption: 25 W (96 points))
Installation method	Installation on DIN rail
External dimensions	201.3 mm × 127.5 mm × 49.2 mm

3.2 Names and Functions of Parts



[1] Multi-point DIO connector (CN1)

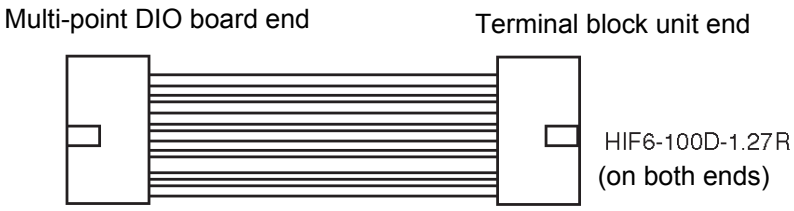
This connector is used to connect a multi-point DIO board for X-SEL controller.

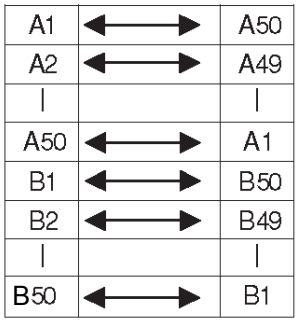
Table 3-2 Specification List for Multi-point DIO Connector

Item	
Connector	HIF6-100PA-12.7DSA (by Hirose) 100-pin half-pitch flat connector
Connector name	CN1
DI	48 points
DO	48 points
Connected unit	Multi-point DIO board

- The wiring cable used for connection with a multi-point DIO board is shown below.

Cable model: CB-X-PIOH020-H6





[2] External I/O connector (CN2, CN3, CN4)

This connector is used to connect external I/O equipment.
One connector accommodates 16 DIs and 16 DOs.

Table 3-3 Specification List for External I/O Connector

Item					
Connector	XG4A-4031 (OMRON) 40-pin MIL flat connector				
DI	16 points each				
DO	16 points each				
Connected unit	External I/O equipment				
Connector name			CN2	CN3	CN4
Terminal assignments Input	1	Common	Common terminal (COM): For IN00 to IN07	Common terminal (COM): For IN16 to IN23	Common terminal (COM): For IN32 to IN39
	2	Common			
	3	General-purpose input	IN00	IN16	IN32
	4	General-purpose input	IN01	IN17	IN33
	5	General-purpose input	IN02	IN18	IN34
	6	General-purpose input	IN03	IN19	IN35
	7	General-purpose input	IN04	IN20	IN36
	8	General-purpose input	IN05	IN21	IN37
	9	General-purpose input	IN06	IN22	IN38
	10	General-purpose input	IN07	IN23	IN39
	11	General-purpose input	IN08	IN24	IN40
	12	General-purpose input	IN09	IN25	IN41
	13	General-purpose input	IN10	IN26	IN42
	14	General-purpose input	IN11	IN27	IN43
	15	General-purpose input	IN12	IN28	IN44
	16	General-purpose input	IN13	IN29	IN45
	17	General-purpose input	IN14	IN30	IN46
	18	General-purpose input	IN15	IN31	IN47
	19	Common	Common terminal (COM): For IN08 to IN15	Common terminal (COM): For IN24 to IN31	Common terminal (COM): For IN40 to IN47
	20	Common			
Terminal assignments Output	21	+24 V	External 24-V power input: For OUT00 to OUT07	External 24-V power input: For OUT16 to OUT23	External 24-V power input: For OUT32 to OUT39
	22	0 V			
	23	General-purpose input	OUT00	OUT16	OUT32
	24	General-purpose input	OUT01	OUT17	OUT33
	25	General-purpose input	OUT02	OUT18	OUT34
	26	General-purpose input	OUT03	OUT19	OUT35
	27	General-purpose input	OUT04	OUT20	OUT36
	28	General-purpose input	OUT05	OUT21	OUT37
	29	General-purpose input	OUT06	OUT22	OUT38
	30	General-purpose input	OUT07	OUT23	OUT39
	31	General-purpose input	OUT08	OUT24	OUT40
	32	General-purpose input	OUT09	OUT25	OUT41
	33	General-purpose input	OUT10	OUT26	OUT42
	34	General-purpose input	OUT11	OUT27	OUT43
	35	General-purpose input	OUT12	OUT28	OUT44
	36	General-purpose input	OUT13	OUT29	OUT45
	37	General-purpose input	OUT14	OUT30	OUT46
	38	General-purpose input	OUT15	OUT31	OUT47
	39	+24 V	External 24-V power input: For OUT08 to OUT15	External 24-V power input: For OUT24 to OUT31	External 24-V power input: For OUT40 to OUT47
	40	0 V			

Pint layout

●CN2（IN00～IN07/IN08～IN15/OUT00～OUT07/OUT08～OUT15）

2	COM	4	IN01	•••	•••	36	OUT13	38	OUT15	40	0V
1	COM	3	IN00	•••	•••	35	OUT12	37	OUT14	39	+24V

Guide key end

●CN3（IN16～IN23/IN24～IN31/OUT16～OUT23/OUT24～OUT31）

2	COM	4	IN17	•••	•••	36	OUT29	38	OUT31	40	0V
1	COM	3	IN16	•••	•••	35	OUT28	37	OUT30	39	+24V

Guide key end

●CN4（IN32～IN39/IN40～IN47/OUT32～OUT39/OUT40～OUT47）

2	COM	4	IN33	•••	•••	36	OUT45	38	OUT47	40	0V
1	COM	3	IN32	•••	•••	35	OUT44	37	OUT46	39	+24V

Guide key end

[3] LED indicators

This unit has LED indicators that show the DO power-input status for each connector.
If external power is not input or a fuse on the board is blown, the applicable LED will turn off.
All fuses are resettable (meaning that the fuse will reconnect automatically once an overcurrent condition is removed). One fuse is provided for each group of eight DOs.

Table 3-4 LED Indicator Specifications

Symbol	Color	Applicable external power input	
LED1	Green	CN2 external power-input indicator	OUT00 ~ 07
LED2	Green		OUT08 ~ 15
LED3	Green	CN3 external power-input indicator	OUT16 ~ 23
LED4	Green		OUT24 ~ 31
LED5	Green	CN4 external power-input indicator	OUT32 ~ 39
LED6	Green		OUT40 ~ 47

[4] External power-supply open detection switch (SW1)

This unit is capable of outputting a detection signal indicating absence of external DO power supply (24 VDC) to the X-SEL controller.
To use this function, the dedicated switch (SW1) must be set to the ON position.
In the power-supply open detection mode, IN47 becomes a dedicated input for detection signal.
The applicable X-SEL controller parameter must also be set to specify error detection input for the terminal block unit.
I/O parameter No. 23: Specification of overcurrent/power-supply error detection input for multi-point DIO external terminal block

Example 1) To detect power-supply open failure only for the unit connected to the multi-point I/O board in expansion slot I/O1 (I/O2), set I/O parameter No. 23 to “20.”
Example 2) To detect power-supply open failure for both units connected to the multi-point I/O boards in expansion slots I/O1 (I/O2) and I/O2 (I/O3), set I/O parameter No. 23 to “220.”

If you want to use IN47 as a normal general-purpose input instead of an open-failure detection signal, be sure to set the switch to the OFF position.

4. I/O Specifications

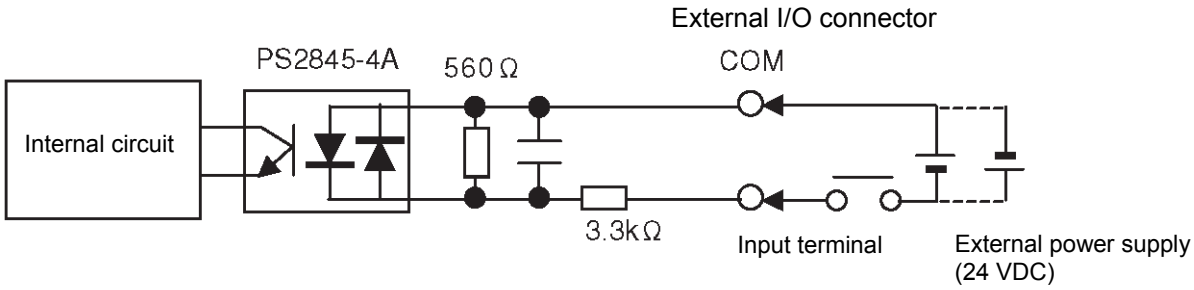
4.1 Input

Table 4-1 Specifications of Input Part

Item	Specification (Common to PNP and NPN specifications)
Insulated element	Photocoupler (by NEC: PS2845-4A)
External power-supply voltage	24 VDC ± 10%
Input current	Max. 7 mA/point
Leak current	Max. 1 mA/point

Fig. 4-1 Circuit of Input Part

• Common to PNP and NPN specifications



4.2 Output

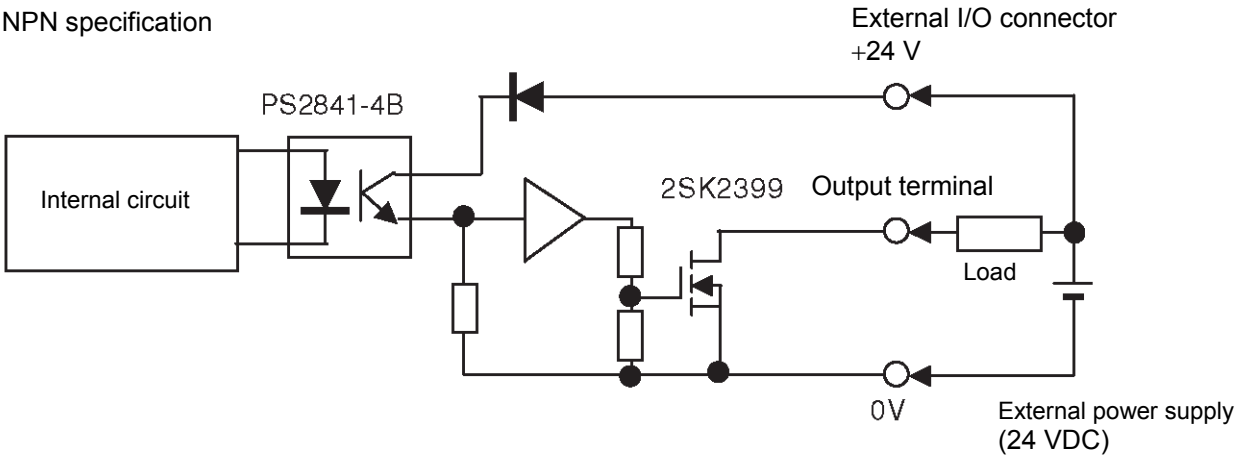
Table 4-2 Specifications of Output Part

	Specification	
	NPN specification	PNP specification
Output element	MOS-FET (by Toshiba: 2SK2399)	MOS-FET (by Toshiba: 2SJ377)
Insulated element	Photocoupler (by NEC: PS2841-4B)	
External power-supply voltage	24 VDC ± 10%	
Maximum load current	Max. 500 mA/point (Max. 800 mA/ 8 points) : *1	
Leak current	Max. 0.5 mA/point	

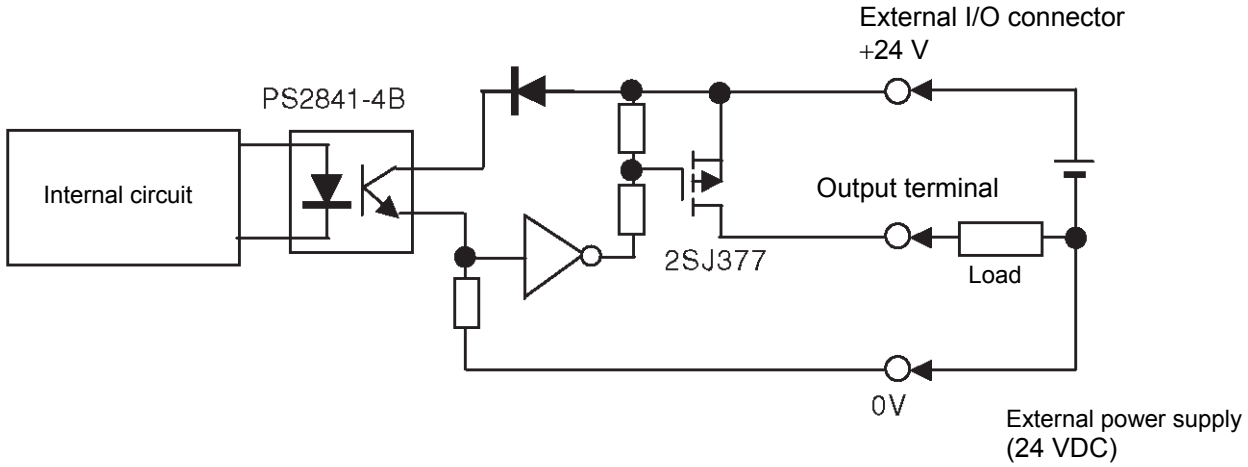
*1: The maximum load current of 800 mA indicates the total of output currents for each 8-point group.

Fig. 4-2 Circuit of Output Part

• NPN specification



• PNP specification



5. Examples of External I/O Interface

Example of interface list 1

The interface list below assumes that the first multi-point DIO board is installed in expansion slot 1 (I/O2). (When one multi-point DIO board is installed in addition to the standard I/O board (32 IN points, 16 OUT points))

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

Category	Pin No.	Color	CN2		CN3		CN4	
			Port No. Terminal name	Function	Port No. Terminal name	Function	Port No. Terminal name	Function
Input	1	Brown-1	COM terminal	For inputs 032 to 039 NPN: 24 V PNP: 0 V	COM terminal	For inputs 048 to 055 NPN: 24 V PNP: 0 V	COM terminal	For inputs 064 to 071 NPN: 24 V PNP: 0 V
	2	Red-1						
	3	Orange-1	032	IN00	048	IN16	064	IN32
	4	Yellow-1	033	IN01	049	IN17	065	IN33
	5	Green-1	034	IN02	050	IN18	066	IN34
	6	Blue-1	035	IN03	051	IN19	067	IN35
	7	Purple-1	036	IN04	052	IN20	068	IN36
	8	Gray-1	037	IN05	053	IN21	069	IN37
	9	White-1	038	IN06	054	IN22	070	IN38
	10	Black-1	039	IN07	055	IN23	071	IN39
	11	Brown-2	040	IN08	056	IN24	072	IN40
	12	Red-2	041	IN09	057	IN25	073	IN41
	13	Orange-2	042	IN10	058	IN26	074	IN42
	14	Yellow-2	043	IN11	059	IN27	075	IN43
	15	Green-2	044	IN12	060	IN28	076	IN44
	16	Blue-2	045	IN13	061	IN29	077	IN45
	17	Purple-2	046	IN14	062	IN30	078	IN46
	18	Gray-2	047	IN15	063	IN31	079	IN47
	19	White-2	COM terminal	For inputs 040 to 047 NPN: 24 V PNP: 0 V	COM terminal	For inputs 056 to 063 NPN: 24 V PNP: 0 V	COM terminal	For inputs 072 to 079 NPN: 24 V PNP: 0 V
	20	Black-2						
Output	21	Brown-3	+24 V	For outputs 316 to 323 External power input	+24 V	For outputs 332 to 339 External power input	+24 V	For outputs 348 to 355 External power input
	22	Red-3	0 V		0 V		0 V	
	23	Orange-3	316	OUT00	332	OUT16	348	OUT32
	24	Yellow-3	317	OUT01	333	OUT17	349	OUT33
	25	Green-3	318	OUT02	334	OUT18	350	OUT34
	26	Blue-3	319	OUT03	335	OUT19	351	OUT35
	27	Purple-3	320	OUT04	336	OUT20	352	OUT36
	28	Gray-3	321	OUT05	337	OUT21	353	OUT37
	29	White-3	322	OUT06	338	OUT22	354	OUT38
	30	Black-3	323	OUT07	339	OUT23	355	OUT39
	31	Brown-4	324	OUT08	340	OUT24	356	OUT40
	32	Red-4	325	OUT09	341	OUT25	357	OUT41
	33	Orange-4	326	OUT10	342	OUT26	358	OUT42
	34	Yellow-4	327	OUT11	343	OUT27	359	OUT43
	35	Green-4	328	OUT12	344	OUT28	360	OUT44
	36	Blue-4	329	OUT13	345	OUT29	361	OUT45
	37	Purple-4	330	OUT14	346	OUT30	362	OUT46
	38	Gray-4	331	OUT15	347	OUT31	363	OUT47
	39	White-4	+24 V	For outputs 324 to 331 External power input	+24 V	For outputs 340 to 347 External power input	+24 V	For outputs 356 to 363 External power input
	40	Black-4	0 V		0 V		0 V	

Example of interface list 2

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

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

Category	Pin No.	Color	CN2		CN3		CN4	
			Port No. Terminal name	Function	Port No. Terminal name	Function	Port No. Terminal name	Function
Input	1	Brown-1	COM terminal	For inputs 080 to 087 NPN: 24 V PNP: 0 V	COM terminal	For inputs 096 to 103 NPN: 24 V PNP: 0 V	COM terminal	For inputs 112 to 119 NPN: 24 V PNP: 0 V
	2	Red-1						
	3	Orange-1	080	IN00	096	IN16	112	IN32
	4	Yellow-1	081	IN01	097	IN17	113	IN33
	5	Green-1	082	IN02	098	IN18	114	IN34
	6	Blue-1	083	IN03	099	IN19	115	IN35
	7	Purple-1	084	IN04	100	IN20	116	IN36
	8	Gray-1	085	IN05	101	IN21	117	IN37
	9	White-1	086	IN06	102	IN22	118	IN38
	10	Black-1	087	IN07	103	IN23	119	IN39
	11	Brown-2	088	IN08	104	IN24	120	IN40
	12	Red-2	089	IN09	105	IN25	121	IN41
	13	Orange-2	090	IN10	106	IN26	122	IN42
	14	Yellow-2	091	IN11	107	IN27	123	IN43
	15	Green-2	092	IN12	108	IN28	124	IN44
	16	Blue-2	093	IN13	109	IN29	125	IN45
	17	Purple-2	094	IN14	110	IN30	126	IN46
	18	Gray-2	095	IN15	111	IN31	127	IN47
	19	White-2	COM terminal	For inputs 088 to 095 NPN: 24 V PNP: 0 V	COM terminal	For inputs 104 to 111 NPN: 24 V PNP: 0 V	COM terminal	For inputs 120 to 127 NPN: 24 V PNP: 0 V
	20	Black-2						
Output	21	Brown-3	+24 V	For outputs 364 to 371 External power input	+24 V	For outputs 380 to 387 External power input	+24 V	For outputs 396 to 403 External power input
	22	Red-3	0 V		0 V		0 V	
	23	Orange-3	364	OUT00	380	OUT16	396	OUT32
	24	Yellow-3	365	OUT01	381	OUT17	397	OUT33
	25	Green-3	366	OUT02	382	OUT18	398	OUT34
	26	Blue-3	367	OUT03	383	OUT19	399	OUT35
	27	Purple-3	368	OUT04	384	OUT20	400	OUT36
	28	Gray-3	369	OUT05	385	OUT21	401	OUT37
	29	White-3	370	OUT06	386	OUT22	402	OUT38
	30	Black-3	371	OUT07	387	OUT23	403	OUT39
	31	Brown-4	372	OUT08	388	OUT24	404	OUT40
	32	Red-4	373	OUT09	389	OUT25	405	OUT41
	33	Orange-4	374	OUT10	390	OUT26	406	OUT42
	34	Yellow-4	375	OUT11	391	OUT27	407	OUT43
	35	Green-4	376	OUT12	392	OUT28	408	OUT44
	36	Blue-4	377	OUT13	393	OUT29	409	OUT45
	37	Purple-4	378	OUT14	394	OUT30	410	OUT46
	38	Gray-4	379	OUT15	395	OUT31	411	OUT47
	39	White-4	+24 V	For outputs 372 to 379 External power input	+24 V	For outputs 388 to 395 External power input	+24 V	For outputs 404 to 411 External power input
	40	Black-4	0 V		0 V		0 V	

Example of interface list 3

The interface list below assumes that the third multi-point DIO board is installed in expansion slot 3 (I/O4).

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

Category	Pin No.	Color	CN2		CN3		CN4	
			Port No. Terminal name	Function	Port No. Terminal name	Function	Port No. Terminal name	Function
Input	1	Brown-1	COM terminal	For inputs 128 to 135 NPN: 24 V PNP: 0 V	COM terminal	For inputs 144 to 151 NPN: 24 V PNP: 0 V	COM terminal	For inputs 160 to 167 NPN: 24 V PNP: 0 V
	2	Red-1						
	3	Orange-1	128	IN00	144	IN16	160	IN32
	4	Yellow-1	129	IN01	145	IN17	161	IN33
	5	Green-1	130	IN02	146	IN18	162	IN34
	6	Blue-1	131	IN03	147	IN19	163	IN35
	7	Purple-1	132	IN04	148	IN20	164	IN36
	8	Gray-1	133	IN05	149	IN21	165	IN37
	9	White-1	134	IN06	150	IN22	166	IN38
	10	Black-1	135	IN07	151	IN23	167	IN39
	11	Brown-2	136	IN08	152	IN24	168	IN40
	12	Red-2	137	IN09	153	IN25	169	IN41
	13	Orange-2	138	IN10	154	IN26	170	IN42
	14	Yellow-2	139	IN11	155	IN27	171	IN43
	15	Green-2	140	IN12	156	IN28	172	IN44
	16	Blue-2	141	IN13	157	IN29	173	IN45
	17	Purple-2	142	IN14	158	IN30	174	IN46
	18	Gray-2	143	IN15	159	IN31	175	IN47
	19	White-2	COM terminal	For inputs 136 to 143 NPN: 24 V PNP: 0 V	COM terminal	For inputs 152 to 159 NPN: 24 V PNP: 0 V	COM terminal	For inputs 168 to 175 NPN: 24 V PNP: 0 V
	20	Black-2						
Output	21	Brown-3	+24 V	For outputs 412 to 419 External power input	+24 V	For outputs 428 to 435 External power input	+24 V	For outputs 444 to 451 External power input
	22	Red-3	0 V		0 V		0 V	
	23	Orange-3	412	OUT00	428	OUT16	444	OUT32
	24	Yellow-3	413	OUT01	429	OUT17	445	OUT33
	25	Green-3	414	OUT02	430	OUT18	446	OUT34
	26	Blue-3	415	OUT03	431	OUT19	447	OUT35
	27	Purple-3	416	OUT04	432	OUT20	448	OUT36
	28	Gray-3	417	OUT05	433	OUT21	449	OUT37
	29	White-3	418	OUT06	434	OUT22	450	OUT38
	30	Black-3	419	OUT07	435	OUT23	451	OUT39
	31	Brown-4	420	OUT08	436	OUT24	452	OUT40
	32	Red-4	421	OUT09	437	OUT25	453	OUT41
	33	Orange-4	422	OUT10	438	OUT26	454	OUT42
	34	Yellow-4	423	OUT11	439	OUT27	455	OUT43
	35	Green-4	424	OUT12	440	OUT28	456	OUT44
	36	Blue-4	425	OUT13	441	OUT29	457	OUT45
	37	Purple-4	426	OUT14	442	OUT30	458	OUT46
	38	Gray-4	427	OUT15	443	OUT31	459	OUT47
	39	White-4	+24 V	For outputs 420 to 427 External power input	+24 V	For outputs 436 to 443 External power input	+24 V	For outputs 452 to 459 External power input
	40	Black-4	0 V		0 V		0 V	

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