

# DeviceNet

---

Operation Manual Eighteenth Edition

**X-SEL**  
**RCS-C**  
**ASEL**  
**PSEL**

**SSEL**  
**TT**  
**E-Con**  
**SCON-C**

***IAI America, Inc.***



## **Please Read Before Use**

Thank you for purchasing our product.

This Operation Manual explains the handling methods, structure and maintenance of this product, among others, providing the information you need to know to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

The CD/DVD that comes with the product contains operation manuals for IAI products.

When using the product, refer to the necessary portions of the applicable operation manual by printing them out or displaying them on a PC.

After reading the Operation Manual, keep it in a convenient place so that whoever is handling this product can reference it quickly when necessary.

### **[Important]**

- This Operation Manual is original.
- The product cannot be operated in any way unless expressly specified in this Operation Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Operation Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
- Using or copying all or part of this Operation Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

## Notes on DeviceNet Products

Please note that the IAI products and Omron PLCs listed below cannot be connected via DeviceNet:

[IAI's products subject to this limitation]

Controller: All X-SEL models

Tabletop actuator: TT series

Gateway unit: RCM-GW-DV

\* Units shipped on or after July 30, 2008

[Omron's products subject to this limitation]

DeviceNet master unit C200HW-DRM21-V1

CVM1-DRM21-V1

\* Units manufactured in or before September 2008

Units manufactured in or after October 2008 can be connected to the above-listed products by IAI.

[Cause]

Communication disharmony

[Action]

Use a PLC of other type, or use a DeviceNet master unit C200HW-DRM21-V1 or CVM1-DRM21-V1 manufactured in or after October 2008. If changing the PLC is difficult, contact the IAI sales office near you or our customer center "Eight."



Caution: The following functions are described in the separate operation manual.

	Title of operation manual/Overview	Control number
1	DeviceNet Operation Manual Refer to this operation manual if you are using an ACON, PCON or SCON-CA controller(s).	ME0256

## Table of Contents

Safety Guide.....	1
1. Overview .....	7
2. X-SEL .....	8
2.1 Models .....	8
(1) Compact type (J type).....	9
(2) General-purpose type (K type).....	9
(3) P/Q types.....	10
2.2 Interface Specifications.....	11
2.3 DeviceNet board .....	12
2.3.1 Name of Each Part.....	12
2.3.2 DIP Switch Settings.....	13
(1) Setting the node address (MAC ID) .....	13
(2) Setting the baud rate.....	13
2.3.3 Monitor LED Indicators.....	14
2.4 Setting of I/O Parameters (Assignment of I/O Ports).....	16
2.4.1 Board Installation Position (Slot) and I/O Parameter Numbers .....	16
(1) J type.....	16
(2) K type .....	16
2.4.2 Factory-set Parameters.....	17
(1) Factory-set parameters for J/K types .....	17
(2) Factory-set parameters for P/Q types.....	18
(3) P/Q types.....	19
2.5 Parameter Setting Examples .....	20
2.5.1 Setting Example for J/K Types.....	20
(1) Setting example when only a DeviceNet board is installed .....	20
(2) Setting example when a DeviceNet board is used together with an expansion I/O board .....	22
2.5.2 Setting Example for P/Q Types.....	26
(1) Setting example when only a DeviceNet board is installed .....	26
(2) Setting example when a DeviceNet board is used together with a standard I/O board.....	28
2.6 I/O Port Numbers for X-SEL .....	32
3. Tabletop Robot TT .....	34
3.1 Model .....	34
3.2 Interface Specifications.....	35
3.3 DeviceNet board .....	36
3.3.1 Name of Each Part.....	36
3.3.2 DIP Switch Settings.....	37
(1) Setting the node address (MAC ID) .....	37
(2) Setting the baud rate.....	37
3.3.3 Monitor LED Indicators.....	38
3.4 Setting of I/O Parameters (Assignment of I/O Ports).....	39
(1) Board Installation Position (Slot) and I/O Parameter Numbers .....	39
(2) Factory-set parameters for TT type .....	40
(3) Parameter setting example for tabletop robot TT .....	41
3.5 I/O Port Numbers for TT Robots.....	43

4.	RCS-C and E-Con .....	46
4.1	Model .....	46
	(1) RCS-C .....	46
	(2) E-Con .....	46
4.2	Interface Specifications .....	47
4.3	DeviceNet Interface .....	48
4.3.1	Name of Each Part .....	48
4.3.2	DIP Switch Settings .....	49
	(1) Setting the node address (MAC ID) .....	49
	(2) Setting the baud rate .....	49
4.3.3	Monitor LED Indicators .....	50
4.4	Input/Output (I/O) .....	51
	(1) RCS-C signal assignments .....	51
	(2) E-Con signal assignments .....	52
5.	SCON-C .....	54
5.1	Model .....	54
5.2	Interface Specifications .....	55
5.3	DeviceNet Interface .....	56
5.3.1	Name of Each Part .....	56
5.3.2	DIP Switch Settings .....	57
	(1) Setting the node address (MAC ID) .....	57
	(2) Setting the baud rate .....	57
5.3.3	Monitor LED Indicators .....	58
5.4	Assignment of I/O Signals .....	59
5.5	Assignment of DeviceNet Addresses .....	61
6.	ASEL, PSEL and SSEL .....	62
6.1	Models .....	62
6.1.1	ASEL, PSEL .....	62
6.1.2	SSEL .....	63
6.2	Interface Specifications .....	64
6.3	DeviceNet Interface .....	65
	(1) Name of Each Part .....	65
	(2) Status LED indications .....	66
	(3) DeviceNet connectors .....	67
6.4	Setting of I/O Parameters .....	68
	(1) Network type setting .....	68
	(2) Node address .....	68
	(3) I/O port assignments .....	68
	(4) Network error monitor .....	68
6.5	Assignment of I/O Port Numbers and DeviceNet Addresses .....	70
	(1) Basic example .....	70
	(2) Using in the positioner mode .....	71
7.	Troubleshooting .....	75

8.	Common Items and Others .....	76
8.1	Communication Cable .....	76
8.2	Connection of Communication Cable Connector .....	77
8.3	Power Supply Connection and Terminal Resistor .....	77
8.3.1	Power Supply Connection.....	77
8.3.2	Terminal Resistor .....	77
8.4	Useful Functions You Should Know When Adjusting an X-SEL Controller.....	77
9.	EDS File .....	78

## Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

### Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none"><li>• This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications.<ol style="list-style-type: none"><li>1) Medical equipment used to maintain, control or otherwise affect human life or physical health.</li><li>2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)</li><li>3) Important safety parts of machinery (Safety device, etc.)</li></ol></li><li>• Do not use it in any of the following environments.<ol style="list-style-type: none"><li>1) Location where there is any inflammable gas, inflammable object or explosive</li><li>2) Place with potential exposure to radiation</li><li>3) Location with the ambient temperature or relative humidity exceeding the specification range</li><li>4) Location where radiant heat is added from direct sunlight or other large heat source</li><li>5) Location where condensation occurs due to abrupt temperature changes</li><li>6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)</li><li>7) Location exposed to significant amount of dust, salt or iron powder</li><li>8) Location subject to direct vibration or impact</li></ol></li><li>• Do not use the product outside the specifications. Failure to do so may considerably shorten</li></ul>

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>• Consider well so that it is not bumped against anything or dropped during the transportation.</li> <li>• Transport it using an appropriate transportation measure.</li> <li>• Do not step or sit on the package.</li> <li>• Do not put any heavy thing that can deform the package, on it.</li> <li>• When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.</li> <li>• When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit.</li> <li>• Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.</li> <li>• Do not get on the load that is hung on a crane.</li> <li>• Do not leave a load hung up with a crane.</li> <li>• Do not stand under the load that is hung up with a crane.</li> </ul>
3	Storage and Preservation	<ul style="list-style-type: none"> <li>• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.</li> </ul>
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> <li>• Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury.</li> <li>• Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life.</li> <li>• When using the product in any of the places specified below, provide a sufficient shield.             <ol style="list-style-type: none"> <li>1) Location where electric noise is generated</li> <li>2) Location where high electrical or magnetic field is present</li> <li>3) Location with the mains or power lines passing nearby</li> <li>4) Location where the product may come in contact with water, oil or chemical droplets</li> </ol> </li> </ul> <p>(2) Cable Wiring</p> <ul style="list-style-type: none"> <li>• Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool.</li> <li>• Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error.</li> <li>• Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error.</li> <li>• When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction.</li> <li>• Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product.</li> <li>• Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.</li> </ul>





No.	Operation Description	Description
4	Installation and Start	<p>(3) Grounding</p> <ul style="list-style-type: none"><li>● Make sure to perform the grounding of type D (Former Type 3) for the controller. The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation.</li></ul> <p>(4) Safety Measures</p> <ul style="list-style-type: none"><li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li><li>● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury.</li><li>● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.</li><li>● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product.</li><li>● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input.</li><li>● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury.</li><li>● Take the measure so that the work part is not dropped in power failure or emergency stop.</li><li>● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety.</li><li>● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire.</li><li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li></ul>

No.	Operation Description	Description
5	Teaching	<ul style="list-style-type: none"> <li>When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well.</li> <li>When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>Place a sign "Under Operation" at the position easy to see.</li> <li>When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
6	Trial Operation	<ul style="list-style-type: none"> <li>When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.</li> <li>When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation.</li> <li>Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc.</li> <li>Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.</li> </ul>
7	Automatic Operation	<ul style="list-style-type: none"> <li>Before the automatic operation is started up, make sure that there is nobody inside the safety protection fence.</li> <li>Before the automatic operation is started up, make sure that all the related peripheral machines are ready for the automatic operation and there is no error indication.</li> <li>Make sure to perform the startup operation for the automatic operation, out of the safety protection fence.</li> <li>In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product.</li> <li>When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.</li> </ul>

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>• Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well.</li> <li>• When the work is to be performed inside the safety protection fence, basically turn OFF the power switch.</li> <li>• When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>• When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>• Place a sign "Under Operation" at the position easy to see.</li> <li>• For the grease for the guide or ball screw, use appropriate grease according to the Operation Manual for each model.</li> <li>• Do not perform the dielectric strength test. Failure to do so may result in a damage to the product.</li> <li>• When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> <li>• Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.</li> </ul>
10	Disposal	<ul style="list-style-type: none"> <li>• When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.</li> <li>• Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.</li> </ul>

## Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the Operation Manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	 Notice

## 1. Overview

DeviceNet, which is an open field network, is a multiple-bit type multi-vendor network that combines controls and data on a machine/line control level.

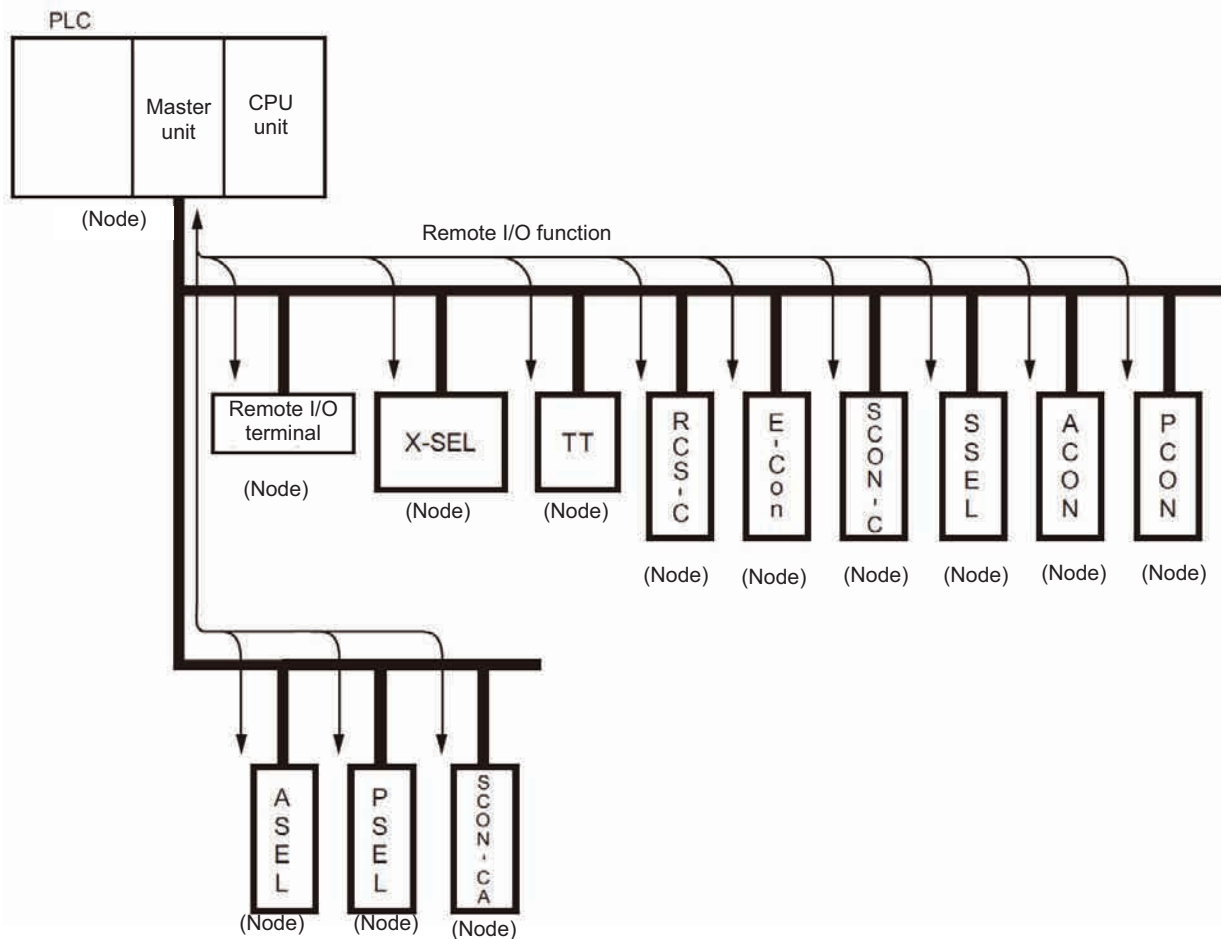
By connecting to DeviceNet, X-SEL, TT, RCS-C, E-CON, ASEL, PSEL, SSEL, SCON-C, ACON, PCON and SCON-CA controllers (hereinafter referred to collectively as “controllers” or individually as a “controller” ) can be used to configure a system based on minimal wiring.

ACON, PCON and SCON-CA are not specified in this operation manual. Refer to the separate ME0256 DeviceNet.

- \* For details of DeviceNet, refer to the operation manual for the programmable controller (hereinafter referred to as “PLC” ) in which the master unit is installed.  
When reading this Operation Manual, also refer to the operation manual for the X-SEL, TT, RCS-C, E-CON, ASEL, PSEL, SSEL, ACON, PCON and SCON controller you are using.

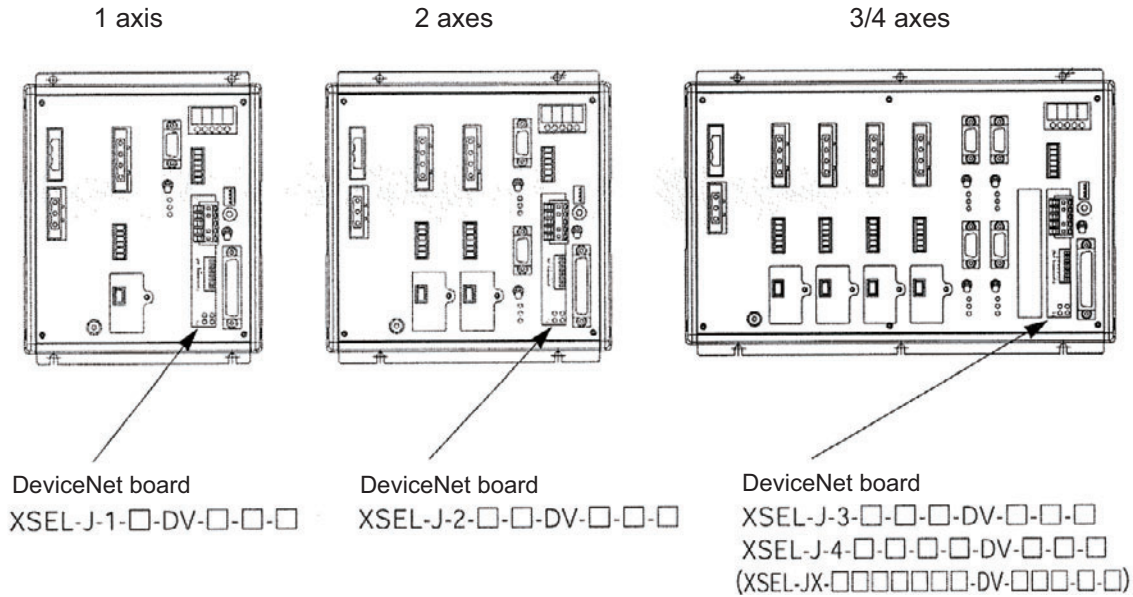
Take note that operations and uses not expressly permitted in this Operation Manual should be considered prohibited.

Example of system configuration





## (1) Compact type (J type)



(Note) I/O boards cannot be installed in controllers of 1/2-axis specifications. Only one expansion I/O board <sup>(Note 1)</sup> can be installed in controllers of 3/4-axis specifications.

Fig. 2-1

## (2) General-purpose type (K type)

- A DeviceNet board is installed in the standard slot (I/O1 --- the slot at the far left).
- Either an expansion I/O board <sup>(Note 1)</sup> or SIO board <sup>(Note 2)</sup> can be installed in each expansion slot.

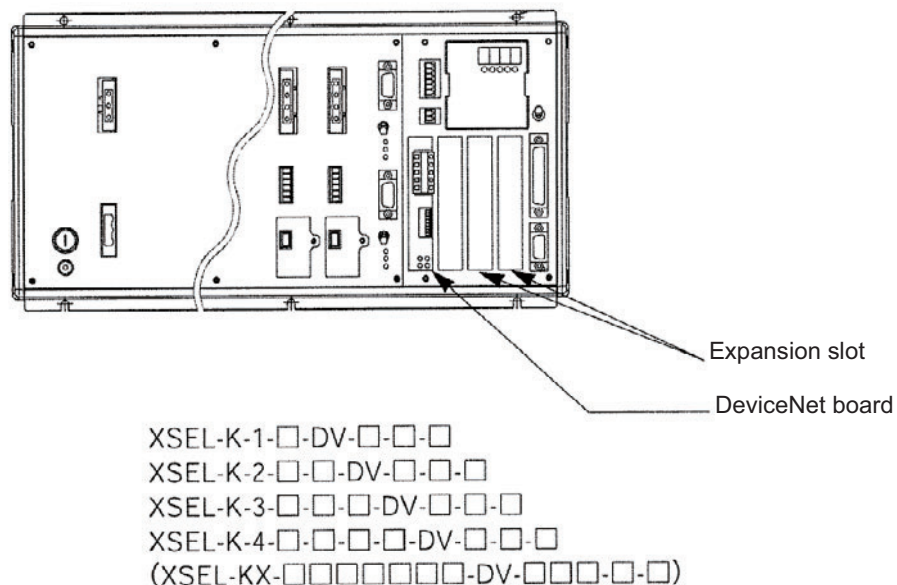


Fig. 2-2

## (3) P/Q types

- A DeviceNet board is installed in the installation position of field network board.

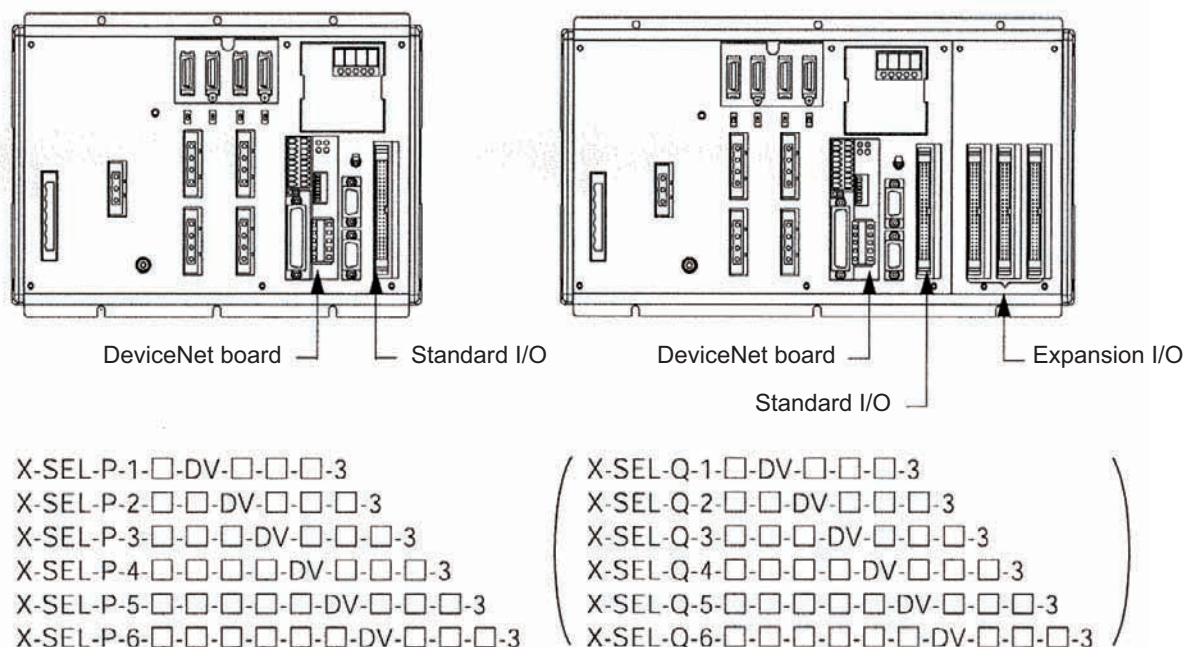


Fig. 2-3

### (Note 1) Expansion I/O board

- Model [1] IA-103-X-32 (32 input points/16 output points, NPN specification)  
[2] IA-103-X-32-P (32 input points/16 output points, PNP specification)  
[3] IA-103-X-16 (16 input points/32 output points, NPN specification)  
[4] IA-103-X-16-P (16 input points/32 output points, PNP specification)  
[5] IA-IO-3204-NP (48 input points/48 output points, NPN specification)  
[6] IA-IO-3204-PN (48 input points/48 output points, PNP specification)  
[7] IA-IO-3205-NP (48 input points/48 output points, NPN specification)  
[8] IA-IO-3205-PN (48 input points/48 output points, PNP specification)  
(Note) [5] and [6] are used for K/P/Q types only, while [7] and [8] are used for J type only.

For details of each specification, refer to the "Operation Manual for X-SEL Controller."

### (Note 2) SIO board

- Model [1] IA-105-X-MW-A (RS232C)  
[2] IA-105-X-MW-B (RS422)  
[3] IA-105-X-MW-C (RS485)

With all boards, one board supports two channels.

## 2.2 Interface Specifications

The DeviceNet interface specifications are summarized below.

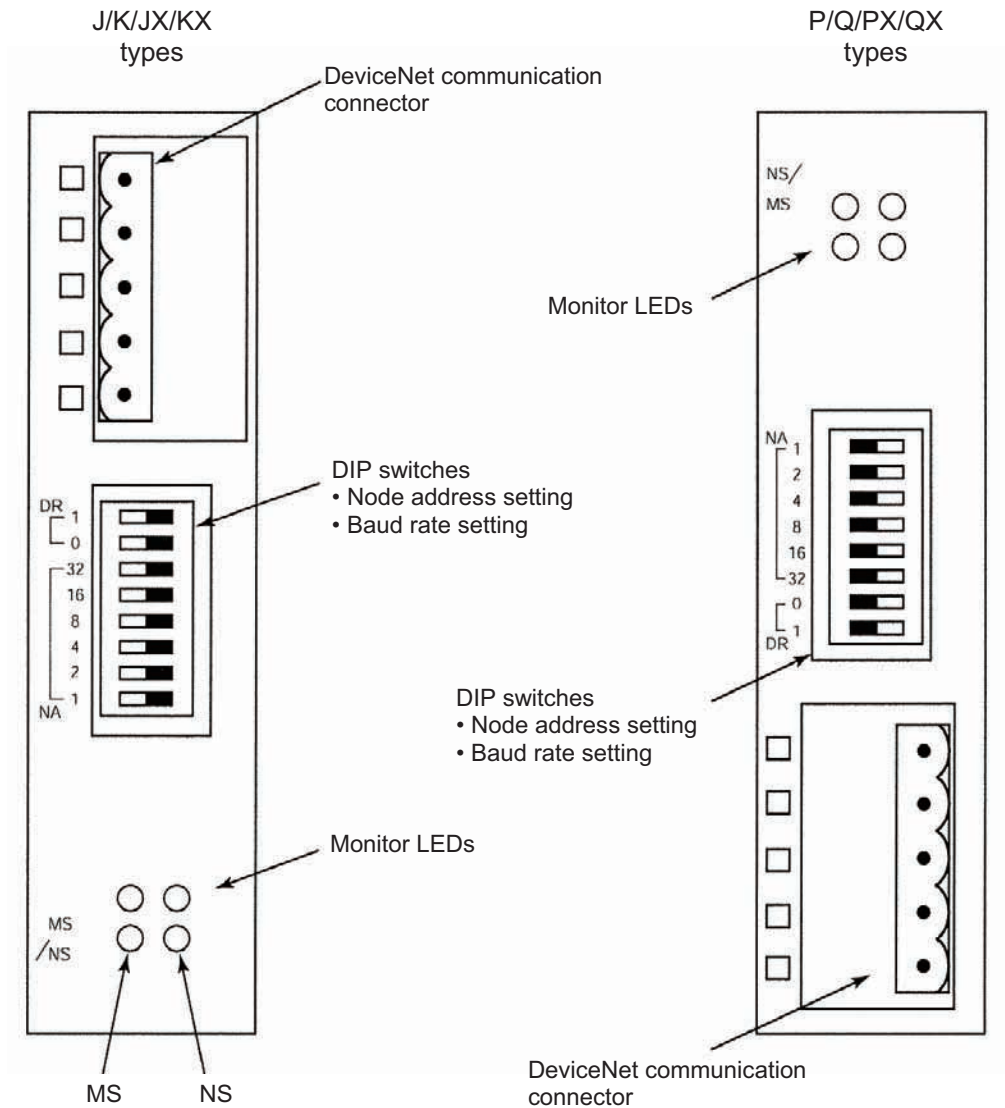
Item	Specification			
Communication protocol	A certified DeviceNet 2.0 interface module is used (certification pending).			
	Group 2 only server			
	Network-powered insulation node			
Communication specification	Master-slave connection	Bit strobe		
		Polling		
		Cyclic		
Baud rate	500 k / 250 k / 125 kbps (selectable by DIP switches)			
Communication cable length	Baud rate	Maximum network length	Maximum branch line length	Total branch line length
	500 kbps	100 m	6 m	39 m
	250 kbps	250 m		78 m
	125 kbps	500 m		156 m
	Note) When a large-size DeviceNet cable is used.			
Communication power supply	24 VDC (supplied from DeviceNet)			
Consumption current of communication power supply	60 mA			
Number of occupied nodes	1 node			
Connector	MSTBA2.5/5-G-5.08AU M (*1) by Phoenix Contact			

(\*1) The cable-end connector is a standard accessory.  
SMSTB2.5/5-ST-5.08AU by Phoenix Contact

## 2.3 DeviceNet board

### 2.3.1 Name of Each Part

2. X-SEL



### 2.3.2 DIP Switch Settings

The DIP switches are used to set the following items:

(1) Node address

(2) Baud rate

(Note) Turn off the X-SEL power before setting the DIP switches.

#### (1) Setting the node address (MAC ID)

Set the node address (MAC ID) using a hexadecimal value according to the table below.

1: ON 0: OFF

Node address (MAC ID)	DIP switches					
	NA32	NA16	NA8	NA4	NA2	NA1
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮
60	1	1	1	1	0	0
61	1	1	1	1	0	1
62	1	1	1	1	1	0
63	1	1	1	1	1	1

(Note) The node address corresponds to the remote I/O address in the PLC. This DeviceNet card supports a maximum of 256 input points and 256 output points. Accordingly, the node address corresponding to the I/O points used will be occupied in the PLC.  
Take note that all node addresses must be unique.  
(For details, refer to the operation manual for the PLC.)

#### (2) Setting the baud rate

Set the baud rate according to the table below.

1: ON 0: OFF

Baud rate	DIP switches	
	DR1	DR0
125 kbps	0	0
250 kbps	0	1
500 kbps	1	0
Setting prohibited	1	1

### 2.3.3 Monitor LED Indicators

The two LEDs, MS and NS, provided on the front panel of the board are used to check the board (node) condition and network condition. (The remaining two LEDs are not currently used.)

The LEDs illuminate in two colors (red and green), and you can monitor the conditions listed in the table below based on the illumination status and color of each LED.

MS (Module Status) LED: Condition of the board (node) itself

NS (Network Status) LED: Condition of the network

LED	Color	Illumination status	Description (meaning)
MS	Green	Steady light	The board is operating normally.
	Red	Steady light	A hardware error occurred. The board must be replaced.
		Blinking	A minor error occurred, such as a DIP switch setting error or configuration error. The error can be reset by, for example, reconfiguring the applicable setting.
	-	Off	Power is not supplied from the X-SEL controller. The X-SEL controller must be repaired or the board must be replaced.
NS	Green	Steady light	Network connection has been established and the board is communicating normally.
		Blinking	The board is online, but network connection is not yet established. Communication is stopped. (The network is normal.)
	Red	Steady light	Node address duplication or bus-off state was detected. Communication is not possible.
		Blinking	A communication error occurred (communication time-out occurred).
	-	Off	<ul style="list-style-type: none"> <li>• The board is not online.</li> <li>• DeviceNet power is not supplied.</li> </ul>

Self test is performed when the power is turned on.

During the test, the monitor LEDs cycle in the following sequence:

- [1] NS turns off.
- [2] MS illuminates in steady green (approx. 0.25 second).
- [3] MS illuminates in steady red (approx. 0.25 second).
- [4] MS illuminates in steady green.
- [5] NS illuminates in steady green (approx. 0.25 second).
- [6] NS illuminates in steady red (approx. 0.25 second).
- [7] NS turns off.

When the self test is finished and the board starts communicating normally, both the MS and NS LEDs change to steady green.



## 2.4 Setting of I/O Parameters (Assignment of I/O Ports)

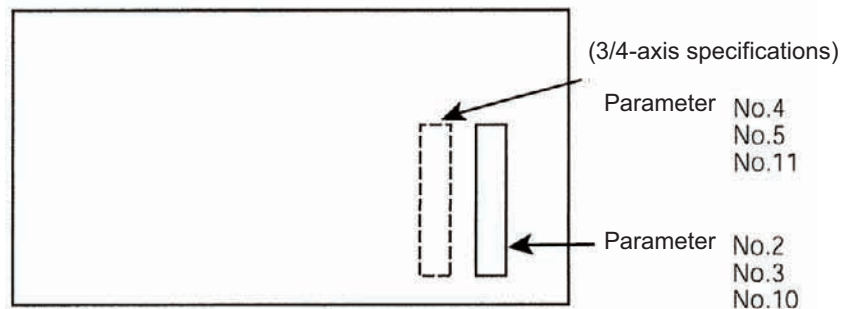
Set the X-SEL I/O ports to be used in DeviceNet communication. X-SEL controllers support various I/O port settings through use of I/O parameters. (For details, refer to the "Operation Manual for X-SEL Controller.")

A representative method to set I/O parameters is explained below.

The basic steps are to set I/O Parameter No. 1, "I/O port assignment type" to "Fixed assignment" and then set I/O port addresses for each I/O slot.

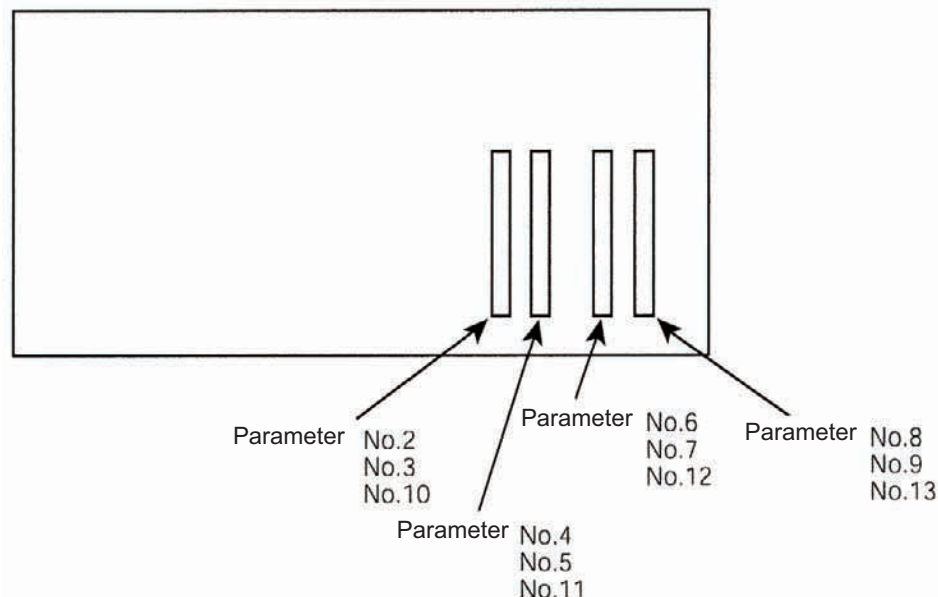
### 2.4.1 Board Installation Position (Slot) and I/O Parameter Numbers

#### (1) J type



(Note) On J-type controllers, Parameter Nos. 6 to 9 are all set to "-1," while Parameter Nos. 12 and 13 are set to "0," because expansion I/O slots 2 and 3 are not available.  
On controllers of 1/2-axis specifications, similarly Nos. 4 and 5 are both set to "-1," while No. 11 is set to "0."

#### (2) K type



## 2.4.2 Factory-set Parameters

### (1) Factory-set parameters for J/K types

No.	Parameter name	Input range	Setting	Remarks
1	I/O port assignment type	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	-1 ~ 599	000	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	0 ~ 5	2	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later) 3: Monitor (Monitor 24-V I/O power supply errors only) (Main application version 0.55 or later)
11	Error monitor for expansion I/O1 (I/O2)	0 ~ 5	0	
12	Error monitor for standard I/O2 (I/O3)	0 ~ 5	0	
13	Error monitor for expansion I/O3 (I/O4)	0 ~ 5	0	
14	Number of ports used for remote input via network I/F card	0 ~ 256	64	Multiple of 8
15	Number of ports used for remote output via network I/F card	0 ~ 256	64	Multiple of 8

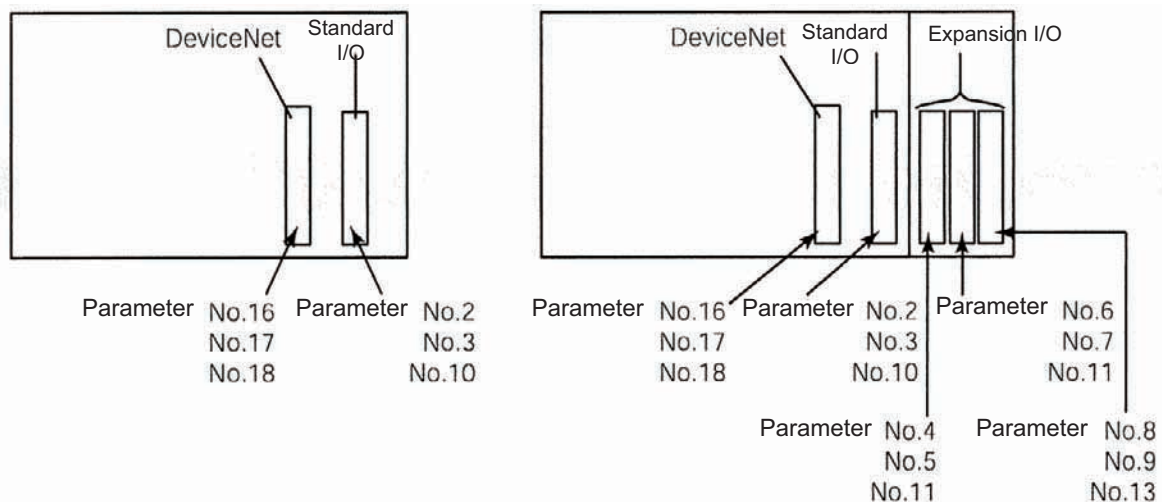
I/O1 through I/O4 indicate slot numbers.

## (2) Factory-set parameters for P/Q types

No.	Parameter name	Input range	Setting	Remarks
1	I/O port assignment type	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	0 ~ 5	0	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later) 3: Monitor (Monitor 24-V I/O power supply errors only) (Main application version 0.55 or later)
11	Error monitor for expansion I/O1 (I/O2)	0 ~ 5	0	
12	Error monitor for standard I/O2 (I/O3)	0 ~ 5	0	
13	Error monitor for expansion I/O3 (I/O4)	0 ~ 5	0	
14	Number of ports used for remote input via network I/F card	0 ~ 256	64	Multiple of 8
15	Number of ports used for remote output via network I/F card	0 ~ 256	64	Multiple of 8
16	Input port start number for network I/F module based on fixed assignment	-1 ~ 599	0	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
17	Output port start number for network I/F module based on fixed assignment	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
18	Error monitor for network I/F module	0 ~ 5	1	0: Do not monitor 1: Monitor * Some exceptions apply.

I/O1 through I/O4 indicate slot numbers.

## (3) P/Q types



## 2.5 Parameter Setting Examples

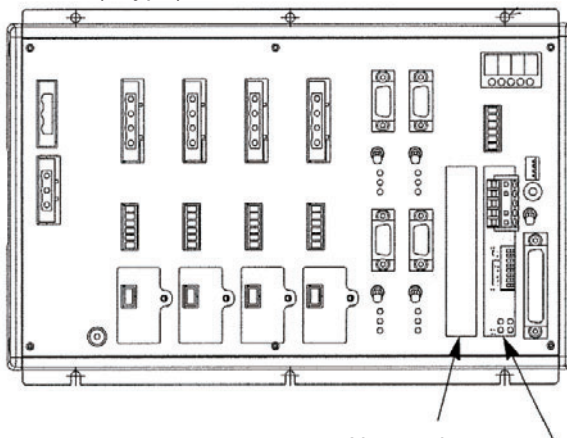
### 2.5.1 Setting Example for J/K Types

#### (1) Setting example when only a DeviceNet board is installed

Assign 32 input points and 16 output points to the DeviceNet board from the first standard I/O port, as you would for the standard X-SEL I/O board (50-pin connector), and do not use any other I/O port.

\* In this case, the I/O power connector need not be connected to 24 VDC (K type).

X-SEL (J type)

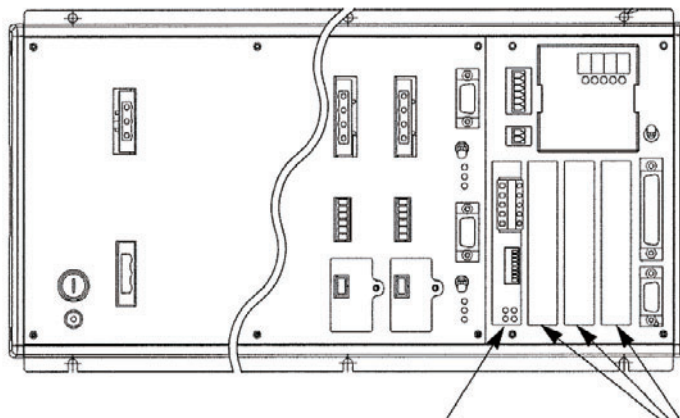


Not used.

(Not available on controllers of 1/2-axis specifications.)

Input port Nos. 000 to 031  
Output port Nos. 300 to 315

X-SEL (K type)



Input port Nos. 000 to 031  
Output port Nos. 300 to 315

Not used.

(This example assumes the installed condition shown in Fig. 2-1 and Fig. 2-2 under 2.1.)

## I/O parameters for X-SEL J/K types

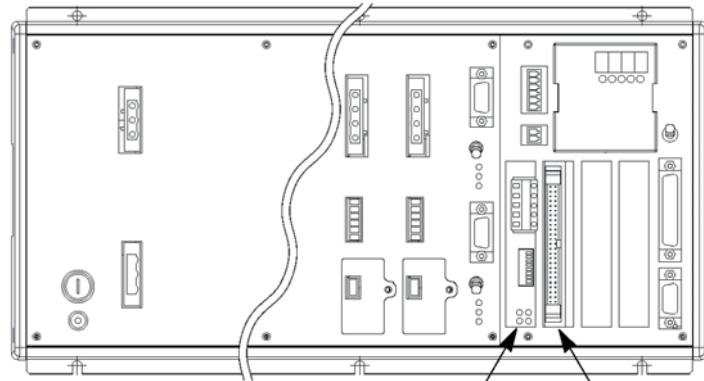
No.	Parameter name	Default value (reference)	Input range	Setting	Remarks
1	I/O port assignment type	0	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	000	-1 ~ 599	000	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	300	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	2	0 ~ 5	2	0: Do not monitor
11	Error monitor for expansion I/O1 (I/O2)	0	0 ~ 5	0	1: Monitor
12	Error monitor for standard I/O2 (I/O3)	0	0 ~ 5	0	2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later)
13	Error monitor for expansion I/O3 (I/O4)	0	0 ~ 5	0	3: Monitor (Monitor 24-V I/O power supply errors only) (Main application version 0.55 or later)
14	Number of ports used for remote input via network I/F card	64	0 ~ 256	32	Multiple of 8
15	Number of ports used for remote output via network I/F card	64	0 ~ 256	16	Multiple of 8

I/O1 through I/O4 indicate slot numbers.

(2) Setting example when a DeviceNet board is used together with an expansion I/O board

- a. Assign 256 input points and 256 output points to the DeviceNet board from the first standard I/O port, and assign the subsequent I/O port numbers to the expansion I/O board IA-103-X-32 (32 input points, 16 output points).

The same settings apply to J-type controllers.



Input port Nos. 256 to 287  
Output port Nos. 556 to 571

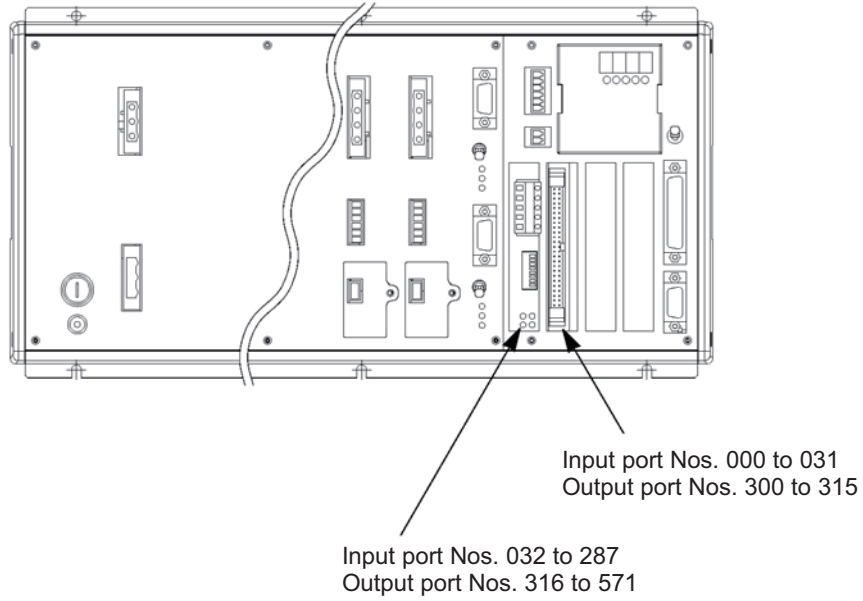
Input port Nos. 000 to 255  
Output port Nos. 300 to 555

## I/O parameters for X-SEL J/K types

No.	Parameter name	Default value (reference)	Input range	Setting	Remarks
1	I/O port assignment type	0	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	000	-1 ~ 599	000	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	300	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	256	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	556	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	2	0 ~ 5	2	0: Do not monitor
11	Error monitor for expansion I/O1 (I/O2)	1	0 ~ 5	1	1: Monitor
12	Error monitor for standard I/O2 (I/O3)	0	0 ~ 5	0	2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later)
13	Error monitor for expansion I/O3 (I/O4)	0	0 ~ 5	0	3: Monitor (Monitor 24-V I/O power supply errors only)
14	Number of ports used for remote input via network I/F card	64	0 ~ 256	256	Multiple of 16
15	Number of ports used for remote output via network I/F card	64	0 ~ 256	256	Multiple of 16

I/O1 through I/O4 indicate slot numbers.

- b. Use the expansion I/O board IA-103-X-32 (32 input points, 16 output points) for standard I/O ports, and assign 256 input points and 256 output points to the DeviceNet board as general-purpose I/O ports. The same settings apply to J-type controllers.



## I/O parameters for X-SEL J/K types

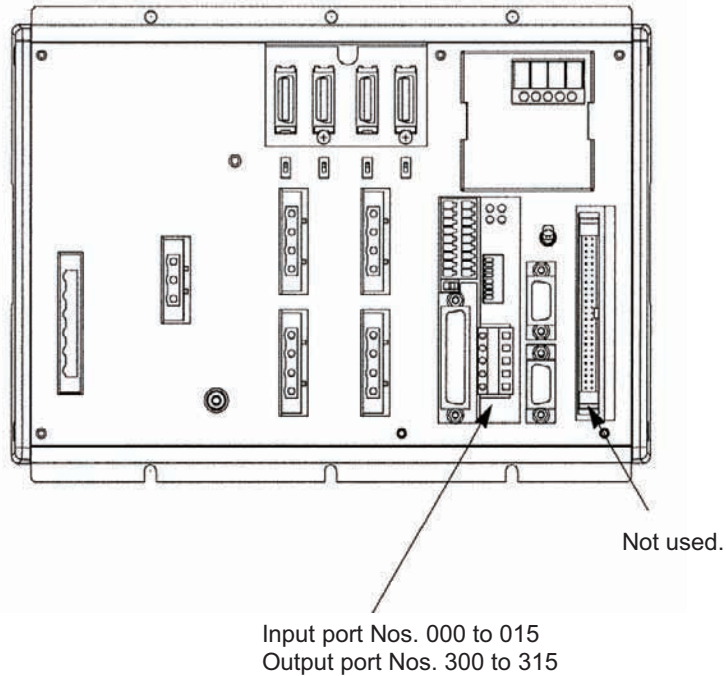
No.	Parameter name	Default value (reference)	Input range	Setting	Remarks
1	I/O port assignment type	0	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	000	-1 ~ 599	032	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	300	-1 ~ 599	316	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	000	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	2	0 ~ 5	2	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later) 3: Monitor (Monitor 24-V I/O power supply errors only)
11	Error monitor for expansion I/O1 (I/O2)	1	0 ~ 5	1	
12	Error monitor for standard I/O2 (I/O3)	0	0 ~ 5	0	
13	Error monitor for expansion I/O3 (I/O4)	0	0 ~ 5	0	
14	Number of ports used for remote input via network I/F card	64	0 ~ 256	256	Multiple of 8
15	Number of ports used for remote output via network I/F card	64	0 ~ 256	256	Multiple of 8

I/O1 through I/O4 indicate slot numbers.

### 2.5.2 Setting Example for P/Q Types

#### (1) Setting example when only a DeviceNet board is installed

Assign 32 input points and 16 output points to the DeviceNet board from the first standard I/O port, as you would for the standard X-SEL I/O board (50-pin connector), and do not use any other I/O port.

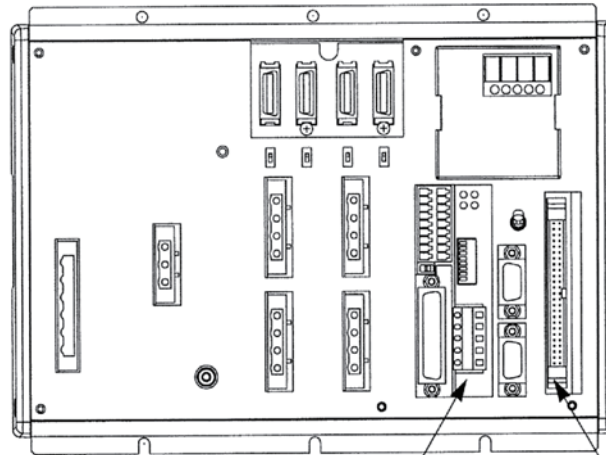


## I/O parameters for X-SEL P/Q types

No.	Parameter name	Default value (reference)	Input range	Setting	Remarks
1	I/O port assignment type	0	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	0	0 ~ 5	0	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later) 3: Monitor (Monitor 24-V I/O power supply errors only) (Main application version 0.55 or later)
11	Error monitor for expansion I/O1 (I/O2)	0	0 ~ 5	0	
12	Error monitor for standard I/O2 (I/O3)	0	0 ~ 5	0	
13	Error monitor for expansion I/O3 (I/O4)	0	0 ~ 5	0	
14	Number of ports used for remote input via network I/F card	64	0 ~ 256	32	Multiple of 8
15	Number of ports used for remote output via network I/F card	64	0 ~ 256	16	Multiple of 8
16	Input port start number for network I/F module based on fixed assignment	0	-1 ~ 599	0	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
17	Output port start number for network I/F module based on fixed assignment	300	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
18	Error monitor for network I/F module	1	0 ~ 5	1	0: Do not monitor 1: Monitor * Some exceptions apply.

I/O1 through I/O4 indicate slot numbers.

- (2) Setting example when a DeviceNet board is used together with a standard I/O board
- a. Assign 256 input points and 256 output points to the DeviceNet board from the first standard I/O port, and assign the subsequent I/O port numbers to the standard I/O board.



Input port Nos. 256 to 287  
Output port Nos. 556 to 571

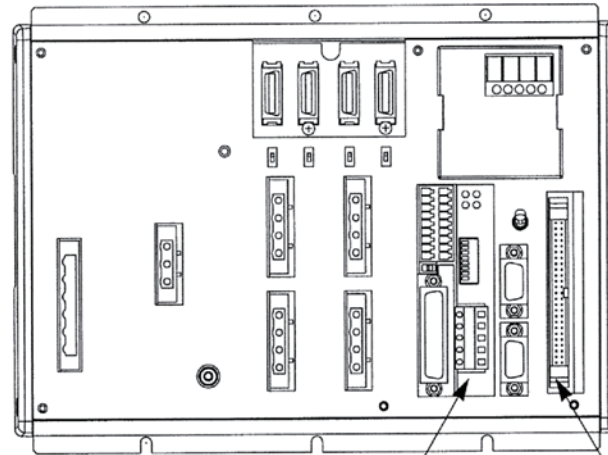
Input port Nos. 000 to 255  
Output port Nos. 300 to 555

## I/O parameters for X-SEL P/Q types

No.	Parameter name	Default value (reference)	Input range	Setting	Remarks
1	I/O port assignment type	0	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	-1	-1 ~ 599	256	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	-1	-1 ~ 599	256	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	0	0 ~ 5	1	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later) 3: Monitor (Monitor 24-V I/O power supply errors only)
11	Error monitor for expansion I/O1 (I/O2)	0	0 ~ 5	0	
12	Error monitor for standard I/O2 (I/O3)	0	0 ~ 5	0	
13	Error monitor for expansion I/O3 (I/O4)	0	0 ~ 5	0	
14	Number of ports used for remote input via network I/F card	64	0 ~ 256	256	Multiple of 16
15	Number of ports used for remote output via network I/F card	64	0 ~ 256	256	Multiple of 16
16	Input port start number for network I/F module based on fixed assignment	0	-1 ~ 599	0	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
17	Output port start number for network I/F module based on fixed assignment	300	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
18	Error monitor for network I/F module	1	0 ~ 5	1	0: Do not monitor 1: Monitor * Some exceptions apply.

I/O1 through I/O4 indicate slot numbers.

- b. Use the standard I/O board IA-103-X-32 (32 input points, 16 output points) for standard I/O ports, and assign 256 input points and 256 output points to the DeviceNet board as general-purpose I/O ports. The same settings apply to J-type controllers.



Input port Nos. 000 to 031  
Output port Nos. 300 to 315

Input port Nos. 032 to 287  
Output port Nos. 316 to 571

## I/O parameters for X-SEL P/Q types

No.	Parameter name	Default value (reference)	Input range	Setting	Remarks
1	I/O port assignment type	0	0 ~ 20	0	0: Fixed assignment 1: Automatic assignment (Priority: Assigned from slot 1) * Ports are assigned consecutively only for slots where a board is physically installed, starting from slot 1, for safety reasons.
2	Input port start number for standard I/O based on fixed assignment (I/O1)	-1	-1 ~ 599	000	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O based on fixed assignment (I/O1)	-1	-1 ~ 599	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.) (Slot immediately next to the standard I/O slot)
5	Output port start number for expansion I/O1 based on fixed assignment (I/O2)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O2 based on fixed assignment (I/O3)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Input port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
9	Output port start number for expansion I/O3 based on fixed assignment (I/O4)	-1	-1 ~ 599	-1	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
10	Error monitor for standard I/O (I/O1)	0	0 ~ 5	1	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) (Main application version 0.55 or later) 3: Monitor (Monitor 24-V I/O power supply errors only) (Main application version 0.55 or later)
11	Error monitor for expansion I/O1 (I/O2)	0	0 ~ 5	0	
12	Error monitor for standard I/O2 (I/O3)	0	0 ~ 5	0	
13	Error monitor for expansion I/O3 (I/O4)	0	0 ~ 5	0	
14	Number of ports used for remote input via network I/F card	64	0 ~ 256	256	Multiple of 8
15	Number of ports used for remote output via network I/F card	64	0 ~ 256	256	Multiple of 8
16	Input port start number for network I/F module based on fixed assignment	0	-1 ~ 599	032	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
17	Output port start number for network I/F module based on fixed assignment	300	-1 ~ 599	316	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
18	Error monitor for network I/F module	1	0 ~ 5	1	0: Do not monitor 1: Monitor * Some exceptions apply.

I/O1 through I/O4 indicate slot numbers.

## 2.6 I/O Port Numbers for X-SEL

The table below lists the standard I/O port numbers for X-SEL controllers.

On X-SEL controllers, port numbers and function assignments can be changed using I/O parameters. (For details, refer to the "Operation Manual for X-SEL Controller.")

	Port No.	Function		Port No.	Function
Input	000	Program start	Output	300	Alarm output
	001	General-purpose input		301	Ready output
	002	General-purpose input		302	Emergency stop output
	003	General-purpose input		303	General-purpose output
	004	General-purpose input		304	General-purpose output
	005	General-purpose input		305	General-purpose output
	006	General-purpose input		306	General-purpose output
	007	Program specification (PRG No. 1)		307	General-purpose output
	008	Program specification (PRG No. 2)		308	General-purpose output
	009	Program specification (PRG No. 4)		309	General-purpose output
	010	Program specification (PRG No. 8)		310	General-purpose output
	011	Program specification (PRG No. 10)		311	General-purpose output
	012	Program specification (PRG No. 20)		312	General-purpose output
	013	Program specification (PRG No. 40)		313	General-purpose output
	014	General-purpose input		314	General-purpose output
	015	General-purpose input		315	General-purpose output
	⋮	⋮		⋮	⋮

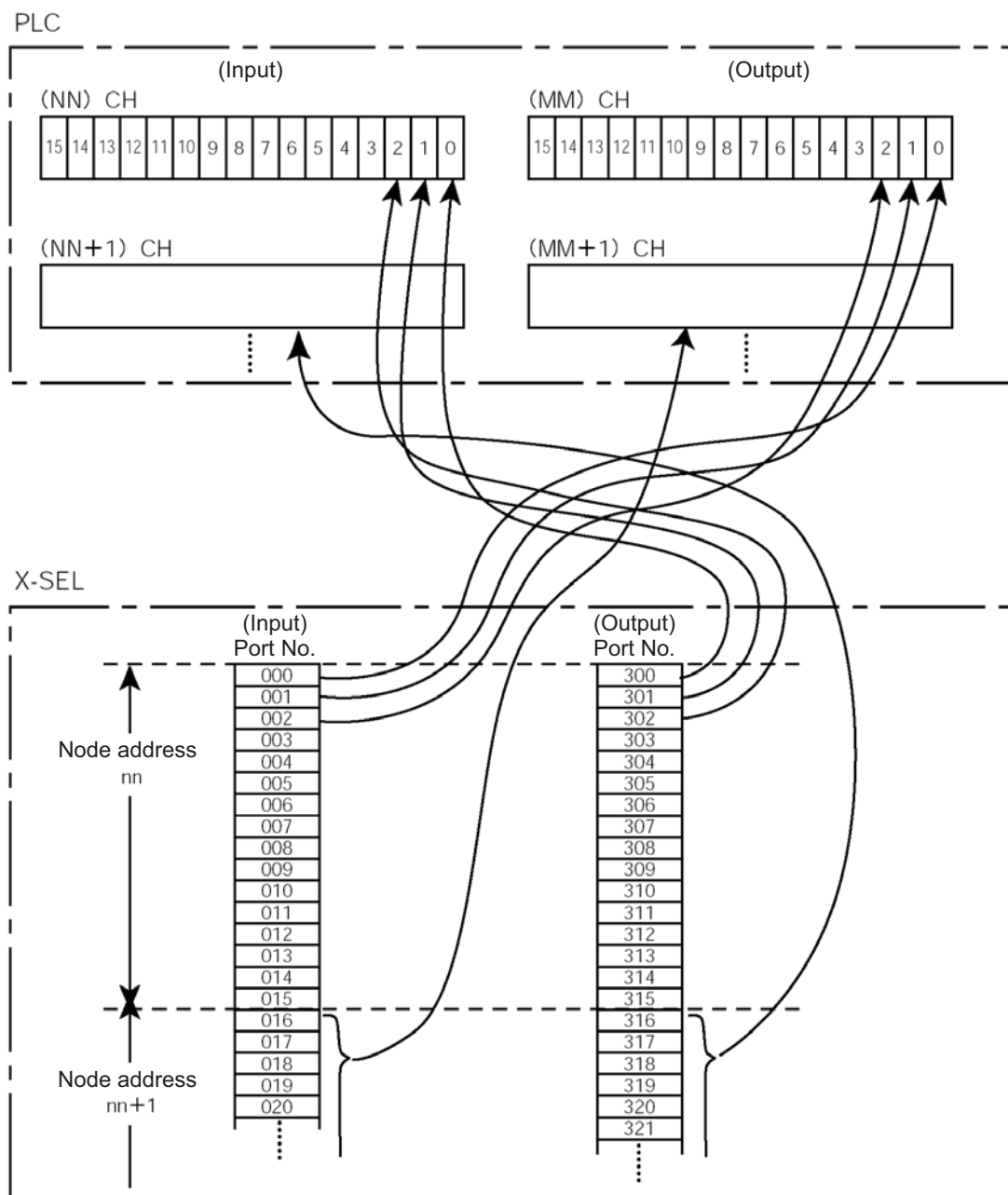
(Note) The numbers of I/O ports are as follows:

Inputs: 000 to 299 (maximum of 300 points)  
Outputs: 300 to 599 (maximum of 300 points)

If DeviceNet and expansion I/O boards are used together, pay attention to the numbers of I/O ports.

## Reference

Port numbers are assigned to bit addresses in the PLC in units of 16 points, starting from the channel corresponding to the node address set with the DIP switches.  
(This does not apply if a configurator is used to assign port numbers.)



(NN) CH and (MM) CH as indicated above represent PLC channel addresses corresponding to node address nn.

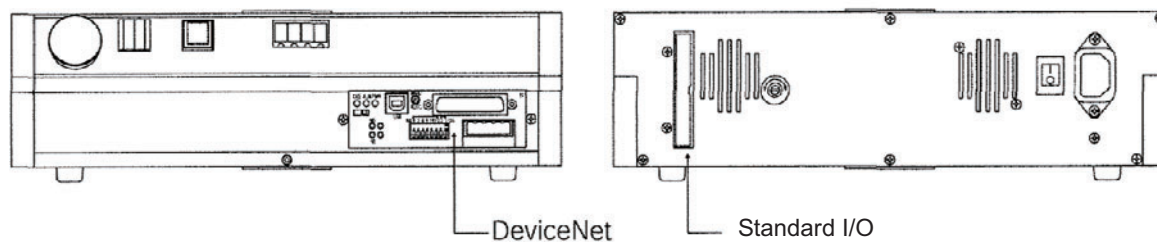
As for nn, nn+1, nn+2, etc., bit addresses corresponding to each node address are occupied in accordance with the numbers of I/O points used. Accordingly, exercise caution to prevent node address duplication.

### 3. Tabletop Robot TT

#### 3.1 Model

Model: TT-□-I-□-PV

Maximum numbers of network I/O points: 240/240



A DeviceNet board is installed in the installation position of field network board.

### 3.2 Interface Specifications

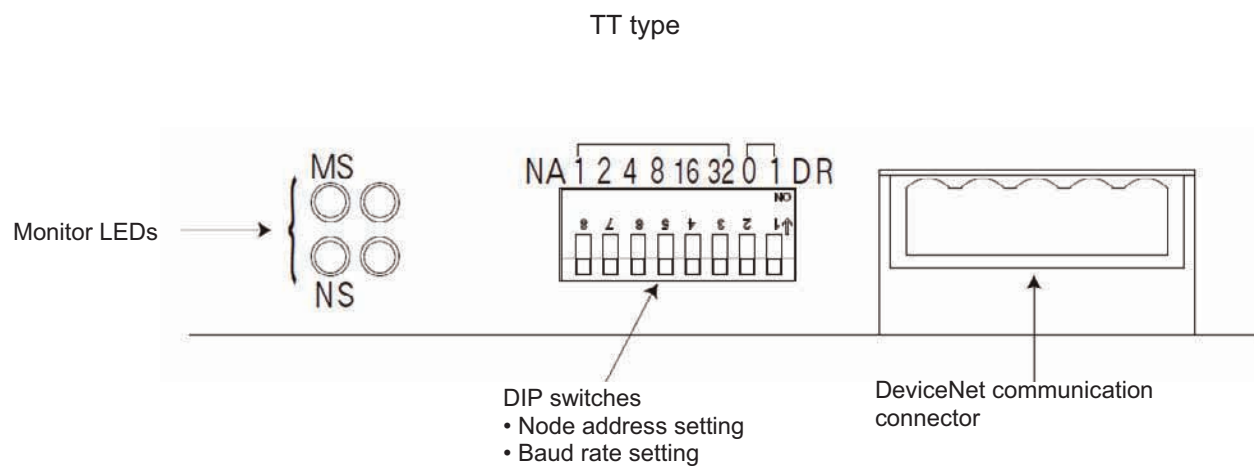
The DeviceNet interface specifications are summarized below.

Item	Specification			
Communication protocol	A certified DeviceNet 2.0 interface module is used (certification pending).			
	Group 2 only server			
	Network-powered insulation node			
Communication specification	Master-slave connection		Bit strobe	
			Polling	
			Cyclic	
Baud rate	500 k / 250 k / 125 kbps (selectable by DIP switches)			
Communication cable length	Baud rate	Maximum network length	Maximum branch line length	Total branch line length
	500 kbps	100 m	6 m	39 m
	250 kbps	250 m		78 m
	125 kbps	500 m		156 m
	Note) When a large-size DeviceNet cable is used.			
Communication power supply	24 VDC (supplied from DeviceNet)			
Consumption current of communication power supply	60 mA			
Number of occupied nodes	1 node			
Connector	MSTBA2.5/5-G-5.08AU M (*1) by Phoenix Contact			

(\*1) The cable-end connector is a standard accessory.  
SMSTB2.5/5-ST-5.08AU by Phoenix Contact

## 3.3 DeviceNet board

### 3.3.1 Name of Each Part



### 3.3.2 DIP Switch Settings

The DIP switches are used to set the following items:

(1) Node address

(2) Baud rate

(Note) Turn off the X-SEL power before setting the DIP switches.

#### (1) Setting the node address (MAC ID)

Set the node address (MAC ID) using a hexadecimal value according to the table below.

1: ON 0: OFF

Node address (MAC ID)	DIP switches					
	NA32	NA16	NA8	NA4	NA2	NA1
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮
60	1	1	1	1	0	0
61	1	1	1	1	0	1
62	1	1	1	1	1	0
63	1	1	1	1	1	1

(Note) The node address corresponds to the remote I/O address in the PLC. This DeviceNet card supports a maximum of 240 input points and 240 output points. Accordingly, the node address corresponding to the I/O points used will be occupied in the PLC.  
Take note that all node addresses must be unique.  
(For details, refer to the operation manual for the PLC.)

#### (2) Setting the baud rate

Set the baud rate according to the table below.

1: ON 0: OFF

Baud rate	DIP switches	
	DR1	DR0
125 kbps	0	0
250 kbps	0	1
500 kbps	1	0
Setting prohibited	1	1

### 3.3.3 Monitor LED Indicators

The two LEDs, MS and NS, provided on the front panel of the board are used to check the board (node) condition and network condition. (The remaining two LEDs are not currently used.)

The LEDs illuminate in two colors (red and green), and you can monitor the conditions listed in the table below based on the illumination status and color of each LED.

MS (Module Status) LED: Condition of the board (node) itself

NA (Network Status) LED: Condition of the network

LED	Color	Illumination status	Description (meaning)
MS	Green	Steady light	The board is operating normally.
	Red	Steady light	A hardware error occurred. The board must be replaced.
		Blinking	A minor error occurred, such as a DIP switch setting error or configuration error. The error can be reset by, for example, reconfiguring the applicable setting.
	-	Off	Power is not supplied from the TT robot. The TT robot must be repaired or the board must be replaced.
NS	Green	Steady light	Network connection has been established and the board is communicating normally.
		Blinking	The board is online, but network connection is not yet established. Communication is stopped. (The network is normal.)
	Red	Steady light	Node address duplication or bus-off state was detected. Communication is not possible.
		Blinking	A communication error occurred (communication time-out occurred).
	-	Off	<ul style="list-style-type: none"> <li>• The board is not online.</li> <li>• DeviceNet power is not supplied.</li> </ul>

Self test is performed when the power is turned on.

During the test, the monitor LEDs cycle in the following sequence:

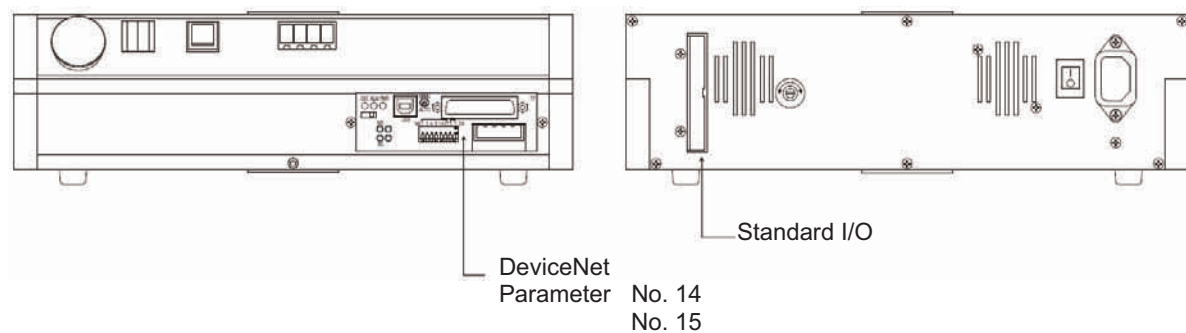
- [1] NS turns off.
- [2] MS illuminates in steady green (approx. 0.25 second).
- [3] MS illuminates in steady red (approx. 0.25 second).
- [4] MS illuminates in steady green.
- [5] NS illuminates in steady green (approx. 0.25 second).
- [6] NS illuminates in steady red (approx. 0.25 second).
- [7] NS turns off.

When the self test is finished and the board starts communicating normally, both the MS and NS LEDs change to steady green.

### 3.4 Setting of I/O Parameters (Assignment of I/O Ports)

Set the TT I/O ports to be used in DeviceNet communication.

#### (1) Board Installation Position (Slot) and I/O Parameter Numbers



TT robots are shipped with the input ports and output ports used in DeviceNet communication both set to 64 points.

## (2) Factory-set parameters for TT type

No.	Parameter name	Input range	Setting	Remarks
1	I/O port assignment type	0	Reference only	0: Fixed assignment
2	Input port start number for standard I/O1 based on fixed assignment	000	Reference only	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O1 based on fixed assignment	300	Reference only	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for standard I/O2 based on fixed assignment	32	Reference only	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
5	Output port start number for standard I/O2 based on fixed assignment	316	Reference only	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O1 based on fixed assignment (Network I/F module)	48	-1 ~ 599	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O1 based on fixed assignment (Network I/F module)	348	-1 ~ 599	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Reserved by the system	-1	-1 ~ 599	
9	Reserved by the system	-1	-1 ~ 599	
10	Error monitor for standard I/O1	0	0 ~ 5	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) 3: Monitor (Monitor 24-V I/O power supply errors only) * Some exceptions apply.
11	Error monitor for standard I/O2	0	0 ~ 5	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) 3: Monitor (Monitor 24-V I/O power supply errors only) * Some exceptions apply.
12	Error monitor for expansion I/O1 (Network I/F module)	1	0 ~ 5	0: Do not monitor 1: Monitor * Some exceptions apply.
13	Reserved by the system	1	0 ~ 5	
14	Number of ports used for remote input via network I/F card	64	0 ~ 240	Multiple of 16
15	Number of ports used for remote output via network I/F card	64	0 ~ 240	Multiple of 16

On TT robots, the numbers of available DeviceNet ports can be changed using applicable parameters.

The DeviceNet I/O port start numbers are fixed.

DeviceNet input port start No. 48

DeviceNet output port start No. 348

The I/O port numbers for standard I/Os (connected via the rear panel I/O connector) are fixed.

Standard input port Nos. 16 to 31

Standard output port Nos. 316 to 331

### (3) Parameter setting example for tabletop robot TT

Assign 240 input points and 240 output points to the DeviceNet as general-purpose I/O ports.

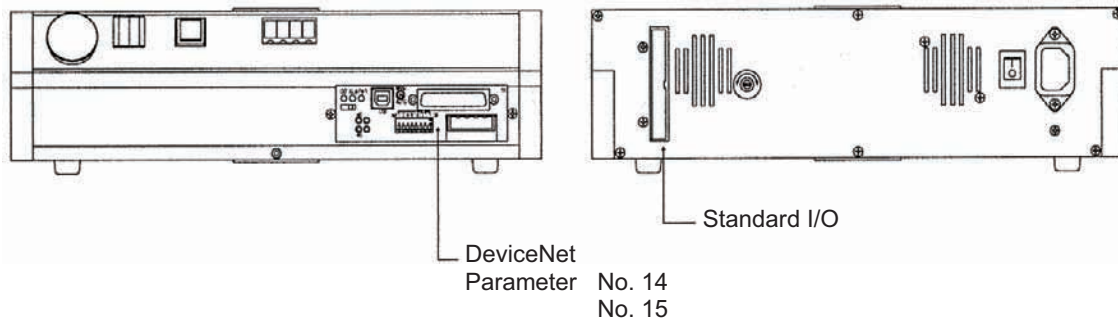
On TT robots, the I/O port start numbers are fixed.

Input port start No. 48

Output port start No. 348

Port are assigned in units of 16 points. Since the port start numbers are fixed, the maximum numbers of input points and output points are set to 240, respectively.

Accordingly, set "240" in I/O Parameter Nos. 14 and 15.



## I/O parameters for TT type

No.	Parameter name	Default value	Input range	Setting	Remarks
1	I/O port assignment type	0	Reference only	0	0: Fixed assignment
2	Input port start number for standard I/O1 based on fixed assignment	000	Reference only	000	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
3	Output port start number for standard I/O1 based on fixed assignment	300	Reference only	300	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
4	Input port start number for standard I/O2 based on fixed assignment	32	Reference only	32	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
5	Output port start number for standard I/O2 based on fixed assignment	316	Reference only	316	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
6	Input port start number for expansion I/O1 based on fixed assignment (Network I/F module)	48	-1 ~ 599	48	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
7	Output port start number for expansion I/O1 based on fixed assignment (Network I/F module)	348	-1 ~ 599	348	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
8	Reserved by the system	-1	-1 ~ 599	-1	
9	Reserved by the system	-1	-1 ~ 599	-1	
10	Error monitor for standard I/O1	0	0 ~ 5	0	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) 3: Monitor (Monitor 24-V I/O power supply errors only) * Some exceptions apply.
11	Error monitor for standard I/O2	0	0 ~ 5	0	0: Do not monitor 1: Monitor 2: Monitor (Do not monitor 24-V I/O power supply errors) 3: Monitor (Monitor 24-V I/O power supply errors only) * Some exceptions apply.
12	Error monitor for expansion I/O1 (Network I/F module)	1	0 ~ 5	1	0: Do not monitor 1: Monitor * Some exceptions apply.
13	Reserved by the system	1	0 ~ 5	1	
14	Number of ports used for remote input via network I/F card	64	0 ~ 240	240	Multiple of 16
15	Number of ports used for remote output via network I/F card	64	0 ~ 240	240	Multiple of 16

### 3.5 I/O Port Numbers for TT Robots

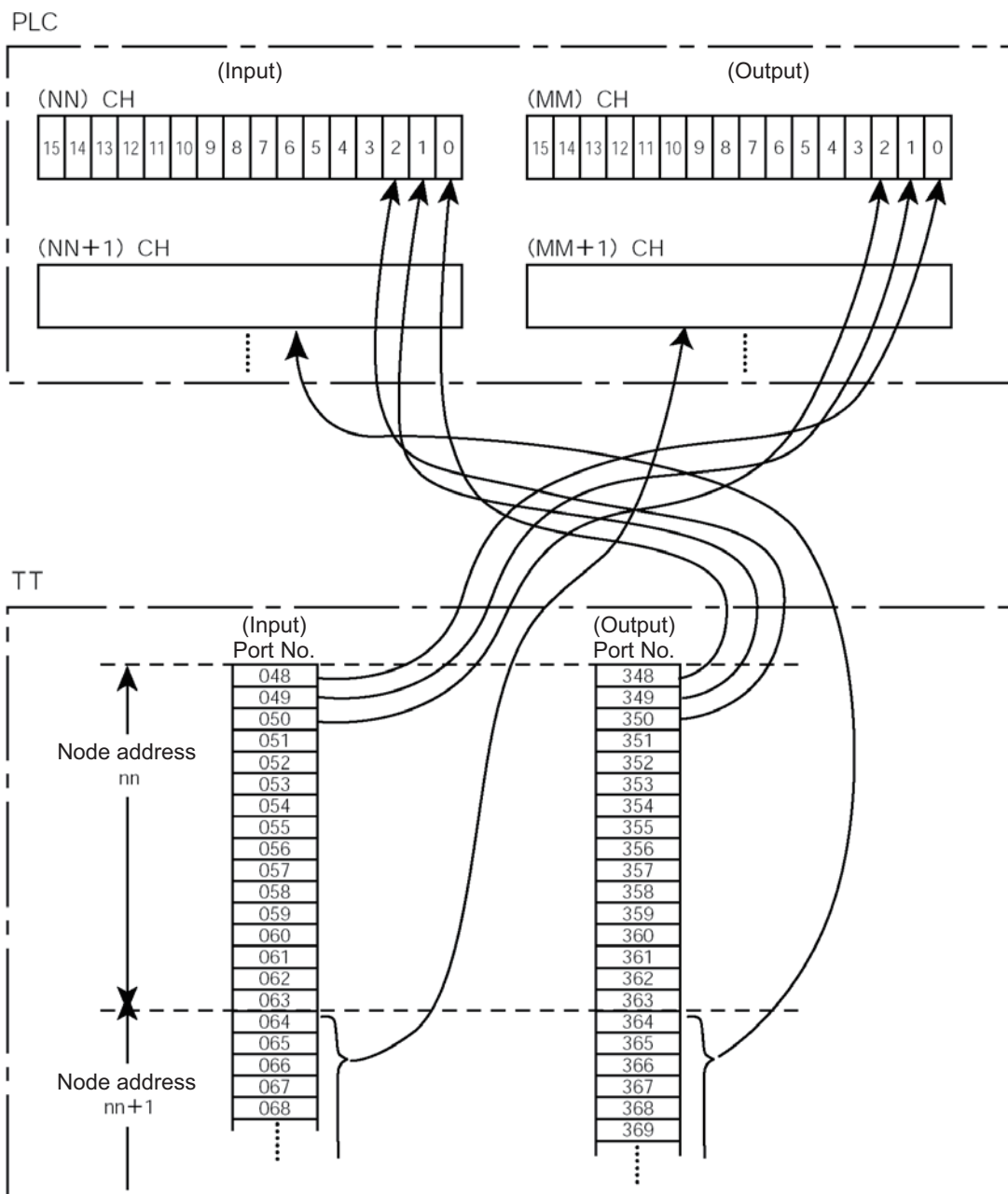
The table below lists the I/O port numbers for TT robots.

(For details, refer to the “Controller Operation Manual for Tabletop Robot TT.”)

	Port No.	Function		Port No.	Function
Internal DI	000	Start	Internal DO	300	ALM (front panel LED)
	001	(Soft reset)		301	RDY (front panel LED)
	002	(Servo on)		302	EMG (front panel LED)
	003	(Start via auto start)		303	Auto mode
	004	(Soft interlock)		304	HPS (front panel LED)
	005	(Pause release)		305	Reserved by the system
	006	(Pause)		306	Reserved by the system
	007	Digital program number specification switch for ones' place		307	Reserved by the system
	008			308	Internal DI-No. 001 ON/OFF
	009			309	Internal DI-No. 002 ON/OFF
	010			310	Internal DI-No. 003 ON/OFF
	011	Digital program number specification switch for tens' place		311	Internal DI-No. 004 ON/OFF
	012			312	Internal DI-No. 005 ON/OFF
	013			313	Internal DI-No. 006 ON/OFF
	014	(Drive-source cutoff input)		314	Internal DI-No. 014 ON/OFF
	015	(Home return, etc.)		315	Internal DI-No. 015 ON/OFF
External DI	016 ~ 031	General-purpose input (rear panel I/O connector)	External DO	316 ~ 331	General-purpose output (rear panel I/O connector)
Internal DI	032	Reserved by the system	Internal DO	332	Specification for 7-segment user display digits
	033			333	Specification for 7-segment user display digits
	034			334	Reserved by the system
	035			335	Reserved by the system
	036			336	Reserved by the system
	037			337	7-segment display refresh
	038			338	7-segment user display/system display switching
	039			339	Specification for 7-segment user display
	040			340	DT0 (7-segment user display bit)
	041			341	DT1 (7-segment user display bit)
	042			342	DT2 (7-segment user display bit)
	043			343	DT3 (7-segment user display bit)
	044			344	DT4 (7-segment user display bit)
	045			345	DT5 (7-segment user display bit)
	046			346	DT6 (7-segment user display bit)
	047			347	Reserved by the system
External DI	048 ~ 287	For DeviceNet	External DO	348 ~ 587	For DeviceNet

## Reference

Port numbers are assigned to bit addresses in the PLC in units of 16 points, starting from the channel corresponding to the node address set with the DIP switches.  
(This does not apply if a configurator is used to assign port numbers.)



(NN) CH and (MM) CH as indicated above represent PLC channel addresses corresponding to node address nn.

As for nn, nn+1, nn+2, etc., bit addresses corresponding to each node address are occupied in accordance with the numbers of I/O points used. Accordingly, exercise caution to prevent node address duplication.



## 4. RCS-C and E-Con

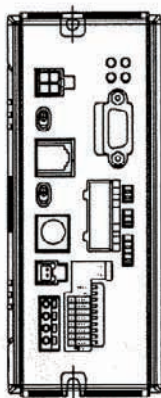
### 4.1 Model

DeviceNet-ready RCS-C and E-Con controllers are shown below.

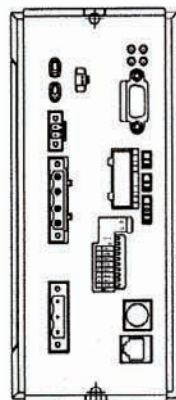
#### (1) RCS-C

Model: RCS-C-□-DV-□-□

Number of I/O points: 8 dedicated input points, 10 dedicated output points



24-V type

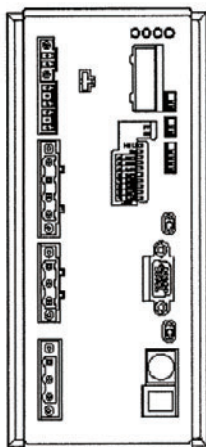


100-V/200-V types

#### (2) E-Con

Model: ECON-□-□-DV-□-□

Number of I/O points: 10 dedicated input points, 12 dedicated output points



## 4.2 Interface Specifications

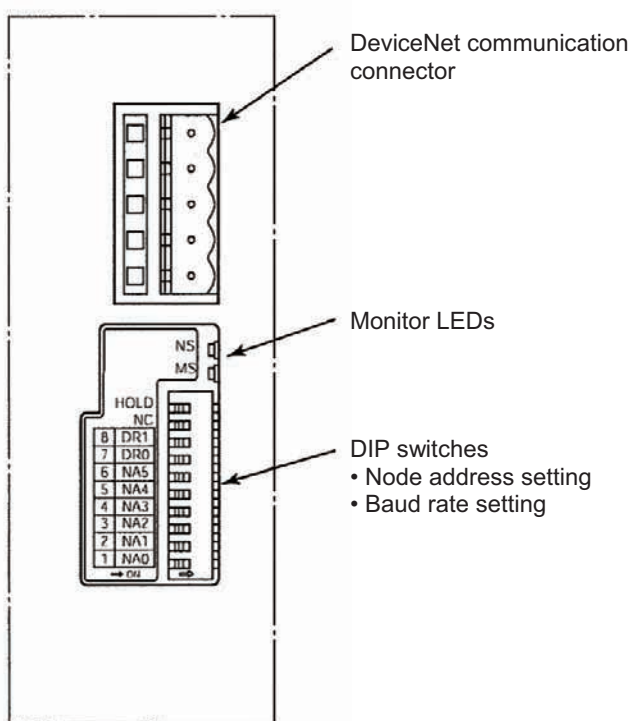
Item	Specification			
Communication protocol	DeviceNet 2.0 (*1)			
	Group 2 only server			
	Network-powered insulation node			
Support connection	Master-slave connection		Bit strobe	
			Polling	
Baud rate	500 k / 250 k / 125 kbps (selectable by DIP switches)			
Communication cable length	Baud rate	Maximum network length	Maximum branch line length	Total branch line length
	500 kbps	100 m	6 m	39 m
	250 kbps	250 m		78 m
	125 kbps	500 m		156 m
	Note) When a large-size DeviceNet cable is used.			
Communication power supply	24 VDC (supplied from DeviceNet)			
Consumption current of communication power supply	60 mA			
Number of occupied nodes	1 node			
Connector	MSTBA2.5/5-G-5.08AU M (*2) by Phoenix Contact			

(\*1) RCS-C controllers are already certified (test version 15).  
Certification is pending for E-Con controllers.

(\*2) The cable-end connector is a standard accessory.  
SMSTB2.5/5-ST-5.08AU by Phoenix Contact

## 4.3 DeviceNet Interface

### 4.3.1 Name of Each Part



### 4.3.2 DIP Switch Settings

The DIP switches are used to set the following items:

(1) Node address

(2) Baud rate

(Note) Turn off the X-SEL power before setting the DIP switches.

#### (1) Setting the node address (MAC ID)

Set the node address (MAC ID) using a hexadecimal value according to the table below.

1: ON 0: OFF

Node address (MAC ID)	DIP switches					
	NA5	NA4	NA3	NA2	NA1	NA0
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮
60	1	1	1	1	0	0
61	1	1	1	1	0	1
62	1	1	1	1	1	0
63	1	1	1	1	1	1

(Note) The node address corresponds to the remote I/O address in the PLC. (For details, refer to the operation manual for the PLC.)

#### (2) Setting the baud rate

Set the baud rate according to the table below.

1: ON 0: OFF

Baud rate	DIP switches	
	DR1	DR0
125 kbps	0	0
250 kbps	0	1
500 kbps	1	0
Setting prohibited	1	1

### 4.3.3 Monitor LED Indicators

The two LEDs, MS and NS, provided on the front panel of the controller are used to check the interface (node) condition and network condition.

The LEDs illuminate in two colors (red and green), and you can monitor the conditions listed in the table below based on the illumination status and color of each LED.

MS (Module Status) LED: Condition of the interface (node) itself

NS (Network Status) LED: Condition of the network

LED	Color	Illumination status	Description (meaning)
MS	Green	Steady light	The board is operating normally.
	Red	Steady light	A hardware error occurred. The controller must be repaired.
		Blinking	A minor error occurred, such as a DIP switch setting error or configuration error. The error can be reset by, for example, reconfiguring the applicable setting.
	-	Off	Power is not supplied from the X-SEL controller. The X-SEL controller must be repaired or the board must be replaced.
NS	Green	Steady light	Network connection has been established and the board is communicating normally.
		Blinking	The board is online, but network connection is not yet established. Communication is stopped. (The network is normal.)
	Red	Steady light	Node address duplication or bus-off state was detected. Communication is not possible.
		Blinking	A communication error occurred (communication time-out occurred).
	-	Off	<ul style="list-style-type: none"> <li>• The board is not online.</li> <li>• DeviceNet power is not supplied.</li> </ul>

Self test is performed when the power is turned on.

During the test, the monitor LEDs cycle in the following sequence:

- [1] NS turns off.
- [2] MS illuminates in steady green (approx. 0.25 second).
- [3] MS illuminates in steady red (approx. 0.25 second).
- [4] MS illuminates in steady green.
- [5] NS illuminates in steady green (approx. 0.25 second).
- [6] NS illuminates in steady red (approx. 0.25 second).
- [7] NS turns off.

When the self test is finished and the board starts communicating normally, both the MS and NS LEDs change to steady green.

## 4.4 Input/Output (I/O)

The I/O specifications of RCS-C and E-Con controllers are as follows:

- (1) RCS-C: 8 dedicated input points, 10 dedicated output points
- (2) E-Con: 10 dedicated input points, 12 dedicated output points

The details are explained below.

For details on each signal, refer to the “Operation Manual for RCS Series ROBO Cylinder Controller, RCS-C Type” or “Operation Manual for E-Con Controller.”)

### (1) RCS-C signal assignments

8-bit input		10-bit output	
Input No.	Signal name	Output No.	Signal name
0	Command position 1	0	Completed position 1
1	Command position 2	1	Completed position 2
2	Command position 4	2	Completed position 4
3	Command position 8	3	Completed position 8
4	Start	4	Position complete
5	Reset	5	Home return complete
6	Servo on	6	Zone
7	*Pause	7	*Alarm
8	Not used	8	*Emergency stop
9	Not used	9	Moving
10	Not used	10	*Battery alarm (Note 1)
11	Not used	11	Not used (Note 2)
12	Not used	12	Not used
13	Not used	13	Not used
14	Not used	14	Not used
15	Not used	15	Not used

The signals denoted by \* are always ON.

(Note 1) This signal is available only on controllers that operate on a mains voltage of 100 or 200 V. The ON/OFF state of the signal is indeterminable on 24-VDC controllers.

(Note 2) The ON/OFF state of signals denoted by “Not used” is indeterminable.

## (2) E-Con signal assignments

10-bit output		12-bit output	
Input No.	Signal name	Output No.	Signal name
0	Command position 1	0	Completed position 1
1	Command position 2	1	Completed position 2
2	Command position 4	2	Completed position 4
3	Command position 8	3	Completed position 8
4	Command position 16	4	Completed position 16
5	Command position 32	5	Completed position 32
6	Not used	6	Not used (Note 2)
7	Not used	7	Not used (Note 2)
8	Start	8	Position complete
9	Reset	9	Home return complete
10	Servo on	10	Zone
11	*Pause	11	*Alarm
12	Not used	12	*Emergency stop
13	Not used	13	Moving
14	Not used	14	*Battery alarm (Note 1)
15	Not used	15	Not used (Note 2)

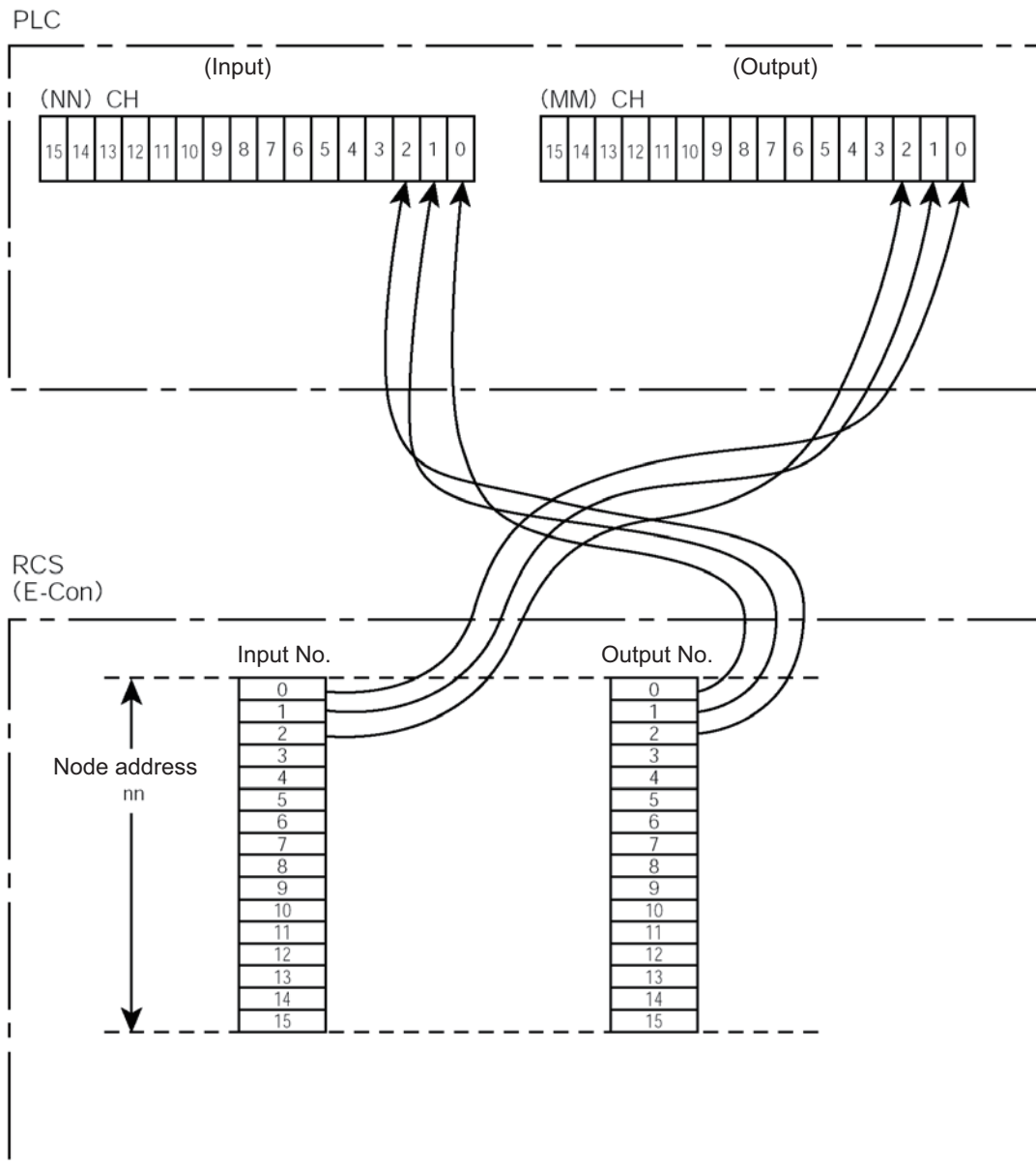
The signals denoted by \* are always ON.

(Note 1) The ON/OFF state of this signal is indeterminable if an incremental encoder is used.

(Note 2) The ON/OFF state of signals denoted by "Not used" is indeterminable.

## Reference

Inputs and outputs are assigned to bit addresses in the PLC sequentially from the youngest number, for the channel corresponding to the node address set with the DIP switches.



(NN) CH and (MM) CH as indicated above represent PLC channel addresses corresponding to node address nn.

## 5. SCON-C

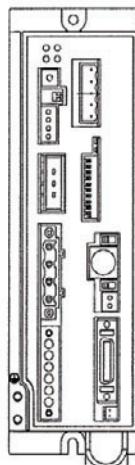
### 5.1 Model

A DeviceNet-ready SCON-C controller is shown below.

SCON

Model: SCON-C-□□-DV-□-□

Number of I/O points: 16 dedicated input points, 16 dedicated output points



## 5.2 Interface Specifications

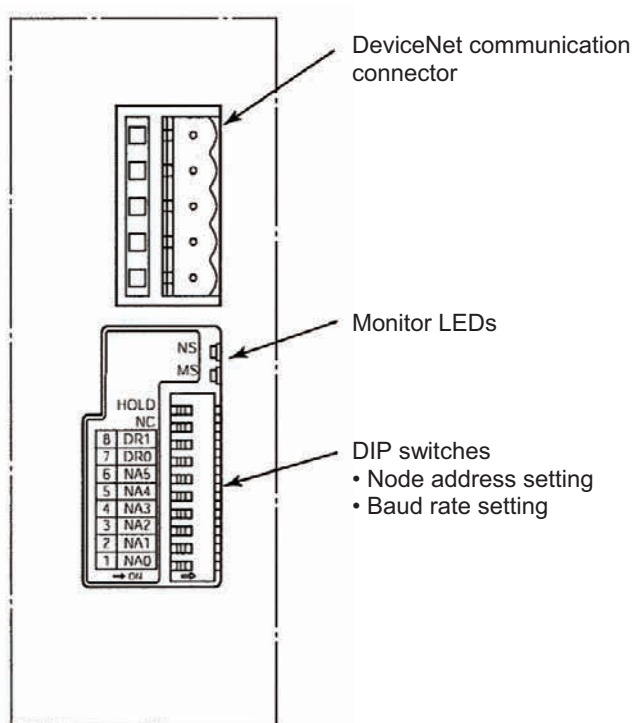
Item	Specification			
Communication protocol	DeviceNet 2.0 (*1)			
	Group 2 only server			
	Network-powered insulation node			
Support connection	Master-slave connection		Bit strobe	
			Polling	
Baud rate	500 k / 250 k / 125 kbps (selectable by DIP switches)			
Communication cable length	Baud rate	Maximum network length	Maximum branch line length	Total branch line length
	500 kbps	100 m	6 m	39 m
	250 kbps	250 m		78 m
	125 kbps	500 m		156 m
	Note) When a large-size DeviceNet cable is used.			
Communication power supply	24 VDC (supplied from DeviceNet)			
Consumption current of communication power supply	60 mA			
Number of occupied nodes	1 node			
Connector	MSTBA2.5/5-G-5.08AU M (*2) by Phoenix Contact			

(\*1) RCS-C controllers are already certified (test version 15).  
Certification is pending for E-Con controllers.

(\*2) The cable-end connector is a standard accessory.  
SMSTB2.5/5-ST-5.08AU by Phoenix Contact

## 5.3 DeviceNet Interface

### 5.3.1 Name of Each Part



### 5.3.2 DIP Switch Settings

The DIP switches are used to set the following items:

(1) Node address

(2) Baud rate

(Note) Turn off the X-SEL power before setting the DIP switches.

#### (1) Setting the node address (MAC ID)

Set the node address (MAC ID) using a hexadecimal value according to the table below.

1: ON 0: OFF

Node address (MAC ID)	DIP switches					
	NA5	NA4	NA3	NA2	NA1	NA0
0	0	0	0	0	0	0
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮
60	1	1	1	1	0	0
61	1	1	1	1	0	1
62	1	1	1	1	1	0
63	1	1	1	1	1	1

(Note) The node address corresponds to the remote I/O address in the PLC. (For details, refer to the operation manual for the PLC.)

#### (2) Setting the baud rate

Set the baud rate according to the table below.

1: ON 0: OFF

Baud rate	DIP switches	
	DR1	DR0
125 kbps	0	0
250 kbps	0	1
500 kbps	1	0
Setting prohibited	1	1

### 5.3.3 Monitor LED Indicators

The two LEDs, MS and NS, provided on the front panel of the controller are used to check the interface (node) condition and network condition.

The LEDs illuminate in two colors (red and green), and you can monitor the conditions listed in the table below based on the illumination status and color of each LED.

MS (Module Status) LED: Condition of the interface (node) itself

NS (Network Status) LED: Condition of the network

LED	Color	Illumination status	Description (meaning)
MS	Green	Steady light	The board is operating normally.
	Red	Steady light	A hardware error occurred. The controller must be repaired.
		Blinking	A minor error occurred, such as a DIP switch setting error or configuration error. The error can be reset by, for example, reconfiguring the applicable setting.
	-	Off	Power is not supplied from the X-SEL controller. The X-SEL controller must be repaired or the board must be replaced.
NS	Green	Steady light	Network connection has been established and the board is communicating normally.
		Blinking	The board is online, but network connection is not yet established. Communication is stopped. (The network is normal.)
	Red	Steady light	Node address duplication or bus-off state was detected. Communication is not possible.
		Blinking	A communication error occurred (communication time-out occurred).
	-	Off	<ul style="list-style-type: none"> <li>• The board is not online.</li> <li>• DeviceNet power is not supplied.</li> </ul>

Self test is performed when the power is turned on.

During the test, the monitor LEDs cycle in the following sequence:

- [1] NS turns off.
- [2] MS illuminates in steady green (approx. 0.25 second).
- [3] MS illuminates in steady red (approx. 0.25 second).
- [4] MS illuminates in steady green.
- [5] NS illuminates in steady green (approx. 0.25 second).
- [6] NS illuminates in steady red (approx. 0.25 second).
- [7] NS turns off.

When the self test is finished and the board starts communicating normally, both the MS and NS LEDs change to steady green.

## 5.4 Assignment of I/O Signals

The I/O specifications of SCON controllers are as follows:

16 dedicated input points, 16 dedicated output points

The details are explained below.

Six I/O patterns are available, from which a desired pattern can be selected using Parameter No. 25 (PIO pattern selection).

For details on each signal, refer to the "Operation Manual for SCON Controller."

		Setting of Parameter No. 25					
		Positioning mode (standard)		Teaching mode (teaching type)		256-point mode (256-point type)	
		0		1		2	
Category	Port No.	Signal name	Symbol	Signal name	Symbol	Signal name	Symbol
Input	0	Command position number	PC1	Command position number	PC1	Command position number	PC1
	1		PC2		PC2		PC2
	2		PC4		PC4		PC4
	3		PC8		PC8		PC8
	4		PC16		PC16		PC16
	5		PC32		PC32		PC32
	6	Not available.	-	Teaching mode command (operation mode)	MODE	Not available.	PC64
	7		-	Jog/inch switching	JISL		PC128
	8		-	+Jog	JOG+		-
	9	Forced brake release	BKRL	-Jog	JOG-	Forced brake release	BKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Home return	HOME	Home return	HOME	Home return	HOME
	12	Pause	*STP	Pause	*STP	Pause	*STP
	13	Positioning start	CSTR	Positioning start/position-data read command	CSTR/PWRT	Positioning start	CSTR
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON command	SON	Servo ON command	SON	Servo ON command	SON
Output	0	Completed position number	PM1	Completed position number	PM1	Completed position number	PM1
	1		PM2		PM2		PM2
	2		PM4		PM4		PM4
	3		PM8		PM8		PM8
	4		PM16		PM16		PM16
	5		PM32		PM32		PM32
	6	Moving signal	MOVE	Moving signal	MOVE	Completed position number	PM64
	7	Zone 1	ZONE1	Teaching mode signal	MODES		PM128
	8	Position zone	PZONE	Position zone	PZONE		PZONE
	9	Operation mode status	RMDS	Operation mode status	RMDS	Operation mode status	RMDS
	10	Home return complete	HEND	Home return complete	HEND	Home return complete	HEND
	11	Position complete signal	PEND	Position complete signal/position-data read complete	PEND/WEND	Position complete signal	PEND
	12	Ready	SV	Ready	SV	Ready	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Battery alarm	*BALM	Battery alarm	*BALM	Battery alarm	*BALM

The signals indicated by \* are ON in a normal state.

The signals denoted by "Not available" are not controlled (their ON/OFF status is indeterminable).

The battery alarm signal is always (mount to) ON if an incremental encoder is used.

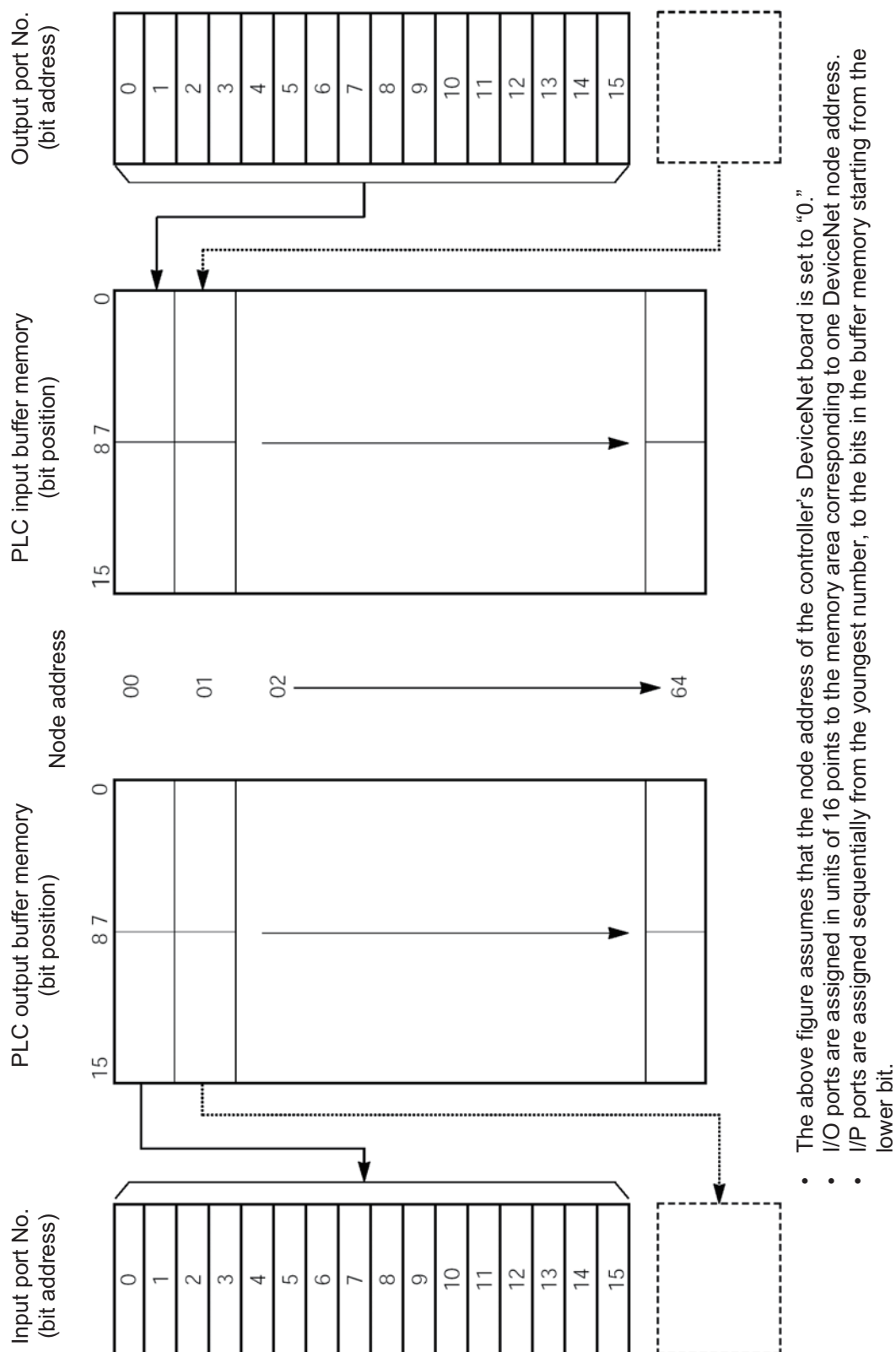
		Setting of Parameter No. 25					
		512-point mode		Solenoid mode 1		Solenoid mode 2	
		3		4		5	
Category	Port No.	Signal name	Symbol	Signal name	Symbol	Signal name	Symbol
Input	0	Command position number	PC1	Start position 0	ST0	Start position 0	STO
	1		PC2	Start position 1	ST1	Start position 1	ST1
	2		PC4	Start position 2	ST2	Start position 2	ST2
	3		PC8	Start position 3	ST3	Not available.	-
	4		PC16	Start position 4	ST4		-
	5		PC32	Start position 5	ST5		-
	6		PC64	Start position 6	ST6		-
	7		PC128	Not available.	-		-
	8		PC256		-		-
	9	Forced brake release	BKRL	Forced brake release	BKRT	Forced brake release	BKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Home return	HOME	Home return	HOME	Not available.	-
	12	Pause	*STP	Pause	*STP		-
	13	Positioning start	CSTR	Not available.	-		-
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON command	SON	Servo ON command	SON	Servo ON command	SON
Output	0	Completed position number	PM1	Position 0 complete	PE0	Rear end move command 0	LS0
	1		PM2	Position 1 complete	PE1	Rear end move command 1	LS1
	2		PM4	Position 2 complete	PE2	Rear end move command 2	LS2
	3		PM8	Position 3 complete	PE3	Not available.	-
	4		PM16	Position 4 complete	PE4		-
	5		PM32	Position 5 complete	PE5		-
	6		PM64	Position 6 complete	PE6		-
	7		PM128	Zone 1	ZONE1	Zone 1	ZONE1
	8		PM256	Position zone	PZONE	Position zone	PZONE
	9	Operation mode output	RMDS	Operation mode output	RMDS	Operation mode output	RMDS
	10	Home return complete	HEND	Home return complete	HEND	Home return complete	HEND
	11	Position complete signal	PEND	Position complete signal	PEND	Not available.	-
	12	Ready	SV	Ready	SV	Ready	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Battery alarm	*BALM	Battery alarm	*BALM	Battery alarm	*BALM

The signals indicated by \* are ON in a normal state.

The signals denoted by "Not available" are not controlled (their ON/OFF status is indeterminable).

The battery alarm signal is always (mount to) ON if an incremental encoder is used.

## 5.5 Assignment of DeviceNet Addresses



ASEL, PSEL and SSEL controllers of DeviceNet specification can handle up to 256 input points and 256 output points.

### 6.1.1 ASEL, PSEL

1 axis  
ASEL-C-1-□-DV-□  
PSEL-C-1-□-DV-□  
2 axes  
ASEL-C-2-□-DV-□  
PSEL-C-2-□-DV-□

The diagram shows the front panel of the IAI-1000 controller. It features a central IAI logo. On the left side, there are two status LEDs labeled "Status LEDs". Below them is a large, multi-pin connector labeled "DeviceNet communication connector". On the right side, there are two smaller connectors, one labeled "Series name" (ASEL or PSEL) and another labeled "Color of front panel" (ASEL: Dark blue, PSEL: Dark green). The bottom of the panel has a small, oval-shaped connector.

### 6.1.2 SSEL

The SSEL models supporting DeviceNet are indicated as follows:

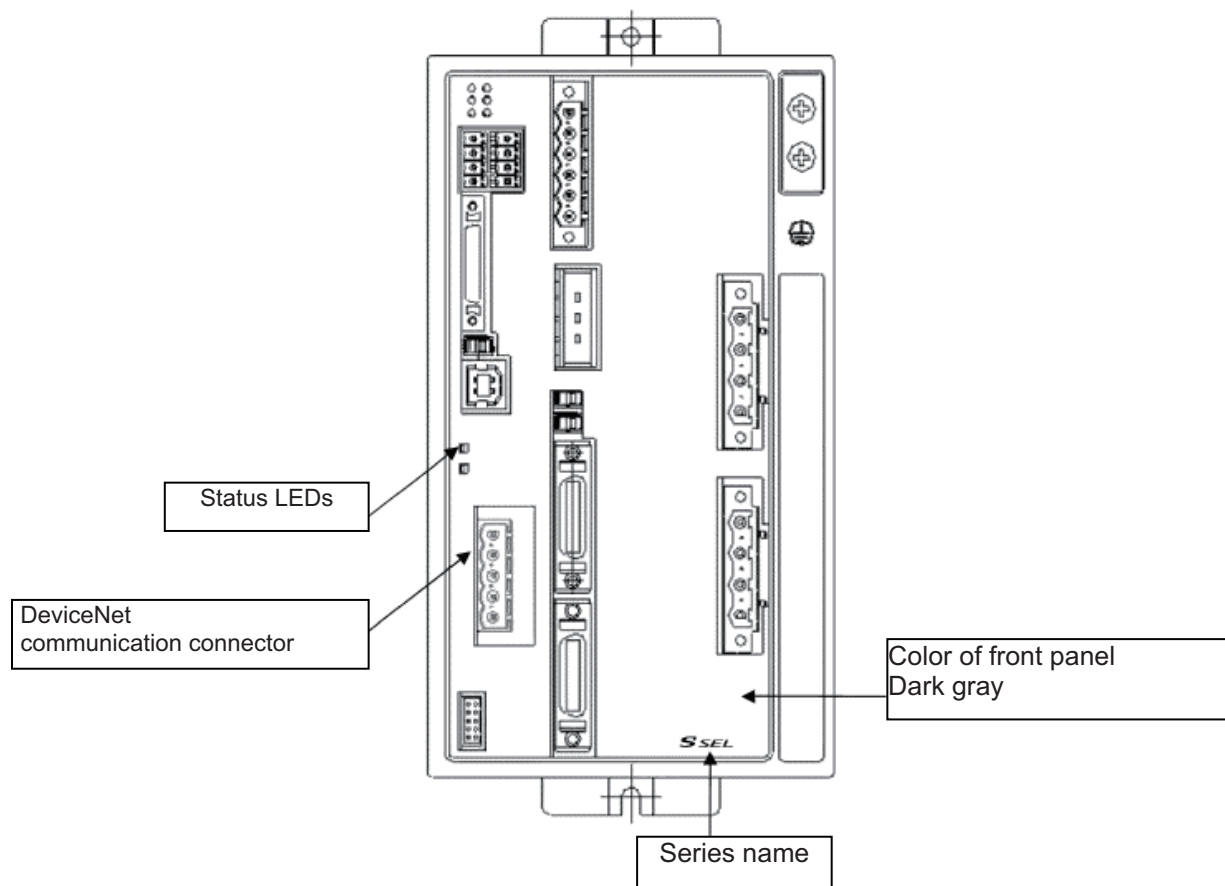
1 axis

SSEL-C-1-□-DV-□

2 axes

SSEL-C-2-□-DV-□

Exterior view



## 6.2 Interface Specifications

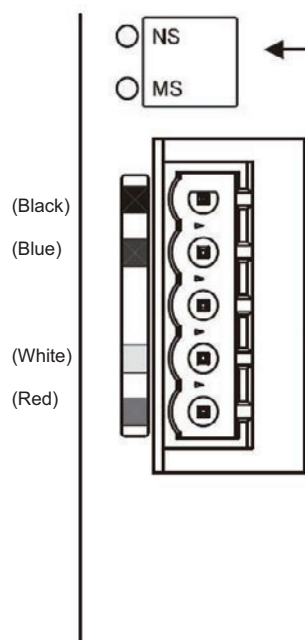
Item	Specification			
Communication protocol	DeviceNet 2.0.			
	Group 2 only server			
	Network-powered insulation node			
Communication specification	Master-slave connection		Bit strobe	
			Polling	
Baud rate	500 k / 250 k / 125 kbps (automatically set to the same value as the band rate set in the master)			
Communication cable length	Baud rate	Maximum network length	Maximum branch line length	Total branch line length
	500 kbps	100 m	6 m	39 m
	250 kbps	250 m		78 m
	125 kbps	500 m		156 m
	Note) When a large-size DeviceNet cable is used.			
Communication power supply	24 VDC (supplied from DeviceNet)			
Consumption current of communication power supply	Typ. 30mA/Max. 55 mA			
Number of occupied nodes	1 node			
Connector	MSTBA2.5/5-G-5.08AU M (*1) by Phoenix Contact			

(\*1) The cable-end connector is a standard accessory.  
SMSTB2.5/5-ST-5.08AU by Phoenix Contact

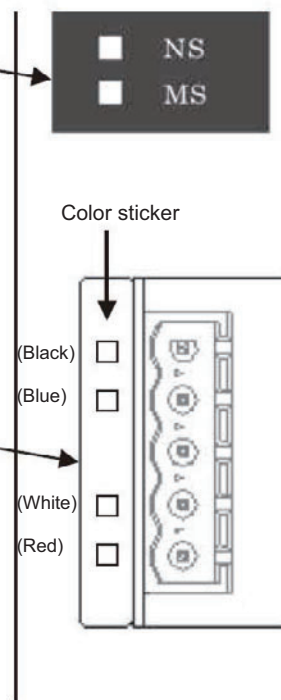
### 6.3 DeviceNet Interface

#### (1) Name of Each Part

##### ●ASEL, PSEL



##### ●SSEL



## (2) Status LED indications

The operating condition of the DeviceNet board, as well as network condition, can be checked using the two LEDs provided on the front panel of the controller.

NS (Network Status) LED: Condition of DeviceNet communication

MS (Module Status) LED: Condition of the controller (node)

LED	Color	Illumination status	Description
NS	Green	Steady light	Connection has been established and communication is being performed properly.
		Blinking (1Hz)	The status is online, but connection is not established yet. Communication is stopped (network is normal).
	Orange	Steady light	Communication is disabled due to a node address duplication or bus OFF error.
		Blinking (1Hz)	A communication error has occurred due to a timeout.
	-	Off	The status is not online. <ul style="list-style-type: none"> <li>• Still checking the baud rate</li> <li>• Still checking for node address duplication</li> <li>• DeviceNet power is not supplied.</li> <li>• A WDT (watchdog timer) error is present.</li> </ul>
MS	Green	Steady light	The controller is operating normally (initialization has completed).
		Blinking (1Hz)	A user interruption timeout has occurred.
	Orange	Steady light	A hardware error, DP-RAM error or WDT (watchdog timer) error is present.
		Blinking (1Hz)	A user setting error or EEPROM checksum error is present.
	-	Off	Power is not supplied to the fieldbus module. The controller is being initialized.

A self-test is performed when the power is turned on. Both the NS and MS LEDs alternate between orange and green during the self-test. Once the self-test has completed and the DeviceNet/controller conditions have been confirmed normal, both LEDs change to a steady green light.

### (3) DeviceNet connectors

The following connectors by Phoenix Contact are used for the board-end and cable-end connectors:

Board-end connector: MSTBA2.5/5-G-5.08AU

Cable-end connector: SMSTB2.5/5-ST-5.08AU

Color stickers corresponding to the wire colors are attached on each connector.

The cable-end connector is a standard accessory.

For the details of signals assigned to respective pins, refer to Chapter 9, "Common Items and Others."



#### Caution

- (1) The baud rate is automatically set to the same value as the baud rate set in the master. Accordingly, you need not set the baud rate.
- (2) The node address is set by I/O parameter No. 226.

## 6.4 Setting of I/O Parameters

Set the node address, I/O ports and other parameters of the of the ASEL, PSEL and SSEL controller used for DeviceNet communication.

### (1) Network type setting

I/O parameter No. 225, "Network I/F module control" has been set to "2H" (DeviceNet) at the factory. (This parameter need not be set.)

### (2) Node address

Set the node address in I/O parameter No. 226, "Network I/F module – Communication attribute 1." The setting range is 0 to 63. (Factory setting: 0)

(Note) If the set address is outside the above range, "D75: Fieldbus parameter error" will occur.

### (3) I/O port assignments

Set the numbers of physical input/output ports of the ASEL, PSEL or SSEL used on the DeviceNet system, as well as port assignments, in the I/O parameters specified below:

No. 1	"I/O port assignment type"	} See 6.5.
No. 14	"Network I/F module – Number of available remote input ports"	
No. 15	"Network I/F module – Number of available remote output ports"	
No. 16	"Network I/F module – First input port number based on mount assignment"	
No. 17	"Network I/F module – First output port number based on mount assignment"	

For details, refer to "List of ASEL, PSEL, SSEL network I/O parameters" on the next page.

(Note) With ASEL, PSEL and SSEL controllers, the following I/O parameters are invalid when the DeviceNet module is used. Even if these parameters are set, they will not affect the numbers of available DeviceNet ports, assigned port numbers, etc.

- No. 2 "Standard I/O – First input port number based on mount assignment (I/O1)"
- No. 3 "Standard I/O – First output port number based on mount assignment (I/O1)"
- No. 10 "Standard I/O – Error monitor"

### (4) Network error monitor

Set whether or not to monitor the network using I/O parameter No. 18, "Network I/F module – Error monitor."

Set the error check time in bits 4 to 11 of I/O parameter No. 120, "Network attribute 1."

A system error will generate if a network link error occurs and remains for the time set in parameter No. 120 or longer.

For details, refer to the "List of ASEL, PSEL, SSEL network I/O parameters" on the next page.

List of ASEL, PSEL and SSEL network I/O parameters

No.	Parameter name	Factory setting	Input range	Remarks
1	I/O port assignment type	0	0~20	0: Fixed assignment 1: Automatic assignment
14	Network I/F module – Number of available remote input ports	64	0~256	Multiple of 8
15	Network I/F module – Number of available remote output ports	64	0~256	Multiple of 8
16	Network I/F module – First input port number based on mount assignment	0	-1~599	0 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
17	Network I/F module – First output port number based on mount assignment	300	-1~599	300 + (multiple of 8) (Invalid, if a value is entered with a negative sign.)
18	Network I/F module – Error monitor	1	0~5	0: Do not monitor 1: Monitor * If a network link error status has continued for at least the network-link error check timer value, a system error will occur. (Refer to I/O parameter No. 120.) * Some exceptions apply.
120	Network attribute 1	1H	0H~ FFFFFFFFH	Bits 0 to 3: Reserved by the system. Bits 4 to 11: Network-link error check timer value (Setting unit: 10 msec) This parameter is valid only when I/O parameter No. 18 is set to "1." (Example) If the set value (bits 4 to 11) is "05H," the timer period becomes 10 ms x 5 = 50 ms. If the set value is "0H," a system error will occur immediately upon occurrence of a network link error.
225	Network I/F module control	2H	Read only	Bits 0 to 3: Network I/F module type (0: Not installed, 1: CC-Link module, 2: DeviceNet module)
226	Network I/F module – Communication attribute 1	0	0~999	Node address of the network I/F module * DeviceNet module: 0 to 63
227	Network I/F module – Communication attribute 2	0H	0H~ FFFFFFFFH	Bits 0 to 3: Baud rate type of the network I/F module * With the DeviceNet module, the baud rate is automatically set to the same value as the baud rate set in the master. Accordingly, you need not set the baud rate.

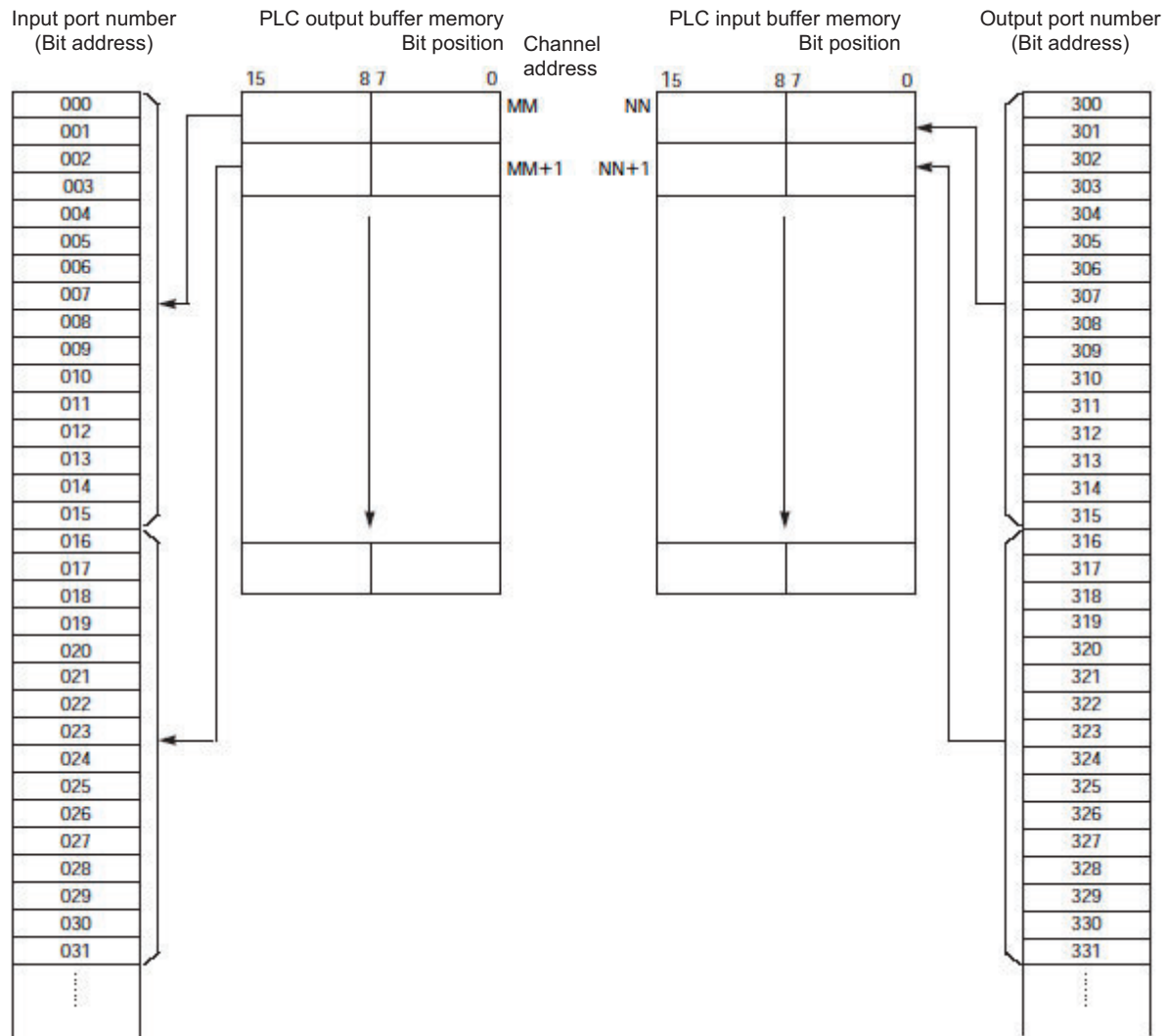
## 6.5 Assignment of I/O Port Numbers and DeviceNet Addresses

ASEL, PSEL and SSEL controllers provide the program mode and positioner mode, but the principles of how ports and addresses are assigned are the same in both modes. To be specific, I/O port numbers are assigned in units of 16 points from the channel addresses in the PLC buffer memory corresponding to the specified node address. Bits in the PLC buffer memory are assigned to the I/O port numbers, starting from the least significant bit and the youngest port number.

### (1) Basic example

The figure below shows the correlation of relevant items when the I/O parameters are set as follows:

No. 16 = 0 (First input port number)  
 No. 17 = 300 (First output port number)  
 No. 14 = No. 15 = 16 (Numbers of input/output ports)  
 No. 266 = nn (Node address)



(Note) NN and MM indicate PLC channel addresses corresponding to node address nn. Node addresses nn, nn+1, nn+2, and so on, are occupied according to the numbers of input/output points used. Accordingly, exercise caution to avoid node address duplication.

(2) Using in the positioner mode

Regardless of the settings of I/O parameter Nos. 1, 16 and 17, physical input ports are assigned from No. 0, while physical output ports are assigned from No. 300.

Use input port Nos. 0 to 23 and output port Nos. 300 to 307 according to the I/O port tables for respective controllers provided on the pages that follow.

I/O parameter Nos. 14 and 15 are both set to "24."

(Note) I/O parameter Nos. 14 and 15 should be set to the same value corresponding to either the number of input ports or output ports whichever is greater.

ASEL I/O port table in positioner mode

Category	Port No.	Positioner mode				
		Standard mode	Type switching mode	2-axis independent mode	Teaching mode	DC-S-C1 compatible mode
Input	16	Position input 10	Input 10	Position input 7	Axis 1 jog-	Position No. 1000 input
	17	Position input 11	Input 11	Position input 8	Axis 2 jog+	-
	18	Position input 12	Input 12	Position input 9	Axis 2 jog-	-
	19	Position input 13	Input 13	Position input 10	Inch (0.01 mm)	-
	20	-	Input 14	Position input 11	Inch (0.1 mm)	-
	21	-	Input 15	Position input 12	Inch (0.5 mm)	-
	22	-	Input 16	Position input 13	Inch (1 mm)	-
	23	Error reset	Error reset	Error reset	Error reset	CPU reset
	0	Start	Start	Axis 1 start	Start	Start
	1	Home return	Home return	Home return	Servo ON	Pause
	2	Servo ON	Servo ON	Axis 1 servo ON	*Pause	Cancel
	3	Push motion	Push motion	*Axis 1 pause	Position input 1	Interpolation setting
	4	*Pause	*Pause	*Axis 1 cancel	Position input 2	Position input 1
	5	*Cancel	*Cancel	Axis 2 start	Position input 3	Position input 2
	6	Interpolation	Interpolation	Axis 2 home return	Position input 4	Position input 4
	7	Position input 1	Input 1	Axis 2 servo ON	Position input 5	Position input 8
	8	Position input 2	Input 2	*Axis 2 pause	Position input 6	Position input 10
	9	Position input 3	Input 3	*Axis 2 cancel	Position input 7	Position input 20
	10	Position input 4	Input 4	Position input 1	Position input 8	Position input 40
	11	Position input 5	Input 5	Position input 2	Position input 9	Position input 80
	12	Position input 6	Input 6	Position input 3	Position input 10	Position input 100
	13	Position input 7	Input 7	Position input 4	Position input 11	Position input 200
	14	Position input 8	Input 8	Position input 5	Teaching mode specification	Position input 400
	15	Position input 9	Input 9	Position input 6	Axis 1 jog+	Position input 800
Output	300	*Alarm	*Alarm	*Alarm	*Alarm	Alarm
	301	Ready	Ready	Ready	Ready	Ready
	302	Position complete	Position complete	Axis 1 position complete	Position complete	Position complete
	303	Home return complete	Home return complete	Axis 1 home return complete	Home return complete	-
	304	Servo ON output	Servo ON output	Axis 1 servo ON	Servo ON output	-
	305	Push motion complete	Push motion complete	Axis 2 position complete		-
	306	System battery error	System battery error	Axis 2 home return complete	System battery error	System battery error
	307	Absolute battery error	Absolute battery error	Axis 2 servo ON	Absolute battery error	Absolute battery error

\*: Contact B

PSEL I/O port table in positioner mode

Category	Port No.	Positioner mode				
		Standard mode	Type switching mode	2-axis independent mode	Teaching mode	DC-S-C1 compatible mode
Input	16	Position input 10	Input 10	Position input 7	Axis 1 jog-	Position No. 1000 input
	17	Position input 11	Input 11	Position input 8	Axis 2 jog+	-
	18	Position input 12	Input 12	Position input 9	Axis 2 jog-	-
	19	Position input 13	Input 13	Position input 10	Inch (0.01 mm)	-
	20	-	Input 14	Position input 11	Inch (0.1 mm)	-
	21	-	Input 15	Position input 12	Inch (0.5 mm)	-
	22	-	Input 16	Position input 13	Inch (1 mm)	-
	23	Error reset	Error reset	Error reset	Error reset	CPU reset
	0	Start	Start	Axis 1 start	Start	Start
	1	Home return	Home return	Home return	Servo ON	Pause
	2	Servo ON	Servo ON	Axis 1 servo ON	*Pause	Cancel
	3	Push motion	Push motion	*Axis 1 pause	Position input 1	Interpolation setting
	4	*Pause	*Pause	*Axis 1 cancel	Position input 2	Position input 1
	5	*Cancel	*Cancel	Axis 2 start	Position input 3	Position input 2
	6	Interpolation	Interpolation	Axis 2 home return	Position input 4	Position input 4
	7	Position input 1	Input 1	Axis 2 servo ON	Position input 5	Position input 8
	8	Position input 2	Input 2	*Axis 2 pause	Position input 6	Position input 10
	9	Position input 3	Input 3	*Axis 2 cancel	Position input 7	Position input 20
	10	Position input 4	Input 4	Position input 1	Position input 8	Position input 40
	11	Position input 5	Input 5	Position input 2	Position input 9	Position input 80
	12	Position input 6	Input 6	Position input 3	Position input 10	Position input 100
	13	Position input 7	Input 7	Position input 4	Position input 11	Position input 200
	14	Position input 8	Input 8	Position input 5	Teaching mode specification	Position input 400
	15	Position input 9	Input 9	Position input 6	Axis 1 jog+	Position input 800
Output	300	*Alarm	*Alarm	*Alarm	*Alarm	Alarm
	301	Ready	Ready	Ready	Ready	Ready
	302	Position complete	Position complete	Axis 1 position complete	Position complete	Position complete
	303	Home return complete	Home return complete	Axis 1 home return complete	Home return complete	-
	304	Servo ON output	Servo ON output	Axis 1 servo ON	Servo ON output	-
	305	Push motion complete	Push motion complete	Axis 2 position complete		-
	306	System battery error	System battery error	Axis 2 home return complete	System battery error	System battery error
	307	-	-	Axis 2 servo ON	-	-

\*: Contact B

SSEL I/O port table in positioner mode

Category	Port No.	Positioner mode				
		Standard mode	Type switching mode	2-axis independent mode	Teaching mode	DC-S-C1 compatible mode
Input	16	Position input 10	Input 10	Position input 7	Axis 1 jog-	Position No. 1000 input
	17	Position input 11	Input 11	Position input 8	Axis 2 jog+	Position No. 2000 input
	18	Position input 12	Input 12	Position input 9	Axis 2 jog-	Position No. 4000 input
	19	Position input 13	Input 13	Position input 10	Inch (0.01 mm)	Position No. 8000 input
	20	Position input 14	Input 14	Position input 11	Inch (0.1 mm)	Position No. 10000 input
	21	Position input 15	Input 15	Position input 12	Inch (0.5 mm)	Position No. 20000 input
	22	Position input 16	Input 16	Position input 13	Inch (1 mm)	(Mount to OFF)
	23	Error reset	Error reset	Error reset	Error reset	CPU reset
	0	Start	Start	Axis 1 start	Start	Start
	1	Home return	Home return	Home return	Servo ON	Pause
	2	Servo ON	Servo ON	Axis 1 servo ON	*Pause	Cancel
	3	Push motion	Push motion	*Axis 1 pause	Position input 1	Interpolation setting
	4	*Pause	*Pause	*Axis 1 cancel	Position input 2	Position input 1
	5	*Cancel	*Cancel	Axis 2 start	Position input 3	Position input 2
	6	Interpolation	Interpolation	Axis 2 home return	Position input 4	Position input 4
	7	Position input 1	Input 1	Axis 2 servo ON	Position input 5	Position input 8
	8	Position input 2	Input 2	*Axis 2 pause	Position input 6	Position input 10
	9	Position input 3	Input 3	*Axis 2 cancel	Position input 7	Position input 20
	10	Position input 4	Input 4	Position input 1	Position input 8	Position input 40
	11	Position input 5	Input 5	Position input 2	Position input 9	Position input 80
	12	Position input 6	Input 6	Position input 3	Position input 10	Position input 100
	13	Position input 7	Input 7	Position input 4	Position input 11	Position input 200
	14	Position input 8	Input 8	Position input 5	Teaching mode specification	Position input 400
	15	Position input 9	Input 9	Position input 6	Axis 1 jog+	Position input 800
Output	300	*Alarm	*Alarm	*Alarm	*Alarm	Alarm
	301	Ready	Ready	Ready	Ready	Ready
	302	Position complete	Position complete	Axis 1 position complete	Position complete	Position complete
	303	Home return complete	Home return complete	Axis 1 home return complete	Home return complete	-
	304	Servo ON output	Servo ON output	Axis 1 servo ON	Servo ON output	-
	305	Push motion complete	Push motion complete	Axis 2 position complete		-
	306	System battery error	System battery error	Axis 2 home return complete	System battery error	System battery error
	307	Absolute battery error	Absolute battery error	Axis 2 servo ON	Absolute battery error	Absolute battery error

\*: Contact B

## 7. Troubleshooting

If you encountered a problem concerning DeviceNet, check the operating condition using the table below and remove the cause of the problem. The monitor LEDs, MS and NS, illuminate in two colors (red and green), and you can check the condition of DeviceNet based on the illumination status and color of each LED.

If an error occurred, MS or NS should change to steady or blinking red. If you spot a steady or blinking red light, check (reconfigure) the connections of the power supply and communication cable, DIP switch settings, parameter settings (X-SEL), etc., and then reconnect the power.

○: Steady light, ●: Blinking, ⊙: Off

Monitor LEDs				Condition	Remedial action
MS		NS			
Grn	Red	Grn	Red		
○	-	○	-	Operating normally	
○	-	●	●	Waiting for completion of node address duplication check by the master.	<ul style="list-style-type: none"><li>• Confirm that the baud rate of the master is the same as the baud rates of all slaves. If not, correct the applicable settings and then restart the system.</li><li>• Confirm that the connectors are connected correctly.</li><li>• Confirm that the communication power (24 VDC) is supplied.</li><li>• Confirm that the master is operating correctly.</li><li>• Confirm that the communication cable is not broken.</li></ul>
○	-	⊙	-	Waiting for connection to be established with the master.	<ul style="list-style-type: none"><li>• Confirm that the master is operating correctly.</li><li>• Confirm that the applicable slave is registered in the master scan list.</li></ul>
-	○	●	●	A hardware error occurred.	<ul style="list-style-type: none"><li>• Contact IAI. (The DeviceNet board may have to be replaced.)</li></ul>
-	⊙	●	●	Incorrect DIP switch setting.	<ul style="list-style-type: none"><li>• Confirm that the baud rate of the slave is the same as the baud rate of the master.</li><li>• Confirm that the configuration is correct.</li><li>• After correcting the applicable settings, restart the system.</li></ul>
○	-	-	○	Detected a node address duplication or bus-off state (communication was stopped due to frequent data errors).	<ul style="list-style-type: none"><li>• Correct the node address, and then restart the system.</li><li>• Confirm that the baud rate of the slave is the same as the baud rate of the master.</li><li>• Confirm that the communication cable length is appropriate.</li><li>• Check the communication cable for wire breakage or loose or disconnected connector.</li><li>• Confirm that the terminal resistors are installed correctly.</li><li>• Confirm that no noise sources are located nearby, that the communication cable is not wired in parallel with any power line, and that the system is not otherwise affected by noise.</li><li>• After correcting the applicable settings, restart the system.</li></ul>
○	-	-	⊙	A communication time out occurred.	<ul style="list-style-type: none"><li>• Confirm that the baud rate of the slave is the same as the baud rate of the master.</li><li>• Confirm that the communication cable length is appropriate.</li><li>• Check the communication cable for wire breakage or loose or disconnected connector.</li><li>• Confirm that the terminal resistors are installed correctly.</li><li>• Confirm that no noise sources are located nearby, that the communication cable is not wired in parallel with any power line, and that the system is not otherwise affected by noise.</li><li>• After correcting the applicable settings, restart the system.</li></ul>
NS switches repeatedly between steady green and blinking green. Or, NS switches repeatedly between blinking red and blinking green.				A communication error occurred.	<ul style="list-style-type: none"><li>• Confirm that the applicable slave is registered in the master scan list.</li><li>• Confirm that any of the I/O area is not used by other slave.</li><li>• Confirm that the I/O area does not exceed the area permitted for use by the master unit (in the case of fixed assignment).</li></ul>

## 8. Common Items and Others

### 8.1 Communication Cable

For the DeviceNet communication cable, use a dedicated 5-wire DeviceNet cable conforming to the DeviceNet Specification. There are two types of dedicated cables: large size and small size.

(Note) Take note that if a small-size cable is used, the maximum network length becomes 100 m or less regardless of the baud rate setting.

Cables by Omron or SWCC Showa Holdings

Item	Large-size cable (thick cable)		Small-size cable (thin cable)	
	Signal line	Power line	Signal line	Power line
Model	DCA2-5C10, TDN18 series		DCA1-5C10, TDN24 series	
Conductor cross-section area	0.86 mm <sup>2</sup>	2.17 mm <sup>2</sup>	0.20 mm <sup>2</sup>	0.38 mm <sup>2</sup>
Conductor outer diameter	1.21 mm	1.92 mm	0.60 mm	0.80 mm
Color	Blue, white	Red, black	Blue, white	Red, black
Impedance	120 Ω ± 10%	-	120 Ω ± 10%	-
Propagation delay	1.36 ns/ft	-	1.36 ns/ft	-
Attenuation ratio	500 kHz: 0.25 dB/ft 125 kHz: 0.13 dB/ft	-	500 kHz: 0.50 dB/ft 125 kHz: 0.29 dB/ft	-
Conductor resistance (at 20°C)	6.9 Ω/1000 ft 22.6 Ω/1000 m	2.7Ω/1000 ft 8.9Ω/1000 m	28 Ω/1000 ft 91.9 Ω/1000 m	17.5 Ω/1000 ft 57.4 Ω/1000 m
Maximum current	-	8A	-	3A
Outer diameter of finished cable	11.2 ~ 12.1 mm		6.9 mm	

Cables by Allen-Bradley

Item	Large-size cable (thick cable)		Small-size cable (thin cable)	
	Signal line	Power line	Signal line	Power line
Model	1485C-P1-A50		1485C-P1-C50	
Conductor cross-section area	0.82 mm <sup>2</sup>	1.65 mm <sup>2</sup>	0.20 mm <sup>2</sup>	0.33 mm <sup>2</sup>
Conductor outer diameter	1.17 mm	1.68 mm	0.60 mm	0.79 mm
Color	Blue, white	Red, black	Blue, white	Red, black
Impedance	120 Ω ± 10%	-	120 Ω ± 10%	-
Propagation delay	1.36 ns/ft	-	1.36 ns/ft	-
Attenuation ratio	500 kHz: 0.25 dB/ft 125 kHz: 0.13 dB/ft	-	500 kHz: 0.50 dB/ft 125 kHz: 0.29 dB/ft	-
Conductor resistance	6.9Ω/1000 ft 22.6Ω/1000 m	3.6Ω/1000 ft 11.8Ω/1000 m	28 Ω/1000 ft 91.9 Ω/1000 m	17.5 Ω/1000 ft 57.4 Ω/1000 m
Maximum current	-	8A	-	3A
Outer diameter of finished cable	11.2 ~ 12.1 mm		6.9 mm	

## 8.2 Connection of Communication Cable Connector

Connect the communication cable in accordance with the connector table below.

Pin No.	Cable wire color	Signal name	Description
1	Black	V-	Network power supply -
2	Blue	CAN_L	Signal wire, differential -
3	Shield	Drain	Drain (shield)
4	White	CAN_H	Signal wire, differential +
5	Red	V+	Network power supply +

Color-coded seals corresponding to the cable wire colors shown in the table above are attached on the supplied cable-end connector.

## 8.3 Power Supply Connection and Terminal Resistor

### 8.3.1 Power Supply Connection

The DeviceNet system supplies power to the network.

The supply voltage is 24 VDC, which is applied between the terminals for red (V+) and black (V-) wires in the main line (5-wire cable).

Use a dedicated power tap or T-junction tap to connect the power supply directly to the communication cable connector.

### 8.3.2 Terminal Resistor

A terminal resistor must be connected on both ends of the main DeviceNet line.

X-SEL, RCS-C and E-Con controllers have no built-in terminal resistors.

To connect a terminal resistor, prepare a dedicated terminal-block type terminal resistor ( $121\ \Omega \pm 1\%$ , 1/4 W) or terminal resistor with T-junction tap ( $121\ \Omega \pm 1\%$ , 1/4 W), or other resistor of equivalent specification, and connect it directly to the communication cable connector.

(Note) For details, refer to the operation manual for the master unit.

## 8.4 Useful Functions You Should Know When Adjusting an X-SEL Controller

- (1) In the case of an X-SEL K-type controller in which a standard or expansion I/O board is installed, the X-SEL controller can be started on its own without connecting a 24-VDC I/O power supply.
- (2) If a DeviceNet board is installed, the X-SEL controller can be started on its own before network connection is established.

In either case, the applicable parameters (I/O Parameter Nos. 10 to 13) must be set to "0: Do not monitor."

(Note) After the necessary operation or adjustment is completed, be sure to reset the parameters to their original settings. If the parameters are not reset, error check will not be performed for the board in each applicable slot.

## 9. EDS File

All X-SEL controllers come with a floppy disk containing an EDS file. To have the master unit recognize the X-SEL controller and automatically configure the applicable settings using a configurator, install the EDS file in the PC. The EDS file can also be downloaded from IAI's website specified below. RCS-C, E-Con, ACON, PCON, SCON, ASEL, PSEL and SSEL controllers do not come with this floppy disk. If you need an EDS file for any of these controllers, download it from IAI's website.

Website: <http://www.iai-robot.co.jp>

### Reference

#### Using Omron's configurator

1. Install the EDS file in the configurator.  
 On an X-SEL controller, the EDS file is installed under the name "AnyBus-S DeviceNet" in the "Communications Adapter" subfolder located in the "HMS Fieldbus Systems AB" folder.  
 On an RCS-C, E-Con or SCON controller, the EDS file is installed under the name "RCS-C-DV," "ECON-C-DV" or "S-CON-C-DV," respectively, in the "Generic Device" subfolder located in the "IAI Corporation" folder.  
 On an ASEL, PSEL, SSEL, ACON or PCON controller, the EDS file is installed under the name "IAFD3803" (same for all five models) in the "Generic Device" subfolder located in the "IAI Corporation" folder.
  2. Build and set up a network using the configurator.  
 On an X-SEL controller, use the EDS file to perform the necessary settings.  
 On an RCS-C, E-Con or SCON controller, 16 input points and 16 output points (fixed) are set as remote I/Os. It is also possible to set I/Os offline and then upload the settings. If the I/Os of the applicable device are fixed, uploading different settings will automatically set a number of bytes that can be used to store I/O property information.
- [Setting for X-SEL, TT, ASEL, PSEL, SSEL, ACON or PCON controller]
- (1) For an X-SEL, TT, ASEL, PSEL, SSEL, ACON or PCON controller, use the EDS file to set the number of bytes to be used to store I/O property information.  
 The number of bytes should correspond to the available I/O ports set by the applicable I/O parameters in the X-SEL, TT, ASEL, PSEL or SSEL controller.  
 For an ACON or PCON controller, set a value corresponding to twice the number of occupied channels in each operation mode. (1 channel = 1 word = 2 bytes).  
 If the EDS file has been installed in a PC, the necessary settings can be done offline and then uploaded.
  - (2) After the settings are complete, open the parameter window in the master (PLC). The applicable device should be found in the unregistered device list. Register the device in the registered device list.  
 (Note) Whether or not to select "Enable automatic assignment upon registration" should be determined in accordance with the assignment method selected for the entire system.
  - (3) If automatic assignment is not enabled at the time of registration, drag the registered device and insert it in the first address of the bytes to be used for I/O assignment. The byte addresses to be used will be assigned automatically. You can also select the edit function to specify the first address.  
 Repeat this process to set byte addresses for both inputs and outputs.
  - (4) Download the settings to the PLC.
  - (5) The X-SEL controller has been registered in the DeviceNet system (master PLC). Perform a final check to confirm that all settings are correct.

## Change History

Revision Date	Description of Revision
November 2011	<p>Eighteenth Edition</p> <ul style="list-style-type: none"><li>• Contents changed in Safety Guide Caution notes added for when working with two or more persons</li><li>• Deleted ACON and PCON.</li></ul>







## ***IAI Corporation***

Head Office: 577-1 Obane Shimizu-KU Shizuoka City Shizuoka 424-0103, Japan  
TEL +81-54-364-5105 FAX +81-54-364-2589  
website: [www.iai-robot.co.jp/](http://www.iai-robot.co.jp/)

Technical Support available in USA, Europe and China

## ***IAI America, Inc.***

Head Office: 2690 W. 237th Street, Torrance, CA 90505  
TEL (310) 891-6015 FAX (310) 891-0815  
Chicago Office: 1261 Hamilton Parkway, Itasca, IL 60143  
TEL (630) 467-9900 FAX (630) 467-9912  
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066  
TEL (678) 354-9470 FAX (678) 354-9471  
website: [www.intelligentactuator.com](http://www.intelligentactuator.com)

## ***IAI Industrieroboter GmbH***

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany  
TEL 06196-88950 FAX 06196-889524

## ***IAI (Shanghai) Co., Ltd.***

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China  
TEL 021-6448-4753 FAX 021-6448-3992  
website: [www.iai-robot.com](http://www.iai-robot.com)