



**PROGRAMMABLE CONTROLLER**  
**FP3/FP10S**  
**MEWNET-TR (I/O) SYSTEM**  
**Technical Manual**

A thick black horizontal bar is positioned below the title text.

FP3/5 MEWNET-TR(I/O) SYSTEM Technical Manual  
ACG-M0076-1

## Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.

To ensure that you use this product correctly, read this User's Manual thoroughly before use.

Make sure that you fully understand the product and information on safe.

This manual uses two safety flags to indicate different levels of danger.

### **WARNING**

**If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.**

- Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
- Do not use this product in areas with inflammable gas. It could lead to an explosion.
- Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

### **CAUTION**

**If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.**

- To prevent abnormal exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assure in these specifications.
- Do not dismantle or remodel the product. It could lead to abnormal exothermic heat or smoke generation.
- Do not touch the terminal while turning on electricity. It could lead to an electric shock..
- Use the external devices to function the emergency stop and interlock circuit.
- Connect the wires or connectors securely.  
The loose connection might cause abnormal exothermic heat or smoke generation
- Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It might cause exothermic heat or smoke generation.
- Do not undertake construction (such as connection and disconnection) while the power supply is on.

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**CHAPTER 1**

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**SYSTEM CONFIGURATIONS**

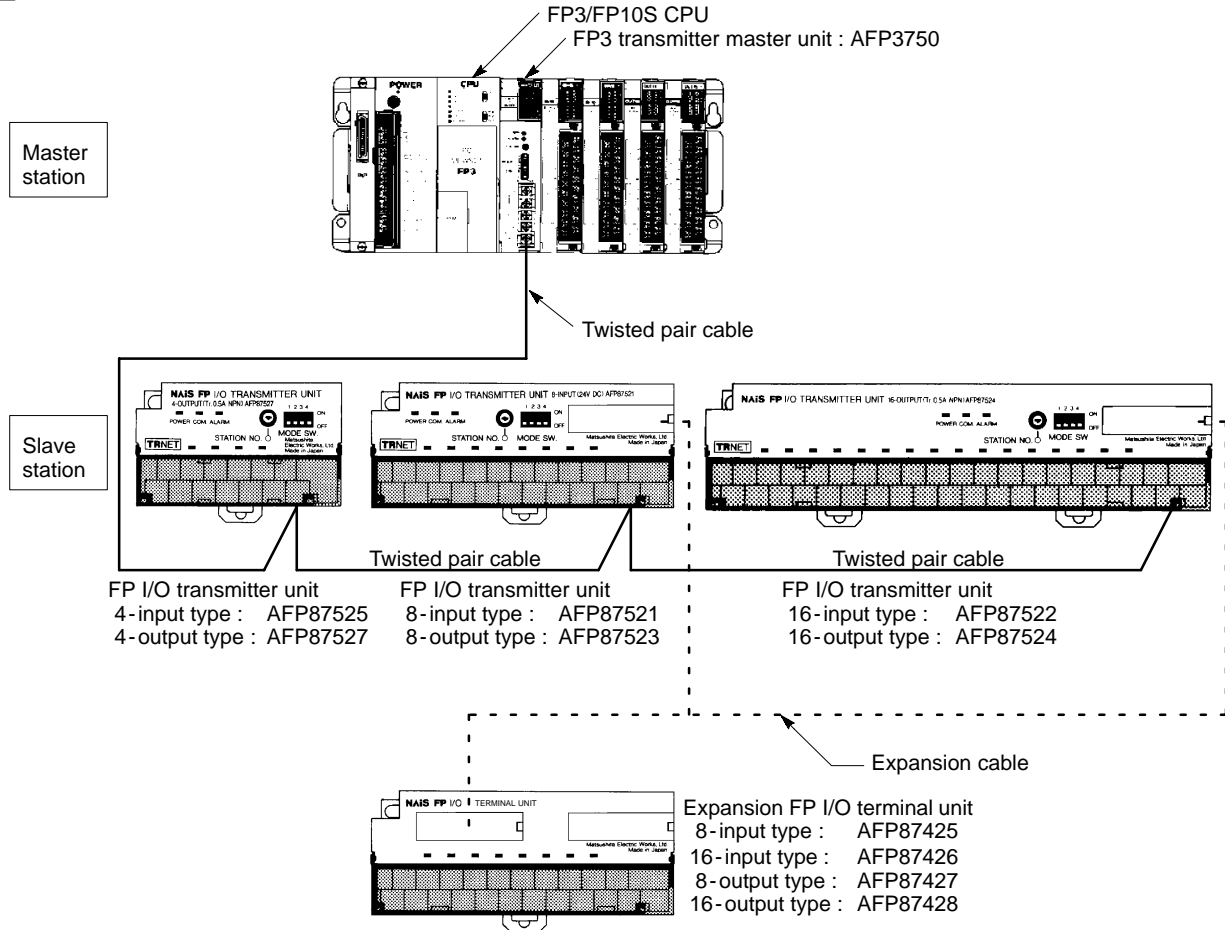
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# 1-1. System Configurations

## ■ A description of the FP3/FP10S MEWNET-TR system

The FP3/FP10S MEWNET-TR system is a network system that links FP3/FP10S CPUs and I/O field devices with minimum wiring. The remote I/O control function allows the user to control the I/O information of the I/O units that are connected. The I/O link function enables the exchange of I/O information when two FP3/FP10S CPUs are connected.

## ■ FP3/FP10S MEWNET-TR



### • Master station

The master station consists of the FP3/FP10S CPU and FP3 transmitter master unit. The FP3/FP10S CPU exchanges I/O information with the connected slave stations through the FP3 transmitter master unit.

### • Slave station

The FP I/O transmitter unit or expansion FP I/O terminal unit is used as a slave station to increase the number of I/O points. For details on slave station units, see “1-3. Product Types” on page 6.



# 1-2. Features

## ■ Remote I/O control

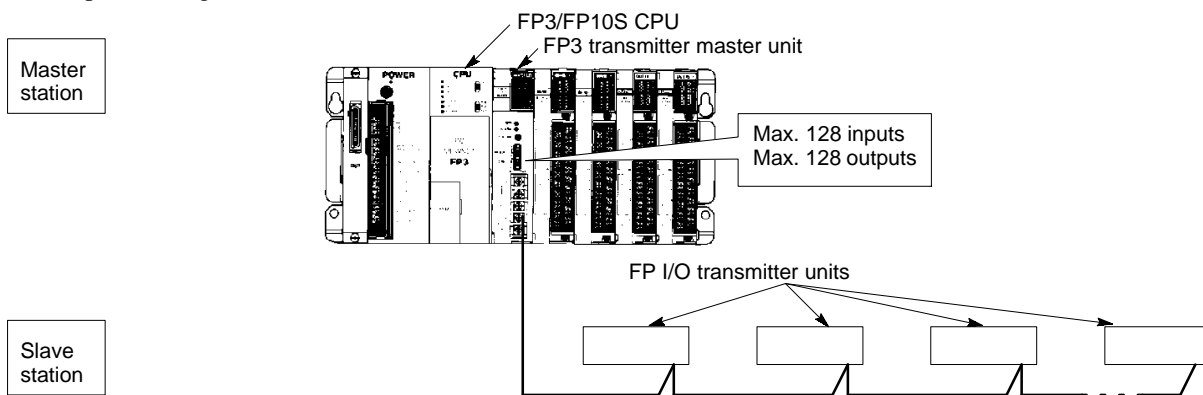
Connecting FP3/FP10S CPUs and I/O terminals, the master station (FP3/FP10S CPU) controls the I/O information of the distant slave stations.

### < FP3/FP10S MEWNET-TR system >

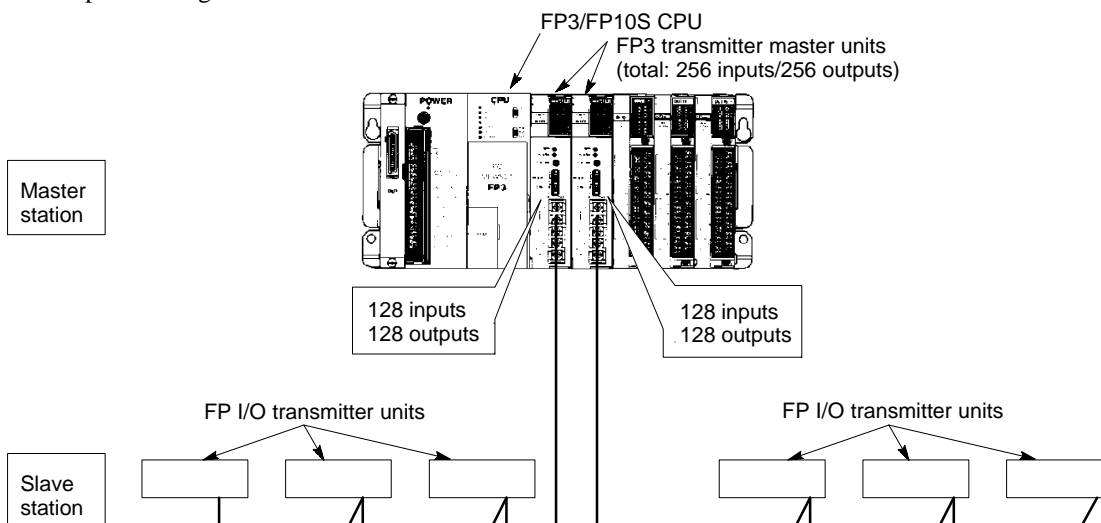
#### • Controlled I/O points:

An FP3 transmitter master unit can control 128 inputs and 128 outputs. In the FP3 MEWNET-TR system, by connecting sixteen FP3 transmitter master units, remote I/O control of up to 2,048 inputs and 2,048 outputs is possible. In the FP10S MEWNET-TR system, by connecting twenty-four FP3 transmitter master units, remote I/O control of up to 3,072 inputs and 3,072 outputs is possible.

#### ● Example of using one FP3 transmitter master unit



#### ● Example of using two FP3 transmitter master units



### Note:

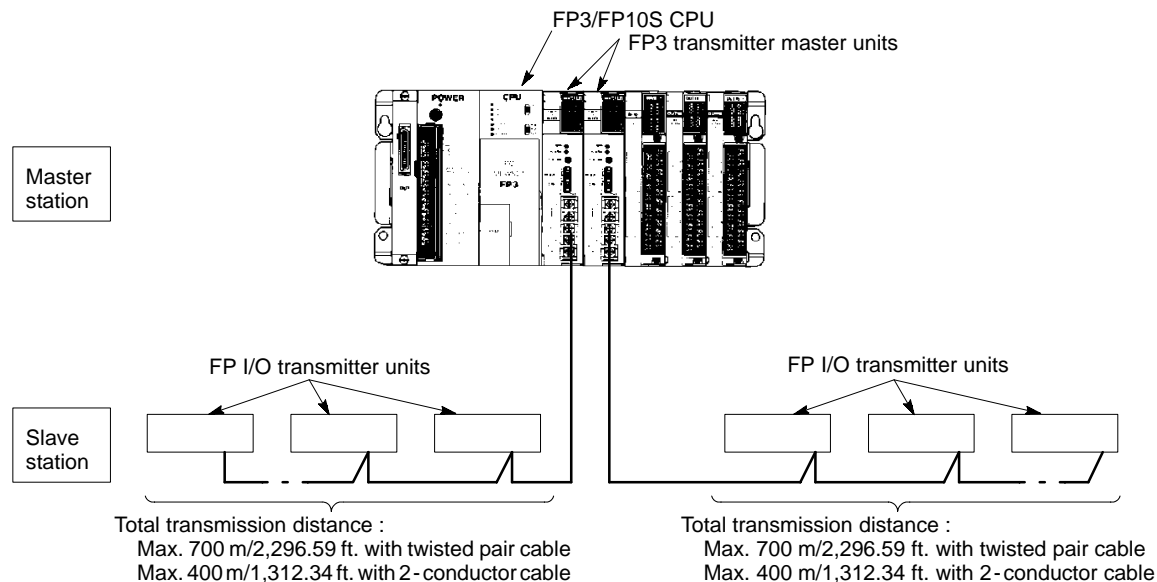
- The number of I/O points is set to 0 at the factory for both input and output. With the number of input and output points set at 0, the remote I/O control function cannot be used.

**■ Total transmission distance of up to 700 m**

When the network is connected with twisted pair cable, the maximum transmission distance is 700 m (2,296.59 ft).

When a 2-conductor cable is used, the maximum transmission distance is 400 m (1,312.34 ft).

**Example :** FP3/FP10S MEWNET-TR system



**■ Selection of the slave station with the most suitable number of I/O points to match the application**

The FP I/O transmitter unit is available with 4, 8 and 16 I/O points for use as a slave station to allow the most suitable system configuration. The 8-point and 16-point FP I/O transmitter units can be combined with the expansion FP I/O terminal unit to establish a system with different numbers of input and output points.

Type		Description	Part number
FP I/O transmitter unit	4-input	Rated power supply voltage: 24 V DC Source input	AFP87525
	8-input		AFP87521
	16-input		AFP87522
	4-output	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87527
	8-output		AFP87523
	16-output		AFP87524
Expansion FP I/O terminal unit	8-input	Rated power supply voltage: 24 V DC Source input	AFP87425
	16-input		AFP87426
	8-output	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87427
	16-output		AFP87428

**Note:**

- The FP I/O transmitter units (4 - input and 4 - output type) cannot be combined with expansion FP I/O terminal units.

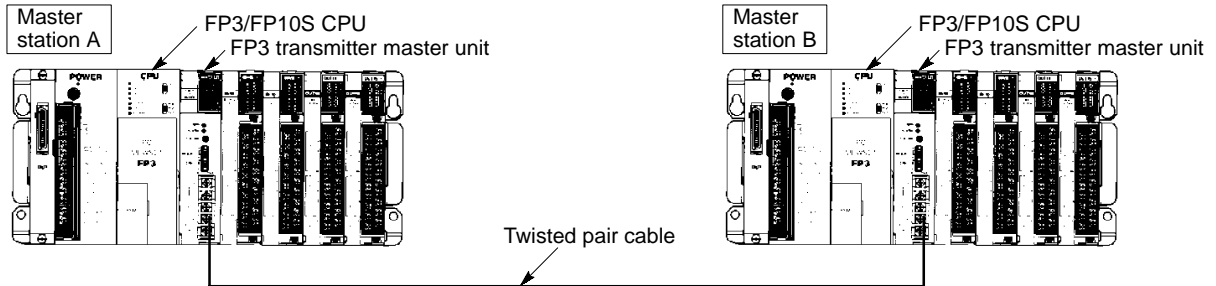
## ■ I/O link function

The I/O information can be exchanged between master stations (between FP3/FP10S and FP3/FP10S, FP3/FP10S and FP1, FP3/FP10S and FP-M).

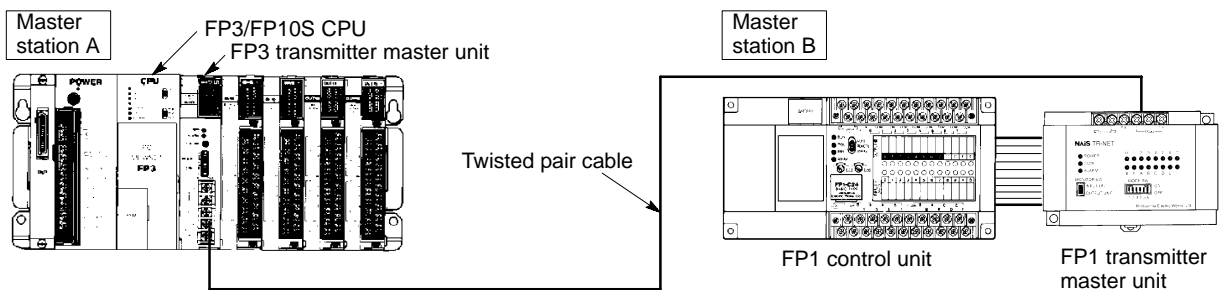
- Numbers of maximum I/O points for I/O link

I/O information of 128 inputs and 128 outputs can be exchanged.

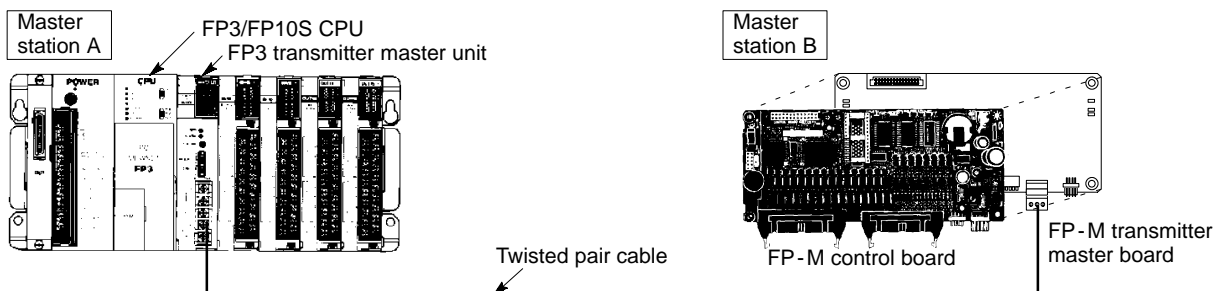
- Between FP3/FP10S and FP3/FP10S



- Between FP3/FP10S and FP1



- Between FP3/FP10S and FP-M



## ■ Equipped with a safety function for selecting the operation status when an abnormality occurs

When an abnormality occurs such as cable or power disconnection, and there is a communication failure even with one single slave station, the control operation can be stopped for all the slave stations. It can also hold the output of a slave station that is out of communication due to cable disconnection.

## ■ Easy wiring and flexible alteration of the equipment layout

Because a twisted pair cable is used for input and output connections, wiring is easy and wiring errors can be minimized. It also allows a flexible alteration of the equipment layout.

# 1-3. Product Types

## 1. Master Stations

Type	Description	Part number
<b>FP3 CPU and FP10S CPU</b>	The FP3/FP10S MEWNET - TR system master station is formed by installing the CPU on the master backplane.	See "FP3/FP10S HARDWARE Technical Manual."
<b>FP3 transmitter master unit</b>	The FP3/FP10S MEWNET - TR system master station is formed by installing the FP3 transmitter master unit on the master or expansion backplane.	AFP3750

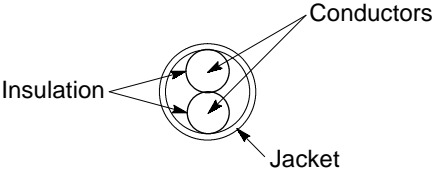
## 2. Slave Stations

Type	Description	Part number	
<b>FP I/O transmitter unit</b>	<b>4-input</b>	Rated power supply voltage: 24 V DC Source input	AFP87525
	<b>8-input</b>		AFP87521
	<b>16-input</b>		AFP87522
	<b>4-output</b>	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87527
	<b>8-output</b>		AFP87523
	<b>16-output</b>		AFP87524
<b>Expansion FP I/O terminal unit</b>	<b>8-input</b>	Rated power supply voltage: 24 V DC Source input	AFP87425
	<b>16-input</b>		AFP87426
	<b>8-output</b>	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87427
	<b>16-output</b>		AFP87428

**Note:**

• The FP I/O transmitter units (4-input and 4-output type) cannot be combined with expansion FP I/O terminal units.

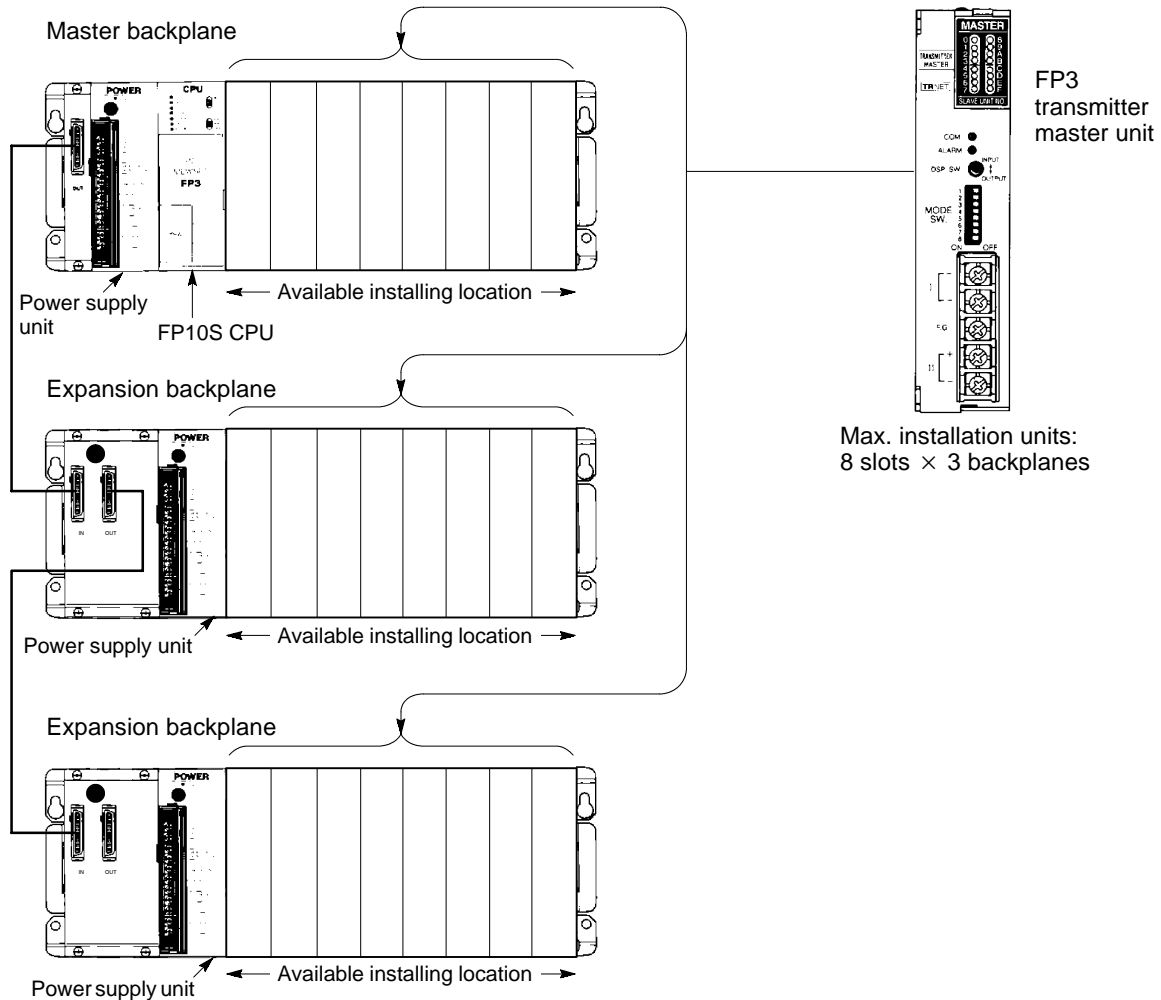
## 3. Transmission Cable

Type	Description
<b>Twisted pair cable and 2-conductor cable</b>	<p><b>Conductor:</b> Size: Min. 1.25 mm<sup>2</sup> (AWG16 or larger) Resistance: Max. 16.8 Ω/km (at 20 °C/68 °F)</p> <p><b>Cable:</b> Insulation material: Polyethylene Insulation thickness: Max. 0.5 mm/0.020 in. Jacket diameter: Approx. 8.5 mm/0.335 in.</p> 

# 1-4. Combinations

## 1. Master Stations

Example: FP10S MEWNET-TR system



### ■ FP3 transmitter master unit

- The FP3 transmitter master unit can be installed in an I/O unit mounting slot of the master backplane or expansion backplane.
- An FP3 CPU or FP10S CPU can be mounted with more than one FP3 transmitter master unit.
- The number of controllable I/O points can be selected by operation mode selector Nos. 5 to 8 of the FP3 transmitter master unit.
  - You can select the number of input points to be 0, 32, 64 or 128.
  - You can select the number of output points to be 0, 32, 64 or 128.
- When two or more FP3 transmitter master units are mounted, the maximum number of controllable I/O points is as follows:
  - FP3 MEWNET-TR system: 2,048 input points, 2,048 output points
  - FP10S MEWNET-TR system: 3,072 input points, 3,072 output points

### Note:

- The number of I/O points is set to 0 at the factory. With this setting, the remote I/O control function cannot be used.

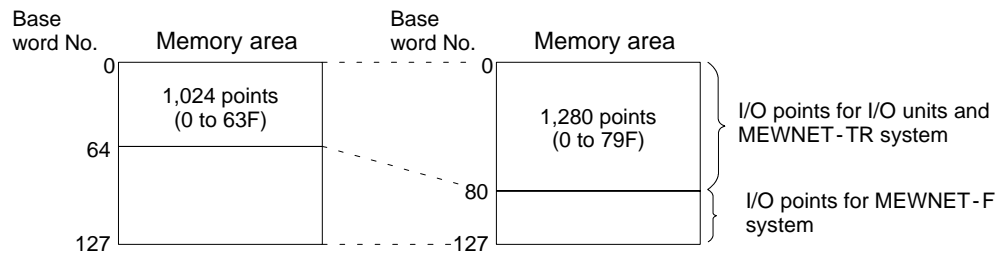
■ Limitations on unit installation

- More than one FP3 transmitter master unit can be mounted; however, the following cautions should be observed.
  - **I/O occupation:**  
 The total number of controllable I/O points should not be set higher than the number of I/O points of the FP3/FP10S CPU.
    - < For FP3 CPU >  
 The maximum number of controllable I/O points is 2,048 for input and 2,048 for output.  
 For example, an FP3 transmitter master unit for which 128 input points and 128 output points are selected can be mounted with up to 16 units.
    - < For FP10S CPU >  
 The maximum number of controllable I/O points is 3,072 for input and 3,072 for output.  
 For example, an FP3 transmitter master unit for which 128 input points and 128 output points are selected can be mounted with up to 24 units.
  - **Current consumption:**  
 The total current consumption of the units used should not exceed the rated output current of their power supply unit.
  
- There is no restriction concerning the combination or mounting slot of the FP3/FP10S I/O units and intelligent units. However, please note that I/O allocation is determined by the mounting positions and combinations of the units (I/O occupation).  
 The I/O occupation points of an FP3 transmitter master unit are the same as the I/O points selected by operation mode selector Nos. 5 to 8.  
 For example, when 128 input points and 128 output points are selected by the operation mode selector, the I/O occupation is 128X and 128Y.

**Notes:**

- See the “FP3/FP10S HARDWARE Technical Manual” for details about limitations on unit installation.
- The maximum number of controllable I/O points for FP3/FP10S CPUs is set at the factory to 1,024. If the number of I/O points used by the MEWNET - TR system exceeds 1,024, change the base word number using the NPST - GR software to increase the number of controllable I/O points. See the “NPST - GR SOFTWARE Manual” and “REMOTE I/O SYSTEM Technical Manual” for details about the I/O number allocation by base word number setting.

**Example:** To use 1,280 I/O points with a MEWNET - TR system, change the base word number from No. 64 (factory setting) to No. 80 using the NPST - GR software.



## 2. Slave Stations

- The slave stations that can be used for remote I/O control are as follows:

	Type	Part number
FP I/O transmitter unit	4-input	AFP87525
	8-input	AFP87521
	16-input	AFP87522
	4-output	AFP87527
	8-output	AFP87523
	16-output	AFP87524

### ■ Combinations of units set for the slave station (factory setting)

The FP3/FP10S MEWNET-TR can be connected with more than one FP I/O transmitter unit within the range of control I/O point numbers set by the operation mode selector of the master station (FP3 transmitter master unit). However, the maximum number of slave stations is 16 units for input and 16 units for output.

### < Example of combination >

When setting the control I/O point numbers to 128 for input and 128 for output using the operation mode selector.

- System configuration with only the 16-point type FP I/O transmitter units
  - 16-input type × 8 units (128 inputs)
  - 16-output type × 8 units (128 outputs)
- System configuration with only the 8-point type FP I/O transmitter units
  - 8-input type × 16 units (128 inputs)
  - 8-output type × 16 units (128 outputs)
- When the system is configured with only 4-point units, the maximum of 16 input units and 16 output units can be used even if the setting is made for 128 input points and 128 output points. Therefore, only 64 points can be used for each, as shown below.
  - 4-input × 16 units (64 inputs)
  - 4-output × 16 units (64 outputs)

### ■ Expansion on the slave station side

- The following units can be added to the slave station.

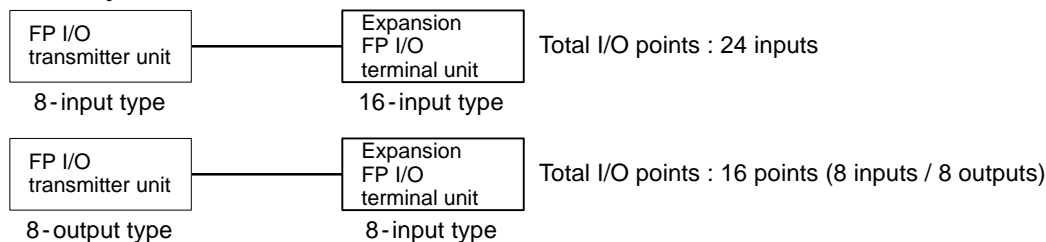
	Type	Part number
Expansion FP I/O terminal unit	8-input	AFP87425
	16-input	AFP87426
	8-output	AFP87427
	16-output	AFP87428

The slave station can be connected with one expansion FP I/O terminal unit to increase the number of I/O points.

### Note:

- The 4-point type slave station (FP I/O transmitter unit) cannot be connected with the expansion FP I/O terminal unit.

### <Example>



- See page 46, “5. Slave Station Expansion” for details about the expansion of slave stations.

### 3. Controllable I/O Points and I/O Allocation

- The I/O allocation example shown in the table below is for an FP3 transmitter master unit installed in slot No. 0 of the master backplane.
  - The open circles (○) indicate the number of points used for input, and the closed circles (●) indicate the number of points used for output.
- < Example > When 32 input points and 32 output points are selected, the input point numbers are X0 to X1F, and the output point numbers are Y20 to Y3F.

Requested I/O point		I/O allocation															
Input	Output	0 to F	10 to 1F	20 to 2F	30 to 3F	40 to 4F	50 to 5F	60 to 6F	70 to 7F	80 to 8F	90 to 9F	100 to 10F	110 to 11F	120 to 12F	130 to 13F	140 to 14F	150 to 15F
128	128	○	○	○	○	○	○	○	○	●	●	●	●	●	●	●	●
	64	○	○	○	○	○	○	○	○	●	●	●	●				
	32	○	○	○	○	○	○	○	○	●	●						
	16	○	○	○	○	○	○	○	○	●							
	0	○	○	○	○	○	○	○	○								
64	128	○	○	○	○	●	●	●	●	●	●	●	●				
	64	○	○	○	○	●	●	●	●								
	32	○	○	○	○	●	●										
	16	○	○	○	○	●											
	0	○	○	○	○												
32	128	○	○	●	●	●	●	●	●	●	●						
	64	○	○	●	●	●	●										
	32	○	○	●	●												
	16	○	○	●													
	0	○	○														
16	128	○	●	●	●	●	●	●	●	●							
	64	○	●	●	●	●											
	32	○	●	●													
	16	○	●														
	0	○															
0	128	●	●	●	●	●	●	●	●								
	64	●	●	●	●												
	32	●	●														
	16	●															

**Notes:**

- The I/O points used in a MEWNET -TR system are selected by the operation mode selector of the FP3 transmitter master unit.
- The first I/O numbers vary depending on the mounting position of the FP3 transmitter master unit and the I/O occupation points of other units installed.



**CHAPTER 2**

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**SPECIFICATIONS AND PARTS  
TERMINOLOGY**

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# 2-1. Specifications

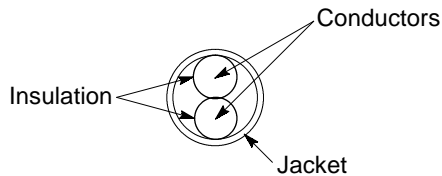
## 1. General Specifications

Item	Description
Ambient temperature	0 °C to + 55 °C (32 °F to 131 °F)
Ambient humidity	30 % to 85 % RH (non-condensing)
Storage temperature	- 20 °C to + 70 °C (- 4 °F to 158 °F)
Storage humidity	30 % to 85 % RH (non-condensing)
Vibration resistance	10 Hz to 55 Hz, 1 cycle/min: double amplitude of 0.75 mm (0.030 in.), 10 min on 3 axes
Shock resistance	98 m/s <sup>2</sup> (10 G) or more, 4 times on 3 axes
Noise immunity	1,000 Vp-p with pulse width, 50 ns and 1 μs (based on in-house measurements)
Operating environment	Must be free from corrosive gases and excessive dust.

## 2. FP3 MEWNET-TR System Specifications

Item	Description
Communication method	Two-lines, half-duplex
Synchronization method	Asynchronous system
Communication path	2-conductor cable or twisted pair cable
Transmission distance	Max. 700 m (2,296.59 ft.) with twisted pair cable Max. 400 m (1,312.34 ft.) with 2-conductor cable See transmission cable below.
Communication speed	0.5 Mbps
Input/output response time	I/O response time is determined by the number of slave stations (FP I/O transmitter units and expansion FP I/O terminal units). See page 128, "8-5. Transfer Time," for details about the I/O response time.
Controllable I/O points	Max. 128 inputs and 128 outputs/FP3 transmitter master unit Max. 2,048 inputs and 2,048 outputs (sixteen FP3 transmitter master units)/FP3 CPU Max. 3,072 inputs and 3,072 outputs (twenty-four FP3 transmitter master units)/FP10S CPU
Interface	RS485
Communication error checking method	Self-diagnosis data checking method

### ■ Transmission cable



#### Conductor:

Size: Min. 1.25 mm<sup>2</sup> (AWG16 or larger)  
Resistance: Max. 16.8 Ω/km (at 20 °C/68 °F)

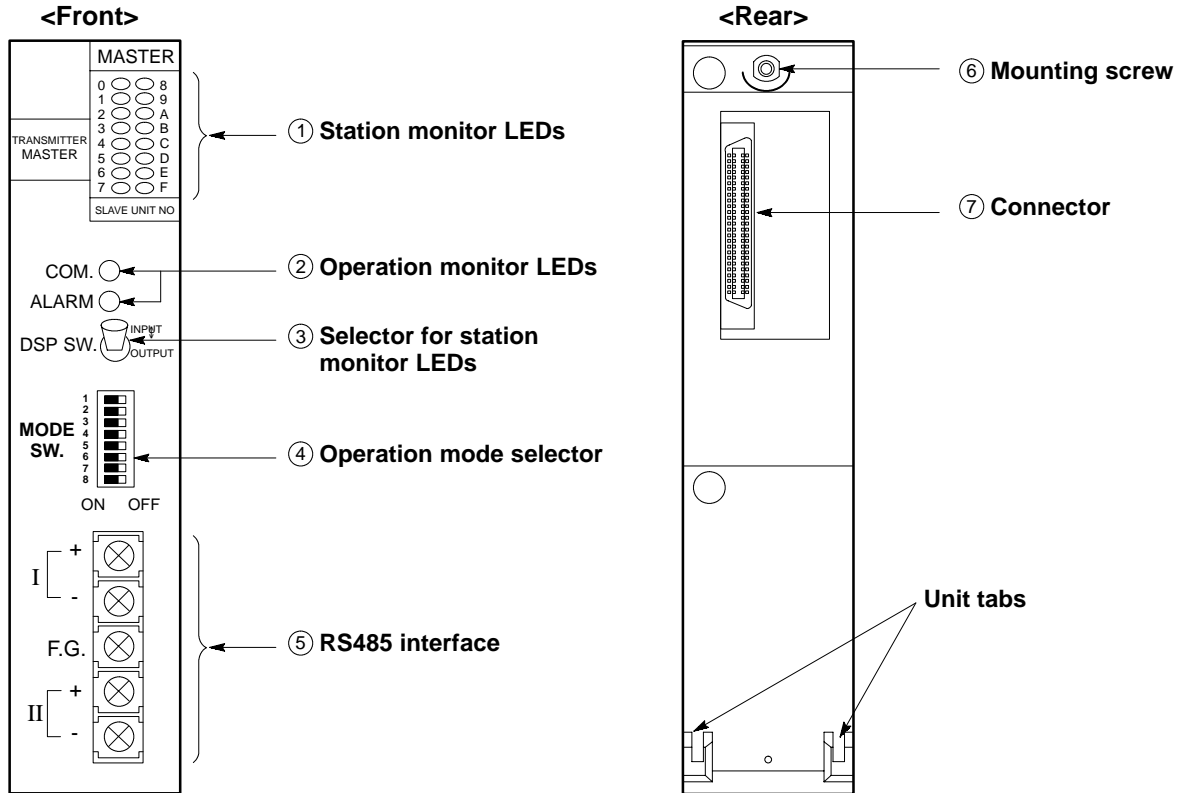
#### Cable:

Insulation material: Polyethylene  
Insulation thickness: Max. 0.5 mm/0.020 in.  
Jacket diameter: Approx. 8.5 mm/0.335 in.

## 2-2. Master Station

### 1. FP3 Transmitter Master Unit

#### 1) Parts terminology



**① Station monitor LEDs:**

LEDs that monitor the slave stations (station number 0 to F) connected to the FP3 transmitter master unit.

- When ON: Connected to a slave station
- When flashing: A communication error at this slave station number
- When OFF: Not connected to a slave station

**② Operation monitor LEDs:**



Indicate the operation and communication status of the MEWNET-TR system. See following page.

**③ Selector for station monitor LEDs:**

Selects the unit type (input or output) of station monitor LEDs.

Input position (INPUT): Status of slave station (FP I/O transmitter unit) input type is indicated by station monitor LEDs.

Output position (OUTPUT): Status of slave station (FP I/O transmitter unit) output type is indicated by station monitor LEDs.

The selector's upper state is "INPUT (  )" and the lower state is "OUTPUT (  )."

**④ Operation mode selector:**

Selects the MEWNET-TR communication conditions and sets the I/O addresses. See following page.

**⑤ RS485 interface:**

Interface for MEWNET-TR communications.

**⑥ Mounting screw:**

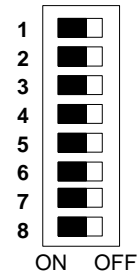
A screw for attaching the unit to a master or expansion backplane.

**⑦ Connector:**

Connects to the slot on the master or expansion backplane.

■ Operation monitor LEDs

LED	Description	
COM.	Flashing:	Normal communication status (flashes in approx. 0.2 s intervals)
	ON:	Waiting for communication
	Flashing slowly:	A communication error occurred at the slave station. The normal slave station continues I/O control operation when operation mode selector No.2 is set to the ON position. (flashes in approx. 1 s intervals)
	OFF:	A communication error with a slave station
ALARM	Flashing:	Station number setting error or operation mode selector Nos. 5 to 8 are all set to the OFF position
	ON:	Error on FP3 transmitter master unit
	OFF:	Normal



■ Operation mode selector settings

Selector number	Function	Description	Selector position							
			1	2	3	4	5	6	7	8
1	System configuration selection	Remote I/O control disabled, master B of I/O link	ON							
		Remote I/O control enabled, master A of I/O link	OFF							
2	Output operation condition during a communication error	Hold (continues I/O control operation)	ON							
		Output OFF	OFF							
3 and 4	Not used		- -							
5 and 6	Input point selection of slave station	0 point					OFF	OFF		
		32 points					ON	OFF		
		64 points					OFF	ON		
		128 points					ON	ON		
7 and 8	Output point selection of slave station	0 point							OFF	OFF
		32 points							ON	OFF
		64 points							OFF	ON
		128 points							ON	ON

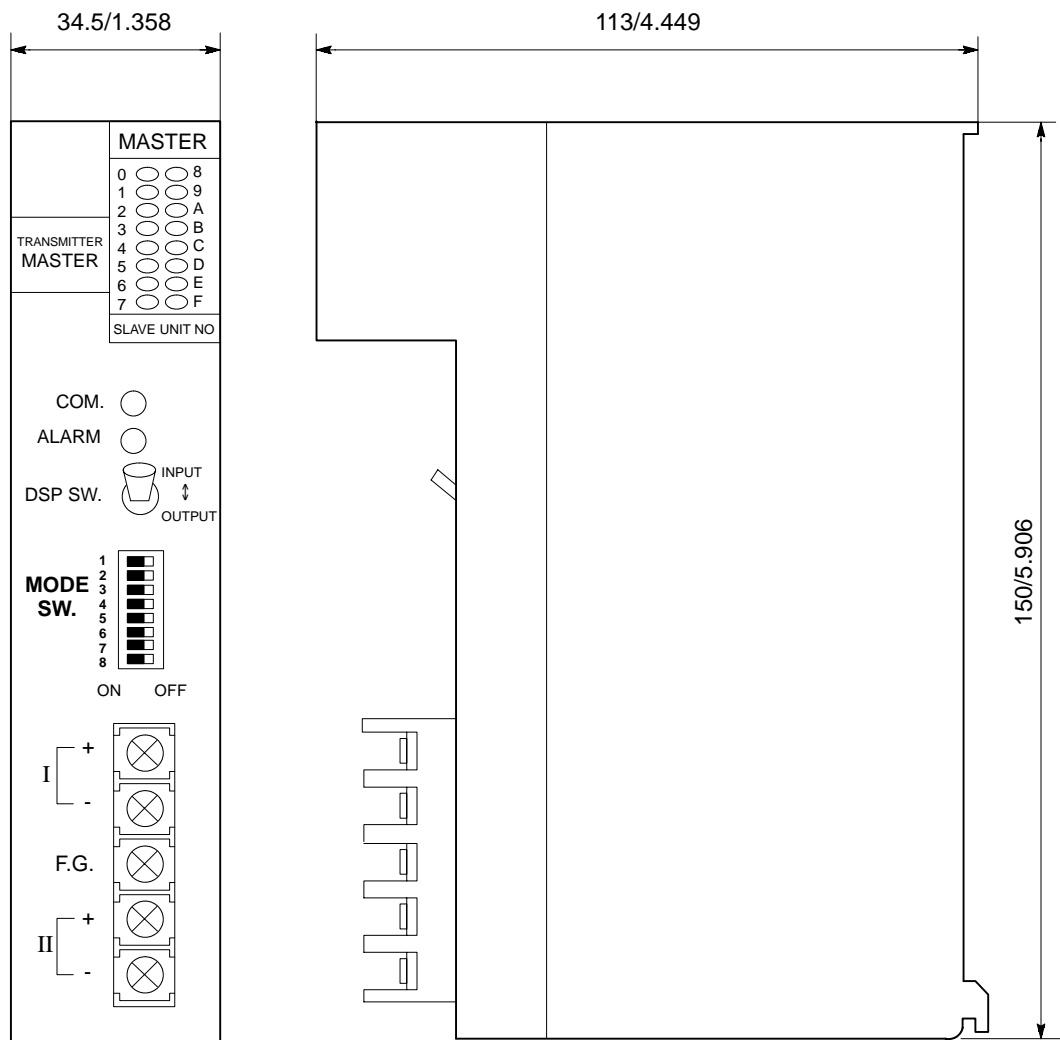
Notes:

- The operation mode selectors are all set to the OFF position when shipped.
- The operation mode selector's right side is "OFF (  )" and the left side is "ON (  )."
- Be sure the power is OFF when changing the selector position.

### 2) Performance specifications

Item	Description
<b>Controllable I/O points</b>	The controllable I/O points are selected by the operation mode selector (selector numbers 5, 6, 7, and 8). Input: Select from 0, 32, 64 or 128 points. Output: Select from 0, 32, 64 or 128 points.
<b>I/O occupation points</b>	The total number of input and output points that are set
<b>Current consumption</b>	130 mA or less
<b>Connection method</b>	Terminal block (M3.5 screw)
<b>Weight</b>	Approx. 240 g/8.466 oz.

### 3) Dimensions



(unit : mm/in.)

# 2-3. Slave Stations

## 1. Product Types

Type	Description	Part number	
FP I/O transmitter unit	4-input	Rated power supply voltage: 24 V DC Source input	AFP87525
	8-input		AFP87521
	16-input		AFP87522
	4-output	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87527
	8-output		AFP87523
	16-output		AFP87524
Expansion FP I/O terminal unit	8-input	Rated power supply voltage: 24 V DC Source input	AFP87425
	16-input		AFP87426
	8-output	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87427
	16-output		AFP87428

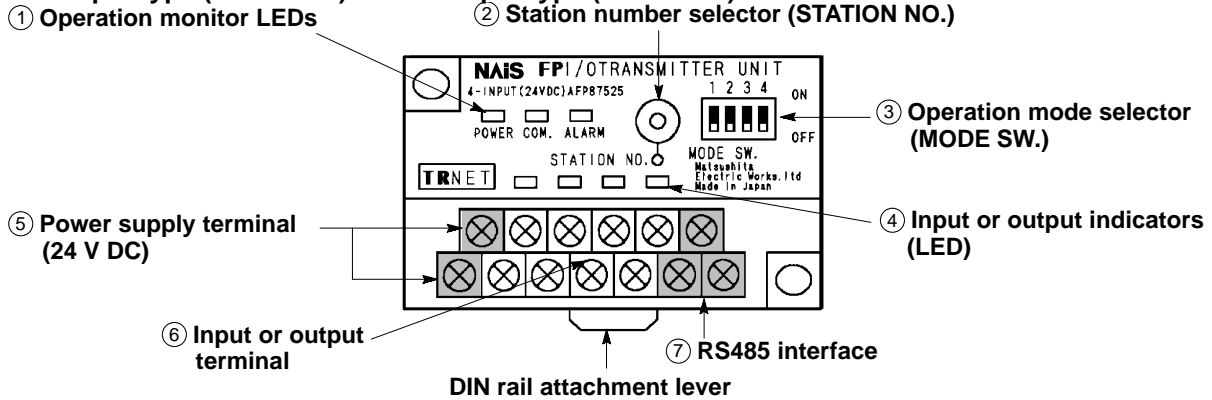
**Note:**

• FP I/O transmitter units (4-input and 4-output type) cannot be combined with expansion FP I/O terminal units.

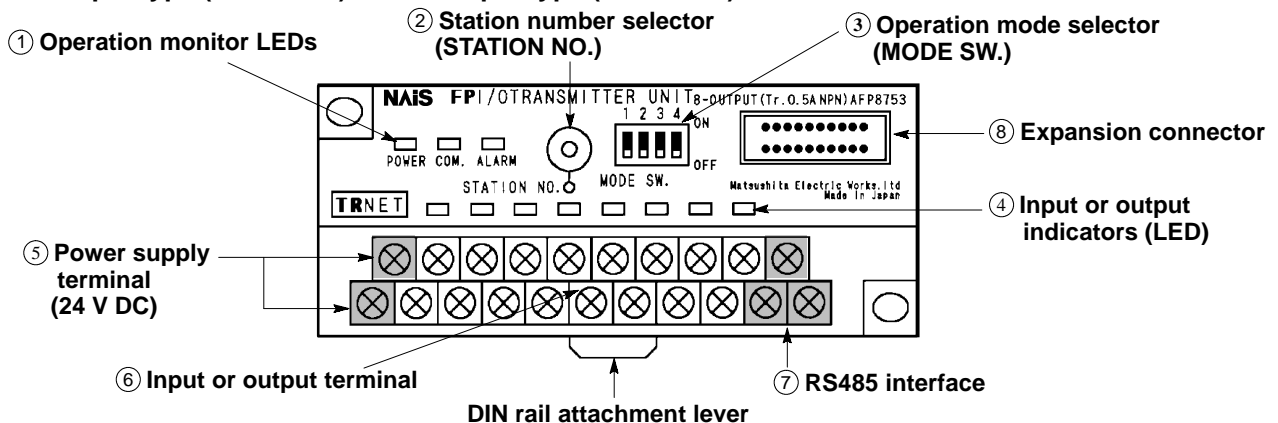
## 2. FP I/O Transmitter Units

### 1) Parts terminology

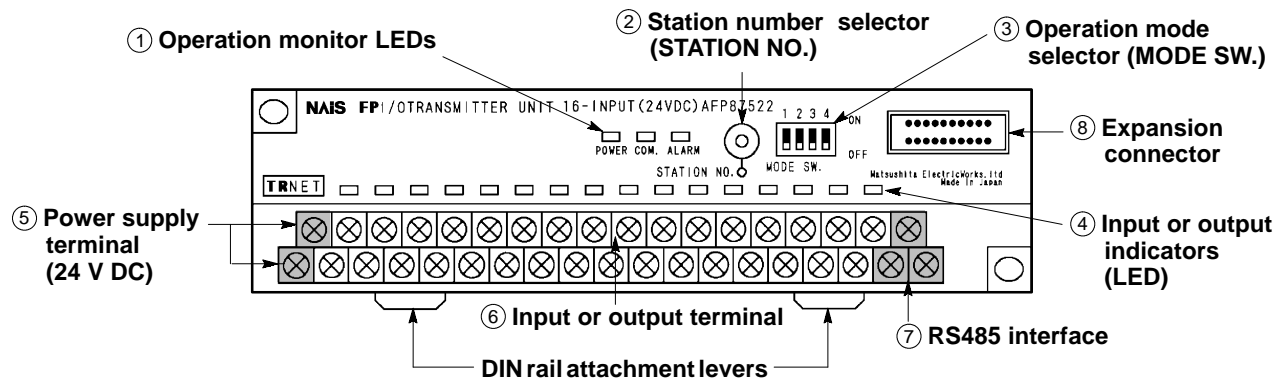
■ 4-input type (AFP87525) and 4-output type (AFP87527)



■ 8-input type (AFP87521) and 8-output type (AFP87523)



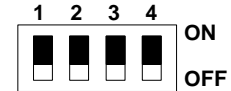
■ 16-input type (AFP87522) and 16-output type (AFP87524)



- ① **Operation monitor LEDs:** Indicate the operation and communication status of the MEWNET-TR system. See following page.
- ② **Station number selector (STATION NO.):** Set the slave station number of the MEWNET-TR system with a screwdriver. See page 57, “4-2. I/O Allocation,” for details about the station number setting.
- ③ **Operation mode selector (MODE SW.):** Selects the MEWNET-TR communication conditions. See following page.
- ④ **Input or output indicators (LED):**  
 Input type: Indicates the input ON/OFF states.  
 Output type: Indicates the output ON/OFF states.  
**<Example: 8-input/output type>**
- |       |   |   |   |   |   |   |   |        |        |
|-------|---|---|---|---|---|---|---|--------|--------|
| TRNET |   |   |   |   |   |   |   | ← LEDs |        |
| +24V  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7      | +RS485 |
- ⑤ **Power supply terminal (24 V DC):** Supplies 24 V DC.
- ⑥ **Input or output terminal:**  
 Input type: Connects to input field devices (e.g., limit switches).  
 Output type: Connects to output field devices (e.g., LEDs).
- ⑦ **RS485 interface:** Interface for MEWNET-TR communications using 2-conductor cable and twisted pair cable.
- ⑧ **Expansion connector:** Connects to expansion FP I/O terminal unit using expansion cable.

■ Operation monitor LEDs

LED	Description	
<b>POWER</b>	ON:	Power is supplied.
	OFF:	Power is not supplied.
<b>COM.</b>	Flashing:	Normal communication status (flashes in approx. 0.2 s intervals)
	ON:	Waiting for communication
	OFF:	A communication error
<b>ALARM</b>	ON:	Error at FP I/O transmitter unit
	OFF:	Normal



■ Operation mode selector setting

Selector number	Function	Description	Selector position			
			1	2	3	4
1	Communication mode selection	(1:1) × n communication	ON			
		1:1 communication	OFF			
2	System configuration selection	This unit is regarded as a slave station.	ON			
		This unit is not regarded as a slave station.	OFF			
3	Output operation condition during a communication error	Hold (continues I/O communication)	ON			
		Output OFF	OFF			
4	Terminal station setting	Terminal station	ON			
		Not a terminal station	OFF			

**Notes:**

- The operation mode selectors are all set to the OFF position when shipped.
- The operation mode selector's upper state is "ON (  )" and the lower state is "OFF (  )."
- Be sure the power is OFF when changing the switch position.



## ■ Input type FP I/O transmitter unit

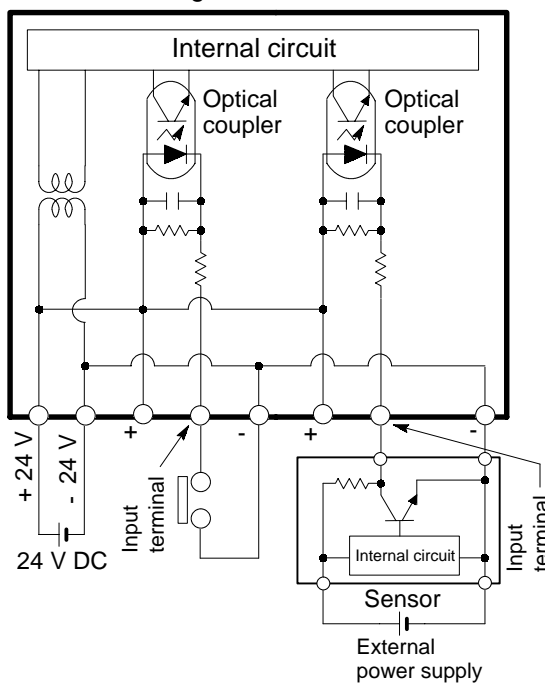
- Performance specifications

Item	Description
<b>Number of input points</b>	AFP87525: 4 points AFP87521: 8 points AFP87522: 16 points
<b>Rated input voltage</b>	24 V DC
<b>Rated input current</b>	Approx. 5.5 mA (at 24 V DC)
<b>Input impedance</b>	Approx. 4.4 k $\Omega$
<b>Input voltage range</b>	20.4 to 26.4 V DC
<b>ON voltage</b>	19.2 V or less
<b>OFF voltage</b>	2.4 V or more
<b>Response time</b>	OFF $\rightarrow$ ON: 1 ms or less ON $\rightarrow$ OFF: 1 ms or less
<b>Internal current consumption (at 24 V DC)</b>	AFP87525: 40 mA or less (when all points are OFF) 65 mA or less (when all points are ON)* AFP87521: 40 mA or less (when all points are OFF) 85 mA or less (when all points are ON)* AFP87522: 40 mA or less (when all points are OFF) 125 mA or less (when all points are ON)*
<b>Input points per common</b>	AFP87525: 4 points/common AFP87521: 8 points/common AFP87522: 16 points/common
<b>Input type</b>	Source input
<b>Connection method</b>	Terminal block (M3.5 screw)
<b>Insulation</b>	Optical coupler
<b>Weight</b>	AFP87525: Approx. 130 g/4.586 oz. AFP87521: Approx. 190 g/6.702 oz. AFP87522: Approx. 280 g/9.877 oz.

### Note:

\* When all points are ON, the current required for the driving input current is also included in the ratings.

- Internal circuit diagram



■ Transistor NPN open collector output type FP I/O transmitter unit

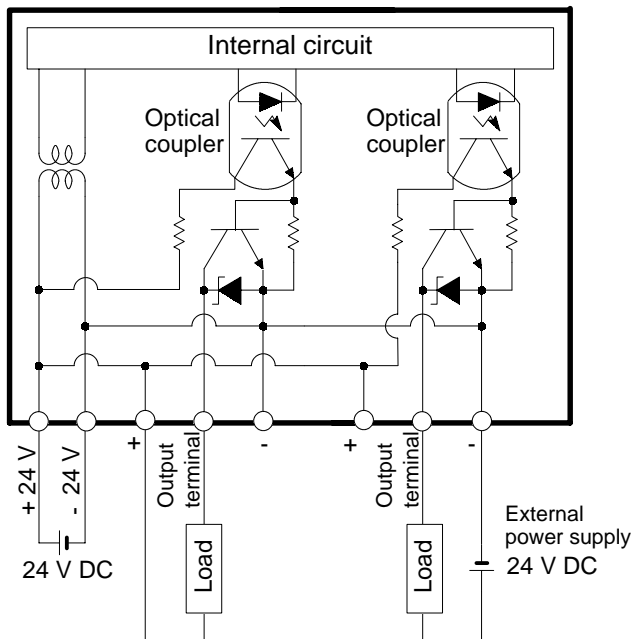
- Performance specifications

Item	Description
Number of output points	AFP87527: 4 points AFP87523: 8 points AFP87524: 16 points
Rated load voltage	24 V DC
Load voltage range	20.4 to 26.4 V DC
Max. load current	0.5 A/point, 1 A/common
OFF state leakage current	100 $\mu$ A or less
Max. ON state voltage drop	1.5 V or less
Response time	OFF $\rightarrow$ ON: 1 ms or less ON $\rightarrow$ OFF: 1 ms or less
Internal current consumption (at 24 V DC)	AFP87527: 40 mA or less (when all points are OFF) 65 mA or less (when all points are ON)* AFP87523: 40 mA or less (when all points are OFF) 85 mA or less (when all points are ON)* AFP87524: 40 mA or less (when all points are OFF) 120 mA or less (when all points are ON)*
Output points per common	AFP87527: 4 points/common AFP87523: 8 points/common AFP87524: 16 points/common
Output type	Sink output
Connection method	Terminal block (M3.5 screw)
Insulation	Optical coupler
Weight	AFP87527: Approx. 130 g/4.586 oz. AFP87523: Approx. 190 g/6.702 oz. AFP87524: Approx. 280 g/9.877 oz.

**Note:**

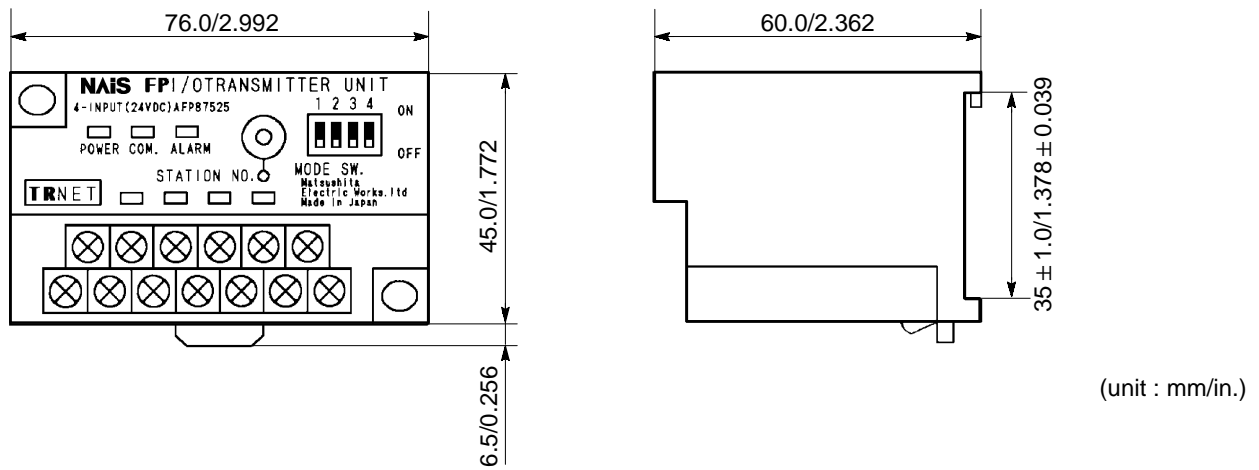
\* The current consumption when all points are ON shows the ratings when no load is connected.

- Internal circuit diagram

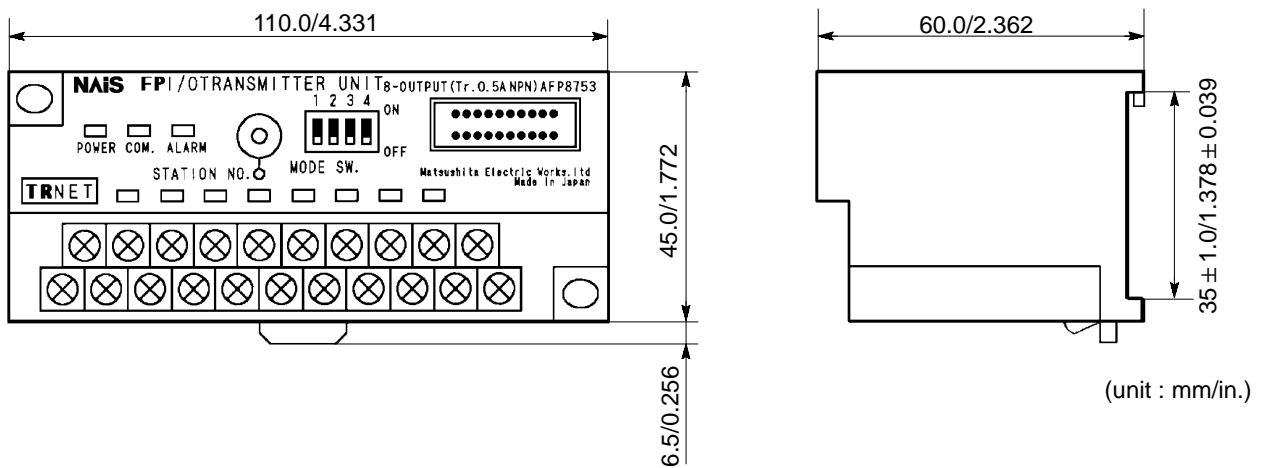


## 2) Dimensions

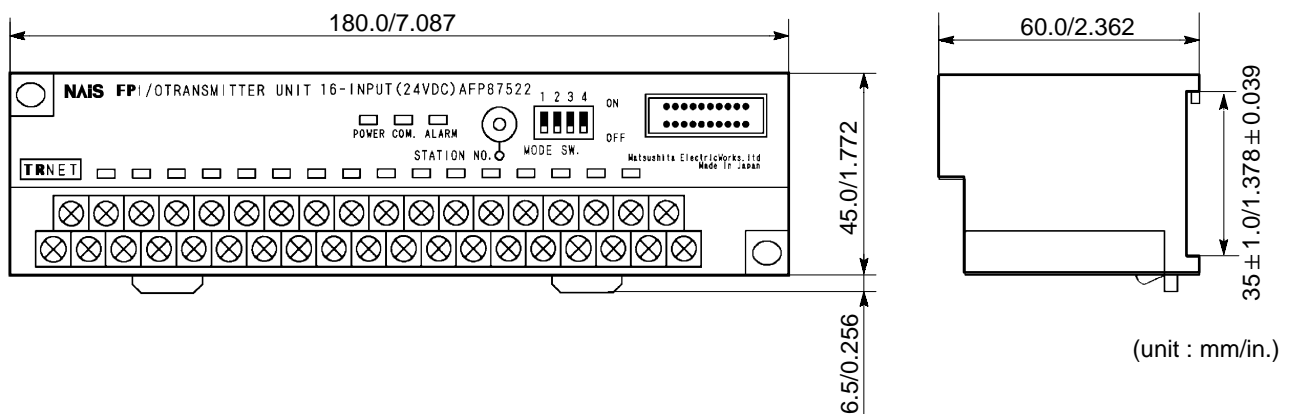
### ■ 4-input type (AFP87525) and 4-output type (AFP87527)



### ■ 8-input type (AFP87521) and 8-output type (AFP87523)



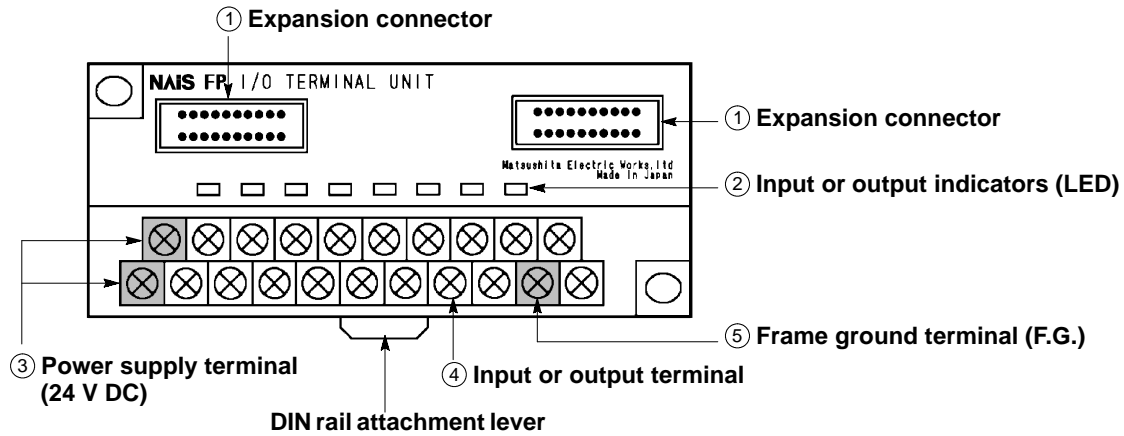
### ■ 16-input type (AFP87522) and 16-output type (AFP87524)



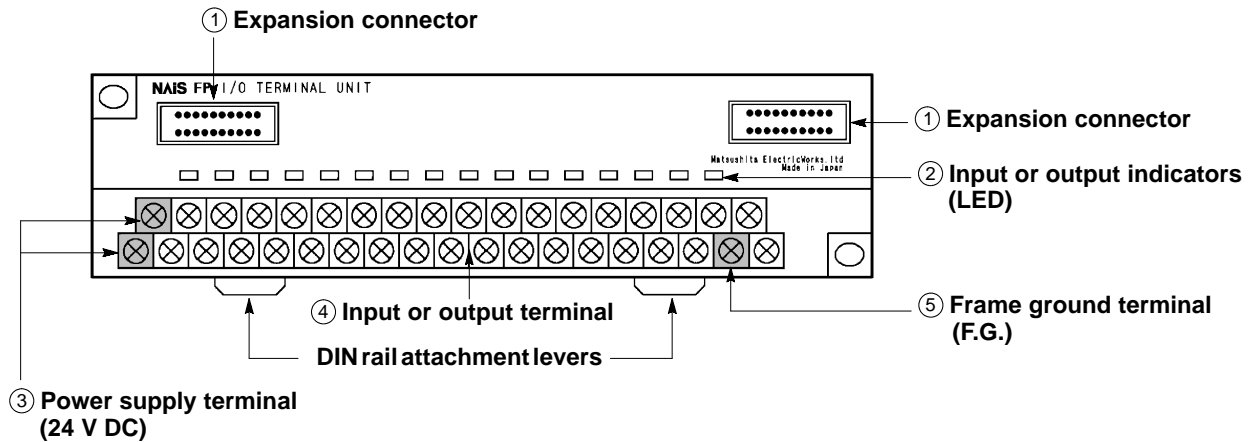
### 3. Expansion FP I/O Terminal Units

#### 1) Parts terminology

##### ■ 8-input type (AFP87425) and 8-output type (AFP87427)



##### ■ 16-input type (AFP87426) and 16-output type (AFP87428)



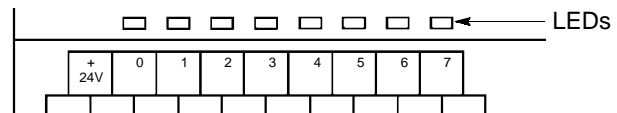
① **Expansion connector:**

Connects to FP I/O transmitter unit using expansion cable.

② **Input or output indicators (LED):**

Input type: Indicate the input ON/OFF states.  
Output type: Indicate the output ON/OFF states.

**<Example: 8-input/output type>**



③ **Power supply terminal (24 V DC):**

Supplies 24 V DC.

④ **Input or output terminal:**

Input type: Connects to input field devices (e.g., limit switches).  
Output type: Connects to output field devices (e.g., LEDs).

⑤ **Frame ground terminal (F.G.):**

This terminal is used for grounding.

## ■ Input type expansion FP I/O terminal unit

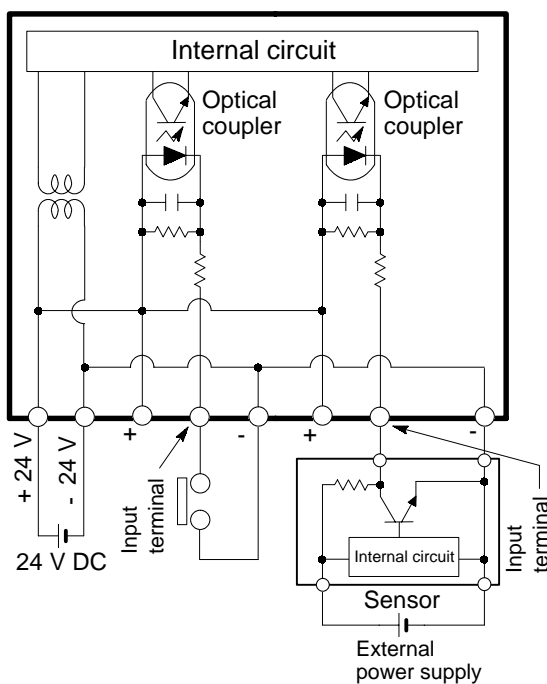
- Performance specifications

Item	Description
Number of input points	AFP87425: 8 points AFP87426: 16 points
Rated input voltage	24 V DC
Rated input current	Approx. 5.5 mA (at 24 V DC)
Input impedance	Approx. 4.4 k $\Omega$
Input voltage range	20.4 to 26.4 V DC
ON voltage	19.2 V or less
OFF voltage	2.4 V or more
Response time	OFF $\rightarrow$ ON: 2 ms or less ON $\rightarrow$ OFF: 2 ms or less
Internal current consumption	AFP87425: 60 mA or less (when all points are ON)* AFP87426: 110 mA or less (when all points are ON)*
Input points per common	AFP87425: 8 points/common AFP87426: 16 points/common
Input type	Source input
Connection method	Terminal block (M3.5 screw)
Insulation	Optical coupler
Weight	AFP87425: Approx. 170 g/5.997 oz. AFP87426: Approx. 270 g/9.524 oz.

### Note:

\* When all points are ON, the current required for the driving input current is also included in the ratings.

- Internal circuit diagram



■ Transistor NPN open collector output type expansion FP I/O terminal unit

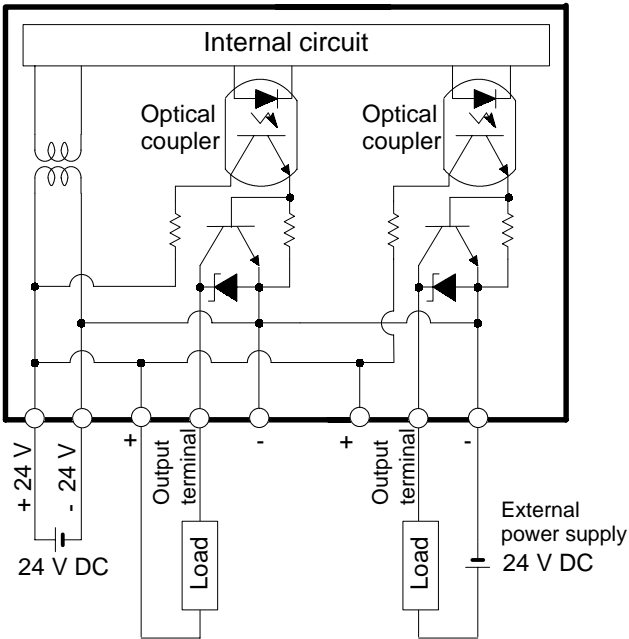
- Performance specifications

Item	Description
<b>Number of output points</b>	AFP87427: 8 points AFP87428: 16 points
<b>Rated load voltage</b>	24 V DC
<b>Load voltage range</b>	20.4 to 26.4 V DC
<b>Max. load current</b>	0.5 A/point, 1 A/common
<b>OFF state leakage current</b>	100 $\mu$ A or less
<b>Max. ON state voltage drop</b>	1.5 V or less
<b>Response time</b>	OFF $\rightarrow$ ON: 1 ms or less ON $\rightarrow$ OFF: 1 ms or less
<b>Internal current consumption</b>	AFP87427: 60 mA or less (when all points are ON)* AFP87428: 110 mA or less (when all points are ON)*
<b>Output points per common</b>	AFP87427: 8 points/common AFP87428: 16 points/common
<b>Output type</b>	Sink output
<b>Connection method</b>	Terminal block (M3.5 screw)
<b>Insulation</b>	Optical coupler
<b>Weight</b>	AFP87427: Approx. 170 g/5.997 oz. AFP87428: Approx. 270 g/9.524 oz.

**Note:**

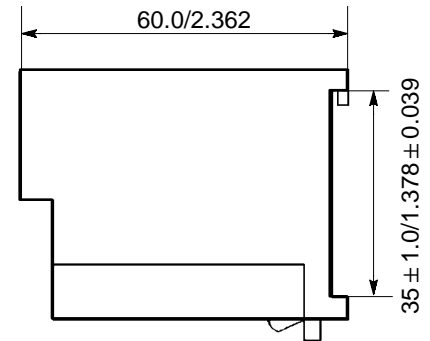
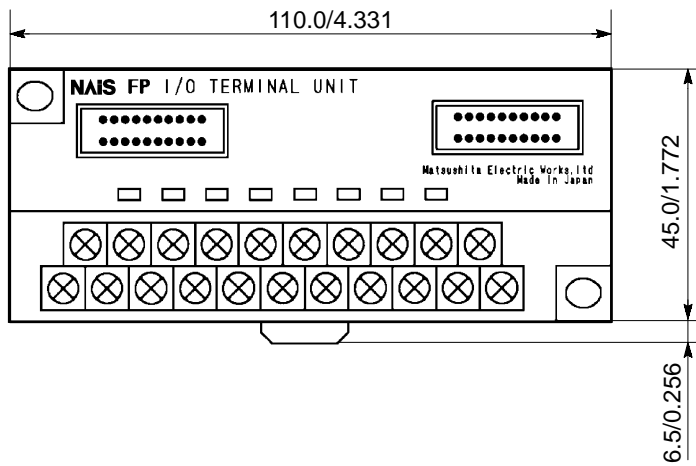
\* The current consumption when all points are ON shows the ratings when no load is connected.

- Internal circuit diagram



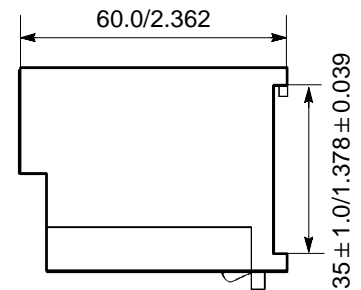
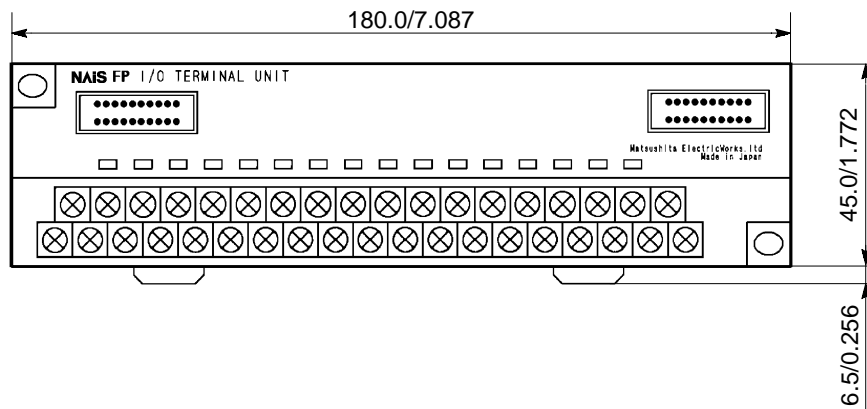
## 2) Dimensions

### ■ 8-input type (AFP87425) and 8-output type (AFP87427)



(unit : mm/in.)

### ■ 16-input type (AFP87426) and 16-output type (AFP87428)



(unit : mm/in.)





**CHAPTER 3**

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**INSTALLATION AND WIRING**

- 3-1. Installation ..... 28
  - 1. Master Station ..... 28
  - 2. Slave Station ..... 33
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  - 2. Wiring the I/O Terminal Power Supply of the Master Station ..... 35
  - 3. Wiring the I/O Terminal Power Supply of the Slave Station ..... 38
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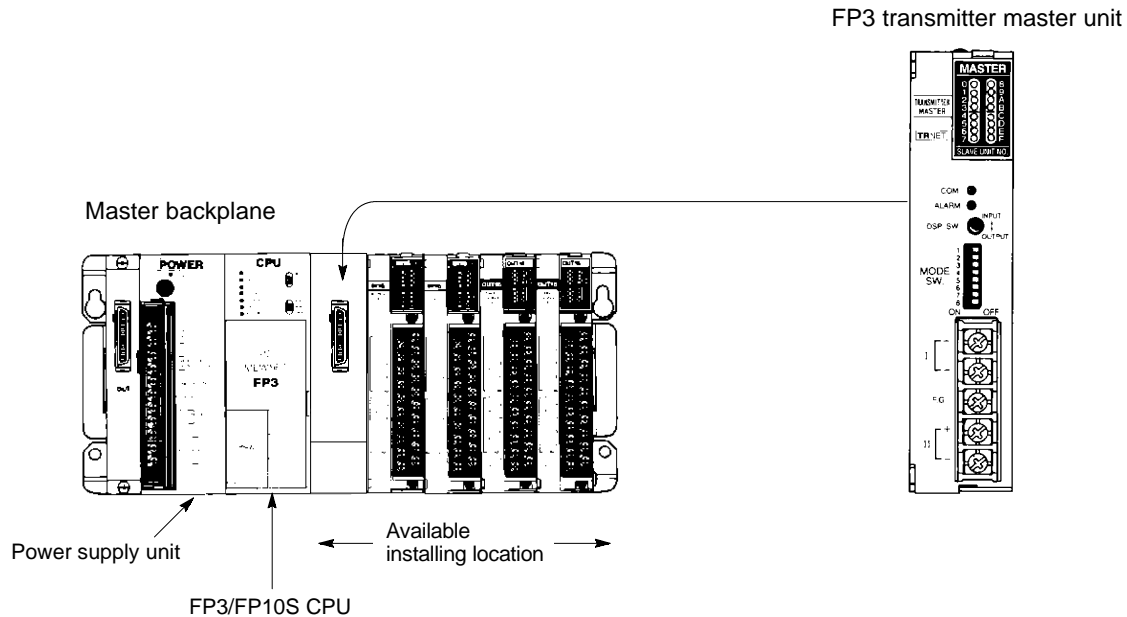
# 3-1. Installation

## 1. Master Station

### 1) Limitations on location

- The FP3 transmitter master unit can be installed in any slot of the master backplane or expansion backplane.

**Example:**



### 2) Limitations on unit installation

- A CPU can be installed with more than one FP3 transmitter master unit. However, the following limitations must be observed.
  - The total current consumption of the units used must not exceed the rated output current of their power supply unit. The current consumption of the FP3 transmitter master unit is 150 mA.
  - The total number of I/O points used by the FP3 transmitter master units must not exceed the number of I/O points of the CPU that is used.
- See the “FP3/FP10S HARDWARE Technical Manual” for details about limitations on current consumption and I/O points.

**Combination example:**

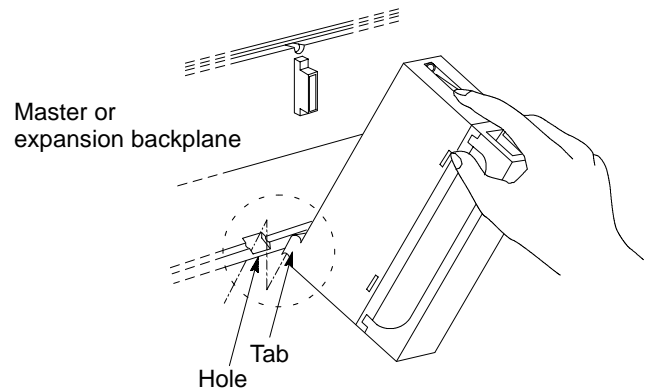
- When using an FP3 CPU to control an FP3 transmitter master unit for which 128 input points and 128 output points are selected, the following unit combinations are possible.
  - Number of FP3 transmitter master units: 16
  - Controllable I/O points
    - Input: 2,048 points
    - Output: 2,048 points
  - Current consumption
    - Basic system on master backplane (8 slots): 1,680 mA
    - Expansion system on expansion backplane (8 slots): 1,300 mA

### 3) Unit installation

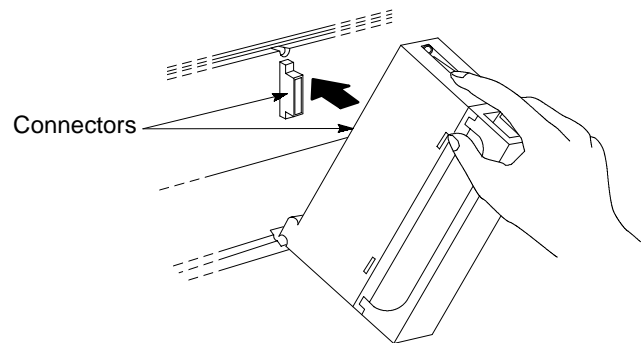
- Before installing the unit, remove the connector cover on the master or expansion backplane.

#### <Procedure>

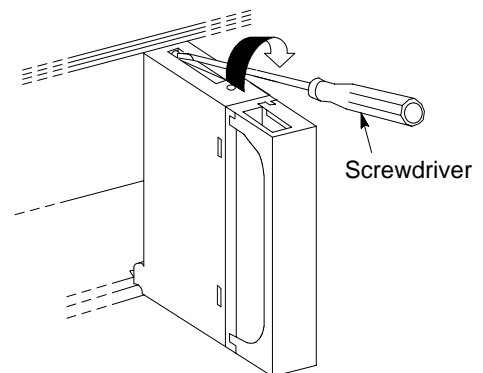
1. Fit the unit tabs into the unit holes on the backplane.



2. Push the unit in the direction of the arrow to plug it onto the backplane.



3. After properly plugging the unit into the backplane, secure the mounting screw at the top.

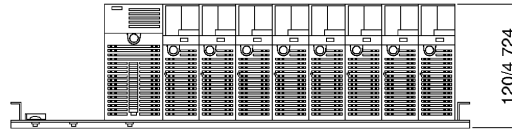
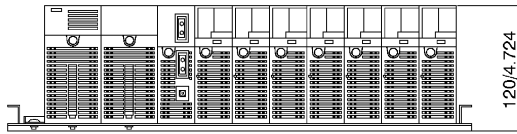
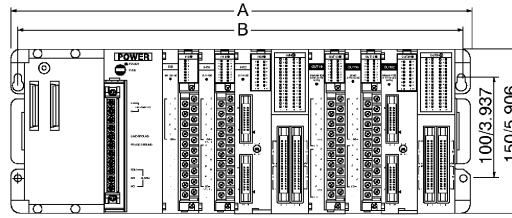
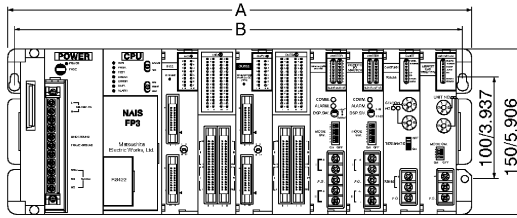


#### Notes:

- Be sure to turn the power supply OFF before installing or removing the units.
- Be careful not to use unreasonable force when plugging the connector on the unit into the connector on the master or expansion backplane.

## 4) Installation environment

### ■ Dimensions



(unit: mm/in.)

	A (mm/in.): Overall length	B (mm/in.): Mounting hole pitch
3-slot type	260/10.236	245/9.646
5-slot type	330/12.992	315/14.402
8-slot type	435/17.126	420/16.535

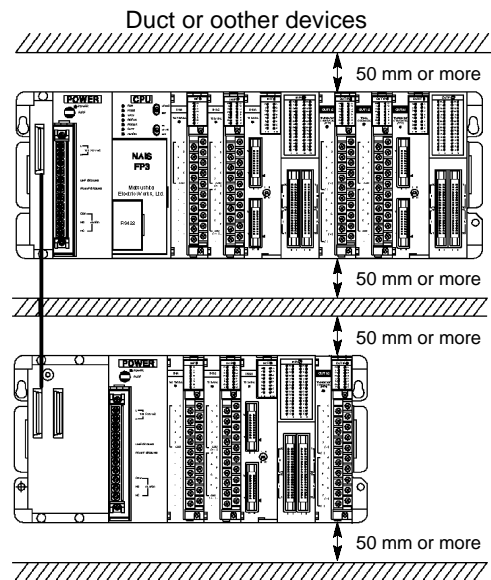
### ■ Installation space

- Leave at least 50 mm of space between the peripheral ducts of the unit and other devices to allow heat radiation and unit replacement.
- Leave some further space, as indicated below, around the lower section when using a link unit.

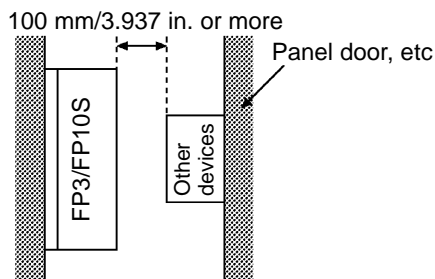
When using the MEWNET-P link unit: 80 mm or more

When using the ET-LAN unit: 100 mm or more

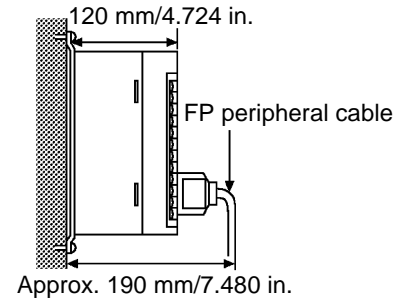
See the “FP3/FP10S HARDWARE Technical Manual” for details about link system.



- When installing devices facing the FP3/FP10S such as on the door of the panel, leave a space of at least 100 mm between that devices and the unit to avoid the effects of heat or radiated noise.



- Although the depth of the unit is 120 mm, leave a space of at least 200 mm from the mounting surface for tool connections and wiring.



### ■ Notes on usage

The unit should be used within the following conditions.

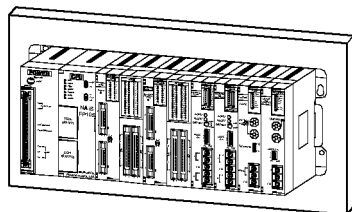
- At ambient temperatures of 0 °C to 55 °C (32 °F to 131 °F).
- At ambient humidity of 35 % to 85 % RH.

It should be used in a place where it will not be exposed to:

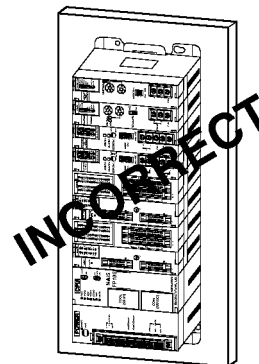
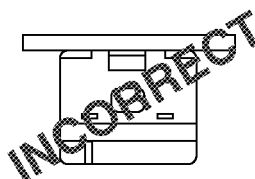
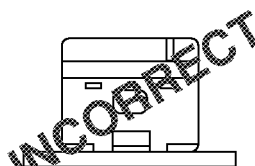
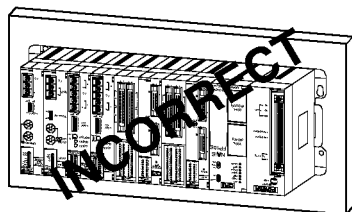
- Sudden temperature change causing dew condensation.
- Inflammable or corrosive gas.
- Excessive airborne dust or iron particles.
- Benzene, paint thinner, alcohol, other organic solvents or strong alkaline solutions of ammonia or caustic soda.
- Excessive vibration or shock.
- Influence from power transmission lines, high voltage equipment, power cables, power equipment, radio transmitters, or any other equipment that generates high switching surges.
- Water splashes.
- Direct sunlight.

### ■ Notes on installation

- Do not install the programmable controller vertically or horizontally since it may cause abnormal heat generation within the programmable controller above devices which generate large amounts of heat such as heaters, transformers or power resistors.
- Keep the surface of each unit at least 10 cm /3.937 in. away from power lines and electromagnetic switching devices to prevent the influence of noise radiation. In particular, observe this distance when installing control panel doors.
- Install the unit only as shown below.

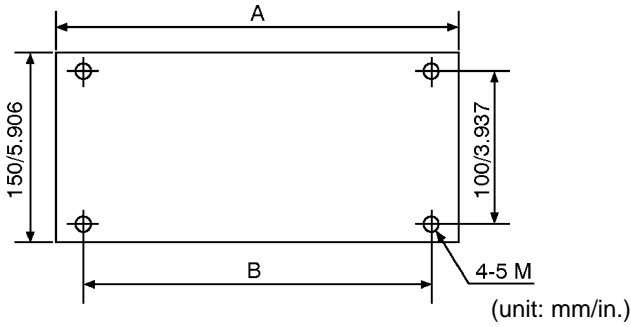


- Do not install as shown below.



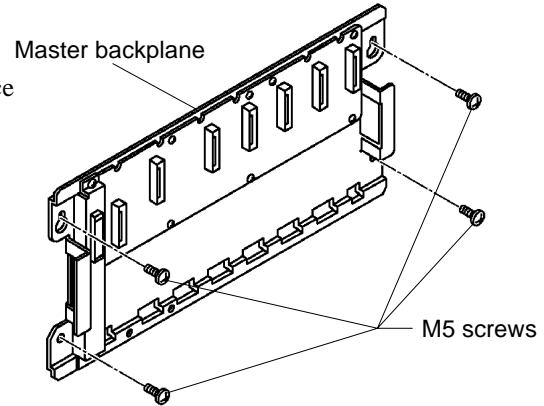
## 5) Mounting method

### ■ Mounting hole dimensions



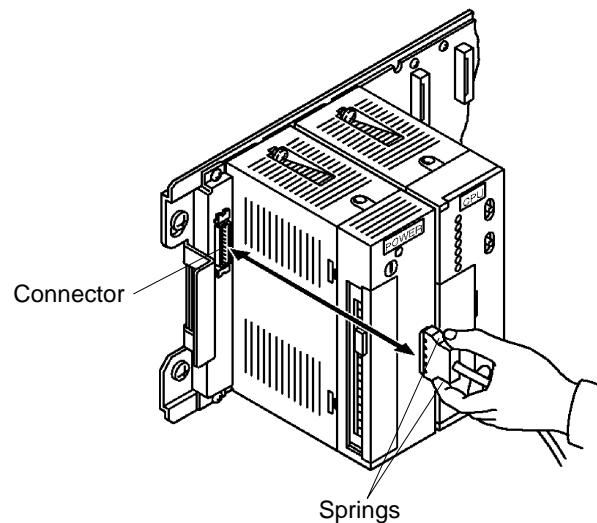
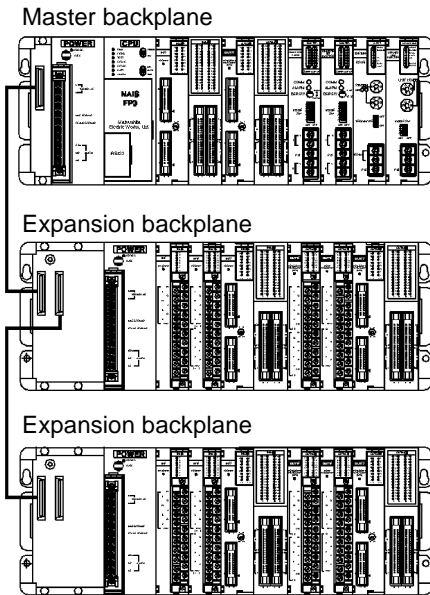
	Type	Part No.	A (mm/in.)	B (mm/in.)
Master backplane	3-slot	AFP3505	260/10.236	245/9.646
	5-slot	AFP3501	330/12.992	315/12.402
	8-slot	AFP3502	435/17.126	420/16.535
Expansion backplane	3-slot	AFP3506	260/10.236	245/9.646
	5-slot	AFP3503	330/12.992	315/12.402
	8-slot	AFP3504	435/17.126	420/16.535

- Mount the master backplane using M5 screws in the sequence given below.
  - ① Lightly secure the upper part of the backplane using the mounting holes.
  - ② Align the mounting holes for the lower part and secure.
  - ③ Tighten the upper screws.



## 6) Connecting expansion cables

- The expansion cables are directional and are equipped with a key to prevent erroneous insertion.
- Connect so that the IN and OUT marks on the cable match the IN and OUT marks on the backplane.
- Insert the expansion cables firmly until they click into place.
- When removing the cables, release the lock by pinching the spring release tabs of the connector before pulling out the cable.



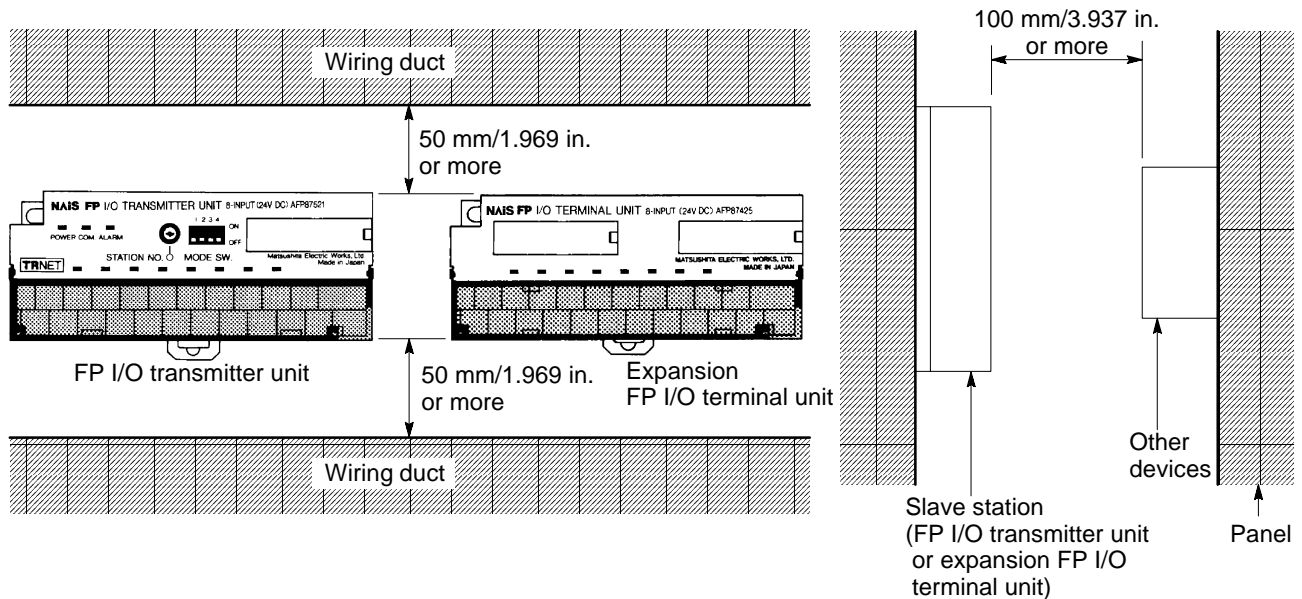
### Notes:

- Leave the dust proofing label on the upper surface of the unit until the wiring work is finished.
- Leave the connector covers on any unused slots to protect them from dust.
- The same for the expansion cable covers.

## 2. Slave Station

### 1) Installation environment

#### ■ Slave station installation space



- Leave at least 50 mm/1.969 in. of space between ducts and other devices to avoid heat radiation.
- When installing devices facing the slave station, such as those on the panel, leave at least 100 mm/3.937 in. of space between the devices and the slave station to avoid heat and noise radiation.
- The FP I/O transmitter unit can be installed in any direction.

#### ■ Notes on installation

- The slave station should be used under the following conditions.
  - At ambient temperatures of 0 °C to 55 °C (32 °F to 131 °F)
  - At ambient humidity of 35 % to 85 % RH
- Do not use the slave station in places where it will be subject to:
  - Sudden temperature changes causing condensation
  - Inflammable or corrosive gas
  - Excessive airborne dust or iron particles
  - Benzene, paint thinner, alcohol, other organic solvents, or strong alkaline solutions of ammonia or caustic soda
  - Excessive vibration or shock
  - Direct sunlight
  - Water splashes
  - Influence from power transmission lines, high-voltage equipment, power cables, power equipment, radio transmitters, or any other equipment that generates high switching surges
- Do not drop the unit or apply excessive force to it.
- Do not install the unit above devices that generate large amounts of heat such as heaters, transformers or power resistors.

## 2) Mounting method

### ■ Panel mount

Mount the slave station to the panel with M4 size screws as follows.

#### <Mounting hole dimensions>



Type		W (mm/in.)	H (mm/in.)
FP I/O transmitter unit	4 I/O points	66/2.598	35/1.378
	8 I/O points	100/3.937	35/1.378
	16 I/O points	170/6.693	35/1.378
Expansion FP I/O terminal unit	8 I/O points	100/3.937	35/1.378
	16 I/O points	170/6.693	35/1.378

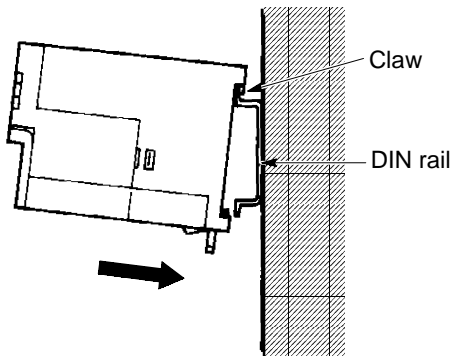
### ■ DIN rail mount

To mount the slave station (FP I/O transmitter unit and expansion FP I/O terminal unit) on a DIN rail, use the attachment lever that is attached to each unit.

#### • Attachment

Align the slave station with the DIN rail groove and push the unit down to install it.

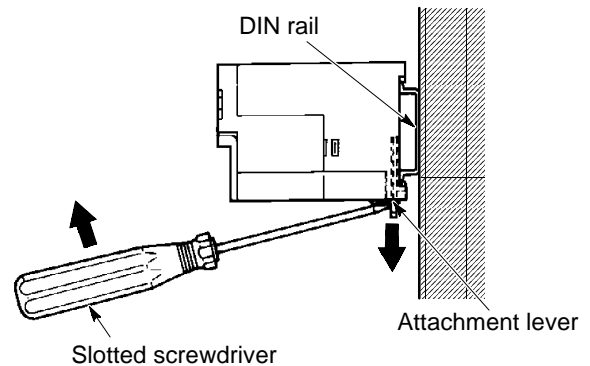
(Example: FP I/O transmitter unit)



#### • Removal

To remove the slave station from the DIN rail, pull the attachment lever down with a slotted screwdriver.

(Example: FP I/O transmitter unit)





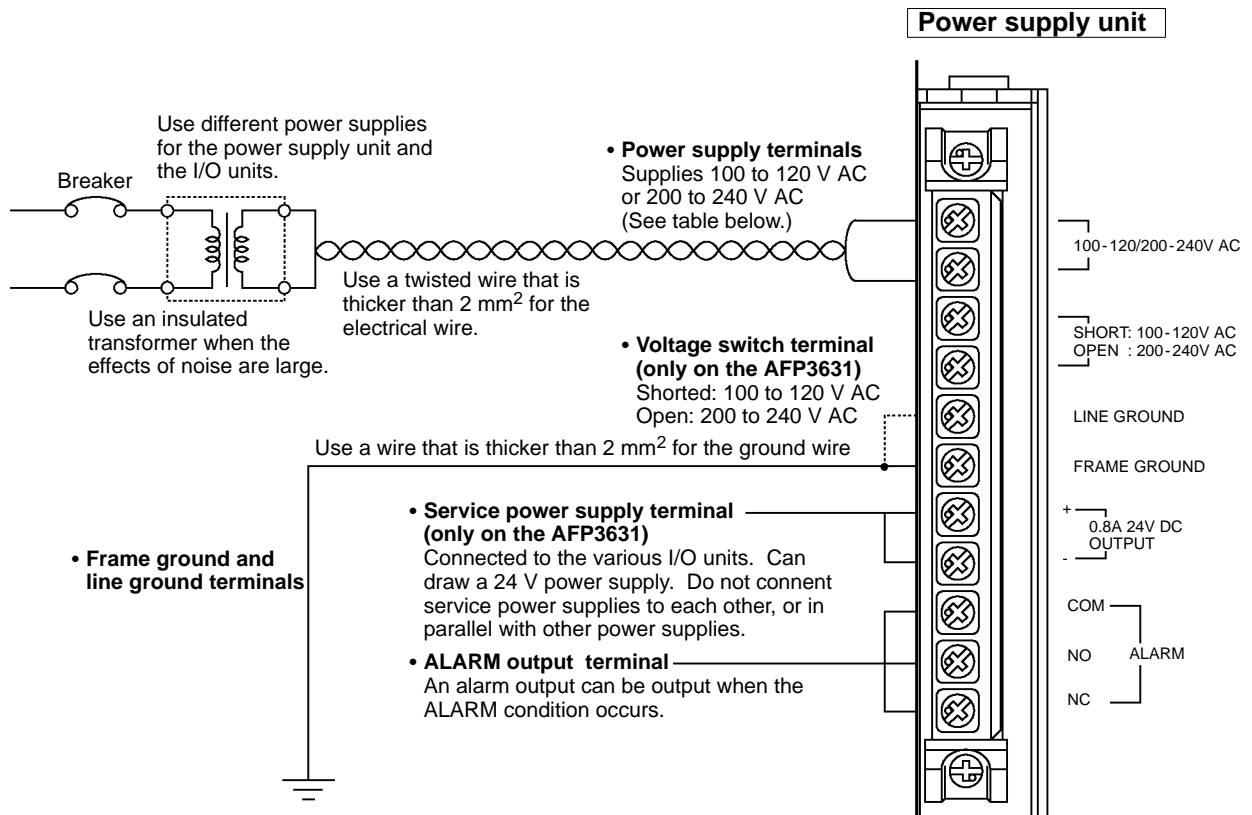
## 3-2. Wiring

### 1. Notes on Wiring

- Turn all power OFF before wiring the I/O terminal power supply.
- Do not drop metal particles into the unit when wiring.

### 2. Wiring the I/O Terminal Power Supply of the Master Station

#### ■ Diagram of the terminal layout on the power supply unit (using the AFP3631 as example)



#### Power supply unit

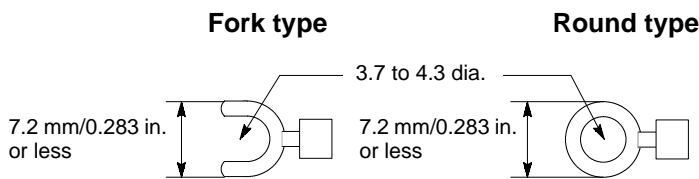
Type	Part No.	Rated operating voltage	Operating voltage range
AC type	AFP3631	100 V to 120 V AC	85 V to 132 V AC
		200 V to 240 V AC	170 V to 264 V AC
	AFP3636	100 V to 240 V AC	85 V to 264 V AC
DC type	AFP3634	24 V DC	16.8 V to 28.8 V DC

**Notes:**

- The AFP3631 is a voltage switching type. The AFP3636 is a free power supply type.
- Use electrical wire that is thicker than 2 mm<sup>2</sup> to minimize the voltage drop.
- Twist the electrical wire to minimize the effects of noise.
- When using the AFP3631:
  - When using 100 to 120 V AC, short the voltage switch terminal using the short circuiting bar included in the package.
  - When using 200 to 240 V AC, check that the space between the terminals is open.

**<Recommended crimp>**

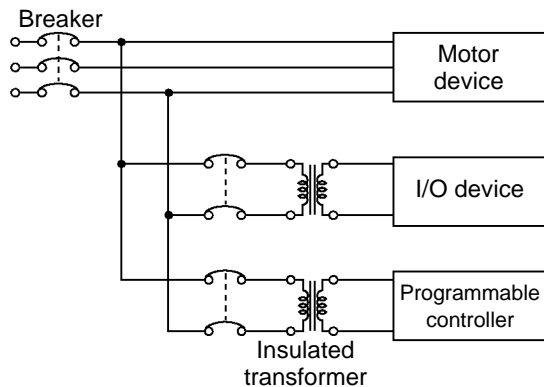
- Use M3.5 screws for the power supply terminal.
- Crimping is recommended for all terminal wiring.
- The following M3.5 screw terminals are recommended for wiring use.



**■ Power supply lines**

- The power supply lines for the FP3 or FP10S, I/O devices and motorized devices should be isolated as shown below.
- Design the power supply lines so that the power for master and expansion backplanes can be turned ON and OFF at the same time.
- Use twisted pair cable with 2 mm<sup>2</sup> or larger conductors as the power supply lines.
- Excessive noise and line voltage fluctuations can result in FP3 or FP10S CPU misoperation or in system shutdown. To prevent accidents caused by noise and line voltage fluctuations, be sure to employ countermeasures (such as use of an insulated transformer, etc.) when wiring the power supply lines.

**Example:**



**■ Momentary power drop**

- The FP3 and FP10S are not influenced by momentary power drops (less than 10 ms.)

■ **Safety**

- In certain applications, malfunction may occur for the following reasons.
  - Power on timing differences between the FP3 or FP10S system and I/O or motorized devices.
  - An operation time lag when a momentary power drop occurs.
  - Abnormality in the FP3 or FP10S, power supply circuit, or other devices.
- In order to prevent malfunction from resulting in system shutdown, the following special attention is required.

**Start up sequence:**

The FP3 and FP10S should be operated after all of the outside devices are energized. To keep this sequence, the following measures are recommended.

- Set the mode selector switches from PROG. mode to RUN mode after power is supplied to all of the outside devices.
- Program the FP3 and FP10S so as to disregard the inputs and outputs until the outside devices are energized.

**Emergency stop circuit:**

Add an emergency stop circuit to controlled devices in order to prevent a system shutdown or an irreparable accident when malfunction occurs.

**Interlock circuit:**

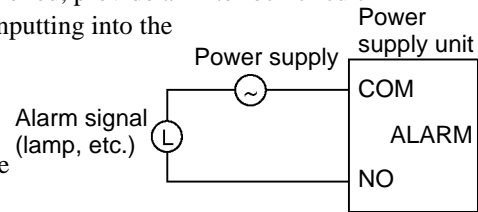
When two motions that are opposed to each other are controlled, add an interlock circuit between the programmable controller's outputs and the control device.

**Example:**

When a motor clockwise/counter-clockwise operation is controlled, provide an interlock circuit that prevents clockwise and counter-clockwise signals from inputting into the motor at the same time.

**Using alarm output of power supply unit:**

The ALARM output goes ON when the watchdog timer is activated by a program error (eg., infinite loop) or an error in the hardware itself. The ALARM output terminal has two relay contacts, N.O. and N.C. on the power supply unit, which can be used as external alarm signals. The watchdog timer is a program error and hardware error detection timer. It goes ON when the scandal time exceeds 640 ms. When the watchdog timer is activated, at the same time the ALARM LED lights, the ALARM contacts on the power supply unit go ON, all outputs to the output units are turned OFF and the unit is put in halted state. (The system is in a non-processing state that includes communications with programming tools as well.)

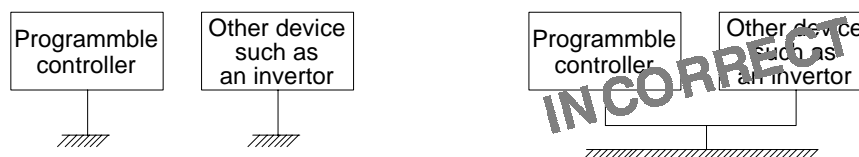


■ **Grounding**

- The frame ground terminal (FG) is internally connected to the metallic part of the backplane, and used for the earth grounding.
- The line ground terminal (LG) is the midpoint terminal for the internal noise filter.
- When the effects of noise are large, ground as shown in diagram below.
- The LG terminal has an electric potential so be sure to ground it to prevent electric shock when connecting with the FG.



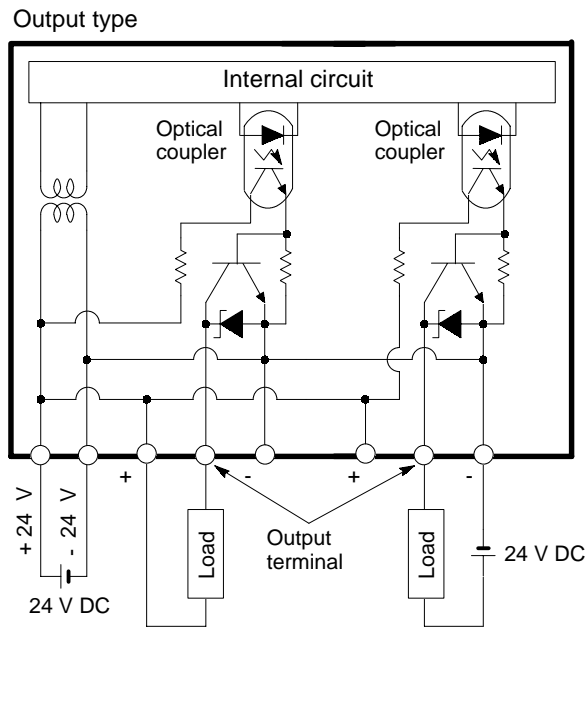
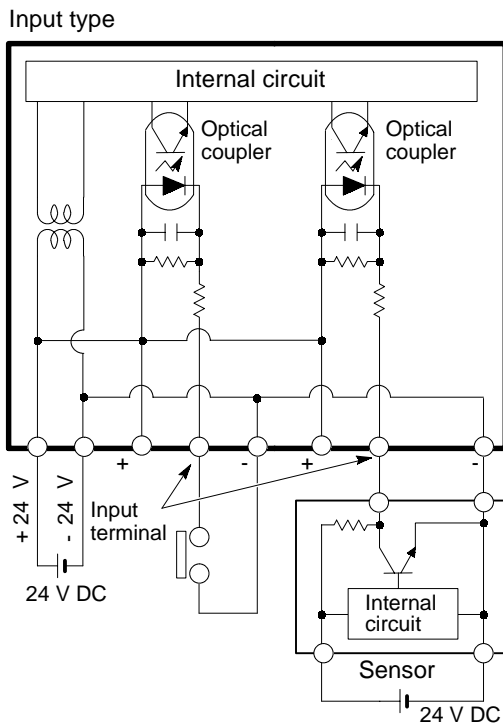
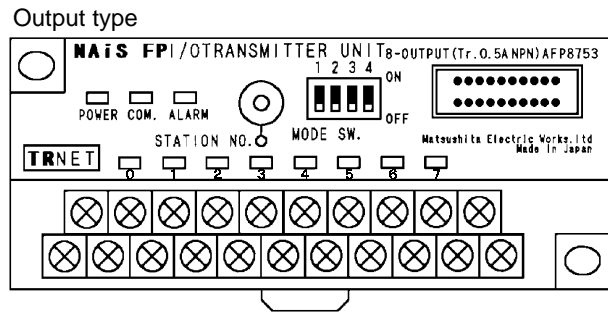
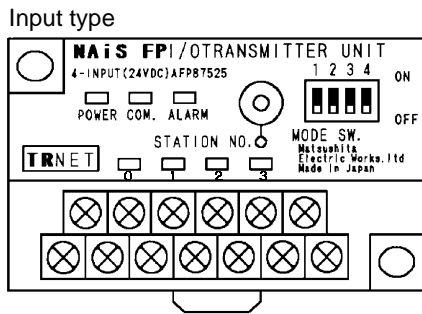
- Use electric wires that are thicker than 2 mm<sup>2</sup> and with less than 100 Ω grounding resistance.
- Make the ground point as close as possible to the programmable controller, and make the length of the ground wire short.
- Use a dedicated ground. If the ground is shared with other devices, a reverse effect may occur.



### 3. Wiring the I/O Terminal Power Supply of the Slave Station

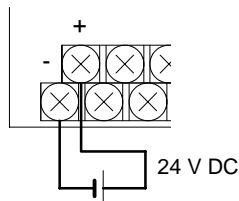
#### 1) Internal circuit diagram

Example: FP I/O transmitter unit



#### 2) Wiring the power supply

- The FP I/O transmitter unit must be provided directly with an external DC power supply.
- Diagram of the power supply terminal layout



#### <Power supply lines>

- The power supply to the FP I/O transmitter unit must be independent from the power supply to the master station.
- Use a twisted pair cable for the power supply line that is thicker than 2 mm<sup>2</sup>, or use larger conductors to minimize the voltage drop.

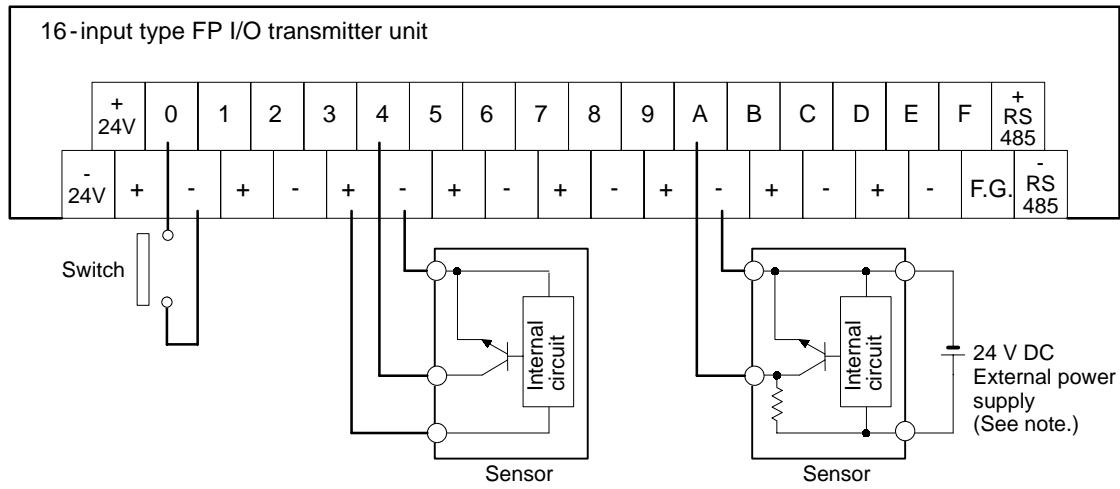
### 3) Recommended crimp

For crimping the power supply terminals of the slave station, see “Recommended crimp” on page 36.

### 4) Wiring input

- The 24-V positive (+) terminal is connected to each positive (+) terminal, and the 24-V negative (-) terminal is connected to each negative (-) terminal, as shown in the internal circuit diagram on page 38.
- There is no need to supply power for inputs, since they are provided with power through the internal circuit. Sensors also use the 24 V DC supplied by the internal circuit.

#### Wiring example:



#### Notes:

- Limit the total capacity of current used from the internal power supply to less than 1 A.

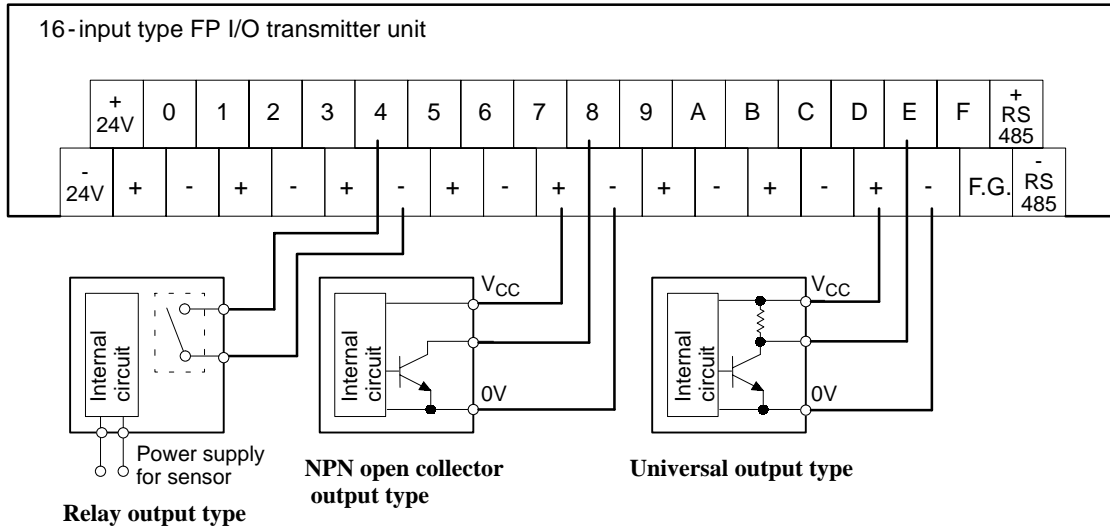
##### Formula:

[Internal drive current 3 mA] × [Number of ON points] + [Current for field devices (sensors, etc.)]

- When supplying external power to sensors, keep it below 26.4 V DC.
- Keep the leakage current under 1 mA when the external power is OFF.

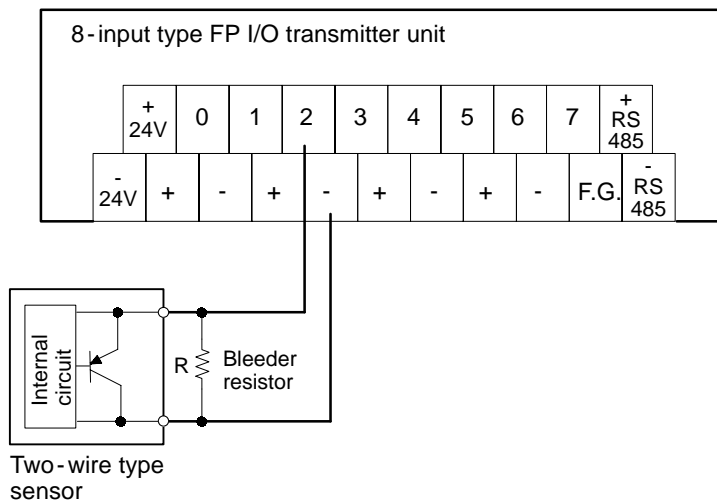
■ **Wiring example for photoelectric sensors**

For a photoelectric sensor output configuration, connect as shown below:



■ **Notes on two-wire type sensor wiring**

- The use of a bleeder resistor is recommended if the input is not turned OFF due to leakage current from a two-wire type sensor.
  - The OFF voltage of the input is 2.4 V. Therefore, select an R value so that the voltage between the negative(-) terminal and the input terminal will be less than 2.4 V. The impedance of the input terminal is 4.4 kΩ.
  - The bleeder resistor R is:  $R \cong \frac{10.56}{4.4I-2.4}$  (kΩ)      I: sensor's leakage current (mA)
  - The wattage W of the bleeder resistor is:  $W = \frac{(\text{Power supply voltage})^2}{R}$
- Actually, use a value that is 3 to 5 times the value of W.



## ■ Notes on limit switch and reed switch wiring

### <LED-equipped limit switches>

- The use of a bleeder resistor is recommended if the input is not turned OFF or if the LED of the limit switch is kept ON due to leakage current from the limit switch.
- The OFF voltage of the input is 2.4 V. Therefore, when the power supply voltage is 24 V, select an R value so that the current will be greater than 2.4 V. The limit switch's leakage current I is:

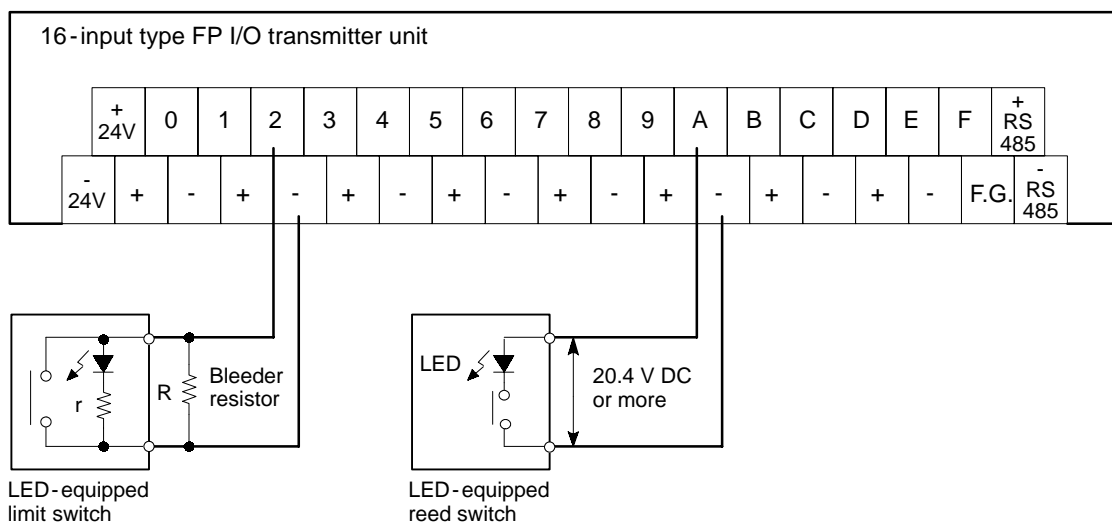
$$I = \frac{24-2.4}{r} \quad r: \text{internal resistor of the limit switch (k}\Omega\text{)}$$

The impedance of the input terminal is 4.4 k $\Omega$ .

- The bleeder resistor R is:  $R \cong \frac{10.56}{4.4I-2.4}$  (k $\Omega$ )
- The wattage W of the bleeder resistor is:  $W = \frac{(\text{Power supply voltage})^2}{R}$   
Actually, use a value that is 3 to 5 times the value of W.

### <LED-equipped reed switch>

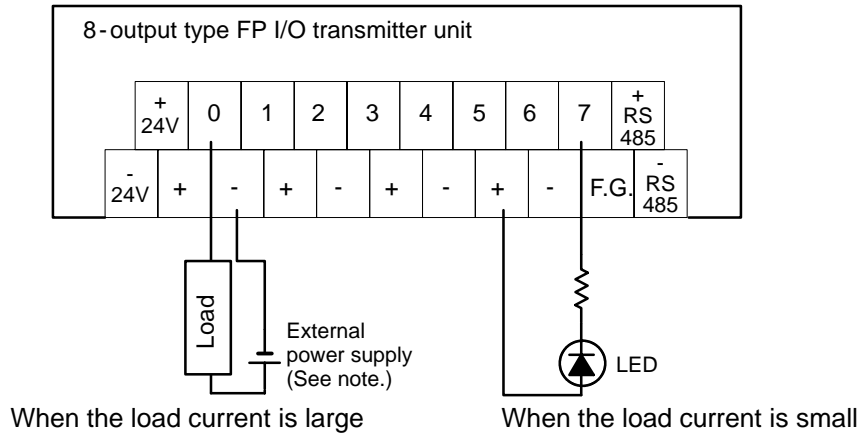
- When an LED, such as an LED-equipped reed switch, is connected in series with an input point, make the voltage that is applied to the FP I/O transmitter unit's input circuit greater than 20.4 V. Take particular care when connecting a number of switches in series.



### 5) Wiring output

- The 24-V positive (+) terminal is connected to each positive (+) terminal, and the 24-V negative (-) terminal is connected to each negative (-) terminal, as shown in the internal circuit diagram on page 38.
- When the current load is large, provide an external power supply.
- When the current load is small, such as that for LEDs, use the 24 V DC supplied by the internal circuit.

**Wiring example:**



**Notes:**

- Keep the external power supplied to the load within 20.4 V to 26.4 V DC.
- When the internal drive current is under 0.5 A, the output terminal can be connected to up to 16 points. (16 output points can be turned ON at the same time.)
- The negative(-) terminal of the external power supply is connected to the nearest negative(-) of the output terminals.
- Limit the total capacity of current used from the internal power supply to less than 1 A.

**Formula:**

$$[\text{Internal drive current } 5 \text{ mA}] \times [\text{Number of ON points}] + [\text{Current load}]$$

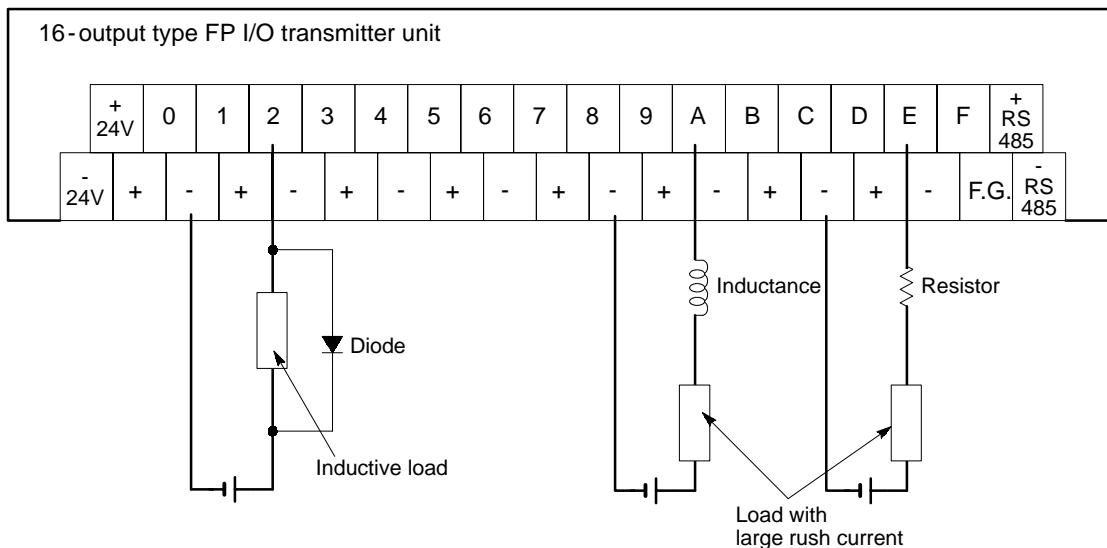
■ **Notes on output wiring**

**<Wiring an inductive load>**

- With an inductive load, provide a protective circuit in parallel with the load.

**<Wiring a load with a large rush current (capacitive load)>**

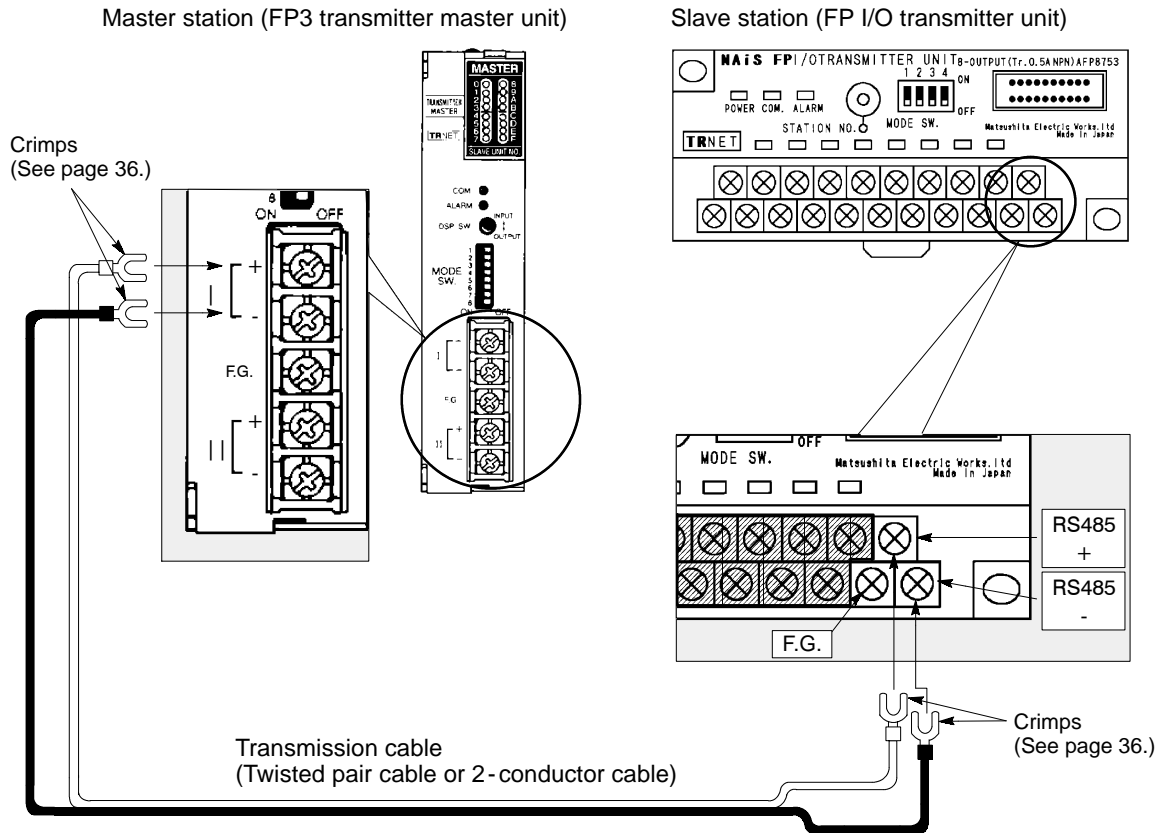
- When connecting a load with a large rush current, use a protective circuit to reduce its effect.



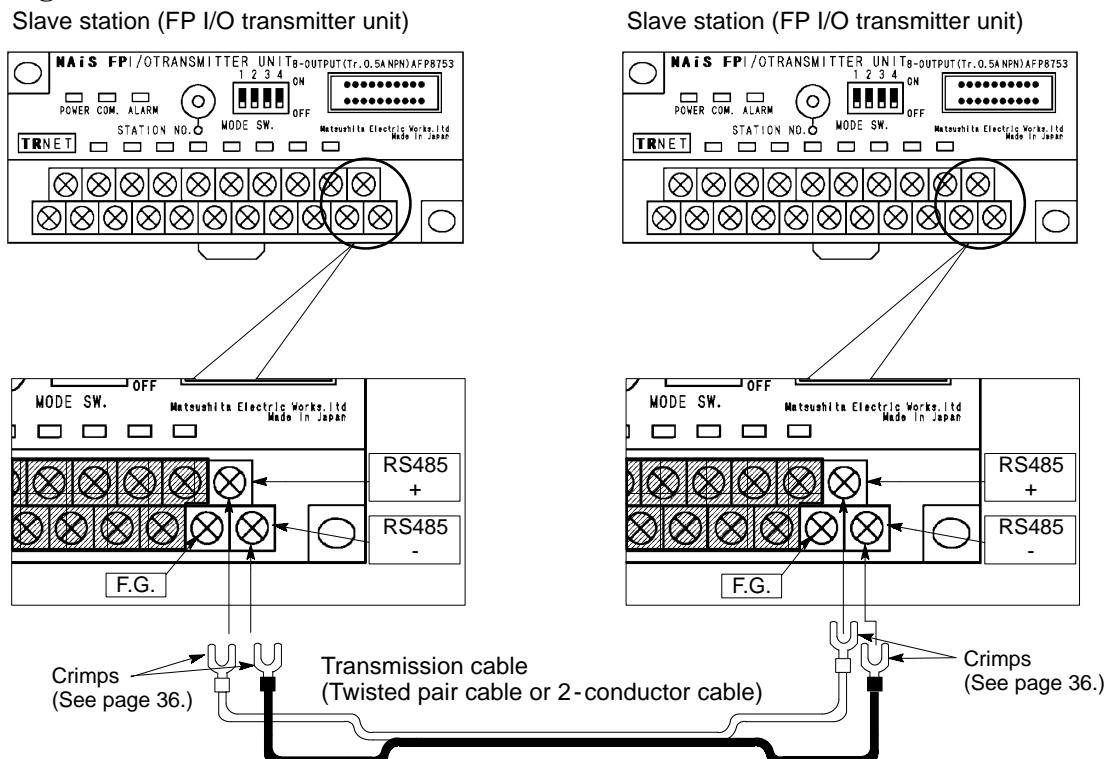


## 4. Wiring Using the Transmission Cable

### 1) Wiring a master station and a slave station



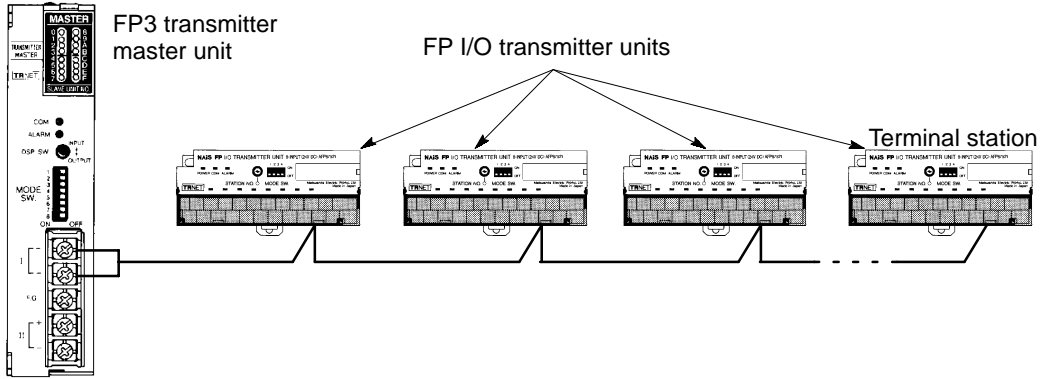
### 2) Wiring a slave station and a slave station



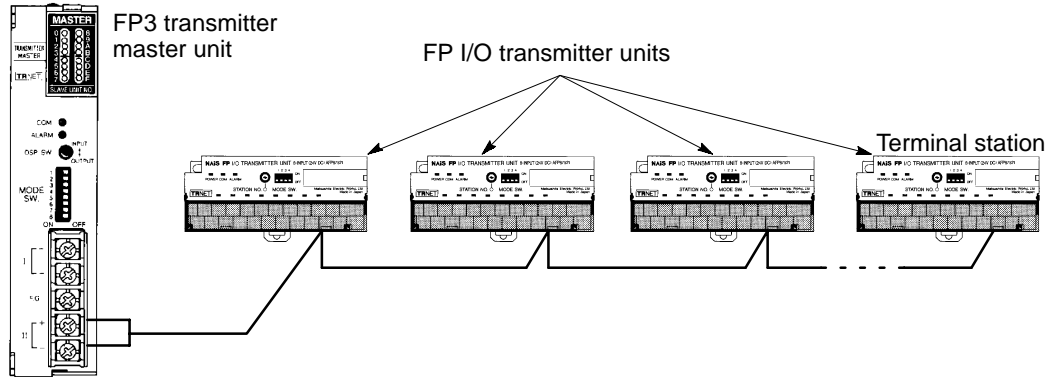
### 3) Wiring layout

- Connect the positive (+) terminal to the positive (+) terminal, and the negative (-) terminal to the negative (-) terminal of each RS485 interface using the transmission cable.
- The two RS485 interface ports (port I and port II) of the FP3 transmitter master unit can be used in the following three connection layout patterns.

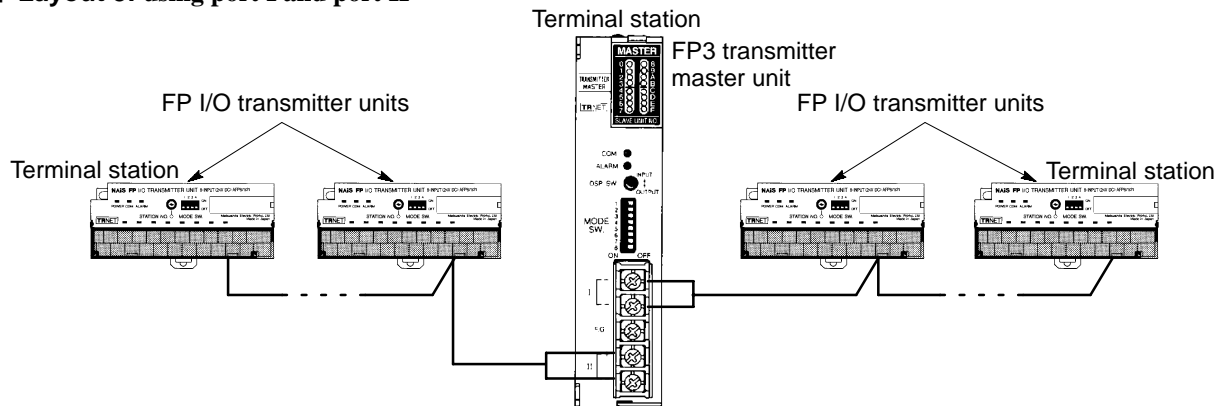
#### Layout 1: using only port I



#### Layout 2: using only port II



#### Layout 3: using port I and port II



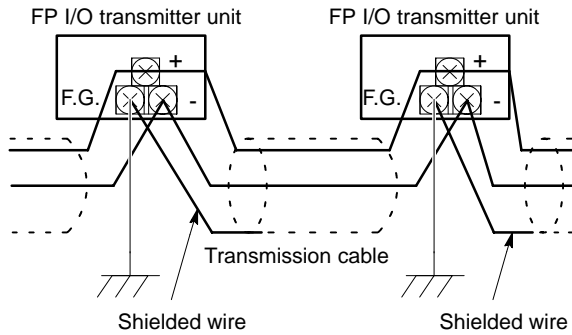
#### Notes:

- Be sure to connect the FP3 transmitter master unit at the end of the connection layout.
- Do not connect transmission cables on both sides of the ports.
- In each layout, an FP3 transmitter master unit can be connected with 16 pieces of input transmitter units and 16 pieces of output transmitter units at maximum.

#### 4) Grounding

- Connect the shielded wire of the transmission cable to the F.G. terminal, and ground the wire.

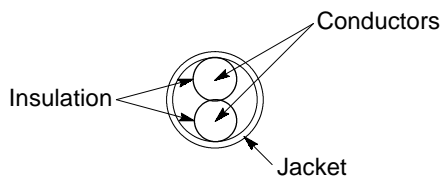
**Grounding example:**



#### 5) Transmission cable

- The following cables are recommended for transmission cable use.

Type	Transmission distance
Twisted pair cable	Max. 700 m/2,296.59 ft.
2-conductor cable	Max. 400 m/1,312.34 ft.



**Conductor:**

Size: Min. 1.25 mm<sup>2</sup> (AWG16 or larger)

Resistance: Max. 16.8 Ω/km (at 20 °C/68 °F)

**Cable:**

Insulation material: Polyethylene

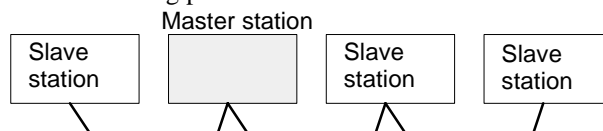
Insulation thickness: Max. 0.5 mm/0.020 in.

Jacket diameter: Approx. 8.5 mm/0.335 in.

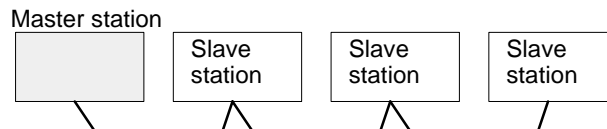
#### 6) Notes on wiring

- The master station can be installed in any of the following positions.

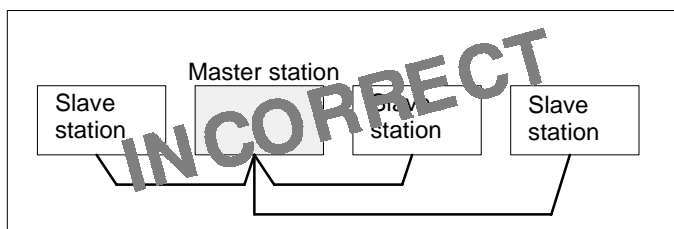
**Example 1:** Between slave stations



**Example 2:** At the end of the network



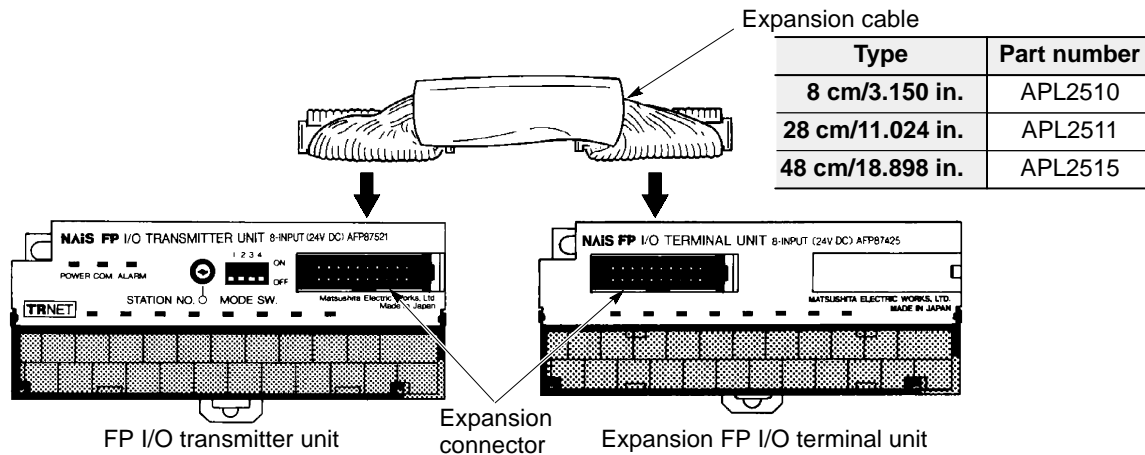
- Incorrect wiring example showing a layout that is not allowed



## 5. Slave Station Expansion

### 1) Connecting a slave station and an expansion unit

- Use an expansion cable to connect the FP I/O transmitter unit and expansion FP I/O terminal unit.



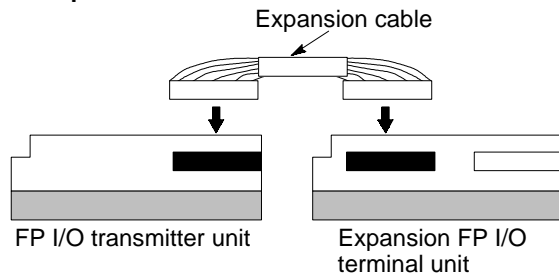
### 2) Connecting method

- Only one expansion FP I/O terminal unit can be connected to one FP I/O transmitter unit (8- or 16-point type).

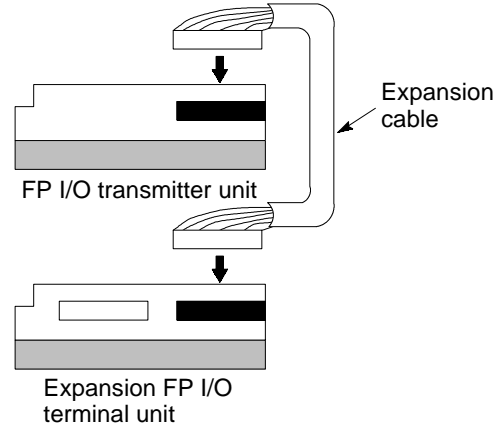
**Note:**

• The 4-point FP I/O transmitter unit cannot be connected with the expansion FP I/O terminal unit.

**<Example 1>**



**<Example 2>**



## 3) Combination of units

FP I/O transmitter unit	Expansion FP I/O terminal unit	I/O point	
		Input	Output
8-input type	8-input type	16	-
	16-input type	24	-
	8-output type	8	8
	16-output type	8	16
16-input type	8-input type	24	-
	16-input type	32	-
	8-output type	16	8
	16-output type	16	16
8-output type	8-input type	8	8
	16-input type	16	8
	8-output type	-	16
	16-output type	-	24
16-output type	8-input type	8	16
	16-input type	16	16
	8-output type	-	24
	16-output type	-	32



## CHAPTER 4

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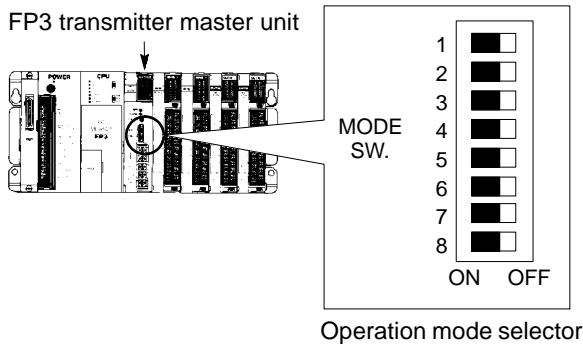
# OPERATION MODE SETTING AND I/O ALLOCATION

4-1. Operation Mode Setting .....	50
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# 4-1. Operation Mode Setting

## 1. Master Station

- The master station’s operating mode (communication conditions and I/O address setting) is set by the operation mode selector of the FP3 transmitter master unit.
- When changing the settings, first turn OFF the power supply, then turn it ON again.



### 1) Operation mode selector setting

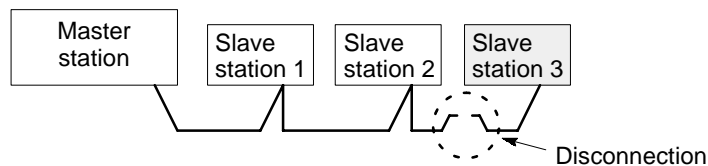
#### • Selector number 1: System configuration selection

- Set the selector to OFF when the remote I/O control function is used.
- When the I/O link control function is used, set the selector of master station A to OFF, and set the selector of master station B to ON. See “Chapter 6 I/O LINK FUNCTION.”

#### • Selector number 2: Output operation condition setting during a communication error

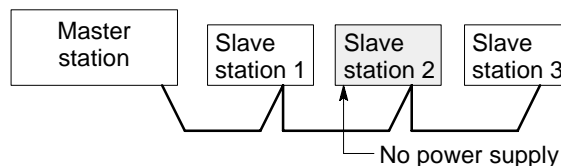
This selector allows you to select whether I/O control is to be terminated or continued with the slave stations in proper connection when the transmission cable disconnects, or when the power supply to a slave station is cut OFF.

**Example 1:** When the cable between slave station 2 and slave station 3 disconnects  
When the master station’s selector number 2 is set to ON, slave stations 1 and 2 continue I/O control. When the selector is set to OFF, all slave stations stop I/O control.



**Example 2:** When the power supply to slave station 2 is cut OFF

When the master station’s selector number 2 is set to ON, slave stations 1 and 3 continue I/O control. When the selector is set to OFF, all slave stations stop I/O control when the power supply to slave station 2 is cut OFF.



See page 54, “3. Operation Mode Setting When an Error Occurs.”



- **Selector numbers 3 and 4: Not used**

- **Selector numbers 5 to 8: I/O point selection**

The I/O points to be used by slave stations are selected by operation mode selector numbers 5 through 8.

See page 57, “4-2. I/O Allocation,” for details about I/O allocation setting and allocation patterns.

I/O points		Allocation pattern number	Selector number			
Input	Output		5	6	7	8
128	128	Pattern No. 1	ON	ON	ON	ON
128	64	Pattern No. 2	ON	ON	OFF	ON
128	32	Pattern No. 3	ON	ON	ON	OFF
128	0	Pattern No. 4	ON	ON	OFF	OFF
64	128	Pattern No. 5	OFF	ON	ON	ON
64	64	Pattern No. 6	OFF	ON	OFF	ON
64	32	Pattern No. 7	OFF	ON	ON	OFF
64	0	Pattern No. 8	OFF	ON	OFF	OFF
32	128	Pattern No. 9	ON	OFF	ON	ON
32	64	Pattern No. 10	ON	OFF	OFF	ON
32	32	Pattern No. 11	ON	OFF	ON	OFF
32	0	Pattern No. 12	ON	OFF	OFF	OFF
0	128	Pattern No. 13	OFF	OFF	ON	ON
0	64	Pattern No. 14	OFF	OFF	OFF	ON
0	32	Pattern No. 15	OFF	OFF	ON	OFF

**Note:**

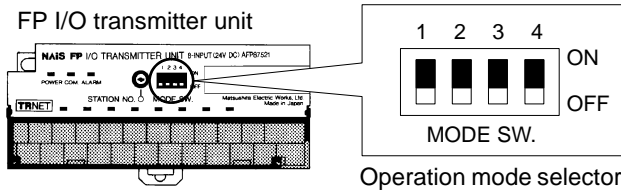
- Since the FP3 transmitter master unit has no selector for terminal station setting, it must be located on the network as a terminal.

## 2) Operation mode when shipped

- The operation mode selector numbers are all set to the OFF position when shipped.
- Operation mode setting when shipped:
  - The unit is used as a MEWNET-TR master station.
  - When an abnormality occurs during operation, all slave stations stop I/O control.
  - The I/O points used are as follows:  
Input: 0 point, Output: 0 point
- When the power supply is turned ON under these conditions, an error occurs.

## 2. Slave Station

- The slave station's operating mode is set by the operation mode selector of the FP I/O transmitter unit.
- When changing the settings, first turn OFF the power supply, then turn it ON again.



**Note:**

- Check the selector number indication on the unit when setting the operation mode selector.

### 1) Operation mode selector setting

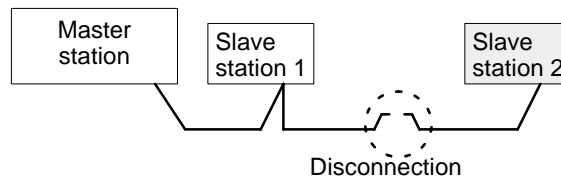
- **Selector number 1: Communication mode selection of FP I/O transmitter unit**
  - The selector can be set to either ON or OFF when the unit is used as a slave station of a MEWNET-TR system.
  - Regarding the communication mode, see page 18, “■ Operation mode selector setting.”
- **Selector number 2: System configuration selection**

Set the selector to ON when the unit is used as a slave station of a MEWNET-TR system, and set it to OFF when the unit is not used as a slave station.
- **Selector number 3: Output operation condition of the slave station during a communication error**

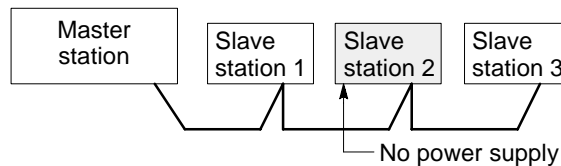
This selector allows you to select whether the slave stations' outputs are turned OFF or held when the master station's I/O control stops.

  - When the transmission cable between the unit and the master station disconnects during output operation, causing a communication error.
  - When the transmission cable between slave stations disconnects or when the power supply to a slave unit stops, and the master station's operation mode selector number 2 is set to ON (continuance of I/O control for properly operating slave stations).

**Example 1:** When the cable between slave stations 1 and 2 disconnects  
 When selector number 3 of each slave station is set to ON, the output is held even if the output of slave station 2 disconnects. If the selector is set to OFF, the slave station's output turns OFF when the cable disconnects.



**Example 2:** When the power supply to slave station 2 is cut OFF  
 When selector number 3 of each slave station is set to ON, the outputs of slave stations 1 and 3 are held. If the selector is set to OFF, the outputs of slave stations 1 and 3 turn OFF.



See page 54, “3. Operation Mode Setting When an Error Occurs.”

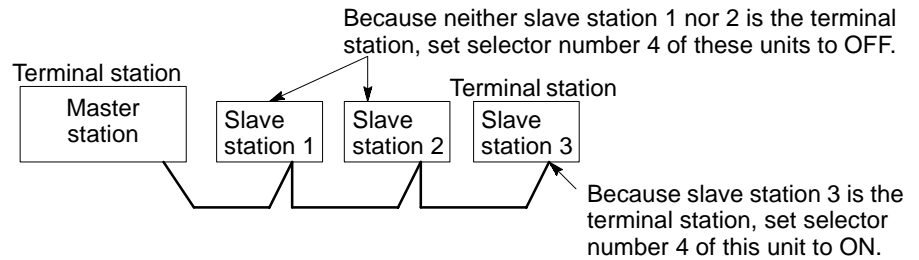
**Notes:**

- When an output type expansion FP I/O terminal unit is connected, the hold setting of selector number 3 is effective for the unit's outputs.
- The setting of selector number 3 of the input type FP I/O transmitter unit is also effective if an output type expansion FP I/O terminal unit is connected.
- The output of slave station 2 turns OFF when no power is supplied to station 2.

- **Selector number 4: Terminal station setting of the slave station**

Set the selector to ON when the slave station is the terminal station, and set it to OFF when the slave station is not the terminal station.

**Example:**



## 2) Operation mode when shipped

- The operation mode selector numbers of the slave station (FP I/O transmitter unit) are all set to the OFF position when shipped.
- Operation mode setting of the FP I/O transmitter unit when shipped:
  - The setting disallows the use of the unit as a slave station of a MEWNET-TR system.
  - When the transmission cable disconnects during output operation, the output turns OFF.
  - The unit is not set for use as the terminal station.

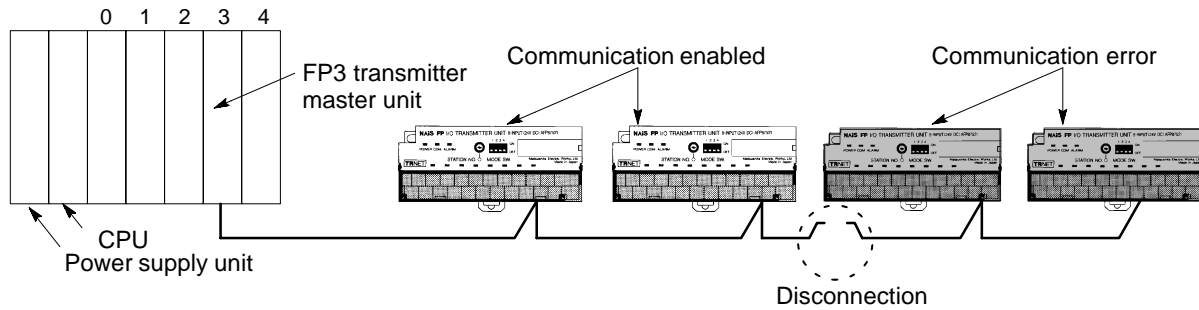
### 3. Operation Mode Setting When an Error Occurs

#### 1) Communication error

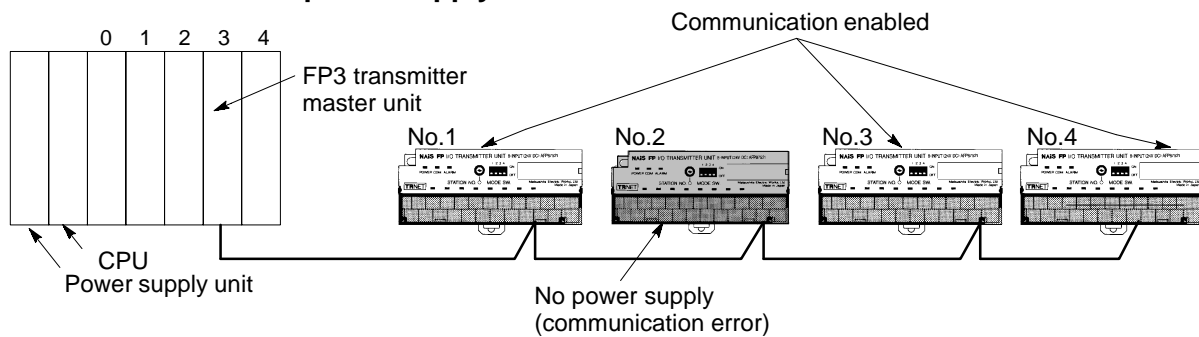
- In this case, the master station cannot communicate with the slave station, causing a communication error.

##### ■ Communication error example:

##### <Error condition: Disconnection of transmission cable>



##### <Error condition: No power supply to slave station No. 2>



#### 2) I/O control operation condition when a communication error occurs

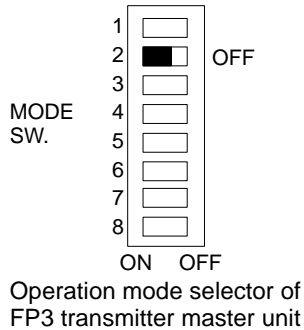
- Operation mode selector No. 2 of the FP3 transmitter master unit and system register 21 let you select whether to continue the I/O control of the properly operating slave stations or to terminate the I/O control of all slave stations when a communication error occurs.

##### ■ To terminate all control of the CPU

- Set system register 21 to K0 (stop). When the register is set this way, operation mode selector No. 2 of the FP3 transmitter master unit becomes ineffective regardless of the setting.
- The COM. LED of the FP3 transmitter master unit and FP I/O transmitter unit turns OFF when a communication error occurs.
- To resume the control operation of the CPU and the units, turn OFF the power supply of the master station. Then, after the cause of the communication error is removed, turn the power supply ON.

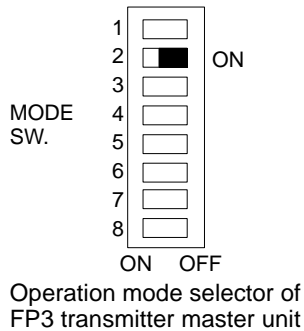
■ **To terminate the I/O control of the MEWNET-TR system**

- Set system register 21 to K1 (continue) and the operation mode selector No. 2 to the OFF position.
- The COM. LED of the FP3 transmitter master unit flashes slowly when a communication error occurs.
- To resume the operation, turn OFF the power supply of the master station. Then, after the cause of the communication error is removed, turn the power supply ON.



■ **To continue the I/O control of the properly operating slave stations**

- Set system register 21 to K1 (continue) and the operation mode selector No. 2 to the ON position.
- The I/O control continues for the slave stations that are properly connected when a communication error occurs.
- When the cause of the communication error is removed, the I/O control resumes for the slave stations for which the communication error occurred.
- To cancel the error status, turn OFF the power supply of the master station.



**Note:**

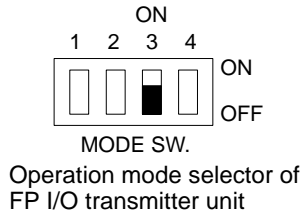
- See the “FP3/FP10S HARDWARE Technical Manual” and “FP3/FP5 Programming Manual” for details about system register settings.

### 3) Output condition when a communication error occurs

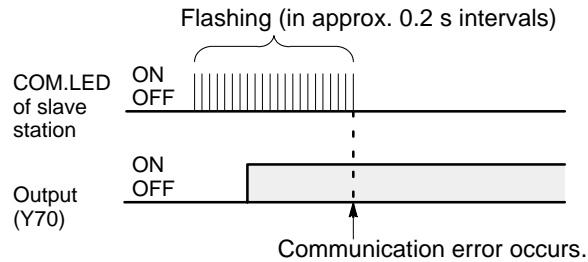
- Operation mode selector No. 3 of the FP I/O transmitter unit lets you select whether to hold or turn OFF the output of the slave station that has generated a communication error.
- Communication errors can be generated due to the following causes.
  - When the transmission cable disconnects.
  - When a communication error is generated with operation mode selector No. 2 of the FP3 transmitter master unit set to OFF.

#### ■ To hold the output of the slave station with a communication error

- Set the operation mode selector No. 3 to the ON position.

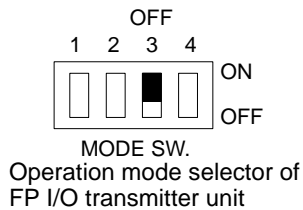


#### Example:

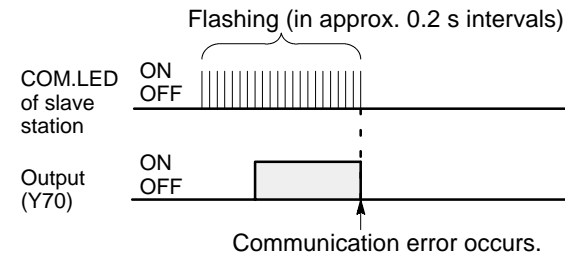


#### ■ To turn OFF the output of the slave station with a communication error

- Set the operation mode selector No. 3 to the OFF position.



#### Example:



#### Notes:

- The output of a slave station to which power is not supplied cannot be held.
- The output hold/OFF setting can also be made with output type expansion FP I/O terminal units using the FP I/O transmitter unit.
 

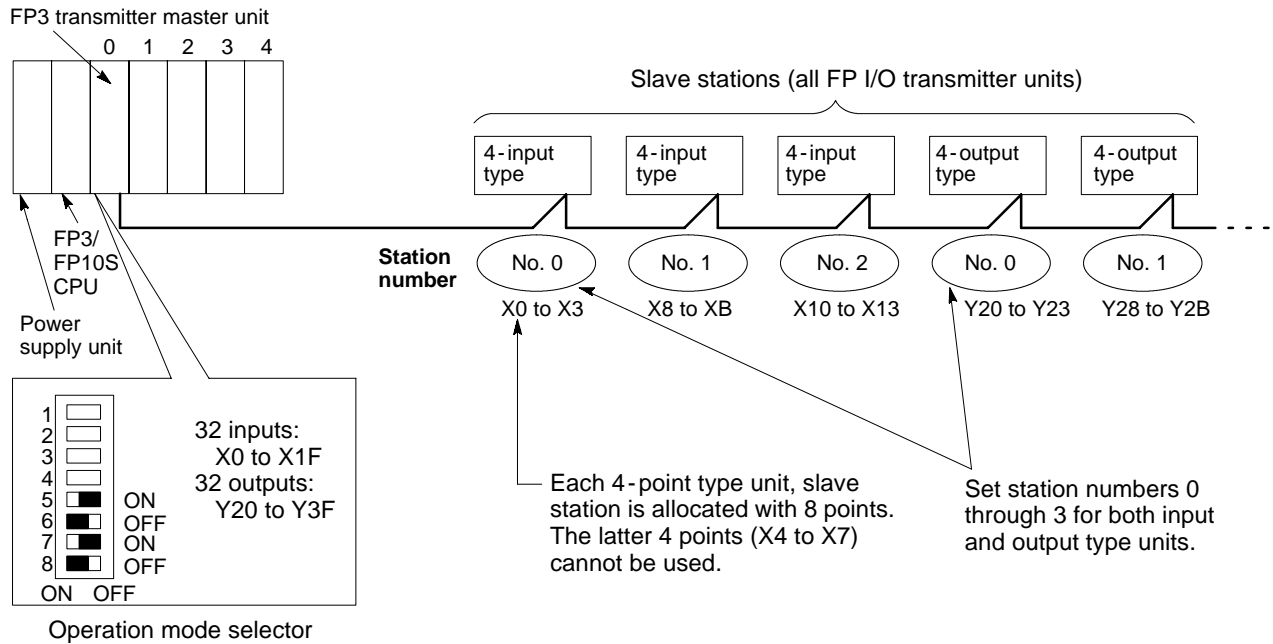
**Example:** When an FP I/O transmitter unit is connected with an output type expansion FP I/O terminal unit, use the FP I/O transmitter unit to set the output operation condition (output hold/OFF setting) of the expansion FP I/O terminal unit.
- Please note that all of the outputs become OFF in the event of a communications error when system register 21 is set to K0 (stop), even if operation mode selector No. 2 of the FP3 transmitter master unit is set to ON (continue).

# 4-2. I/O Allocation

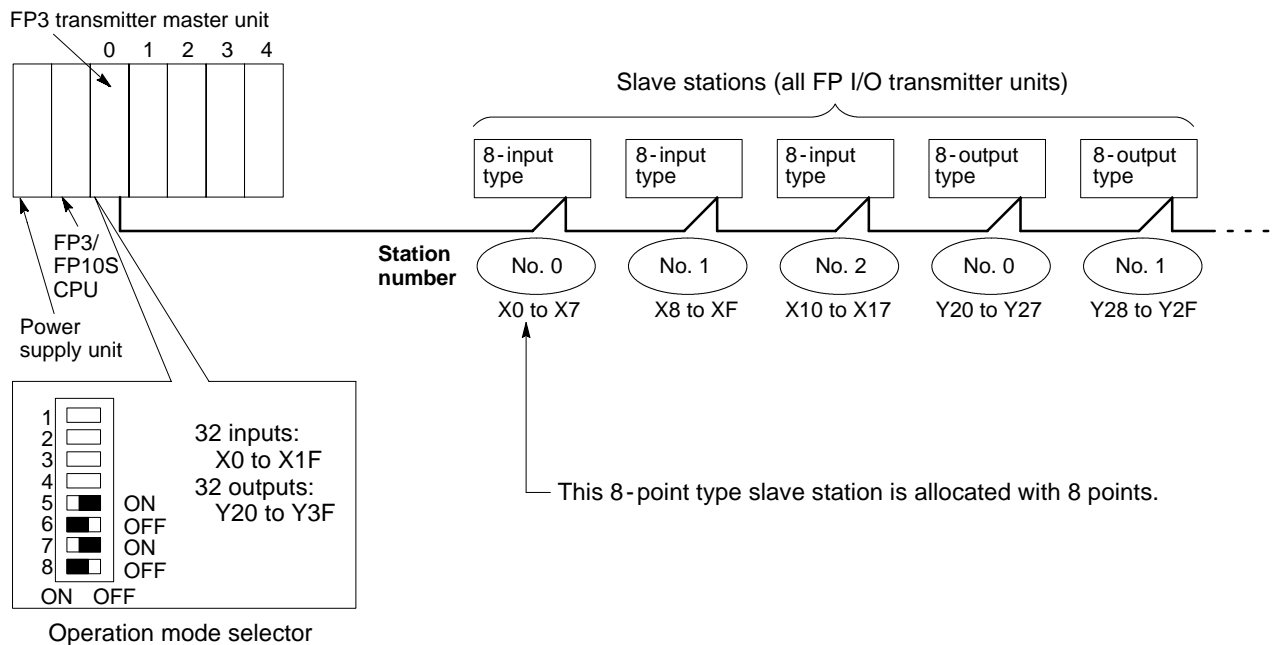
## 1. I/O Allocation and Station Number Setting

### ■ When using only FP I/O transmitter units as slave stations

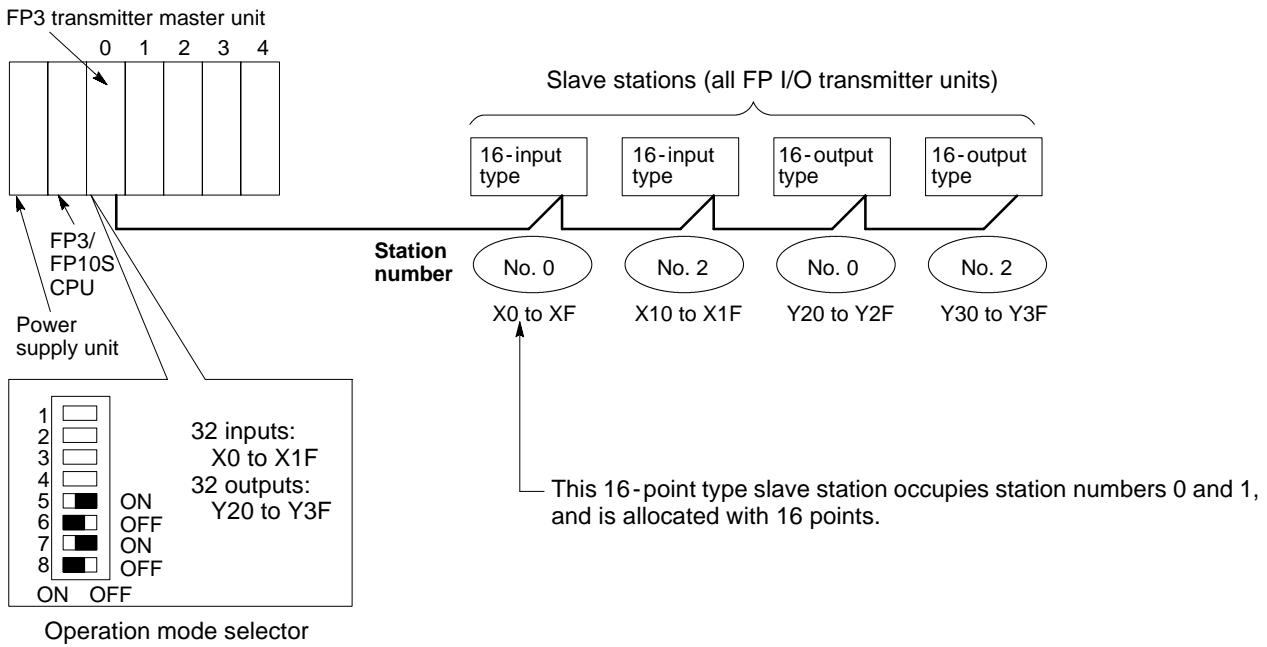
**Example 1:** When configuring a system with 4-point type units



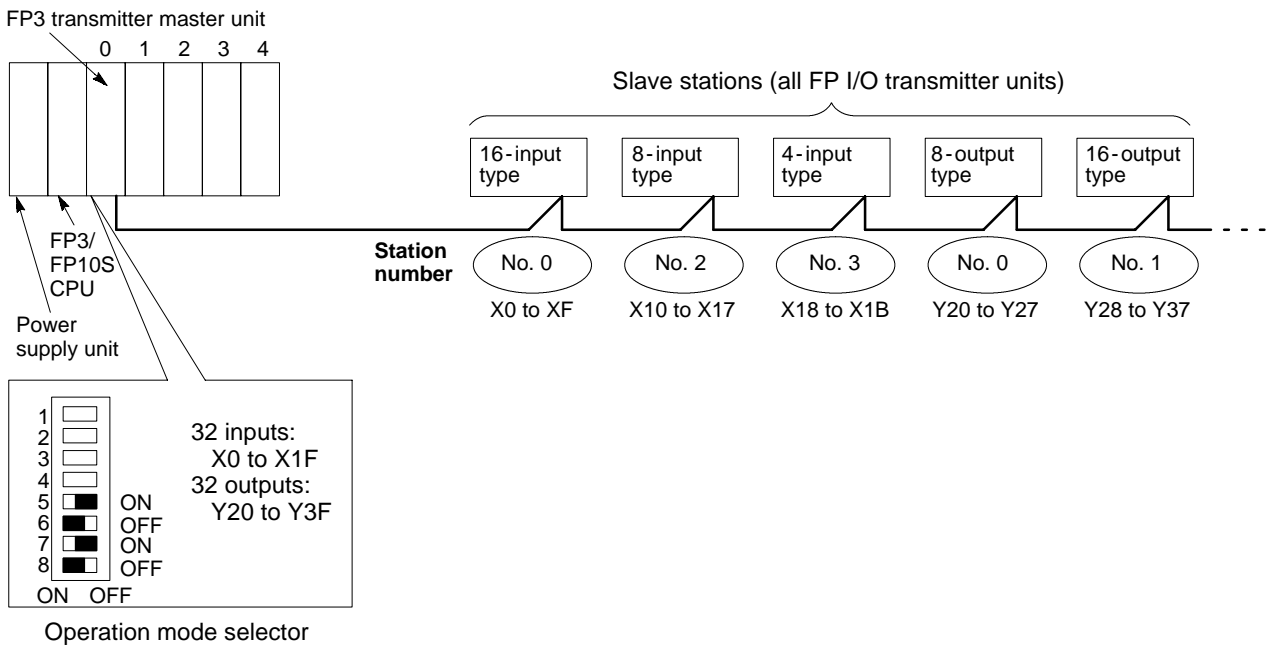
**Example 2:** When configuring a system with 8-point type units



**Example 3:** When configuring a system with 16-point type units



**Example 4:** When combining 4-, 8- and 16-point type units





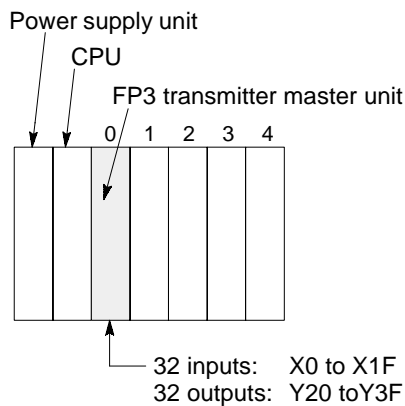
## 1) I/O numbers allocated to slave stations

- The I/O numbers to be used are selected by operation mode selector numbers 5 through 8 of the FP3 transmitter master unit.

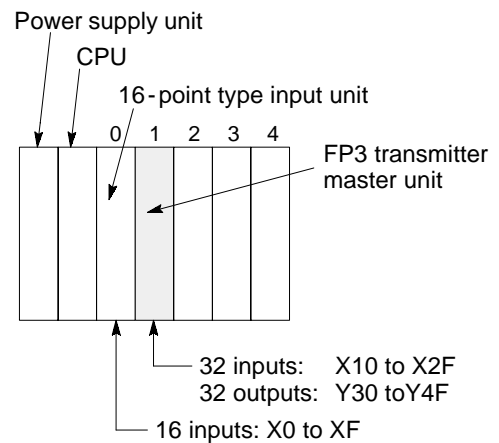
Item	Selector number				Number of points
	5	6	7	8	
Input	ON	ON	-	-	128
	OFF	ON	-	-	64
	ON	OFF	-	-	32
	OFF	OFF	-	-	0
Output	-	-	ON	ON	128
	-	-	OFF	ON	64
	-	-	ON	OFF	32
	-	-	OFF	OFF	0

- The first I/O number changes according to the unit's structure on the backplanes.
- I/O numbers are assigned from input to output in turn.

**Example 1:** When an FP3 transmitter master unit set to 32 inputs/32 outputs is mounted in slot 0 of the backplane



**Example 2:** When an FP3 transmitter master unit set to 32 inputs/32 outputs is mounted in slot 1 of the backplane

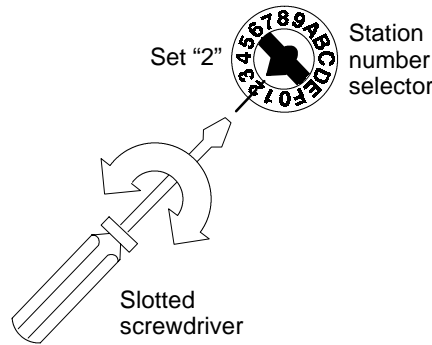


- The number of input and output points is set to 0 at the factory. If the unit is turned on with this setting, the ALARM LED will flash, and the unit will not operate.

## 2) Setting station numbers

- The I/O numbers to be allocated to each slave station are determined by the slave station number setting. Since each I/O number is assigned to a single slave station number, set each slave station with the slave station number that corresponds to the I/O numbers you wish to allocate.
- To set a slave station number, turn the station number selector of the FP I/O transmitter unit using a slotted screwdriver.

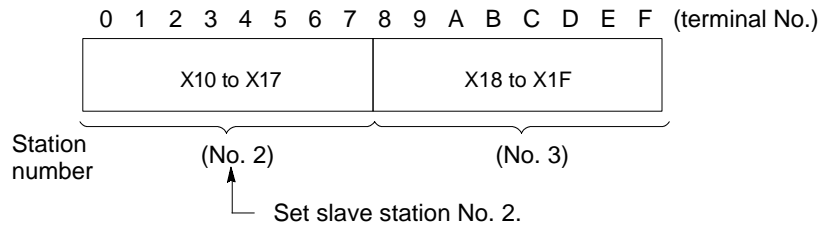
**Example:** Setting station number 2



- A slave station number is allocated with 8 points. All 4-point and 8-point type units are assigned with one station number, and a 16-point type unit occupies 2 station numbers. The station number to be set is the first station number.
- 4-point type FP I/O transmitter units use only the first 4 points of the 8 allocated points. The last 4 points cannot be used.

**Example:** 16-point type

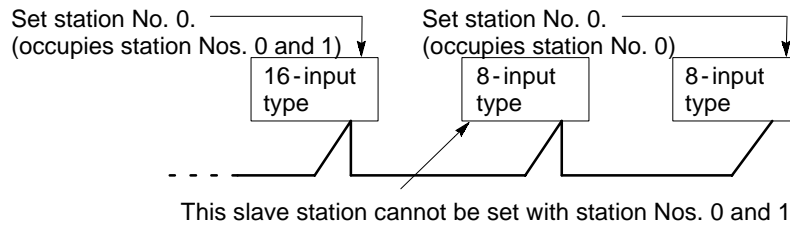
(2 station numbers)



### ■ Notes on station number setting

- Slave station numbers do not have to be set in the order that the units are connected.
- Make sure that the slave station numbers that are being set are not assigned to or occupied by another slave station of the same input/output type. The same slave station numbers can be used by two units if they are input and output type units.

**Example:**



- Do not use the same station number for more than one slave station even if they are separately connected to Port I and Port II.

### 3) I/O allocation method

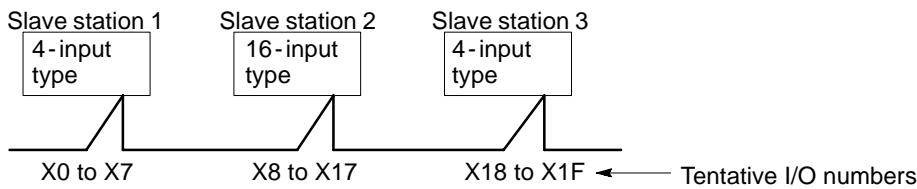
Described below is the procedure for setting slave station numbers according to the slave station configuration.

#### <Example>

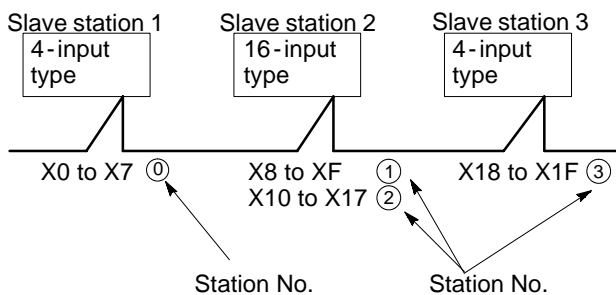
- The following example is based on the following I/O allocation conditions.
  - I/O points: 32 inputs, 32 outputs
  - Slot location: the FP3 transmitter master unit is mounted in slot 0 (first I/O No.: 0).
 When the above settings are made, X0 to X1F (station Nos. 0 to 3) are allocated for inputs, and Y20 to Y3F (station Nos. 0 to 3) for outputs. Although the example is based on an input type FP I/O transmitter unit, the procedure is the same for output type units.

1. Tentatively allocate I/O numbers to be used, according to the unit type and the number of points of each FP I/O transmitter unit.

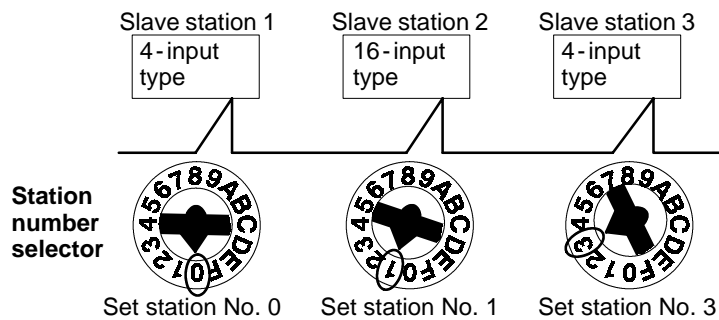
Allocate 8-point I/O numbers even for 4-point type FP I/O transmitter units.



2. Divide the tentatively allocated I/O numbers into groups of 8 points, and give a slave station number to each group of points in order.



3. For each FP I/O transmitter unit, set the first slave station number using the station number selector.



- For example, slave station 2 above is allocated with the following I/O numbers.

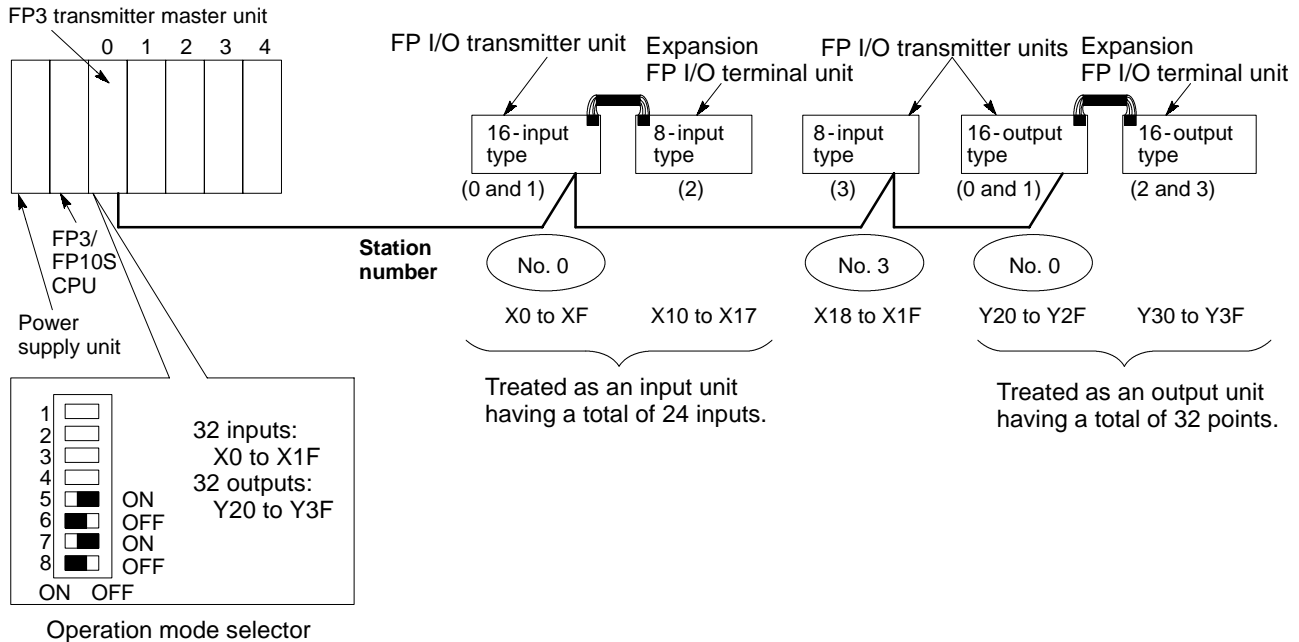
16-input type FP I/O transmitter unit																	
	X8	X9	XA	XB	XC	XD	XE	XF	X10	X11	X12	X13	X14	X15	X16	X17	
+ 24V	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	+ RS 485
- 24V	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	F.G. RS 485

- 4-point type units use only the first 4 points of the 8 allocated points. Slave station 1 above uses X0 to X3, while slave station 3 uses X18 to X1B.

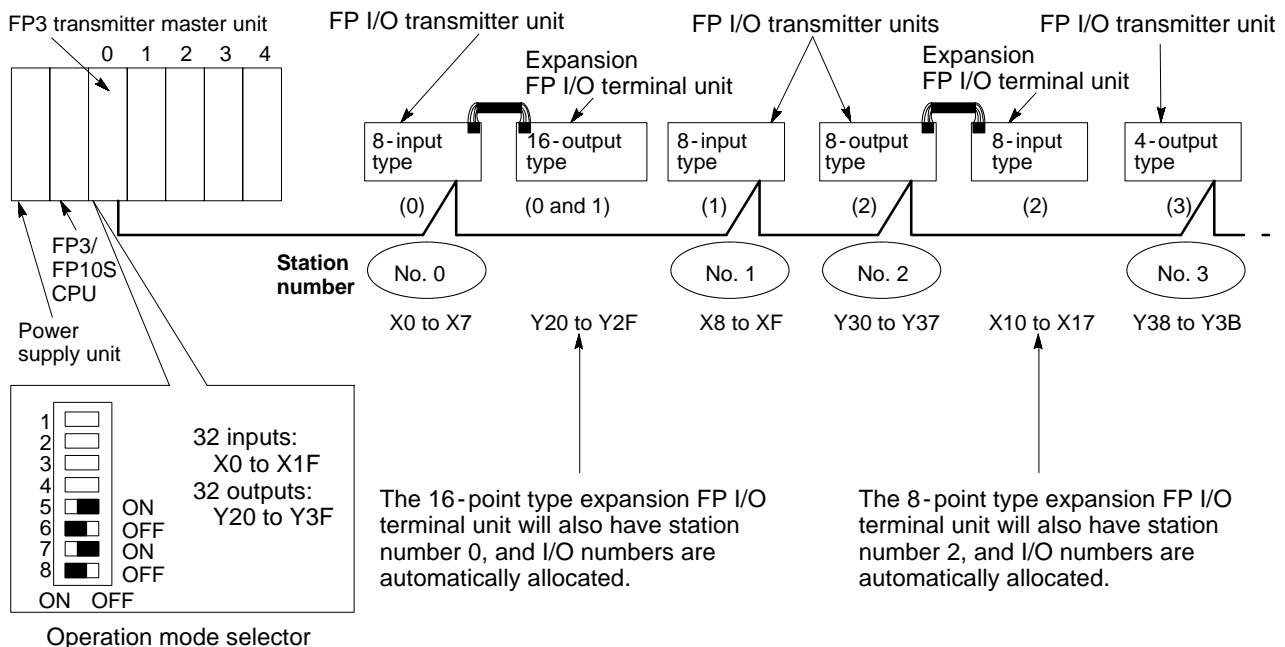
## 2. I/O Allocation When Using Expansion Units

### ■ When adding expansion FP I/O terminal units to FP I/O transmitter units

**Example 1:** When adding input type expansion FP I/O terminal units to input type FP I/O transmitter units, or when adding output type expansion FP I/O terminal units to output type FP I/O transmitter units



**Example 2:** When adding output type expansion FP I/O terminal units to input type FP I/O transmitter units, or when adding input type expansion FP I/O terminal units to output type FP I/O transmitter units



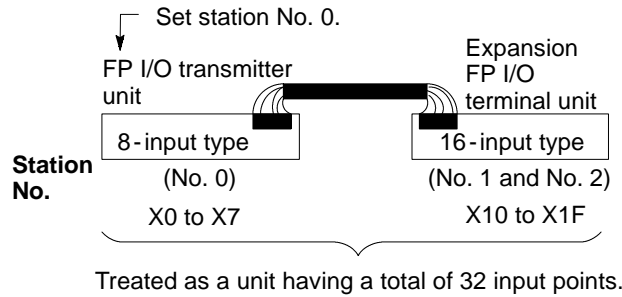
### 1) I/O allocation of expansion FP I/O terminal units

- Although the expansion FP I/O terminal unit is not provided with a switch to set a station number, the unit automatically occupies station numbers when connected to an FP I/O transmitter unit, and the I/O numbers corresponding to those station numbers are automatically allocated to the added expansion FP I/O terminal unit.

- When adding an expansion FP I/O terminal unit to an FP I/O transmitter unit

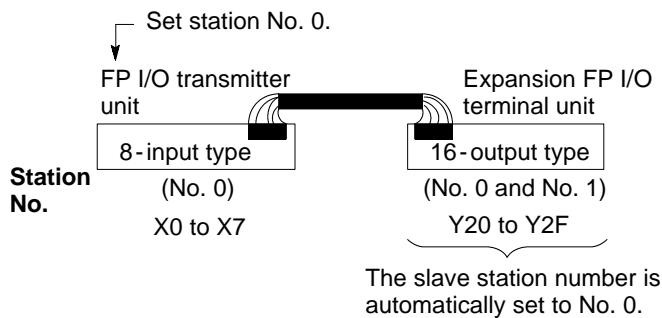
- ① When adding a unit of the same type (input unit to input unit, or output unit to output unit), the expansion FP I/O terminal unit occupies the station numbers that follow the station numbers occupied by the FP I/O transmitter unit.

**Example:**

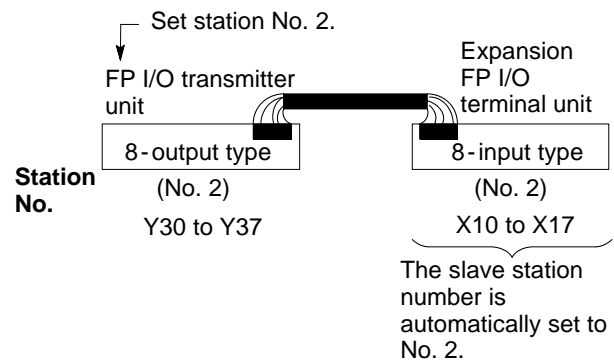


- ② When adding a different type unit (input unit to output unit, or output unit to input unit), the station numbers that are occupied by the FP I/O transmitter unit are also set in the expansion FP I/O terminal unit.

**Example 1:** When adding an output type unit to an input type unit



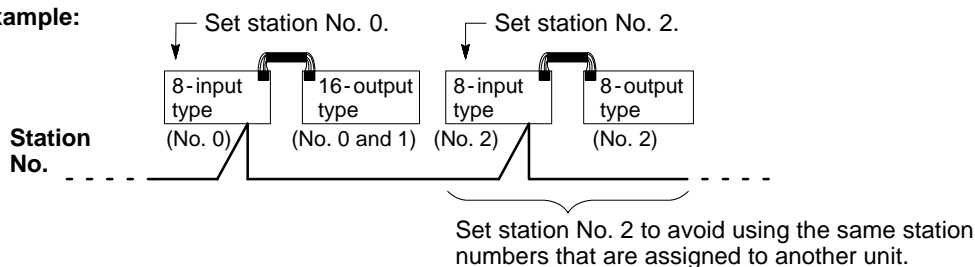
**Example 2:** When adding an input type unit to an output type unit



**Note:**

- When connecting an input type unit to an output type unit, or an output type unit to an input type unit, make sure that the same station numbers are not occupied by more than one unit.

**Example:**



### 3. I/O Allocation Table

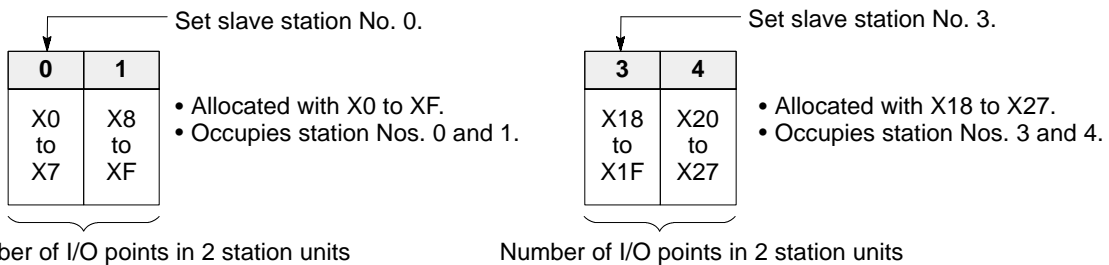
The following table shows the I/O allocation for an FP3 transmitter master unit mounted in slot 0 of the backplane.

I/O allocation pattern	Operation mode selector of the FP3 transmitter master unit	Slave station type	I/O points	I/O allocation of the slave station
Pattern No. 0 (Factory setting)		Input type	0 input	_____
		Output type	0 output	_____
Pattern No. 1		Input type	128 inputs	X0 to X7F
		Output type	128 outputs	Y80 to Y15F
Pattern No. 2		Input type	128 inputs	X0 to X7F
		Output type	64 outputs	Y80 to Y11F
Pattern No. 3		Input type	128 inputs	X0 to X7F
		Output type	32 outputs	Y80 to Y9F
Pattern No. 4		Input type	128 inputs	X0 to X7F
		Output type	0 output	_____

**Note:**

Starting with the first slave station number, I/O numbers are allocated in the number of 1 station unit to a 4-point type unit and an 8-point type unit, and 2 station units to a 16-point type unit.

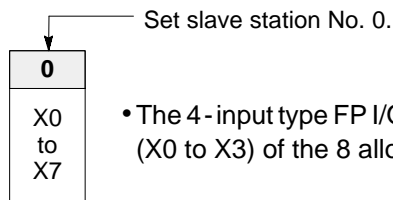
**Example 1:** I/O allocation for a slave station (16-input type FP I/O transmitter unit) when an FP3 transmitter master unit set to 64 input points is mounted in slot 0 of the backplane



Station numbers of the slave station																
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
<b>Not used</b> (Please note that an error will occur if the power supply is turned on with these settings.)																
X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F	
Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	Y100 to Y107	Y108 to Y10F	Y110 to Y117	Y118 to Y11F	Y120 to Y127	Y128 to Y12F	Y130 to Y137	Y138 to Y13F	Y140 to Y147	Y148 to Y14F	Y150 to Y157	Y158 to Y15F	
X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F	
Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	Y100 to Y107	Y108 to Y10F	Y110 to Y117	Y118 to Y11F	<b>Not used</b>								
X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F	
Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	<b>Not used</b>												
X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F	
<b>Not used</b>																

**Note:**

- **Example 2:** I/O allocation for a slave station (4-input type FP I/O transmitter unit) when an FP3 transmitter master unit set to 32 input points is mounted in slot 0 of the backplane.



- The 4-input type FP I/O transmitter unit in the example can use only the first 4 points (X0 to X3) of the 8 allocated points.

4-2. I/O Allocation

I/O allocation pattern	Operation mode selector of the FP3 transmitter master unit	Slave station type	I/O points	I/O allocation of the slave station
Pattern No. 5		Input type	64 inputs	X0 to X3F
		Output type	128 outputs	Y40 to Y11F
Pattern No. 6		Input type	64 inputs	X0 to X3F
		Output type	64 outputs	Y40 to Y7F
Pattern No. 7		Input type	64 inputs	X0 to X3F
		Output type	32 outputs	Y40 to Y5F
Pattern No. 8		Input type	64 inputs	X0 to X3F
		Output type	0 output	—————
Pattern No. 9		Input type	32 inputs	X0 to X1F
		Output type	128 outputs	Y20 to Y9F
Pattern No. 10		Input type	32 inputs	X0 to X1F
		Output type	64 outputs	Y20 to Y5F



	Station numbers of the slave station															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	Y100 to Y107	Y108 to Y10F	Y110 to Y117	Y118 to Y11F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F	<b>Not used</b>							
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	<b>Not used</b>											
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	<b>Not used</b>															
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	<b>Not used</b>							

4-2. I/O Allocation

I/O allocation pattern	Operation mode selector of the FP3 transmitter master unit	Slave station type	I/O points	I/O allocation of the slave station
Pattern No. 11	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	32 inputs	X0 to X1F
		Output type	32 outputs	Y20 to Y3F
Pattern No. 12	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	32 inputs	X0 to X1F
		Output type	0 output	—————
Pattern No. 13	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input type="checkbox"/> ON ON OFF	Input type	0 input	—————
		Output type	128 outputs	Y0 to Y7F
Pattern No. 14	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	0 input	—————
		Output type	64 outputs	Y0 to Y3F
Pattern No. 15	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	0 input	—————
		Output type	32 outputs	Y0 to Y1F

	Station numbers of the slave station															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	<b>Not used</b>											
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	<b>Not used</b>															
	<b>Not used</b>															
	Y 0 to Y 7	Y 8 to Y F	Y10 to Y17	Y18 to Y1F	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F
	<b>Not used</b>															
	Y 0 to Y 7	Y 8 to Y F	Y10 to Y17	Y18 to Y1F	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	<b>Not used</b>							
	<b>Not used</b>															
	Y 0 to Y 7	Y 8 to Y F	Y10 to Y17	Y18 to Y1F	<b>Not used</b>											



**CHAPTER 5**

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**BEFORE TRIAL OPERATION**

- 5-1. Things to Check Before Turning the Power ON ..... 72
- 5-2. Procedure Up to Trial Operation ..... 73
  - 1. Trial Operation Procedure ..... 73
  - 2. Checking the Communication Condition of  
the Slave Stations ..... 74

# 5-1. Things to Check Before Turning the Power ON

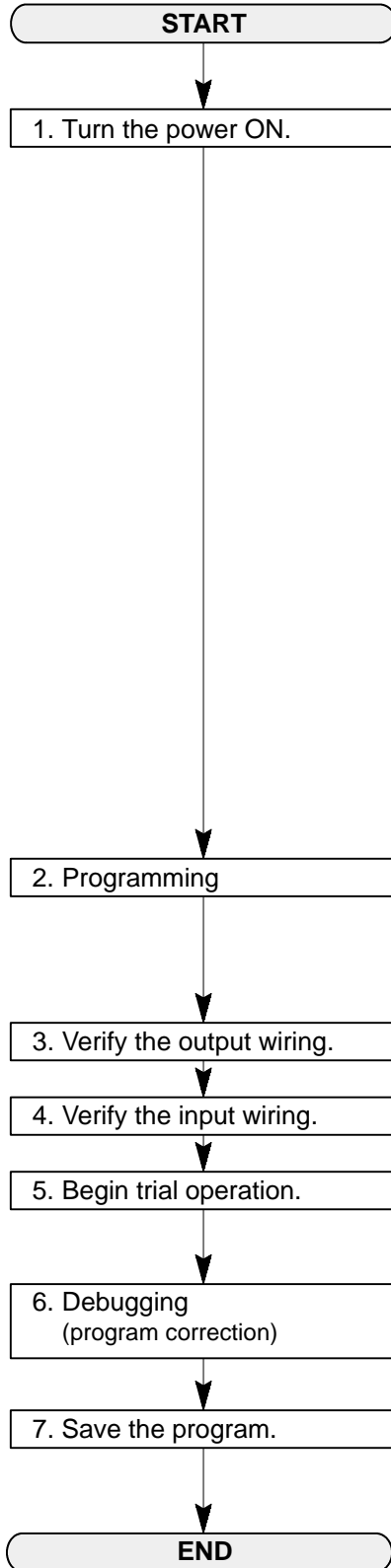
- After wiring, be sure to check these items before turning ON the power of the FP3 MEWNET-TR system.

Item		Description	Page to see
<b>Unit</b>		<ul style="list-style-type: none"> <li>• Does the unit type match the design list?</li> <li>• Are the unit mounting screws properly tightened?</li> </ul>	page 7 to 10 and 29
<b>Power supply</b>		<ul style="list-style-type: none"> <li>• Is the power supply for the master station different from the power supply for slave stations?</li> <li>• Is the voltage correctly supplied?</li> <li>• Is the wire size correct?</li> </ul>	page 35 to 42
<b>Wiring</b>		<ul style="list-style-type: none"> <li>• Is the RS485 interface on the unit correctly connected?</li> <li>• Are the expansion cables properly connected between units?</li> <li>• Does the wiring of the terminal match?</li> <li>• Is the wire size correct?</li> </ul>	page 43 to 47
<b>Setting of terminal station</b>	<b>Master station</b>	• Is the FP3 transmitter master unit located as a terminal of the network layout?	page 44
	<b>Slave station</b>	• Is operation mode selector No. 4 set to the ON position when a slave station (FP I/O transmitter unit) is located as a terminal station?	page 53
<b>Setting of master station</b>		<CPU> <ul style="list-style-type: none"> <li>• Is the mode selector set to the PROG. mode?</li> <li>• Is the backup battery connector firmly connected?</li> </ul> <FP3 transmitter master unit> <ul style="list-style-type: none"> <li>• Is operation mode selector No. 1 set to the OFF position?</li> <li>• Is the I/O address set correctly using operation mode selector Nos. 5 to 8?</li> </ul>	See the "FP3/FP10S HARDWARE Technical Manual."  page 50 and 51
<b>Setting of slave station</b>		<FP I/O transmitter unit> <ul style="list-style-type: none"> <li>• Is operation mode selector No. 2 set to the ON position?</li> <li>• Is the station number correctly set?</li> <li>• Are any station numbers overlapping?</li> </ul>	page 52, 58 and 59

# 5-2. Procedure Up to Trial Operation

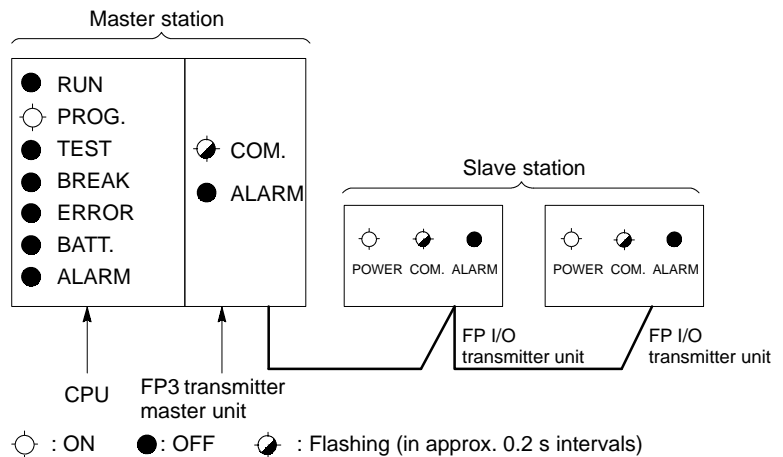
## 1. Trial Operation Procedure

- After installation and wiring, perform a trial operation according to the following procedure.



- Before turning the power ON, check the items described on the previous page.
- Turn ON the slave stations (FP I/O transmitter units) first, then turn ON the master station (Power supply unit).
- After the power is turned ON, check that the LED indication on each unit is as shown below. If the LEDs do not light in the same manner shown below, there is a communication error. See page 91, "7-2. Remote I/O Control When an Error Occurs."

<FP3 MEWNET-TR System>

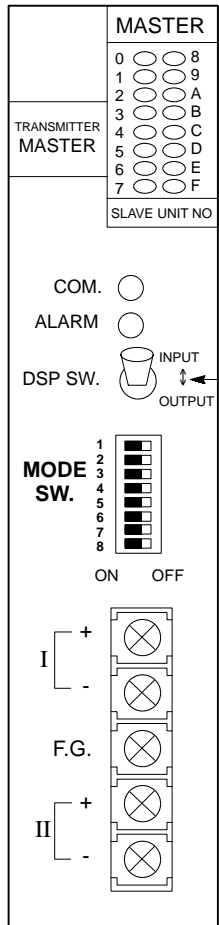


- Check the I/O addresses allocated to each slave station.
- Enter the program with the NPST-GR or FP Programmer II.
- When using the FP Programmer II, be sure to perform the "Clear Program" operation before inputting.
- Use the programming tool's total check function to check for syntax errors.
- Check the output wiring by using the forced ON/OFF function.
- Check the input wiring by watching the ON/OFF status of the input LEDs.
- Switch the mode selector from PROG. mode to RUN mode, and verify that the RUN LED turns ON.
- Check the sequence operation of the program.
- If there is an error in the operation, check the program using the programming tool's monitor function.
- Correct the program.
- We recommend that the created program be saved onto a floppy disk, onto EEPROM for the FP3C CPU (AFP3210C, AFP3211C, and AFP3220C), and onto an IC memory card for the FP10S CPU (AFP6231). Printing out is also possible.

## 2. Checking the Communication Condition of the Slave Stations

- The station monitor LEDs of the FP3 transmitter master unit indicate whether communication is properly conducted with each slave station (FP I/O transmitter unit).

FP3 transmitter master unit



### Station monitor LEDs:

- These are LEDs that monitor the slave stations (station numbers 0 to F) connected to the FP3 transmitter master unit.

**turn ON** (○): Communication is normal with the slave station of the corresponding station number.

**flash** (◐): There is a communication error with the slave station of the corresponding station number.

**turn OFF** (●): No slave station has been set with the corresponding station number.

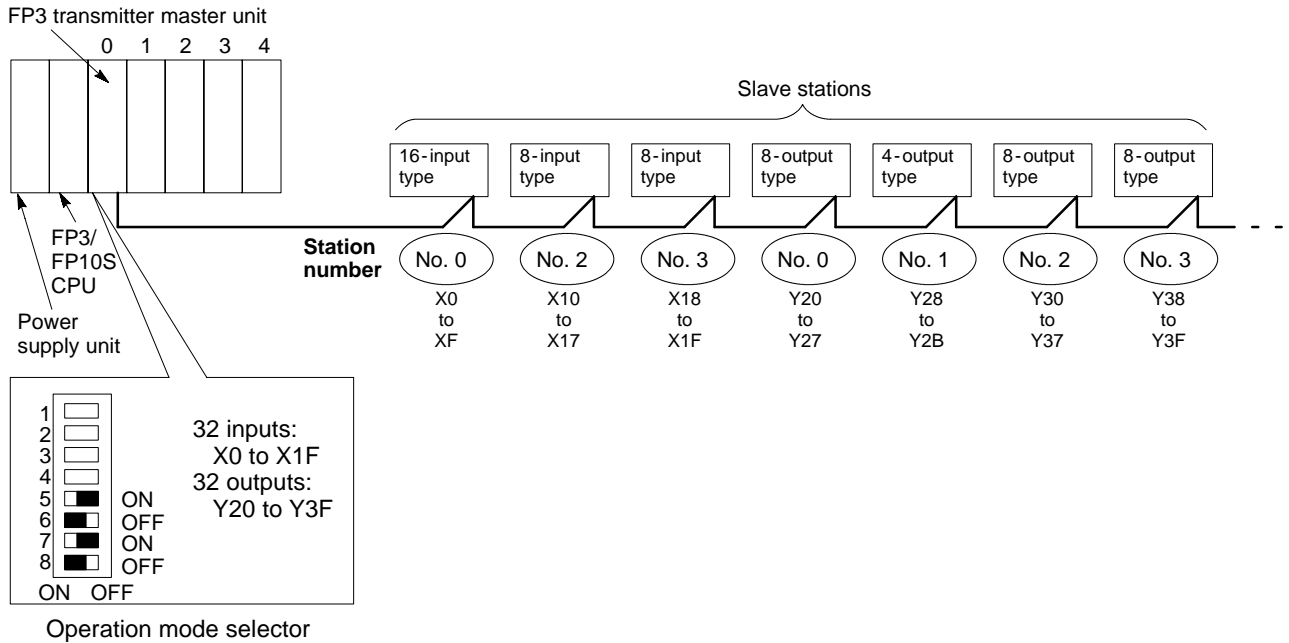
- Even if the station number is occupied by the latter 8 points of a 16-point type FP I/O transmitter unit or expansion FP I/O terminal unit, the LED does not light unless the station number is set.

### Selector for station monitor LEDs:

- When the selector is set to the INPUT position, the station number LEDs correspond to station numbers 0 to F of the input slave stations. When the selector is set to the OUTPUT position, the station number LEDs correspond to station numbers 0 to F of the output slave stations.

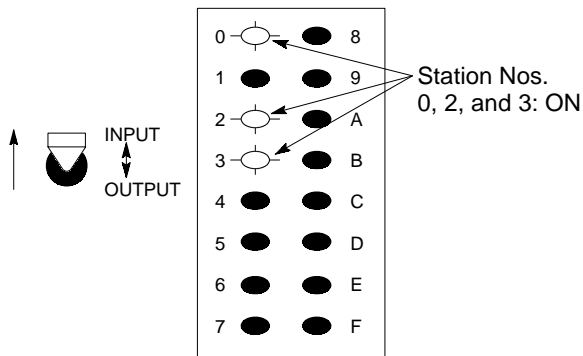


**Example:**

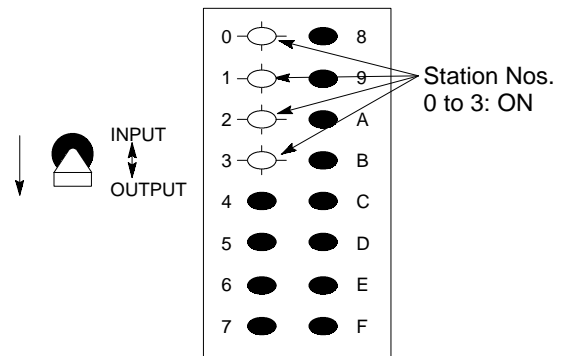


- In the above system configuration, when communication is normal, the station monitor LEDs indicate as follows depending on the position (INPUT or OUTPUT) of the selector for the station monitor LEDs.

Connection status of input type slave stations (selector in INPUT position)



Connection status of output type slave stations (selector in OUTPUT position)

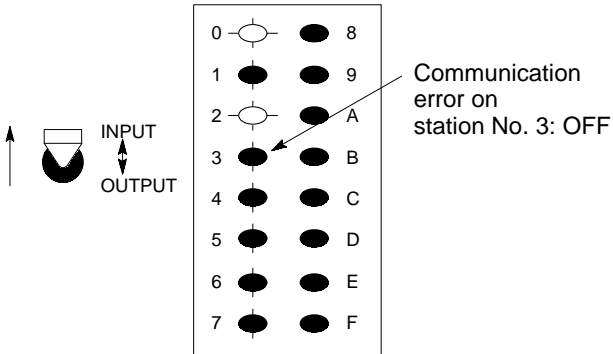


5-2. Procedure Up to Trial Operation

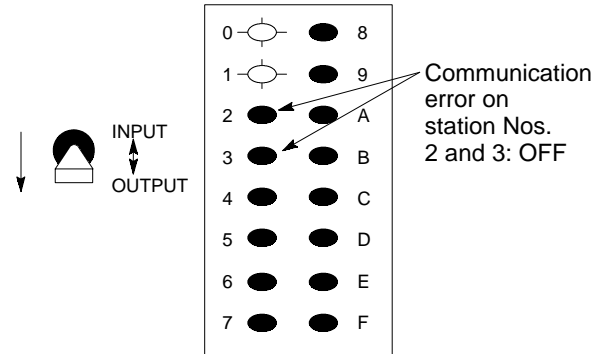
- If the LEDs look like the example when the power is turned ON, there is a communication error. Check the power supply and transmission cable of the error-generating slave station.

**Example:**

Connection status of input type slave stations  
(selector in INPUT position)



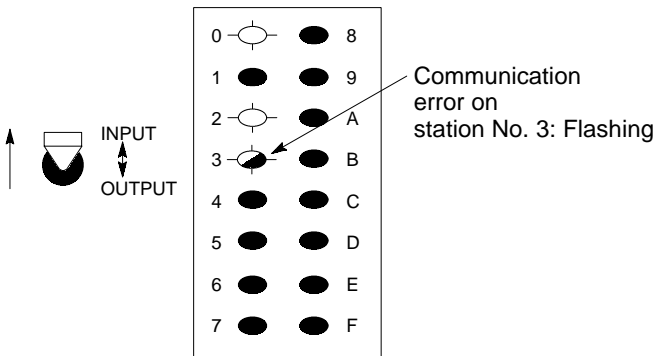
Connection status of output type slave stations  
(selector in OUTPUT position)



- If a communication error suddenly occurs when communication has been normal, the LED indicator corresponding to the error-generating slave station flashes. In the example, check the power supply and transmission cable of slave station No. 3.

**Example:**

Connection status of input type slave stations  
(selector in INPUT position)



# CHAPTER 6

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## I/O LINK FUNCTION

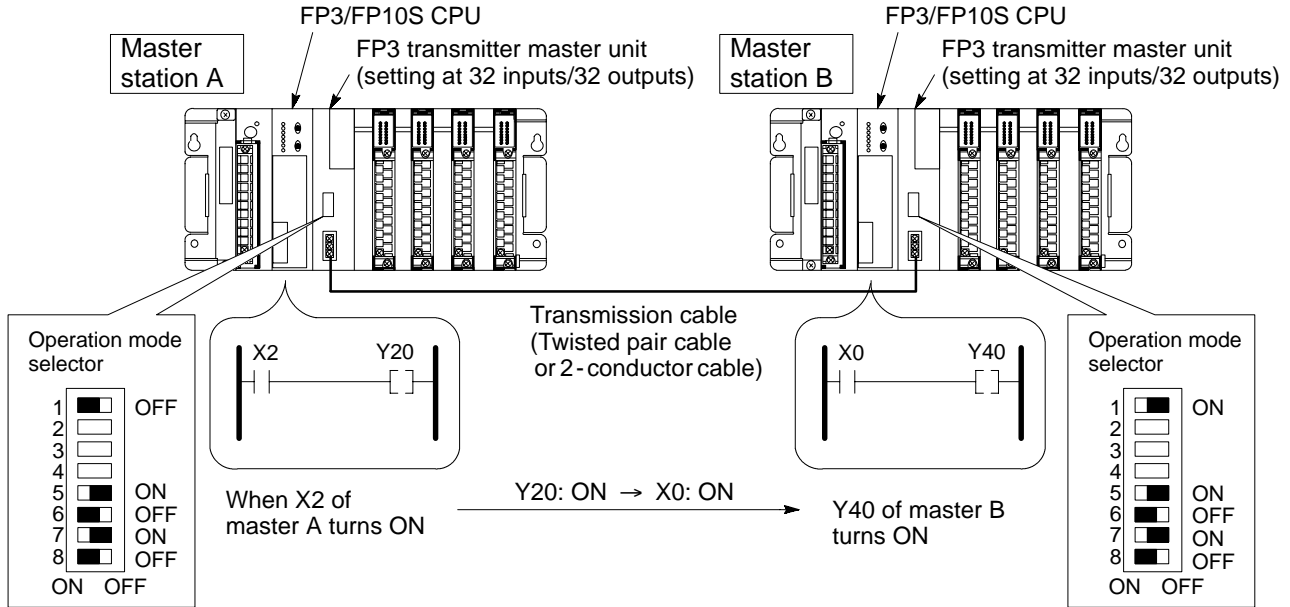
- 6-1. Master Station and Master Station ..... 78
  - 1. FP3/FP10S and FP3/FP10S ..... 78
- 6-2. FP-M/FP1 Master Station and FP3/FP10S
  - Master Station ..... 80
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- 6-3. I/O Link Application Examples ..... 84
  - 1. FP-M MEWNET-TR System and FP3/FP10S
    - Master Station ..... 84
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    - Master Station ..... 86
- 6-4. Notes on 16-Bit Data Transfer ..... 88

# 6-1. Master Station and Master Station

## 1. FP3/FP10S and FP3/FP10S

- By connecting two FP3 transmitter master units, I/O data can be exchanged between the two FP3/FP10S master stations. The I/O points allocated to master stations A and B correspond one to one. When an output is generated from one master station, the corresponding input point of the other master station turns ON.

### 1) Wiring and setting method



- Connect the RS485 interfaces of the two FP3 transmitter master units with a transmission cable.
- Set the operation mode selectors of the two FP3 transmitter master units as shown below.

<Master A>  
Selector No. 1: OFF

<Master B>  
Selector No. 1: ON

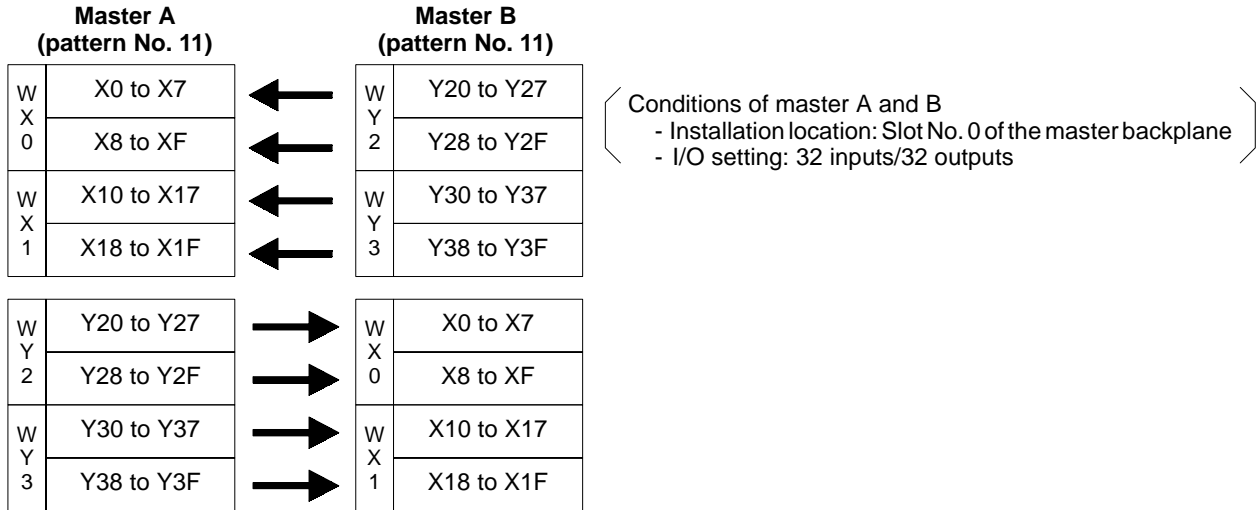
### Notes:

- Either master station can be set as master A. However, be sure to pair up two stations as master A and master B.
- When the I/O link function is used, do not connect a slave station.
- It is recommended that the two FP3 transmitter master units have the same number of I/O points. To set I/O points, use operation mode selector Nos. 5 through 8, and follow the same procedure as for the I/O allocation for remote I/O slave stations.
- For the I/O point setting of operation mode selector Nos. 2 through 8, see page 50, "4-1. Operation Mode Setting."

## 2) I/O link function example

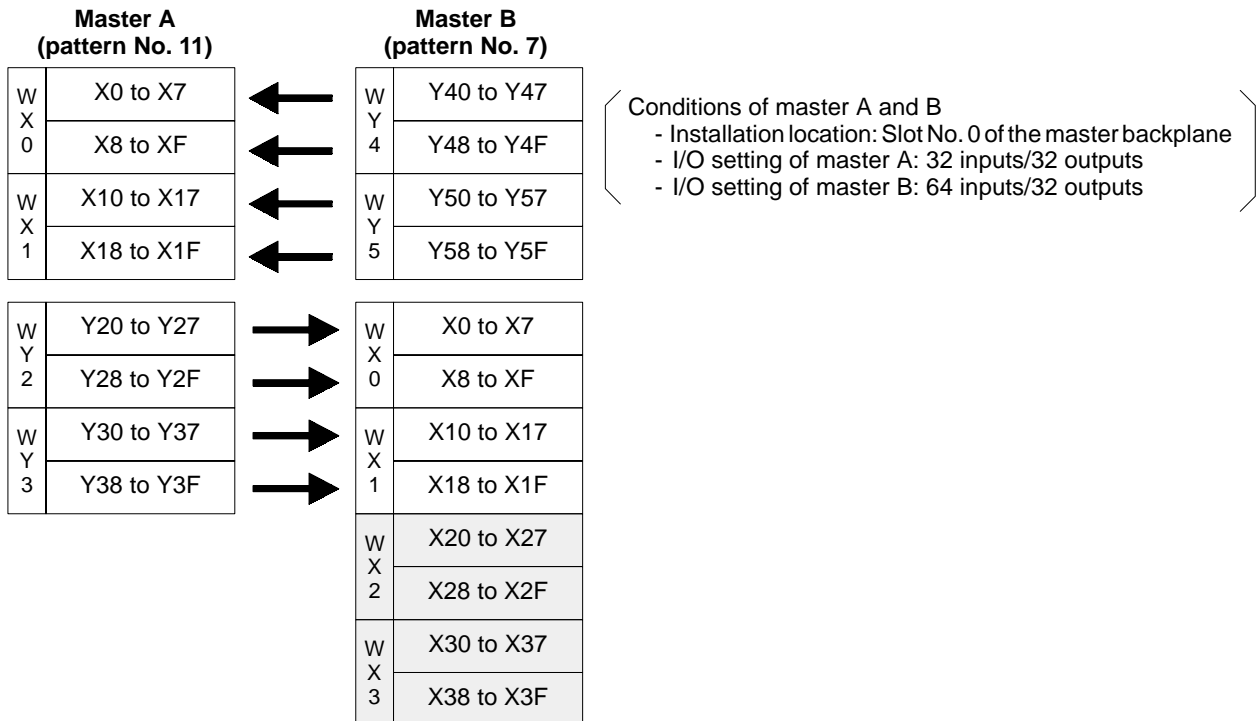
**Example 1:** When using the same I/O allocation pattern

- In this example, when an output is generated from Y27 of one master station, X7 of the other master station turns ON.



**Example 2:** When using different I/O allocation patterns

- In this example, when an output is generated from Y5F of master B, X1F of master A turns ON.



### Notes:

- When the number of I/O points differs between the two FP3 transmitter master units, I/O information cannot be exchanged with the sections (indicated by the shaded area) where corresponding I/O points are not set.
- The output relays indicated by the shaded area can be used as internal relays from the program.
- See page 64, “3. I/O Allocation Table” for details about I/O allocation pattern numbers of master A and B.

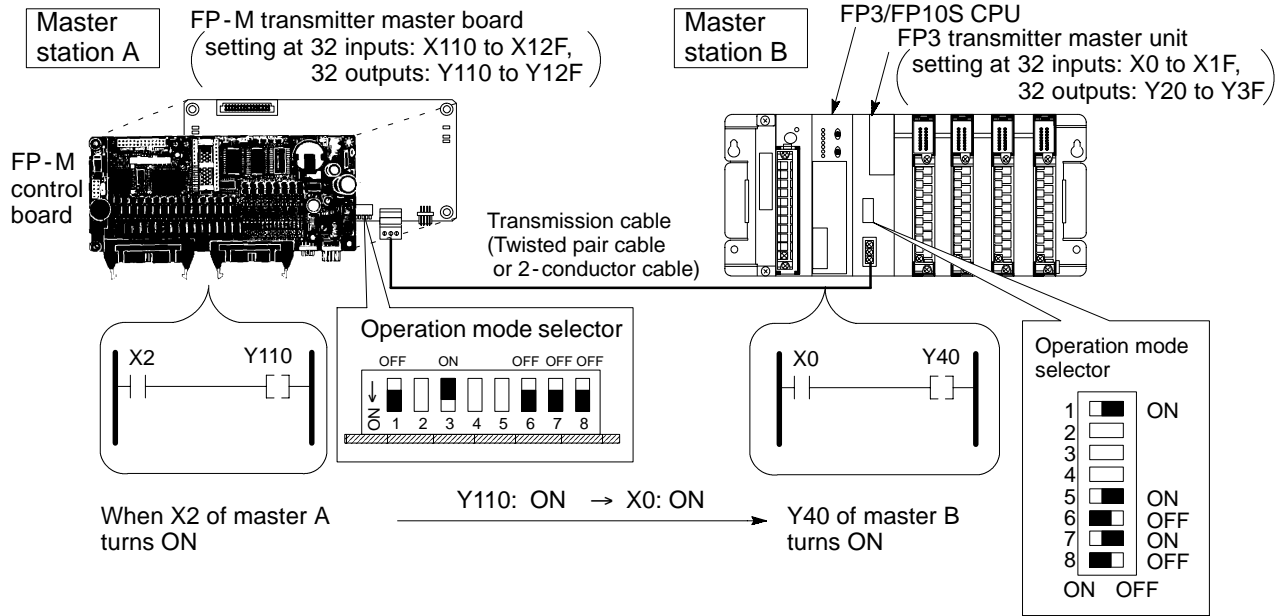
# 6-2. FP-M/FP1 Master Station and FP3/FP10S Master Station

## 1. FP-M and FP3/FP10S

By connecting the FP-M transmitter master board and FP3 transmitter master unit, I/O data can be exchanged between the two master stations. The I/O points allocated to master stations A and B correspond one to one. When an output is generated from one master station, the corresponding input point of the other master station turns ON.

### 1) Wiring and setting method

#### ■ FP-M and FP3/FP10S



- Connect the RS485 interfaces of the FP-M transmitter master board and FP3 transmitter master unit with a transmission cable.
- Set the operation mode selectors of each master station as shown below.

<Master A>

FP-M Selector No. 1: OFF, No. 3: ON

<Master B>

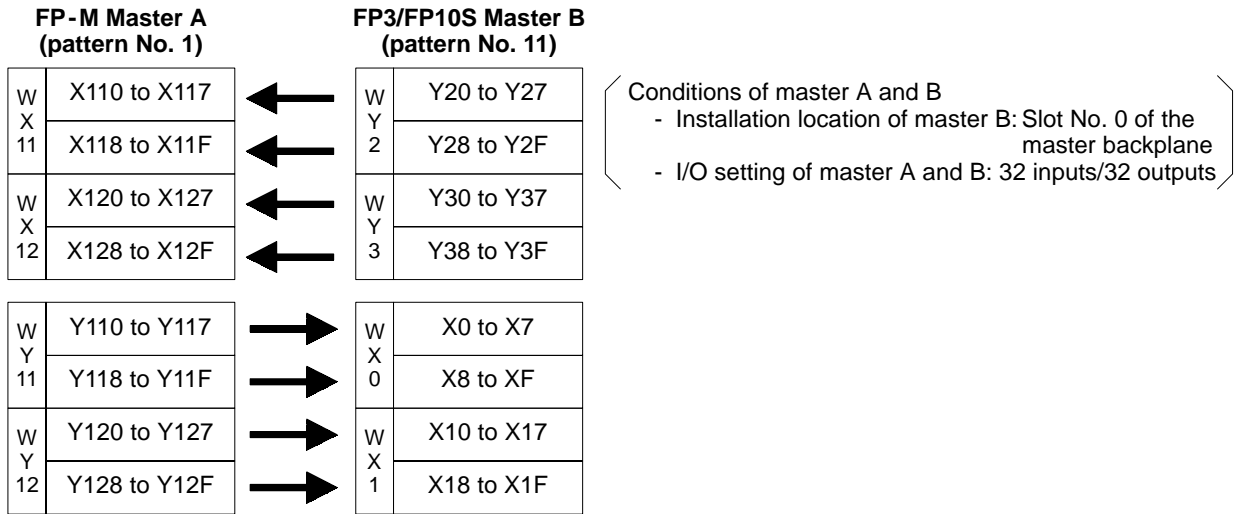
FP3/FP10S Selector No. 1: ON

#### Notes:

- Either master station can be set as master B. However, be sure to pair up two stations as master A and master B.
- When the I/O link function is used, do not connect a slave station.
- It is recommended that the FP-M transmitter master board and FP3 transmitter master unit have the same number of I/O points. To set the number of I/O points, use the operation mode selectors, and follow the same procedure as for the I/O allocation for remote I/O slave stations.
- For the I/O point setting of operation mode selector of the FP3 transmitter master unit, see page 50, “4-1. Operation Mode Setting.”
- For the setting of operation mode selector of the FP-M transmitter master board, see the “FP-M/FP1 MEWNET-TR Technical Manual.”

## 2) I/O link function example

- In this example, when an output is generated from Y110 of FP-M master A, X0 of FP3/FP10S master B turns ON.



### Notes:

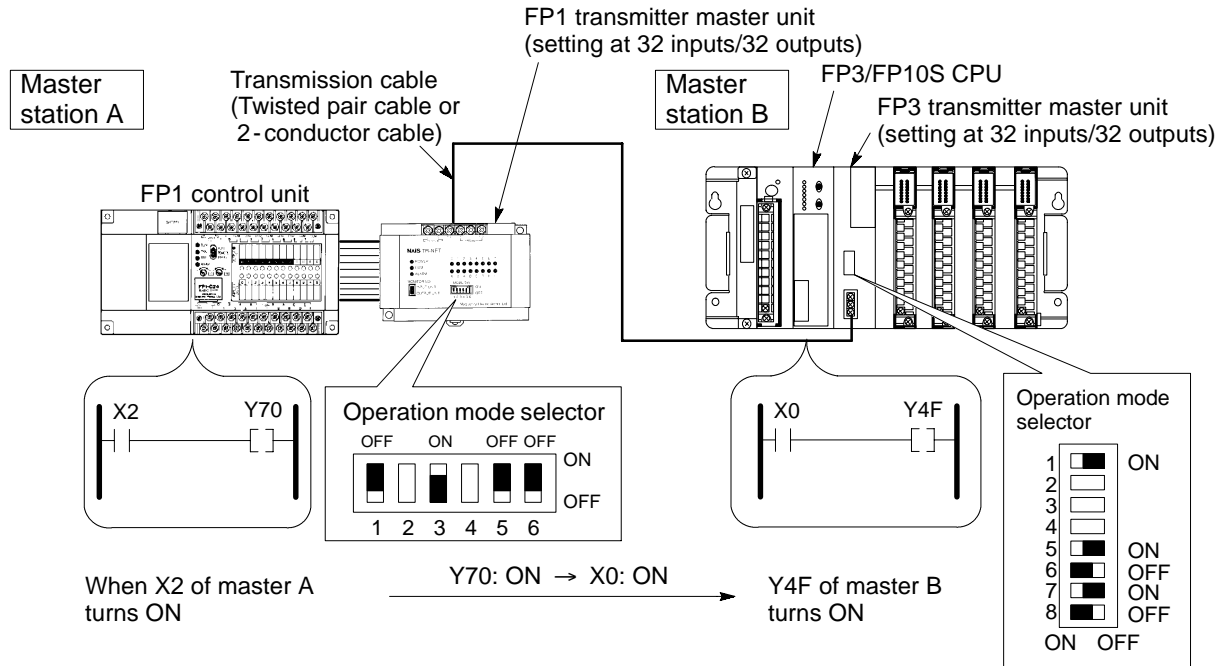
- For the I/O allocation pattern numbers of FP-M master A, see the “FP-M/FP1 MEWNET-TR Technical Manual.”
- For the pattern numbers of FP3/FP10S master B, see page 64, “3. I/O Allocation Table.”
- When the number of I/O points differs between master A and master B, I/O information cannot be exchanged if there is no corresponding I/O point.

## 2. FP1 and FP3/FP10S

By connecting the FP1 transmitter master unit and FP3 transmitter master unit, I/O data can be exchanged between the two master stations. The I/O points allocated to master stations A and B correspond one to one. When an output is generated from one master station, the corresponding input point of the other master station turns ON.

### 1) Wiring and setting method

#### ■ FP1 and FP3/FP10S



- Connect the RS485 interfaces of the FP1 transmitter master unit and FP3 transmitter master unit with a transmission cable.
- Set the operation mode selectors of each master station as shown below.
 

<Master A> FP1 Selector No. 1: OFF, No. 3: ON	<Master B> FP3/FP10S Selector No. 1: ON
--	--

#### Notes:

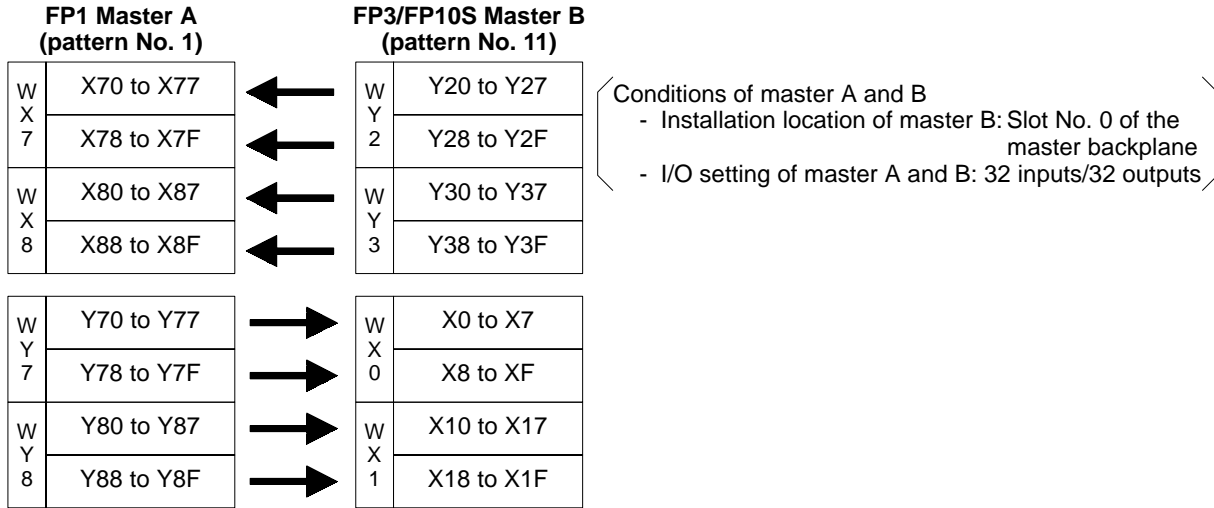
- Either master station can be set as master B. However, be sure to pair up two stations as master A and master B.
- When the I/O link function is used, do not connect a slave station.
- It is recommended that master A and master B have the same number of I/O points. To set I/O points, use the operation mode selectors, and follow the same procedure as for the I/O allocation for remote I/O slave stations.
- For the setting of the operation mode selector of the FP3 transmitter master unit, see page 50, “4-1. Operation Mode Setting.”
- For the setting of the operation mode selector of the FP1 transmitter master unit, see the “FP-M/FP1 MEWNET-TR Technical Manual.”



## 2) I/O link function example

### Example 1: FP1 and FP3/FP10S

- In this example, when an output is generated from Y70 of FP1 master A, X0 of FP3/FP10S master B turns ON.



### Notes:

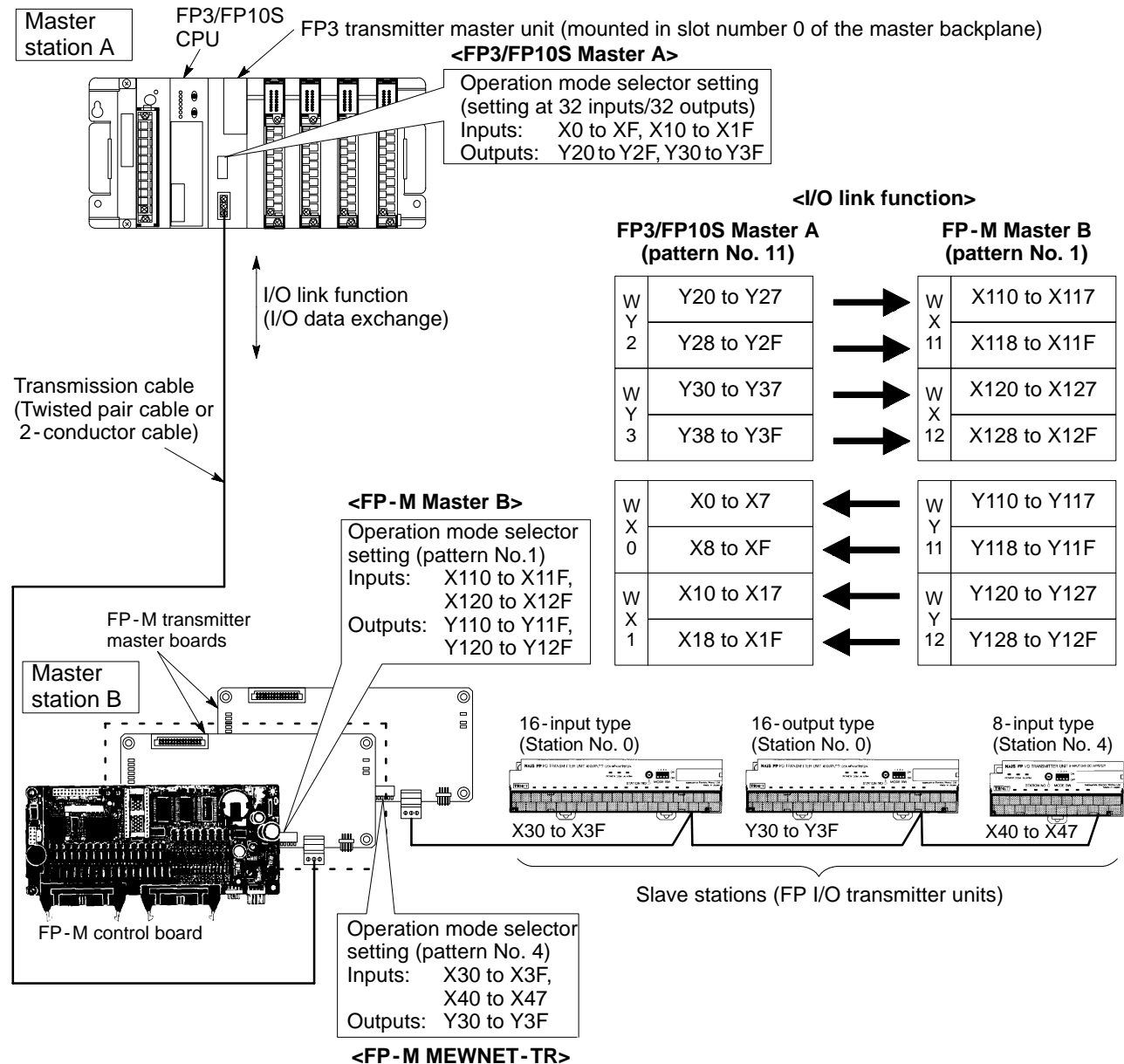
- For the I/O allocation pattern numbers of FP1 master A, see the “FP-M/FP1 MEWNET-TR Technical Manual.”
- For the pattern numbers of FP3/FP10S master B, see page 64, “3. I/O Allocation Table.”
- When the number of I/O points differs between master A and master B, I/O information cannot be exchanged if there is no corresponding I/O point.

# 6-3. I/O Link Application Examples

## 1. FP-M MEWNET-TR System and FP3/FP10S Master Station

- By connecting the RS485 interfaces of the FP-M transmitter master board of an FP-M MEWNET-TR system and the FP3 transmitter master unit with a transmission cable, I/O data can be exchanged between the slave stations of the FP-M MEWNET-TR system and the FP3/FP10S master station.  
The I/O points allocated to master stations A and B correspond one to one.

### I/O link function of FP-M MEWNET-TR system and FP3/FP10S master



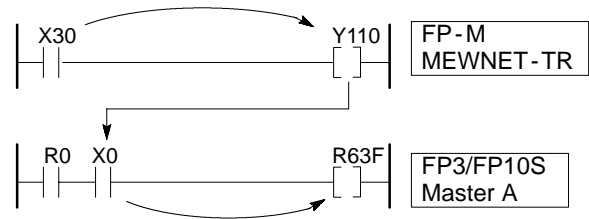
### Notes:

- For the I/O allocation pattern numbers of FP-M master B, see the "FP-M/FP1 MEWNET-TR Technical Manual."
- For the pattern numbers of FP3/FP10S master A, see page 64, "3. I/O Allocation Table."

### ■ Program example

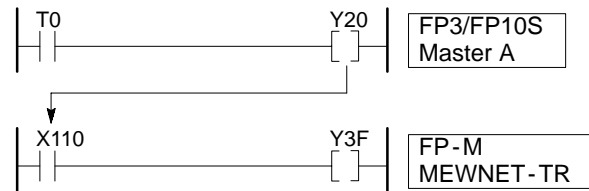
**Example 1:** I/O data transfer from a slave station of the FP-M MEWNET-TR system to FP3/FP10S master A

When R0 of FP3/FP10S master A turns ON, input data from the 16-point input slave station (station No. 0) of the FP-M MEWNET-TR system is transferred to internal relay R63F of FP3/FP10S master A.



**Example 2:** I/O data transfer from FP3/FP10S master A to a slave station of the FP-M MEWNET-TR system

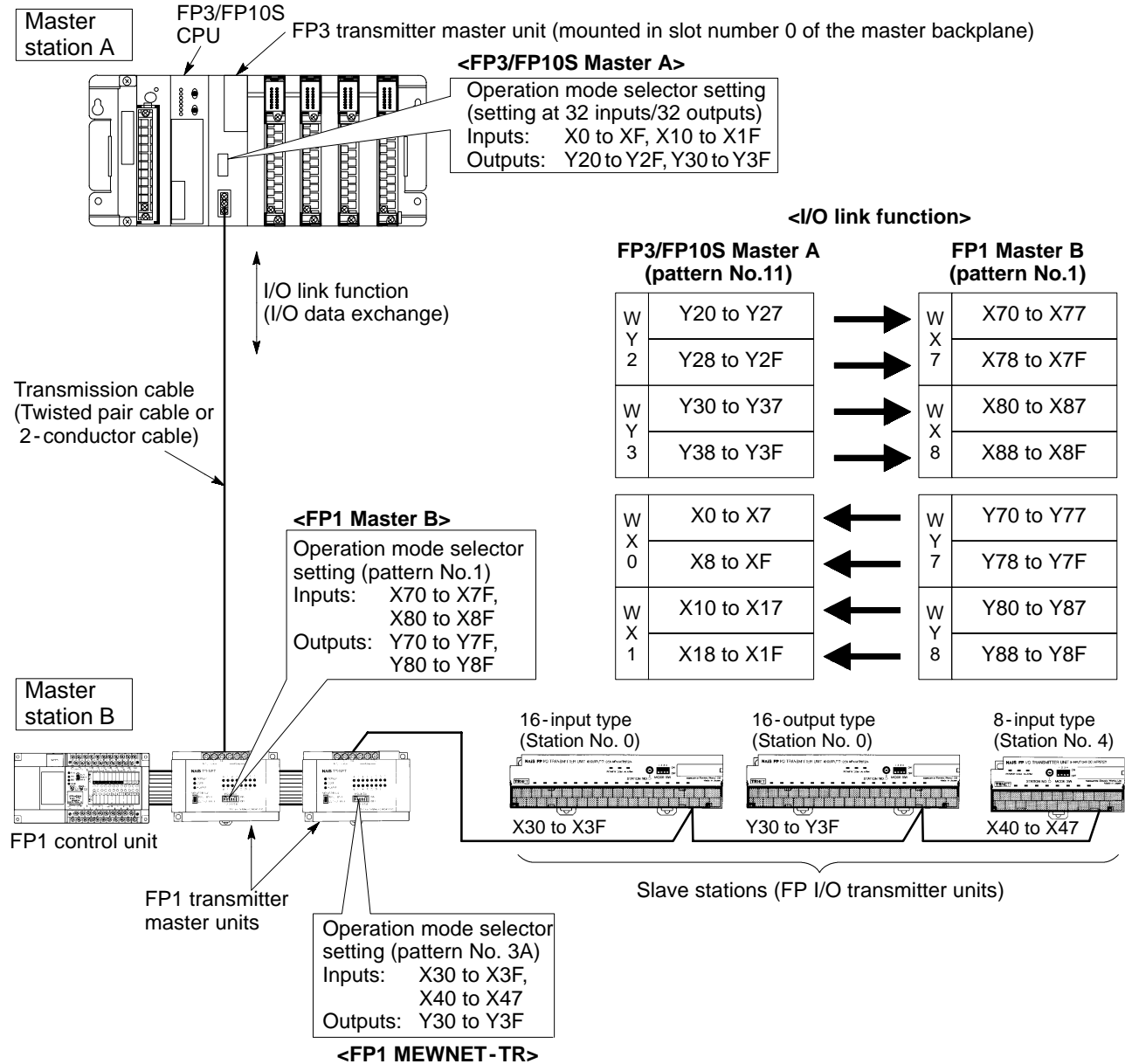
When timer relay T0 of FP3/FP10S master A turns ON, an output is generated from terminal F of station No. 0 of the 16-point output slave station of the FP-M MEWNET-TR system.



## 2. FP1 MEWNET-TR System and FP3/FP10S Master Station

- By connecting the RS485 interfaces of the FP1 transmitter master unit of an FP1 MEWNET-TR system and the FP3 transmitter master unit with a transmission cable, I/O data can be exchanged between the slave stations of the FP1 MEWNET-TR system and FP3/FP10S master station.  
The I/O points allocated to master stations A and B correspond one to one.

### I/O link function of the FP1 MEWNET-TR system and FP3/FP10S master



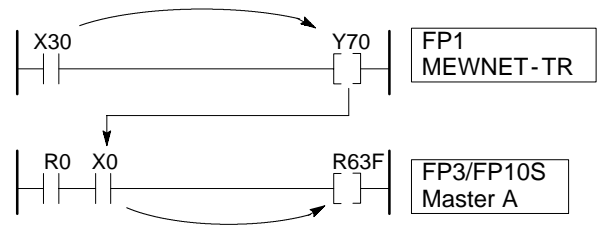
#### Notes:

- For the I/O allocation pattern numbers of FP1 master B, see the "FP-M/FP1 MEWNET-TR Technical Manual."
- For the pattern numbers of FP3/FP10S master A, see page 64, "3. I/O Allocation Table."

## ■ Program example

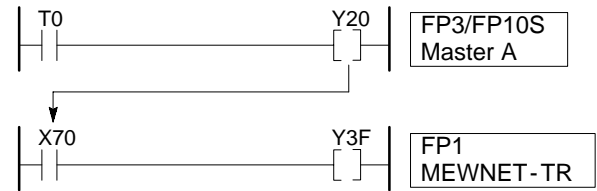
**Example 1:** I/O data transfer from a slave station of the FP1 MEWNET-TR system to FP3/FP10S master A

When R0 of FP3/FP10S master A turns ON, input data from the 16-point input slave station (station No. 0) of the FP1 MEWNET-TR system is transferred to internal relay R63F of FP3/FP10S master A.



**Example 2:** I/O data transfer from FP3/FP10S master A to a slave station of the FP1 MEWNET-TR system

When timer relay T0 of FP3/FP10S master A turns ON, an output is generated from terminal F of station No. 0 of the 16-point output slave station of the FP1 MEWNET-TR system.

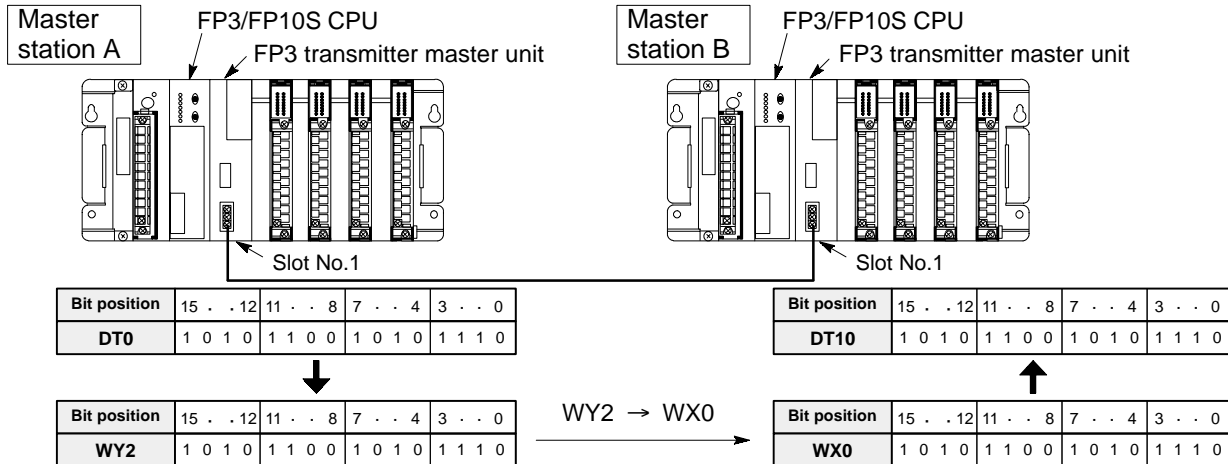


# 6-4. Notes on 16-Bit Data Transfer

- When the I/O link function is used to transmit or receive 16-bit data, the data may not be exchanged accurately depending on the input/output timing. When this happens, take the following programming measure.

## I/O link function of FP3 Master A and Master B

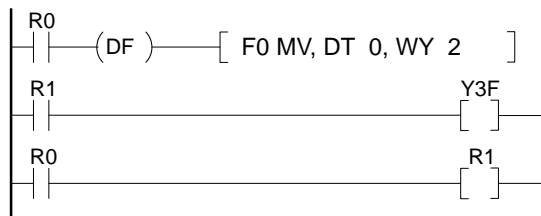
- The example shows a 16-bit data exchange using the pattern No. 11 [I/O allocation : X0 to X1F (WX0 to WX1), Y20 to Y3F (WY2 to WY3)] for both FP3 master A and master B.
- The value in data register DT0 of master A is transferred to data register DT10 of master B.



## Program example

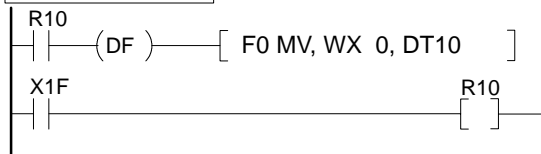
- To ensure the accuracy of 16-bit data, an allow flag is set using the I/O allocation of the I/O link. The input condition when the allow flag is ON is set for 16-bit data processing.

### Master station A



- The 16-bit data in data register DT0 is output from WY2, then after one scanning cycle, a read allow flag Y3F is output (X1F of the master station B turns ON).

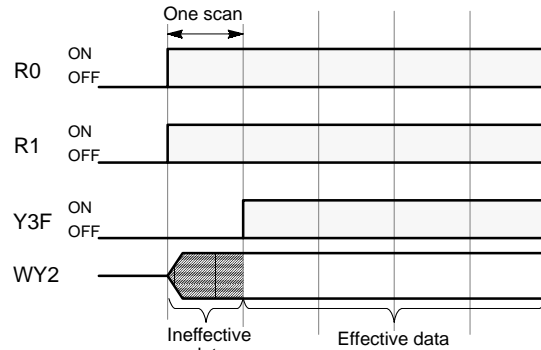
### Master station B



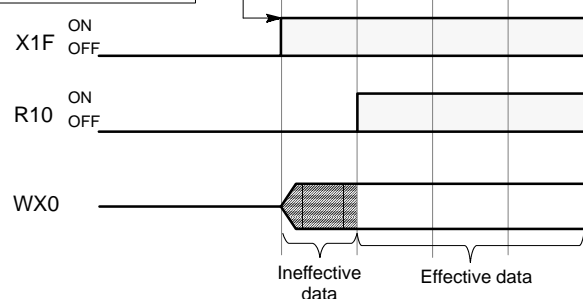
- One scanning cycle after the read allow flag X1F turns ON, the value of WX0 is transferred to data register DT10.
- If the program is written so that the data writing condition (in the example, R0 of master A) of the output side turns OFF at the time an effective value is transferred to the data register of the input side (in the example, when R10 of master B turns ON), the values of the new data will be output consecutively.

## Timing chart

### Master station A



### Master station B



- Since the accuracy of the values cannot be ensured for the 16-bit data written during the first scanning cycle of output or input, the program shown on the left processes the values in the second and following scanning cycles as effective data.

## CHAPTER 7

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# TROUBLESHOOTING

7-1. Checking the CPU When an Error Occurs .....	90
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1. Operation Monitor LED Status .....	103
2. Troubleshooting .....	108

# 7-1. Checking the CPU When an Error Occurs

- If a communication error or an error in the FP3 transmitter master unit occurs, check the LED status for the FP3 transmitter master unit and the FP I/O transmitter unit.  
See pages 91 to 98 and 103 to 107 for details about the operation monitor LED status when an error occurs.
- When a communication error occurs, the CPU of the FP3/FP10S detects the error using a self-diagnostic function.

## ■ Checking method

1) The operation monitor LEDs of the CPU show the following LED status.

○	RUN	[ RUN LED: ON ERROR LED: ON Other LEDs: OFF ]
●	PROG.	
●	TEST	
●	BREAK	
○	ERROR	
●	BATT.	
●	ALARM	

- 2) With the FP3 CPU, special internal relay R9002 turns ON.
- 3) Self-diagnostic error code “E40” can be read by the NPST-GR software and FP programmer II.  
Error code “E40” is stored in special data register DT9000 for the FP3, and in special data register DT90000 for the FP10S.  
See the “FP3/FP10S HARDWARE Technical Manual” for details about the special data registers and self-diagnostic error codes.
- 4) The slot No. of the FP3 transmitter master unit that is generating an error can be checked with special data registers DT9002 and DT9003.

### Example:

- When an error is generated in the FP3 transmitter master unit mounted in slot No. 3 of the master backplane.

### Special data registers: DT9003, DT9002

<b>Slot number</b>	15 . . 12	11 . . 8	7 . . 4	3 . . 0	<b>Slot number</b>	15 . . 12	11 . . 8	7 . . 4	3 . . 0
<b>Bit position</b>	15 . . 12	11 . . 8	7 . . 4	3 . . 0	<b>Bit position</b>	15 . . 12	11 . . 8	7 . . 4	3 . . 0
<b>DT9003</b>	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	<b>DT9002</b>	0 0 0 0	0 0 0 0	0 0 0 0	1 0 0 0



## 7-2. Remote I/O Control When an Error Occurs

### 1. Operation Monitor LED Status

- Check the LED status of each unit of the FP3 MEWNET-TR system to judge the condition of the transmission cable and each unit.

#### Note:

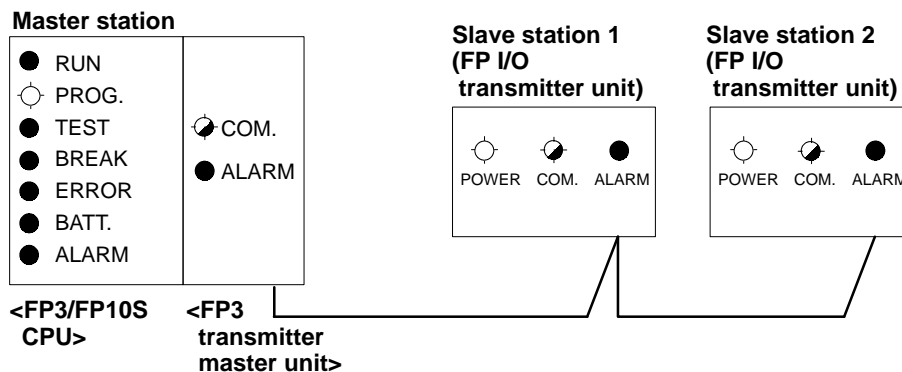
- The LED status is indicated as follows.
 

○	: ON
●	: OFF
◐	: Flashing (in approx. 0.2 s intervals)
◑	: Flashing slowly (in approx. 1 s intervals)

#### 1) When the power for each unit is turned ON

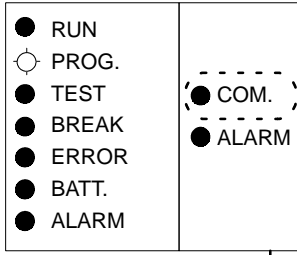
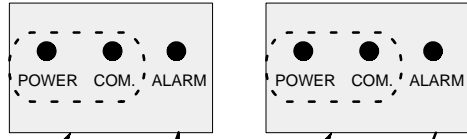
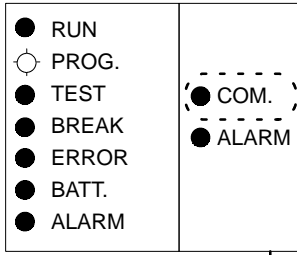
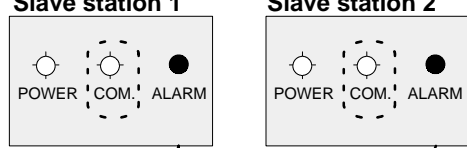
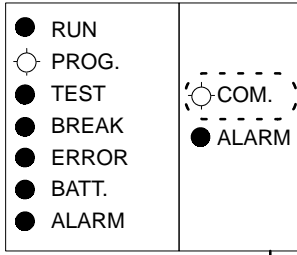
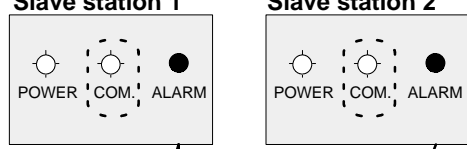
##### ■ Normal condition

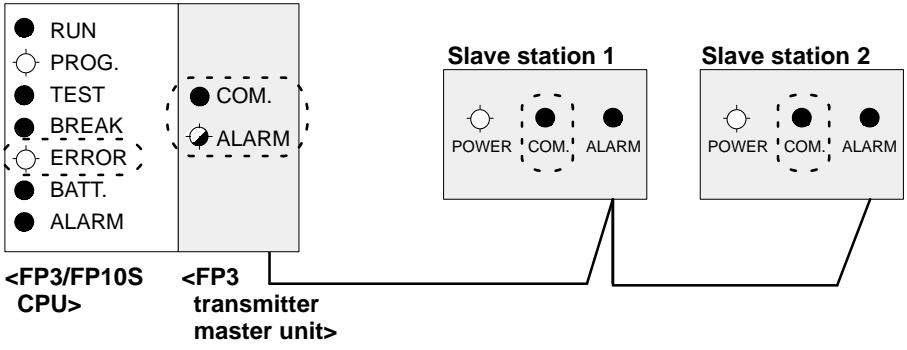
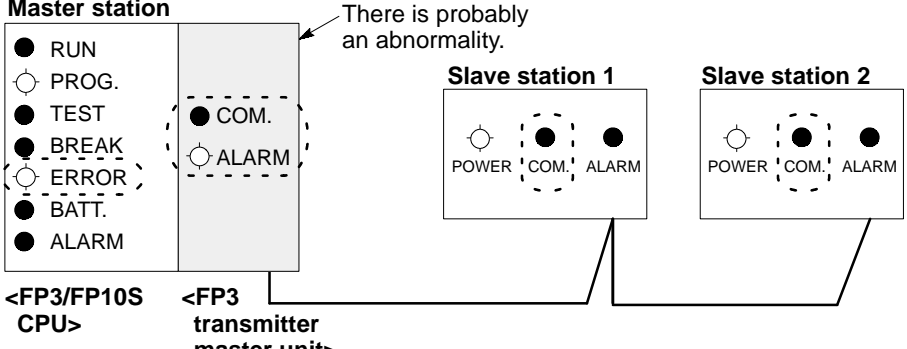
- FP3/FP10S CPU  
(RUN: OFF, PROG.: ON, TEST, BREAK, ERROR, BATT. and ALARM: OFF)
- FP3 transmitter master unit  
(COM.: Flashing, ALARM: OFF)
- Slave stations 1 and 2  
(POWER: ON, COM.: Flashing, ALARM: OFF)



■ Abnormal conditions

LED status	Steps to take														
<p>• When communication is not possible with some slave stations (communication is normal with other slave stations)</p> <p>&lt;Slave station 2 COM.: ON, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p> <table border="1" style="display: inline-table; vertical-align: top;"> <tr><td>● RUN</td><td>○ COM.</td></tr> <tr><td>○ PROG.</td><td>● ALARM</td></tr> <tr><td>● TEST</td><td></td></tr> <tr><td>● BREAK</td><td></td></tr> <tr><td>● ERROR</td><td></td></tr> <tr><td>● BATT.</td><td></td></tr> <tr><td>● ALARM</td><td></td></tr> </table> <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p> <p style="text-align: center;">Slave station 1     Slave station 2</p> <p style="text-align: center;">POWER COM. ALARM     POWER COM. ALARM</p> <p style="text-align: center;">Disconnection</p>	● RUN	○ COM.	○ PROG.	● ALARM	● TEST		● BREAK		● ERROR		● BATT.		● ALARM		<ul style="list-style-type: none"> <li>• Check the wiring between slave stations.</li> </ul>
● RUN	○ COM.														
○ PROG.	● ALARM														
● TEST															
● BREAK															
● ERROR															
● BATT.															
● ALARM															
<p>&lt;Slave station 1 POWER: OFF, COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p> <table border="1" style="display: inline-table; vertical-align: top;"> <tr><td>● RUN</td><td>○ COM.</td></tr> <tr><td>○ PROG.</td><td>● ALARM</td></tr> <tr><td>● TEST</td><td></td></tr> <tr><td>● BREAK</td><td></td></tr> <tr><td>● ERROR</td><td></td></tr> <tr><td>● BATT.</td><td></td></tr> <tr><td>● ALARM</td><td></td></tr> </table> <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p> <p style="text-align: center;">Slave station 1     Slave station 2</p> <p style="text-align: center;">POWER COM. ALARM     POWER COM. ALARM</p> <p style="text-align: center;">No power supply</p>	● RUN	○ COM.	○ PROG.	● ALARM	● TEST		● BREAK		● ERROR		● BATT.		● ALARM		<ul style="list-style-type: none"> <li>• Check that power is properly supplied to slave station 1.</li> </ul>
● RUN	○ COM.														
○ PROG.	● ALARM														
● TEST															
● BREAK															
● ERROR															
● BATT.															
● ALARM															
<p>&lt;Slave station 1 COM.: OFF, ALARM: ON, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p> <table border="1" style="display: inline-table; vertical-align: top;"> <tr><td>● RUN</td><td>○ COM.</td></tr> <tr><td>○ PROG.</td><td>● ALARM</td></tr> <tr><td>● TEST</td><td></td></tr> <tr><td>● BREAK</td><td></td></tr> <tr><td>● ERROR</td><td></td></tr> <tr><td>● BATT.</td><td></td></tr> <tr><td>● ALARM</td><td></td></tr> </table> <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p> <p style="text-align: center;">Slave station 1     Slave station 2</p> <p style="text-align: center;">POWER COM. ALARM     POWER COM. ALARM</p> <p style="text-align: center;">Communications error</p>	● RUN	○ COM.	○ PROG.	● ALARM	● TEST		● BREAK		● ERROR		● BATT.		● ALARM		<ul style="list-style-type: none"> <li>• Communications error on slave station 1. See page 101.</li> </ul>
● RUN	○ COM.														
○ PROG.	● ALARM														
● TEST															
● BREAK															
● ERROR															
● BATT.															
● ALARM															

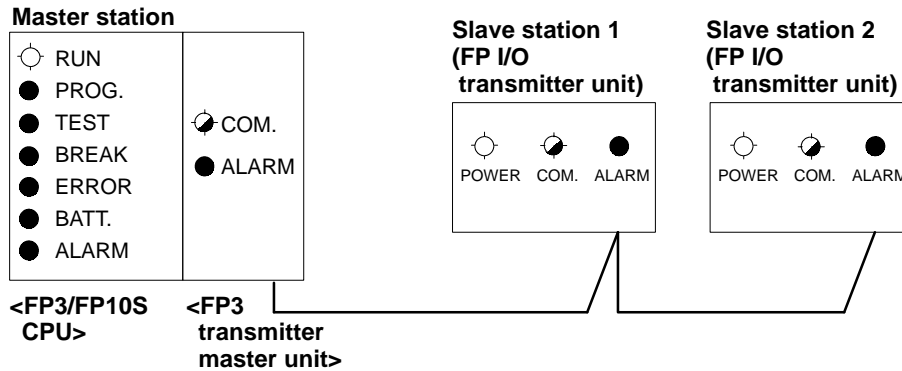
LED status	Steps to take
<p>• When communication is not possible with any slave station</p> <p>&lt;Master station COM.: OFF, Slave stations 1 and 2 POWER: OFF, COM: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> <p><b>Slave station 1</b>    <b>Slave station 2</b></p>  <p>No power supply    No power supply or Incorrect terminal station</p>	<ul style="list-style-type: none"> <li>• Check that power is properly supplied to the slave stations.</li> <li>• Set the terminal station correctly.</li> </ul>
<p>&lt;Master station COM.: OFF, Slave stations 1 and 2 COM.: ON, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> <p><b>Slave station 1</b>    <b>Slave station 2</b></p>  <p>Disconnection</p>	<ul style="list-style-type: none"> <li>• Check the wiring between master and slave station.</li> </ul>
<p>• When the remote I/O control function cannot be used</p> <p>&lt;Master station COM.: ON, Slave stations 1 and 2 COM.: ON, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> <p><b>Slave station 1</b>    <b>Slave station 2</b></p> 	<ul style="list-style-type: none"> <li>• Set operation mode selector No. 1 on the FP3 transmitter master unit to the OFF position.</li> </ul>

LED status	Steps to take
<p>• When the slave station number is overlapped or the wrong I/O points are set</p> <p>&lt;Master station ERROR: ON, COM.: OFF, ALARM: Flashing, Slave stations 1 and 2 COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt; &lt;FP3 transmitter master unit&gt;</p>	<ul style="list-style-type: none"> <li>• Check that all slave station numbers are correctly registered.</li> <li>• Set the I/O points correctly using operation mode selector Nos. 5 through 8.</li> </ul>
<p>• When the ALARM LED on the FP3 transmitter master unit is ON</p> <p>&lt;Master station ERROR: ON, COM.: OFF, ALARM: ON, Slave stations 1 and 2 COM: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt; &lt;FP3 transmitter master unit&gt;</p> <p>There is probably an abnormality.</p>	<ul style="list-style-type: none"> <li>• See troubleshooting on page 98.</li> </ul>

## 2) During remote I/O control

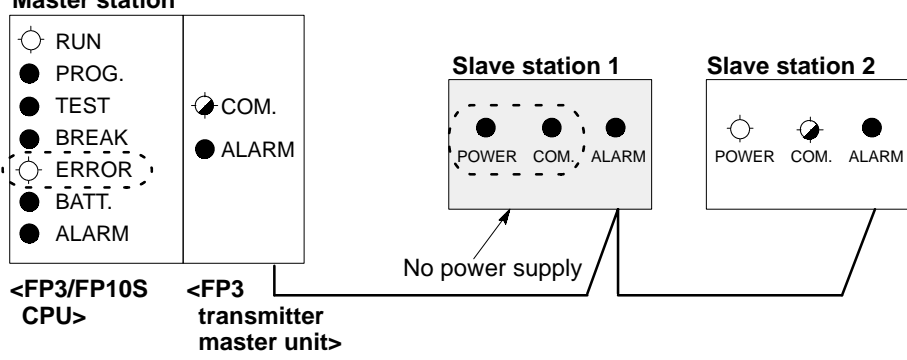
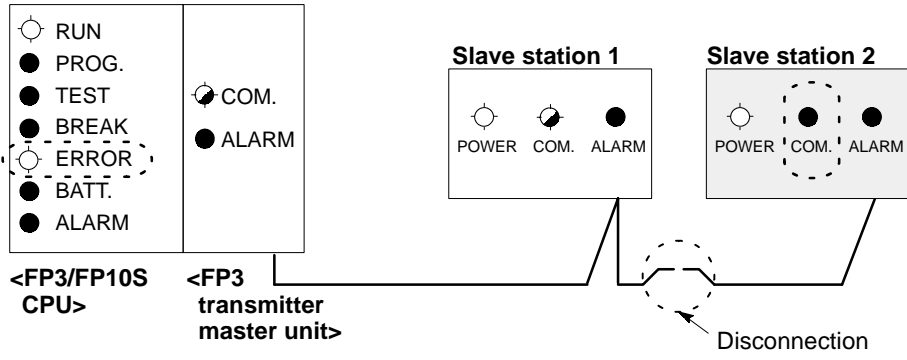
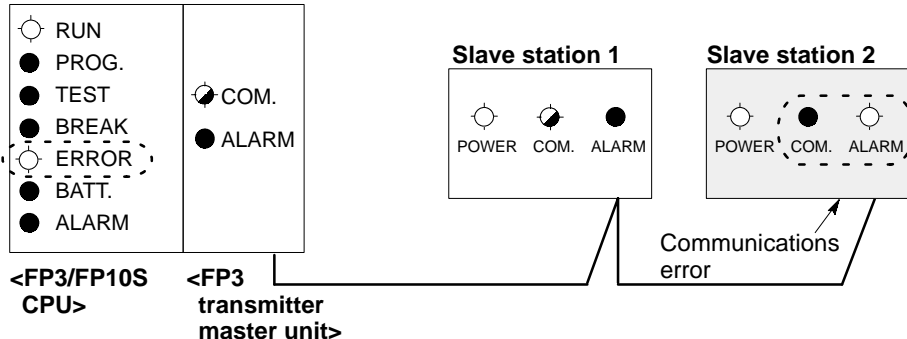
### ■ Normal condition

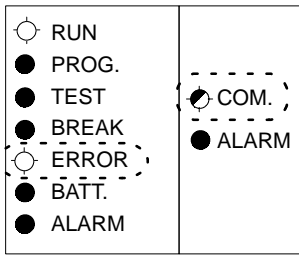
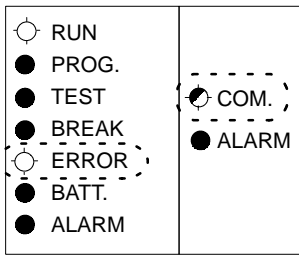
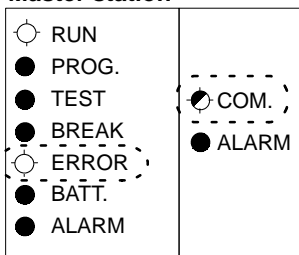
- FP3/FP10S CPU  
(RUN: ON, PROG., TEST, BREAK, ERROR, BATT. and ALARM: OFF)
- FP3 transmitter master unit  
(COM.: Flashing, ALARM: OFF)
- Slave stations 1 and 2  
(POWER: ON, COM.: Flashing, ALARM: OFF)



### ■ Abnormal conditions

LED status	Steps to take
<p>• When communication is not possible with any slave station</p> <p>&lt;Master station ERROR: ON, COM.: OFF, Slave stations 1 and 2 POWER: OFF, COM.: OFF, Other LEDs: normal status&gt;</p>	<ul style="list-style-type: none"> <li>• Check that power is properly supplied to slave stations 1 and 2.</li> </ul>
<p>&lt;Master station ERROR: ON, COM.: OFF, Slave stations 1 and 2 COM.: OFF, Other LEDs: normal status&gt;</p>	<ul style="list-style-type: none"> <li>• Check the wiring between master and slave station.</li> </ul>

LED status	Steps to take
<p>• Communications error</p> <p>When operation mode selector No. 2 of the FP3 transmitter master unit is ON (when the setting is made to allow continuing remote I/O control of properly operating slave stations in the event of a communications error)</p> <p>&lt;Master station ERROR: ON, Slave station 1 POWER: OFF, COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p>	<ul style="list-style-type: none"> <li>• Check that power is properly supplied to slave station 1.</li> </ul>
<p>&lt;Master station ERROR: ON, Slave station 2 COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p>	<ul style="list-style-type: none"> <li>• Check the wiring between slave stations.</li> </ul>
<p>&lt;Master station ERROR: ON, Slave station 2 COM.: OFF, ALARM: ON, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p>	<ul style="list-style-type: none"> <li>• Communications error on slave station 2. See page 101.</li> </ul>

LED status	Steps to take
<p>• Communications error</p> <p>When operation mode selector No. 2 of the FP3 transmitter master unit is OFF (when the setting is made to terminate the remote I/O control of all slave stations in the event of a communications error)</p> <p>&lt;Master station ERROR: ON, COM.: Flashing slowly, Slave station 1 POWER: OFF, COM.: OFF, Slave station 2 COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p> <p>Slave station 1: POWER (off), COM. (off), ALARM (off)</p> <p>Slave station 2: POWER (off), COM. (off), ALARM (off)</p> <p>No power supply</p>	<p>• Check that power is properly supplied to slave station 1.</p>
<p>&lt;Master station ERROR: ON, COM.: Flashing slowly, Slave stations 1 and 2 COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p> <p>Slave station 1: POWER (off), COM. (off), ALARM (off)</p> <p>Slave station 2: POWER (off), COM. (off), ALARM (off)</p> <p>Disconnection</p>	<p>• Check the wiring.</p>
<p>&lt;Master station ERROR: ON, COM.: Flashing slowly, Slave station 1 COM.: OFF, Slave station 2 COM.: OFF, ALARM: ON, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p>  <p>&lt;FP3/FP10S CPU&gt;     &lt;FP3 transmitter master unit&gt;</p> <p>Slave station 1: POWER (off), COM. (off), ALARM (off)</p> <p>Slave station 2: POWER (off), COM. (off), ALARM (on)</p> <p>Communications error</p>	<p>• Communications error on slave station 2. See page 101.</p>

LED status	Steps to take
<ul style="list-style-type: none"> <li>When the ALARM LED on the FP3 transmitter master unit is ON</li> </ul> <p>&lt;Master station ERROR: ON, COM.: OFF, ALARM: ON, Slave stations 1 and 2 COM.: OFF, Other LEDs: normal status&gt;</p> <p><b>Master station</b></p> <p>○ RUN ● PROG. ● TEST ● BREAK ○ ERROR ● BATT. ● ALARM</p> <p>&lt;FP3/FP10S CPU&gt; &lt;FP3 transmitter master unit&gt;</p> <p>There is probably an abnormality.</p> <p><b>Slave station 1</b></p> <p>○ POWER ● COM. ● ALARM</p> <p><b>Slave station 2</b></p> <p>○ POWER ● COM. ● ALARM</p>	<ul style="list-style-type: none"> <li>See troubleshooting below.</li> </ul>

## 2. Troubleshooting

### 1) Troubleshooting on a master station

#### ■ When the ALARM LED is ON

<Error condition: There is probably an abnormality in the FP3 transmitter master unit.>

Turn the power of the FP3 transmitter master unit OFF, and then ON again.

- If the ALARM LED is still ON, please contact your dealer.

#### ■ When the ALARM LED is flashing

<Error condition: A station number setting error has occurred and the I/O points are set incorrectly.>

Set the station number correctly.

- See page 57 for details about station number setting.

Set the I/O points correctly using operation mode selector Nos. 5 through 8.

- See page 57 for details about the I/O allocation.

After checking the above items, turn the power OFF, then ON again.

#### ■ When the COM. LED is ON

<Error condition: The system configuration is not set to “remote I/O control enabled.”>

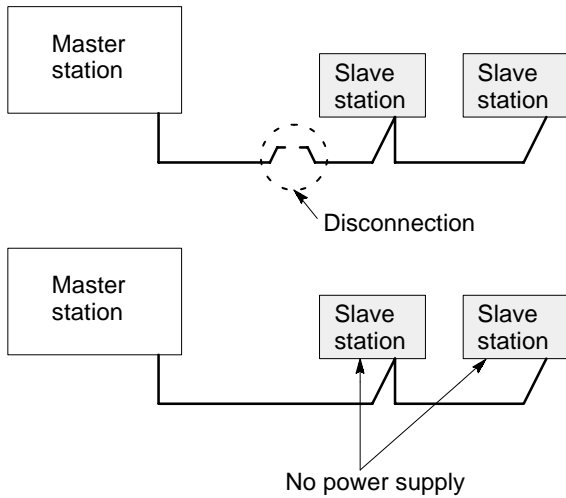
Set operation mode selector No. 1 to the OFF position, turn the power OFF and ON again.



■ When the COM. LED is OFF

<Error condition: There is no communications with any slave station.>

Error example



Check the POWER LED and power supply wiring of the slave station.

↓

Set the terminal station correctly using the operation mode selector.

- See page 53 for details about terminal station setting.
- When the setting is changed, turn the power OFF and then ON again.

↓

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

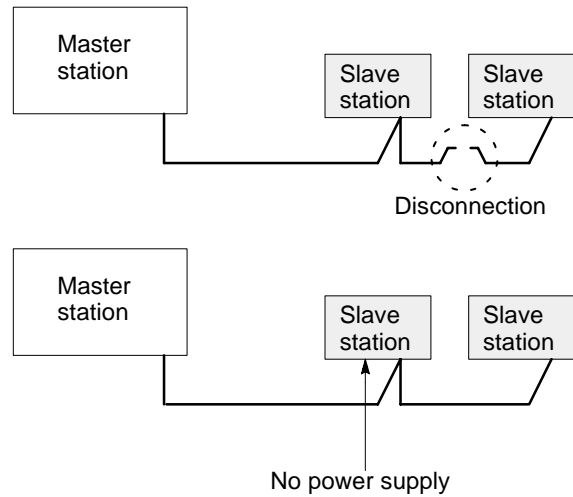
↓

If there is a break in the transmission cable, change the cable.

■ When the COM. LED is flashing slowly (in 1 s intervals)

<Error condition: Remote I/O control terminated due to a communications error.>

Error example



Make sure that power is properly supplied to the slave stations.

↓

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

↓

If there is a break in the transmission cable, change the cable.

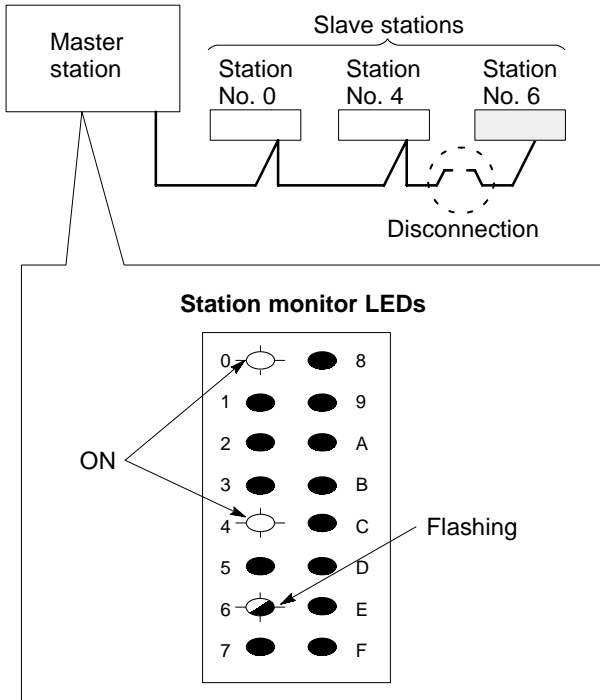
↓

After checking the above items, turn the power OFF, then ON again.

■ When the station monitor LED is flashing

<Error condition: Communications is not possible with the slave station indicated by the flashing LED.>

Error example



Confirm the unit type (input or output) of the LED using the selector for the station monitor LEDs.

Make sure power is properly supplied to the slave station indicated by the flashing LED.

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

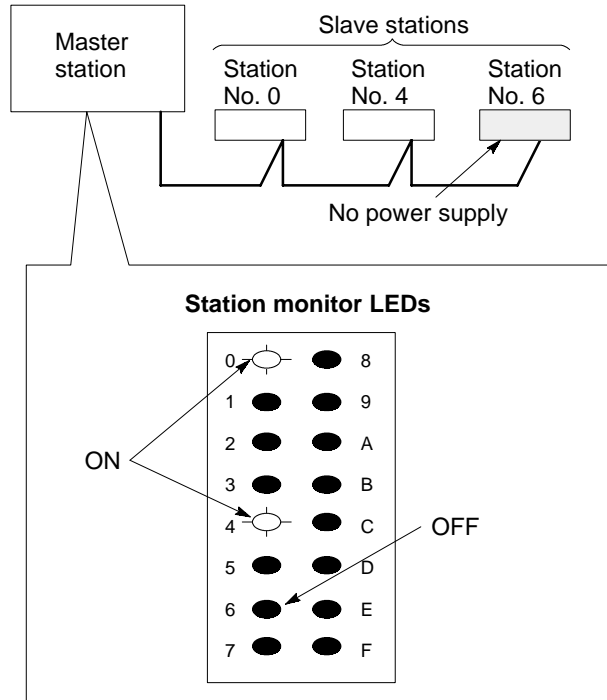
- See page 43 about wiring with transmission cable.

If there is a break in the transmission cable, change the cable.

■ When the station monitor LED is OFF

<Error condition: No communications with the slave station indicated by the unlit LED since the system began operation.>

Error example



Confirm the unit type (input or output) of the LED using the selector for the station monitor LEDs.

Make sure power is properly supplied to the slave station indicated by the unlit LED.

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

If there is a break in the transmission cable, change the cable.

## 2) Troubleshooting on a slave station

### ■ When the ALARM LED is ON

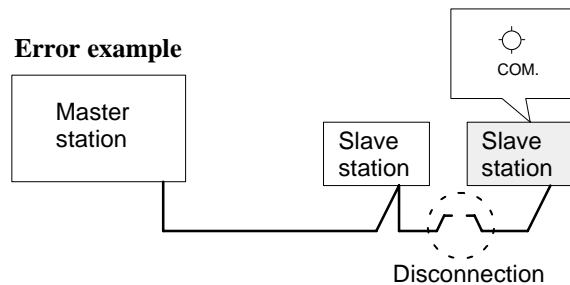
<Error condition: There is probably an abnormality in the FP I/O transmitter unit.>

Turn the power of the FP I/O transmitter unit OFF then ON again.

- If the ALARM LED is still ON, please contact your dealer.

### ■ When the COM. LED is ON

<Error condition: No communications between the master and the slave station indicated by the lit COM. LED station since the system began operation.>



Make sure power is properly supplied to the master station.

Check operation mode selector No. 1 on the FP3 transmitter master unit.  
Set operation mode selector No. 1 to OFF.

- When the setting is changed, turn the power OFF and then ON again.

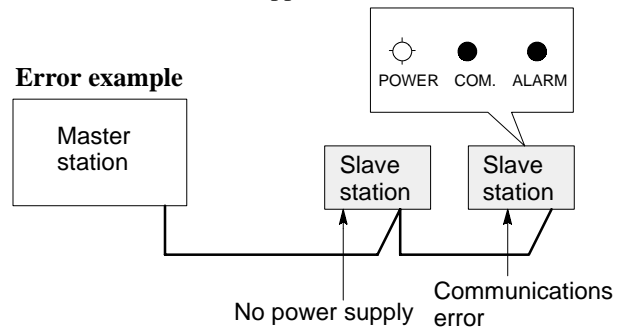
Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

If there is a break in the transmission cable, change the cable.

### ■ When the COM. LED is OFF

<Error condition: No communications between the master station and the slave station indicated by the unlit COM. LED. If operation mode selector No. 2 was in the OFF position when a communications error was generated, all control may have stopped.>



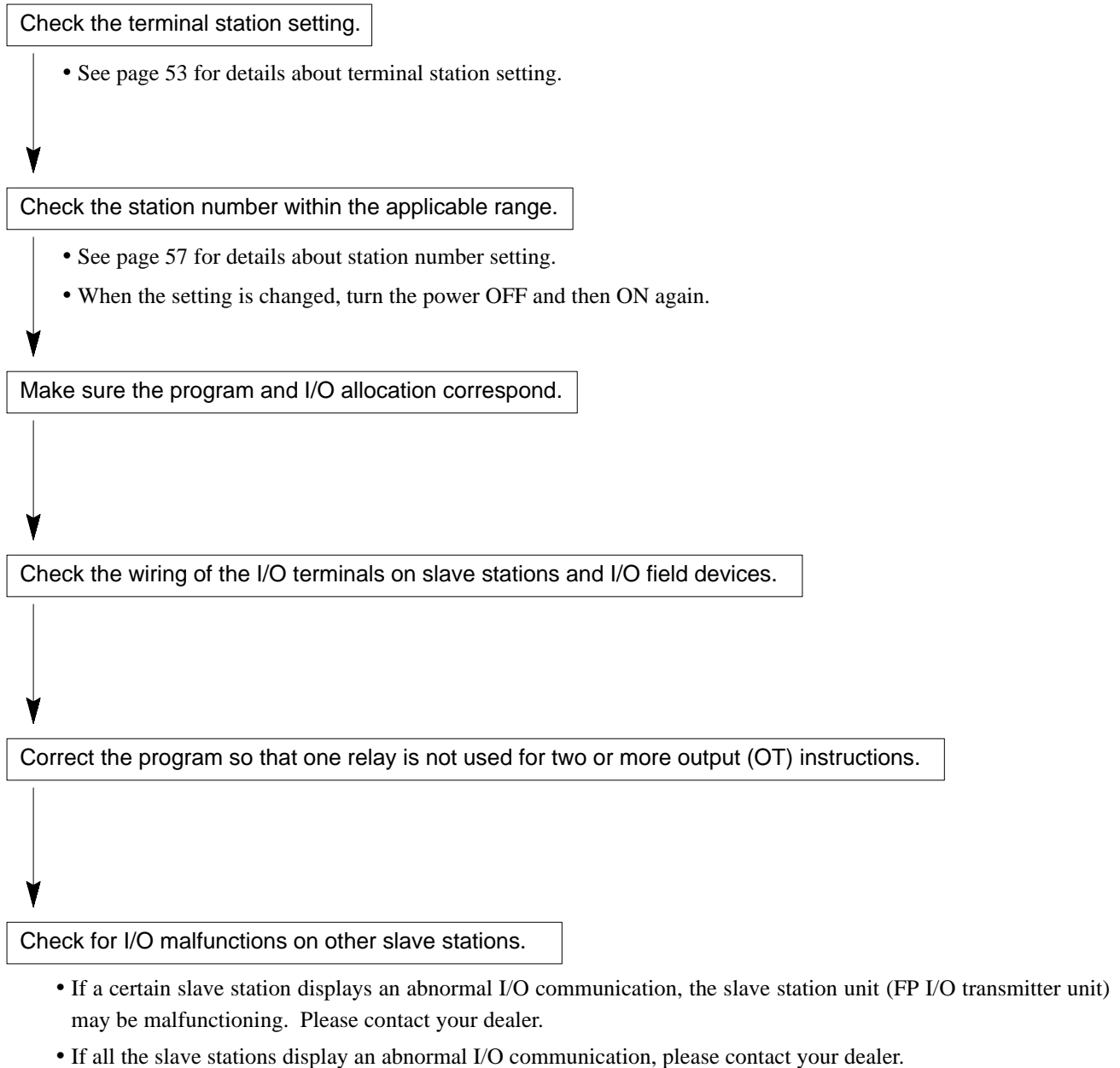
Make sure power is properly supplied to the slave station.

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

If there is a break in the transmission cable, change the cable.

### 3) When I/O data cannot be exchanged accurately even though the LED status is normal



# 7-3. I/O Link Control When an Error Occurs

## 1. Operation Monitor LED Status

- Check the LED status to judge the condition of the transmission cable, and each unit.

### Note:

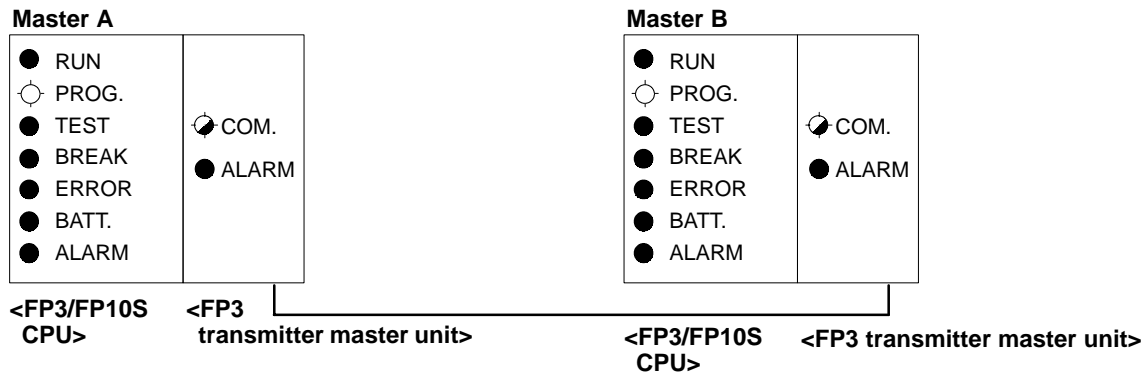
- The LED status is indicated as follows.

○	: ON
●	: OFF
◐	: Flashing (in approx. 0.2 s intervals)
◑	: Flashing slowly (in approx. 1 s intervals)

### 1) When the power for each unit is turned ON

#### ■ Normal condition

- Master A and B:
  - FP3/FP10S CPU  
(RUN: OFF, PROG.: ON, TEST, BREAK, ERROR, BATT. and ALARM: OFF)
  - FP3 transmitter master unit  
(COM.: Flashing, ALARM: OFF)



#### ■ Abnormal conditions

LED status	Steps to take
<ul style="list-style-type: none"> <li>• Communications error between master A and master B</li> </ul> <p>&lt;Master A COM.: OFF, Master B COM.: ON, Other LEDs: normal status&gt;</p> <p>The diagram shows a communication error between Master A and Master B. Master A's COM. LED is off, while Master B's COM. LED is on. A dashed circle labeled 'Disconnection' is shown on the communication line between the transmitter master units of the two masters.</p>	<ul style="list-style-type: none"> <li>• Check the wiring.</li> </ul>

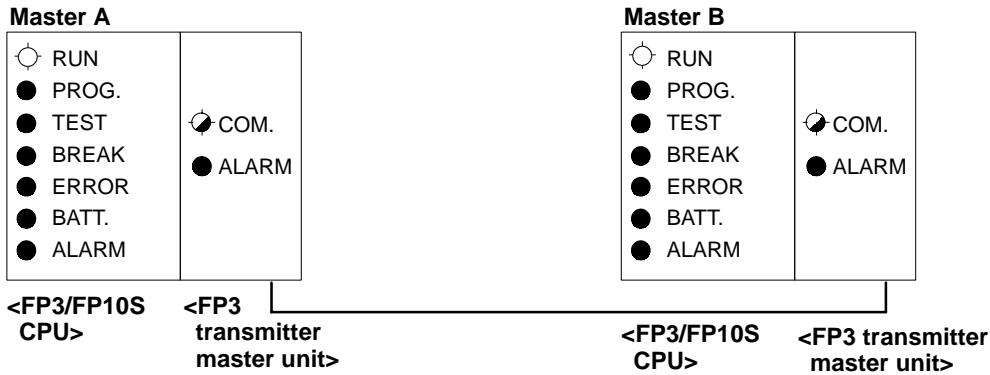
LED status	Steps to take
<p>&lt;Master A COM.: OFF, Master B PROG.: OFF, COM.: OFF, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div> <p style="text-align: center;">No power supply</p>	<ul style="list-style-type: none"> <li>• Make sure power is properly supplied to master B.</li> </ul>
<p>&lt;Master A COM.: OFF, Master B ERROR: ON, COM.: OFF, ALARM: ON, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div> <p style="text-align: center;">There is probably an abnormality.</p>	<ul style="list-style-type: none"> <li>• See troubleshooting on page 109.</li> </ul>
<p>&lt;Master A COM.: OFF, Master B COM.: OFF, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div> <p style="text-align: center;">Incorrect terminal station</p> <p style="text-align: center;">Incorrect terminal station and incorrect master station setting</p>	<p>&lt;Terminal station setting&gt;</p> <ul style="list-style-type: none"> <li>• Set operation mode selector No. 3 of master A and B to ON.</li> </ul> <p>&lt;Master station setting&gt;</p> <ul style="list-style-type: none"> <li>• Set operation mode selector No. 1 of master B to ON.</li> </ul>

LED status	Steps to take
<p>• Error on master A                      &lt;Master A PROG.: OFF, COM.: OFF, Master B COM.: ON, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div>	<ul style="list-style-type: none"> <li>• Make sure power is properly supplied to master A.</li> </ul>
<p>&lt;Master A ERROR: ON, COM.: OFF, ALARM: ON, Master B COM.: ON, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div>	<ul style="list-style-type: none"> <li>• See troubleshooting on page 108.</li> </ul>
<p>&lt;Master A and B ERROR: ON, COM.: ON, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div>	<ul style="list-style-type: none"> <li>• Set operation mode selector No. 1 of master A to OFF.</li> </ul>

## 2) During I/O link control

### ■ Normal condition

- Master A and B:  
 FP3/FP10S CPU (RUN: ON, PROG., TEST, BREAK, ERROR, BATT., and ALARM: OFF)  
 FP3 transmitter master unit (COM.: Flashing, ALARM: OFF)



### ■ Abnormal conditions

LED status	Steps to take
<ul style="list-style-type: none"> <li>• Communications error when operation mode selector No. 2 of master A is set to ON.</li> </ul> <p>&lt;Master A and B ERROR: ON, COM.: OFF, Other LEDs: normal status&gt;</p>	<ul style="list-style-type: none"> <li>• Check the wiring.</li> </ul>
<p>&lt;Master A ERROR: ON, COM.: OFF, Master B RUN: OFF, COM.: OFF, Other LEDs: normal status&gt;</p>	<ul style="list-style-type: none"> <li>• Make sure power is properly supplied to master B.</li> </ul>

### Note:

- If operation mode selector No. 2 of master A is in the OFF position and a communications error is generated, the COM. LED of master A flashes slowly (in approx. 1 s intervals).  
 When the COM. LED flashes slowly, see troubleshooting on page 108.



LED status	Steps to take
<p>&lt;Master A ERROR: ON, COM.: OFF, Master B ERROR: ON, COM.: OFF, ALARM: ON, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div> <p style="text-align: center;">There is probably an abnormality.</p>	<ul style="list-style-type: none"> <li>• See troubleshooting on page 109.</li> </ul>
<p>&lt;Master A RUN: OFF, COM.: OFF, Master B ERROR: ON, COM.: OFF, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div> <p style="text-align: center;">No power supply</p>	<ul style="list-style-type: none"> <li>• Make sure power is properly supplied to master A.</li> </ul>
<p>&lt;Master A ERROR: ON, COM.: OFF, ALARM: ON, Master B ERROR: ON, COM.: OFF, Other LEDs: normal status&gt;</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Master A</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> <div style="text-align: center;"> <p><b>Master B</b></p> <p>&lt;FP3/FP10S CPU&gt;    &lt;FP3 transmitter master unit&gt;</p> </div> </div> <p style="text-align: center;">There is probably an abnormality.</p>	<ul style="list-style-type: none"> <li>• See troubleshooting on page 108.</li> </ul>

**Note:**

- If operation mode selector No. 2 of master A is in the OFF position and a communications error is generated, the COM. LED of master A flashes slowly (in approx. 1 s intervals). When the COM. LED flashes slowly, see troubleshooting on page 108.

## 2. Troubleshooting

### 1) Troubleshooting on master A

#### ■ When the ALARM LED is ON

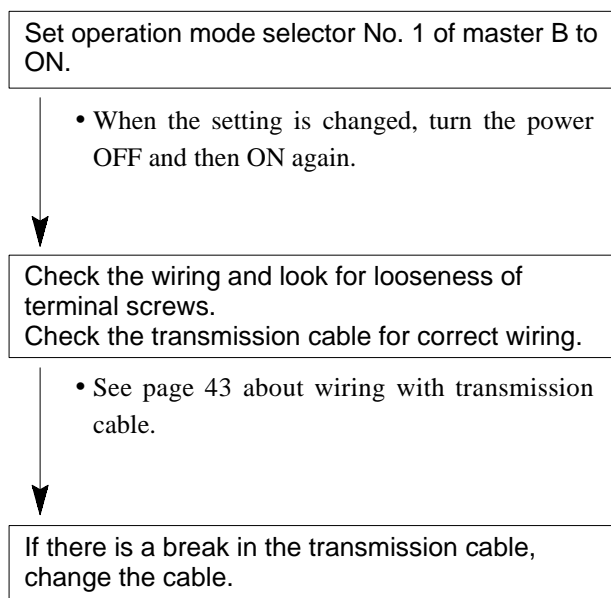
<Error condition: There is probably an abnormality in the FP3 transmitter master unit of master A.>

Turn the power of the FP3 transmitter master unit OFF then ON again.

- If the ALARM LED is still ON, please contact your dealer.

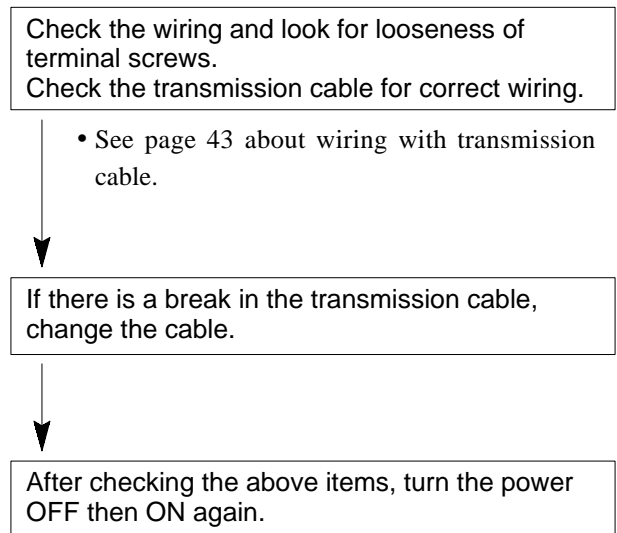
#### ■ When the COM. LED is OFF

<Error condition: Master A is not communicating with master B.>



#### ■ When the COM. LED is flashing slowly (in 1 s intervals)

<Error condition: A communications error has been generated.>



#### Note:

- If operation mode selector No. 2 of master A is in the OFF position and a communications error is generated, the COM. LED of master A flashes slowly (in approx. 1 s intervals).

## 2) Troubleshooting on master B

### ■ When the ALARM LED is ON

<Error condition: There is probably an abnormality in the FP3 transmitter master unit of master B.>

Turn the power of the FP3 transmitter master unit OFF then ON again.

- If the ALARM LED is still ON, please contact your dealer.

### ■ When the COM. LED is OFF

<Error condition: Master B is not communicating with master A.>

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

If there is a break in the transmission cable, change the cable.

### ■ When the COM. LED is ON

<Error condition: Master B has not communicated with master A since the power was turned ON.>

Set operation mode selector No. 1 of master A to OFF.

- When the setting is changed, turn the power OFF and then ON again.

Check the wiring and look for looseness of terminal screws.  
Check the transmission cable for correct wiring.

- See page 43 about wiring with transmission cable.

If there is a break in the transmission cable, change the cable.

## 3) When I/O data cannot be exchanged accurately even though the LED status is normal

Make sure the program and I/O allocation correspond.

Check the I/O allocation pattern of master A and B.

- See page 79 for details about the I/O allocation pattern of the I/O link function.

Correct the program so that one relay is not used for two or more output (OT) instructions.



# CHAPTER 8

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# APPENDIX

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# 8-1. Specifications

## 1. General

Item	Description
Ambient temperature	0 °C to + 55 °C (32 °F to 131 °F)
Ambient humidity	30 % to 85 % RH (non-condensing)
Storage temperature	- 20° C to + 70° C (- 4° F to 158° F)
Storage humidity	30 % to 85 % RH (non-condensing)
Vibration resistance	10 Hz to 55 Hz, 1 cycle/min: double amplitude of 0.75 mm (0.030 in.), 10 min on 3 axes
Shock resistance	98 m/s <sup>2</sup> (10 G) or more, 4 times on 3 axes
Noise immunity	1,000 Vp-p with pulse width, 50 ns and 1 μs (based on in-house measurements)
Operating environment	Must be free from corrosive gases and excessive dust.

## 2. FP3 MEWNET-TR System

Item	Description
Communication method	Two-lines, half-duplex
Synchronization method	Asynchronous system
Communication path	2-conductor cable or twisted pair cable
Transmission distance	Max. 700 m (2,296.59 ft.) with twisted pair cable Max. 400 m (1,312.34 ft.) with 2-conductor cable See page 45 for about the transmission cable.
Communication speed	0.5 Mbps
Input/output response time	I/O response time is determined by the number of slave stations (FP I/O transmitter units and expansion FP I/O terminal units). See page 128, "8-5. Transfer Time," for details about the I/O response time.
Controllable I/O points	Max. 128 inputs and 128 outputs/FP3 transmitter master unit Max. 2,048 inputs and 2,048 outputs (sixteen FP3 transmitter master units)/FP3 CPU Max. 3,072 inputs and 3,072 outputs (twenty-four FP3 transmitter master units)/FP10S CPU
Interface	RS485
Communication error checking method	Self-diagnosis data checking method

## 3. Performance

### 1) FP3 transmitter master unit

Item	Description
Controllable I/O points*	The controllable I/O points are selected by the operation mode selector (selector numbers 5, 6, 7, and 8). Input: Select from 0, 32, 64 or 128 points. Output: Select from 0, 32, 64 or 128 points.
I/O occupation points	The total number of input and output points that are set
Current consumption*	130 mA or less
Connection method	Terminal block (M3.5 screw)
Weight	Approx. 240 g/8.466 oz.

\* The total number of controllable I/O points should not be set higher than the number of I/O points of the FP3/FP10S CPU.  
The total current consumption of the units used should not exceed the rated output current of their power supply unit.  
See page 8 for about the limitations on unit installation.

## 2) FP I/O transmitter unit

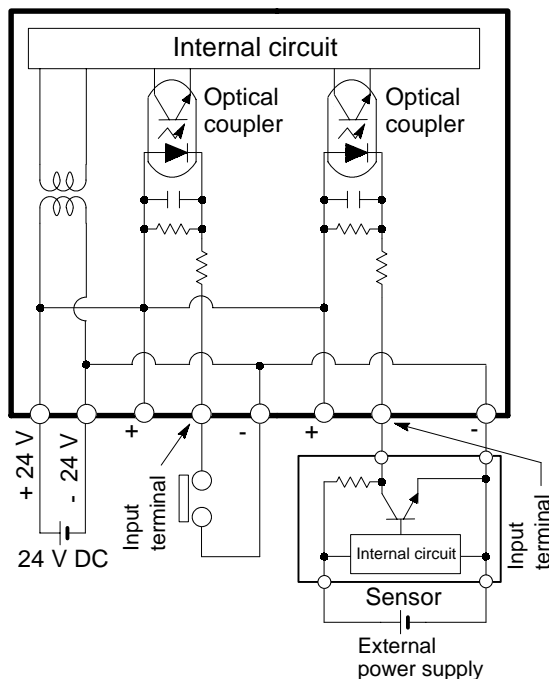
## ■ Input type

Item	Description
Number of input points	AFP87525: 4 points AFP87521: 8 points AFP87522: 16 points
Rated input voltage	24 V DC
Rated input current	Approx. 5.5 mA (at 24 V DC)
Input impedance	Approx. 4.4 kΩ
Input voltage range	20.4 to 26.4 V DC
ON voltage	19.2 V or less
OFF voltage	2.4 V or more
Response time	OFF → ON: 1 ms or less ON → OFF: 1 ms or less
Internal current consumption (at 24 V DC)	AFP87525: 40 mA or less (when all points are OFF) 65 mA or less (when all points are ON)* AFP87521: 40 mA or less (when all points are OFF) 85 mA or less (when all points are ON)* AFP87522: 40 mA or less (when all points are OFF) 125 mA or less (when all points are ON)*
Input points per common	AFP87525: 4 points/common AFP87521: 8 points/common AFP87522: 16 points/common
Input type	Source input
Connection method	Terminal block (M3.5 screw)
Insulation	Optical coupler
Weight	AFP87525: Approx. 130 g/4.586 oz. AFP87521: Approx. 190 g/6.702 oz. AFP87522: Approx. 280 g/9.877 oz.

**Note:**

\* When all points are ON, the current required for the driving input current is also included in the ratings.

## • Internal circuit diagram



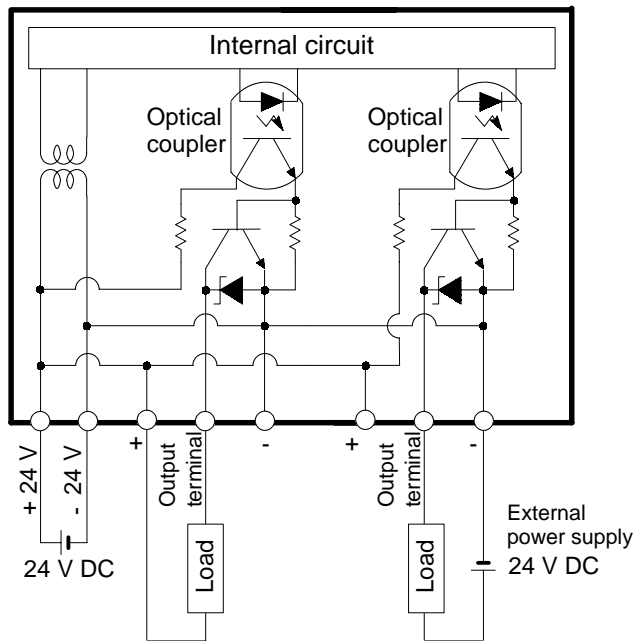
■ Transistor NPN open collector output type

Item	Description
Number of output points	AFP87527: 4 points AFP87523: 8 points AFP87524: 16 points
Rated load voltage	24 V DC
Load voltage range	20.4 to 26.4 V DC
Max. load current	0.5 A/point, 1 A/common
OFF state leakage current	100 $\mu$ A or less
Max. ON state voltage drop	1.5 V or less
Response time	OFF $\rightarrow$ ON: 1 ms or less ON $\rightarrow$ OFF: 1 ms or less
Internal current consumption (at 24 V DC)	AFP87527: 40 mA or less (when all points are OFF) 65 mA or less (when all points are ON)* AFP87523: 40 mA or less (when all points are OFF) 85 mA or less (when all points are ON)* AFP87524: 40 mA or less (when all points are OFF) 120 mA or less (when all points are ON)*
Output points per common	AFP87527: 4 points/common AFP87523: 8 points/common AFP87524: 16 points/common
Output type	Sink output
Connection method	Terminal block (M3.5 screw)
Insulation	Optical coupler
Weight	AFP87527: Approx. 130 g/4.586 oz. AFP87523: Approx. 190 g/6.702 oz. AFP87524: Approx. 280 g/9.877 oz.

**Note:**

\* The current consumption when all points are ON shows the ratings when no load is connected.

• Internal circuit diagram





### 3) Expansion FP I/O terminal unit

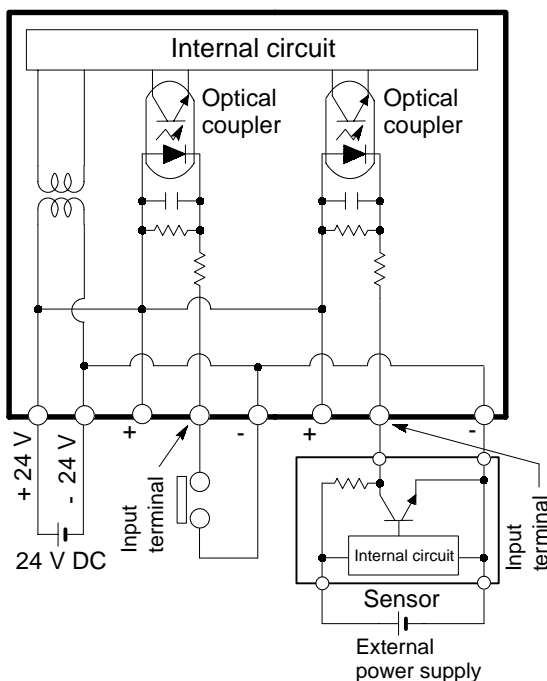
#### ■ Input type

Item	Description
Number of input points	AFP87425: 8 points AFP87426: 16 points
Rated input voltage	24 V DC
Rated input current	Approx. 5.5 mA (at 24 V DC)
Input impedance	Approx. 4.4 k $\Omega$
Input voltage range	20.4 to 26.4 V DC
ON voltage	19.2 V or less
OFF voltage	2.4 V or more
Response time	OFF $\rightarrow$ ON: 2 ms or less ON $\rightarrow$ OFF: 2 ms or less
Internal current consumption	AFP87425: 60 mA or less (when all points are ON)* AFP87426: 110 mA or less (when all points are ON)*
Input points per common	AFP87425: 8 points/common AFP87426: 16 points/common
Input type	Source input
Connection method	Terminal block (M3.5 screw)
Insulation	Optical coupler
Weight	AFP87425: Approx. 170 g/5.997 oz. AFP87426: Approx. 270 g/9.524 oz.

#### Note:

\* When all points are ON, the current required for the driving input current is also included in the ratings.

- Internal circuit diagram



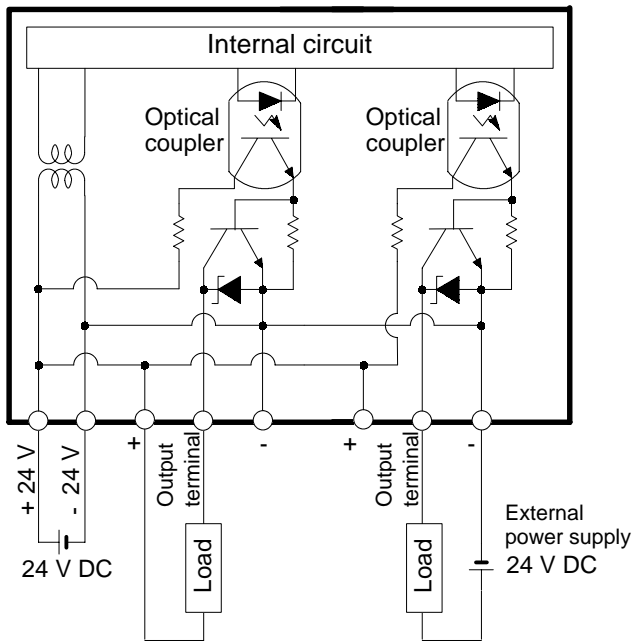
■ Transistor NPN open collector output type

Item	Description
Number of output points	AFP87427: 8 points AFP87428: 16 points
Rated load voltage	24 V DC
Load voltage range	20.4 to 26.4 V DC
Max. load current	0.5 A/point, 1 A/common
OFF state leakage current	100 $\mu$ A or less
Max. ON state voltage drop	1.5 V or less
Response time	OFF $\rightarrow$ ON: 1 ms or less ON $\rightarrow$ OFF: 1 ms or less
Internal current consumption	AFP87427: 60 mA or less (when all points are ON)* AFP87428: 110 mA or less (when all points are ON)*
Output points per common	AFP87427: 8 points/common AFP87428: 16 points/common
Output type	Sink output
Connection method	Terminal block (M3.5 screw)
Insulation	Optical coupler
Weight	AFP87427: Approx. 170 g/5.997 oz. AFP87428: Approx. 270 g/9.524 oz.

**Note:**

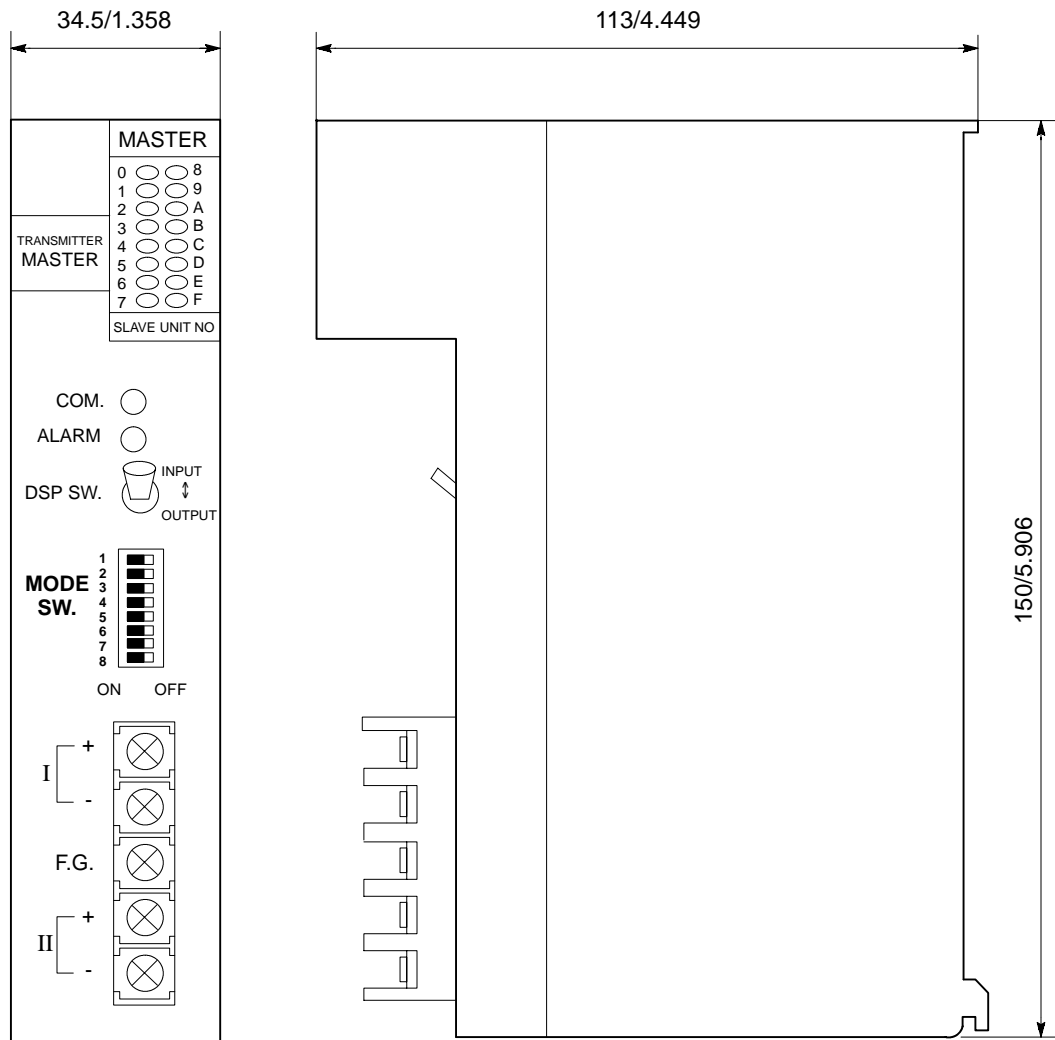
\* The current consumption when all points are ON shows the ratings when no load is connected.

• Internal circuit diagram



# 8-2. Dimensions

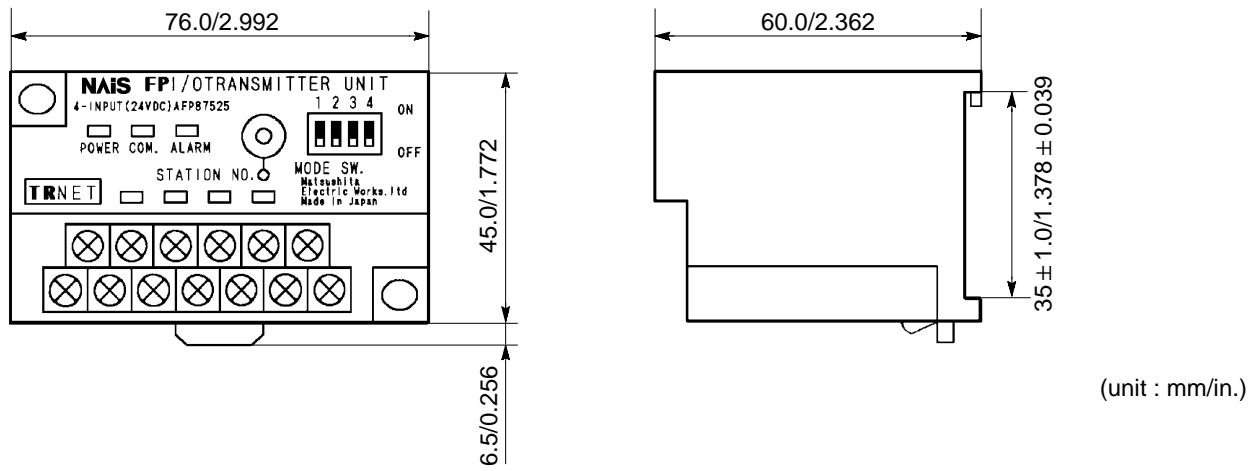
## 1. FP3 Transmitter Master Unit (AFP3750)



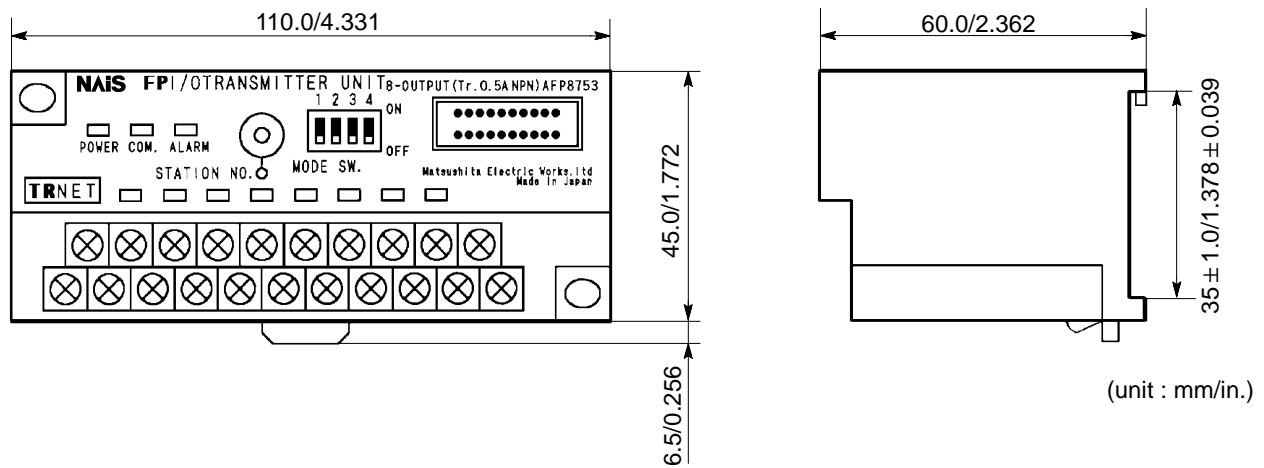
(unit : mm/in.)

## 2. FP I/O Transmitter Unit

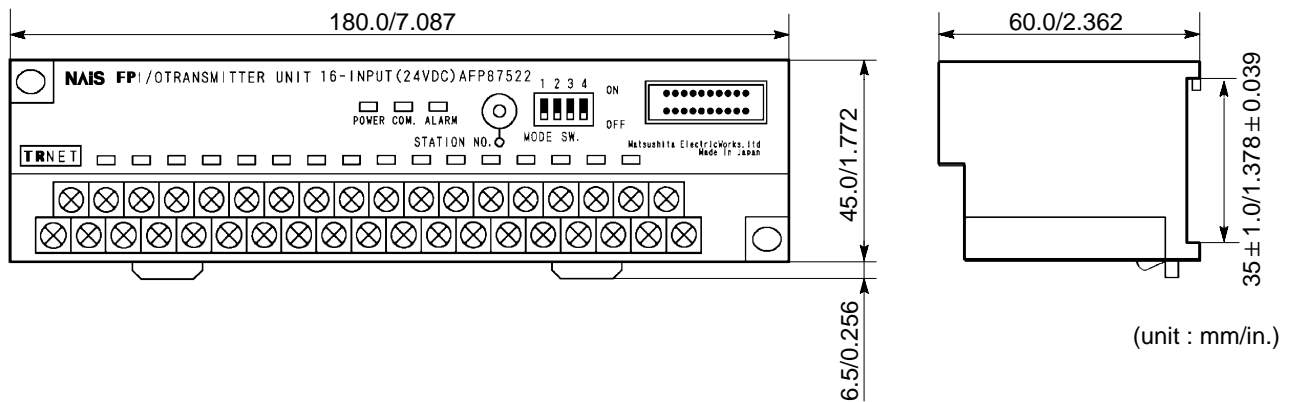
### ■ 4-input type (AFP87525) and 4-output type (AFP87527)



### ■ 8-input type (AFP87521) and 8-output type (AFP87523)

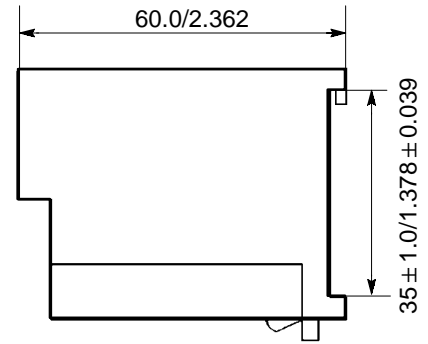
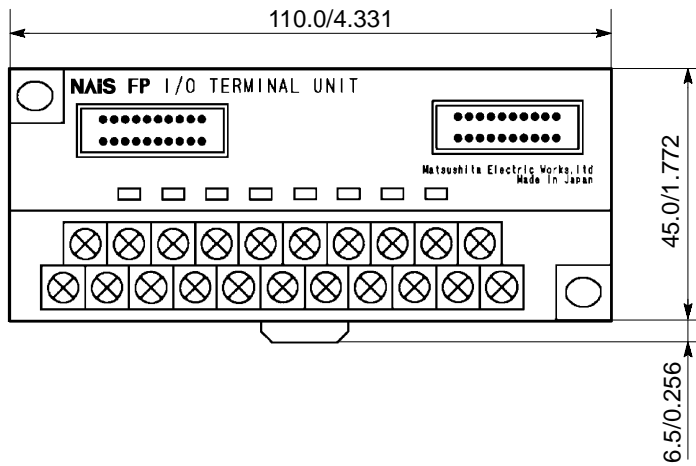


### ■ 16-input type (AFP87522) and 16-output type (AFP87524)



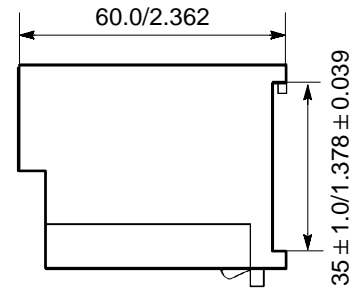
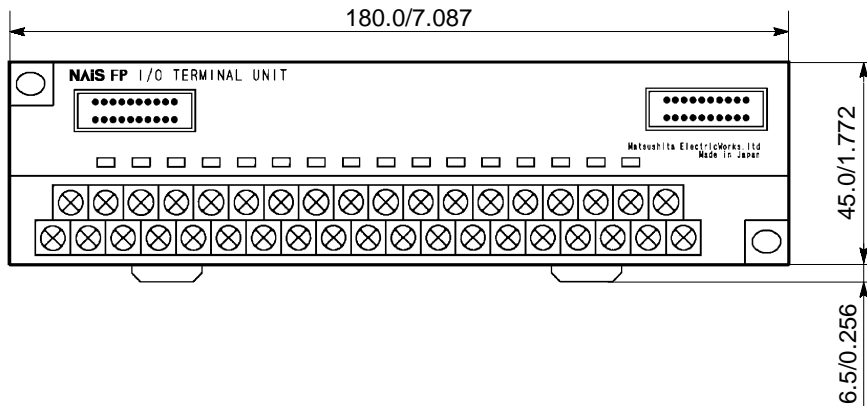
### 3. Expansion FP I/O Terminal Unit

■ 8-input type (AFP87425) and 8-output type (AFP87427)



(unit : mm/in.)

■ 16-input type (AFP87426) and 16-output type (AFP87428)



(unit : mm/in.)

# 8-3. Settings

## 1. Operation Mode Selector

### 1) FP3 transmitter master unit

Operation mode selector



Selector number	Function	Description	Selector position							
			1	2	3	4	5	6	7	8
1	System configuration selection	Remote I/O control disabled, master B of I/O link	ON							
		Remote I/O control enabled, master A of I/O link	OFF							
2	Output operation condition during a communication error	Hold (continues I/O control operation)	ON							
		Output OFF	OFF							
3 and 4	Not used		- -							
5 and 6	Input points selection of slave station	0 point					OFF	OFF		
		32 points					ON	OFF		
		64 points					OFF	ON		
		128 points					ON	ON		
7 and 8	Output points selection of slave station	0 point							OFF	OFF
		32 points							ON	OFF
		64 points							OFF	ON
		128 points							ON	ON

**Notes:**

- The operation mode selectors are all set to the OFF position when shipped.
- The operation mode selector’s right side is “OFF (  )” and the left side is “ON (  ).”
- Be sure the power is OFF when changing the selector position.



## 2) FP I/O transmitter unit

### Operation mode selector



Selector number	Function	Description	Selector position			
			1	2	3	4
1	Communication mode selection	(1:1) × n communication	ON			
		1:1 communication	OFF			
2	System configuration selection	This unit is regarded as a slave station.	ON			
		This unit is not regarded as a slave station.	OFF			
3	Output operation condition during a communication error	Hold (continues I/O communication)	ON			
		Output OFF	OFF			
4	Terminal station setting	Terminal station				ON
		Not a terminal station				OFF

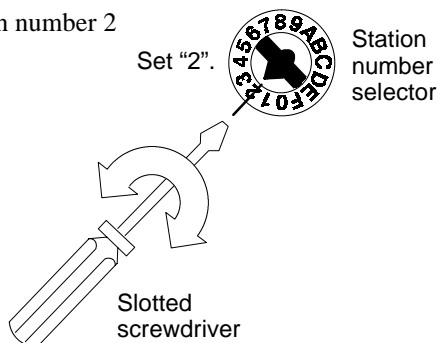
### Notes:

- The operation mode selectors are all set to the OFF position when shipped.
- The operation mode selector's upper state is "ON (  )" and the lower state is "OFF (  )."
- Be sure the power is OFF when changing the switch position.

## 2. Station Number Selector

- The I/O numbers to be allocated to each slave station are determined by the slave station number setting.  
Since each I/O number is assigned to a single slave station number, set each slave station with the slave station number that corresponds to the I/O numbers you wish to allocate.
- To set a slave station number, turn the station number selector of the FP I/O transmitter unit using a slotted screwdriver.

**Example:** Setting station number 2



# 8-4. I/O Allocation Table

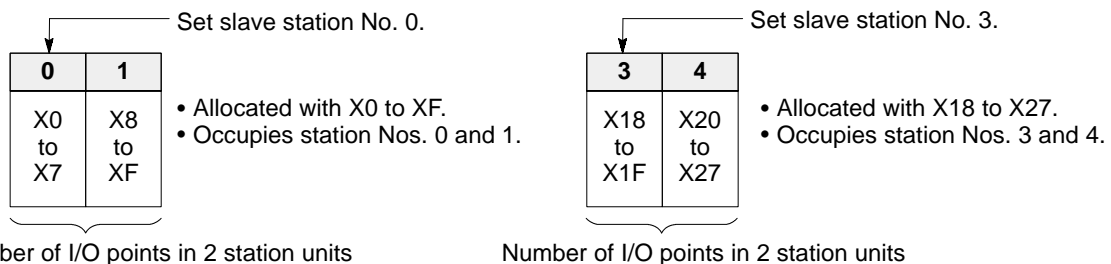
•The following table shows the I/O allocation for an FP3 transmitter master unit mounted in slot 0 of the backplane.

I/O allocation pattern	Operation mode selector of the FP3 transmitter master unit	Slave station type	I/O points	I/O allocation of the slave station
Pattern No. 0 (Factory setting)	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	0 input	_____
		Output type	0 output	_____
Pattern No. 1	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	128 inputs	X0 to X7F
		Output type	128 outputs	Y80 to Y15F
Pattern No. 2	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	128 inputs	X0 to X7F
		Output type	64 outputs	Y80 to Y11F
Pattern No. 3	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	128 inputs	X0 to X7F
		Output type	32 outputs	Y80 to Y9F
Pattern No. 4	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> ON 7 <input type="checkbox"/> OFF 8 <input type="checkbox"/> OFF ON OFF	Input type	128 inputs	X0 to X7F
		Output type	0 output	_____

**Note:**

- Starting with the first slave station number, I/O numbers are allocated in the number of 1 station unit to a 4-point type unit and to an 8-point type unit, and 2 station units to a 16-point type unit.

**Example 1:** I/O allocation for a slave station (16-input type FP I/O transmitter unit) when an FP3 transmitter master unit set to 64 input points is mounted in slot 0 of the backplane

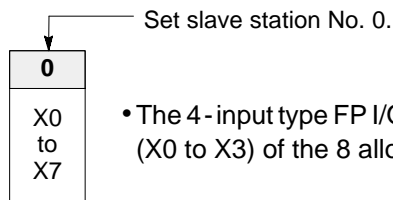




	Station numbers of the slave station															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	<b>Not used</b> (Please note that an error will occur if the power supply is turned on with these settings.)															
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F
	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	Y100 to Y107	Y108 to Y10F	Y110 to Y117	Y118 to Y11F	Y120 to Y127	Y128 to Y12F	Y130 to Y137	Y138 to Y13F	Y140 to Y147	Y148 to Y14F	Y150 to Y157	Y158 to Y15F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F
	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	Y100 to Y107	Y108 to Y10F	Y110 to Y117	Y118 to Y11F	<b>Not used</b>							
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F
	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	<b>Not used</b>											
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	X40 to X47	X48 to X4F	X50 to X57	X58 to X5F	X60 to X67	X68 to X6F	X70 to X77	X78 to X7F
	<b>Not used</b>															

**Note:**

**Example 2:** I/O allocation for a slave station (4-input type FP I/O transmitter unit) when an FP3 transmitter master unit set to 32 input points is mounted in slot 0 of the backplane.



- The 4-input type FP I/O transmitter unit in the example can use only the first 4 points (X0 to X3) of the 8 allocated points.

8-4. I/O Allocation Table

I/O allocation pattern	Operation mode selector of the FP3 transmitter master unit	Slave station type	I/O points	I/O allocation of the slave station
Pattern No. 5	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	64 inputs	X0 to X3F
		Output type	128 outputs	Y40 to Y11F
Pattern No. 6	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	64 inputs	X0 to X3F
		Output type	64 outputs	Y40 to Y7F
Pattern No. 7	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	64 inputs	X0 to X3F
		Output type	32 outputs	Y40 to Y5F
Pattern No. 8	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> ON 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	64 inputs	X0 to X3F
		Output type	0 output	—————
Pattern No. 9	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	32 inputs	X0 to X1F
		Output type	128 outputs	Y20 to Y9F
Pattern No. 10	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	32 inputs	X0 to X1F
		Output type	64 outputs	Y20 to Y5F

	Station numbers of the slave station															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F	Y100 to Y107	Y108 to Y10F	Y110 to Y117	Y118 to Y11F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F	<b>Not used</b>							
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	<b>Not used</b>											
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	X20 to X27	X28 to X2F	X30 to X37	X38 to X3F	<b>Not used</b>							
	<b>Not used</b>															
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F	Y80 to Y87	Y88 to Y8F	Y90 to Y97	Y98 to Y9F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	<b>Not used</b>							

8-4. I/O Allocation Table

I/O allocation pattern	Operation mode selector of the FP3 transmitter master unit	Slave station type	I/O points	I/O allocation of the slave station
Pattern No. 11	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	32 inputs	X0 to X1F
		Output type	32 outputs	Y20 to Y3F
Pattern No. 12	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> ON 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	32 inputs	X0 to X1F
		Output type	0 output	—————
Pattern No. 13	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input type="checkbox"/> ON ON OFF	Input type	0 input	—————
		Output type	128 outputs	Y0 to Y7F
Pattern No. 14	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> OFF 8 <input checked="" type="checkbox"/> ON ON OFF	Input type	0 input	—————
		Output type	64 outputs	Y0 to Y3F
Pattern No. 15	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> OFF 6 <input checked="" type="checkbox"/> OFF 7 <input checked="" type="checkbox"/> ON 8 <input checked="" type="checkbox"/> OFF ON OFF	Input type	0 input	—————
		Output type	32 outputs	Y0 to Y1F

	Station numbers of the slave station															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	<b>Not used</b>											
	X0 to X7	X8 to XF	X10 to X17	X18 to X1F	<b>Not used</b>											
	<b>Not used</b>															
	<b>Not used</b>															
	Y0 to Y7	Y8 to YF	Y10 to Y17	Y18 to Y1F	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	Y40 to Y47	Y48 to Y4F	Y50 to Y57	Y58 to Y5F	Y60 to Y67	Y68 to Y6F	Y70 to Y77	Y78 to Y7F
	<b>Not used</b>															
	Y0 to Y7	Y8 to YF	Y10 to Y17	Y18 to Y1F	Y20 to Y27	Y28 to Y2F	Y30 to Y37	Y38 to Y3F	<b>Not used</b>							
	<b>Not used</b>															
	Y0 to Y7	Y8 to YF	Y10 to Y17	Y18 to Y1F	<b>Not used</b>											

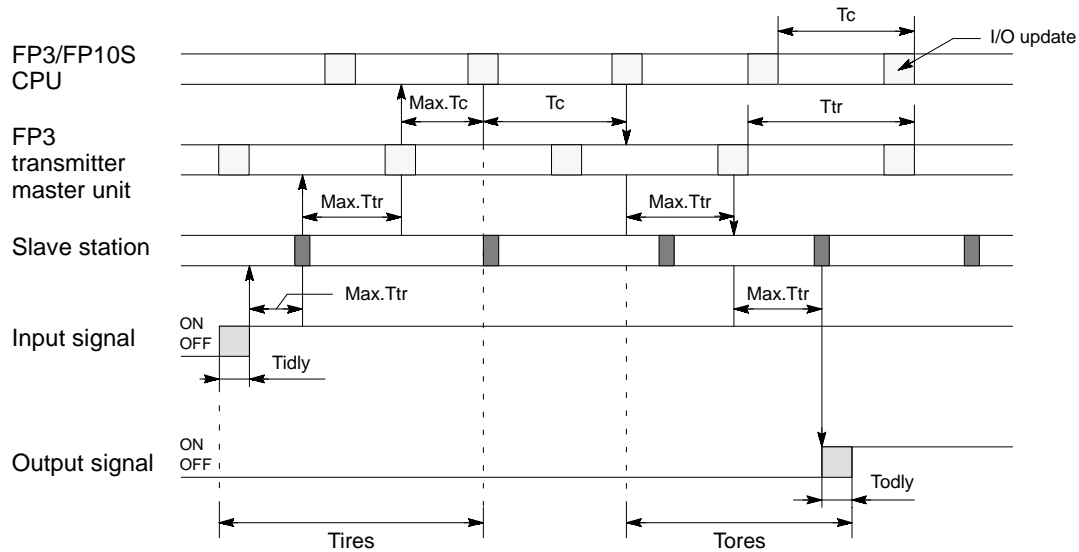
# 8-5. Transfer Time

## 1. Remote I/O Control

### ■ Maximum remote I/O response time (Tres)

- The maximum remote I/O response time (Tres) is the time it takes for a slave station to generate an output signal based on the result of processing by the FP3/FP10S CPU, such as an I/O update or program execution, after receiving an input signal.
- Tres is calculated by the following formula.

**Tres (ms)** = Tires + Tc + Tores  
**Tires** = Input response time  
**Tc** = Scan time of the CPU  
**Tores** = Output response time



### ■ Maximum input response time (Tires)

- The maximum input response time (Tires) is the maximum time it takes for an input signal received by a slave station to reach the FP3/FP10S CPU via the FP3 transmitter master unit.
- Tires is calculated by the following formula.

$$\mathbf{Tires\ (ms)} = T_{tr} \times 2 + T_c + T_{idly}$$

**Ttr** = Scan time of the MEWNET-TR system

This is the time required for the FP3 transmitter master unit to receive input information from each slave station. Please see next page.

**Tc** = Scan time of the CPU

This is the time required for the FP3/FP10S CPU to perform an I/O update, program execution or tool services. The value varies depending on the program and operating conditions.

The current, minimum and maximum values of the scan time are stored in special data registers:

- DT9022, DT9023, and DT9024 of the FP3 CPU
- DT90022, DT90023, and DT90024 of the FP10S CPU

Special data registers

Address	Name	Scan time calculation formula
<b>DT9022, DT90022</b>	Scan time register (current value)	Current scan time (ms) = data × 0.1
<b>DT9023, DT90023</b>	Scan time register (minimum value)	Minimum scan time (ms) = data × 0.1
<b>DT9024, DT90024</b>	Scan time register (maximum value)	Maximum scan time (ms) = data × 0.1

**Tidly** = Input response time of the input type slave station

Slave station	Response time
<b>FP I/O transmitter unit</b>	OFF ↔ ON: 1 ms or less
<b>Expansion FP I/O terminal unit</b>	OFF ↔ ON: 2 ms or less

### ■ Maximum output response time (Tores)

- The maximum output response time (Tores) is the maximum time it takes for a signal to be transmitted from the FP3/FP10S CPU to a slave station and an output to be generated from the corresponding terminal.
- Tores is calculated by the following formula.

$$\mathbf{Tores\ (ms)} = T_{tr} \times 2 + T_{odly}$$

**Ttr** = Scan time of the MEWNET-TR system

This is the time required for the FP3 transmitter master unit to transmit output information to each slave station. Please see next page.

**Todly** = Output response time of the output type slave station

Slave station	Response time
<b>FP I/O transmitter unit</b>	OFF ↔ ON: 1 ms or less
<b>Expansion FP I/O terminal unit</b>	OFF ↔ ON: 1 ms or less

■ Scan time of the MEWNET-TR system (Ttr)

- The scan time of the MEWNET-TR system (Ttr) is the time it takes for the FP3 transmitter master unit to transmit output information to or receive input information from each slave station.
- Ttr is calculated by the following formula.

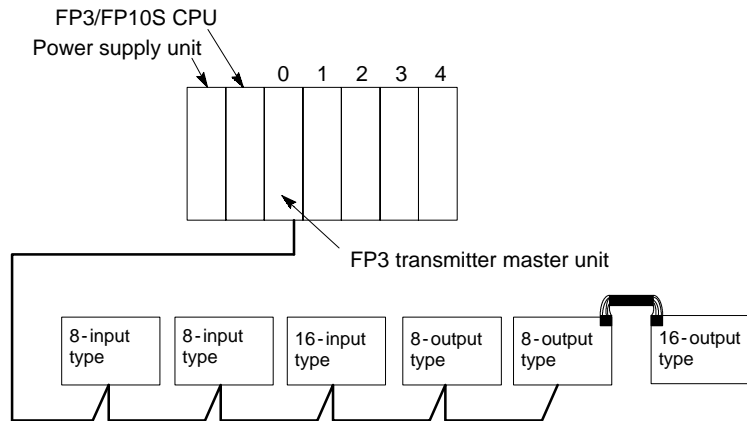
$$Ttr \text{ (ms)} = Ta + Tb + Tc + Td + Te + Tf + Tg + 3.20$$

Ta to Tg = I/O response time of the slave station

Item	Slave station combinations		I/O response time calculation formula
	FP I/O transmitter unit	Expansion FP I/O terminal unit	
Ta	4-input type	-	Ta = 1.01 × number of FP I/O transmitter units
Tb	4-output type	-	Tb = 0.63 × number of FP I/O transmitter units
Tc	8-input type or 16-input type	-	Tc = 1.06 × number of FP I/O transmitter units
Td	8-output type or 16-output type	-	Td = 0.68 × number of FP I/O transmitter units
Te	8-input type or 16-input type	8-input type or 16-input type	Te = 1.16 × number of expansion FP I/O terminal units
Tf	8-output type or 16-output type	8-output type or 16-output type	Tf = 0.78 × number of expansion FP I/O terminal units
Tg	8-input type or 16-input type	8-output type or 16-output type	Tg = 1.30 × number of expansion FP I/O terminal units
	8-output type or 16-output type	8-input type or 16-input type	

**Example:** The maximum input response time (Tires) of the MEWNET-TR system in the diagram below is calculated as follows. The scan time of the CPU is 7.5 ms.

- Scan time of the MEWNET-TR system (Ttr) = 0 + 0 + 1.06 × 3 + 0.68 × 1 + 0 + 0.78 × 1 + 0 + 3.20 = 7.84 ms
- Maximum input response time (Tires) = Ttr × 2 + Tc + Tidly = 7.84 × 2 + 7.5 + 1 = 24.18 ms





## 2. I/O Link Control

### ■ Maximum I/O link transmission time (Tiol)

- The maximum I/O link transmission time (Tiol) is the time it takes for an output signal from one master station (master A or master B) to be transmitted to and received by another master station (master A or master B) as an input signal during I/O link control.
- Tiol is calculated by the following formula.

**Tiol (ms)** = Tc + 12 . . . master station combinations (FP3/FP10S and FP1, FP3/FP10S and FP-M)

**Tiol (ms)** = Tc + 14 . . . master station combination (FP3/FP10S and FP3/FP10S)

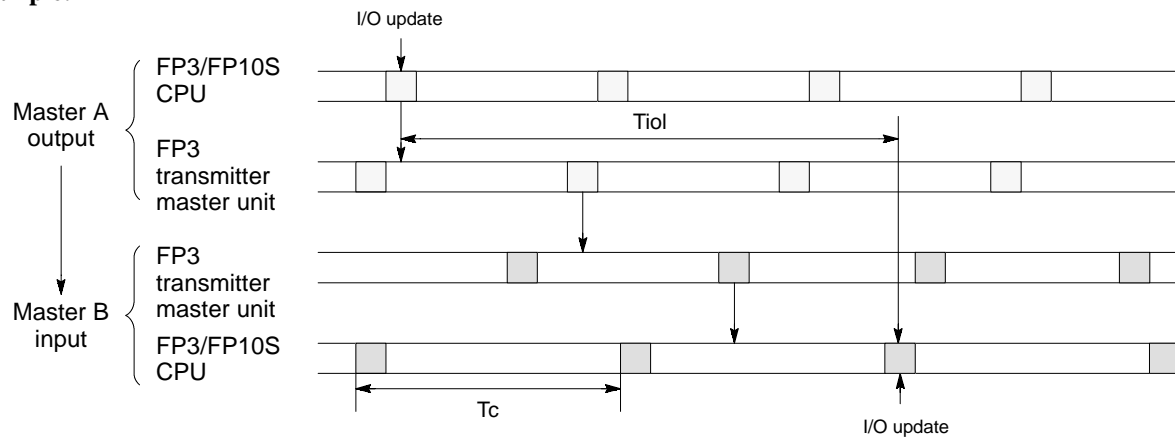
**Tc** = Scan time of the CPU

This is the time required for the FP3/FP10S CPU to perform an I/O update, program execution or tool services. The value varies depending on the program and operating conditions.

The current, minimum and maximum values of the scan time are stored in special data registers:

- DT9022, DT9023, and DT9024 of the FP3 CPU
- DT90022, DT90023, and DT90024 of the FP10S CPU

### Example:



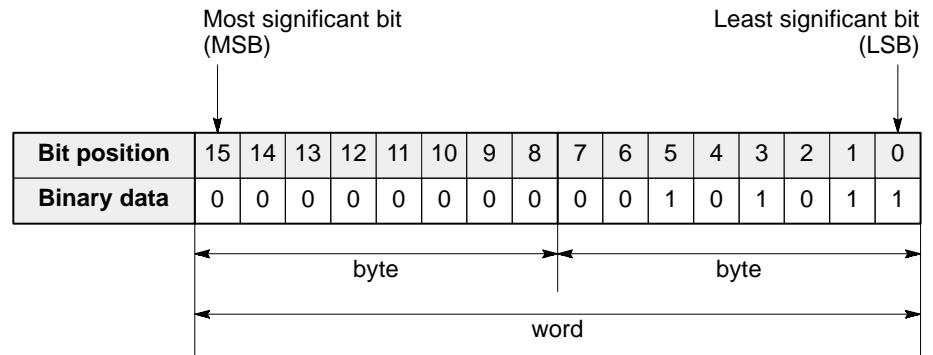
## 8-6. Terminology

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<b>address:</b>	An alphanumeric value that identifies where data is stored.
<b>ambient temperature:</b>	The temperature of the air surrounding a system.
<b>American Wire Gauge (AWG):</b>	A standard system used for designating the size of electrical conductors. Larger gauge numbers have smaller diameter.
<b>AND:</b>	A Boolean operation that produces a logic “1” output if all inputs are “1”, and a logic “0” if any input is “0”.
<b>ASCII:</b>	American Standard Code for Information Interchange. ASCII is normally used when alphanumeric (letters and decimal numbers) and control codes are sent as information to printers, etc. ASCII can be represented using 7 or 8 bits and is often expressed in a 2-digit hexadecimal form converted from specific binary expressions. ASCII expressed in 2-digit hexadecimals is called “ASCII HEX code”. For details about actual ASCII codes, refer to the table for ASCII. [EXAMPLE] When a letter “M” is expressed in ASCII code: 7-bit ASCII : 1001101 (binary) ASCII HEX code: 4D (hexadecimal)
<b>asynchronous:</b>	Not synchronous. Repeated operations that take place in patterns unrelated over time.
<b>AWG:</b>	See American Wire Gauge (AWG).
<b>backplane:</b>	A printed circuit board located in the back of a chassis, that contains a data bus, power bus, and mating connectors for units. For FP3, FP5, FP10S and FP10 programmable controllers, two types of backplanes are available: Master Backplane Expansion Backplane
<b>backup:</b>	A device that is kept available to replace something that may fail during operation.
<b>battery backup:</b>	A battery or set of batteries that will provide power to the processor memory only when system power is lost. FP3 CPU, FP10S CPU, and S-RAM type IC cards have a battery backup system.
<b>battery low:</b>	A condition that exists when the backup battery voltage drops low enough to require battery replacement. For FP3 CPU, FP10S CPU, S-RAM and S-RAM/Flash-EEPROM type IC cards, the ERROR LED turns ON.
<b>baud:</b>	Formally defined as the shortest pulse width in data communication. However, usually used to refer to the number of binary bits transmitted per second (bps) during serial data communication.
<b>BCC:</b>	See Block Check Code
<b>BCD:</b>	See Binary Coded Decimal

**binary:**

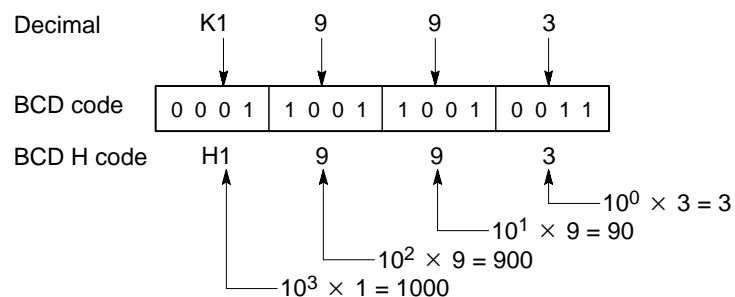
In general, programmable controllers work with binary numbers in one form or another to represent various codes or quantities. The binary number system uses the number 2 as the base and the only allowable symbols are “0” and “1”. There are no 2s, 3s, etc. Each digit of binary is called as “bit”. “Bit” means “binary digit”. A group of 8 bits is called a “byte” and a group of 16 bits (two bytes) is called a “word”.



The binary number “000000000101011” is expressed in decimal as follows:  
 $1 \times 2^0 + 1 \times 2^1 + 0 \times 2^2 + 1 \times 2^3 + 0 \times 2^4 + 1 \times 2^5 + \dots + 0 \times 2^{15}$   
 $= 1 + 2 + 0 + 8 + 0 + 32 + \dots + 0$   
 $= 43$

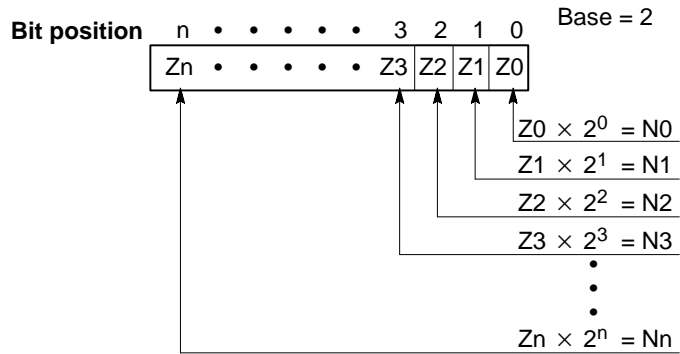
**Binary Coded Decimal (BCD):** One of the codes expressed in binary. BCD is a binary code in which each decimal digit from 0 to 9 is represented by four binary digits (bits). The four positions have a weighted value of 1, 2, 4, and 8, respectively, starting with the least significant bit. A thumbwheel switch is specified as a BCD device, and when connected to a programmable controller, each decimal digit requires four inputs. BCD is usually expressed grouping four bits as one digit in the same way as the hexadecimal constant H. **When BCD is grouped in four bit units, the BCD is expressed by adding the prefix H to the data. Since the weight of each BCD H code is same as that of decimals, be sure to pay attention not to be confused with hexadecimal numbers when BCD H code is handled.**

**Example:** When K1993 (decimal) is expressed in BCD.



**binary number system:**

A number system that uses two symbols, “0” and “1”. Each digit position has a weighted value of 1, 2, 4, 8, 16, 32, 64, and so on beginning with the least significant (right-most) digit.



The sum of N0 through Nn is the decimal equivalent of the number in base “2”.

**Block Check Code (BCC):**

This code is used to detect errors in message transmissions. It is created by Exclusive ORing all of the codes from the header through the last text character, then translating the result (8-bit) data into two ASCII characters.

**buffer:**

A group of registers used for temporary data storage. This is used for data transmission and works effectively when there are transmission rate differences between sending and receiving devices.

**bug:**

Software errors which will cause unexpected actions.

**bus:**

Power distribution conductors.

**Central Processing Unit:**

The Central Processing Unit is usually referred to as the CPU. The CPU controls system activities of the programmable controller.

**character:**

A symbol such as a letter of the alphabet or decimal number. An ASCII character is most commonly used to express characters using binary.

**complement:**

A logical operation that inverts a signal or bit. The complement of “1” is “0”, and the complement of “0” is “1”.

**computer link:**

One of the communication methods between a computer and programmable controllers. In a computer link, the computer is the host, and it can control programmable controllers using a protocol. For FP series programmable controllers, communication between a computer and programmable controllers is performed using the MEWTOCOL-COM communication protocol. From the computer, you can read, write, or monitor data stored in the memory of a programmable controller.

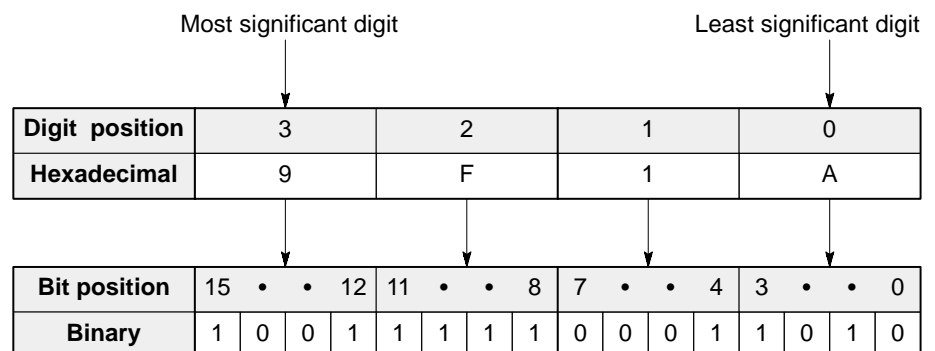
**CPU:**

See Central Processing Unit.

**CRT:**

Abbreviation for cathode-ray tube.

<b>data transfer:</b>	The data transfer function enables a programmable controller to send or get data to/from another programmable controller. This function is usually used between programmable controllers using the <b>F145 (SEND)/P145 (PSEND)</b> and <b>F146 (RECV)/P146 (PRECV)</b> instructions through the link units. If you use this for communication with a computer, you need to prepare programs that conform to the MEWTOCOL-DAT format at the computer.
<b>debug:</b>	Removing errors from a program.
<b>decimal number system:</b>	The decimal number system uses the number 10 as the base and the allowable symbols are “0”, “1”, “2”, “3”, “4”, “5”, “6”, “7”, “8”, and “9”. Each digit position has a weighted value of 1, 10, 100, 1000, and so on, beginning with the least significant (right-most) digit.
<b>duplex:</b>	See full-duplex.
<b>EEPROM:</b>	Electrically Erasable Programmable Read Only Memory. EEPROM can be programmed and erased by electrical pulses.
<b>EPROM:</b>	Erasable Programmable Read Only Memory. EPROM can be reprogrammed after being entirely erased with the use of an ultra-violet light source.
<b>FIFO:</b>	See First-In-First-Out.
<b>First-In-First-Out:</b>	The order that data is written in, and read from registers.
<b>flag:</b>	A relay used to detect and remember certain events in the programmable controller. In FP series programmable controllers, some of the special internal relays are used as flags.
<b>full-duplex:</b>	A communication link in which data can be transmitted and received at the same time.
<b>half-duplex:</b>	A communication link in which transmission is limited to one direction at a time.
<b>hexadecimal:</b>	The hexadecimal number system uses 16 as the base. The allowable symbols are numbers 0 through 9 and letters A through F. The letters are substituted for numbers 10 to 15, respectively, to represent all 16 numbers in one digit. The binary number system can easily be represented in hexadecimal with 4 bit groups. In this manner, a very large binary number can be represented by a hexadecimal number with significantly fewer digits.



**hold:** The memory area whose contents will not be lost or modified if operating power is lost or if the mode of the programmable controller is changed from RUN to PROG.

**interrupt:** The act of performing a more urgent task by putting off the presently executing task. FP series programmable controllers have three types of interrupts, as follows:

- input initiated interrupt
- high-speed counter initiated interrupt
- time initiated interrupt

**I/O:** Abbreviation of Input/Output.

**I/O update:** Taking the input data at the input interface into the memory for program execution and outputting the result of program execution to the output interface.

**ladder diagram:** A standard for representing relay-logic systems.

**LCD:** Abbreviation for Liquid Crystal Display.

**leading edge differential:** A programming technique to operate a bit only for one scan at the moment its input condition turns ON from the OFF state.

**Least Significant Bit (LSB):** The bit which represents the smallest value in a byte, word, or double-word.

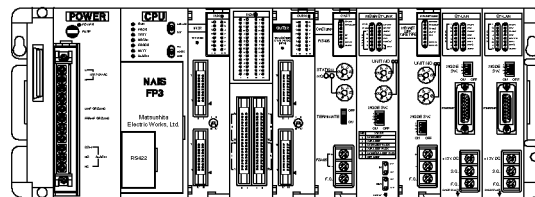
**Least Significant Digit (LSD):** The digit which represents the smallest value in a number.

**LED:** Abbreviation for Light-Emitting Diode.

**link number:** Link numbers are used for expressing the position of link units separately for the standard link system and high-level link system, starting from the link unit at the slot nearest to the CPU as follows:

**[Link number for standard link system]**

- FP3: "S link 1", "S link 2" and "S link 3"
- FP10S: "S link 1", "S link 2", "S link 3", "S link 4" and "S link 5"

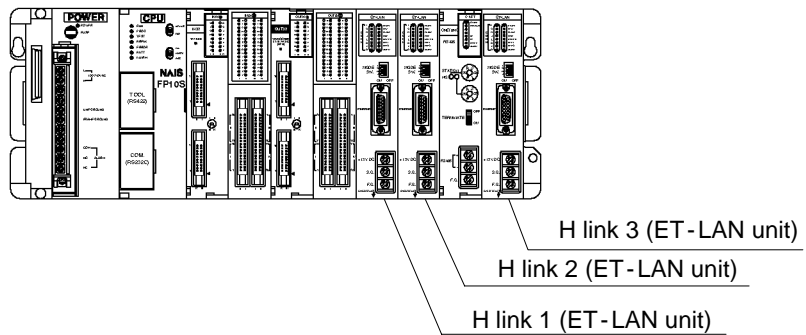


S link 3 (MEWNET-W link unit)

S link 2 (MEWNET-P link unit)

S link 1 (C-NET link unit)

**[Link number for high-level link system]**  
 “H link 1”, “H link 2” and “H link 3”

**link unit:**

Link units available for FP3 and FP10S are classified into two types: those for the “standard link system” and those for the “high-level link system”.

Units for the “standard link system” and “high-level link system” are listed as:

- Units for the standard link system:

C.C.U. (Computer Communication Unit), C-NET Link Unit,  
 MEWNET-P (Optical) Link Unit, MEWNET-W (Wire) Link Unit

- Units for the high-level link system:

ET-LAN Unit, MEWNET-H Link Unit

**malfunction:**

Incorrect function.

**Master Control Relay:**

A relay which controls any series of programs with its operation. If the master control relay is de-energized, all of the contacts and devices controlled by the master control relay are de-energized.

**MEWTOCOL-COM:**

A communication protocol for FP series programmable controllers that performs communication between a computer and programmable controllers.

**modem:**

Abbreviation for MODulator/DEModulator. The modem modulates digital signals and transmits them through a telephone line.

**Most Significant Bit (MSB):** The bit which represents the greatest value in a byte, word, or double-word.

**Most Significant Digit (MSD):** The digit which represents the greatest value in a number.

**multidrop link:**

A communication link in which one host can communicate with two or more stations.

**noise:**

Random, unexpected electrical signals, that are caused by radio waves or by electrical or magnetic fields.

**non-hold:**

The memory area whose contents will be lost or modified if operating power is lost or if the mode of the programmable controller is changed from RUN to PROG.

**normally-closed contact:** A contact which is closed when the coil of the relay is not activated.

**normally-open contact:** A contact which is open when the coil of the relay is not activated.

**offline:** Not being in continuous communication with another processor.

**online:** Being in continuous communication with another processor.

<b>overflow:</b>	The act of exceeding the maximum limit in a registers capacity.
<b>parity check:</b>	A check method for the number of 1s in a character when data communication is performed. The parity check is performed by calculating the number of ones in a character.
<b>PC link:</b>	<p>The term “PC link” means one of the link functions between programmable controllers that use specified relays and data registers. In the PC link, you do not have to make a complicated program for communications. The PC link function is available separately for the standard link system and the high-level link system as follows:</p> <p><b>[PC link for standard link system]</b></p> <p>In the standard link system, a maximum of two PC links are available per CPU using MEWNET - P (Optical) or MEWNET - W (Wire) link units. The two PC links for the standard link systems are called “PC link S0” and “PC link S1”. For each link communication, 1,024 points of link relays L and 128 words of link data registers LD are used for communications. The PC link S0 and S1 allocations can be set using system register 46* as follows:</p> <ul style="list-style-type: none"><li>- when system register 46 = K0, between two MEWNET - P or MEWNET - W link units used for PC link, PC link S0 is assigned for the unit nearest to the CPU (unit with a smaller S link number).</li><li>- when system register 46 = K1, between two MEWNET - P or MEWNET - W link units used for PC link, PC link S0 is assigned for the unit farthest from the CPU (unit with a larger S link number).</li></ul> <p>* System register 46 is available for FP3C series with CPU version 4.4 or later and all FP10Ses.</p> <p><b>[PC link for high-level link system]</b></p> <p>In the high-level link system, a maximum of two PC links are available per CPU using MEWNET - H link units. The two PC links for the high-level link systems are called “PC link H0” and “PC link H1”. For each link communication, you can assign relays and registers used for link communications using setting tools. The PC link H0 and H1 allocations are decided by the position of the MEWNET - H link units. Between the two MEWNET - H link units used for the PC link, PC link H0 is assigned for the unit nearest to the CPU (unit with a smaller H link number), and PC link H1 for the unit farthest from the CPU (unit with a larger H link number).</p>
<b>peripheral device:</b>	Devices that are connected to the programmable controller.
<b>PLC:</b>	Abbreviation for Programmable Logic Controller. See programmable controller.
<b>potentiometer:</b>	A simple transducer which works based on resistance change.
<b>programmable controller:</b>	A control device which can be programmed to control process or machine operations. A programmable controller is often referred to as a PLC when abbreviated.
<b>RAM:</b>	Random Access Memory. RAM provides an excellent means for easily creating and altering a program. Many of the FP series programmable controllers use RAM with battery backup for the application memory.

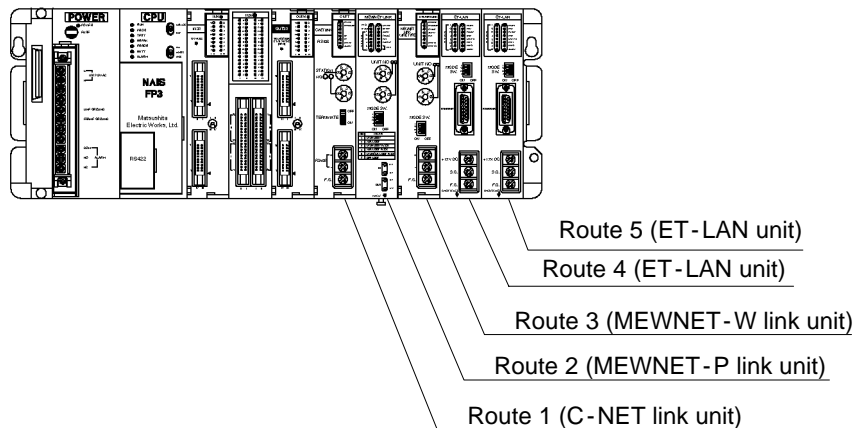


**register:** A unit of memory for various types of data. A register is usually 16 bits wide.

**ROM:** Read Only Memory. See EEPROM and EPROM.

**route number:** Route numbers are used for expressing the position of standard and high-level link units together. This numbering system is used to perform communication over layers, such as when remote programming, etc. The route numberings are assigned starting from the link unit at the slot nearest to the CPU as follows:

- FP3: "route 1", "route 2", "route 3", "route 4", "route 5" and "route 6" including 3 standard link units and 3 high-level link units
- FP10S: "route 1", "route 2", "route 3", "route 4", "route 5", "route 6", "route 7" and "route 8" including 5 standard link units and 3 high-level link units.



**RS232C:** An EIA communication standard for data transmission media that is less than 15 m. Most common serial communication standard.

**RS422:** An EIA communication standard for data transmission media.

**rung:** Term for a ladder program. A rung refers to the programmed instructions that drive one output.

**scan:** Time required to read all inputs, execute the program, and update local and remote information.

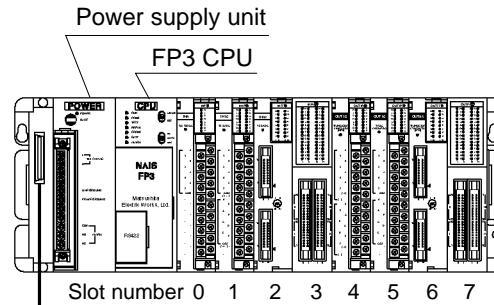
**self-diagnostic function:** A function within the programmable controller which monitors operation and indicates any fault that is detected.

**serial communication:** A communication style in which data is transmitted bit by bit serially.

**slot number:**

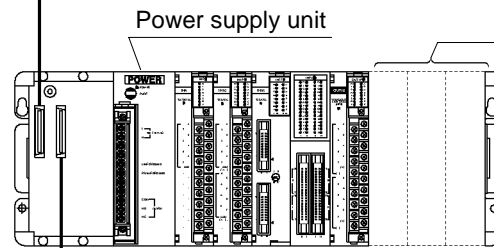
Slot numbers are used for expressing the position of FP3/FP10S units except for the CPU and power supply unit. The slot numbers are assigned for each unit, starting from the unit in the slot nearest to the CPU. In the slot numbering system, all types of backplanes are regarded as the 8-slot type and the number is assigned in the order: CPU equipped master backplane, expansion backplane with board number 1, and then the expansion backplane with board number 2, starting from slot number 0.

Master Backplane



Slot number 0 1 2 3 4 5 6 7

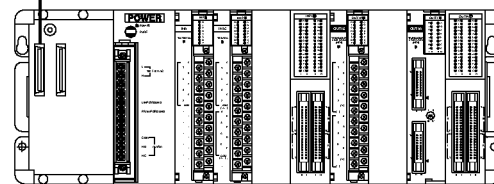
Expansion Backplane (board number 1)



Slot number 8 9 10 11 12 13 14 15

On five slot backplanes, each of the three open slots, which actually do not exist, is counted as one slot.  
On three slot backplanes, each of the five open slots, which actually do not exist, is counted as one slot.

Expansion Backplane (board number 2)



Slot number 16 17 18 19 20 21 22 23

**stop bit:**

The last bit when a character is transmitted.

**system errors:**

Errors resulting from the device or the environment.

**system register:**

The registers used only for system settings of the programmable controller.

**trailing edge differential:**

A programming technique to operate a bit only for one scan at the moment its input condition turns OFF from the ON state.

<b>two's complement:</b>	A number system used to express positive and negative numbers in binary. In this system, the number becomes negative if the most significant bit of the data is "1". In FP series programmable controllers, numbers are expressed using the two's complement.
<b>underflow:</b>	The act of going below the minimum limit in a register's capacity.
<b>watchdog timer:</b>	A timer that monitors processing time of the programmable controller. If the program does not time out, the processor is assumed to be faulty.
<b>word:</b>	A unit of bits which is usually executed at the same time. A word is composed of 16 bits.

# 8-7. Product Types

## 1. Master Stations

Type	Description	Part number
<b>FP3 CPU and FP10S CPU</b>	The FP3/FP10S MEWNET - TR system master station is formed by installing the CPU on the master backplane.	See "FP3/FP10S HARDWARE Technical Manual."
<b>FP3 transmitter master unit</b>	The FP3/FP10S MEWNET - TR system master station is formed by installing the FP3 transmitter master unit on the master or expansion backplane.	AFP3750

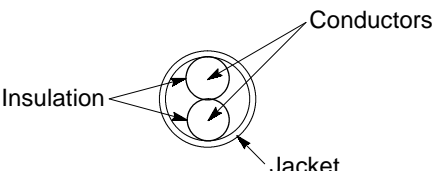
## 2. Slave Stations

Type	Description	Part number	
<b>FP I/O transmitter unit</b>	<b>4-input</b>	Rated power supply voltage: 24 V DC Source input	AFP87525
	<b>8-input</b>		AFP87521
	<b>16-input</b>		AFP87522
	<b>4-output</b>	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87527
	<b>8-output</b>		AFP87523
	<b>16-output</b>		AFP87524
<b>Expansion FP I/O terminal unit</b>	<b>8-input</b>	Rated power supply voltage: 24 V DC Source input	AFP87425
	<b>16-input</b>		AFP87426
	<b>8-output</b>	Rated power supply voltage: 24 V DC Transistor NPN open collector output Max. load current: 0.5 A/point, 1 A/common	AFP87427
	<b>16-output</b>		AFP87428

**Note:**

• The FP I/O transmitter units (4-input and 4-output type) cannot be combined with expansion FP I/O terminal units.

## 3. Transmission Cable

Type	Description
<b>Twisted pair cable and 2-conductor cable</b>	<p><b>Conductor:</b> Size: Min. 1.25 mm<sup>2</sup> (AWG16 or larger) Resistance: Max. 16.8 Ω/km (at 20 °C/68 °F)</p> <p><b>Cable:</b> Insulation material: Polyethylene Insulation thickness: Max. 0.5 mm/0.020 in. Jacket diameter: Approx. 8.5 mm/0.335 in.</p> 

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# RECORD OF CHANGES

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These materials are printed on ECF pulp.  
These materials are printed with earth-friendly vegetable-based (soybean oil) ink.



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