DIGITAL

Human Machine Interface

Pro-face®

Flex Network
DIO Unit
User Manual

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Preface

Thank you for purchasing Pro-face's Flex Network DIO units, hereafter referred to as the "Unit".

The unit is designed to be used with Pro-face's Graphical Logic Controller (GLC) Series, LT Series, and GP3000 Series FLEX NETWORK board type (hereafter referred to as "GLC") as a remote I/O system.

This manual explains the overall features and specifications of the Unit, as well as its installation procedures.

Please be sure to read this manual thoroughly to understand the correct and safe usage of this product and its features.

<Note>

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2) The information provided in this manual is subject to change without notice.

3) This manual has been written with care and attention to detail; however, should you find any errors or omissions, please contact Digital Electronics Corporation and inform us of your findings.

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Essential Safety Precautions

This guide contains a variety of safety markings for safe and correct operation of this Unit. Please read this installation guide and any related manuals carefully to fully understand how to correctly use this Unit's functions.

■ Safety Symbols

Please pay attention to these symbols and follow all instructions given.

The safety symbols and their meanings are as follows:

⚠ **DANGER**	Indicates situations where severe bodily injury, death or major machine damage will definitely occur.
⚠ **WARNING**	Indicates situations where severe bodily injury, death or major machine damage can possibly occur.
⚠ CAUTION	Indicates situations where slight bodily injury or machine damage can occur.

⚠ DANGERS

- **An emergency stop circuit and an interlock circuit should be constructed outside of this Unit. Constructing these circuits inside a system that uses this Unit may cause a runaway situation, system failure, or an accident due to unit failure.**

- **Systems using this Unit should be designed so that output signals which could cause a serious accident are monitored from outside the Unit.**

- **This Unit is designed to be a general-purpose device for general industries, and is neither designed nor produced to be used with equipment or systems in potentially life-threatening conditions. If you are considering using this Unit for special uses, including nuclear power control devices, electric power devices, aerospace equipment, medical life support equipment, or transportation vehicles, please contact your local Pro-face distributor.**

⚠ WARNINGS

- **Prior to installing, removing, wiring, and conducting maintenance or inspections, be sure to disconnect power to this Unit to prevent an electric shock or fire.**
- **Do not disassemble or remodel this Unit, since it may lead to an electric shock or fire.**
- **Do not use this Unit in an environment that contains flammable gases since an explosion may occur.**
- **Do not use this Unit in an environment that is not specified in either the Installation Guide or User Manual. Otherwise, an electric shock, fire, malfunction or other failure may occur.**
- **Due to the possibility of an electric shock or malfunction, do not touch this Unit's power terminals it is operating.**

⚠ CAUTIONS

- **Communication cables or I/O signal lines must be wired separately from the main circuit (high-voltage, large-current) line, high-frequency lines such as inverter and power lines. Otherwise, a malfunction may occur due to noise.**
- **This Unit must be installed according to directions given in its Installation Guide and User manual. Improper installation may cause the Unit to malfunction or fail.**
- **This Unit must be wired according to directions in the Installation Guide and User Manual. Improper wiring may cause a malfunction, failure or electric shock.**
- **Do not allow foreign substances, including chips, wire pieces, water, or liquids to enter inside this Unit's case. Otherwise, a malfunction, failure, electric shock, or fire may occur.**
- **When disposing of this Unit, it should be processed according to your country's industrial waste disposal laws.**

General Precautions

■ To Prevent Unit Damage

- Avoid storing or operating this Unit in either direct sunlight or excessively dusty or dirty environments.

- Because this Unit is a precision instrument, do not store or use it in locations where excessive shocks or vibration may occur.

- Avoid covering this Unit's ventilation holes, or operating it in an environment that may cause it to overheat.

- Avoid operating this Unit in locations where sudden temperature changes can cause condensation to form inside the Unit.

- Do not use paint thinner or organic solvents to clean this Unit.

Documentation Conventions

The list below describes the documentation conventions used in this manual.

Symbol	Meaning
⚠️ **Important**	Indicates important information or procedures that must be followed for correct and risk-free software/device operation.
*1	Indicates useful or important supplemental information.
1) , 2)	Indicates steps in a procedure. Be sure to perform these steps in the order given.
▼Reference▲	Refers to useful or important supplemental information.
Note:	Provides useful or important supplemental information.
GLC	Generic name for the "GLC Series" of Graphic Logic Controllers made by Pro-face. In this manual, it also indicates "LT Series" and "GP3000 Series FLEX NETWORK board type".

Flex Network Unit Models

Flex Network Units allow the GLC to communicate via a Flex Network system. The available Flex Network Unit model numbers are shown below.

Product Family	Unit Name	Model No.	Nodes Required	Manual
Flex Network	I/O Unit	FN-X16TS41	1	This Manual
		FN-X32TS41	2	
		FN-Y16SK41	1	
		FN-Y16SC41	1	
		FN-XY08TS41	1	
		FN-XY16SK41	1	
		FN-XY16SC41	1	
		FN-XY32SKS41	4	
		FN-Y08RL41	1	
	Analog Unit	FN-AD02AH41	1	2-Cannel Analog Unit User Manual
		FN-DA02AH41	1	
		FN-AD04AH11	4	Analog Unit User Manual
		FN-DA04AH11	4	
	Single-Axis Positioning Unit	FN-PC10SK41	4	Single-Axis Positioning Unit User Manual
		FN-PC10LD41	-	
	High-Speed Counter Unit	FN-HC10SK41	8	High-Speed Counter Unit User Manual

Compatible GLC Units

The following GLC units can be used with the Flex Network units. (GLC, LT , and GP are referred to collectively as the "GLC" in this manual.)

Product Family	Series Name		Unit Name	Model No.
GLC	GLC2000 Series	GLC2300 Series	GLC2300T	GLC2300-TC41-24V
			GLC2300L	GLC2300-LG41-24V
		GLC2400 Series	GLC2400T	GLC2400-TC41-24V
		GLC2500 Series	GLC2500T	GLC2500-TC41-24V
				GLC2500-TC41-200V
		GLC2600 Series	GLC2600T	GLC2600-TC41-24V
				GLC2600-TC41-200V
LT	LT Series		LT TypeB	GLC150-BG41-FLEX-24V
			LT Type B+	GLC150-BG41-XY32KF-24V
			LTC Type B+	GLC150-SC41-XY32KF-24V
			LT Type C	GLC150-BG41-RSFL-24V
GP	GP3000 Series	GP-3300 Series	AGP-3300L	AGP3300-L1-D24-FN1M
			AGP-3300T	AGP3300-T1-D24-FN1M
		GP-3400 Series	AGP-3400T	AGP3400-T1-D24-FN1M
		GP-3500 Series	AGP-3500T	AGP3500-T1-D24-FN1M
				AGP3500-T1-AF-FN1M
		GP-3600 Series	AGP-3600T	AGP3600-T1-D24-FN1M
				AGP3600-T1-AF-FN1M

Driver

The driver for the Flex Network Unit is required in order to use the unit.

For GLC2000 series and LT series,

You can select the Flex Network Driver via GP-PRO/PBIII C-Package (Pro-Control Editor) or LT Editor.

If the selection of the appropriate unit's name does not appear in the [I/O Configuration] - [I/O Unit Settings] area, you will need to update the driver file.

You can download the latest driver from Pro-face's web site.

URL :http://www.pro-face.com/

For GP3000 Series,

You can select the Flex Network Driver via GP-Pro EX as an I/O driver.

1 The LT Type A unit is not compatible with the Flex Network.

UL/c-UL(CSA) Approval

The following Flex Network Units are UL/c-UL (CSA) approved.

- FN-X16TS41 (UL File No. E 195835)
- FN-XY08TS41 (UL File No. E 195835)
- FN-Y08RL41 (UL File No. E 195835)
- FN-Y16SK41 (UL File No. E 195835)
- FN-Y16SC41 (UL File No. E 195835)
- FN-X32TS41 (UL File No. E 220851)
- FN-XY16SK41 (UL File No. E 220851)
- FN-XY16SC41 (UL File No. E 220851)
- FN-XY32SKS41 (UL File No. E 220851)

These Units conform to the following standards:

◆ **UL508**

Industrial Control Equipment

◆ **CAN/CSA-C22.2, No. 1010.1**

Safety requirements for electrical equipment for measurement and laboratory use.

FN-X16TS41 (UL Registration Model: 2880063-02)

FN-XY08TS41 (UL Registration Model: 2880063-03)

FN-Y08RL41 (UL Registration Model: 2880063-04)

FN-Y16SK41 (UL Registration Model: 2880063-05)

FN-Y16SC41 (UL Registration Model: 2880063-06)

FN-X32TS41 (UL Registration Model: 3080039-01)

FN-XY16SK41 (UL Registration Model: 3080039-02)

FN-XY16SC41 (UL Registration Model: 3080039-03)

FN-XY32SKS41 (UL Registration Model: 3080057-01)

<Cautions>

- This Unit must be used as a built-in component of an end-use product.

- If this Unit is installed so as to cool itself naturally, be sure to install it on a vertical DIN rail or to a vertical panel via attachment holes. Also, be sure that this Unit is mounted at least 100 mm away from any adjacent structures or equipment. If these requirements are not met, the heat generated by this Unit's internal components may cause the Unit to fail to meet UL/c-UL standard requirements.

- Any power supply device connected to the Unit should be a UL/c-UL(CSA) approved Class 2 power supply or Class 2 transformer. [*1]

  Single unit power supplies, when connected to this Unit, multiple Flex Network units or when driving a load, should be designed so that the total power consumption of the Flex Network unit(s) and the total load current meets the standards for a Class 2 power supply, or a Class 2 power transformer.

  Also, be aware that the number of load producing points, and the load current value will determine the number of output points that can be simultaneously turned ON.

CE Marking

■ Flex Network I/O Units

The following Flex Network Units are CE marked products that conform to EMC directives EN55011 Class A and EN61000-6-2.

[Compatible Units]

FN-X16TS41[*2],   FN-XY08TS41[*2], FN-Y08RL41[*2],   FN-Y16SK41[*2],
FN-Y16SC41[*2],   FN-X32TS41,   FN-XY16SK41,   FN-XY16SC41
FN-XY32SKS41

<Cautions>

Even though the GLC meets the abovementioned EMC standards, if it is installed into another piece of machinery, that machinery's installation, wiring or positioning method(s) used may cause the GLC to fail to meet the designated EMC standard. Therefore, the combination of the GLC and this machinery may need to be re-tested, as a final, complete unit.

* For detailed CE marking information, please contact your local Pro-face distributor.

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*1 *The National Electrical Code states that Class 2 power supplies and Class 2 transformers should not exceed an output of 30V, and at 8A or less, should not exceed 100VA.*

*2 *A CE Marked unit that conforms to EMC directives EN61131-2. Applies to selected low voltages directives.*

Chapter

1 Introduction

This chapter explains the standard system design for the Flex Network unit, and the types of units available.

1.1   System Design

The following information explains how to connect the GLC's built-in Flex Network I/F to an Flex Network Unit.

For wiring details, ▼**Reference**◣ *3.2 Wiring*

When connecting the Flex Network unit, 2 channels are available - CH1 and CH2. Each channel outputs the same data and either can be used for data transmission.

The maximum number of connectable units, when using a single channel, is 31, and when using a second channel, the number increases by 32 to a total of 63.
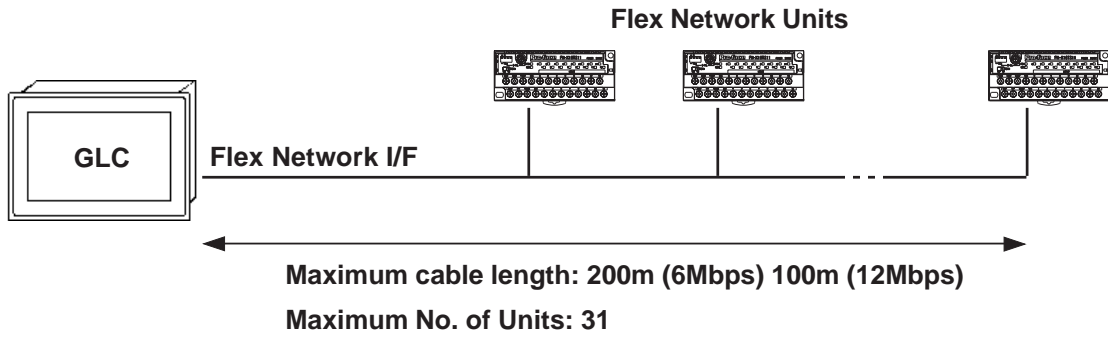
⚠ **Important**

The Flex Network uses high speed data transfer technology, and if a is cable used for data transfer that is not the same as that specified in this document, network data transfer performance cannot be guaranteed. Thus, be sure to use only the cable(s) recommended here.

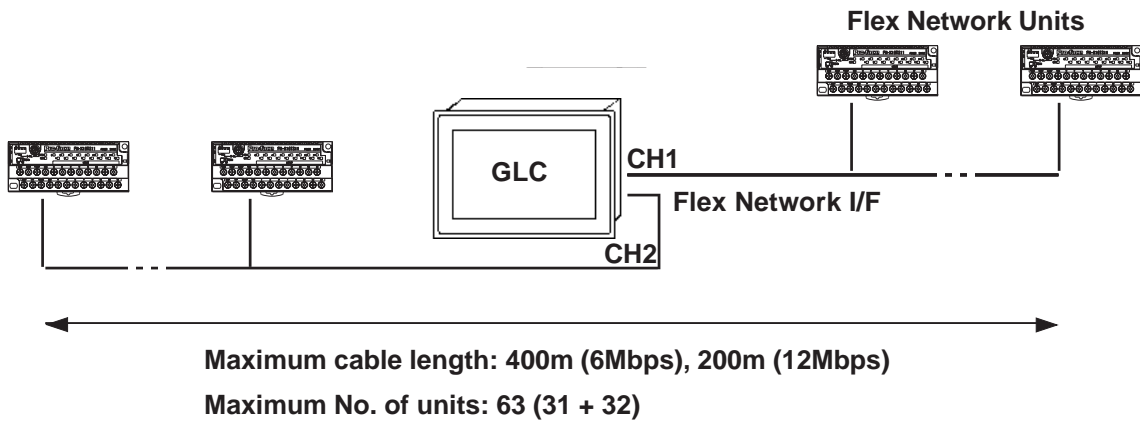▼**Reference**◣ *3.2.1 Connecting the Flex Network Data Transfer Cable*

• ***When turning the entire system's power ON, turn on the Flex Network unit's power supply before turning on the GLC's power.***

• ***The no. of exclusive use nodes required will depend on the type of Flex Network unit(s) used. Be sure that your system's design recognizes the number of nodes required by the Flex Network unit(s).***

▼**Reference**◣ *Flex Network Unit Models*

■ **With One (1) Channel**

Flex Network Units

GLC   Flex Network I/F

Maximum cable length: 200m (6Mbps) 100m (12Mbps)

Maximum No. of Units: 31

■ **With Two (2) Channels**

Flex Network Units

GLC   CH1

Flex Network I/F

CH2

Maximum cable length: 400m (6Mbps), 200m (12Mbps)

Maximum No. of units: 63 (31 + 32)

Note: **When using two channels, up to 32 nodes can be connected to either channel.**

■ Standard System Design
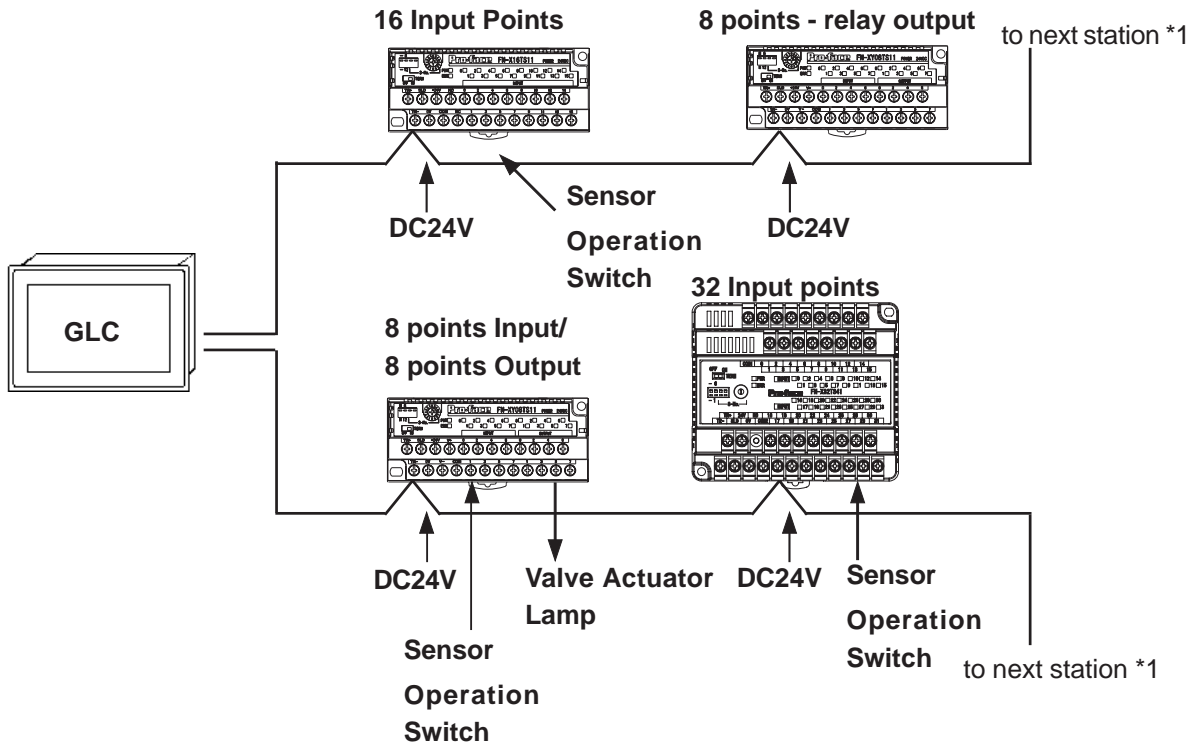
1.2 Accessories

All optional equipment listed here is sold separately.

■ Optional Items

Item	Model No.	Description
Flex Network Communication Cable	FN-CABLE 2010-31-MS (10m)	Connect GLC units with Flex Network units.
	FN-CABLE 2050-31-MS (50m)	
	FN-CABLE 2200-31-MS (200m)	

■ Maintenance Items

Item	Model No.	Description
DIO Connector (Spring Type)	GLC-DIOCN03	Connectors (terminal screws) for "FN-XY32SKS41" units. Easy-to-use spring-clamp type. (no screws)

Chapter

2   Specifications

2.1   General Specifications

2.1.1 Electrical

	FN-X16T S11/ FN-X16T S41 FN-XY08T S11/FN-XY08T S41 FN-Y16SK41/ FN-Y16SC41	FN-Y08RL11 FN-Y08RL41	FN-X32T S41 FN-XY16SK41 FN-XY16SC41	FN-XY32SKS41
Rated Voltage	DC24V			
Rated Voltage Range	DC20.4V to DC28.8V			
Allowable Voltage Interruption	10ms or less (Power Supply: DC24V)			
Power Consumption	1.5W or less	1W or less	2.5W or less	3.5W or less
Voltage Endurace	AC1500V 10mA for 1min. (between power/Input and Output, and FG terminals)		AC500V 10mA for 1 min. (between power/ Input and Output, and FG terminals)	
Insulation Resistance	DC500V at 10MΩ or higher (between power/Input and Output, and FG terminals)			
In-rush Current	30A or less			15A or less

2.1.2 Environmental

	FN-X16TS41 FN-XY08TS41 FN-Y16SK41 FN-Y16SC41 FN-Y08RL41	FN-X32TS41 FN-XY16SK41 FN-XY16SC41 FN-XY32SKS41
Operating Temperature	0^oC to 55^oC	
Storage Temperature	-25^oC to $+70^oC$	
Operating Humidity	5%RH to 95%RH (non-condensing) (wet bulb temperature: less than 39°C)	
Storage Humidity	5%RH to 95%RH (non-condensing) (wet bulb temperature: less than 39°C)	
Air Purity (Dust)	$0.1mg/m^3$ or less (non-conductive levels)	
Pollution Degree	Pollution Degree 2	
Corrosive Gasses	Free of corrosive gasses	
Vibration Endurance	5Hz to 55Hz $60m/s^2$ (in X,Y,Z directions for 2 hours each)	IEC61131-2 (JIS B 3501) compliant When vibration IS NOT continuous: 10Hz to 57Hz 0.075mm, 57Hz to 150Hz $9.8m/s^2$ When vibration IS continuous: 10Hz to 57Hz 0.035mm, 57Hz to 150Hz $4.9m/s^2$ X,Y,Z directions for 10 times (80 min.)
Shock Endurance	$300m/s^2$ (for 10ms in X,Y, Z directions - 3 times each)	IEC61131-2 (JIS B 3501) compliant $147 m/s^2$ (for 11ms in X, Y, Z directions - 2 times each)
Noise Immunity (via noise simulator)	Noise Voltage: 1,000Vp-p, Pulse Duration: $1\mu s$, Rise Time: 1ns	
Electrostatic Discharge Immunity	6kV (IEC61000-4-2, RH-1/ESD-3)	

2.1.3 Structural

	FN-X16TS41 FN-XY08TS41 FN-Y16SK41 FN-Y16SC41 FN-Y08RL41	FN-X32TS41 FN-XY16SK41 FN-XY16SC41	FN-XY32SKS41
Attachment Method	via 35mm DIN rail or by attachment screws		
Cooling Method	Natural air circulation		
Weight	150g or less	350g or less	
External Dimensions	W 108mm [4.25in.] x H 45mm [1.77in.] x D 49mm [1.93in.]	W 110mm [4.33in.] x H 95mm [3.74in.] x D 57mm [2.24in.]	W 135mm [5.31in.] x H 95mm [3.74in.] x D 46mm [1.81in.]
Rating	IP20[*1]		IP20 (without terminal block)

*1 With terminal block attached.

2.2 Performance Specifications

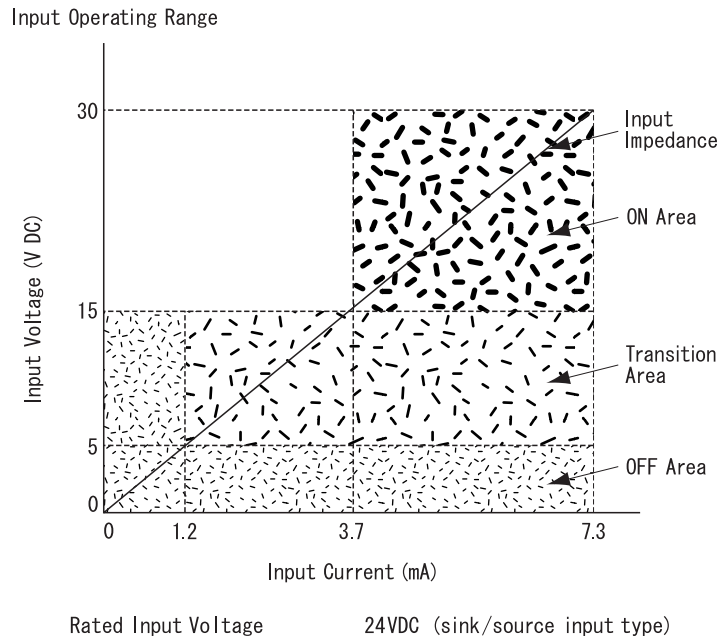## 2.2.1 Data Transfer Settings

■ Flex Network Data Transfer Settings

	GLC2000/LT Series	GP3000 Series
Communication Type	1:N	
Connection Method	Multi Drop	
Transfer Distance	At 6Mbps 200m per CH, at 12Mbps100m per CH	
Transfer Method	During cyclic period, distributed transmission, Half-duplex	
Transfer Speed	6Mbps, 12Mbps	
Transfer I/F	Differential method, Pulse transfer resistance	
Error Check	Format check, bit check, CRC-12 check	
No. of Stations	63 (max.), 1008 I/O points (depending on type of units used.)	63 stations max., Bit variable input: 256 points, Bit variable output: 256 points, Integer variable input: 64 points, Integer variable output: 64 points (depending on type of units used.)

2.2.2   Flex Network Unit Input/Ouput

■ 16 Point Input Sink/Source type (FN-X16TS41)

Rated Input Voltage		DC24V
Max. Input Voltage		DC28.8V
No. of Input Points		16 points (sink/source type - dual use)
No. of Common		1
Input Type		Type 1 [*1]
Input ON Voltage		DC15V or higher
Input OFF Voltage		DC5V or less
Input Impedance		4.1kΩ
Isolation Method		Photocoupler Isolation
Input Delay	OFF-ON	1.5ms or less
	ON-OFF	1.5ms or less
No. of Exclusive Use Nodes		1

1 Digital input is for detecting signals from mechanical switching devices such as relay contacts, push buttons, switches, etc.
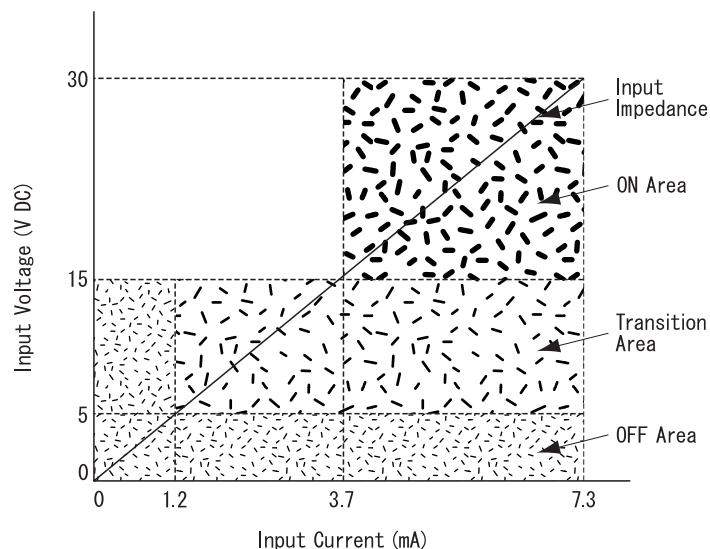

Rated Input Voltage   24VDC (sink/source input type)

■ 8 Point Input Sink-Source /8 Point Transistor Output Sink Type (FN-XY08TS41)

I N P U T	Rated Input Voltage	DC24V
	Max. Input Voltage	DC28.8V
	No. of Input Points	8 points (sink/source type - dual use)
	No. of Common	1
	Input Type	Type 1[*1]
	Input ON Voltage	DC15V or higher
	Input OFF Voltage	DC5V or less
	Input Impedance	4.1kΩ
	Isolation Method	Photocoupler Isolation
	Input Delay — OFF-ON	1.5ms or less
	Input Delay — ON-OFF	1.5ms or less
O U T P U T	Rated Output Voltage	DC24V
	Rated Output Voltage Range	DC20.4V to DC28.8V
	No. of Output Points	8 points (sink type)
	No. of Common	1
	Maximum Load Voltage	0.2A/1 point (8 points/1 common, max. common current:1.6A)
	Isolation Method	Photocoupler Isolation
	Output Protection	None
	Voltage Drop (ON Voltage)	DC1.5V or less
	Clamp Voltage	DC39V +/-1V
	Current Leakage	0.1mA or less
	Output Delay Time — OFF-ON	1ms or less
	Output Delay Time — ON-OFF	1ms or less
	No. of Exclusive Use Nodes	1

1 Digital input is for detecting signals from mechanical switching devices such as relay contacts, push buttons, switches, etc.

Input Operating Range

Rated Input Voltage   24VDC (sink/source input type)

■ 8 Point Relay Output/1 Common Type (FN-Y08RL41)

Rated Output Voltage (from V+ to V-)		DC24V
Rated Output Voltage Range (from V+ to V-)		DC20.4V to DC28.8V
Power Consumption		1.2W or less (when all outputs are ON /DC24V)
No. of Output Points		8 points/1 common
No. of Common		1
Maximum Load Voltage		1.0A/1 point (8 points/1 common - Max. common current 4.0A)
Isolation Method		Relay Isolation
Contact Rating		AC240V, 1A (resistance load, induced load) DC24V, 1A (resistance load, induced load)
Output Delay Time	OFF-ON	10ms or less
	ON-OFF	5ms or less
Min. Open/Close Load		1mA/DC5V
Initial Shorting Resistance		50mΩ or less
Electrical Life		100,000 operations or more
Mechanical Life		20 million operations or more
No. of Exclusive Use Nodes		1

■ 16 Point Output Sink Type (FN-Y16SK41)

Rated Output Voltage (from V+ to V-)		DC24V
Rated Output Voltage Range (from V+ to V-)		DC20.4V to DC28.8V
No. of Output Points		16 points
No. of Common		1
Maximum Load Voltage		0.2A/point (16 points/1 common, max. common current 2.0A)
Isolation Method		Photocoupler Isolation
Output Protection		None
Voltage Drop (ON Voltage)		DC1.5V or less
Clamp Voltage		DC39V +/-1V
Current Leakage		0.1mA
Output Delay Time	OFF-ON	1ms or less
	ON-OFF	1ms or less
No. of Exclusive Use Nodes		1

■ 16 Point Output Source Type (FN-Y16SC41)

Rated Output Voltage (from V+ to V-)	DC24V
Rated Output Voltage Range (from V+ to V-)	DC20.4V to DC28.8V
No. of Output Points	16 points
No. of Common	1
Maximum Load Voltage	0.2A/point (16 points/common, max. common current 2.0A)
Isolation Method	Photocoupler Isolation
Output Protection	None
Voltage Drop (ON Voltage)	DC1.5V or less
Clamp Voltage	DC39V +/-1V
Current Leakage	0.1mA
Output Delay Time — OFF-ON	1ms or less
Output Delay Time — ON-OFF	1ms or less
No. of Exclusive Use Nodes	1

■ 32 Point Input Sink/Source Type (FN-X32TS41)

Rated Input Voltage	DC24V
Max. Input Voltage	DC28.8V
No. of Input Points	32 points (sink/source type - dual use)
No. of Common	2
Input Type	Type 1[*1]
Input ON Voltage	DC15V or higher
Input OFF Voltage	DC5V or less
Input Impedance	4.2kΩ
Isolation Method	Photocoupler Isolation
Input Delay — OFF-ON	1.5ms or less
Input Delay — ON-OFF	1.5ms or less
No. of Exclusive Use Nodes	2

1 Digital input is for detecting signals from mechanical switching devices such as relay contacts, push buttons, switches, etc.
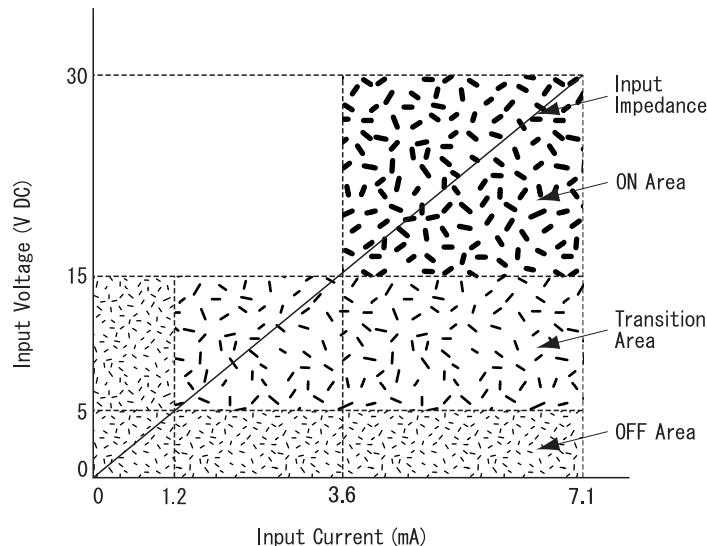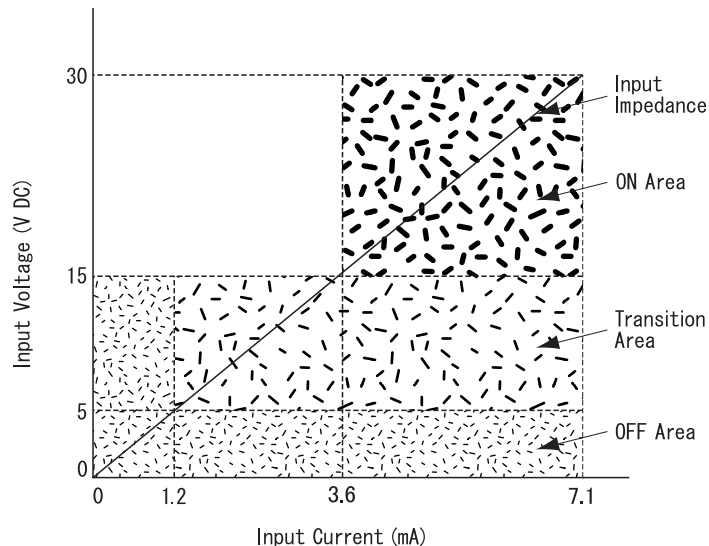
Input Operating Range

Rated Input Voltage   24VDC (sink/source input type)
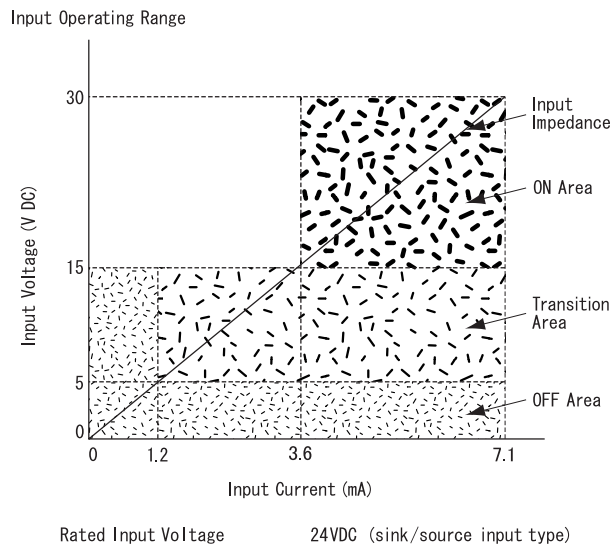
■ 16 Point Input Sink-Source/16 Point Transistor Output Sink Type (FN-XY16SK41)

I N P U T	Rated Input Voltage		DC24V
	Max. Input Voltage		DC28.8V
	No. of Input Points		16 points (sink/source type-dual use)
	No. of Common		1
	Input Type		Type 1 [*1]
	Input ON Voltage		DC15V or higher
	Input OFF Voltage		DC5V or less
	Input Impedance		4.2kΩ
	Isolation Method		Photocoupler Isolation
	Input Delay Time	OFF-ON	1.5ms or less
		ON-OFF	1.5ms or less
O U T P U T	Rated Output Voltage		DC24V
	Rated Output Voltage Range		DC20.4V to DC28.8V
	No. of Output Points		16 points (sink type)
	No. of Common		1
	Maximum Load Voltage		0.2A/1 point (16 points/1 common, max. common current: 1.6A)
	Isolation Method		Photocoupler Isolation
	Output Protection		None
	Built-in Fuse		3.5A, DC125V built-in Chip Fuse (cannot be replaced)
	Voltage Drop (ON Voltage)		DC1.5V or less
	Clamp Voltage		DC39V +/-1V
	Current Leakage		0.1mA or less
	Output Delay Time	OFF-ON	1ms or less
		ON-OFF	1ms or less
No. of Exclusive Use Nodes			1

*1 Digital input is for detecting signals from mechanical switching devices such as relay contacts, push buttons, switches, etc.


Input Operating Range

Rated Input Voltage   24VDC (sink/source input type)

■ 16 Point Input Sink-Source/16 Point Transistor Output Source Type (FN-XY16SC41)

|		
I N P U T	Rated Input Voltage	DC24V
	Max. Input Voltage	DC28.8V
	No. of Input Points	16 points (sink/source type-dual use)
	No. of Common	1
	Input Type	Type 1[*1]
	Input ON Voltage	DC15V or higher
	Input OFF Voltage	DC5V or less
	Input Impedance	4.2kΩ
	Isolation Method	Photocoupler Isolation
	Input Delay Time OFF-ON	1.5ms or less
	Input Delay Time ON-OFF	1.5ms or less
O U T P U T	Rated Output Voltage	DC24V
	Rated Output Voltage Range	DC20.4V to DC28.8V
	No. of Output Points	16 points (source type)
	No. of Common	1
	Maximum Load Voltage	0.2A/1 point (16 points/1 common, max. common current: 1.6A)
	Isolation Method	Photocoupler Isolation
	Output Protection	None
	Built-in Fuse	3.5A, DC125V built-in Chip Fuse (cannot be replaced)
	Voltage Drop (ON Voltage)	DC1.5V or less
	Clamp Voltage	DC39V +/-1V
	Current Leakage	0.1mA or less
	Output Delay Time OFF-ON	1ms or less
	Output Delay Time ON-OFF	1ms or less
	No. of Exclusive Use Nodes	1

*1 Digital input is for detecting signals from mechanical switching devices such as relay contacts, push buttons, switches, etc.

Input Operating Range

Rated Input Voltage   24VDC (sink/source input type)

■ 32 Point Input Sink-Source/32 Point Transistor Output Sink Type (FN-XY32SKS41)

<table>
<tr><td rowspan="12">I N P U T</td><td colspan="2">Rated Input Voltage</td><td>DC24V</td></tr>
<tr><td colspan="2">Max. Input Voltage</td><td>DC28.8V</td></tr>
<tr><td colspan="2">No. of Input Points</td><td>32 points (sink/source type-dual use)</td></tr>
<tr><td colspan="2">No. of Common</td><td>2</td></tr>
<tr><td colspan="2">Input Type</td><td>Type 1[*1]</td></tr>
<tr><td colspan="2">Input ON Voltage</td><td>DC15V or higher</td></tr>
<tr><td colspan="2">Input OFF Voltage</td><td>DC5V or less</td></tr>
<tr><td colspan="2">Input Impedance</td><td>4.2kΩ</td></tr>
<tr><td colspan="2">Input Derating</td><td>Refer to ◆ Input Derating</td></tr>
<tr><td colspan="2">Isolation Method</td><td>Photocoupler Isolation</td></tr>
<tr><td rowspan="2">Input Delay Time</td><td>OFF-ON</td><td>1.5ms or less</td></tr>
<tr><td>ON-OFF</td><td>1.5ms or less</td></tr>
<tr><td rowspan="13">O U T P U T</td><td colspan="2">Rated Output Voltage</td><td>DC24V</td></tr>
<tr><td colspan="2">Rated Output Voltage Range</td><td>DC20.4V to DC28.8V</td></tr>
<tr><td colspan="2">No. of Output Points</td><td>32 points (sink type)</td></tr>
<tr><td colspan="2">No. of Common</td><td>2</td></tr>
<tr><td colspan="2">Maximum Load Voltage</td><td>0.2A/1 point
(16 points/1 common, max. common current: 1.6A)</td></tr>
<tr><td colspan="2">Isolation Method</td><td>Photocoupler Isolation</td></tr>
<tr><td colspan="2">Output Protection</td><td>None</td></tr>
<tr><td colspan="2">Built-in Fuse</td><td>3.5A, DC125V built-in Chip Fuse (cannot be replaced)</td></tr>
<tr><td colspan="2">Voltage Drop (ON Voltage)</td><td>DC1.5V or less</td></tr>
<tr><td colspan="2">Clamp Voltage</td><td>DC39V +/-1V</td></tr>
<tr><td colspan="2">Current Leakage</td><td>0.1mA or less</td></tr>
<tr><td rowspan="2">Output Delay Time</td><td>OFF-ON</td><td>1ms or less</td></tr>
<tr><td>ON-OFF</td><td>1ms or less</td></tr>
<tr><td colspan="3">No. of Exclusive Use Nodes</td><td>4</td></tr>
</table>

1 Digital input is for detecting signals from mechanical switching devices such as relay contacts, push buttons, switches, etc.

Input Operating Range
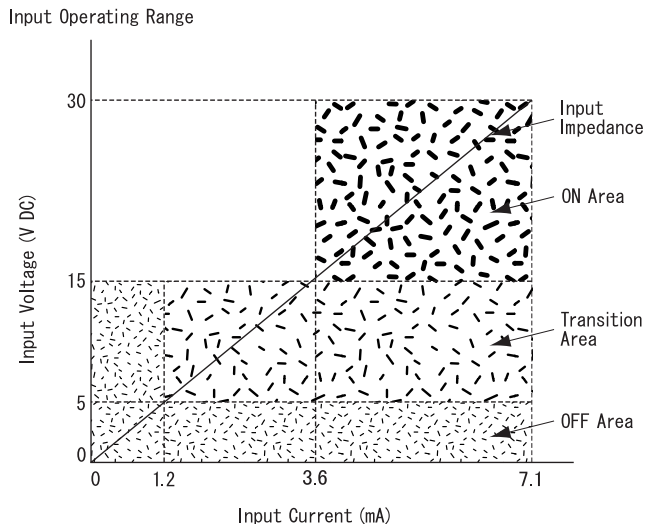
Rated Input Voltage   24VDC (sink/source input type)

◆ **Input Derating**

Using FN-XY32SKS41 at levels in excess of the Rated Input Voltage, Input ON Voltage, No. of Input Points, Operating Temperature and so on, can cause the product's input parts to malfunction. To prevent a malfunction, Input Derating should be set within that range. (See below.)
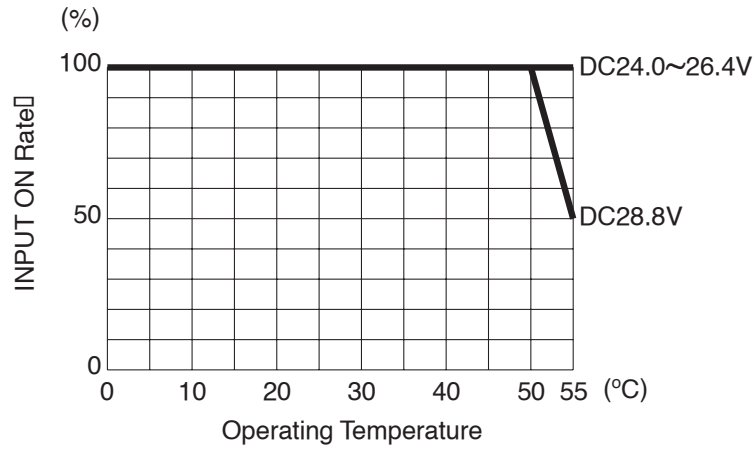
2.3 Input/Output Circuit Drawings

This section explains the Flex Network DIO unit circuit connection drawings.

✎**Note:** **Be sure to separate the DIO unit's power and output lines, and sensor power lines to prevent the unit from receiving excessive levels of noise.**

■ 16 Point Input Sink/Source Type (FN-X16TS41)

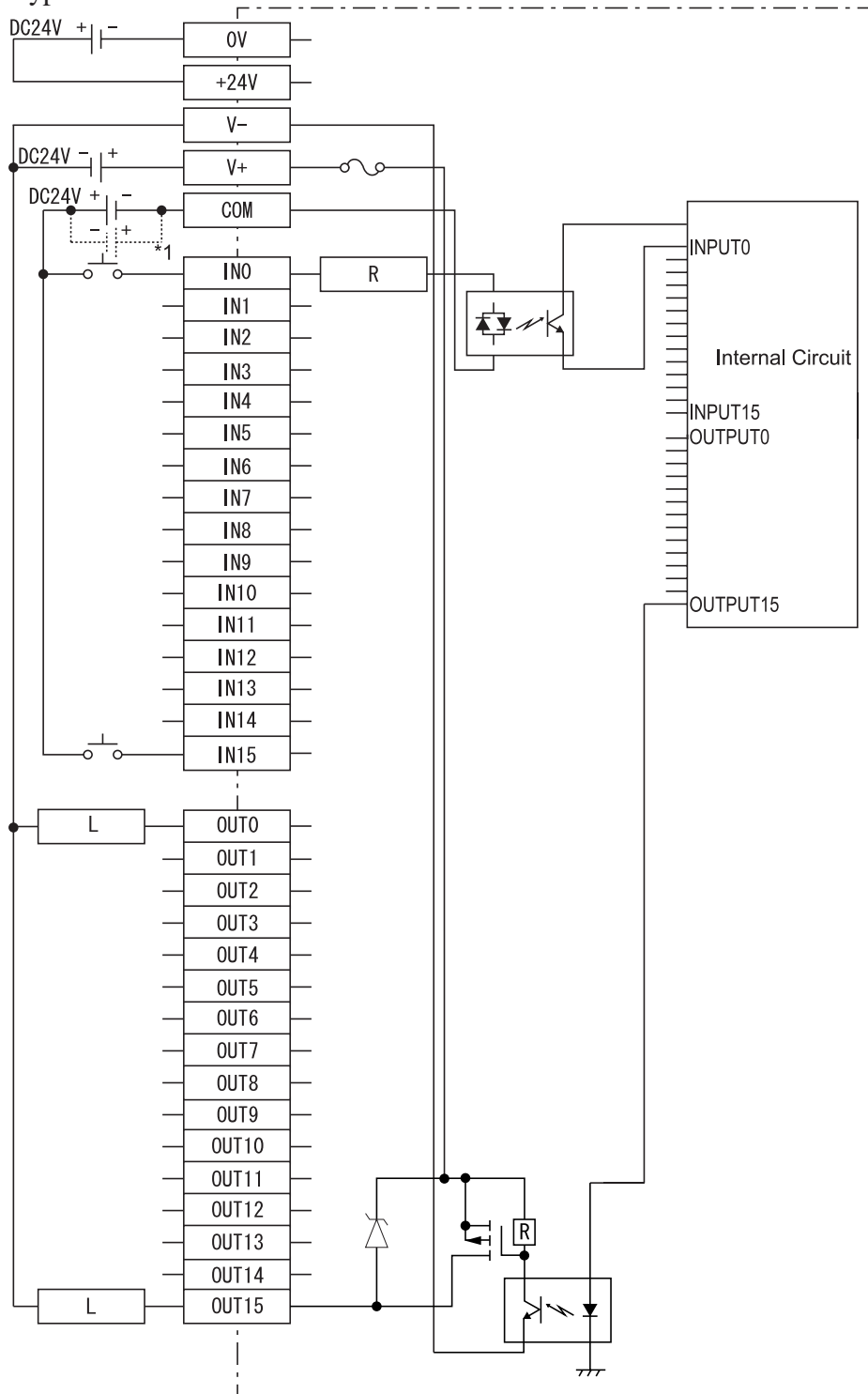This drawing shows the connection between the input section and the sink output type.
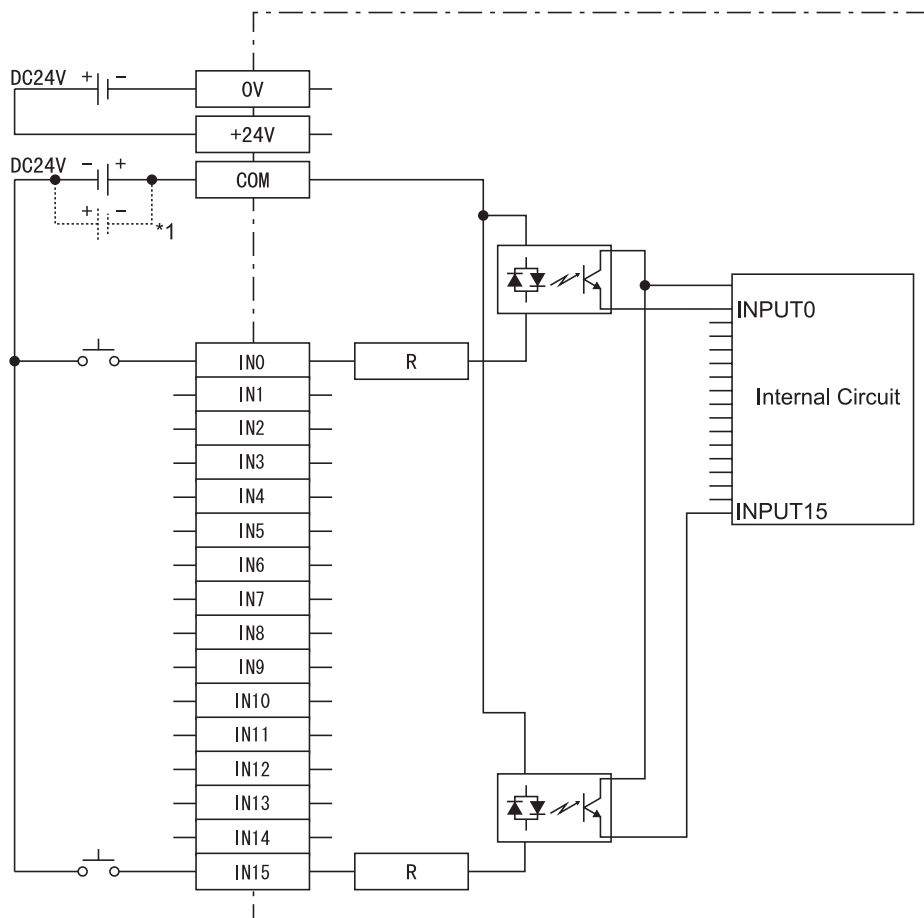
1 Dotted line shows the source output connection.

■ **8 Point Input Sink-Source/8 Point Transistor Output Sink Type (FX-XY08TS41)**

This drawing shows the connection between the input section and the sink output type.

---
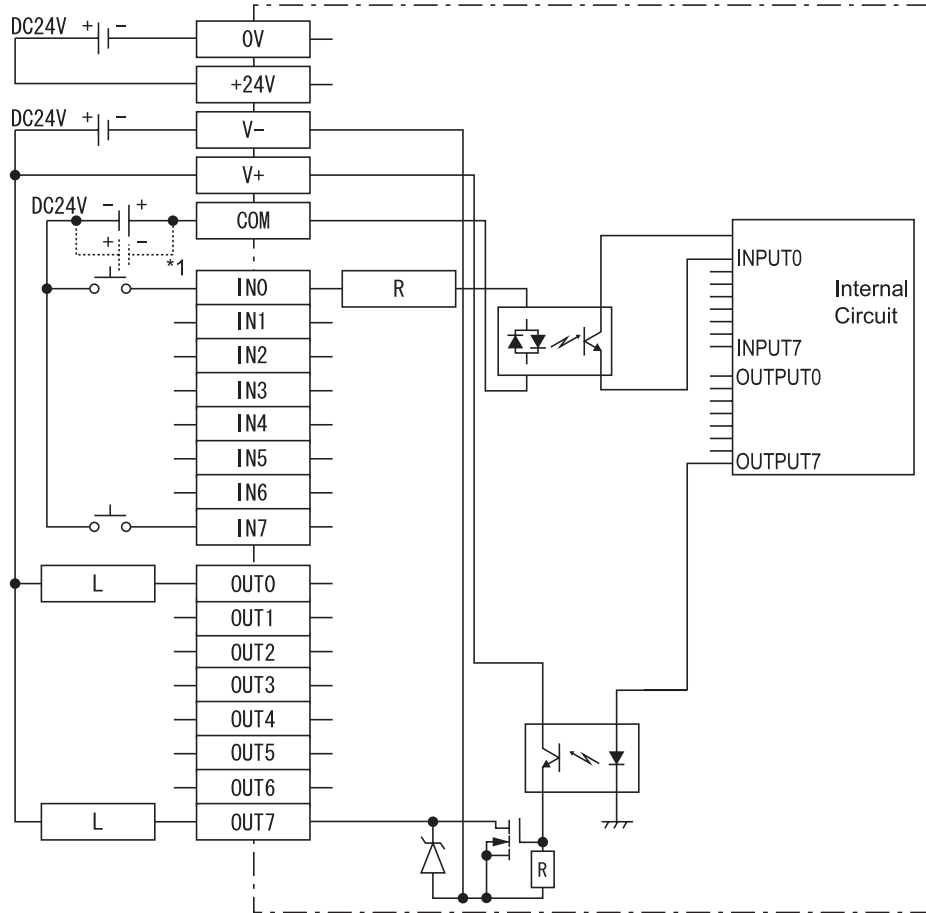
1 Dotted line shows the source output connection.

■ 8 Point Relay Output/1 Point Common Type (FN-Y08RL41)

The relay specifications can change the COM power supply.
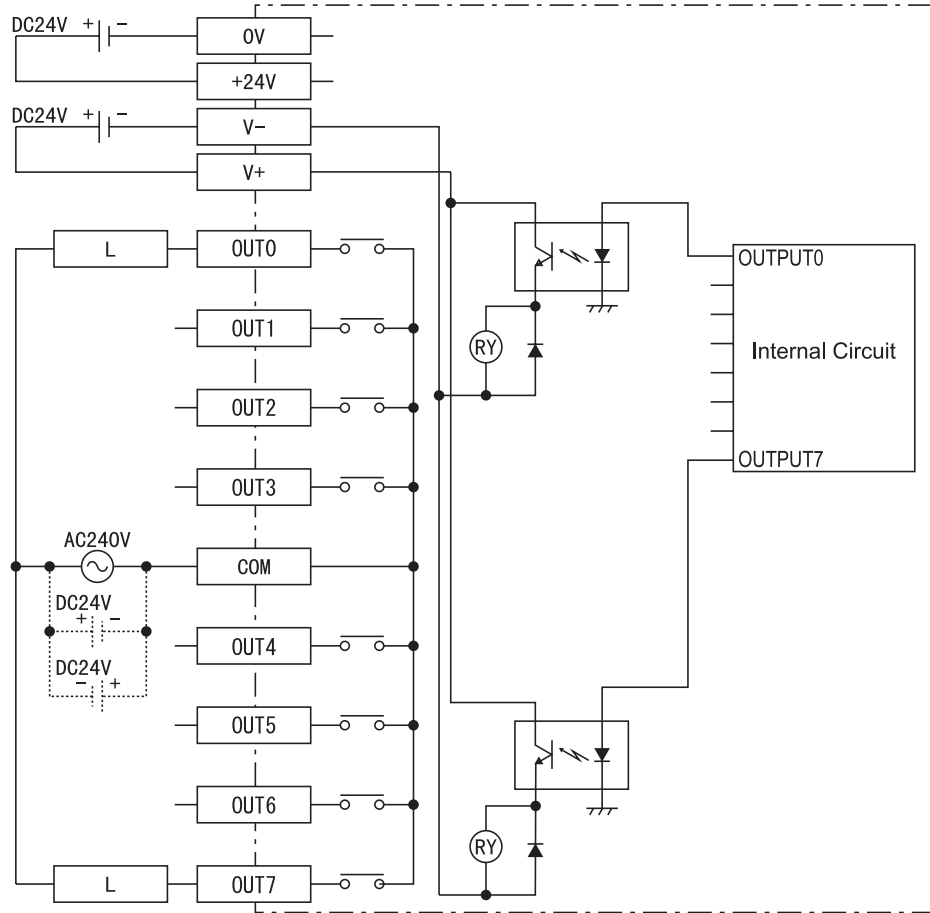
■ **16 Point Output Sink Type (FN-Y16SK41)**
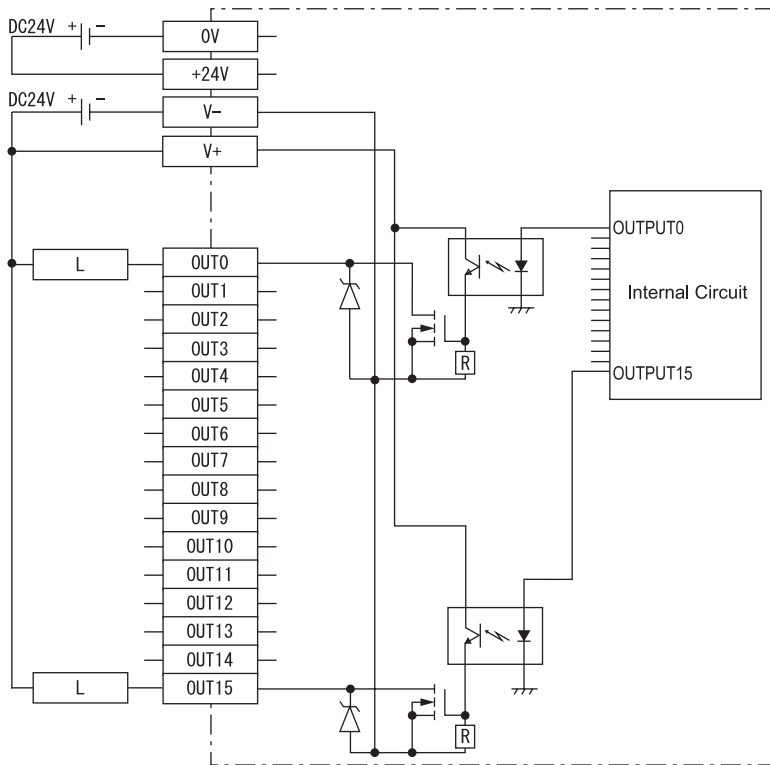
■ **16 Point Output Source Type (FN-Y16SC41)**
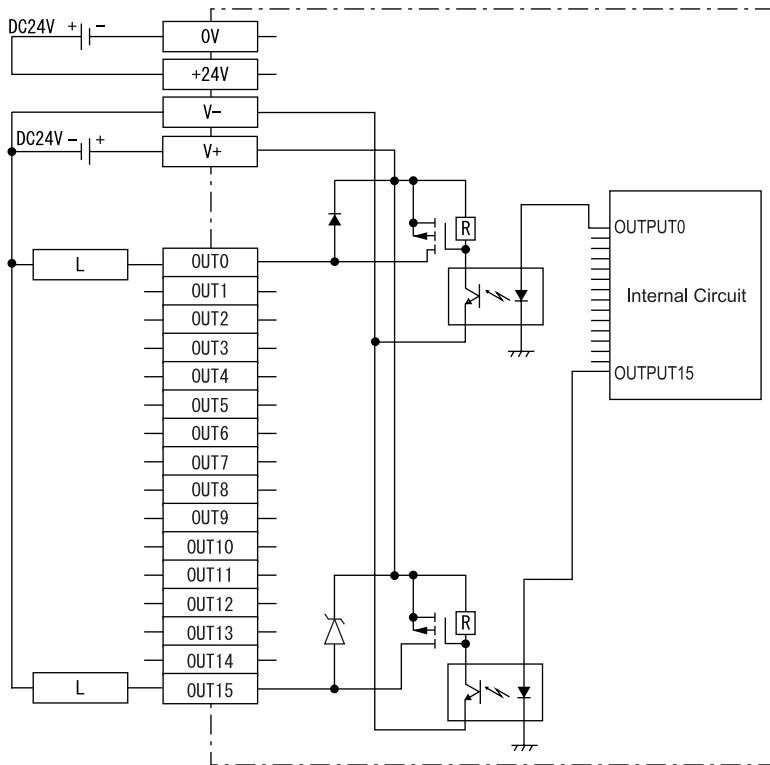
■ 32 Point Input Sink/Source Type (FN-X32TS41)

This drawing shows the connection between the input section and the sink output type.
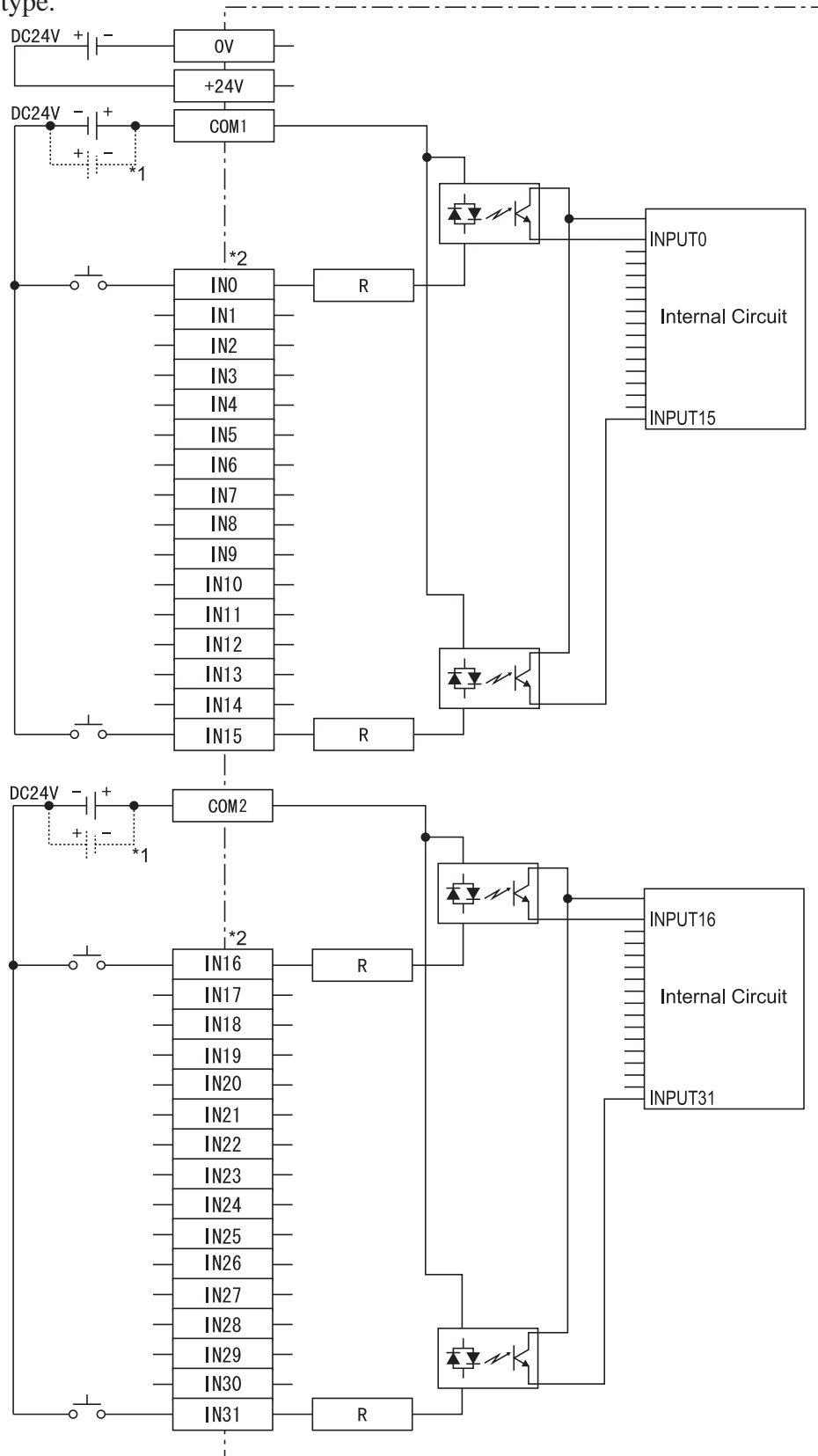
*1 Dotted line shows the source output connection.

*2 For IN0 to IN15, use COM1.
   For IN16 to IN31, use COM2 as the input common.

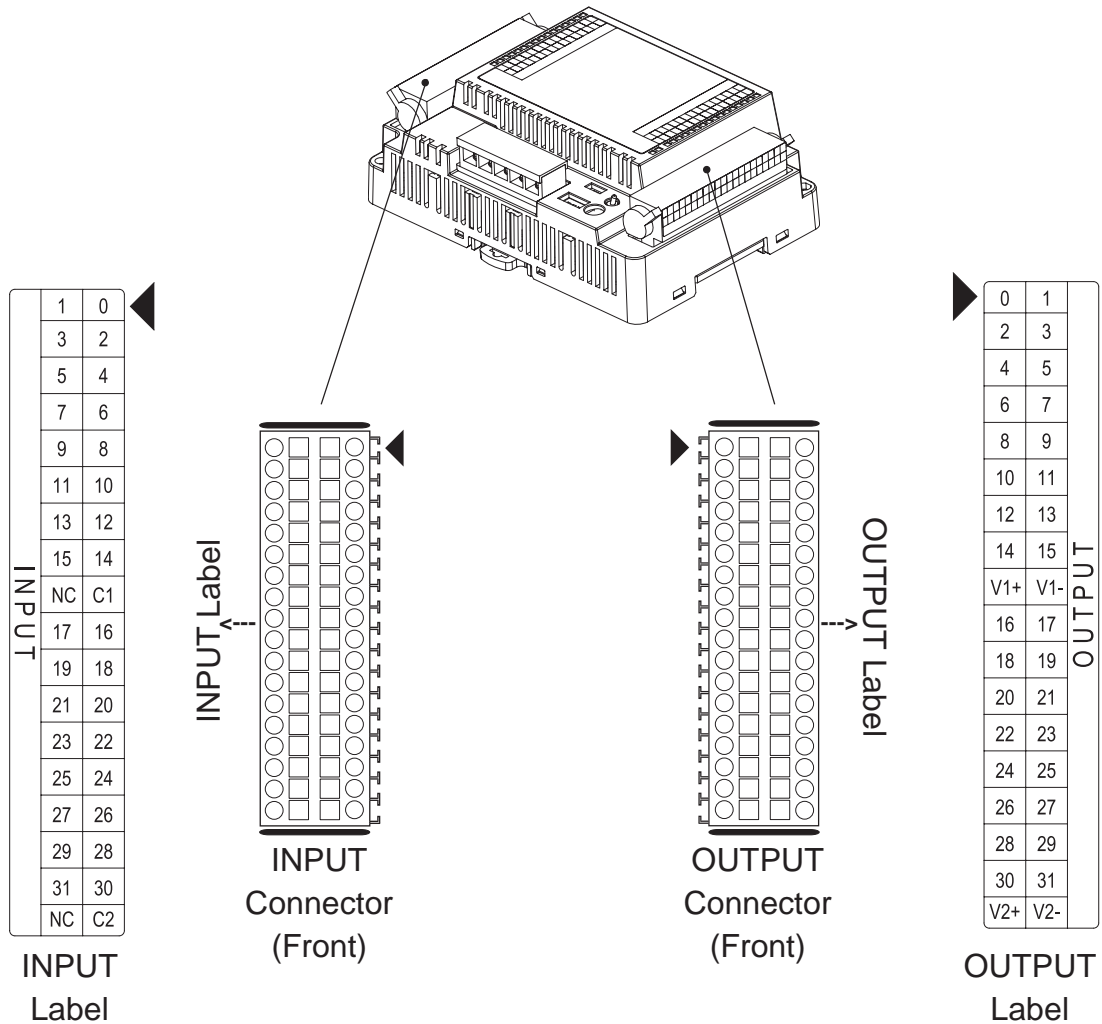■ **16 Point Input Sink-Source/16 Point Transistor Output Sink Type (FN-XY16SK41)**

This drawing shows the connection between the input section and the sink output type.

---
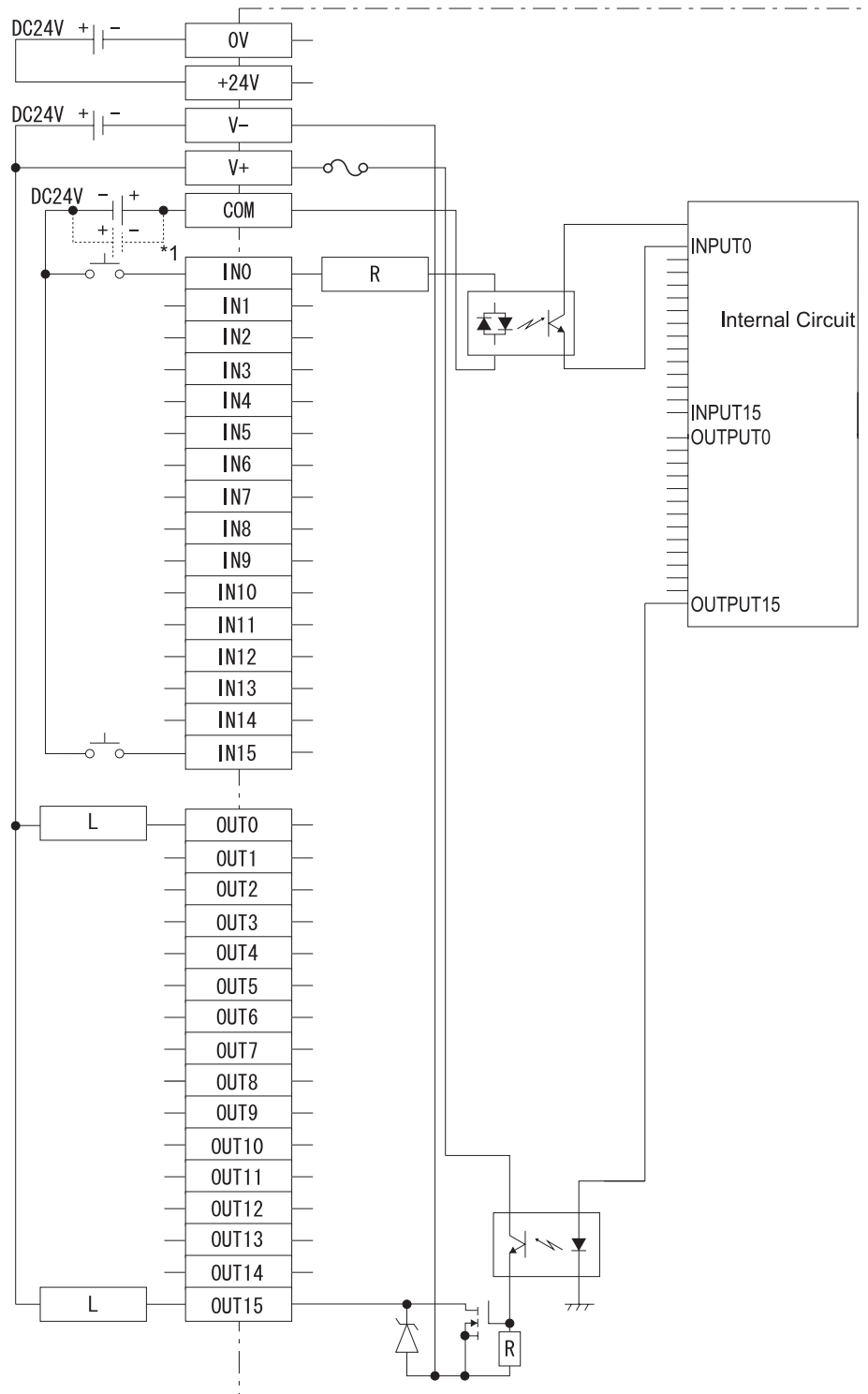
1 Dotted line shows the source output connection.

■ **16 Point Input Sink-Source/16 Point Transistor Output Source Type (FN-XY16SC41)**

This drawing shows the connection between the input section and the source output type.

---

1 Dotted line shows the sink output connection.

■ **32 Point Input Sink-Source/32 Point Transistor Output Sink Type (FN-XY32SKS41)**

This drawing shows the connection between the input section and the sink output type.

Note: **When wiring your unit, use the pin assignments given in this chapter's ■ 64 Point Unit Pin Assignments (next page).**
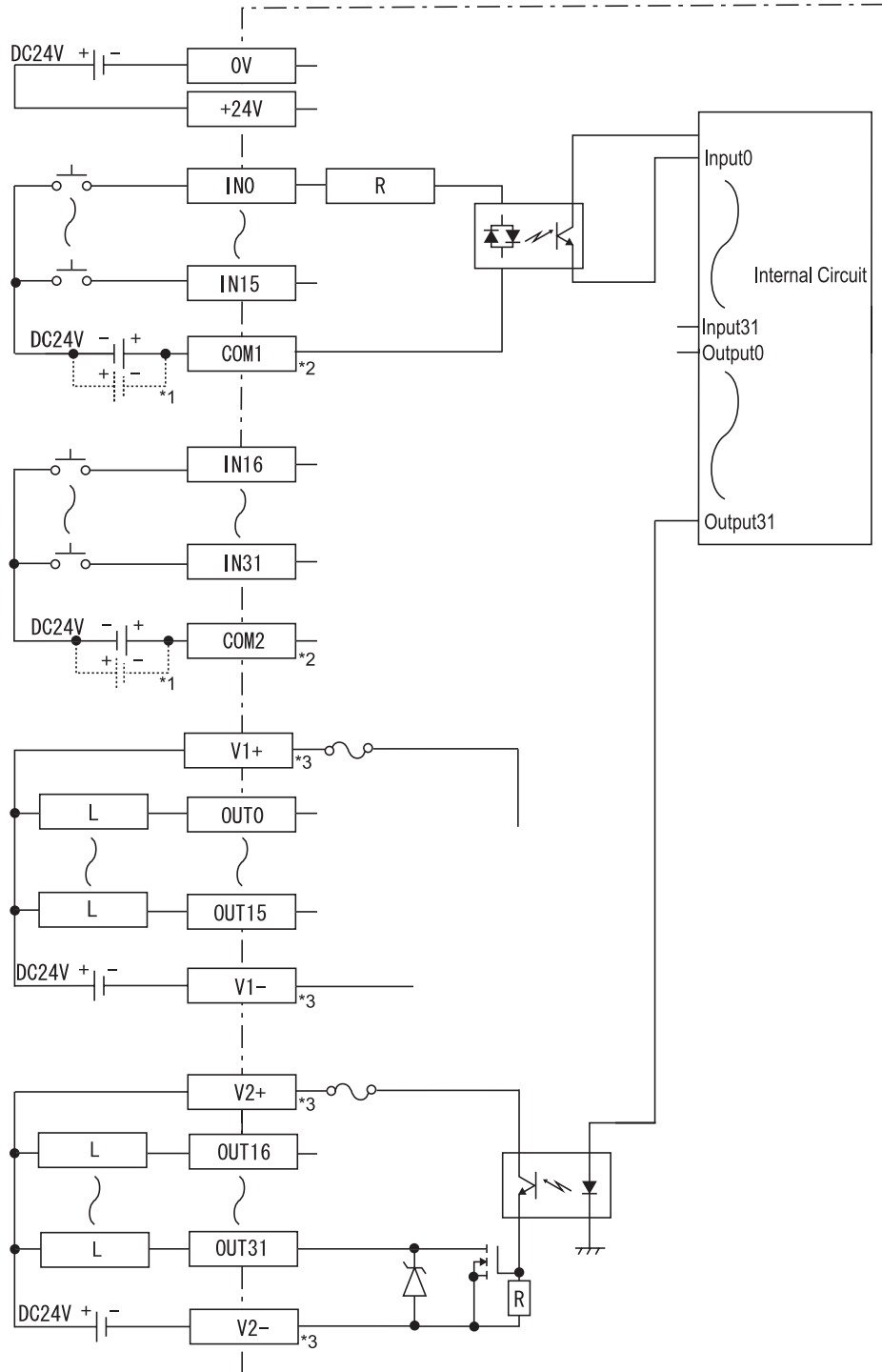
*1 *Dotted line shows the source output connection.*

*2 *For IN0 to IN15, use COM1.*
   For IN16 to IN31, use COM2 as the input common.

*3 *For OUT0 to OUT15, connect the output power to V1+/V1-.*
   For OUT16 to OUT31, connect the output power to V2+/V2-.

■ **64 Point Unit Pin Assignments**

◆ **Connectors**

One connector has an INPUT label and the other has an OUTPUT label. (see below)

1	0
3	2
5	4
7	6
9	8
11	10
13	12
15	14
NC	C1
17	16
19	18
21	20
23	22
25	24
27	26
29	28
31	30
NC	C2

INPUT

INPUT
Label

INPUT Label

INPUT
Connector
(Front)

OUTPUT Label

OUTPUT
Connector
(Front)

0	1
2	3
4	5
6	7
8	9
10	11
12	13
14	15
V1+	V1-
16	17
18	19
20	21
22	23
24	25
26	27
28	29
30	31
V2+	V2-

OUTPUT

OUTPUT
Label

Note: **For connector wiring details,** ▽**Reference**△ **3.2.6 Wiring 64-Point Unit Connectors**

◆ **INPUT Label Pin Assignments**

INPUT Label	Label Signal Names	Signal Name	Description	Label Signal Name	Signal Name	Description
	1	IN1	INPUT1	0	IN0	INPUT0
	3	IN3	INPUT3	2	IN2	INPUT2
	5	IN5	INPUT5	4	IN4	INPUT4
	7	IN7	INPUT7	6	IN6	INPUT6
	9	IN9	INPUT9	8	IN8	INPUT8
	11	IN11	INPUT11	10	IN10	INPUT10
	13	IN13	INPUT13	12	IN12	INPUT12
	15	IN15	INPUT15	14	IN14	INPUT14
	NC	NC	Reserved	C1	COM1	INPUT Common (for IN0 to IN15)
	17	IN17	INPUT17	16	IN16	INPUT16
	19	IN19	INPUT19	18	IN18	INPUT18
	21	IN21	INPUT21	20	IN20	INPUT20
	23	IN23	INPUT23	22	IN22	INPUT22
	25	IN25	INPUT25	24	IN24	INPUT24
	27	IN27	INPUT27	26	IN26	INPUT26
	29	IN29	INPUT29	28	IN28	INPUT28
	31	IN31	INPUT31	30	IN30	INPUT30
	NC	NC	Reserved	C2	COM2	INPUT Common (for IN16 to IN31)

◆ **OUTPUT Label Pin Assignments**

OUTPUT Label	Label Signal Names	Signal Name	Description	Label Signal Names	Signal Name	Description
	0	OUT0	OUTPUT0	1	OUT1	OUTPUT1
	2	OUT2	OUTPUT2	3	OUT3	OUTPUT3
	4	OUT4	OUTPUT4	5	OUT5	OUTPUT5
	6	OUT6	OUTPUT6	7	OUT7	OUTPUT7
	8	OUT8	OUTPUT8	9	OUT9	OUTPUT9
	10	OUT10	OUTPUT10	11	OUT11	OUTPUT11
	12	OUT12	OUTPUT12	13	OUT13	OUTPUT13
	14	OUT14	OUTPUT14	15	OUT15	OUTPUT15
	V1+	V1+	OUTPUT POWER +24V (for OUT0 to OUT15)	V1-	V1-	OUTPUT POWER 0V (for OUT0 to OUT15)
	16	OUT16	OUTPUT16	17	OUT17	OUTPUT17
	18	OUT18	OUTPUT18	19	OUT19	OUTPUT19
	20	OUT20	OUTPUT20	21	OUT21	OUTPUT21
	22	OUT22	OUTPUT22	23	OUT23	OUTPUT23
	24	OUT24	OUTPUT24	25	OUT25	OUTPUT25
	26	OUT26	OUTPUT26	27	OUT27	OUTPUT27
	28	OUT28	OUTPUT28	29	OUT29	OUTPUT29
	30	OUT30	OUTPUT30	31	OUT31	OUTPUT31
	V2+	V2+	OUTPUT POWER +24V (for OUT16 to OUT31)	V2-	V2-	OUTPUT POWER 0V (for OUT16 to OUT31)

2.4   Part Names and Features

A **B**   **D**

C

F   **(FN-X16TS41 unit)**

D

C

A

B

F   **(FN-X32TS41 unit)**

D

F   **C**   **A**   **B**   **E**
(FN-XY32SKS41 unit)

■ Output Hold Settings

The left-most dip switch is used to turn this setting ON/OFF. The factory setting is OFF (No Hold)

Dip Switch 1

Output Hold OFF

Output Hold ON

◆ Output Hold ON (Hold)

When a communication error occurs, the unit will HOLD the output condition received in the previous communication cycle. When the next cycle is performed and the next command is successfully received, the output will then be changed.

A: Dip Switches

Sets the output hold settings, transmission speed and station no. (upper 1st digit).
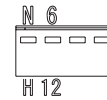
B: Rotary Switch

Uses the lower 1st digit to set the station no.
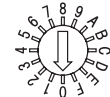
8/16 point   32 /64 point

C: Terminal Switch

Turns the termination resistance feature ON or OFF.

OFF   ON

D: Status LED

Indicates the following conditions.

Status LED	Condition
PWR (Green LED)	When unit is first turned ON.
ERR (RED LED)	Lights when the unit is malfunctioning.
INPUT/OUTPUT (ORANGE LED)	Lights when each I/O point turns ON.

E: IN/OUT LED Changeover Switch

The IN/OUT LED can be switched between IN/OUT ("0-15" & "16-31").

16-31 ◄──► 0-15

LED SW.
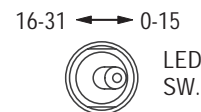
F: DIN Rail Attachment Hook

Use to attach the I/O Unit to the DIN rail.

Flex Network DIO Unit User Manual

◆ **Output Hold OFF (Non-Hold)**

When a communication error occurs, all outputs are reset to 0 (OFF). When normal communication is restored, the output is also restored.

> ⚠ *Important*
>
> • *When output hold is used, the output ON signal is held when an error occurs. As a result, be sure to structure your system so that a V+ terminal does not control an emergency safety circuit. This type of feature is usually referred to as a fail-safe system.*

▼ *Reference* ◢ *3.2.3 Connecting the I/O Cable (With 2 transistor units)*

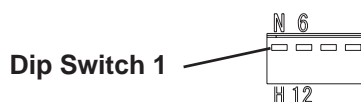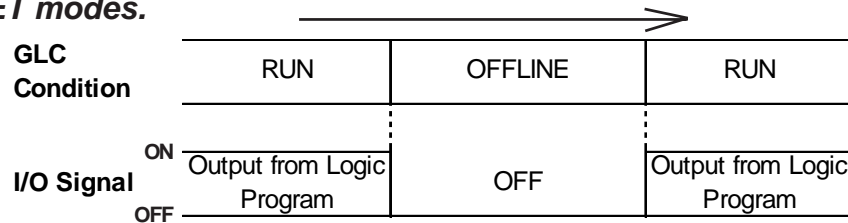• *When the Logic Program changes from the RUN condition to either the OFFLINE mode or RESET, The GLC or the I/O signal will be performed as shown below, regardless of the Output Hold Setting. Be sure to consider this when changing to either the OFFLINE or RESET modes.*

GLC Condition	RUN	OFFLINE	RUN
I/O Signal ON ... OFF	Output from Logic Program	OFF	Output from Logic Program

Please remember that the Reset mode's I/O signal OFF timing is not fixed.

■ Communication Speed Settings

The Dip Switch that is the second from the left controls the communication speed (6Mbps or 12Mbps). The factory setting is 6Mbps and is recommended.

6Mbps
12Mbps

N 6
H 12
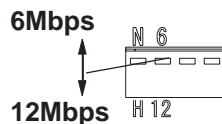
> ⚠ *Important*
>
> *The Communication Speed setting status is read when the Flex Network unit is turned ON. To change this setting, turn the Flex Network unit OFF, change the setting and then turn the unit ON again.*

■ S-No. (Station Number) Setting

Station numbers from 1 to 63 are set in hexadecimal (01h to 3Fh). (When using a 64-point unit, the S-No. can be set from 01h to 3Ch because the unit occupies 4 nodes.) The factory setting is 0.

The hex upper digit is controlled by the two dip switches on the right side, via ON/OFF settings.

ON
OFF

N 6
H 12
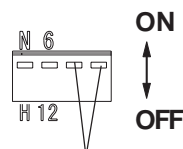
indicates the hex upper digit

The arrow's tip indicates the position
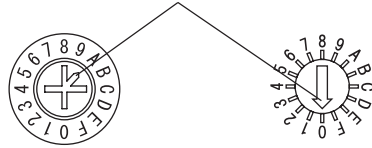
8/16 point   32 point/64 point

S-No. Setting Example

S-No.	Dip Switch		Rotary Switch
Base 10	the 2nd from the right	right side	
S-No. 1 (01h)	OFF (0)	OFF (0)	1
S-No. 16 (10h)	OFF (0)	ON (1)	0
S-No. 63 (3Fh)	ON (1)	ON (1)	F

! *Important*

- *The S-No. setting status is read when the Flex Network unit is turned ON. To change this setting, turn the Flex Network unit OFF, change the setting and then turn the unit ON again.*

- *When using I/O units that require (monopolize) multiple nodes, these units will use S-No.s in sequence, starting from the number set with the abovementioned switches. For information about the number of S-No.s used by each Flex Network Unit, ▽Reference△ Flex Network Unit Models*

■ Termination Settings

This setting helps prevent reflections (echoes) from the terminating unit. (adjusts the termination impedance)

Be sure that each channel in your system's final unit has this termination setting set to ON.

TERM
OFF   ON
OFF ◄──► ON

! *Important*

*The Termination Resistance setting status is read when the Flex Network unit is turned ON. To change this setting, turn the Flex Network unit OFF, change the setting and then turn the unit ON again.*
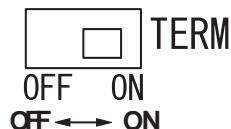
■ Switching the 64 Points Unit's INPUT/OUTPUT LED Display

The 64-Point unit has 16 LEDs for each INPUT/OUTPUT point, however, the total number of INPUT/OUTPUT signals is 32 points for INPUT and 32 points for OUTPUT. Therefore, each bank of LEDs shows INPUT/OUTPUT [0-15], or [16-31]. Therefore, you need to manually change the INPUT/OUTPUT LED Switch to confirm all of the INPUT/OUTPUT status points, i.e. [0-15] and [16-31].

INPUT/OUTPUT LED

64 Point Unit   **INPUT/OUTPUT LED**

(Front)   **Switch**
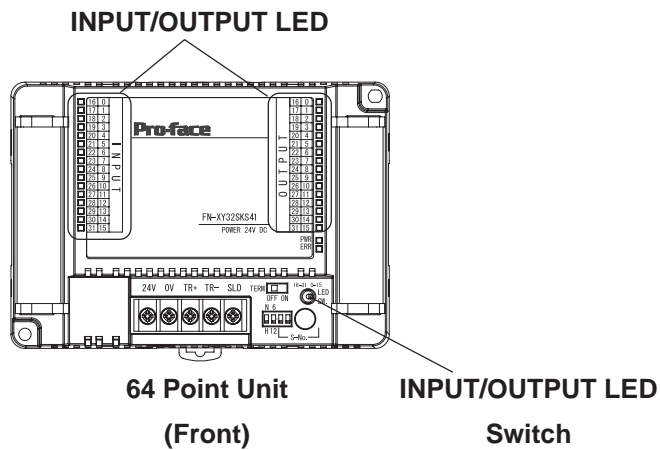
When the INPUT/OUTPUT LED Changeover Switch is set to [0-15], as shown below, the INPUT/OUTPUT LEDs display [INPUT0] to [INPUT15], and from [OUTPUT0] to [OUTPUT15].

Setting the INPUT/OUTPUT LED Changeover Switch to [16-31], shows from [INPUT16] to [INPUT31], and from [OUTPUT16] to [OUTPUT31] .

16-31 ← → 0-15

LED

SW.

2.5   Dimensions

Each type of DIO unit will have the same dimensions. Units shown here are 8/16 Point, 32 Point and 64 Point types.

■ 8/16 Point Units

Units: mm [in.]

(FN-X16TS41 unit)

■ 32 Point Unit

◆ 32 Point Unit Only

Units: mm [in.]

(FN-X32TS41 unit)
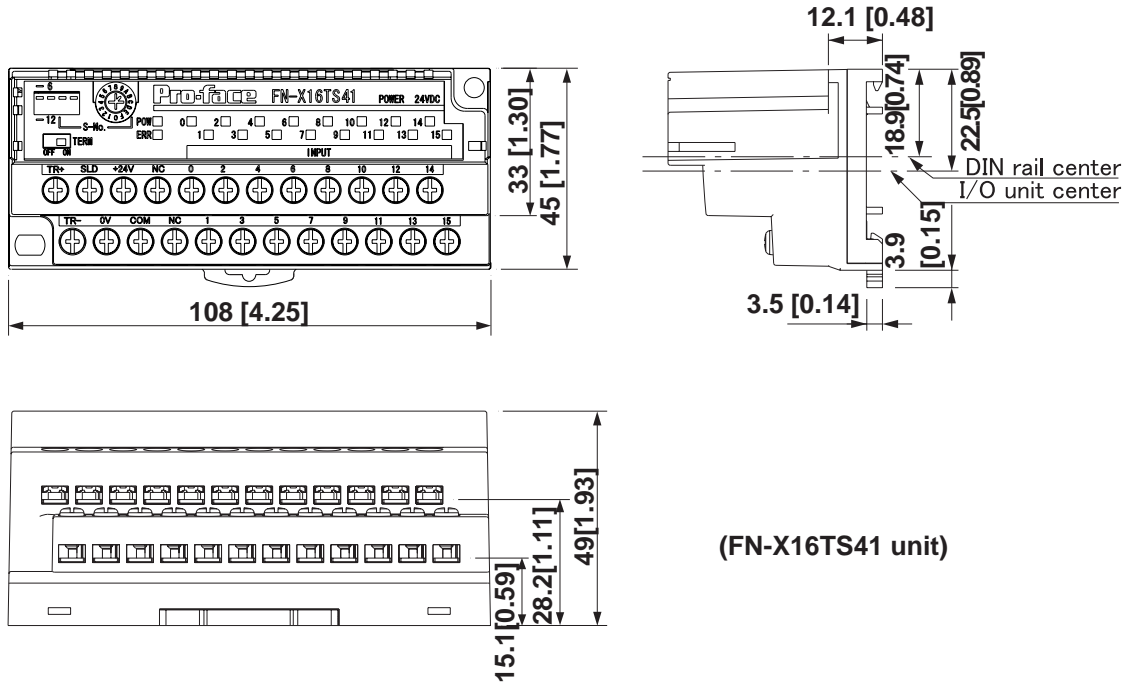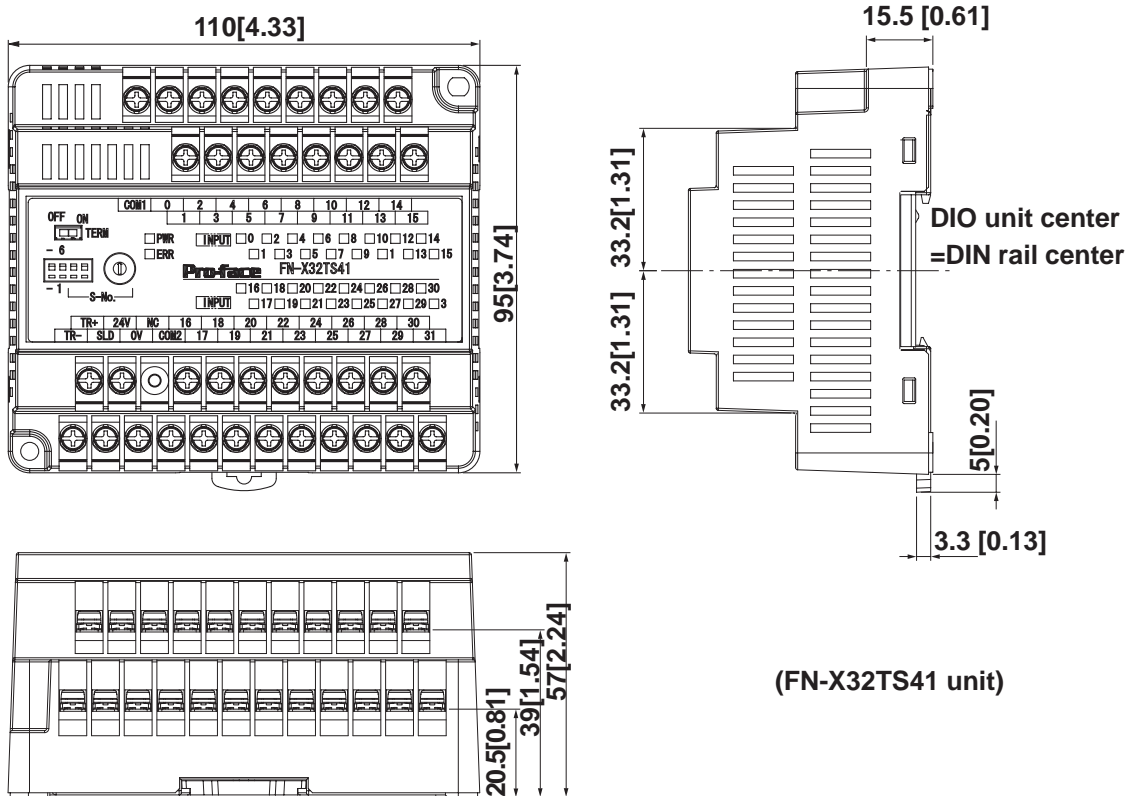
◆ **32 Point unit when attached to a GLC2300 Series unit or a GP-3300 Series unit**

Note: **The following diagrams show the DIO unit attached to a DIN rail (recommended length: 105mm), which is attached to the rear of the GLC2300 series unit or the GP-3300 series unit.**

Units: mm [in.]

110 [4.33]

A*1

B

C

*2
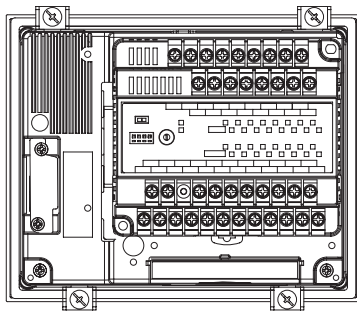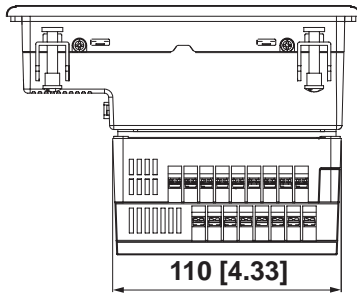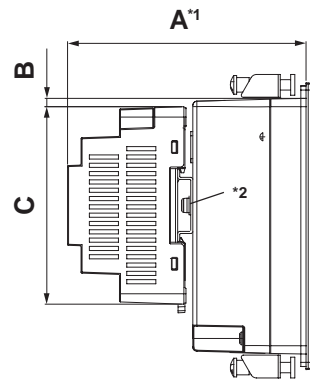
	GLC2300 Series	GP-3300 Series
A*1	115[4.53]	115[4.53]
B	4[0.16]	1[0.04]
C	95[3.74]	95[3.74]

*1 *This depth dimension (A) includes a DIN rail. (H35mm x D7mm)*
*2 *Use M4 screws. (No longer than 6mm.) For the DIN rail attachment information,*
▼Reference▲ *3.1.2 Attaching a 32-Point/64-Point DIO Unit.*

■ 64 Point Unit

◆ 64 Point Unit Only
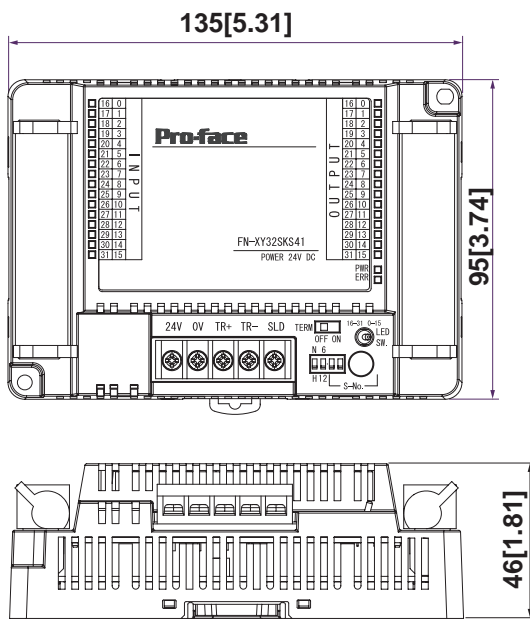
Units: mm [in.]

135[5.31]

Pro-face

INPUT

OUTPUT

FN-XY32SKS41
POWER 24V DC

PWR
ERR

24V 0V TR+ TR- SLD   TERM   16~31 0~15
OFF ON   LED SW.
N 6
H 12   S-No.

95[3.74]

46[1.81]

15.5[0.61]

DIO unit center
=DIN rail center

5[0.20]

3.3[0.13]

◆ 64 Point Unit when attached to a GLC2300 Series unit or a GP-3300 Series unit

Note: **The following diagrams show the DIO unit attached to a DIN rail (recommended length: 105mm), which is attached to the rear of the GLC2300 series unit or the GP-3300 series unit.**

Units: mm [in.]

135[5.31]

Pro-face

INPUT

FN-XY32SKS41
POWER 24V DC

A*1

B

C

*2
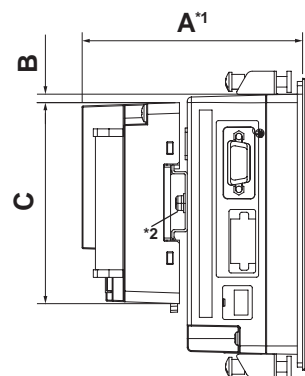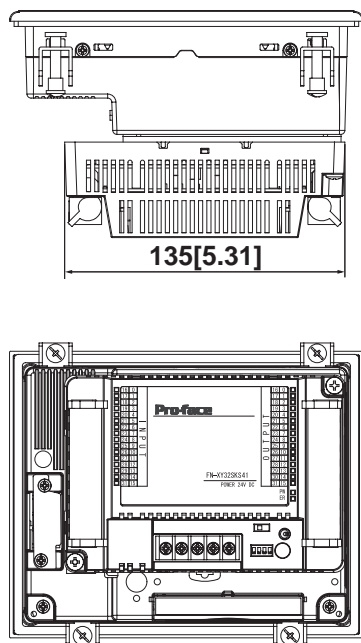
	GLC2300 Series	GP-3300 Series
A*1	104[4.09]	103.4[4.07]
B	4[0.16]	1[0.04]
C	95[3.74]	95[3.74]

*1 *This depth dimension (A) includes a DIN rail. (H35mm x D7mm)*

*2 *Use M4 screws. (No longer than 6mm.) For the DIN rail attachment information,*

▼*Reference*▲ *3.1.2 Attaching a 32-Point/64-Point DIO Unit.*

Chapter

3   Installation and Wiring

3.1   Installation

⚠ WARNING

Prior to installing the Flex Network Unit:

Be sure that the main power supply is turned completely OFF before beginning to wire the unit.

3.1.1   Unit Installation/Removal

■ **Attaching the Unit to a 35 mm DIN Rail**

◆ **Attachment**

Place the unit's curved, top lip over the top of the DIN rail, and then tilt the unit down until the bottom face attachment clip clicks into place.

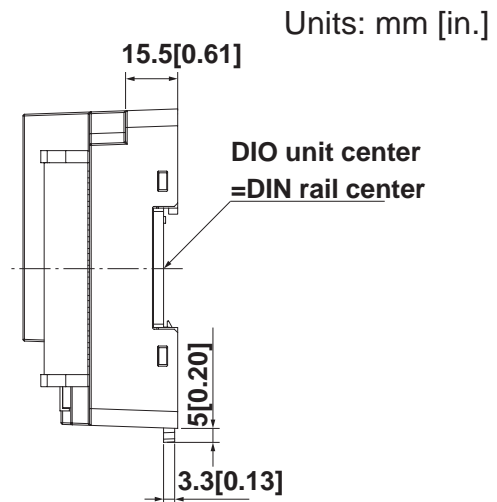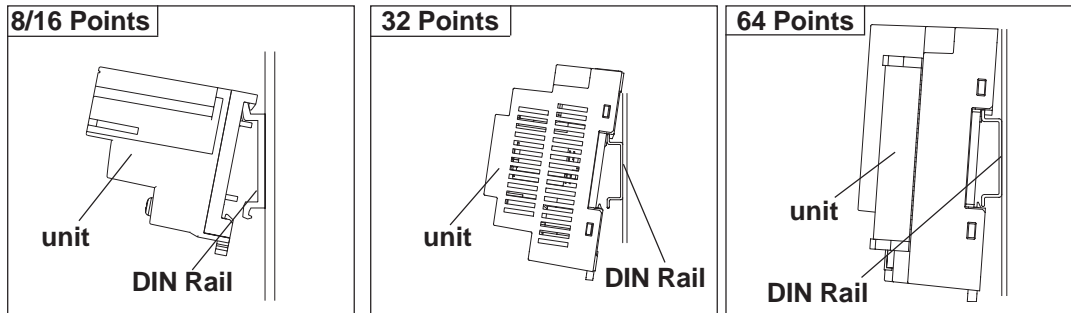- *Be sure that the top and bottom faces of the unit are facing the correct direction and the unit is installed in a vertical position. Incorrect installation may prevent heat from dissipating .*

- *For 32-Point/64-Point units, the attachment clip can be set to remain open. When attaching the unit to the DIN rail, be sure the attachment clip is completely closed and confirm that the unit is held securely on the DIN rail.*

◆ **Removal**

Use a standard screwdriver to force the unit's attachment clip down until the bottom of the unit is freed from the rail. Next, tilt the unit up and remove.
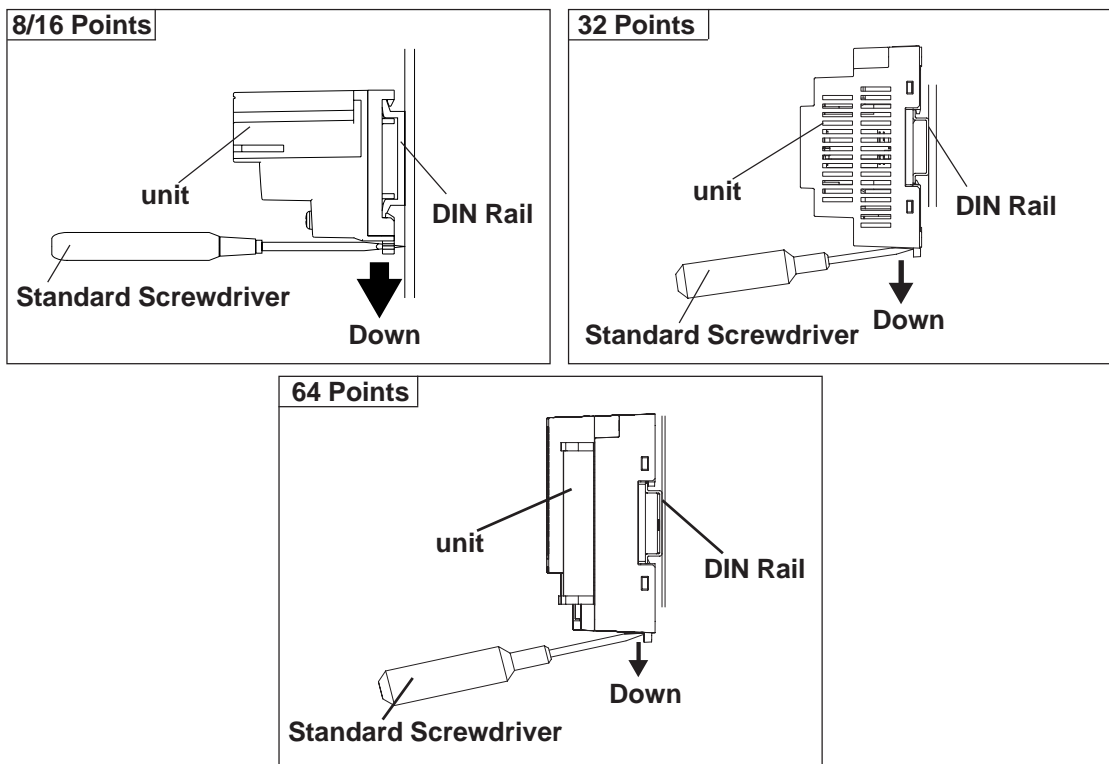
■ When Installing the Unit in a Panel

Drill installation holes in the panel according to the dimensions given below and use M4 screws to attach the unit. A torque of only 0.5 to 1.3N•m is sufficient.

Unit: mm [in.]

8/16 Point Unit
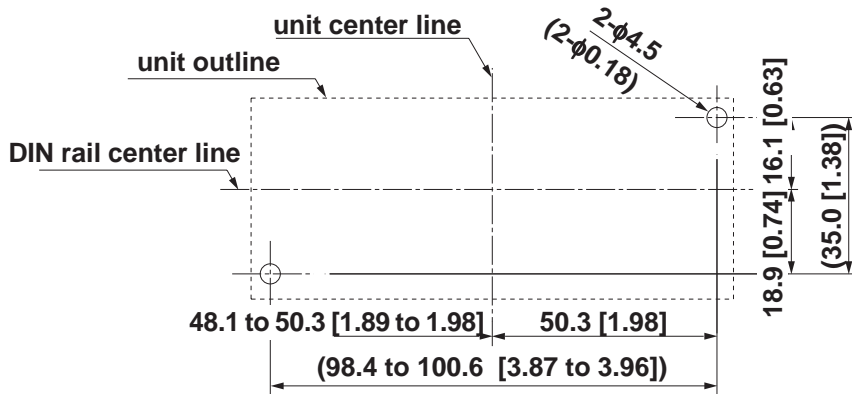
32 Point Unit
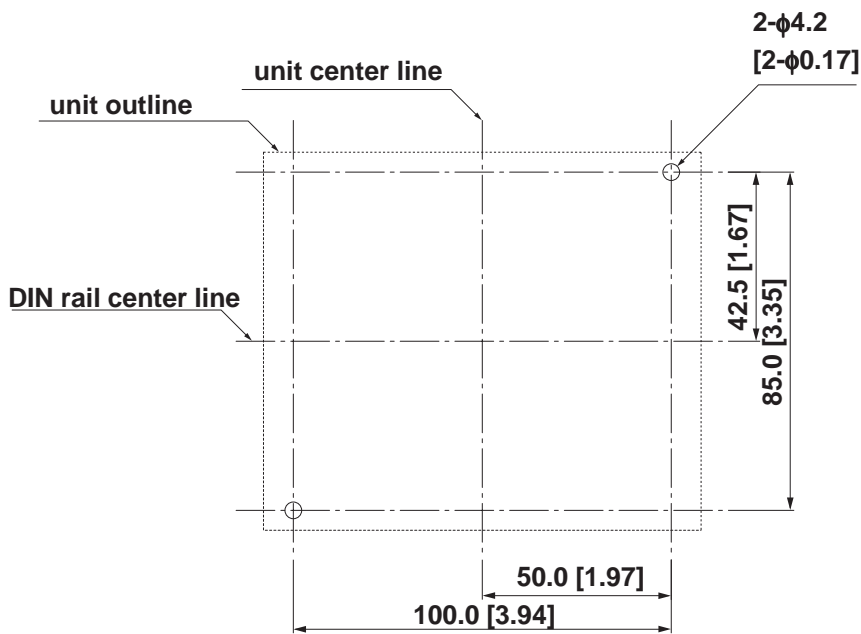
64 Point Unit
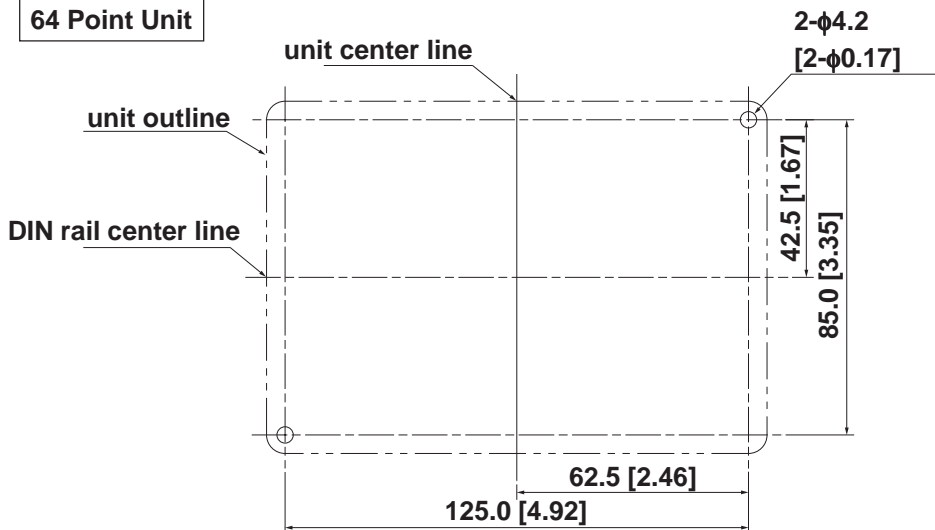
3.1.2 Attaching a 32-Point/64-Point Unit

This explanation attaches a 32-Point/64-Point unit to a DIN rail, then to the rear of the GLC.

⚠️ *Important* ***This installation method can only be used with a GLC2300 Series unit or a GP-3300 Series unit.***

1) Attach the DIN rail (H35mm, recommended length: 105mm) to the rear of the GLC. Fasten the two (2) M4 screws as shown. (The length is less than 6mm.) The torque required for these screws is only 0.5 to 0.6 N•m.
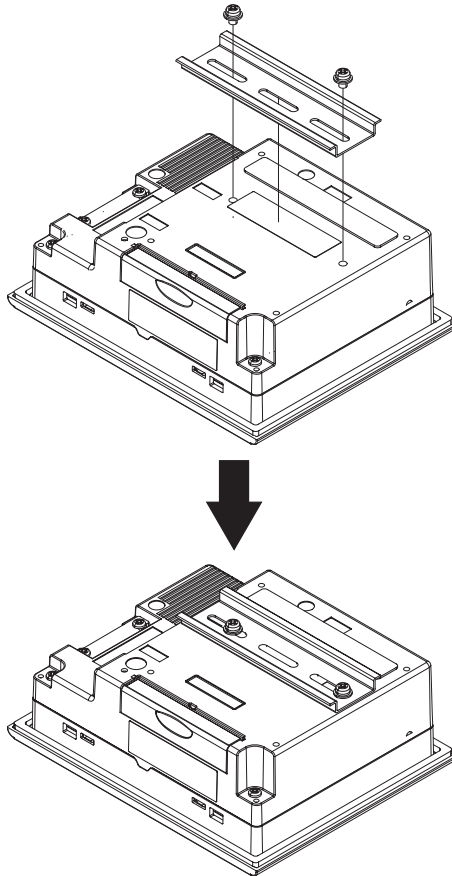
2) Attach the Unit (32-Point/64-Point) to the DIN rail.

▼*Reference*▲ *3.1.1 Unit Installation/Removal* ■ *Attaching the Unit to a 35mm DIN Rail*

| **32-Point Unit** | **GLC2300** | **64-Point Unit** | **GLC2300** |
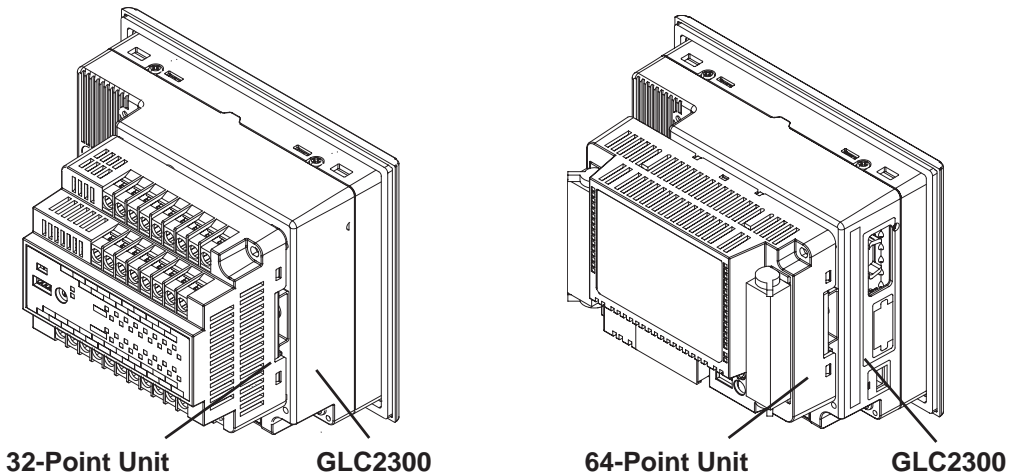
3.2 Wiring

⚠️ WARNING

Prior to wiring the Flex Network Unit:

Be sure that the main power supply is turned completely OFF before beginning to wire the Unit.

Important
- *The required torque for securing ring terminals is as follows;*

    8/16 Points: 0.6 to 1.0 N•m.

    32/64 Points: 0.3 to 0.5 N•m.

3.2.1 Connecting the Flex Network Data Transfer Cable

Use jumper wires between the GLC unit's Flex Network I/F and Flex Network units, as well as between each distributed Flex Network unit (T-type connections are not possible)

We suggest the following cables for your Flex Network.

Retailer	Model No.	Length
	FN-CABLE2010-31-MS	10m
Pro-face	FN-CABLE2050-31-MS	50m
	FN-CABLE2200-31-MS	200m

■ Flex Network Unit Wiring

The cable should be made as shown below:

Blue(TR+)

White(TR-)

Shield(SLD)
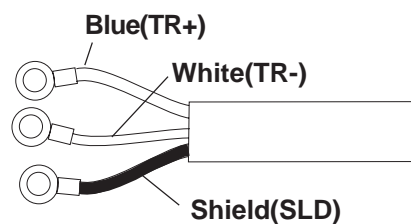
Important *The shield line should either be taped or be covered with a plastic tube.*

Use the following type of crimp terminals.

3.8[0.15] or less   **5.2[0.20] or more**   **Unit: mm[in.]**

6.0[0.24] or less

φ 3.2[φ 0.13] or larger
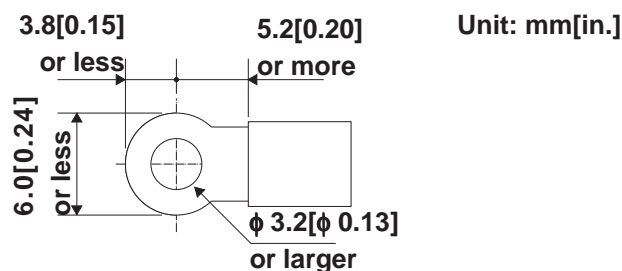
Important
- *Crimp terminals should either be taped or be covered with a plastic tube.*

- *Check that all Flex Network Unit terminal screws are securely tightened, even if they are not used.*

Note:
- Up to 2 ring terminals can be attached to a single terminal screw.

■ Flex Network I/F Wiring

Remove the wire's external covering and insert the wire center strand into the opening.

Unit: mm[in.]

6 to 8[0.24 to 0.31]

Blue(TR+)

White(TR-)

* Do not solder end

(25 to 35
[0.98 to 1.38])

Shield (SLD)

!
Important
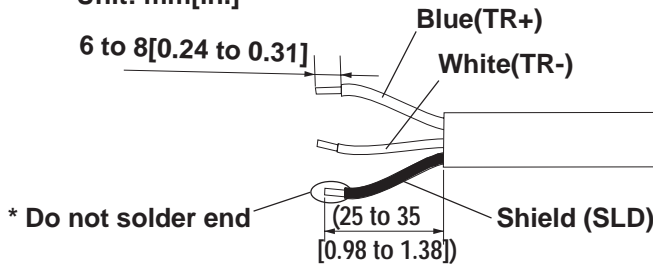
• **Be sure to tape or put a plastic tube over the shield line.**

• **Do not solder the wire itself. This could lead to a bad or poor contact.**

◆ Connecting the Flex Network Cable to a GLC2400/GLC2500/GLC2600 Series Unit
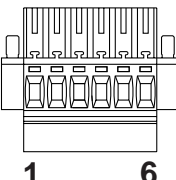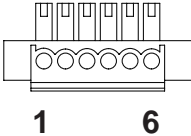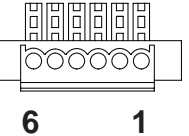
Screwlock Terminal Block (shown in the following table's bold rectangle (No. 3 to 8).

Pin Assignments	Pin No.	Signal	Meaning	
	1	AUXCOM	External Reset Common	External Reset
	2	AUXRESET	External Reset Input	
	3	TR+	CH1 Communication Data	Flex Network Communication
	4	TR -	CH1 Communication Data	
	5	SLD	CH1 Cable/Shielded Line	
	6	TR+	CH2 Communication Data	
	7	TR -	CH2 Communication Data	
	8	SLD	CH2 Cable/Shielded Line	
	9	RESERVE	Reserve	-
	10	SP OUT	Speaker Output	Sound Output
	11	GND	Ground	
	12	LINE OUT	Sound Output	

Applicable Connector : BL3.5/12LH <made by Weidmuller Japan>

◆ **Connecting the Flex Network Cable to a GLC2300/LT/GP3000 Series Unit**

Screwlock Terminal Block

Pin No.	Signal	Meaning	Pin Arrangement		
			GLC2300 Series	LT Series	GP3000 Series
1	TR+	CH1 Communication Data			
2	TR -	CH1 Communication Data			
3	SLD	CH1 Cable/Shielded Line			
4	TR+	CH2 Communication Data			
5	TR -	CH2 Communication Data			
6	SLD	CH2 Cable/Shielded Line			

Applicable Connector

GLC2300 Series :BL3.5/6/90F <made by Weidmuller>

LT Series :MC1,5/6-STF-3,81 <made by Phoenix Contact>

GP3000 Series : 284510-6 <made by Tyco Electronics AMP.>

Note:
- **Use a small sized screwdriver to tighten the set screws.**
- **If the central wire's end (individual) wires are not twisted correctly, the end wires may either short against each other, or against an electrode. For use of pin terminal, refer to the recommended pin terminal shown in the table below.**

Model	Recommended Pin Terminal
GLC2000 Series	H0.5/6, H0.75/6, H1/6 <made by Weidmuller Japan>
LT Series	AI0.5-6WH, AI0.3-6TQ <made by Phoenix Contact>
GP3000 Series	*-966 067-* compatible <made by Tyco Electronics AMP.> Select the one adaptable to AWG28 - 16.

■ **Flex Network System Wiring Layout**

The following drawing shows the wiring layout used for wires from the GLC unit's Flex Network I/F.
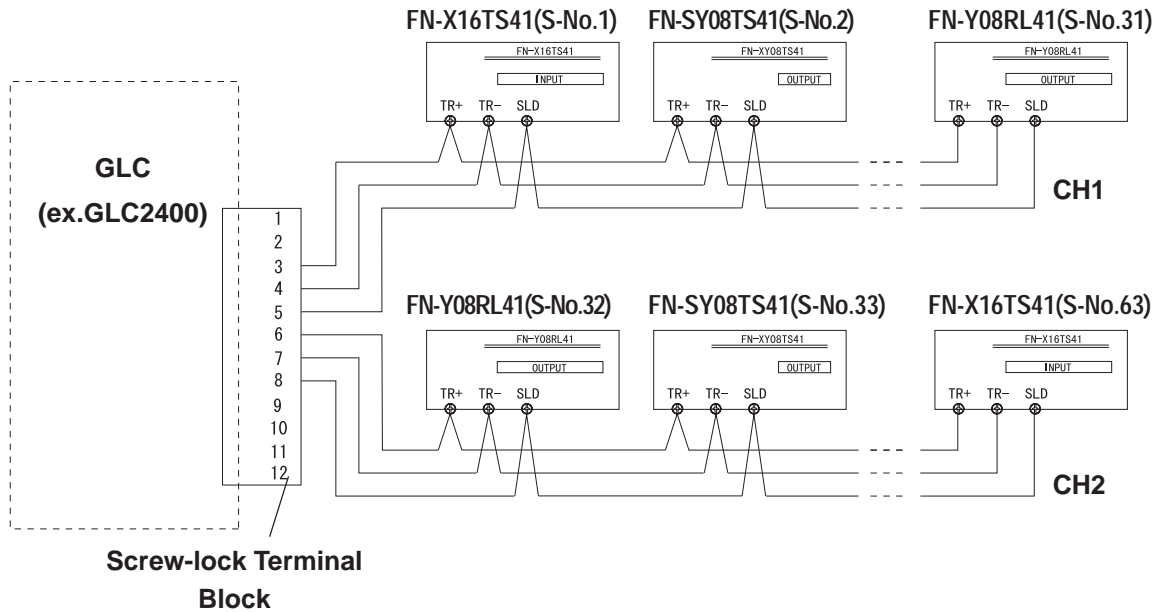
3.2.2   Connecting the Power Cord

<div>

⚠ WARNINGS

- **Be sure that the main power supply is turned completely OFF before beginning to wire the unit's power cord.**
- **The I/O unit uses only DC24V power. Using either the incorrect voltage or AC power could result in damage to both the power supply and the unit.**
- **Since this unit has no OFF/ON switch, be sure to install a breaker type device to switch power ON or OFF.**

</div>

- Wherever possible, use thick lines (max. 1.25mm²[0.0024in²]) and be sure to twist the wire ends to reduce noise.
  Applicable wire sizes are UL1015 and UL1007.
- Use the same type of crimp terminals as used for the Flex Network Communication Cable.

⚠ Important
- *Check that all I/O Unit terminal screws are securely tightened, even if they are not used.*

3.2.3 Connecting the I/O Wires

- Be sure to use wires that are 0.5 to 1.25mm²[0.0004 to 0.0024in²](AWG20 to AWG18) thick. Applicable wire sizes are UL1015 and UL1007. For more information about connecting the 64-Point unit to I/O units and applicable wire sizes, ▼Reference▲ 3.2.6 Wiring 64-Point Unit Connectors

- Use the same type of crimp terminals as used for the Flex Network Communication Cable.

Important
- *Check that all I/O Unit terminal screws are securely tightened, even if they are not used.*

- *Do not allow the wire pieces to fall inside the unit.*

■ Input Wiring

When two (2) DC input units (FN-X16TS41/FN-X32TS41) are used, with the same common line, use the following wiring setup.

For Sink Output type:
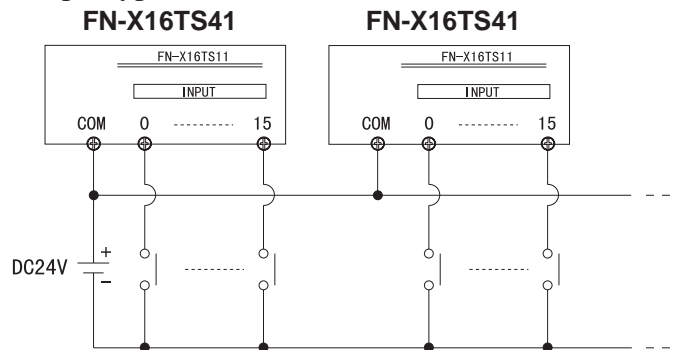
Note: When using a source ouput type, change the input circuit and the common (COM) lines.

■ Output Wiring

When using a Relay Output unit (FN-Y08RL41) together with noise generating magnetic devices or valves, attaching a diode for DC power, and a surge absorber for AC power is recommended
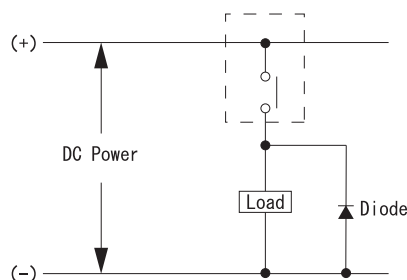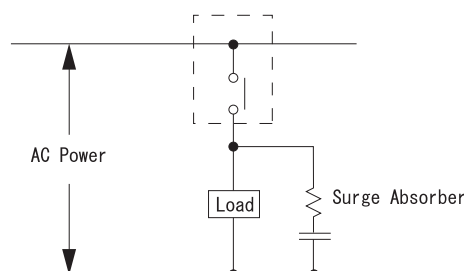
When using the Transistor output unit, (FN-XY08TS41/FN-Y16SC41/FN-Y16SK41/FN-XY16SK41/FN-XY16SC41/FN-XY32SKS41), be sure to connect a Reverse Start Power Absorbing Diode to both ends of the load.

FN-XY08TS41
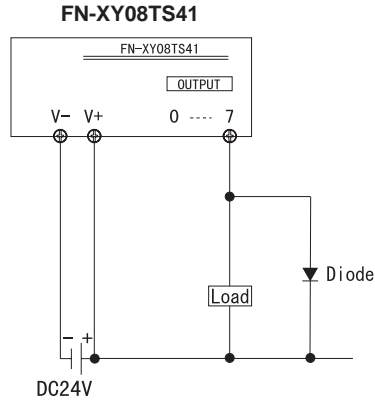
When using the Transistor output unit, (FN-XY08TS41/FN-Y16SC41/FN-Y16SK41/FN-XY16SK41/FN-XY16SC41/FN-XY32SKS41), be sure to connect a Reverse Start Power Absorbing Diode to both ends of the load.
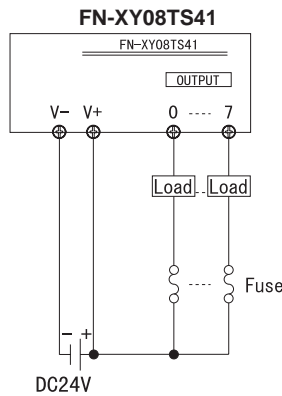
FN-XY08TS41

When attaching two (2) Transistor Ouput units (FN-XY08TS41/FN-Y16SC41/FN-Y16SK41/FN-XY16SK41/FN-XY16SC41/FN-XY32SKS41) with the same Common line, be sure to use the wiring shown below.

FN-XY08TS41   **FN-XY08TS41**
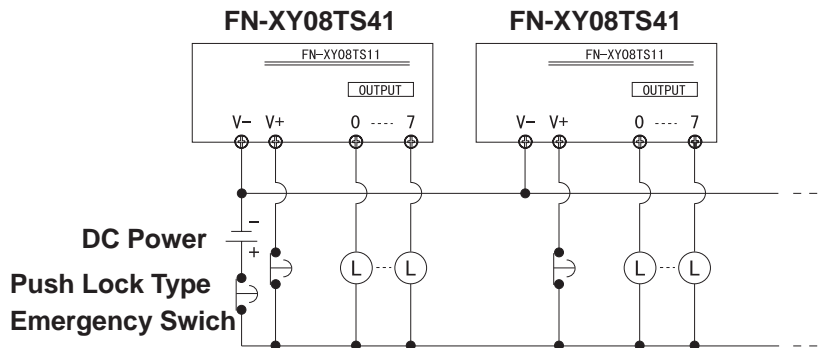
Do not use software to modify the Emergency Stop circuit. Instead, create a hardware circuit like the "Failsafe" circuit shown above.

3.2.4 General Cautions

Separating all communication lines from power lines by placing them in a separate duct will help to prevent problems from noise and interference.

Duct for Communication Lines	Duct for Regular Control Lines	Duct for Power Lines
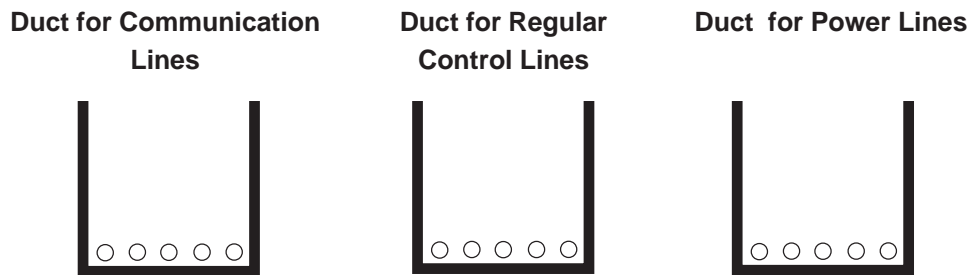
If the wires must be placed in the same duct, separate them via an earthed/grounded divider.

Grounded Separators

Com. Cables   Standard cables   Power cables

Duct (non-conducting resin/plastic)

Earth/ Ground
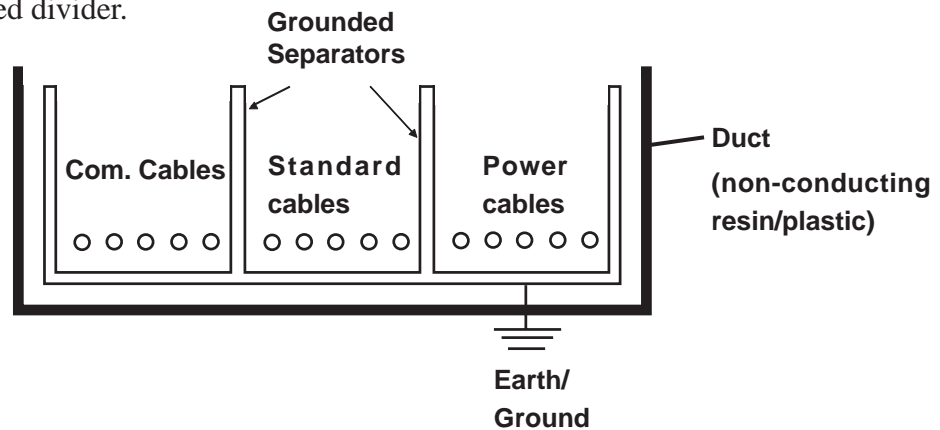
Note: **When you are unable to separate the cables as shown above, be sure to use shielded cable and create a ground from the shield line.**

Important

- *Use noise-reducing external wiring methods to increase overall system reliability.*

- *To prevent power surges or noise interference, use ducts to separate all DC I/O or current circuit wires from communication cables.*

- *To prevent malfunctions due to noise, communication cables must be wired separately from high-frequency lines and power lines such as high-voltage lines, high-current lines, and inverters.*

3.2.5 Attachment/Removal of the connectors for 64-Point Unit

■ Attachment

Each connector has two black lock levers, one on either side.

Rotate the these levers towards the connector's side-face label.
(See Fig-1)

INPUT Connector

OUTPUT Connector

64-Point Unit
<Fig-1>
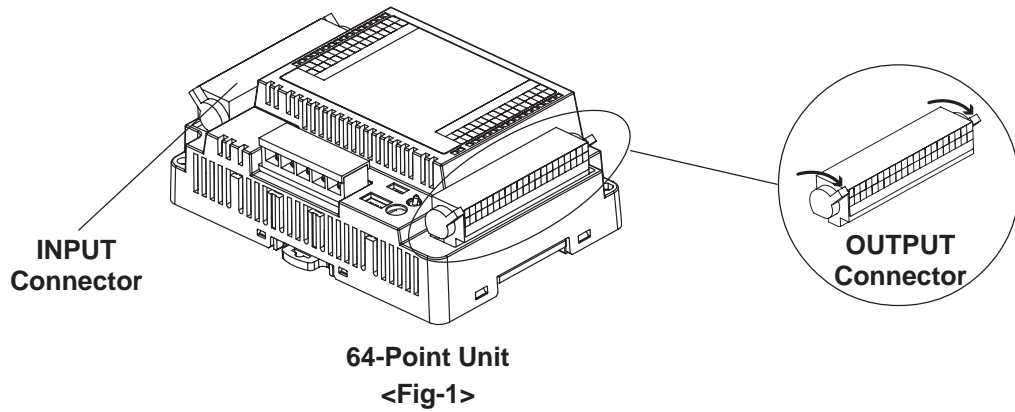
Note: • **Before attaching the connectors, be sure to place the unit on a level surface.**
• **To prevent unit damage, do not attach/remove the connector from the unit while the unit is attached to a DIN rail, or similar device.**

■ Removal

Rotate the attachment levers towards the opposite side, away from the connector's side-face label. The connector can then be lifted up and removed. (See Fig-2)

INPUT Connector

OUTPUT Connector
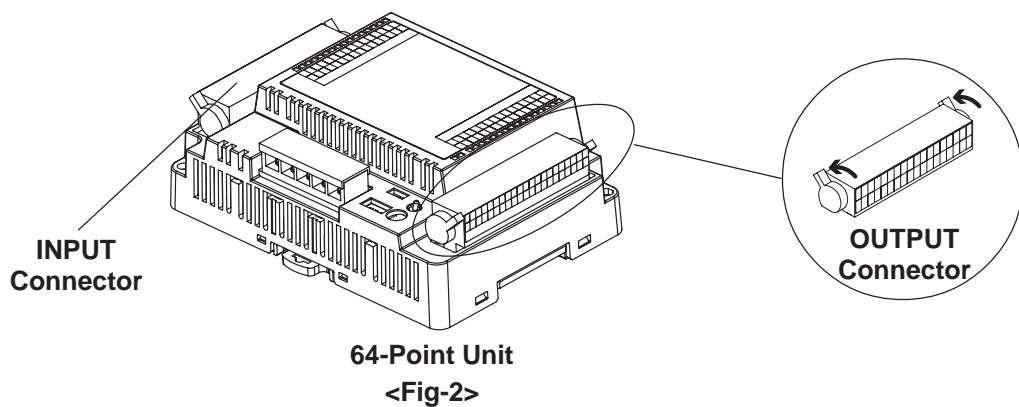
64-Point Unit
<Fig-2>

3.2.6   Wiring to the 64-Point Unit's Connectors

⚠ WARNING

Prior to wiring the connectors:

Be sure to remove the 64-Point unit's connectors prior to starting wiring. Failing to do so may cause an electric shock.

◆ **Items Required to Wire Connectors**

  - Screwdriver

Recommended type: **SDI (Product No. 900837)**
                                         <Weidmuller Japan>

  If another manufacturer is used, be sure it has the following dimensions:

   point depth: 0.4mm

   point hight: 2.5mm

   length from the point to the handle: 80mm

   Point shape should be DIN5264A, and meet Security Standard DN EN60900.

   Also, the screwdriver's tip should be shaped as follows:

Screwdriver Tip Shape

⚠ *Important*

The connector Pin Assignments differ for INPUT and for OUTPUT.

Please refer to 2.3 Input/Output Circuit Drawings ◆64-Point Unit Pin Assignments for wiring information.

The connectors are a spring clamp type. Use the following procedure to connect the wires to the connectors.

1) Insert the screwdriver into the square-shaped hole.

   This will open the wire's round-shaped hole.

2) Hold the screwdriver and insert the wire into the wire's round-shaped hole.

3) Take out the screwdriver from the square-shaped hole.

   The round-shaped hole will then close, and the wire will be held securely in place.

   To remove the wire, re-insert the screwdriver into the square-shaped hole and when the wire's spring clamp releases, pull the wire out.
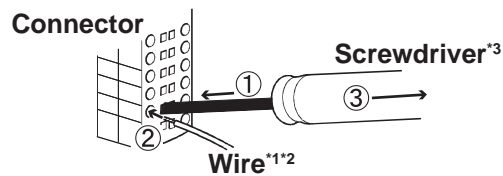
*1 Wire should be AWG22 to AWG18 thick, and twisted. Applicable wire sizes are UL1015 and UL1007.

*2 Be sure to strip from 6.5 to 8.0mm [0.26 to 0.31 in.] of cover from the wire.

Important

- **Be sure to strip only the amount of cover required.**
  If too much cover is removed, the end wires may short against each other, or against an electrode,which can create an electric shock.
  If not enough cover is removed the wire cannot carry a charge.

- **Do not solder the wire itself. This could lead to a bad or poor contact.**

- **Insert each wire completely into its opening. Failure to do so can lead to a unit malfunction or short, either against wire filaments, or against an electrode.**

*3 Do not rotate the point of the screwdriver inside the square-shaped opening. It may cause a malfunction.

Chapter

1. Prior to Troubleshooting
2. Error Code Display
3. Troubleshooting for GLC2000/ LT Series
4. Troubleshooting for GP3000 Series
5. After-sales service

4 Problems and Solutions

This section describes the Flex Network system's error messages and countermeasures.

4.1 Prior to Troubleshooting

Prior to locating a unit problem's cause via this chapter's section *Troubleshooting*, be sure to identify the the problem type and other basic items.

To help you with this, the Flex Network errors are classified into the following three types:

(1) Logic Program Error

  • The logic program does not run (GLC status LED: Green is not lit).

(2) Flex Network I/F Error

  • Communication cannot be performed with any Flex Network units.

(3) Flex Network Unit Error

  • Signal input or output cannot be performed for a Flex Network unit's points (all or some).

■ Check Items

After finishing your preliminary check, be sure to also check the following items before starting troubleshooting to locate the cause(s) of the problem.

  • Is the correct power voltage being supplied to the GLC and Flex Network units?

  • Is the power supplied to the GLC and Flex Network unit(s) within the allowable voltage range?

  • Are all connected cable wiring and connections (communication cable, I/O cable) secure and correct?

  • Is any Flex Network unit terminals loose or disconnected?

  • Are all Flex Network unit switches (rotary switch, dip switch, terminal switch, IN/OUT LED changeover switch) set correctly?

  • Is the designated communication cable being used?

4.2 Error Code Display

By displaying an error code on the GLC screen with using the system variables that indicate the I/O driver error codes, troubleshooting can be performed quickly.

Model	System Variable
GLC2000/LT Series	#IOStatus
GP3000 Series	#L_IOStatus

Note: **For GP3000 series, an error code is displayed in the system window on the GP screen without using the system variables.**

The following is an example of an error code display application.

■ Example Application

1. Create an I/O System Diagnosis button.

2. Create a ladder logic program that displays the system status as an error code when the [System Diagnosis] button is pressed.

4.3   Troubleshooting for GLC2000/LT Series

4.3.1   Troubleshooting Checklist for GLC2000/LT Series

Use the following flowchart to locate the problem cause(s) and take appropriate countermeasure(s).

Is the GLC unit's green status LED lit (not blinking)? → **NO** →

<Not lit>
The GLC unit's power has not been turned ON. Turn the power ON.

<Red LED is lit>
A major error has occurred in the logic program. Check the logic program status.

<Green LED is lit>
The logic program has not run. Activate the controller and run the logic program.

▼Reference◣ *Pro-Control Editor Operation Manual, Chapter 4*

LT Editor Operation Manual, Logic Program Edition, Chapter 2 – "Executing Logic Program"

YES ↓

Can the logic program be checked via Pro-Control Editor/LT Editor? → **NO** (left)

YES ↓

Was the "Use I/O" check box selected ? → **NO** →

Check Pro-Control Editor/LT Editor's [System Settings] window's [Use I/O] check box, and then download the logic program to the GLC.

▼Reference◣ *Pro-Control Editor Operation Manual, Chapter 4*

LT Editor Operation Manual, Logic Program Edition, Chapter 2 – "Executing Logic Program"

YES ↓

Is an error code displayed? ▼Reference◣ *4.2 – "Error Code Display"* → **NO** →

YES ↓

Is Error Code 841 displayed? → **NO** →

▼Reference◣ *4.3.2 Error Code List for GLC2000/LT Series*

YES ↓

Is the I/F unit's status LED "RUN" lit ? → **NO** →

The Flex Network unit is defective.

Contact your local distributor immediately.

YES ↓

YES

Is the
Flex Network
unit's status LED
"ERR" lit?

NO →

The Flex Network unit is defective. Contact your local distributor immediately.

YES

Can
the system
enter OFFLINE mode with
the logic program
stopped?

YES →

Perform self-diagnosis via the GLC's Offline [Error S-No. Display] function.

▽ *Reference* △ *Pro-Control Editor User Manual*
Flex Network Driver

LT Editor Operation Manual,
Logic Program Edition
Flex Network Driver

NO

Are
all connected I/O
unit's status LED
"PWR" lamps
lit?

NO →

The connected I/O unit's power has not turned on. Turn the power ON.

YES

Is the I/O unit's
status LED "ERR" lit?

YES →

The following causes are possible:

<I/O unit>

- **The dip switch or rotary switch has not been set up correctly (communication speed, terminating resistance, S-No. settings).**
- **The communication cable has not been connected correctly, or TR+ and TR- have been transposed.**
- **The communication cable has been disconnected or has short-circuited.**

NO

The I/O unit is defective.

↓

Reconnect any disconnected cables.

▽ *Reference* △ *Chapter 3 – " Installation and Wiring"*

✎ *Note:* **It is recommended that substitute Flex Network units be prepared in advance. This will allow you to minimize the amount of system downtime due to unexpected errors or problems.**

4.3.2   Error Code List for GLC2000/LT Series

■ **System Design Errors**

Error Code	Definition
501	Internal variable mapped to I/O terminal.
502	Input variable mapped to output terminal.
503	Output variable allocated to input terminal
504	Discrete variable mapped to integer terminal.
505	Integer variable mapped to discrete terminal
506	Variable type not supported by driver.
507	Variable is not mapped to terminal.
801	Duplicate terminal number encountered.
802	Duplicate S-No.
803	S-No. exceeded the range.
804	Analog unit S-No. is duplicated
805	FN-HC unit S-No. is duplicated
806	FN-PC unit S-No. is duplicated

■ **Initialization Errors**

Error Code	Definition
821	There is no hardware unit, or the unit type is incorrect.
822	Initial error
823	Analog unit setting error

■ **Runtime Errors**

Error Code	Definition
841	Error (disconnection, malfunction) among connected I/O units.
842	Error (disconnection, malfunction) in analog input unit. (Input range: set at 4 - 20mA)
843	FN-HC unit error occurred. For details, use a command to call up the unit's error code. ▼*Reference*◣ *Flex Network High Speed Counter Unit User Manual*
844	Initial error in the FN-HC Unit
845	FN-HC unit Write Command error
846	FN-PC unit error. For details, use a command to call up the unit's error code. ▼*Reference*◣ *Flex Network Single-Axis Positioning Unit User Manual*
847	FN-PC unit Write Command error

■ **Internal Error**

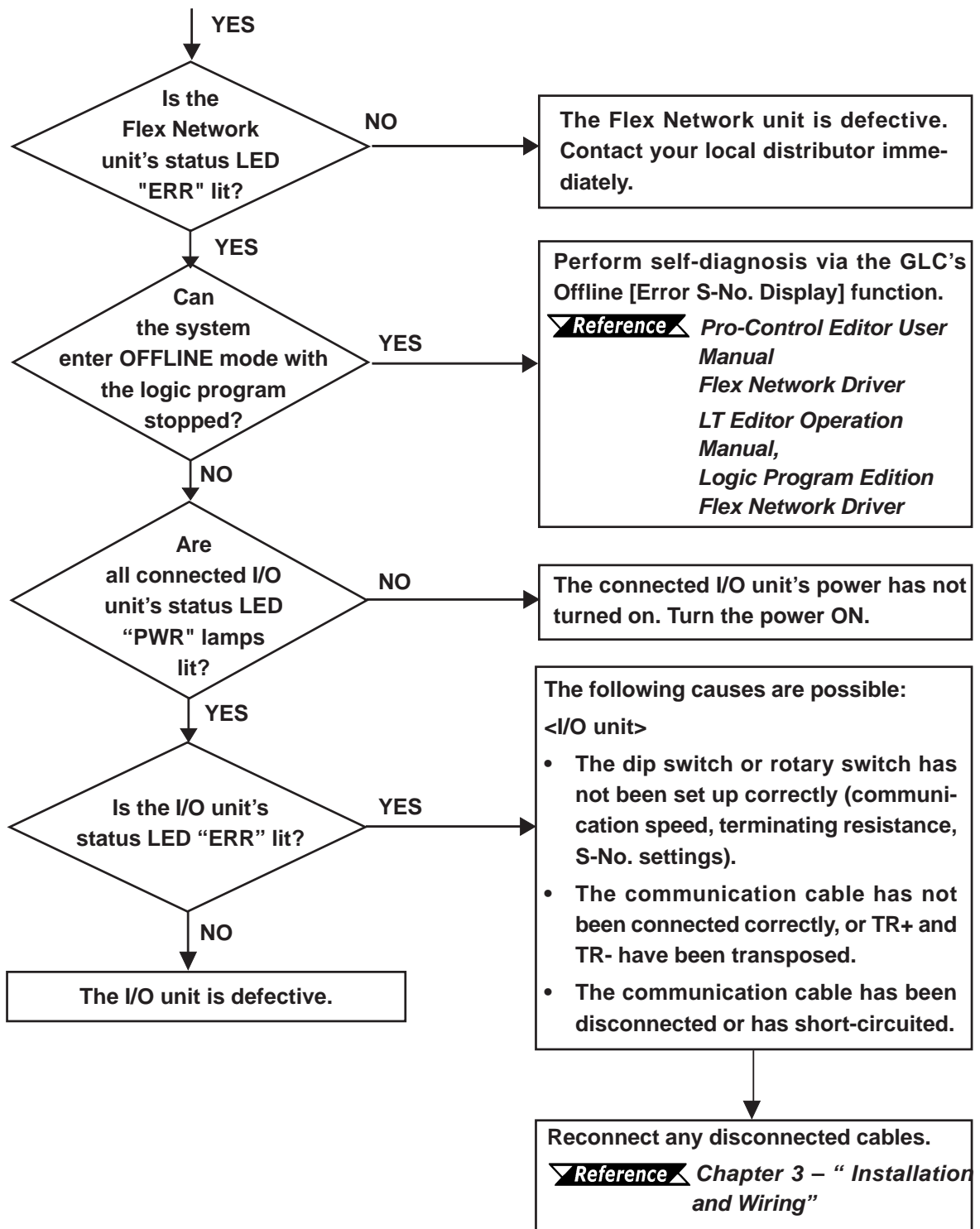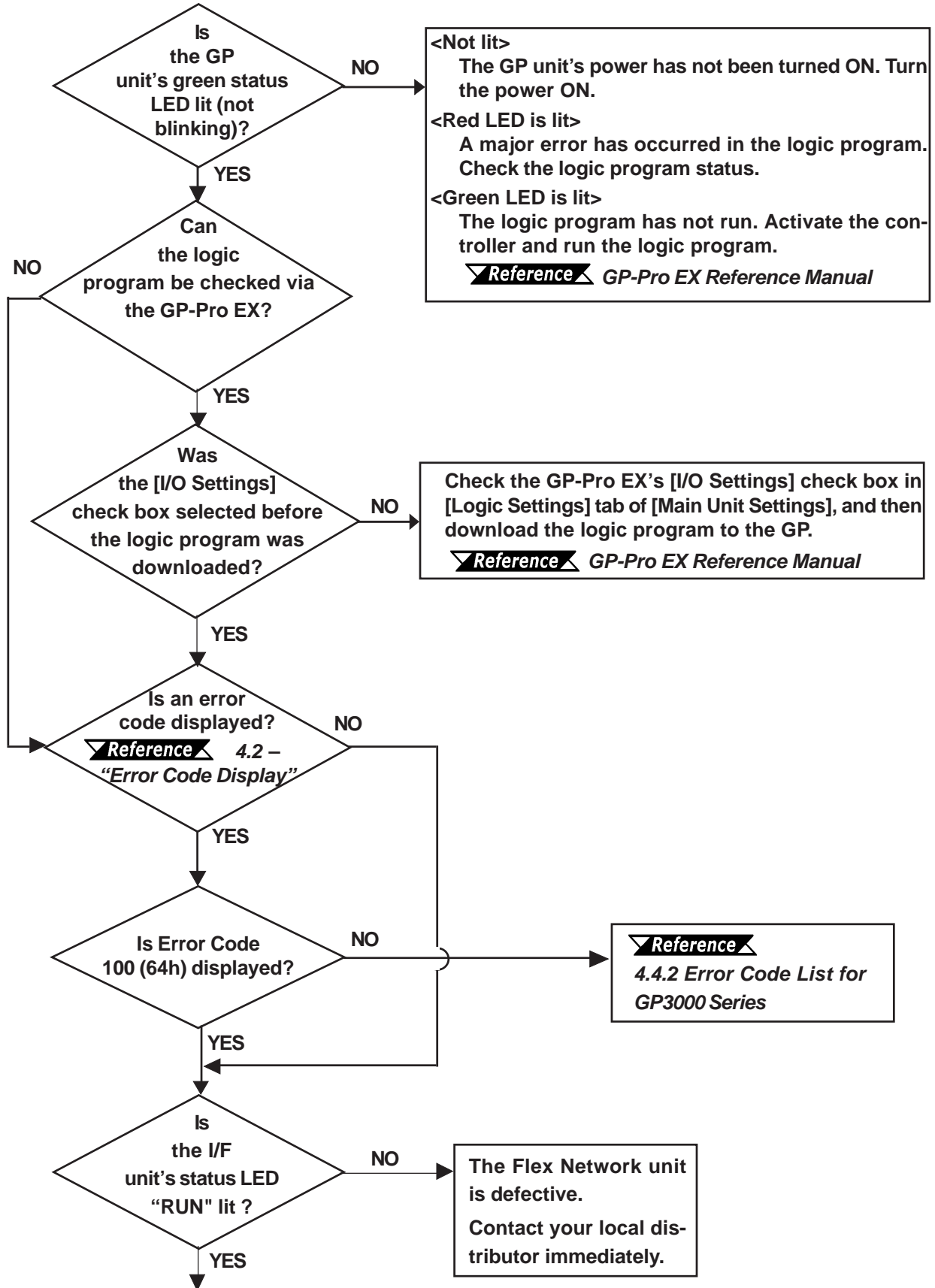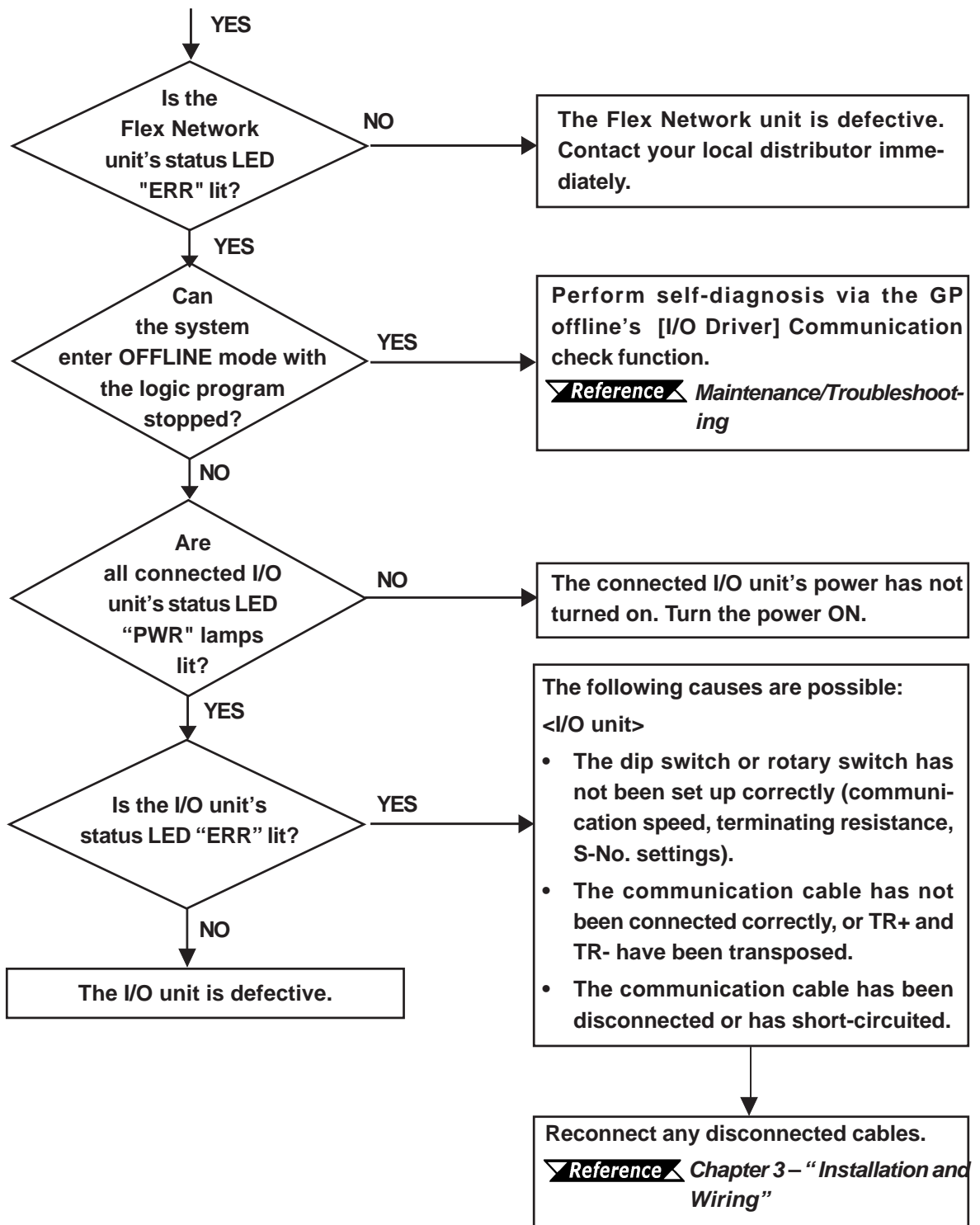| Error Code	Definition
850 -	Driver error #850. Please contact your local distributor.

4.4 Troubleshooting for GP3000 Series

4.4.1 Troubleshooting Checklist for GP3000 Series

Use the following flowchart to locate the problem cause(s) and take appropriate countermeasure(s).

Is the GP unit's green status LED lit (not blinking)? — NO →

\<Not lit\>
The GP unit's power has not been turned ON. Turn the power ON.

\<Red LED is lit\>
A major error has occurred in the logic program. Check the logic program status.

\<Green LED is lit\>
The logic program has not run. Activate the controller and run the logic program.

▼**Reference**△ *GP-Pro EX Reference Manual*

YES ↓

Can the logic program be checked via the GP-Pro EX?

NO ← / YES ↓

Was the [I/O Settings] check box selected before the logic program was downloaded? — NO →

Check the GP-Pro EX's [I/O Settings] check box in [Logic Settings] tab of [Main Unit Settings], and then download the logic program to the GP.

▼**Reference**△ *GP-Pro EX Reference Manual*

YES ↓

Is an error code displayed?
▼**Reference**△ *4.2 – "Error Code Display"* — NO

YES ↓

Is Error Code 100 (64h) displayed? — NO →

▼**Reference**△
4.4.2 Error Code List for GP3000 Series

YES ↓

Is the I/F unit's status LED "RUN" lit ? — NO →

The Flex Network unit is defective.

Contact your local distributor immediately.

YES ↓

YES

```
Is the
Flex Network          NO        The Flex Network unit is defective.
unit's status LED  ────────▶    Contact your local distributor imme-
"ERR" lit?                      diately.
```

YES

```
Can
the system             YES       Perform self-diagnosis via the GP
enter OFFLINE mode with  ──────▶ offline's [I/O Driver] Communication
the logic program                check function.
stopped?                         ▼Reference▲ Maintenance/Troubleshoot-
                                            ing
```

NO

```
Are
all connected I/O      NO        The connected I/O unit's power has not
unit's status LED  ────────▶     turned on. Turn the power ON.
"PWR" lamps
lit?
```

YES

```
                       YES       The following causes are possible:
Is the I/O unit's  ────────▶     <I/O unit>
status LED "ERR" lit?
                                 •  The dip switch or rotary switch has
                                    not been set up correctly (communi-
                                    cation speed, terminating resistance,
                                    S-No. settings).
                                 •  The communication cable has not
                                    been connected correctly, or TR+ and
                                    TR- have been transposed.
                                 •  The communication cable has been
                                    disconnected or has short-circuited.
```

NO

```
The I/O unit is defective.
```

```
Reconnect any disconnected cables.
▼Reference▲ Chapter 3 – "Installation and
            Wiring"
```

Note: **It is recommended that substitute Flex Network units be prepared in advance. This will allow you to minimize the amount of system downtime due to unexpected errors or problems.**

4.4.2 Error Code List for GP3000 Series

Note: In the system window on the GP screen, an error code is displayed with RGE* put to the top of the error code.

Ex.) RGE*001 Not supported unit

■ System Design Errors

Error Code	Error Message	Definition
001	Not supported unit.	The type of the unit is different.
002	Illegal Parameter.	The data type of the symbol variable assigned to the Flex Network unit is illegal. The Flex Network unit setting value is illegal.
003	Device offset beyond limit.	The address of the symbol variable assigned to the Flex Network unit is out of range.
004	Terminal config overlapped.	The number of Flex Network unit terminals exceeds the limit.
005	Illegal terminal sequence.	The I/O terminal numbers are not specified in ascending order.
006	Insufficient terminals.	The number of I/O terminals is not appropriate (insufficient).
007	Units config overlapped.	Flex Network unit S-No. is duplicated and set.
008	Units count over limit.	The maximum number of connected Flex Network units (63 units) is exceeded. The maximum value of S-No. (S-No. 63) is exceeded. S-No. of the Flex Network unit that occupies more than one node has exceeded the max. (S-No. 63).
009	Drivers config overlapped.	The driver has been registered twice.
010	Unmatched In/Out terminal.	The input/output settings of the Flex Network unit are not correct.
011	Unmatched bit/word term.	The variable type specified in the Flex Network unit is incorrect.
012	Illegal level nunber.	Something is wrong with the I/O driver.
013	Illegal data addr. Gotten.	The I/O driver information is incorrect. The controller information is incorrect.
014	No drivers/units registed.	The I/O driver or Flex Network unit is not registered.

■ Runtime Errors

Error Code	Error Message	Definition
100	Unit communication error.	A communication error has occurred between the main unit and the Flex Network unit. The communication cable is cut off. The Flex Network unit is not connected. The editor settings have problems.
101	4ch. analog setting error.	Communication with the 4ch. analog unit has failed.
102	2ch. analog setting error.	Communication with the 2ch. analog unit has failed.
103	Analog unit's wire broken.	The 4 to 20mA-ranging input signal of the 4ch. or 2ch. analog unit is cut off.
104	Counter unit's error.	An error has occurred in the high-speed counter unit. For details, use a command to call up the unit's error code. ▼*Reference*◣ *Flex Network High Speed Counter Unit User Manual*
105	Counter initial error.	Initializing the high-speed counter unit has failed.
106	Counter communication err.	A communication error with the high-speed counter unit has occurred. The communication cable is cut off. The high-speed counter unit is not connected. The editor settings have problems.
107	Positioning Unit's error.	An error has occurred in the positioning unit. For details, use a command to call up the unit's error code. ▼*Reference*◣ *Flex Network Single-Axis Positioning Unit User Manual*
108	Comm.position error.	A communication error with the positioning unit has occurred. The communication cable is cut off. The positioning unit is not connected. The editor settings have problems.
109	2ch. analog comm. error.	A communication error with the 2ch. analog unit has occurred. The communication cable is cut off. The 2ch. analog unit is not connected. The editor settings have problems.

■ Internal Error

Error Code	Error Message	Definition
200	SetValue func.(INT) NG.	Integer-type Terminal data of the Flex Network unit could not be read.
201	SetValue func.(bit) NG.	Bit-type Terminal data could not be read.
202	GetValue func.(INT) NG.	Integer-type Terminal data could not be written.
203	GetValue func.(bit) NG.	Bit-type Terminal data could not be written.

4.5   After-sales service

For details on after-sales service, refer to Pro-face website at

http://www.pro-face.com/trans/en/manual/1001.html

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