No.EX※※-OMT0009

Operation Manual

PRODUCT NAME

PROFINET Compatible Fieldbus System

MODEL / Series / Product Number

EX500-GPN2
EX500-S103
EX500-DXP#

SMC Corporation

Table of Contents

Safety Instructions 3
Product Overview 9
System construction 9
EX500 GW unit
Model Indication and How to Order 10
Summary of Product parts 10
Mounting and Installation 11
Installation 11
Wiring 12
LED Display 17
Hardware Configuration 18
Connection to SIEMENS PLC S7 19
Web server function 32
Specification 43
Specifications 43
Dimensions 45
SI unit
Model Indication and How to Order 46
Summary of Product parts 46
Mounting and Installation 47
Installation 47
Separate power supply 50
LED Display and Settings 51
Specification 52
Specifications 52
Dimensions 53

Input unit

Model Indication and How to Order 54
Summary of Product parts 54
Mounting and Installation 55
Installation 55
Wiring 56
LED Display 62
Specification 63
Specifications 63
Dimensions 64
Interchangeability of system 65
Troubleshooting 68
Accessories 74



Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage.
These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger".
They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
ISO 4413: Hydraulic fluid power -- General rules relating to systems.
IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -Safety.
etc.

⚠ **Caution**	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
⚠ **Warning**	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ **Danger**	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

⚠Caution

1.The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered,whichever is first.∗2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

∗2) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are govemed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules goveming that export are known and followed.

Operator

- ♦This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- ♦Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

■Safety Instructions

⚠Warning

■Do not disassemble, modify (including changing the printed circuit board) or repair.
An injury or failure can result.

■Do not operate the product outside of the specifications.
Do not use for flammable or harmful fluids.
Fire, malfunction, or damage to the product can result.
Verify the specifications before use.

■Do not operate in an atmosphere containing flammable or explosive gases.
Fire or an explosion can result.
This product is not designed to be explosion proof.

■If using the product in an interlocking circuit:
- •Provide a double interlocking system, for example a mechanical system.
- •Check the product regularly for proper operation.

Otherwise malfunction can result, causing an accident.

■The following instructions must be followed during maintenance:
- •Turn off the power supply.
- •Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance.

Otherwise an injury can result.

⚠ Caution

■After maintenance is complete, perform appropriate functional inspections.
Stop operation if the equipment does not function properly.
Safety cannot be assured in the case of unexpected malfunction.

■Provide grounding to assure the safety and noise resistance of the Serial System.
Individual grounding should be provided close to the product with a short cable.

■NOTE

○Follow the instructions given below when designing, selecting and handling the product.

•The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.

∗Product specifications

•The direct current power supply to combine should be UL1310 Class 2 power supply when conformity to UL is necessary.

•The product is a UL approved product only if they have a c UL us mark on the body.

•Use the specified voltage.
Otherwise failure or malfunction can result.

•Reserve a space for maintenance.
Allow sufficient space for maintenance when designing the system.

•Do not remove any nameplates or labels.
This can lead to incorrect maintenance, or misreading of the operation manual, which could cause damage or malfunction to the product.
It may also result in non-conformity to safety standards.

•Product handling

∗Installation

•Do not drop, hit or apply excessive shock to the fieldbus system.
Otherwise damage to the product can result, causing malfunction.

•Tighten to the specified tightening torque.
If the tightening torque is exceeded the mounting screws may be broken.
IP65/67 protection cannot be guaranteed if the screws are not tightened to the specified torque.

•Never mount a product in a location that will be used as a foothold.
The product may be damaged if excessive force is applied by stepping or climbing onto it.

∗Wiring

•Avoid repeatedly bending or stretching the cables, or placing heavy load on them.
Repetitive bending stress or tensile stress can cause breakage of the cable.

•Wire correctly.
Incorrect wiring can break the product.

•Do not perform wiring while the power is on.
Otherwise damage to the fieldbus system and/or I/O device can result, causing malfunction.

•Do not route wires and cables together with power or high voltage cables.
Otherwise the fieldbus system and/or I/O device can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line.
Route the wires (piping) of the fieldbus system and/or I/O device separately from power or high voltage cables.

•Confirm proper insulation of wiring.
Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.

•Take appropriate measures against noise, such as using a noise filter, when the fieldbus system is incorporated into equipment.
Otherwise noise can cause malfunction.

•Separate the power line for output devices from the power line for control.
Otherwise noise or induced surge voltage can cause malfunction.

∗Environment

•Select the proper type of protection according to the environment of operation.
IP65/67 protection is achieved when the following conditions are met.
(1) The units are connected properly with fieldbus cable with M12 connector and power cable with M12 (M8) connector.
(2) Suitable mounting of each unit and manifold valve.
If using in an environment that is exposed to water splashes, please take measures such as using a cover.
If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction etc.).

•Do not use the product in an environment where corrosive gases or fluids could be splashed.
Otherwise damage to the product and malfunction can result.

•Do not use in an area where surges are generated.
If there is equipment which generates a large amount of surge (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the fieldbus system, this may cause deterioration or breakage of the internal circuit of the fieldbus system. Avoid sources of surge generation and crossed lines.

•When a surge-generating load such as a relay or solenoid is driven directly, use an fieldbus system with a built-in surge absorbing element.
Direct drive of a load generating surge voltage can damage the fieldbus system.

•The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.

•Prevent foreign matter such as remnant of wires from entering the fieldbus system to avoid failure and malfunction.

- Mount the product in a place that is not exposed to vibration or impact.
  Otherwise failure or malfunction can result.
- Do not use the product in an environment that is exposed to temperature cycle.
  Heat cycles other than ordinary changes in temperature can adversely affect the inside of the product.
- Do not expose the product to direct sunlight.
  If using in a location directly exposed to sunlight, shade the product from the sunlight.
  Otherwise failure or malfunction can result.
- Keep within the specified ambient temperature range.
  Otherwise malfunction can result.
- Do not operate close to a heat source, or in a location exposed to radiant heat.
  Otherwise malfunction can result.

∗Adjustment and Operation

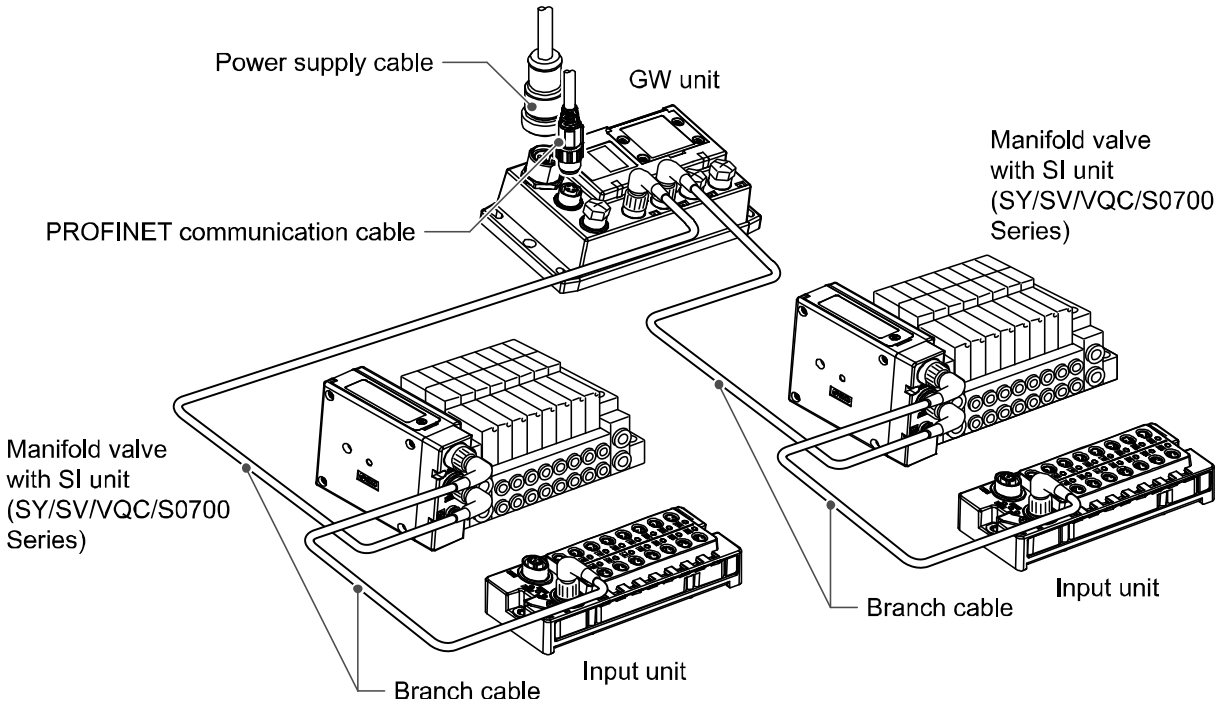
- Perform settings suitable for the operating conditions.
  Incorrect setting can cause operation failure.
- Please refer to the PLC manufacturer's manual etc. for details of programming and addresses.
  For the PLC protocol and programming refer to the relevant manufacturer's documentation.

∗Maintenance

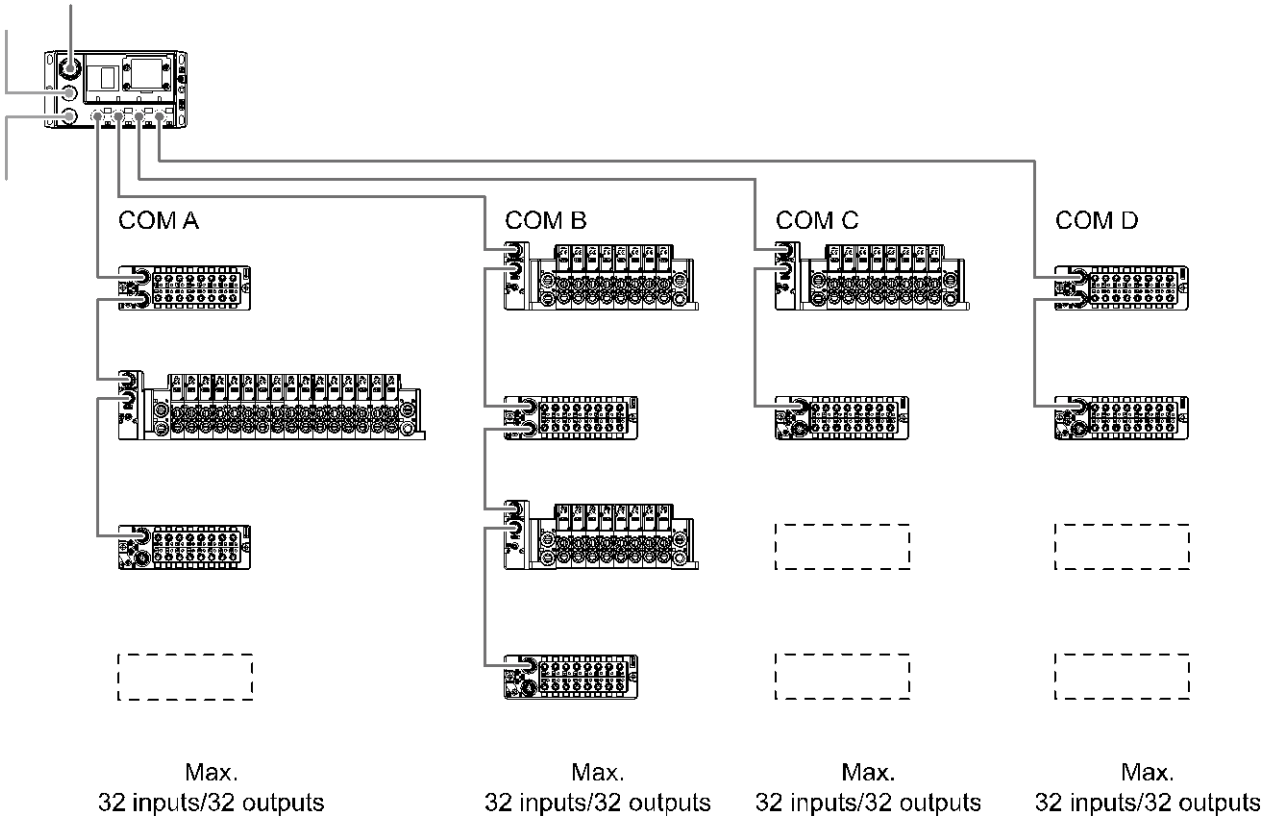
- Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.
  There is a risk of unexpected malfunction.
- Perform regular maintenance and inspections.
  There is a risk of unexpected malfunction.
- After maintenance is complete, perform appropriate functional inspections.
  Stop operation if the equipment does not function properly.
  Otherwise safety is not assured due to an unexpected malfunction or incorrect operation.
- Do not use solvents such as benzene, thinner etc. to clean the each unit.
  They could damage the surface of the body and erase the markings on the body.
  Use a soft cloth to remove stains.
  For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.

Product Overview

■System construction



The EX500 range of units can be connected to open fieldbus (PROFINET) to realize the reduction of input or output device wiring and the distributed control system.
One branch of manifold valves/input unit can be connected to 32 outputs/32 inputs. Up to 4 branches can be connected (total 128 outputs/128 inputs).



EX500 GW unit

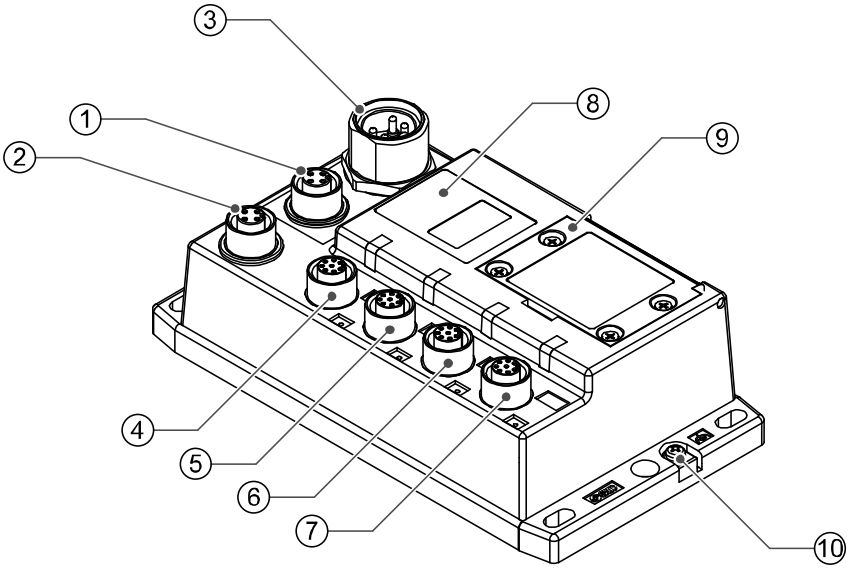
Model Indication and How to Order

EX500-G PN2

Fieldbus

PN2	PROFINET

Summary of Product parts



No.	Name	Application
1	Communication connector (Port1/IN)	Connect to PROFINET line. *1
2	Communication connector (Port2/OUT)	
3	Power supply connector	Connector to supply power to the output devices such as solenoid valves and input and control equipment such as sensors. *1
4	Branch port A(COM A)	Connect the SI unit (with manifold valves) or input unit using a branch cable. *1
5	Branch port B(COM B)	
6	Branch port C(COM C)	
7	Branch port D(COM D)	
8	Display window	Displays the status of the power supply and the communication with the PLC. *2
9	Protective cover	This protective cover should not be opened.
10	Grounding terminal (FE)	Used for functional grounding. (It is recommended to ground with resistance of 100 ohms or less)

Accessories

Seal cap: 5 pcs. (for M12 connector socket)	Used for unused communication connector and branch ports.

*1: Refer to page 12 for wiring.

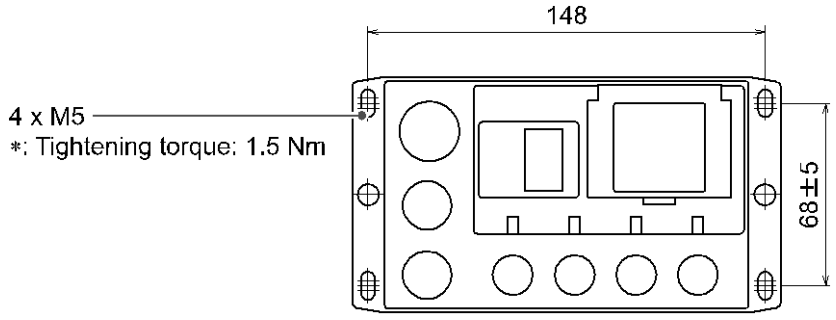
*2: Refer to page 17 for display.

Mounting and Installation

■Installation

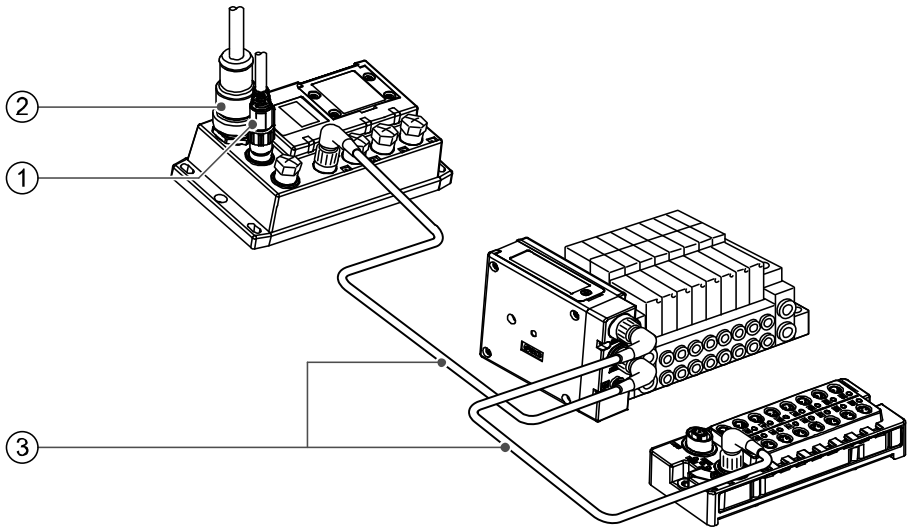
•Direct mounting

Install the product using 4 M5 screws x 15 mm or longer with a head ø5.2 minimum.



Holes for mounting

■Wiring



Described as follows:-

①Communication wiring: Connection with PROFINET.

↓

②Power supply wiring: Connection of the power supply for the solenoid valve and the power supply for input and control.

↓

③Branch wiring: Connection from GW unit to SI unit or input unit.

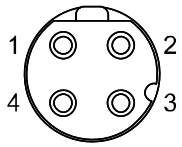
1. Wiring for communication

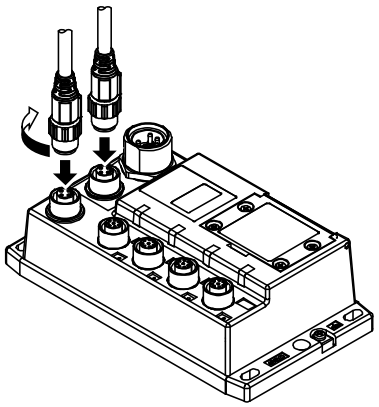
Connect the Ethernet communication cable to the communication connector.

Communication connector pin layout (Port1/Port2)

M12, 4 pin, socket, D code.

No.	Description
1	TX+
2	RX+
3	TX-
4	RX-





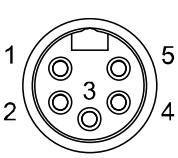
2. Power supply wiring

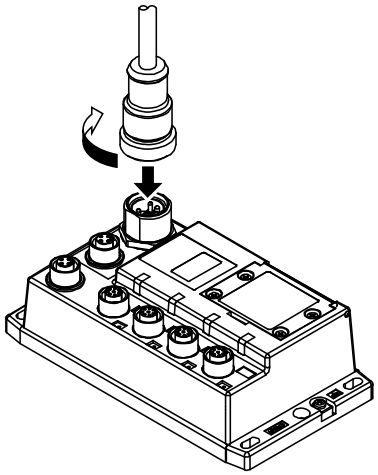
Connect a power supply cable to the power supply connector on the GW unit.
Refer to page 6 for the selection of the power supply.

Connector pin layout

7/8 inch, 5 pin, plug

No.	Description
1	0 V(For solenoid valves)
2	0 V(For input and control)
3	FE
4	24 VDC(For input and control)
5	24 VDC(For solenoid valves)

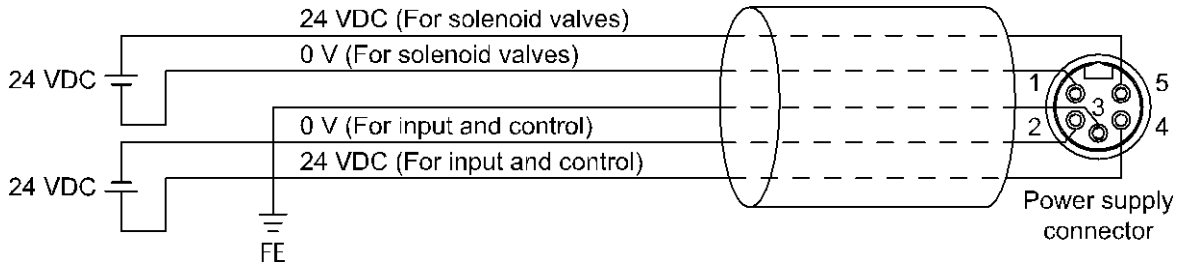




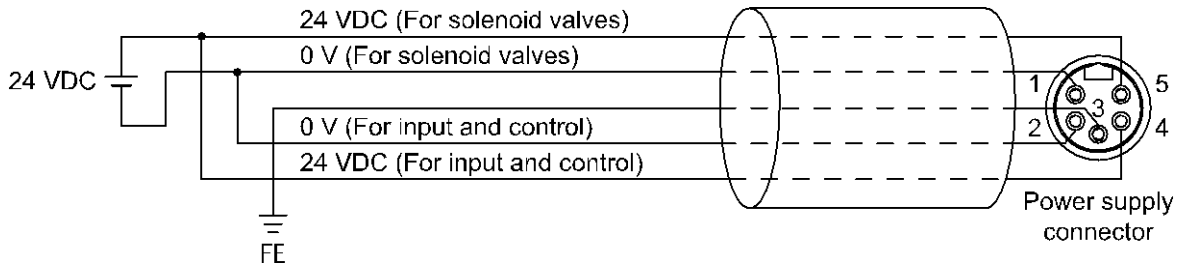
Power supply

Either single or dual power supply can be used. Separate wiring for the solenoid valves and input / control is necessary.

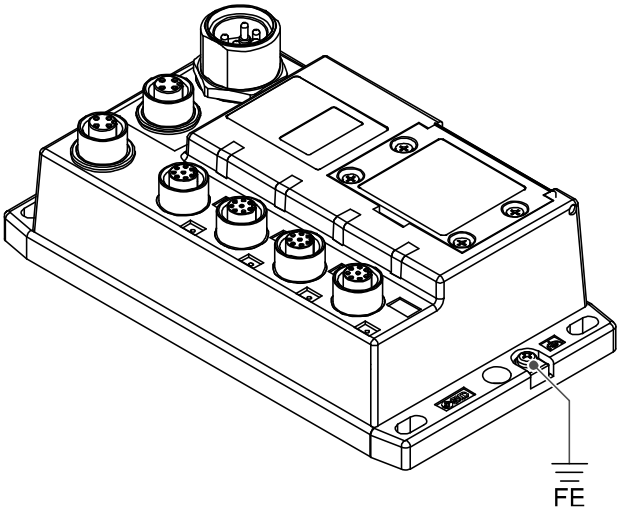
A. With separate power supplies



B. With one power supply



○Ground connection

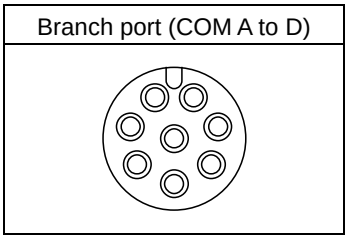


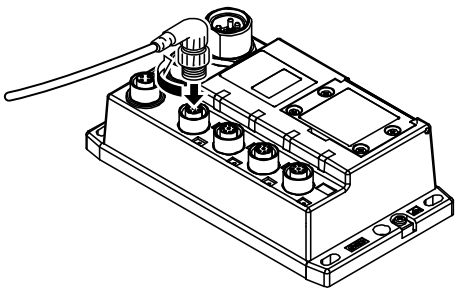
Note
Connect the FE terminal to ground.

3. Branch wiring

Connect the valve manifold with SI unit or a input unit to a branch port (COM A to D) using a branch cable (cable with M12 connector).

One branch port can be connected with up to 32 inputs and 32 outputs (Max. 4 units).





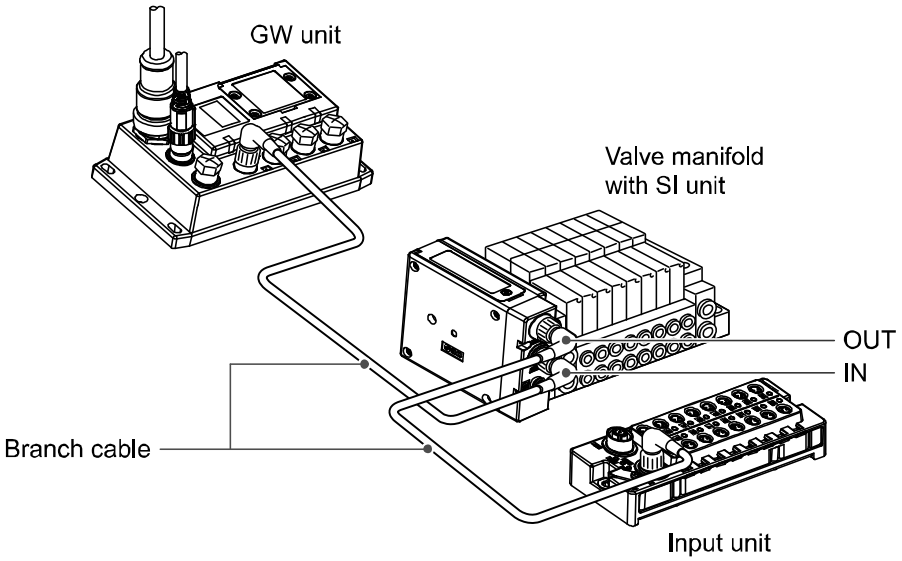
Note

Be sure to fit a seal cap on any unused connectors of the GW unit.
IP65 is maintained by using the seal cap.
(Tightening torque: 0.1 Nm)

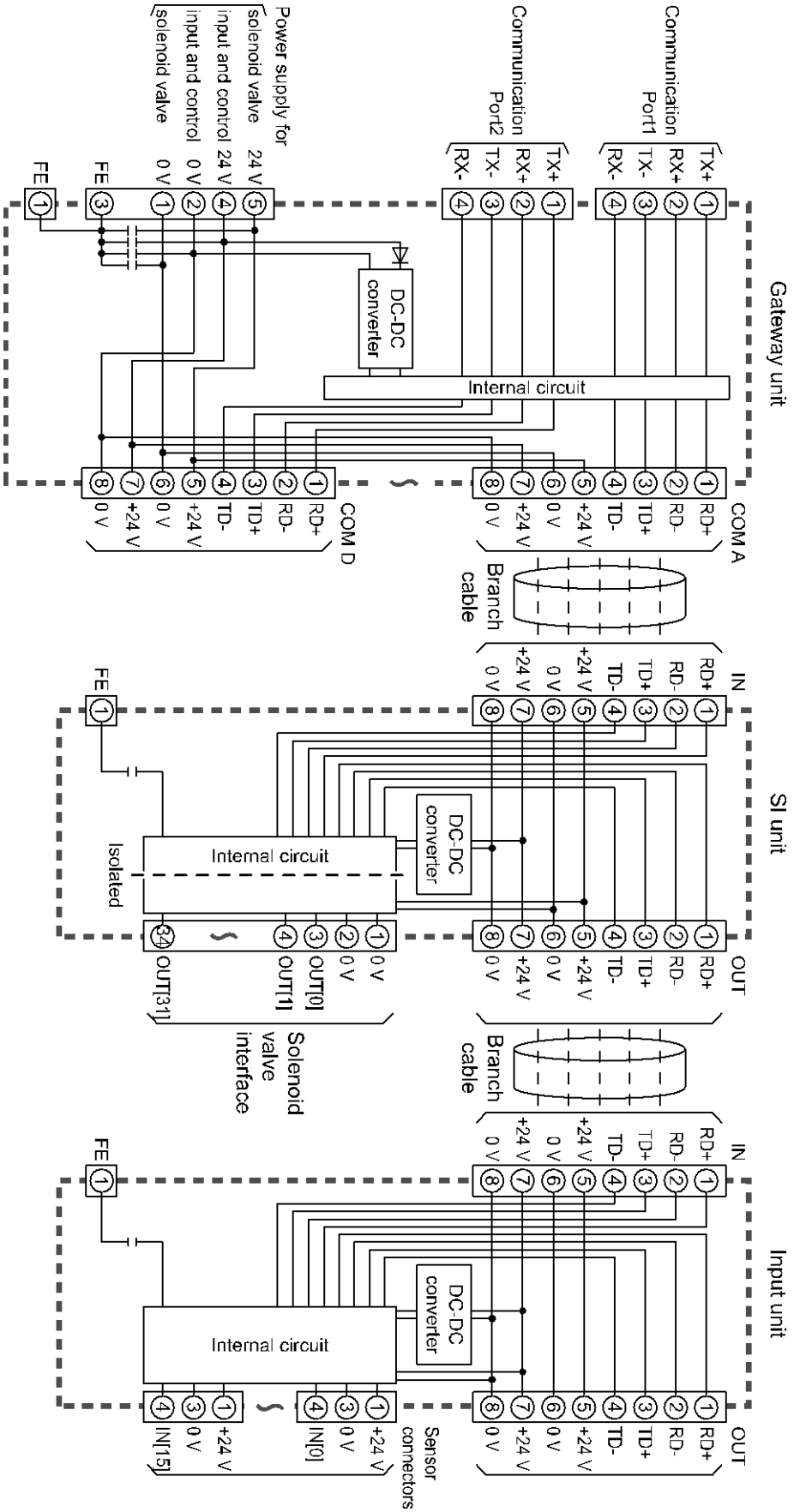
[Connection example]

Connecting a GW unit to a valve manifold with SI unit and to an input unit

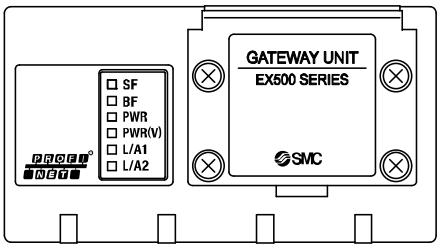
2 pcs. of the connector for wiring the branch cable are prepared for each SI unit and Input unit.
The branch cable from the GW unit is connected to the branch connector (IN).
The cable to the next SI unit or input unit is connected to the branch connector (OUT).



●**Internal circuit**



LED Display



Display	Meaning	
SF	LED is OFF	Normal operation
	Red LED is ON	Diagnostics error
BF	LED is OFF	PROFINET communication established
	Red LED is flashing	PROFINET communication not established
	Red LED is ON	No Link (Port1/Port2)
PWR	LED is OFF	Power supply for inputs and control is OFF
	Green LED is ON	Power supply for inputs and control is ON
PWR(V)	LED is OFF	Power supply for Solenoid valve is OFF
	Green LED is ON	Power supply for Solenoid valve is ON
L/A1	LED is OFF	No Link, No Activity (Port1)
	Green LED is ON	Link, No Activity (Port1)
	Orange LED is flashing	Link, Activity (Port1)
L/A2	LED is OFF	No Link, No Activity (Port2)
	Green LED is ON	Link, No Activity (Port2)
	Orange LED is flashing	Link, Activity (Port2)

COM A	LED is OFF	Not connected
	Green LED is ON	Normal operation
	Green LED is flashing	Diagnostics error
COM B	LED is OFF	Not connected
	Green LED is ON	Normal operation
	Green LED is flashing	Diagnostics error
COM C	LED is OFF	Not connected
	Green LED is ON	Normal operation
	Green LED is flashing	Diagnostics error
COM D	LED is OFF	Not connected
	Green LED is ON	Normal operation
	Green LED is flashing	Diagnostics error

Hardware Configuration

■GSDML file and symbol file

In order to configure GW unit with your PROFINET master's software the appropriate GSDML file is required.
Please download the latest GSD file from the SMC website (URL http://www.smcworld.com).

●GSDML file: GSDML-V2.3-SMC-EX500-********.xml
●Symbol file: GSDML-0083-000B-EX500_N.bmp

＊: Please refer to the configuration software manual for instructions on how to install the GSDML file.

Overview of Modules for EX500 System

Bus node module	Occupied bytes		Allowable slot	Model number
	Inputs	Outputs		
EX500-GPN2	-	-	Slot0	EX500-GPN2
Port Diagnostics	2	-	Slot1	
Brach port module	**Occupied bytes**		**Allowable slot**	**Model number**
	Inputs	Outputs		
COM	-	-	Slot2/3/4/5	-
16IN_Module	2	-	Slot2.1…5.4	EX500-DXP#
16OUT_Module	-	2		EX500-S103(16 Outputs)
32OUT_Module	-	4		EX500-S103(32 Outputs)
In32/Out32_Port	4	4	Slot2.1/3.1/4.1/5.1	EX500-DXP# EX500-S103
Legacy_Port(In16/Out16)	2	2		Refer to page 65.

■Connection to SIEMENS PLC S7

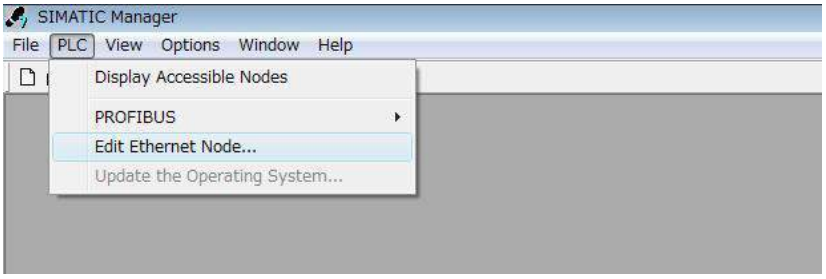
How to connect the EX600 series to SIEMENS PLC is explained below.
Refer to the Operation Manual of the STEP7™ for the detailed operation.

∗: The drawing below shows the SIEMENS software, STEP7™ V5.5.

•Device Name assignment

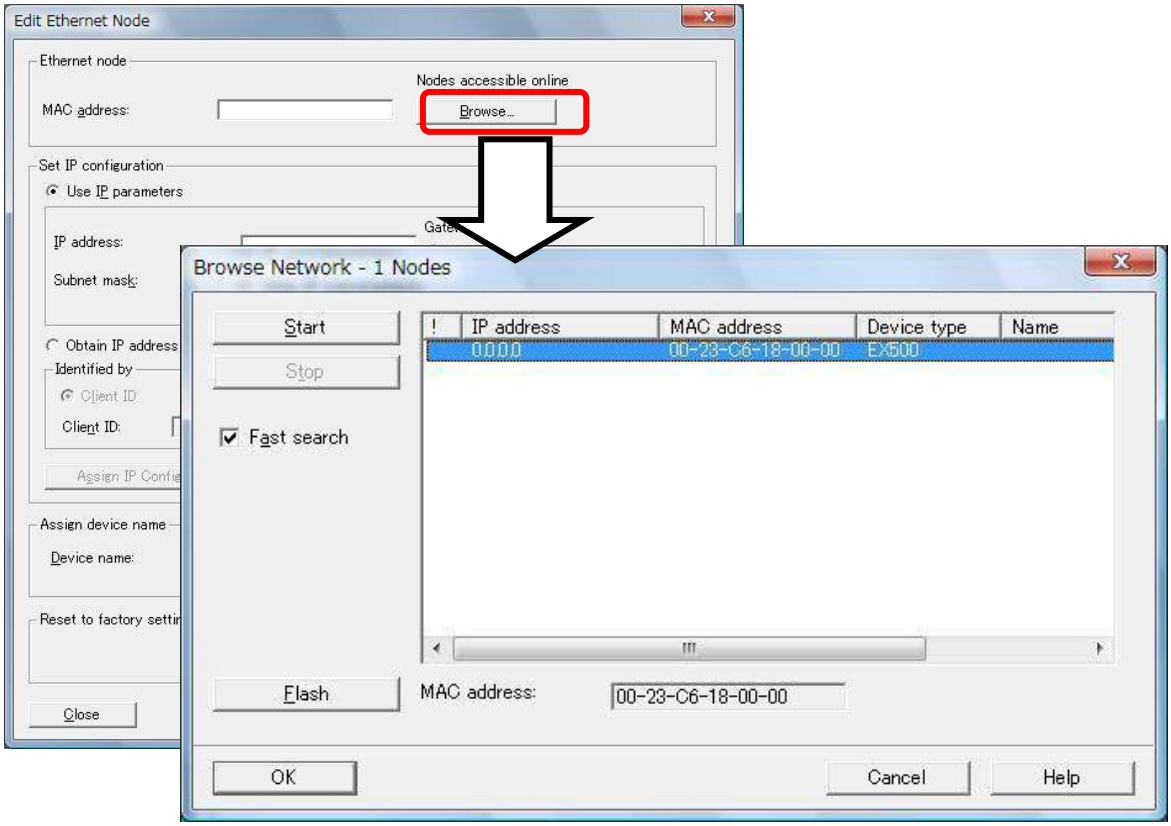
(1)Connect the EX500 system to the PLC.

(2)Select [PLC] → [Ethernet] → [Edit Ethernet Node] from the menu bar of [HW Config].



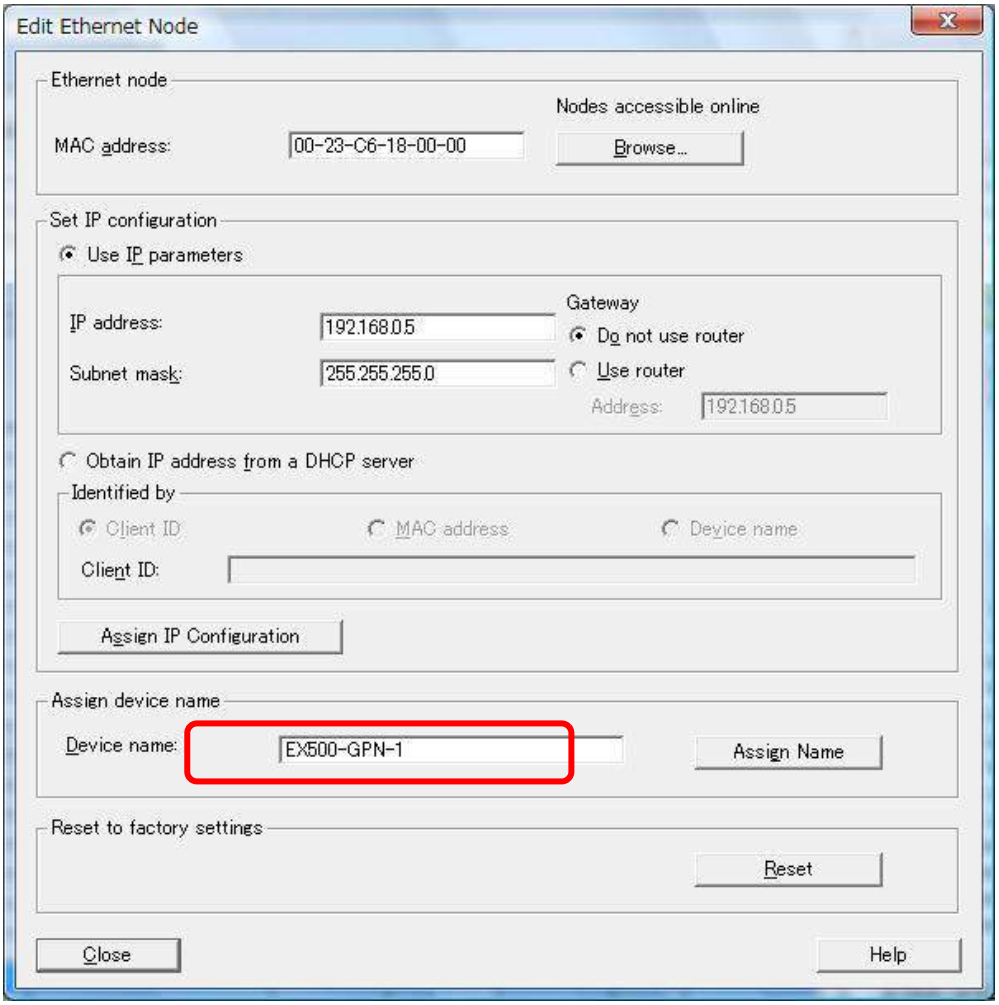
(3)[Edit Ethernet Node] screen will be displayed. Press the [Browse] button.

(4)[Browse Network] screen will be displayed. The list of equipment in the same network will be displayed.
Select SI unit MAC address for assigning Device Name.
Press the [OK] button.



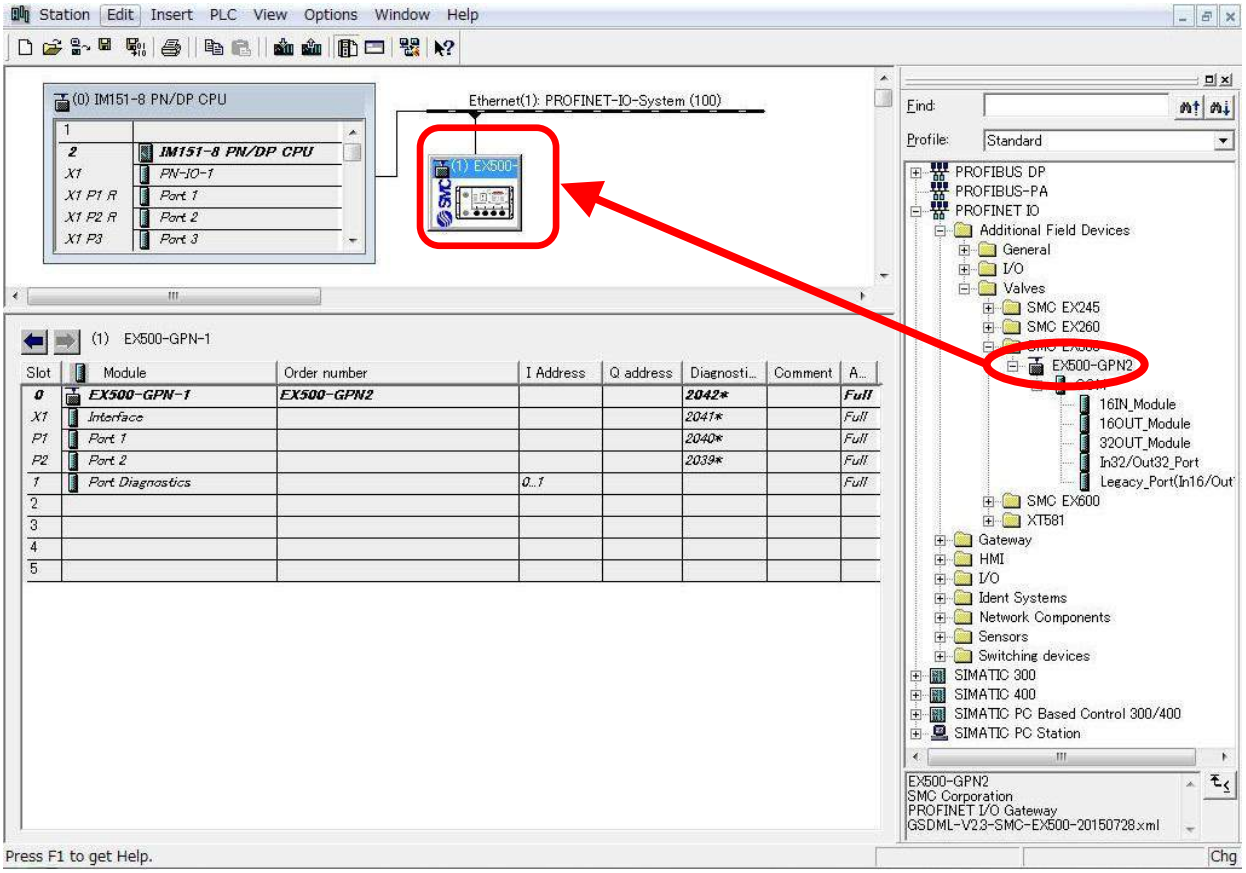
(5)[Edit Ethernet Node] will be displayed with GW unit MAC address. Enter [Device name].

(6)Press the [Assign Name] button.

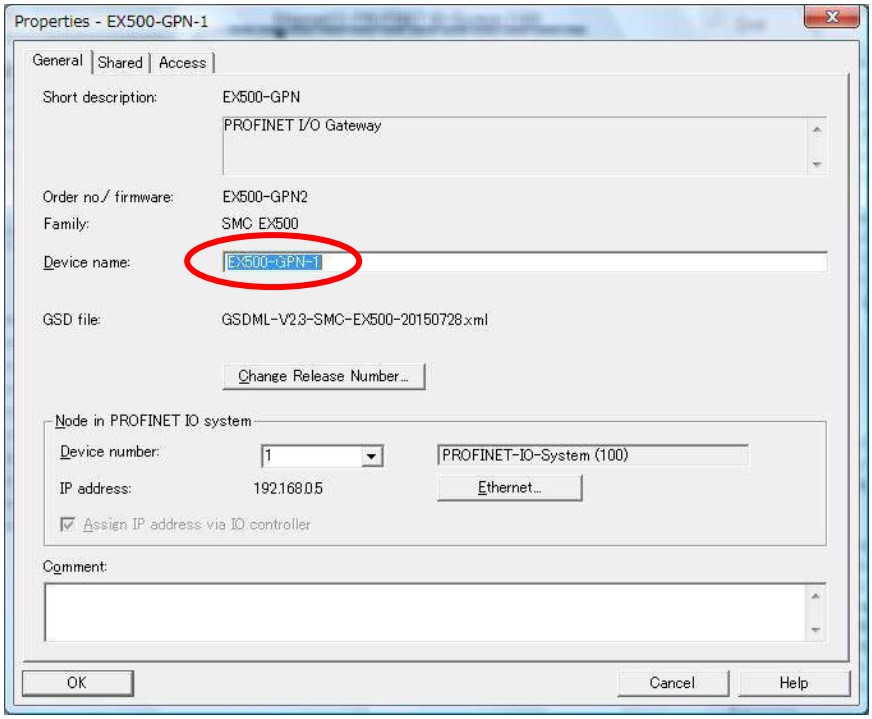


•Addition of device

(1)Drag EX500-GPN2 from [HW Config] screen [Hardware Catalog] window, and drop it into the [PROFINET-IO-System] line.



(2)Double-click the EX500 icon, or place the cursor on the icon and right-click it to select [Object Properties ---]. Properties screen is displayed. Enter the same name which was set by [Edit Ethernet Node] screen to [Device name] and press the [OK] button.

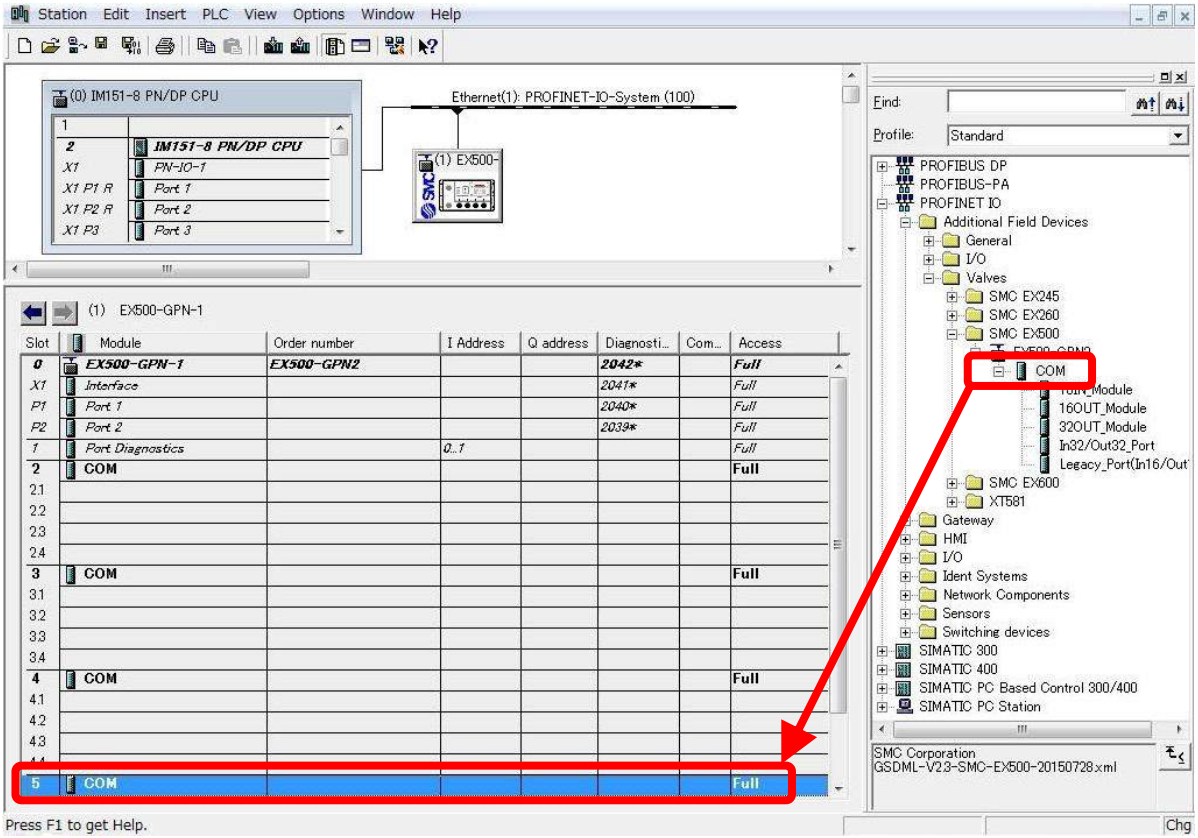


•Configure branch port

(1)Drag the "COM" module from the hardware catalog window, into the slot in the HW config screen that corresponds to the branch port to be configured.

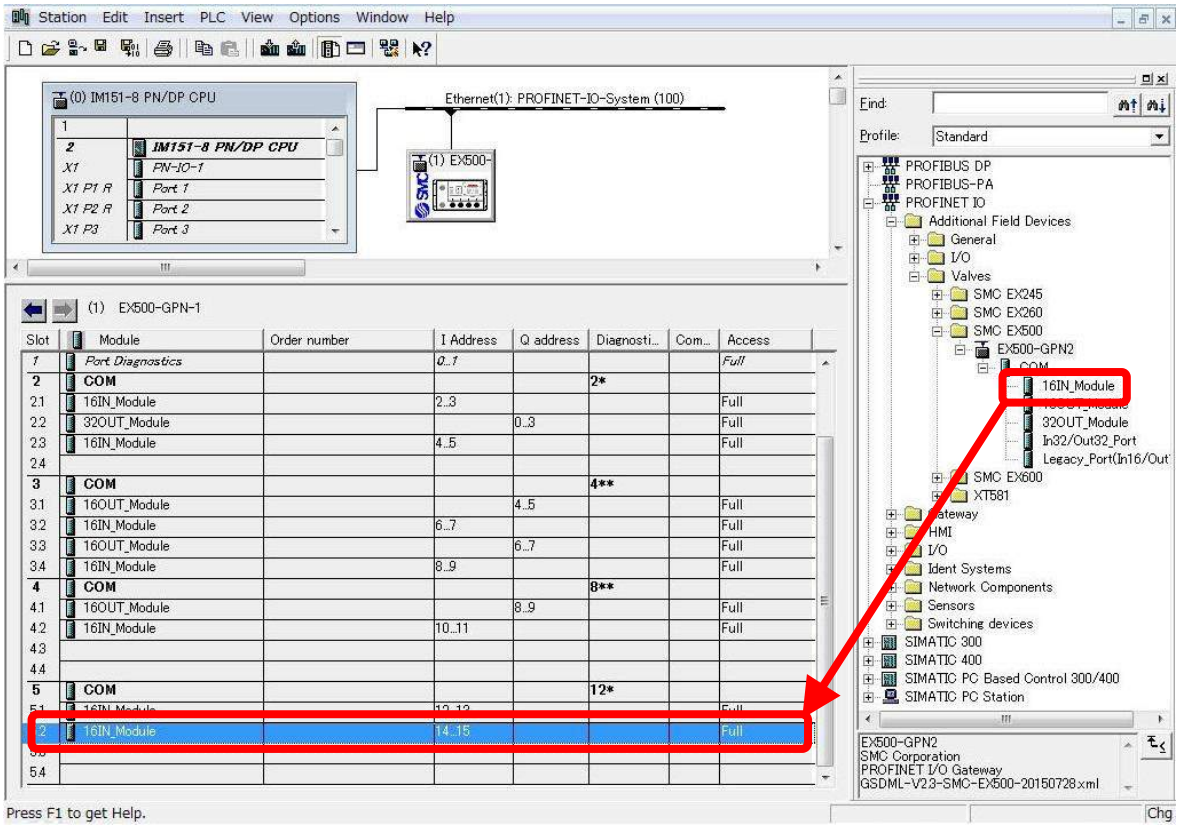
Slot allocation of branch port

Branch port	Slot number
COM A	Slot2
COM B	Slot3
COM C	Slot4
COM D	Slot5



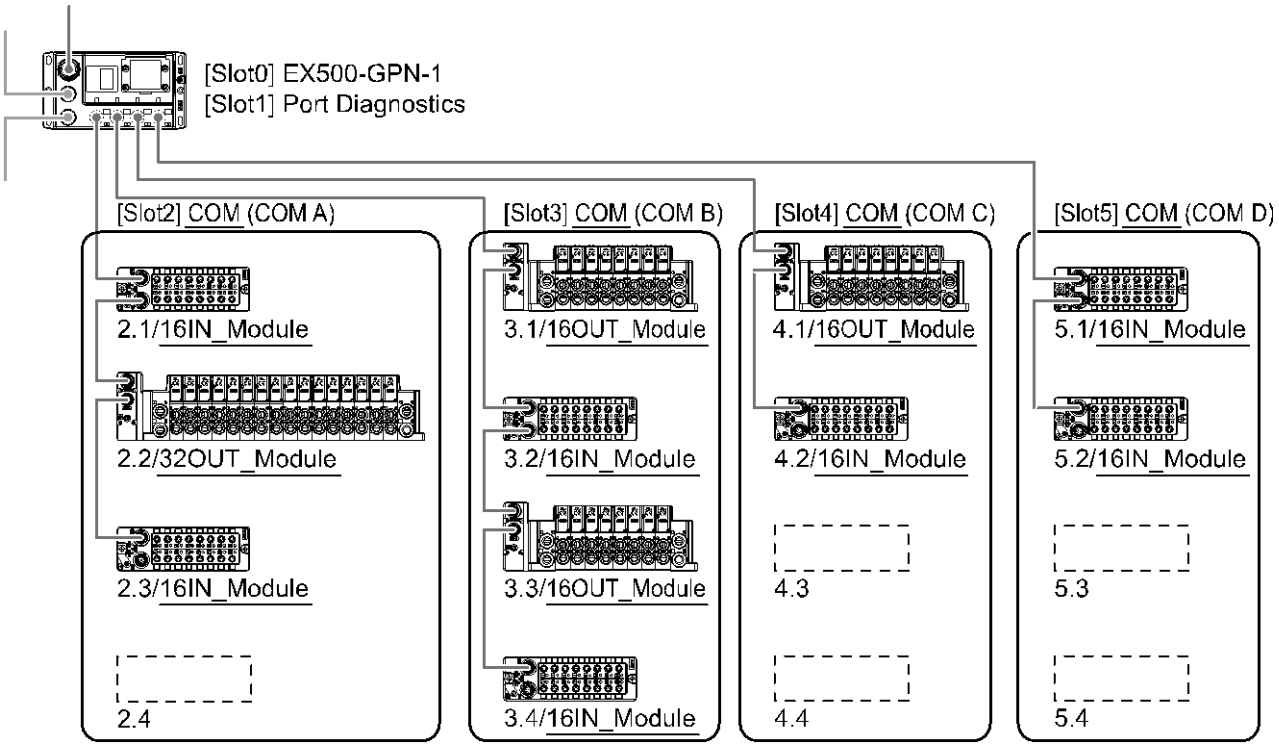
(2)Drag the "IO module" from the hardware catalog window, into the subslot in the HW config screen that corresponds to the actual module attached to branch port.

Module name	Occupied byte		Allowable slot	Model number
	Inputs	outputs		
16IN_Module	2	-	Slot2.1…5.4	EX500-DXP#
16OUT_Module	-	2		EX500-S103(16 Outputs)
32OUT_Module	-	4		EX500-S103(32 Outputs)



NOTE
A slot cannot have a blank subslot between 2 allocatted subslots.

Example of a configuration



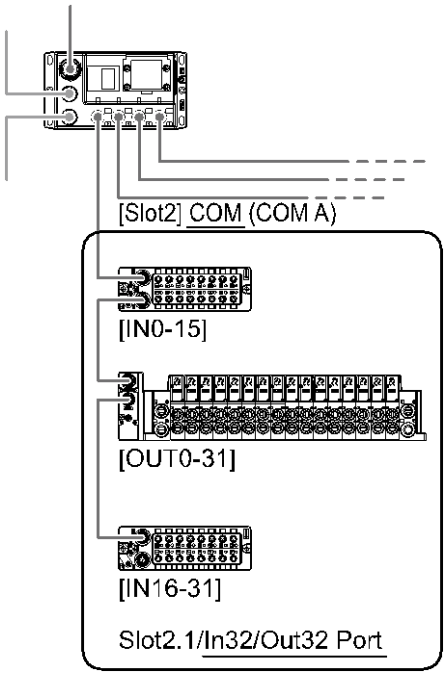
Slot		Module	Input bytes	Output bytes
Slot 2 (COM A)		COM		
	2.1	16IN_Module	2	-
	2.2	32OUT_Module	-	4
	2.3	16IN_Module	2	-
	2.4			
Slot 3 (COM B)		COM		
	3.1	16OUT_Module	-	2
	3.2	16IN_Module	2	-
	3.3	16OUT_Module	-	2
	3.4	16IN_Module	2	-
Slot 4 (COM C)		COM		
	4.1	16OUT_Module	-	2
	4.2	16IN_Module	2	-
	4.3			
	4.4			
Slot 5 (COM D)		COM		
	5.1	16IN_Module	2	-
	5.2	16IN_Module	2	-
	5.3			
	5.4			

∗: In32/Out32_Port module

The In32/Out32_Port module can be assigned to give more flexibility for the users application. This module allocates 4 input and 4 output bytes for the corresponding branch port. The user can attach any combination of I/O modules, in any order, as long as total I/O does not exceed 4/4 bytes.

Module	Occupied bytes		Allowable slot	Model number
	Inputs	Outputs		
In32/Out32_Port	4	4	Slot2.1/3.1/4.1/5.1	EX500-DXP# EX500-S103

Example of a configuration



Slot	Module	Input bytes	Output bytes
Slot 2 (COM A)	COM	-	-
2.1	In32/Out32_Port	4	4
2.2			
2.3			
2.4			
Slot 3 (COMB)	COM	-	-
:	:	:	:
:	:	:	:

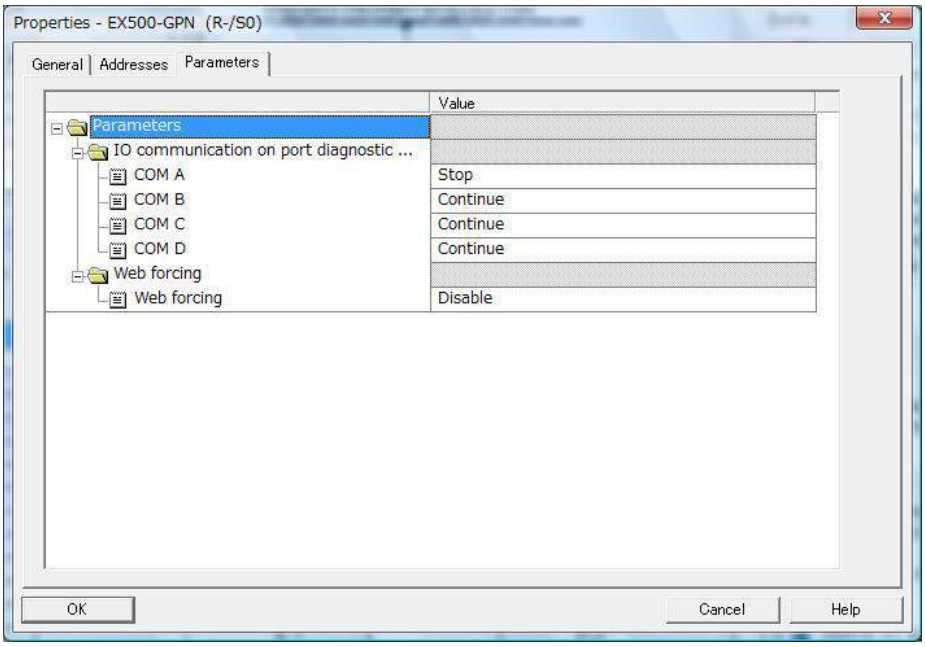
NOTE
If a slot contains an "IN32/OUT32_port" module, it's not possible to add any further modules from the hardware catalogue screen.

•Parameters

○System parameters

Parameter	Meaning / value
IO communication on port diagnostic error 【COM A/COM B/COM C/COM D】	Select the output operation during a diagnostic error for each port Continue (Default) Stop
Web forcing	Limit the forced output function of Web server function. Disable: Forced output is disabled while PROFINET communication is established (Default status) Enable: Forced output is available while PROFINET communication is established

To access the system parameters, double click on slot 0 and select the "Parameters" tab. Then set the parameter values as required and download to the PLC.

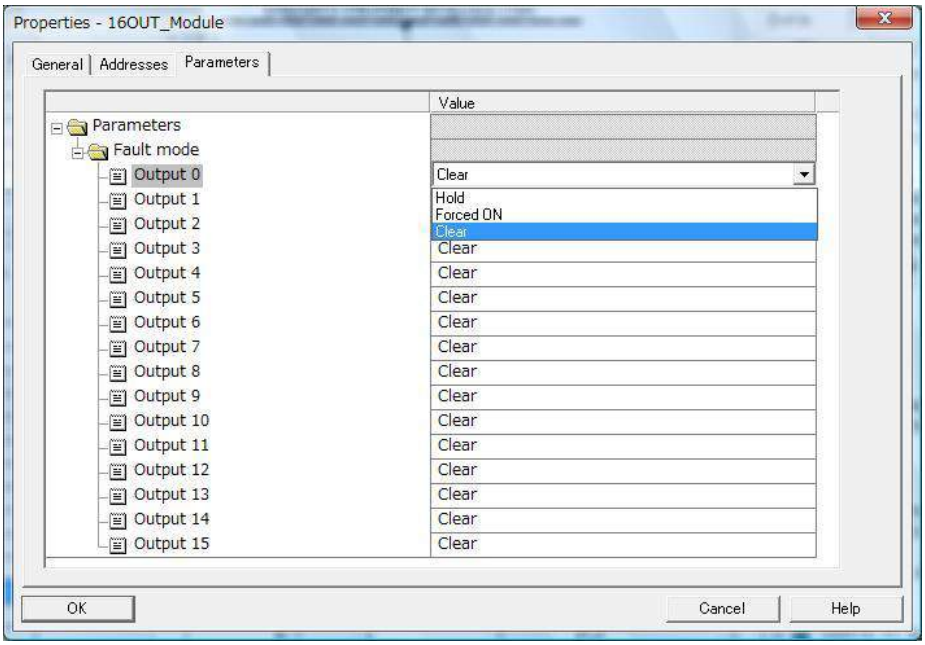


NOTE
When diagnostic No2, 6 or 7 occurs, the communication on the branch port will stop. In this situation all inputs will be read as "0" and all outputs set to "OFF". This behaviour is not affected by the setting of [IO communication on port diagnostic (COM A-D)] parameter.

○Module parameters

Parameters	Meaning/value
Fault mode 【Output 0】	Hold or Clear of output during PROFINET communication error can be set. Clear (Default) Hold Forced ON
Fault mode 【Output 1】	
:	
Fault mode 【Output 15 (Output 31)】	

To access the parameters for any of the output modules, double click on the corresponding subslot in the HW config screen and then select the "Parameters" tab.



NOTE
The parameter for output modules takes priority over the system parameter [IO communication on port diagnostic (COM A-D)].
When “Hold” or “Forced ON” is selected, the value of [IO communication on port diagnostic (COM A-D)] parameter “Stop” does not affect the output operation during a diagnostic error for the branch port.

•Diagnostic data

GW unit allocates 2 input bytes in slot 1 for the port diagnosis data.

<Port diagnostics >

Slot	Input data								Meaning
	MSB			LSB	MSB			LSB	
	15			8	7			0	
1	Fixed 0				COM_D	COM_C	COM_B	COM_A	Port diagnosis

< COM_A - COM_D port diagnosis >

Value	Status
0	OK
1	Diagnostic error

Please refer to table "PROFINET alarm" for a description of the diagnostic error.

< PROFINET alarm >

No.	Alarm message	meaning
1	Module missing	Input unit/SI unit specified by PLC configuration is not connected.
2	Incorrect module	The actual I/O module attached to the branch port, does not match the module allocated to the corresponding subslot, during hardware configuration.
3	Unassigned module	More than 32 inputs or 32 outputs is connected to 1 branch port.
4	IO size exceeded/Configuration error	The total I/O allocated for 1 branch port during hardware configuration, exceeds the maximum I/O of 4/4bytes.
5	Short circuit	Short circuit or over current of input unit sensor connector.
6	Over current or short circuit	Short circuit or over current of GW unit branch port input and control power supply.
7	IO stopped / Configuration error	A slot has a blank subslot between 2 allocated subslots.
8	WEB Forcing	The web server function is being used to force outputs.

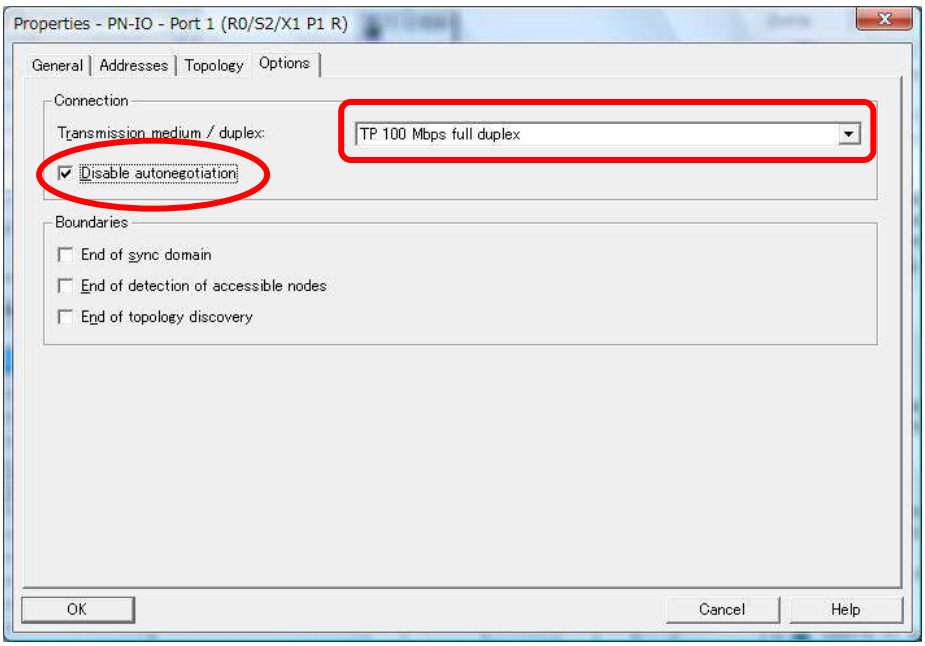
NOTE
The alarm No.1 and No.2 are not available for the "In32/Out32_port" module.
Port diagnostic status bits are not set when web forcing function is used.
In case that PLC configuration is changed while PROFINET alarm occurs or multiple PROFINET alarms occur at the same time, GW unit rarely need to be power cycled to clear PROFINET alarms.

∗: FSU (Fast Start Up) setup

The EX500 supports the FSU function.
To enable the FSU function, it is necessary to change the FSU setting of the connected PLC.

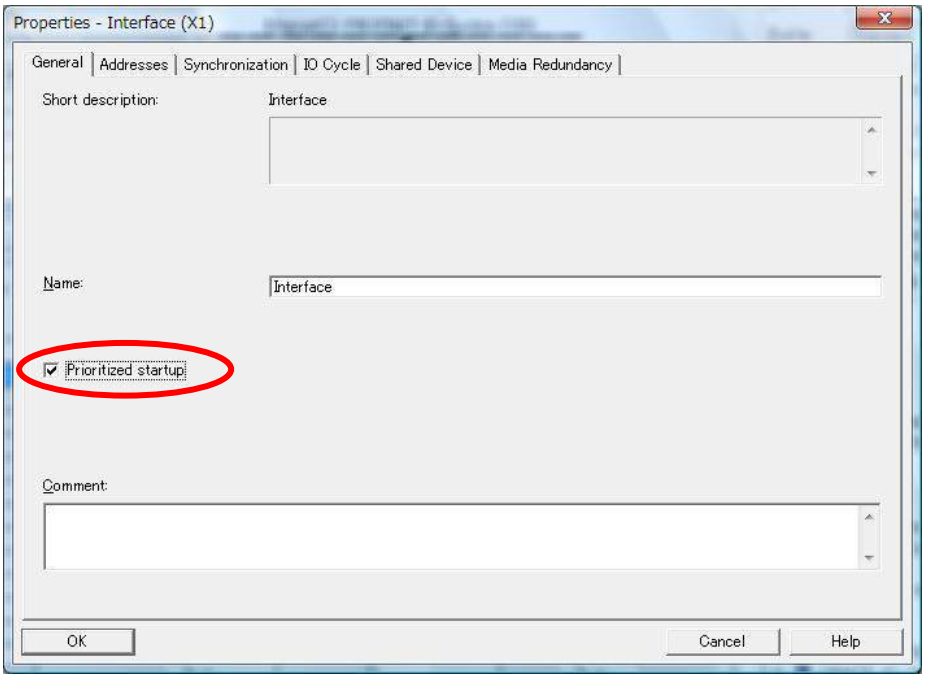
1. PLC set up

The [Properties] screen will be displayed by double-clicking the PLC PROFINET port in the [HW Config] screen, which is connected to the EX500.
Select the [TP 100Mbps full duplex] in the [Options] tab.
Tick the box for [Disable autonegotiation]. and press the [OK] button.

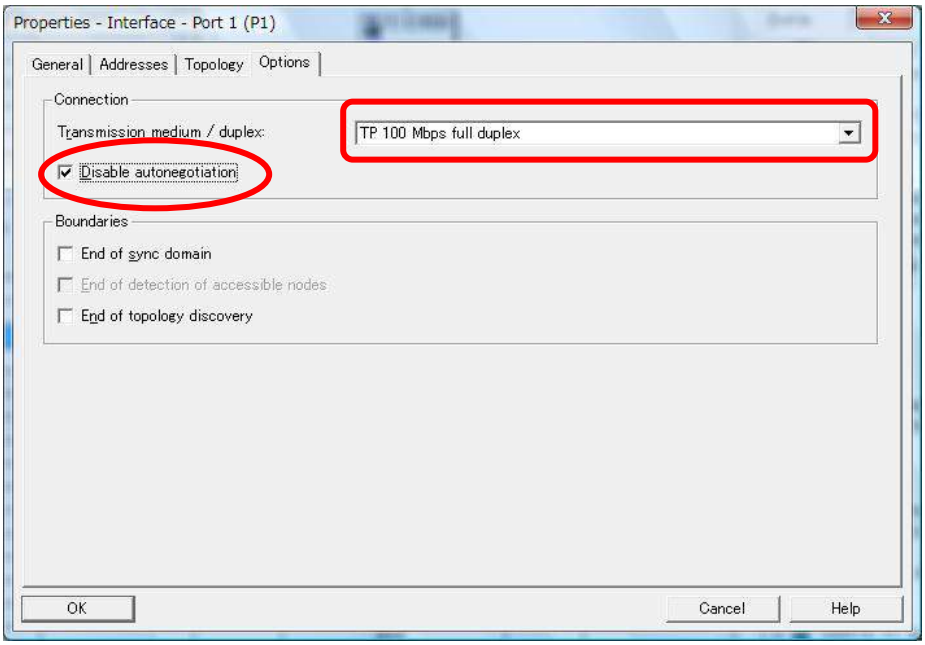


2. GW unit setup

The [Properties] screen will be displayed by double-clicking the [Interface] of the [Configuration table] window [Slot X1].
Tick the box for [Prioritized startup] in the [General] tab and press the [OK] button.



The [Properties] screen will be displayed by double-clicking the Slot1 P1 or P2 (communication port using the FSU function) in the [HW Config] screen.
Select [TP 100Mbps full duplex] in the the [Options] tab.
Tick the box for [Disable autonegotiation] and press the [OK] button.



■Web server function

The GW unit has a Web server function which allows checking the information of the slave configuration from a PC Web browser during maintenance, or checking of I/O monitor or forced output of ON/OFF of the valve.

●Connection of GW unit and PC

Connect GW unit and PC to the same Ethernet network, then start the Web browser on the PC.
The GW unit can be connected to the Web server by inputting GW unit IP address to the Web browser address bar.

NOTE
Set the same significant 3 octets of PC IP address as GW unit IP address.
Set the PC subnet mask to "255.255.255.0".

Ex. 1 GW unit: 192.168.0.5	PC: 192.168.0.1	OK: Correct IP address setting
Ex. 2 GW unit: 192.168.0.5	PC: 192.168.3.1	NG: Incorrect IP address setting

∗: IP Addressing for GW unit

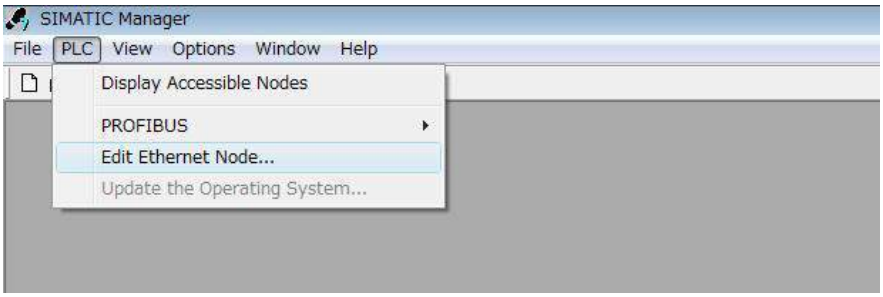
If web function is used while PLC is not connected to GW unit, then IP address must be set manually. (default IP address ; 0,0,0,0)

Procedure for setting IP address when using STEP 7 configuration software.

∗: The drawing below shows the SIEMENS software, STEP7™ V5.5.

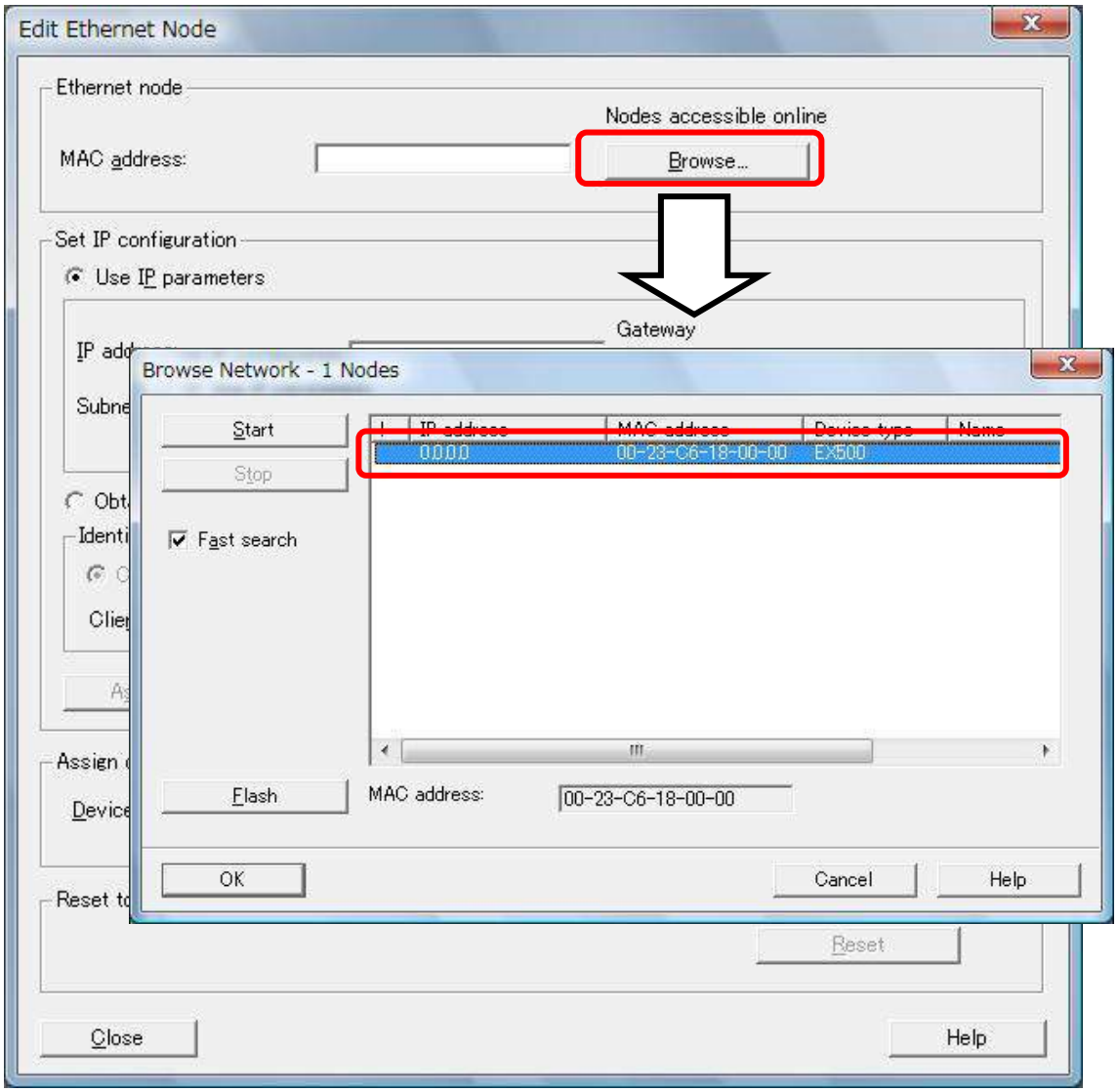
(1)Connect the EX500 system to the PLC.

(2)Select [PLC] → [Ethernet] → [Edit Ethernet Node] from the menu bar of [HW Config].



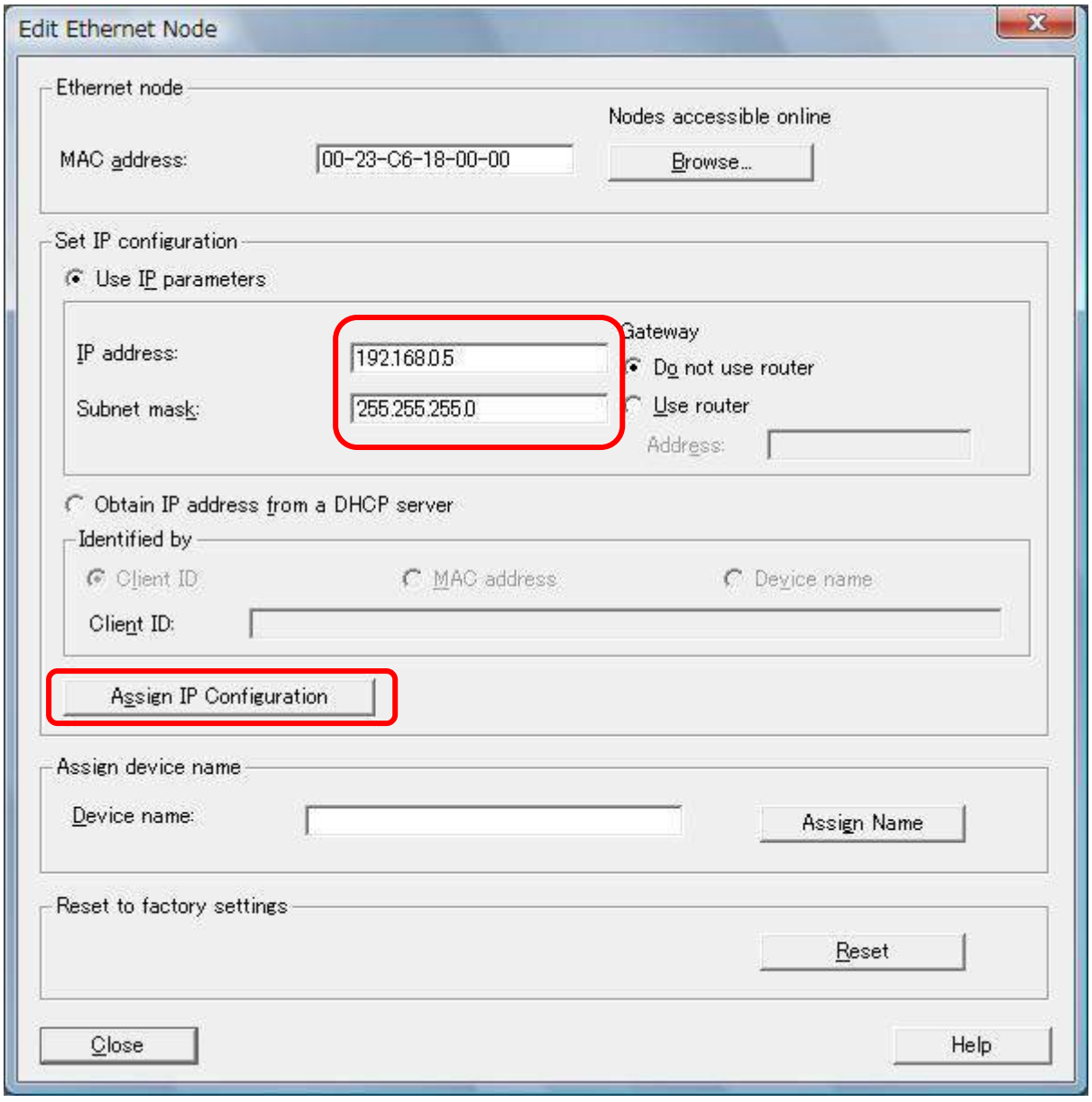
(3)[Edit Ethernet Node] screen will be displayed. Press the [Browse] button.

(4)[Browse Network] screen will be displayed. The list of equipment in the same network will be displayed. Select SI unit MAC address for assigning IP address.



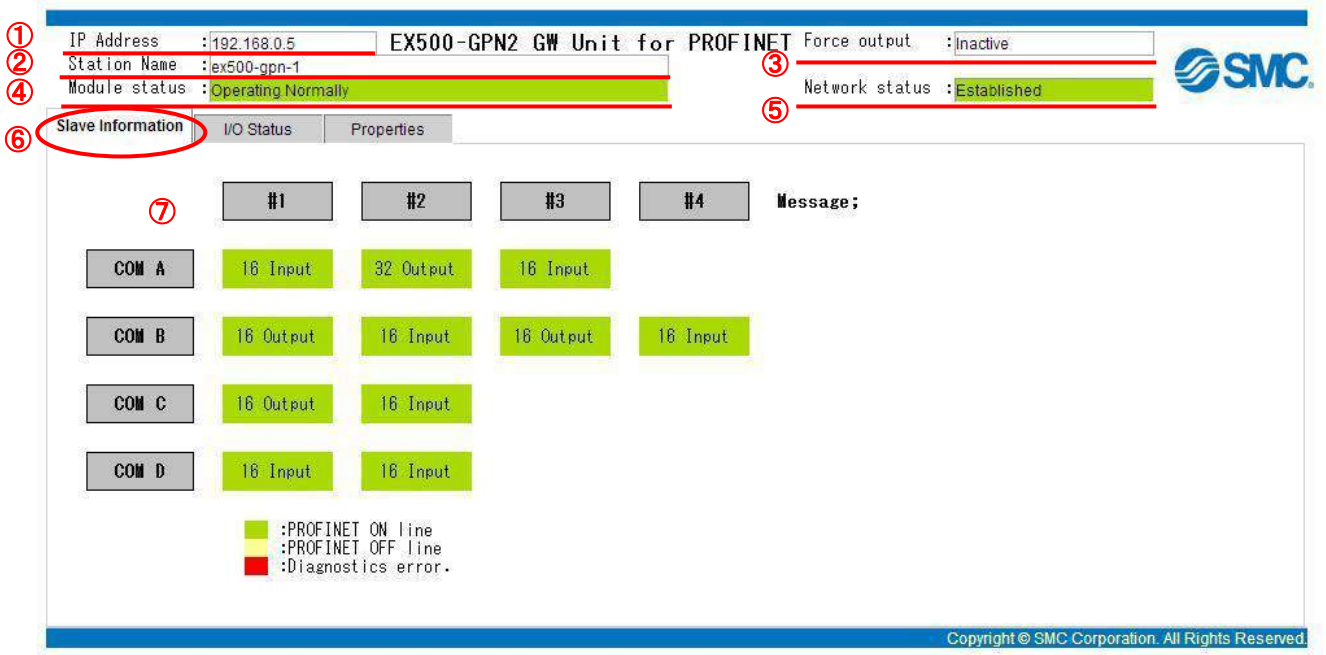
(6)[Edit Ethernet Node] will be displayed with GW unit MAC address. Enter [IP address] and [Subnet mask].

(7)Press the [Assign IP configuration] button.



●Web server contents
Web browser screen when the Web server is connected is shown below.

< Slave information tab (Home screen) >
Slave configuration corresponding to the condition of each COM port is displayed.



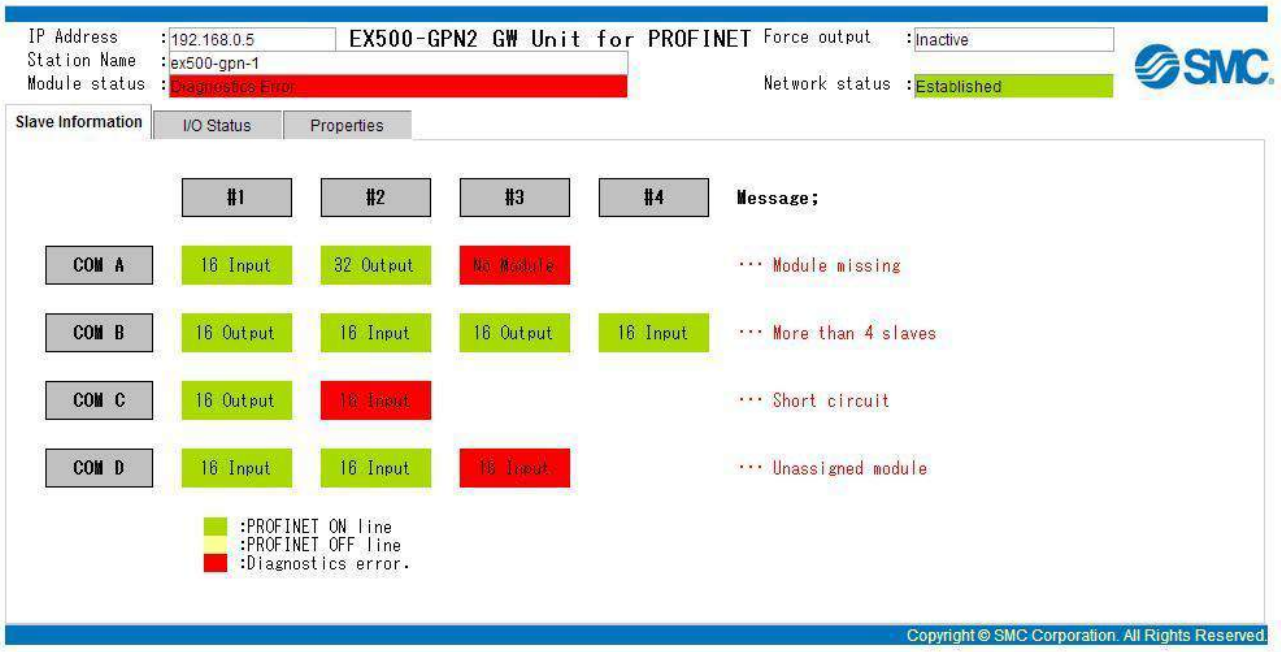
16 Input: Input unit is connected.
16 Output: SI unit (16 output) is connected.
32 Output: SI unit (32 output) is connected.
Blank: Slave is not connected.

No.	Item	Meaning
1	IP Address	IP address of GW unit connected to Web server
2	Station Name	Station name of GW unit
3	Force output	Force output mode enable/disable. Active: Force output mode enabled Inactive: Force output mode disabled
4	Module status	GW unit operating condition. Operating Normally: Normal operation Diagnostics Error: Diagnostic error detected
5	Network status	Displays the communication status of the GW unit PROFINET. Established: PROFINET communication is established Not established: PROFINET communication is not established Timeout: PROFINET communications time out
6	Menu tab	Menu is changed by selecting the tab.
7	Slave Information	Configuration of SI unit and input unit connected to each branch port.

∗: Slave information is not available for the "Legacy_Port (In16/Out16)" module.

< Diagnostic error >

Example below shows Slave information when a diagnostic error is generated.
Diagnostic error name is displayed in Message space. *



Diagnostic Error name and meaning

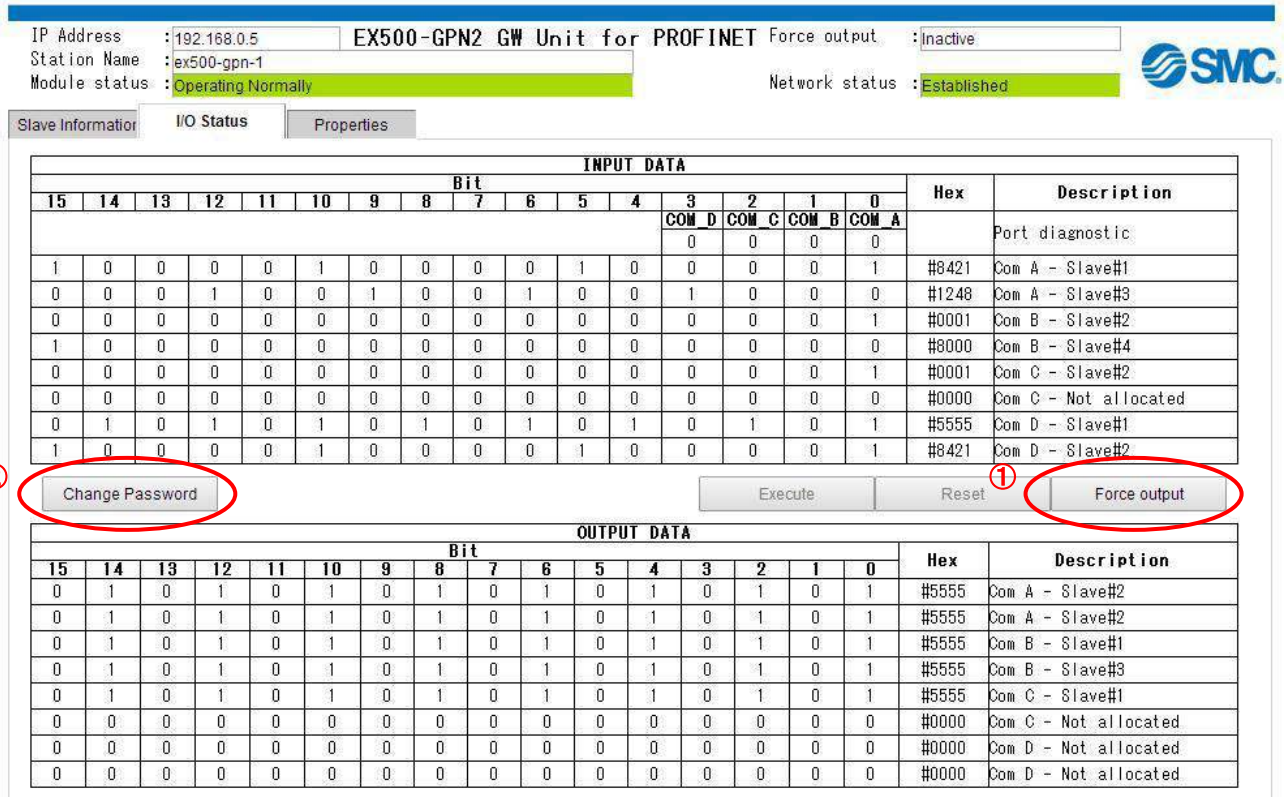
Problems	Meaning
Module missing	Input unit/SI unit specified by PLC configuration is not connected.
Incorrect module	The actual I/O module attached to the branch port, does not match the module allocated to the corresponding subslot, during hardware configuration.
Unassigned module	More than 32 inputs or 32 outputs is connected to 1 branch port.
More than 4 slaves	More than 4 Input uint/SI unit are connected to 1 branch port.
IO size exceeded/Configuration error	The total I/O allocated for 1 branch port during hardware configuration, exceeds the maximum I/O of 4/4bytes.
IO stopped/Configuration error	A slot has a blank subslot between 2 allocated subslots.
Short-circuit	Short circuit or over current of input unit sensor connector.
Over current or short-circuit	Short circuit or over current of GW unit branch port input and control power supply.

*: One representative error is displayed when multiple errors are generated simultaneously in the same port.
Following message will be displayed after the errors are solved.

< I/O Status tab >

Current GW unit I/O memory map is displayed.

Refer to page 29 for Port diagnostic.



No.	Item	Meaning
1	Force output	Select for force output mode.
2	Change password	Select for changing the password to enable changing to force output mode.

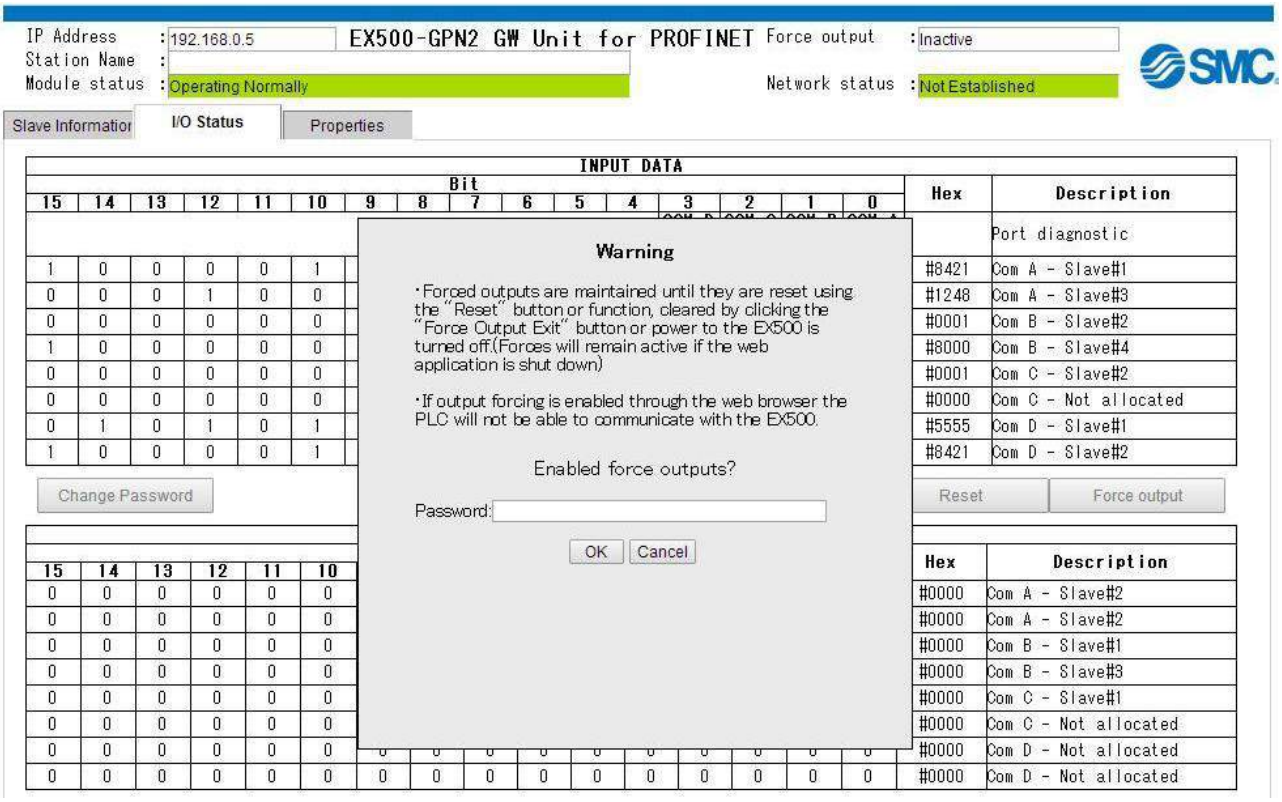
●Forced output mode

Procedure to change to forced output more and the method of forced output.

Warning and password input screen will appear by selecting the Force output button.

Force output space becomes active when the password entered is successful. The mode will be changed to force output mode.

Initial password is "SMCEX500".



< CAUTION >

●Forced output is valid until selecting Reset or Force output exit.
Forced output is valid even if the network is shut down during forced output mode.
(Forced output is released when GW unit power supply is off.)

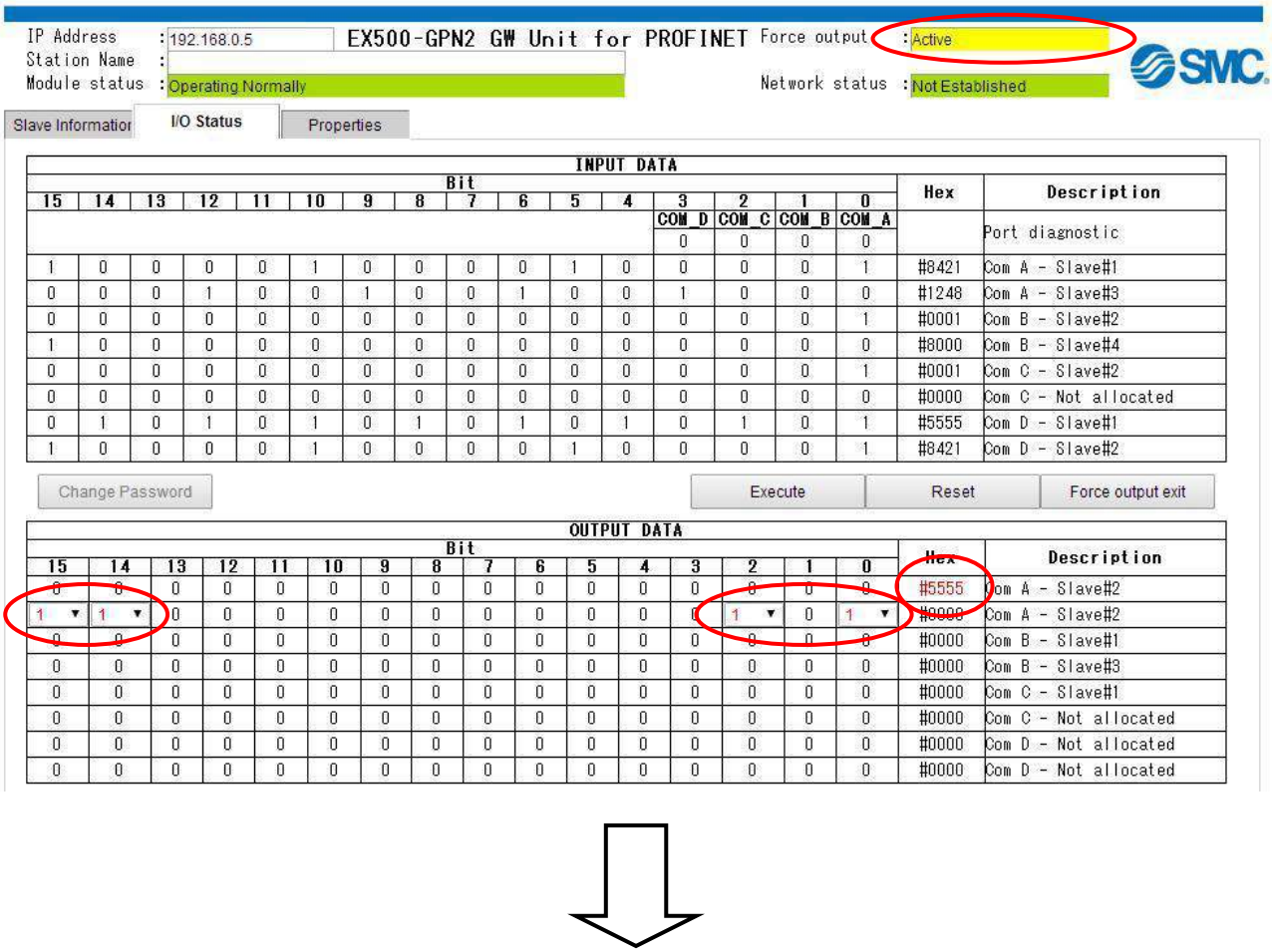
●It's not possible to use the web forcing function while a PLC is connected to the GW.
To use Web forcing function while PLC is connected, the parameter [Web forcing] must be set to "enable".

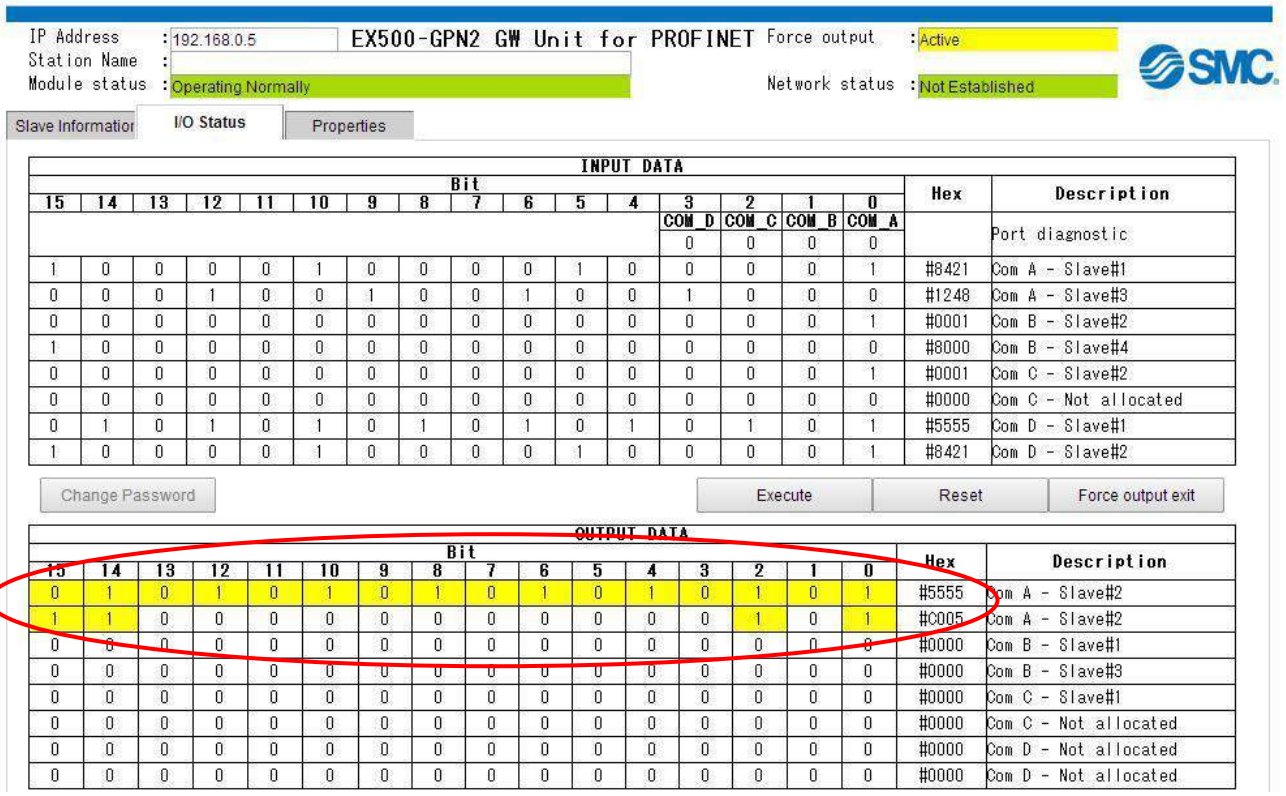
●If a PLC is connected to the GW while the Web forcing function is active, then the output data from the PLC is ignored.



OUTPUT DATA becomes editable in forced output mode.
Edited OUTPUT DATA is displayed in red.

After OUTPUT DATA is edited, the output data will be reflected by selecting "Execute".
Reflected OUTPUT DATA is displayed in yellow.





IP Address : 192.168.0.5
Station Name :
Module status : Operating Normally

EX500-GPN2 GW Unit for PROFINET

Force output : Active
Network status : Not Established

Slave Information | I/O Status | Properties

INPUT DATA

Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hex	Description
												COM_D	COM_C	COM_B	COM_A		Port diagnostic
												0	0	0	0		
1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	#8421	Com A - Slave#1
0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	#1248	Com A - Slave#3
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	#0001	Com B - Slave#2
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#8000	Com B - Slave#4
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	#0001	Com C - Slave#2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com C - Not allocated
0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	#5555	Com D - Slave#1
1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	#8421	Com D - Slave#2

Change Password | Execute | Reset | Force output exit

OUTPUT DATA

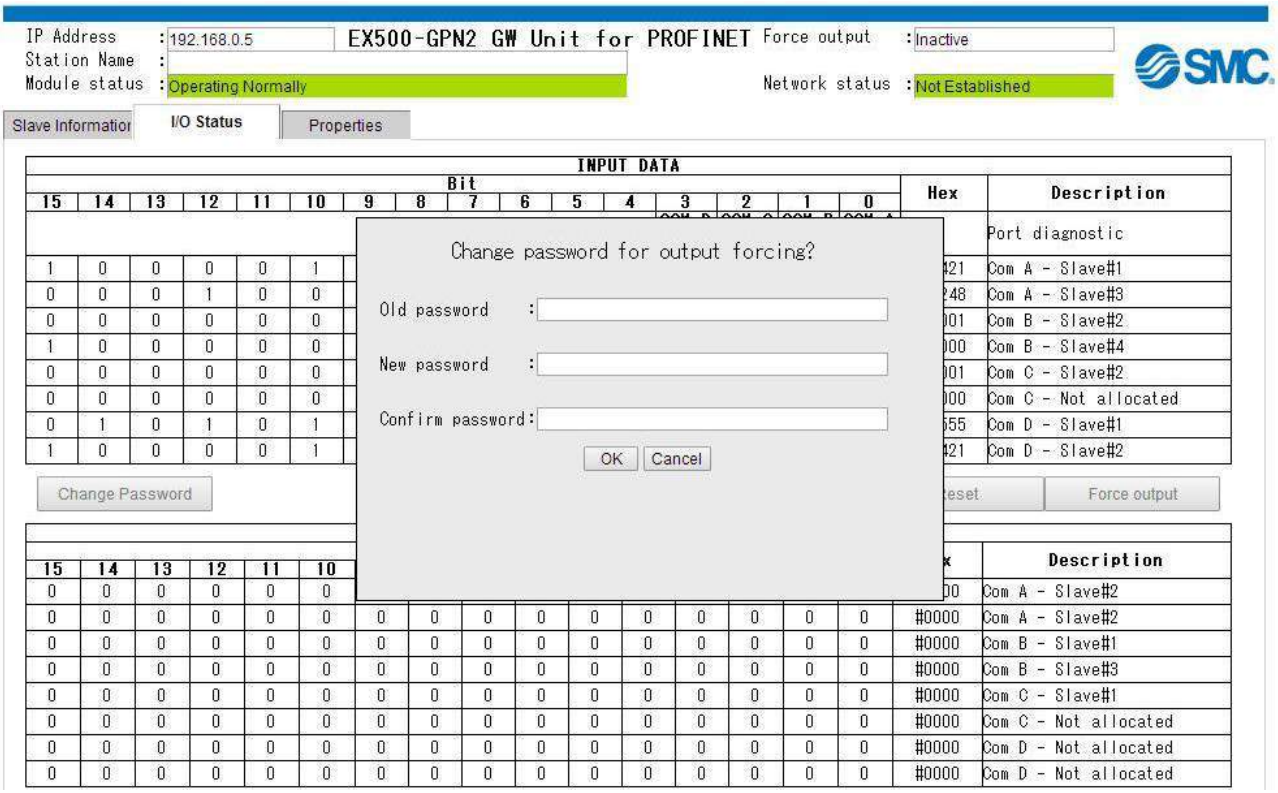
Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hex	Description
0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	#5555	Com A - Slave#2
1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	#C005	Com A - Slave#2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com B - Slave#1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com B - Slave#3
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com C - Slave#1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com C - Not allocated
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com D - Not allocated
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	#0000	Com D - Not allocated

All output data can be cleared by selecting “Reset”.
Forced output mode is released by selecting “Force output exit“.
At this time, the output data is automatically cleared.

●Password change

Password can be changed by selecting the Change password button.

Type the password before change in the Old password space, and the new password in the New password and Confirm password spaces. Password change is completed by selecting OK.



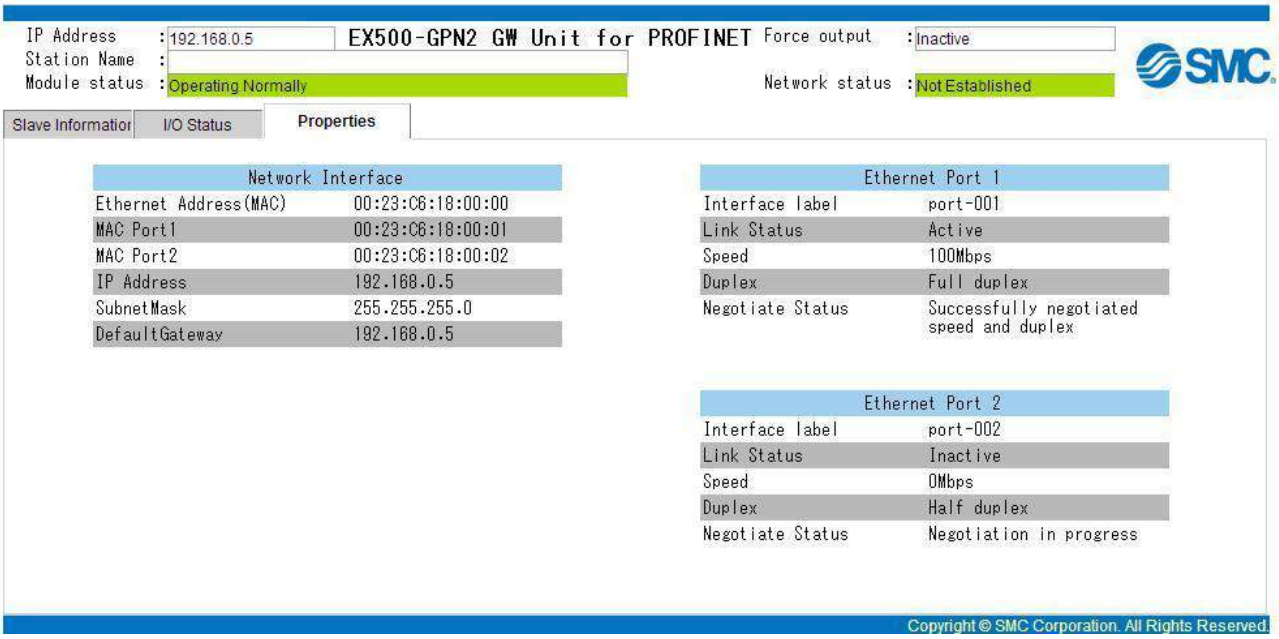
< CAUTION >

- Valid character for password is half-width alphanumeric and "-", "_", "." and "@".
- Maximum number of characters for password is 16.
- Changed password must be strictly controlled.
- If the password is forgotten and needs to be reset, PROFINET Factory Reset command can initialize the password.

*: Please refer to the configuration software manual for instructions on how to send FACTORY RESET command.

< Properties tab >

Network information including the GW unit MAC address and communication speed are displayed.



Specification

■Specifications

Basic Specifications

Item	Specifications
Power supply voltage range	Power supply for input and control: 24 VDC ±10% * Power supply for solenoid valve: 24 VDC +10%/-5% *
Rated current	Power supply for input and control: 6.2 A (GW unit internal current consumption: 200 mA or less) Power supply for solenoid valve: 4 A
Number of inputs and outputs	Input: Max. 128 points/Output: Max. 128 points
Standard	CE marking, UL(CSA), RoHS
Weight	550 g

∗: The direct current power supply to combine should be UL1310 class 2 power supply when conformity to UL is necessary.

Environment specifications

Item	Specifications
Enclosure rating	IP65
Body material	PBT
Operating temperature range	Operation: -10 to 50 °C, Storage: -20 to 60 °C (No condensation or freezing)
Operating humidity range	Operation, Storage: 35 to 85%RH (No condensation)
Operating atmosphere	No corrosive gas

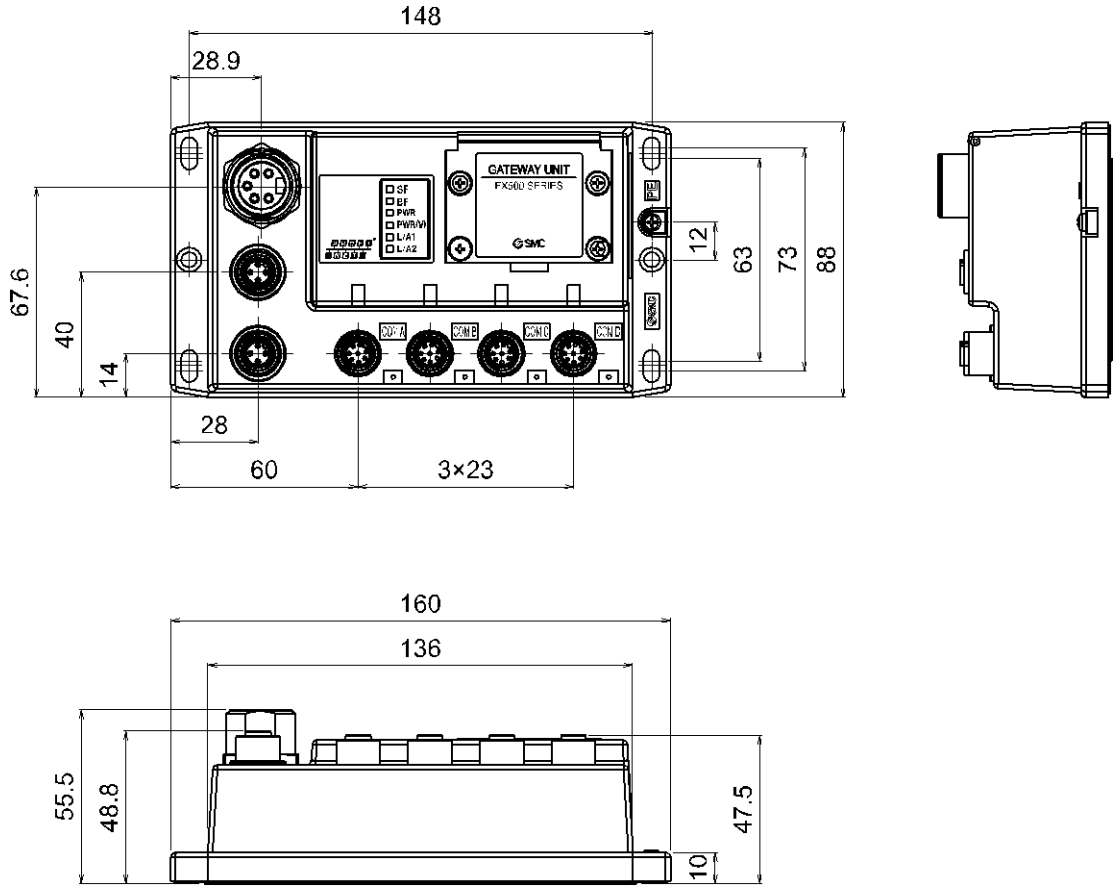
Communication specifications

Item		Specifications
Protocol		Ethernet (IEEE802.3)
	Media	100BASE-TX (CAT5 or more)
	Communication speed	100 Mbps
	Communication method	Full duplex / half duplex (automatically selected)
Fieldbus protocol		PROFINET IO
Device information		Vendor ID: 0x0083 (SMC Corp.) Device ID: 0x000B
Applicable function		FSU (Fast Start Up) MRP (Media Redundancy Protocol) Conformance Class C (RT/IRT) Web server (Applicable browser: Internet Explorer6 to 11, Firefox28.0 to 31.0, Google Chrome 36.0 to 37.0 Applicable OS: windows 8, windows 7)

Branch port specifications

Item	Specifications
Number of inputs and outputs	128 Inputs/128 Outputs
Applicable system	Gateway distribution system 2 (128 point)
Number of branch port	4 (Input: Max. 32 points/Output: Max. 32 points per branch)
Number of connected slave	Max. 16 (Input unit: 2 pcs./SI unit: 2 pcs. per branch)
Power supply for input equipment and control	24 VDC, Max. 1.5 A per one branch port
Power supply for Solenoid valve	24 VDC, Max. 1.0 A per one branch port
Branch cables	Cable with M12 connector made by SMC (EX500-AC□□□-S□P□)
Branch cable length	Total length 20 m or less per branch

■Dimensions


148
28.9
67.6
40
14
28
60
3×23
12
63
73
88
GATEWAY UNIT
EX500 SERIES
SF
BF
PWR
PWR/V
L/A1
L/A2
PE
COM A
COM B
COM C
COM D
160
136
55.5
48.8
47.5
10

SI unit

Model Indication and How to Order

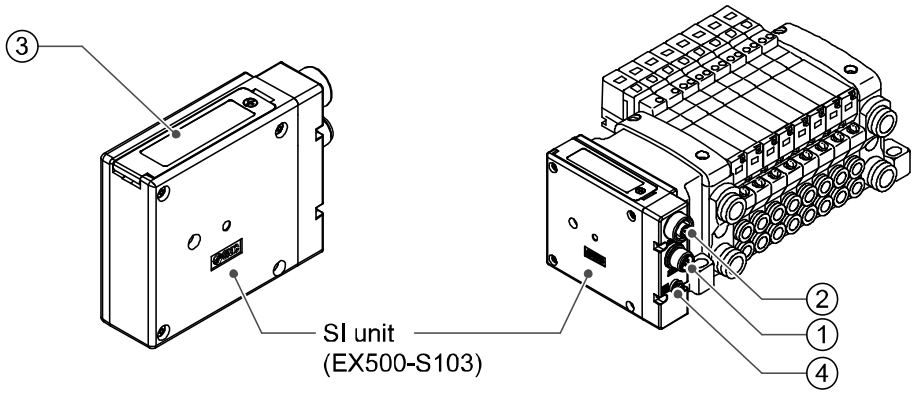
EX500-S 1 03

Output type

1	Source/PNP (negative common)

Summary of Product parts

SI unit is combined with the manifold valve to communicate with GW unit.
The EX9 series general output block can be connected with the SI unit to operate the solenoid valve or relays.



No.	Description	Application
1	Branch connector (IN)	Connector for branch cable (with M12 connector) from the GW unit. *1
2	Branch connector (OUT)	Connector for branch cable (with M12 connector) to the next unit on the branch line. *1
3	Display and switch setting cover	LED display to indicate the SI unit status. *2 Set the output points using the switches under the cover.
4	Grounding terminal (FE)	Used for functional grounding. (M3 thread) (It is recommended to ground with resistance of 100 ohms or less)

Accessories

Hexagon socket head cap screw (M3 x 30): 2 pcs.	Connects the SI unit and the valve manifold.
Seal cap: 1 pc. (for M12 connector socket)	For unused branch connector (OUT).

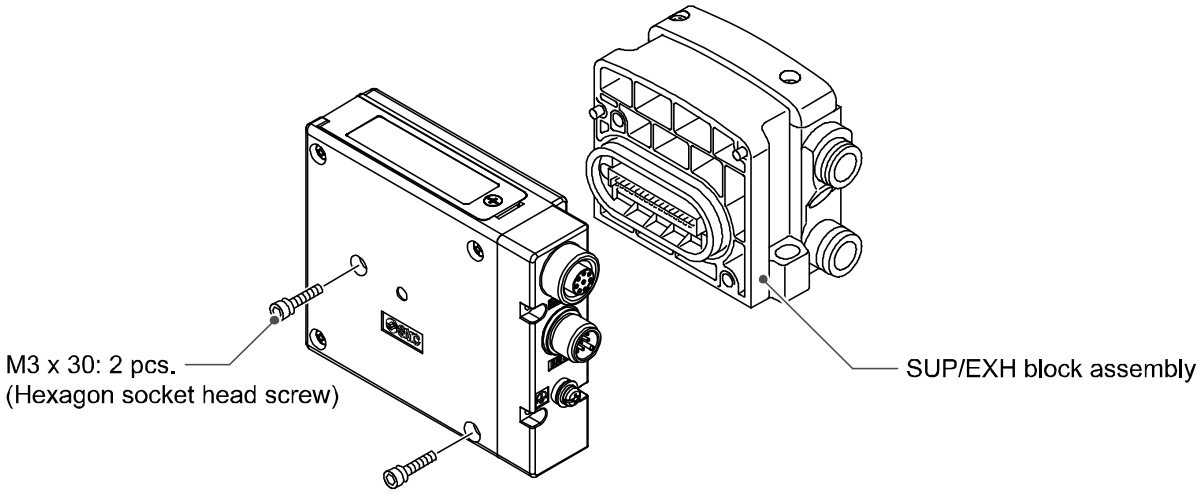
∗1: Refer to page 12 for wiring.

∗2: Refer to page 51 for display

Mounting and Installation

■Installation

Refer to the drawing below.

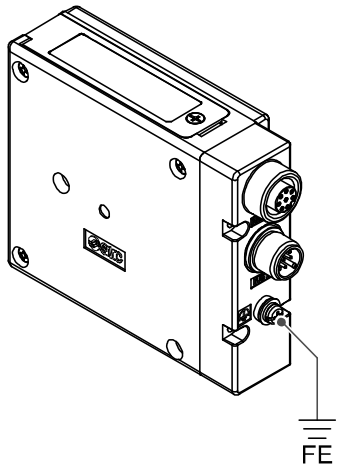


SI unit (EX500-S103)

NOTE
Tighten the screws while holding the SI unit and the supply/exhaust block assembly so that there is no gap between them. Tighten the screws with the tightening torque specified.
(Tightening torque: 0.6 Nm)

∗: Refer to the catalogue and the operation manuals for details of the installation of the solenoid valve and manifold.

○Ground connection



NOTE
Connect the FE terminal to ground.

○Output No. assignment

Output No.	0	2	4	6	8	10	12	14	Solenoid on A side
D Side ⟵ (on SI unit side)									⟶ U side
Output No.	1	3	5	7	9	11	13	15	Solenoid on B side

Valve manifold

∗: Output No. starts from 0, and will be assigned to the valves in order from the SI unit mounted side (D side).

∗: Standard wiring on the manifold is for double-solenoid valves and output number starts A side and B side in that order. If the mounted valves are single solenoid valves, the output on B side will be empty. (See fig. a)

∗: Special wiring specification with a mixed wiring of single solenoid and double solenoid can be specified with a wiring specification sheet. This makes it possible to specify the output numbers without empty outputs. (See fig. b)

Fig. a

	Double	Single	Double	Double	
No.	0	2	4	6	A side
Station	1	2	3	4	----
No.	1	3	5	7	B side

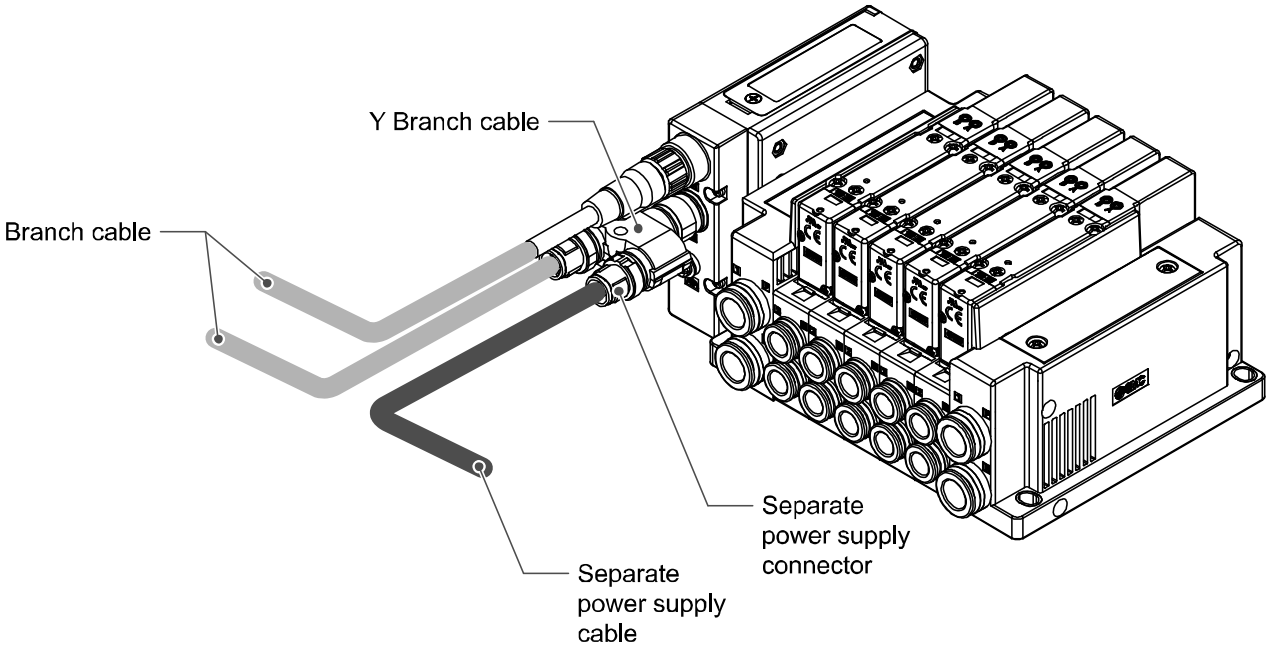
Fig. b

	Double	Single	Double	Double	
No.	0	2	3	5	A side
Station	1	2	3	4	----
No.	1	–	4	6	B side

Vacant

■Separate power supply

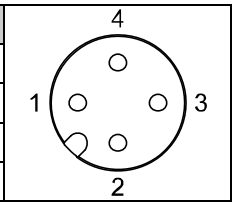
It is possible to provide a separate power supply to the SI unit and valves using a Y branch connector.



Separate connector pin layout

M12, 4 pin, plug

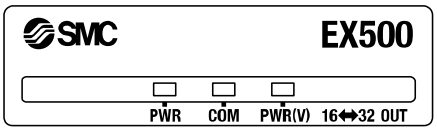
No.	Description
1	24 VDC (For solenoid valves)
2	0 VDC (For solenoid valves)
3	Unused
4	Unused



∗: Refer to page 78 for Y branch connector.

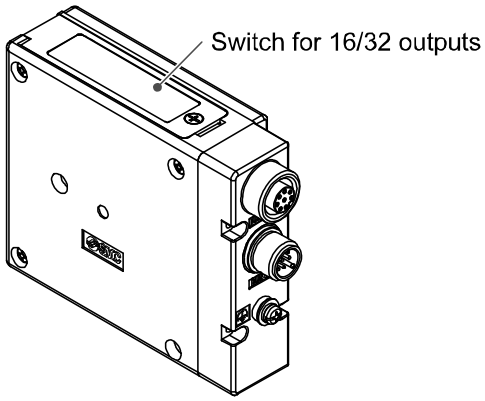
LED Display and Settings

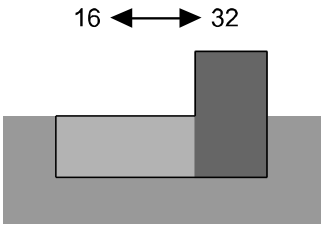
•LED display



Display	Meaning	
PWR	LED is OFF	The power supply for input and control is OFF
	Green LED is ON	Power supply for input and control is ON
COM	LED is OFF	Communication error between GW unit has occurred
	Green LED is ON	Communication between GW unit is normal
PWR(V)	LED is OFF	Power supply for solenoid valve is OFF
	Green LED is ON	Power supply for solenoid valve is ON

•Switch setting





Number of outputs

	Meaning
16	16 output
32	32 output

∗: The default setting is 32.

Specification

■Specifications

Item	Specifications
Output type	PNP (negative common)
Number of outputs	32 points (Internal switch for selecting 16 point or 32 point)
Connected load	Solenoid valve with surge voltage suppressor of 24 VDC and 1.0 W or less (manufactured by SMC)
Short circuit protection	Applicable
Load current	Max power supply of GW unit 1.0 A, Max. external power supply 1.5 A
Internal current consumption	50 mA or less
Enclosure rating	IP67
Body material	PBT
Operating temperature range	Operation: -10 to 50 °C, Storage: -20 to 60 °C (No condensation or freezing)
Operating humidity range	Operation, Storage: 35 to 85%RH (No condensation)
Operating atmosphere	No corrosive gas
Standard	CE marking, UL(CSA), RoHS
Weight	200 g
System	Gateway distribution system 2 (128 point)

Applicable valve series

Refer to the catalogue and the operation manuals for details of the specifications of the solenoid valve and manifold.

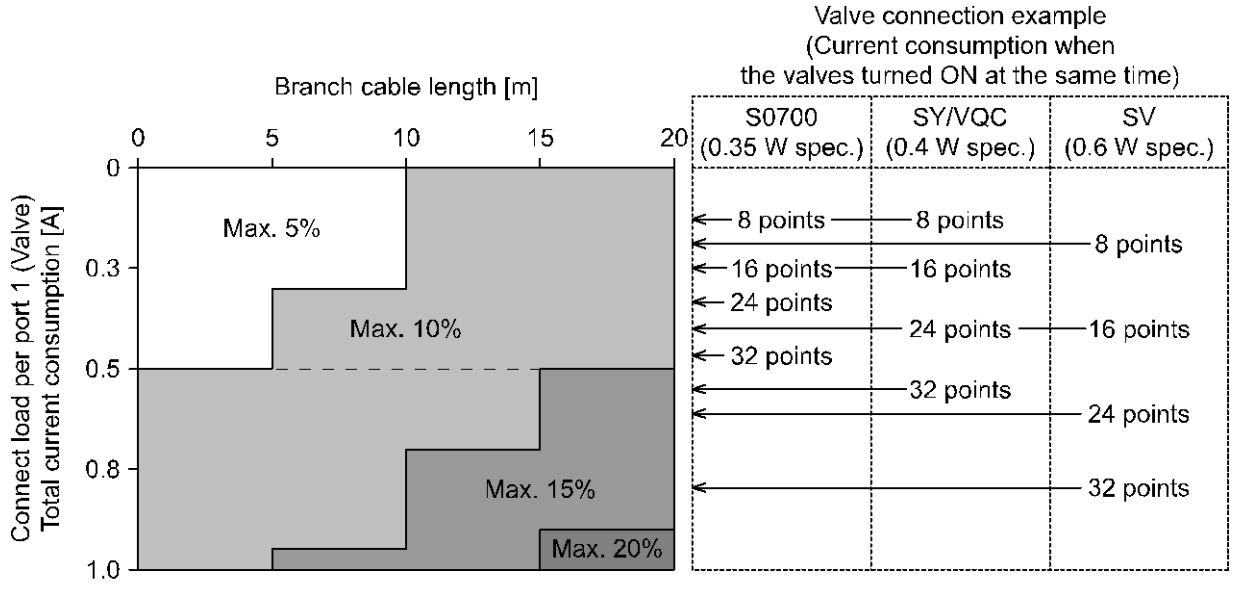
Valve series	
SV series	SV1000、SV2000、SV3000
SY series	SY3000、SY5000、SY7000
VQC series	VQC1000, VQC2000, VQC4000, VQC5000
S0700 series	S0700

Power supply voltage for Solenoid valve

Voltage drop may occur to the source voltage supplied via the SI unit to the valve due to the power consumption of the valves and the length of the branch cable.

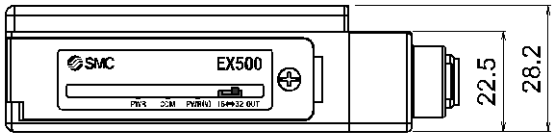
Refer to the guidelines of the Solenoid Valve Power Supply Voltage Drop below.

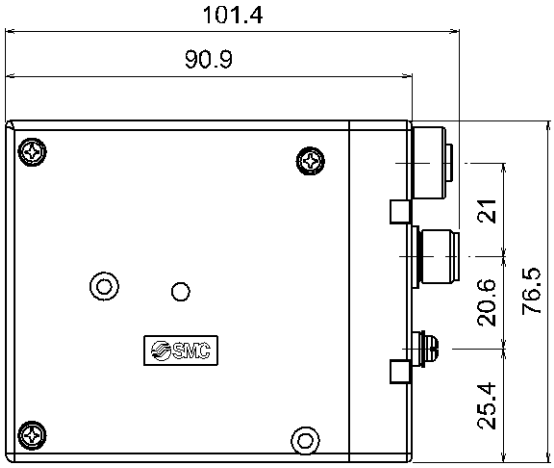
∗: Y connector is also available depending on your usage.

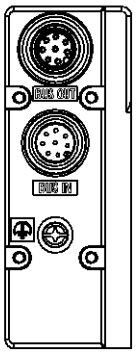


< Guideline of the Solenoid Valve Power Supply Voltage Drop >

■Dimensions







Input unit

Model Indication and How to Order

EX500-DX P A

- Connector type

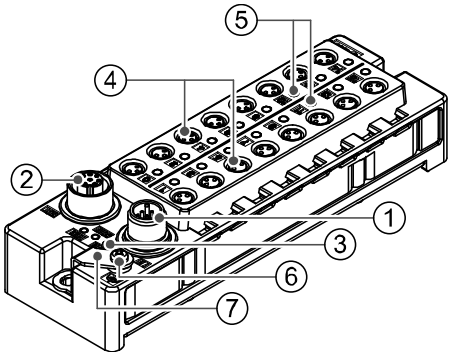
A	M8, 3 pin
B	M12, 5 pin

- Input type

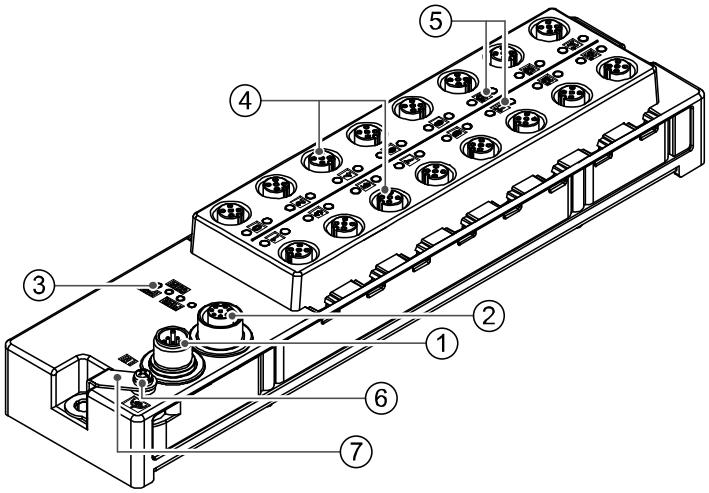
P	PNP sensor input

Summary of Product parts

•EX500-DXPA



•EX500-DXPB



No.	Description	Application
1	Branch connector (IN)	Connector for branch cable (with M12 connector) from the GW unit. *1
2	Branch connector (OUT)	Connector for branch cable (with M12 connector) to the next unit on the branch line. *1
3	Display LED	LED display to indicate the input status. *2
4	Sensor connector	Connector for sensor. *1
5	Display LED	Displays the sensor signal status. *2
6	Grounding terminal	Used for functional grounding. (M3 thread) (It is recommended to ground with resistance of 100 ohms or less)
7	Grounding bracket	Connect the mounting hole to the grounding terminal

Accessories

EX500-DXPA	
Seal cap: 1 pc. (for M12 connector socket)	For unused branch connector (OUT).
Seal cap: 16 pcs. (for M8 connector socket)	Used for unused sensor connector.

EX500-DXPB	
Seal cap: 17 pc. (for M12 connector socket)	For unused branch connector (OUT).

*1: Refer to page 12 for wiring.

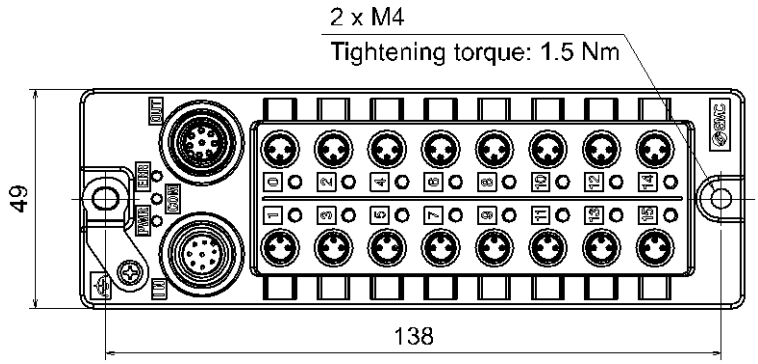
*2: Refer to page 62 for display.

Mounting and Installation

■Installation

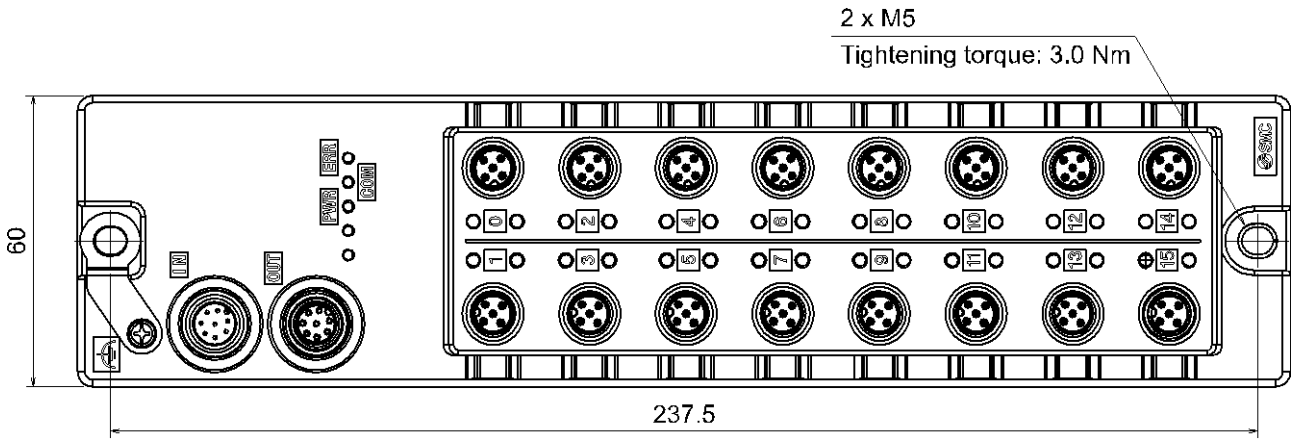
•EX500-DXPA

Install the product using 2 M4 screws x 20 mm or longer with a head ø8 minimum.



•EX500-DXPB

Install the product using 2 M5 screws x 20 mm or longer with a head ø9 to ø11.



■Wiring

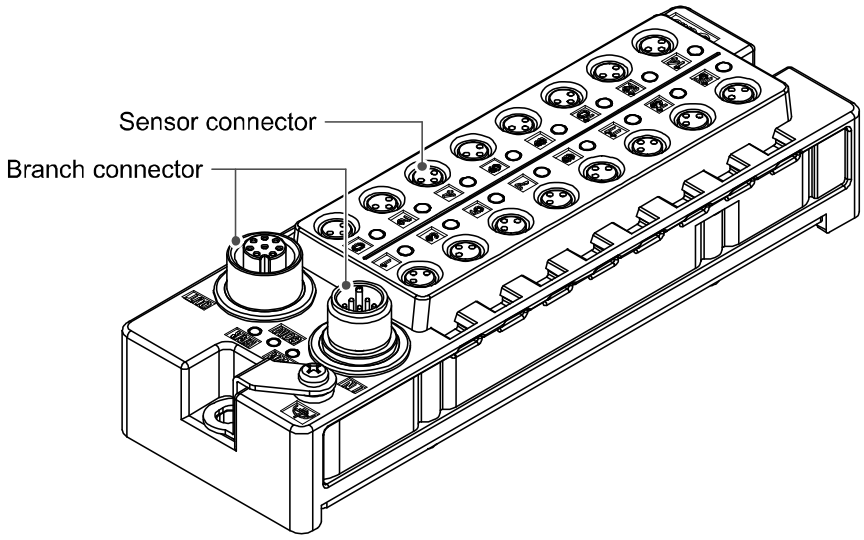
●EX500-DXPA

Branch wiring

Connect the branch cable to the branch connector (IN/OUT). Refer to page 12 for wiring.

Sensor wiring

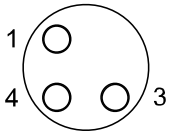
Connect the sensors to the sensor connectors.



Pin layout of the sensor connector

M8 connector (3 pin, socket)

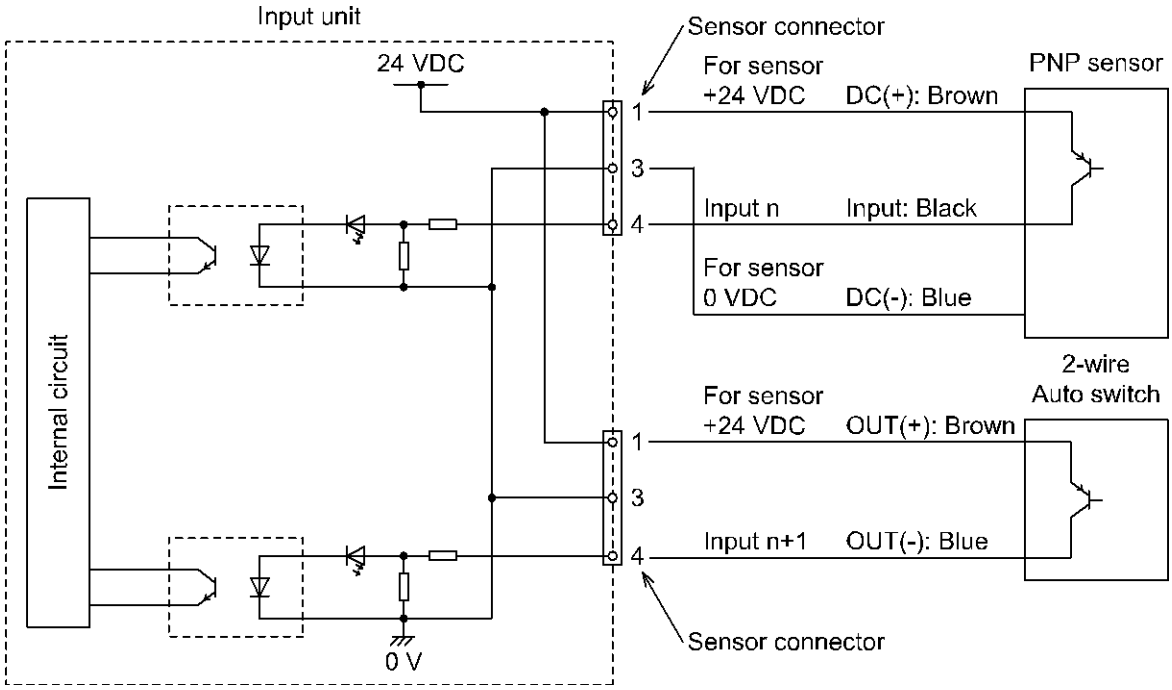
No.	Description
1	Power supply (24 VDC)
3	Power supply (0 V)
4	Input



NOTE

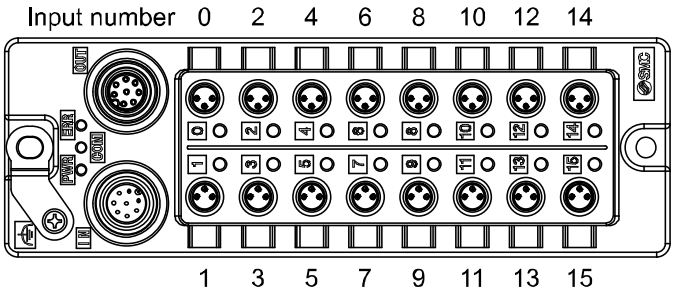
Be sure to fit a seal cap on any unused connectors of the input block.
IP67 is maintained by using the seal cap.
(Tightening torque for M8: 0.05 Nm, M12: 0.1 Nm)

Sensor wiring example (PNP input)

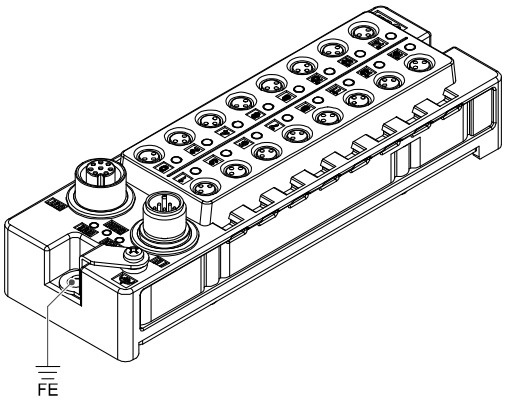


Correspondence between the input number and input

The input number is assigned from 0 to 15 from the branch connector side.



Ground connection



The mounting hole at the branch connector side is connected to the ground terminal using the grounding bracket.

NOTE
Connect the FE terminal to ground.

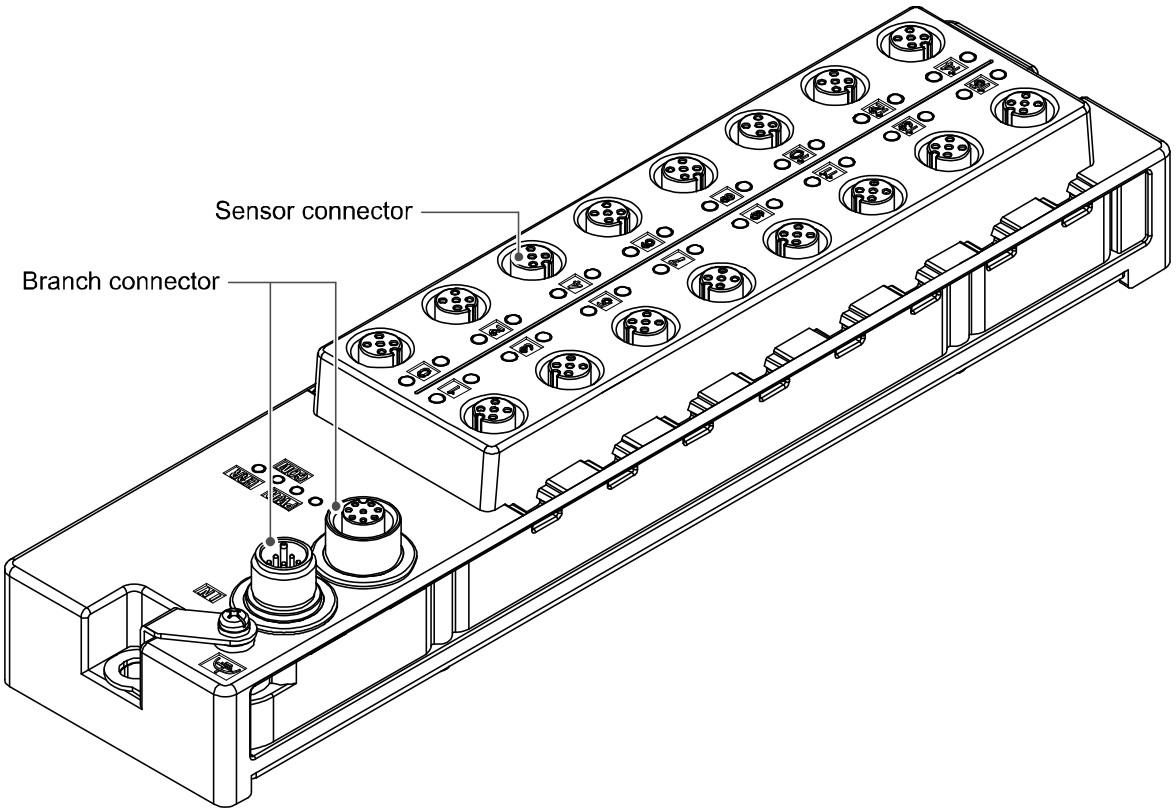
●EX500-DXPB

Branch wiring

Connect the branch cable to the branch connector (IN/OUT). Refer to page 12 for wiring.

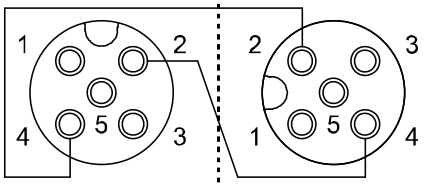
Sensor wiring

Connect the sensors to the sensor connectors.

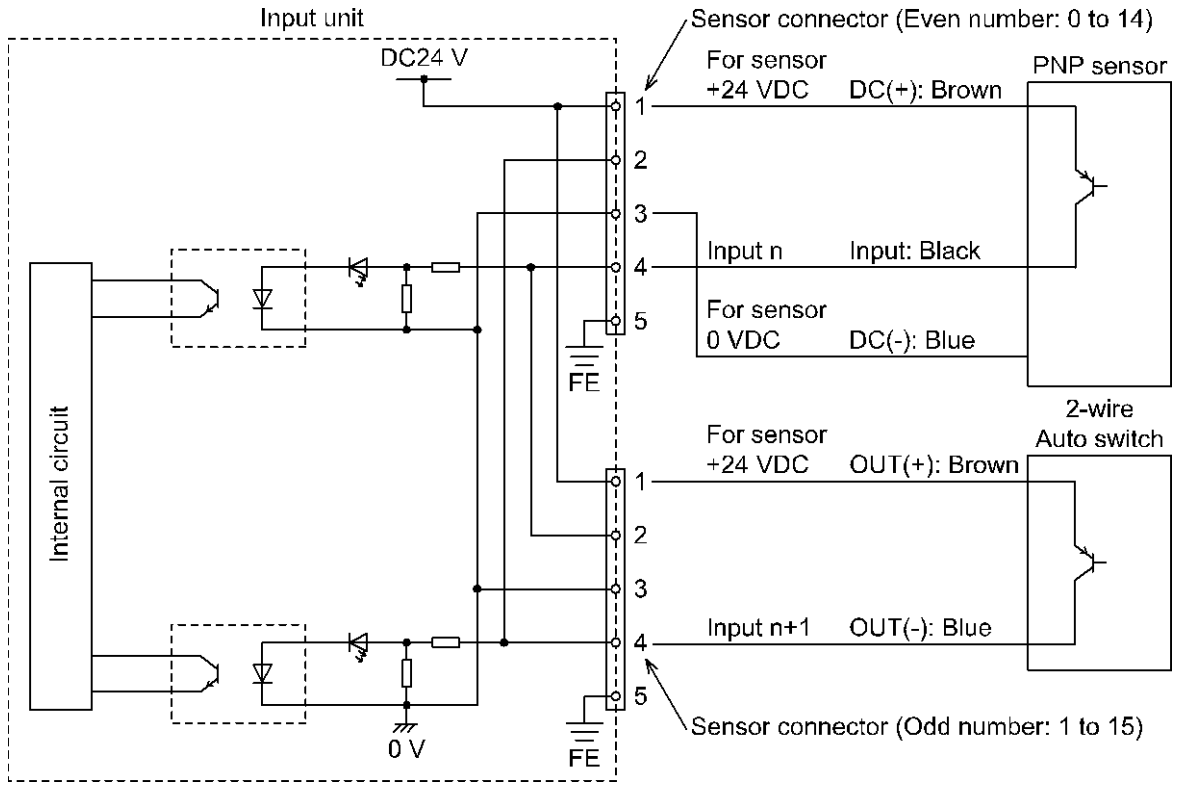


Pin layout of the sensor connector

M12 connector (5 pin, socket)

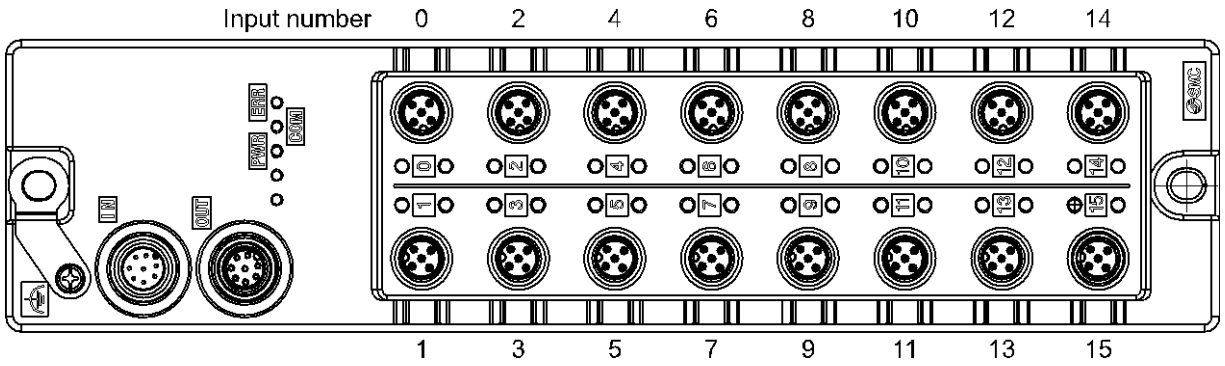
No.	Description	Even number 0 to 14	Odd number 1 to 15
1	Power supply (24 VDC)		
2	(Input)		
3	Power supply (0 V)		
4.	Input		
5	FE		

Sensor wiring example (PNP input)

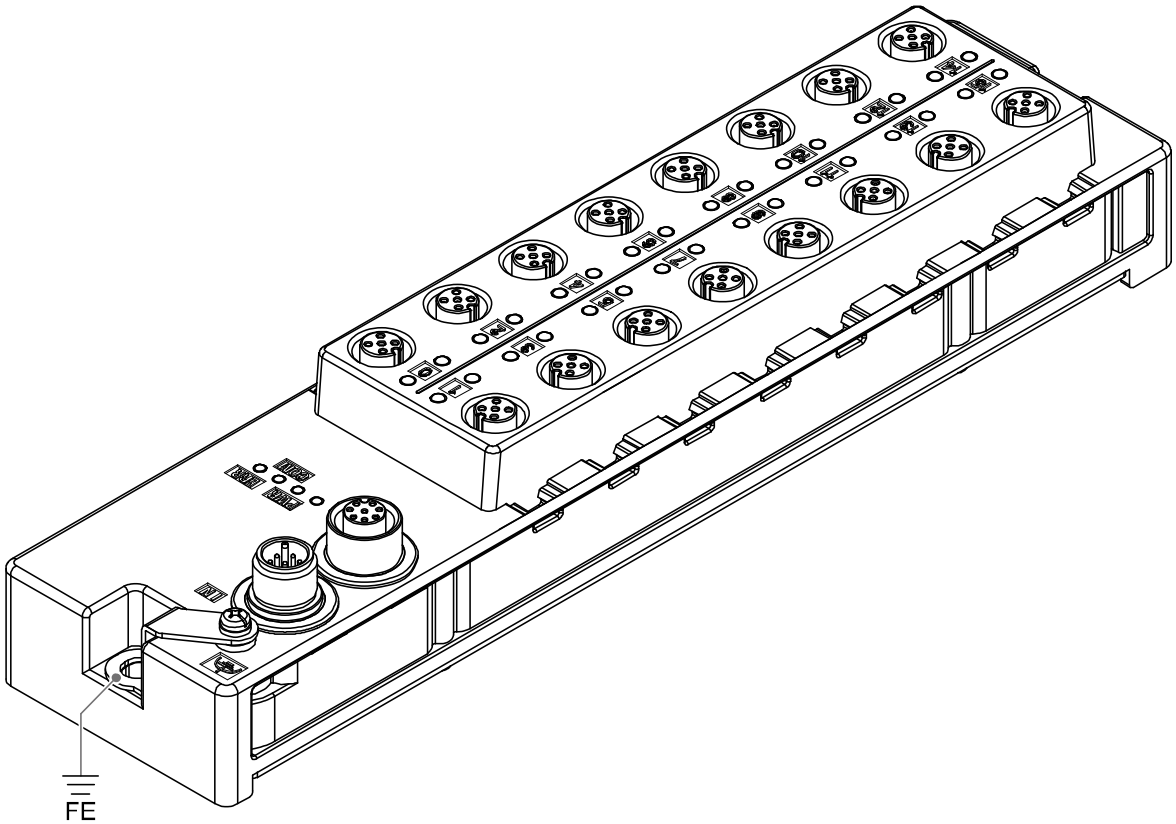


Correspondence between the input number and input

The input number is assigned from 0 to 15 from the branch connector side.



Ground connection

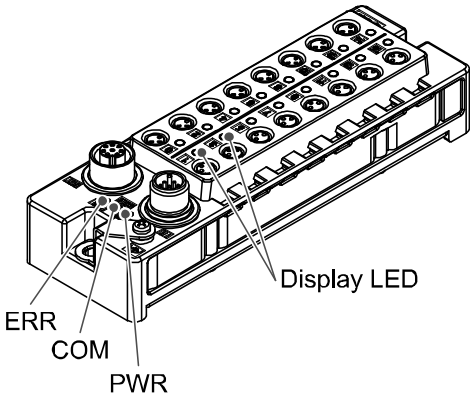


The mounting hole at the branch connector side is connected to the ground terminal using the grounding bracket.

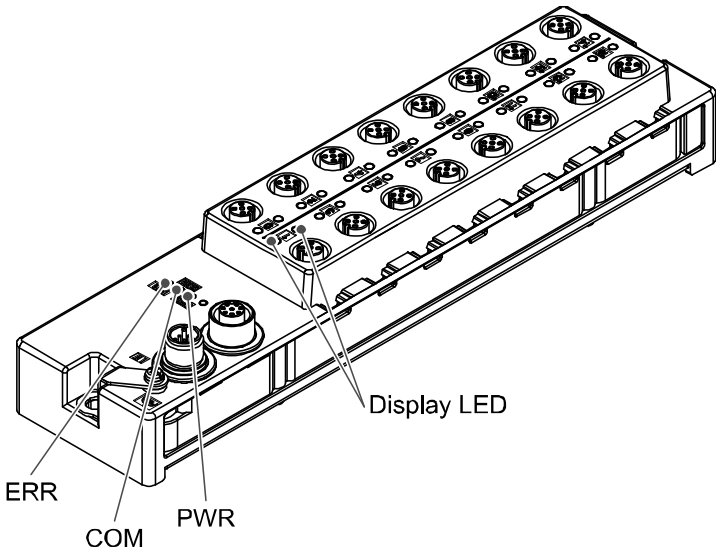
NOTE
Connect the FE terminal to ground.

LED Display

•EX500-DXPA



•EX500-DXPB



Display	Meaning	
PWR	LED is OFF	The power supply for input and control is OFF
	Green LED is ON	Power supply for input and control is ON
COM	LED is OFF	Communication error between GW unit has occurred
	Green LED is ON	Communication between GW unit is normal
ERR	LED is OFF	Normal operation
	Red LED is ON	Short circuit detection
Display LED	LED is OFF	Sensor signal input is OFF
	Green LED is ON	Sensor signal input is ON

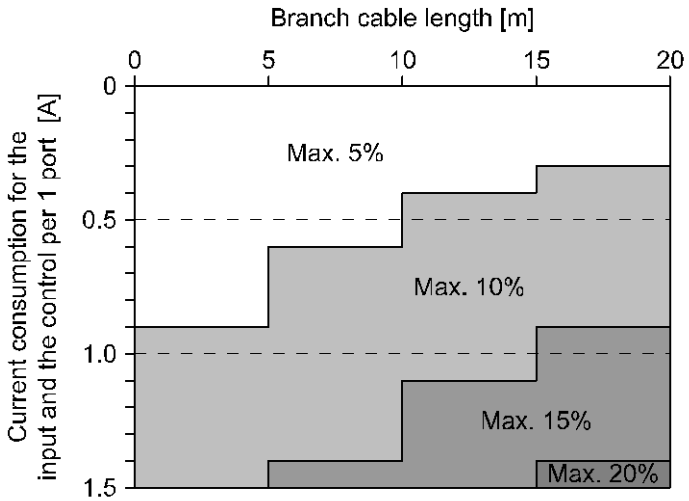
Specification

■Specifications

Item	Specifications
Input type	PNP sensor input
Number of inputs	16
Voltage for input equipment	24 VDC
Current for input equipment	Max. 1.3 A/unit (Total of 8 connectors of even number must be Max. 0.65 A, 8 connectors of odd number must be Max. 0.65 A)
Input ON voltage/input ON current	11 V or more/Typ.7 mA (at 24 VDC)
Input OFF voltage/input OFF current	5 V or less/1.5 mA or less (at 24 VDC)
Rated input current	Approx. 7 mA
Internal current consumption	200 mA or less (when the input signal is ON)
Display	Green LED (Lights when ON)
Sensor connector	EX500-DXPA: M8 connector (3 pin, socket) EX500-DXPB: M12 connector (5 pin, socket)
Short circuit protection	Available
Enclosure rating	IP67
Body material	PBT
Operating temperature range	Operation: -10 to 50 °C, Storage: -20 to 60 °C (No condensation or freezing)
Operating humidity range	Operation, Storage: 35 to 85%RH (No condensation)
Operating atmosphere	No corrosive gas
Standard	CE mark, UL(CSA), RoHS
Weight	EX500-DXPA: 250 g EX500-DXPB: 450 g
System	Gateway distribution system 2 (128 point)

Power supply voltage for input and control

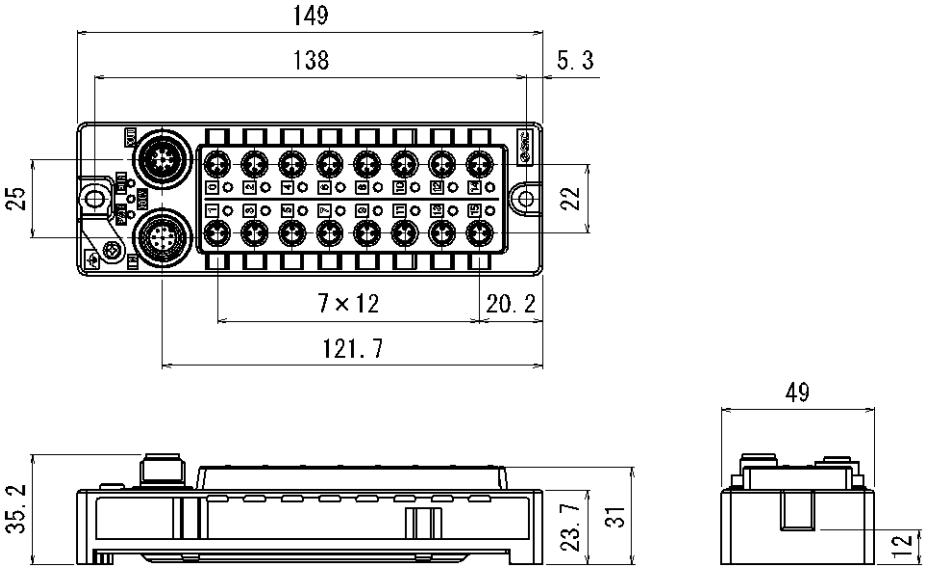
Voltage drop may occur to the source voltage supplied from the input unit to the sensor due to the connected unit, power consumption of the sensor or the length of the branch cable.
Refer to the Guideline of the Voltage Drop of the Power Supply for Input and Control below.



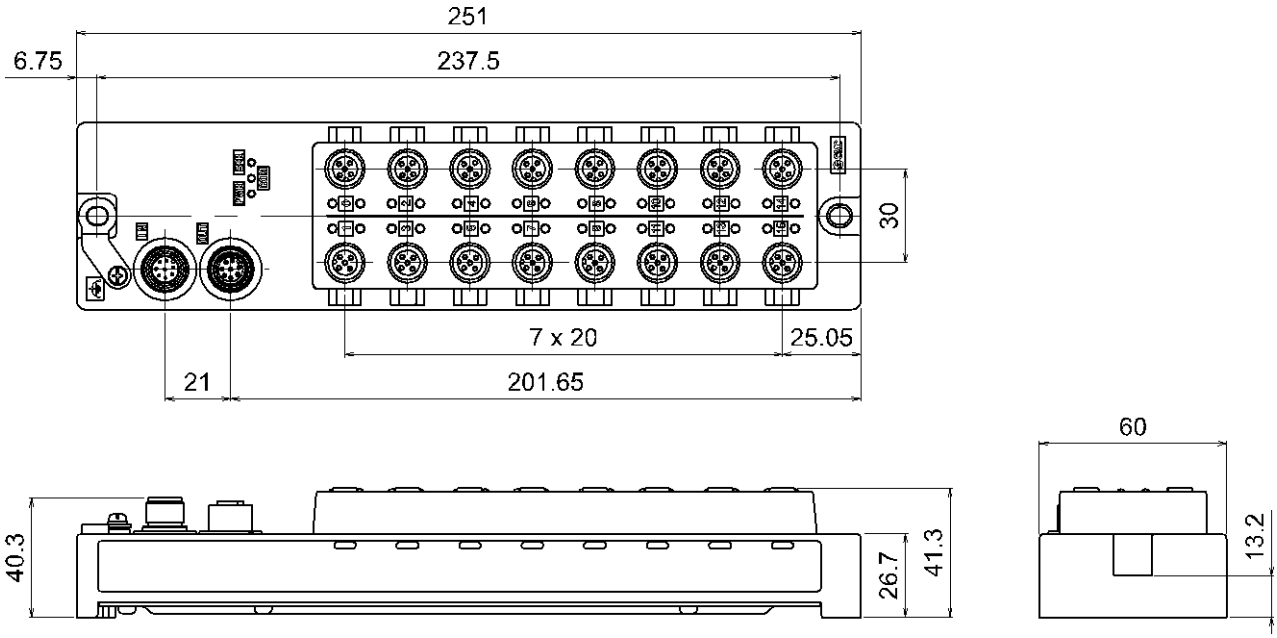
< Guideline of the Voltage Drop of the Power Supply for Input and Control >

■Dimensions

•EX500-DXPA



•EX500-DXPB



Interchangeability of system

Mixed usage Gateway distribution system 2 (128 points) and gateway distribution system (64 points)
EX500-GPN2, EX500-S103, EX500-DXP# are products for gateway distribution system 2 (128 points). Although it is possible to use with existing 64 point gateway distribution system, the operating condition must comply with the specifications of the 64 point gateway system.

		GW unit	
		Gateway distribution system 2 (128 points) •EX500-GEN2 •EX500-GPN2	**Gateway distribution system (64 points)** •EX500-GDN1 •EX500-GPR1A
SI unit Input unit	**Gateway distribution system 2 (128 points)** •EX500-S103 •EX500-DXP#	Usable	Usable ∗:Same specifications of gateway distribution system (64 point)
	Gateway distribution system (64 points) •EX500-S001 •EX500-Q#01 •EEX500-IB1-#	Usable ∗:Same specifications of gateway distribution system (64 point)	Usable

•Specifications of gateway distribution system (64 point)

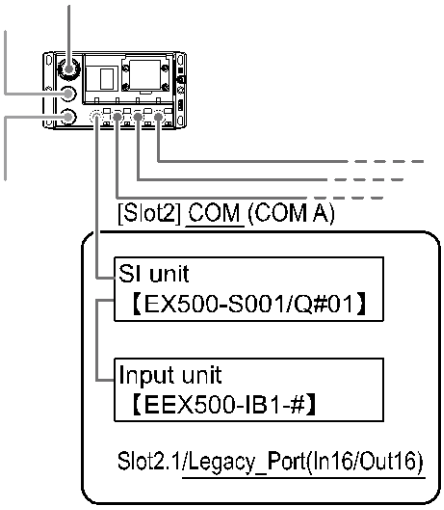
Item		Specifications
Number of inputs and outputs		64 input (16 input per branch) 64 output (16 output per branch)
Number of occupied slave		Max. 8 (Input unit: 1 pc./SI unit: 1 pc. per branch)
Rated current	GW unit	Power supply for input and control: 3.0 A Power supply for Solenoid valve: 3.0 A
	Input unit	Max. 0.5 A/unit
	SI unit	Max. 0.75 A/ unit
Branch cable length		Total length 10 m or less per branch

GW unit using SI unit for 64 point gateway distribution system and input unit.
Use the Legacy_port(In16/Out16) module, when connecting an SI unit and input block from the GW distributed system (64 points).

This module allocates 2 input and 2 output bytes for the corresponding branch port.

Module	Occupied bytes		Allowable slots	Model number
	Inputs	Outputs		
Legacy_Port(In16/Out16)	2	2	Slot2.1/3.1/4.1/5.1	EX500-S001 EX500-Q#01 EEX500-IB1-#

Example of a configuration



Slot	Module	Input bytes	Output bytes
Slot1	Port Diagnostics	2	-
Slot2 (COM A)	COM	-	-
2.1	Legacy_Port (In16/Out16)	2	2
2.2			
2.3			
2.4			
Slot3 (COMB)	COM	-	-
:	:	:	:
:	:	:	:

NOTE
If a slot contains an "Legacy_Port (In16/Out16)" module, it's not possible to add any further modules from the hardware catalogue screen.

•Diagnostic data

Slot	Input data								Meaning
	MSB			LSB	MSB			LSB	
	15			8	7			0	
0	Fixed 0					COM_D	COM_C	COM_B	COM_A	Port diagnosis (Legacy_Port)

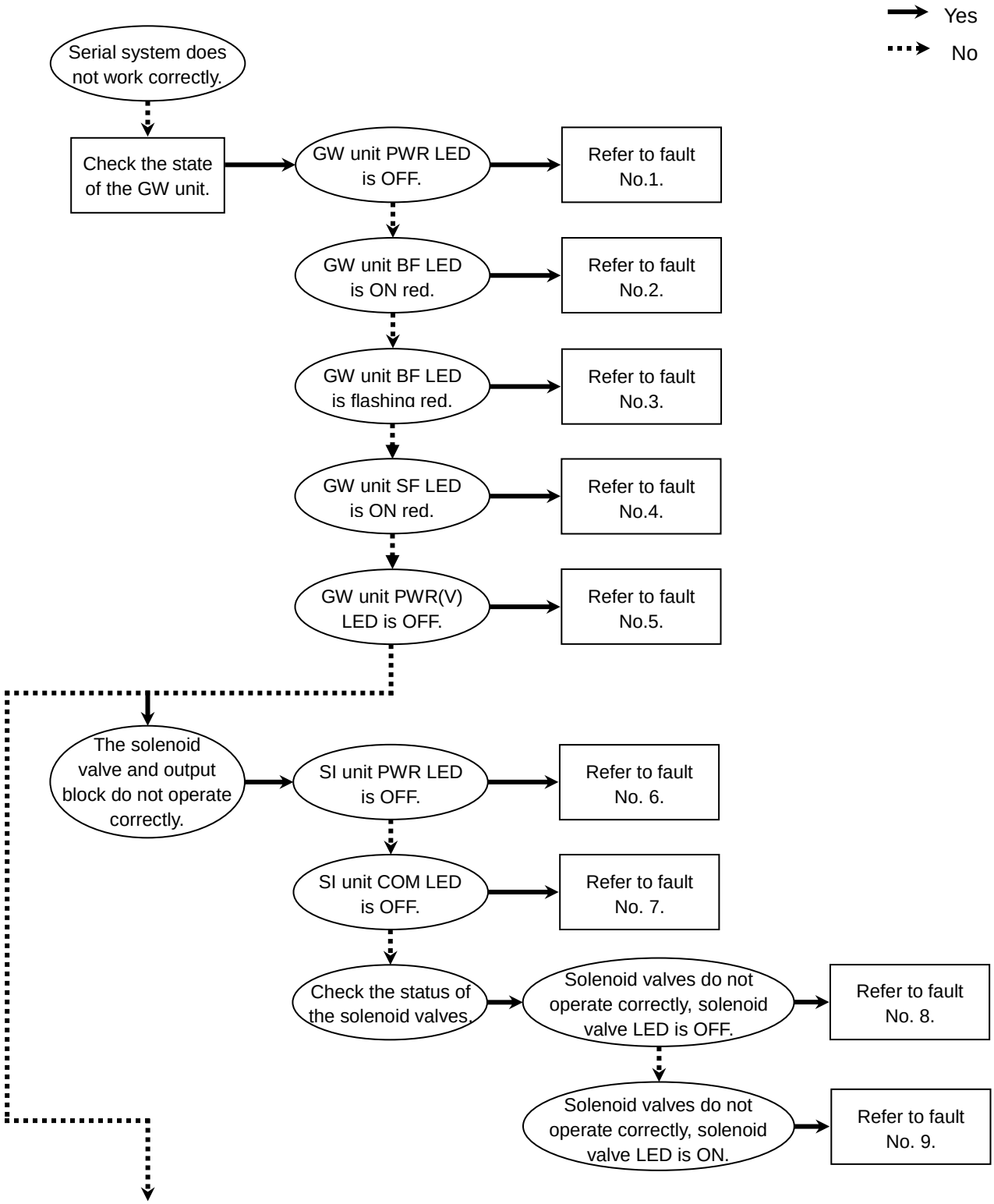
< COM_A – COM_D port condition >

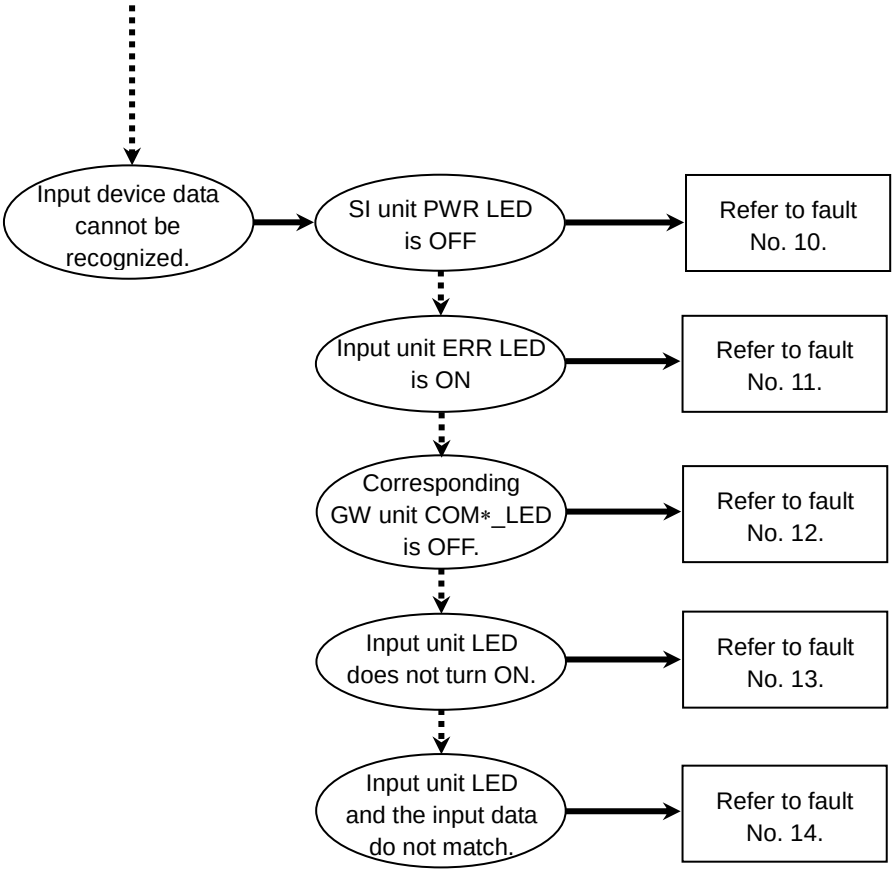
Value	Status
0	Connection port
1	Not connected

Troubleshooting

Troubleshooting flow chart

When any serial system failure occurs, perform the following trouble shooting.




Input device data cannot be recognized.
SI unit PWR LED is OFF
Refer to fault No. 10.
Input unit ERR LED is ON
Refer to fault No. 11.
Corresponding GW unit COM∗_LED is OFF.
Refer to fault No. 12.
Input unit LED does not turn ON.
Refer to fault No. 13.
Input unit LED and the input data do not match.
Refer to fault No. 14.

Troubleshooting

Fault No. 1

Fault	Possible cause	Investigation method	Countermeasures
GW unit PWR LED is OFF.	Wiring of the power supply for input and control is defective	Check the power supply cable connections and check for broken wires.	Tighten the power supply cable connection. (if there is a broken wire, replace the cable).
			Correct the power cable wiring layout.
	Incorrect power supply for input and control	Check the supply voltage for input and control.	Supply 24 VDC ±10% to the power supply for control and inputs of the product.

Fault No. 2

Fault	Possible cause	Investigation method	Countermeasures
GW unit BF LED is ON red	No Link on Port1 and Port2	Check the communication cable connections and check for broken wires.	Tighten the communication cable connection. (if there is a broken wire, replace the cable)
		Check the communication cable connections and check for broken wires.	Tighten the communication cable connection. (if there is a broken wire, replace the cable)
		Check if the PLC is operating normally.	Review the setting of PLC.

Fault No. 3

Fault	Possible cause	Investigation method	Countermeasures
GW unit BF LED is flashing red	Communication failure of the PROFINET	Check the Device name setting.	Set the Device name so that it is not duplicated.
		Check the communication cable connections and check for broken wires.	Tighten the communication cable connection. (if there is a broken wire, replace the cable)
		Check that there is no noise source or high voltage line around the PROFINET cables and power cables.	Separate the communication and power supply cables away from noise sources.
		Check if the PLC is operating normally.	Review the setting of PLC.

Fault No. 4

Fault	Possible cause	Investigation method	Countermeasures
GW unit SF LED is ON red.	Diagnostics error detected	Check the meaning of diagnostic error.	Solve the diagnostic error.
	Configuration failure of the PLC	Check the configuration setting of PLC..	Review the configuration setting of PLC

Fault No. 5

Fault	Possible cause	Investigation method	Countermeasures
GW unit PWR(V)_LED is OFF.	Wiring of the solenoid valve power supply is defective.	Check the power supply cable connections and check for broken wires.	Tighten the power supply cable connection. (if there is a broken wire, replace the cable)
			Correct the power cable wiring layout.
	Solenoid valve power supply failure	Check proper supply voltage of solenoid valve power supply.	Power supply for solenoid valves: 24 VDC +10%/-5%

Fault No. 6

Fault	Possible cause	Investigation method	Countermeasures
SI unit PWR LED is OFF.	Power supply for input and control: 24 VDC ±10%	Check the branch cable connections and check for broken wires.	Tighten the branch cable connection. (if there is a broken wire, replace the cable)

Fault No. 7

Fault	Possible cause	Investigation method	Countermeasures
SI unit COM LED is OFF.	Communication failure of the branch port	Check the branch cable connections and check for broken wires.	Tighten the branch cable connection. (if there is a broken wire, replace the cable)
		Check the wiring length of the branch cable and check that the recommended cable is used.	Review wiring Total length 20 m or less per branch
		Check that there is no high voltage cable or equipment that generates noise around the branch cable.	Separate the branch cable away from noise sources.

Fault No. 8

Fault	Possible cause	Investigation method	Countermeasures
Solenoid valves not operating correctly. Solenoid valve LED is OFF.	Defective connection between the SI unit and solenoid valve manifold.	Check for any loose screws at the connection between the SI unit and the valve manifold.	Same as Investigation method.
	Polarity of the solenoid valve and the SI unit output are not compatible.	Check that the solenoid valve polarity specification and output polarity of the SI unit are compatible.	The solenoid valve polarity specification and output polarity of the SI unit are compatible.
	Solenoid valve failure	Refer to the troubleshooting of the solenoid valve.	Same as Investigation method.

Fault No. 9

Fault	Possible cause	Investigation method	Fault
Solenoid valves not operating correctly. Solenoid valve LED is ON.	Solenoid valve failure	Refer to the troubleshooting of the solenoid valve.	Solenoid valves not operating correctly. Solenoid valve LED is ON.

Fault No. 10

Fault	Possible cause	Investigation method	Countermeasures
Input unit PWR LED is OFF.	Power supply for input and control: 24 VDC ±10%	Check the branch cable connections and check for broken wires.	Tighten the branch cable connection. (if there is a broken wire, replace the cable)

Fault No. 11

Fault	Possible cause	Investigation method	Countermeasures
Input unit ERR LED is ON	Over current power supply for input and control	Check the total current consumption of the input devices such as the sensor used.	Ensure that the total current consumption is within the specified range of the input unit.
			Resolve the short-circuit or over current.
	Power supply short-circuit of the input devices used	Check the input devices used, and check the wiring to the input devices. Refer to the input device operation manual troubleshooting section, or contact the input device manufacturer.	Same as Investigation method.
		Check the troubleshooting of input equipment Or, confirm with the manufacturer of the input equipment.	

Fault No. 12

Fault	Possible cause	Investigation method	Countermeasures
Corresponding GW unit COM ∗LED is OFF.	Communication failure of the branch port	Check the branch cable connections and check for broken wires.	Tighten the branch cable connection. (if there is a broken wire, replace the cable)
		Check the wiring length of the branch cable and check that the recommended cable is used.	Revise the wiring length: Total length 20 m or less per branch Exclusive cables: EX500-AC□□□-S□P□
		Check that there is no high voltage cable or equipment that generates noise around the branch cable.	Separate the branch cable away from noise sources.

Fault No. 13

Fault	Possible cause	Investigation method	Countermeasures
Input unit display LED does not turn ON.	Polarity of the input unit and input device including sensor are not compatible.	Check that the polarity of the input unit and the input device are compatible.	Use an input device polarity compatible with the polarity of the input unit.
	Defective connection between the input unit and input device.	Check the input device connection and wiring (pin layout) and check for broken wires.	Tighten the cable connection. (Replace the cable if it is broken.)
			Rectify the wiring of the input device cable.
	Malfunction of input unit	-	Contact your sales representative.

Fault No. 14

Fault	Possible cause	Investigation method	Countermeasures
Input unit display LED and the input data do not match.	Communication failure of the branch port	Check the wiring length of the branch cable and check that the recommended cable is used.	Review wiring Total length 20 m or less per branch
		Check that there is no high voltage cable or equipment that generates noise around the branch cable.	Separate the branch cable away from noise sources.
	Malfunction of input unit	-	Contact your sales representative.

Accessories

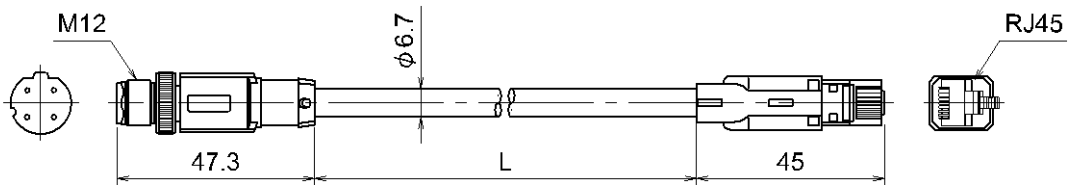
(1) Ethernet communication connector cable

How to Order: EX9-AC 020 EN-PSRJ

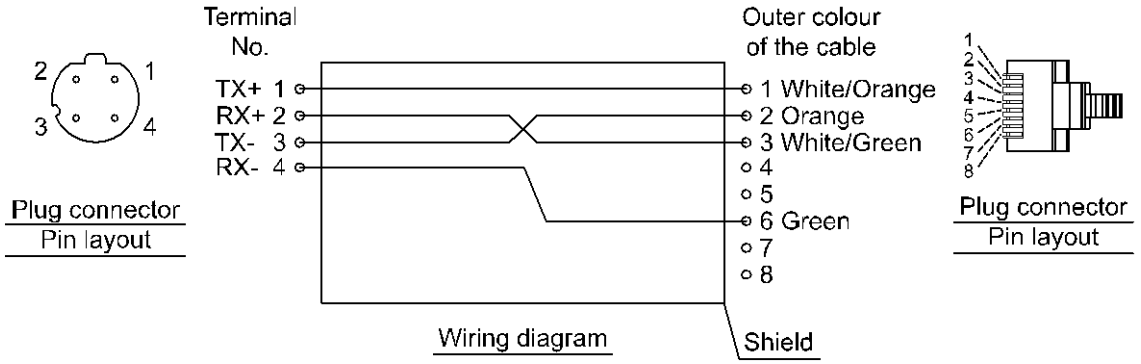
Cable length (L) ● ● Connector specification

010	1 m
020	2 m
030	3 m
050	5 m
100	10 m

M12 RJ45



With M12 socket connector
EX9-AC□EN-PSRJ



Plug connector
Pin layout

Wiring diagram

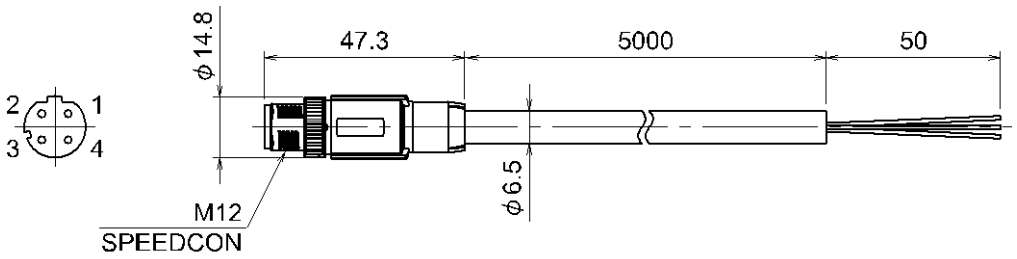
Plug connector
Pin layout

Item	Specifications
Cable O.D.	ϕ6.7 mm
Min. bending radius	34 mm

How to Order: PCA-1446566

Cable specification

With M12 plug connector (one side): 5 [m]



M12 plug connector

PCA-1446566

Item	Specifications
Cable O.D.	ϕ6.5 mm
Nominal cross section	AWG22
Wire diameter (Including insulator)	ϕ1.5 mm
Min. bending radius	45.5 mm

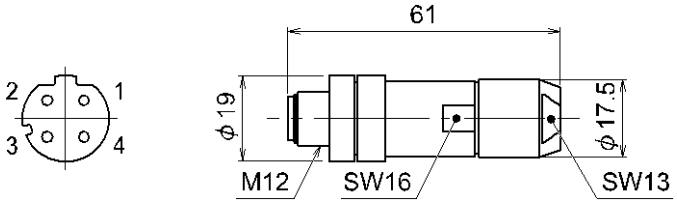
Pin No.	Cable color: Signal
1	Yellow: TX+
2	White: RX+
3	Orange: TX-
4	Blue: RX-

(2) Assembly type communication connector for Ethernet

How to Order: PCA-1446553

Connector specification

M12 plug connector



Applicable cable

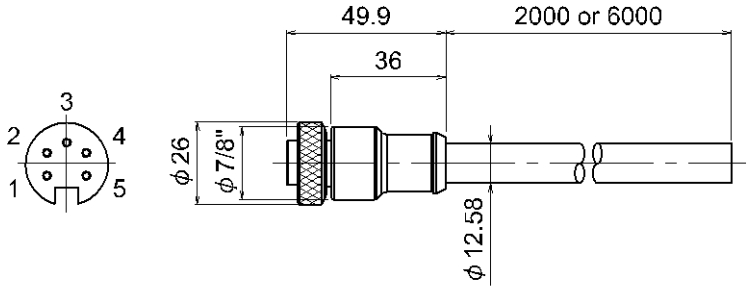
Item	Specifications
Cable O.D.	ϕ4.0 to 8.0 mm
Electric wire cross section (Twist line)	AWG26 to 22

(3) Cable with 7/8 inch connector for power supply.

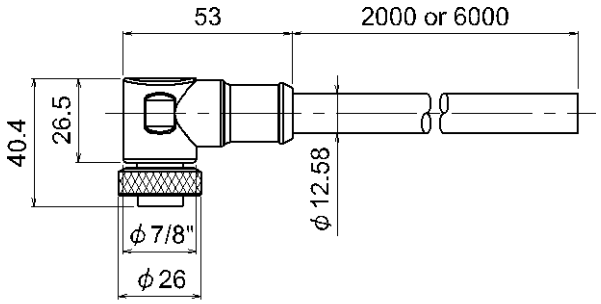
How to Order: PCA-1558810

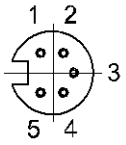
Cable specification

1558810	Straight: 2 m
1558823	Straight: 6 m
1558836	Angle: 2 m
1558849	Angle: 6 m



Straight connector type
2 m: PCA-1558810
6 m: PCA-1558823





Angled connector type
2 m: PCA-1558836
6 m: PCA-1558849

Item	Specifications
Cable O.D.	Φ12.6 mm
Nominal cross section	AWG16
Min. bending radius	110 mm (When fixed)

Pin No.	Cable color : Signal
1	Red/White : 0 V(For solenoid valves)
2	Red :0 V(For inputs and control)
3	Green : FE
4	Red/Orange: 24 VDC(For inputs and control)
5	Red/Black : 24 VDC(For solenoid valves)

(4) Branch cable with M12 connector

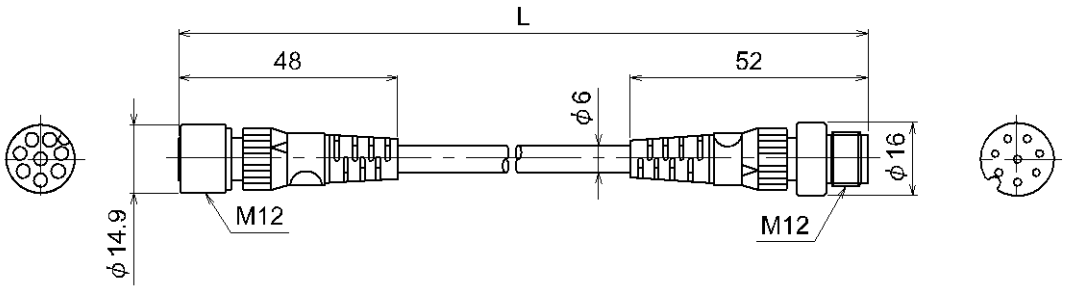
How to Order: EX500-AC 030 - SSPS

Cable length (L)

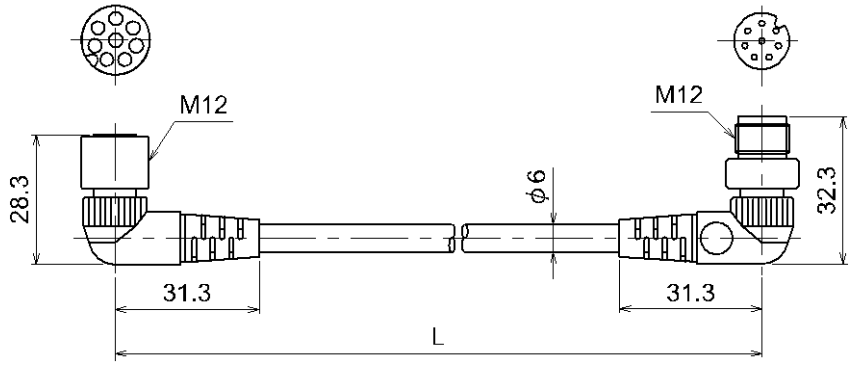
003	0.3 m
005	0.5 m
010	1 m
030	3 m
050	5 m
100	10 m

Connector specification

SSPS	Socket side: Straight, Plug side: Straight
SAPA	Socket side: Angled, Plug side: Angled



Straight connector type
EX500-AC□-SSPS



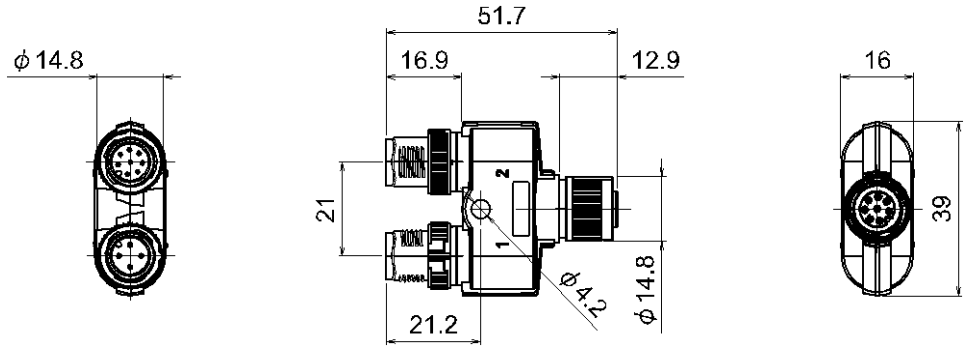
Angled connector type
EX500-AC□-SAPA

L = 300, 500, 1000, 3000, 5000, 10000 (mm)

Item	Specifications
Cable O.D.	ø6 mm
Min. bending radius	40 mm (When fixed)

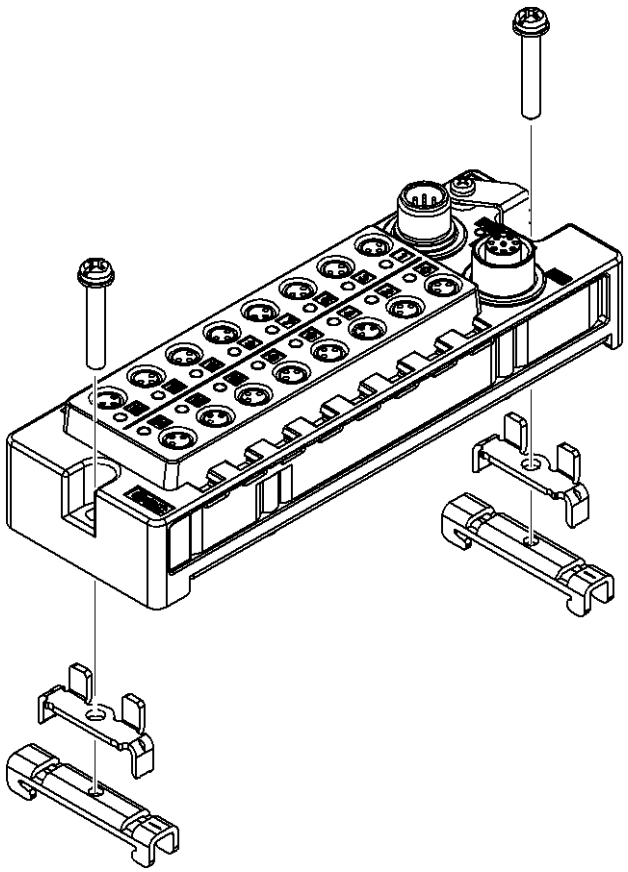
(5) Y branch connector
Connector to provide a separate power supply to SI unit valve.

How to Order: EX500-ACY01-S



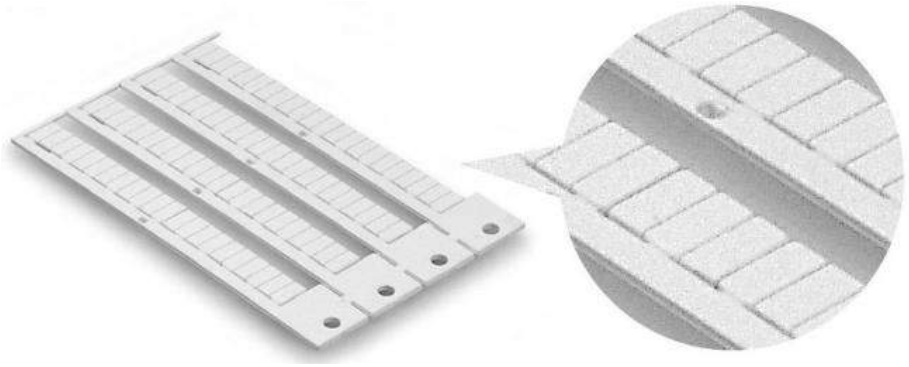
(6) DIN rail bracket (2 pcs.)
Bracket for mounting the input unit to DIN rail.

How to Order: EX500-ZMA1



(7) Marker (1 sheet, 88 pcs.)
The signal name of the input device and unit address can be written on the marker, and can be installed to each unit.

How to Order: EX600-ZT1

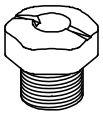


(8) Seal cap
Mount the seal cap in the unused ports of the GW unit and input unit.
IP65/67 is satisfied by using the seal cap properly.
(The seal cap is provided with each product.)

How to Order: EX9-AW□

• Connector specification

ES	M8, connector (for socket): 10 pcs.
TS	M12, connector (for socket): 10 pcs.



NOTE
Tighten the seal caps to the tightening torque specified.
(For M8: 0.05 Nm, M12: 0.1 Nm)

Revision history

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URL http://www.smcworld.com

NOTE: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
EX500-GPN2 uses FreeRTOS (see www.freertos.org)
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No.EX※※-OMT0009