Panasonic

PROGRAMMABLE CONTROLLER

FP7 Digital Input/Output Unit

User's Manual

WUME-FP7DIO-03

2020.10 | panasonic.net/id/pidsx/global

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 safety.
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 excessive exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
-Do not dismantle or remodel the product. It could cause excessive 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 could cause excessive 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 could cause excessive exothermic heat or smoke generation.
-Do not undertake construction (such as connection and disconnection) while the power supply is on. It could lead to an electric shock.

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Introduction

Thank you for buying a Panasonic product. Before you use the product, please carefully read the installation instructions and the user's manual, and understand their contents in detail to use the product properly.

Types of Manual

- There are different types of user's manual for the FP7 series, as listed below. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded on our website:
  https://industrial.panasonic.com/ac/e/dl_center/manual/

Unit name or purpose of use	Manual name	Manual code
FP7 Power Supply Unit	FP7 CPU Unit User's Manual (Hardware)	WUME-FP7CPUH
FP7 CPU Unit	FP7 CPU Unit Command Reference Manual	WUME-FP7CPUPGR
	FP7 CPU Unit User's Manual (Logging Trace Function)	WUME-FP7CPULOG
	FP7 CPU Unit User's Manual (Security Function)	WUME-FP7CPUSEC
Instructions for Built-in LAN Port	FP7 CPU Unit User's Manual (LAM Port Communication)	WUME-FP7LAN
	FP7 CPU Unit User's Manual (EtherNet IP communication)	WUME-FP7CPUEIP.
	FP7 Web Server Function Manual	WUME-FP7WEB.
Instructions for Built-in COM Port	FP7 series User's Manual (SCU communication)	WUME-FP7COM
FP7 Extension (Communication) Cassette (RS-232C/RS485 type)		
FP7 Extension (Communication) Cassette (Ethernet type)	FP7 series User's Manual (Communication cassette Ethernet type)	WUME-FP7CCET
FP7 Extension (Function) Cassette Analog Cassette	FP7 Analog Cassette User's Manual	WUME-FP7FCA
FP7 Digital Input/Output Unit	FP7 Digital Input/Output Unit User's Manual	WUME-FP7DIO
FP7 Analog Input Unit	FP0R Analog Input Unit User's Manual	WUME-FP7AIH
FP7 Analog Output Unit	FP7 Analog Output Unit User's Manual	WUME-FP7AOH

Unit name or purpose of use	Manual name	Manual code
FP7 Thermocouple Multi-analog Input Unit	FP7 Thermocouple Multi-analog Input Unit FP7 RTD Input Unit Users Manual	WUME-FP7TCRTD
FP7 RTD Input Unit		
FP7 Multi Input/Output Unit	FP7 Multi Input/Output Unit Users Manual	WUME-FP7MXY
FP7 High-speed counter unit	FP7 High-speed Counter Unit Users Manual	WUME-FP7HSC
FP7 Pulse Output Unit	FP7 Pulse Output Unit Users Manual	WUME-FP7PG
FP7 Positioning Unit	FP7 Positioning Unit Users Manual	WUME-FP7POSP
FP7 Motion Control Unit	FP7 Motion Control Unit Users Manual	WUME-FP7MCEC
FP7 Serial Communication Unit	FP7 series Users Manual (SCU communication)	WUME-FP7COM
FP7 Multi-wire Link Unit	FP7 Multi-wire Link Unit Users Manual	WUME-FP7MW
PHLS System	PHLS System User's Manual	WUME-PHLS
Programming Software FPWIN GR7	FPWIN GR7 Operation Guide	WUME-FPWINGR7

Table of Contents

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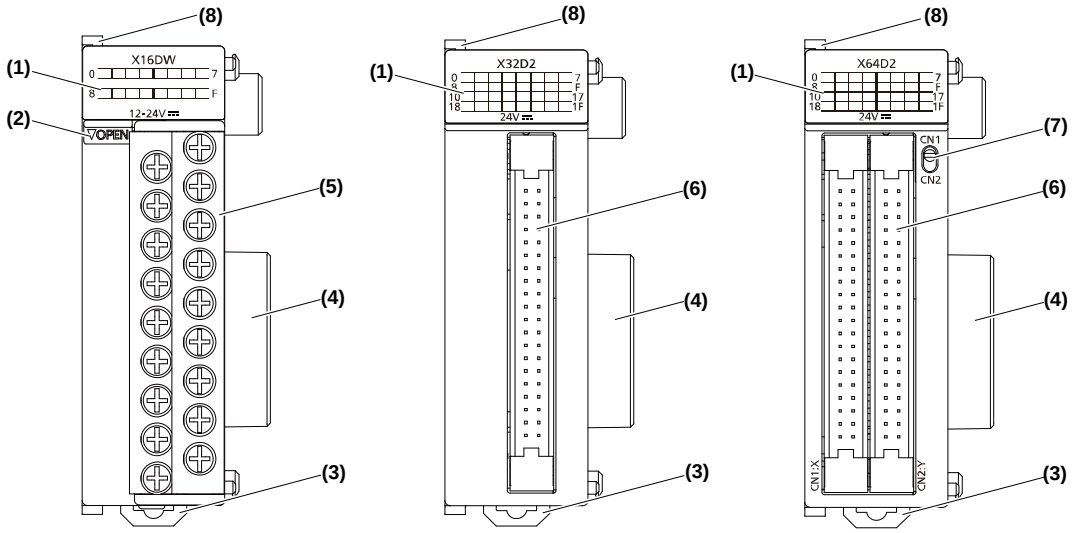
Unit Common Specifications

1.1 Names and Functions of Parts



(1) I/O indicator LEDs

Indicates the ON/OFF status of the input and output.

(2) Terminal block release lever

Lowering this lever makes it possible to dismount the terminal block from the unit without disconnecting the wiring. Push the lock button on the bottom of the unit to lock the release leaver after the terminal block is installed.

(3) DIN hook

This hook is used to mount the unit onto the DIN rail.

(4) Unit Connector

This connector is used to connect the internal circuits of two or more units.

(5) Terminal block

Connect power supplies for the purpose of operating and driving I/O circuits. Crimp terminals for M3 can be used.

(6) Connector (40P)

Connect power supplies for the purpose of operating and driving I/O circuits. Connectors for wire-pressed terminal cable or flat cable connectors can be used.

(7) Indicator selection switch

Use this switch to select the 32 points in the first half or the 32 points in the second half to be displayed by the I/O indicator LEDs.

(8) Fixing hook

This hook is used to fix two or more units.

1.2 Unit Type

■ **Input unit**

Type	Points	Connection method	Description
DC input	16 points	Terminal block	12 to 24 V DC (Common polarities + & - common) Response time switchable
	32 points	Connector	24 V DC (Common polarities + & - common) Response time switchable
	64 points	Connector	24 V DC (Common polarities + & - common) Response time switchable

■ **Output unit**

Type	Points	Connection method	Description
Relay output	16 points	Terminal block	Load current 2 A/1 point and 5 A/1 common 16 points/1 common (with no relay sockets)
Transistor output sink type	16 points	Terminal block	Load current 1 A/1 point and 5 A/1 common 16 points/1 common
	32 points	Connector	Load current 0.3 A/1 point and 3.2 A/1 common 32 points/1 common
	64 points	Connector	Load current 0.3 A (8 points: Y0-Y7) and 0.1 A (56 points: Y8-Y3F) 3.2 A/1 common and 32 points/1 common
Transistor output source type	16 points	Terminal block	Load current 1 A/1 point and 5 A/1 common 16 points/1 common
	32 points	Connector	Load current 0.3 A/1 point and 3.2 A/1 common 32 points/1 common
	64 points	Connector	Load current 0.3 A (8 points: Y0-Y7), 0.1 A (56 points: Y8-Y3F) 3.2 A/1 common, 32 points/1 common

■ **I/O mixed unit**

Type	Points	Connection method	Description
DC input/ Transistor output sink type	Input: 32 points output: 32 points	Connector	• Input specifications 24 V DC (Common polarities + & - common) Response time switchable • Output specifications Load current 0.3 A (8 points: Y0-Y7) and 0.1 A (24 points: Y8-Y1F) 3.2 A/1 common and 32 points/1 common
DC input/ Transistor output source type	Input: 32 points output: 32 points	Connector	• Input specifications 24 V DC (Common polarities + & - common) Response time switchable • Output specifications Load current 0.3 A (8 points: Y0-Y7) and 0.1 A (24 points: Y8-Y1F) 3.2 A/1 common and 32 points/1 common

2

Specifications

2.1 General Specifications

2.1.1 Common Specifications

■ **Description**

Items	Description
Ambient temperature	0°C to +55°C
Storage temperature	-40°C to +70°C
Ambient humidity	10% to 95% (RH) with no condensation (at +25°C)
Storage humidity	10% to 95% (RH) with no condensation (at +25°C)
Breakdown voltage	<DC input and transistor output> 500 V AC for 1 min. (see note 1) ● Between input terminals and output terminals ● Between output terminals and output terminals (between different common terminals) ● Between input terminals and CPU unit power supply terminals/function earth terminals ● Between output terminals and CPU unit power supply terminals/function earth terminals <Relay output> 2300 V AC for 1 min. (see note 1) ● Between output terminals and output terminals (between different common terminals) ● Between output terminals and CPU unit power supply terminals/function earth terminals
Insulation resistance (Test voltage: 500 V DC)	<DC input and transistor output> 100MΩ or more ● Between input terminals and output terminals ● Between output terminals and output terminals (between different common terminals) ● Between input terminals and CPU unit power supply terminals/function earth terminals ● Between output terminals and CPU unit power supply terminals/function earth terminals <Relay output> 100MΩ or more ● Between output terminals and output terminals (between different common terminals) ● Between output terminals and CPU unit power supply terminals/function earth terminals
Vibration resistance	Conforming to JIS B 3502 and IEC 61131-2 5 to 8.4 Hz, 3.5-mm-wide single amplitude 8.4 to 150 Hz, acceleration 9.8 m/s^2 10-minute sweeping in X, Y, and Z directions (1 octave/min.)
Shock resistance	Conforming to JIS B 3502 and IEC 61131-2 147 m/s^2 or more, 3 times each in X, Y, and Z directions
Noise resistance	<DC input and transistor output> 1,000 V p-p, pulse widths: 50 ns and 1 μs <Relay output> 1,500 V p-p, pulse width: 50 ns and 1 μs
Environment	Free from corrosive gases and excessive dust.
EU Directive applicable standard	EMC Directive: EN 61131-2; Low-voltage Directive: EN 61131-2
Overvoltage category	Category II
Pollution level	Pollution level 2

Note 1) Cutoff current: 5 mA (Factory default setting)

2.1.2 Current Consumption

Product name		Model number	Internal current consumption (24 V DC)
DC input unit	16 points	AFP7X16DW	25 mA or less
	32 points	AFP7X32D2	30 mA or less
	64 points	AFP7X64D2	35 mA or less
16-point-type relay output unit		AFP7Y16R	180 mA or less
Transistor output unit (sink type)	16 points	AFP7Y16T	35 mA or less
	32 points	AFP7Y32T	50 mA or less
	64 points	AFP7Y64T	75 mA or less
Transistor output unit (source type)	16 points	AFP7Y16P	35 mA or less
	32 points	AFP7Y32P	50 mA or less
	64 points	AFP7Y64P	75 mA or less
I/O Mixed Unit 32-point DC input 32-point transistor output (sink type)		AFP7XY64D2T	55 mA or less
I/O Mixed Unit 32-point DC input 32-point transistor output (source type)		AFP7XY64D2P	55 mA or less

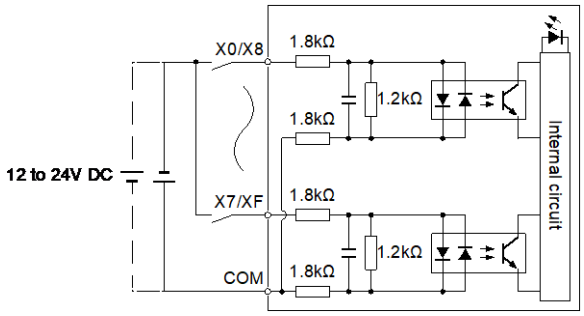
2.2 Input Unit Specifications

2.2.1 16-point-type DC Input Unit

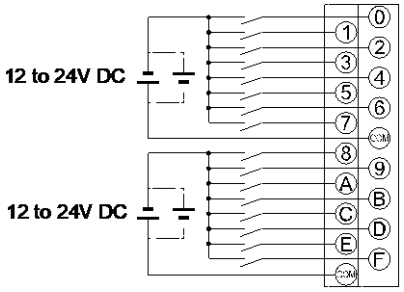
■ **Description**

Items		AFP7X16DW
Insulation system		Optical coupler
Rated input voltage		12 to 24 V DC
Rated input current		Approx. 6 mA (at 24 V DC)
Input impedance		Approx. 3.6kΩ
Operating voltage range		10.2 to 26.4 V DC
Minimum ON voltage/Minimum ON current		9.6 V/2 mA
Maximum OFF voltage/Maximum OFF current		2.5 V/1 mA
Response time	OFF→ON	0.1 ms or less (changeable with time constant switching function at time of input)
	ON→OFF	0.2 ms or less (changeable with time constant switching function at time of input)
Input points per common		8 points/1 common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 125 g

■ **Internal circuit diagram**



■ **Terminal layout**

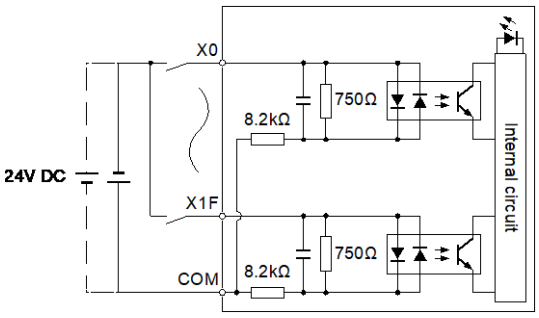


2.2.2 32-point-type DC Input Unit

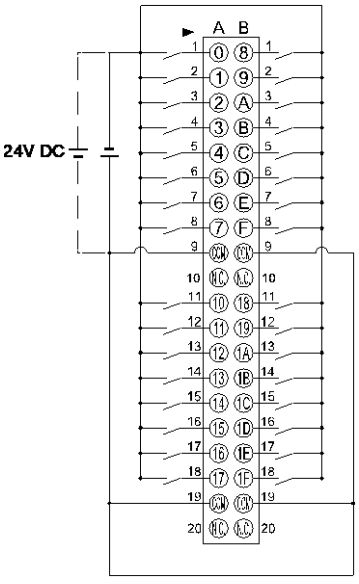
■ Description

Items		AFP7X32D2
Insulation system		Optical coupler
Rated input voltage		24 V DC
Rated input current		Approx. 2.7 mA (at 24 V DC)
Input impedance		Approx. 8.2kΩ
Operating voltage range		20.4 to 26.4 V DC
Min. ON voltage/Min. ON current		19.2 V/2.5 mA
Max. OFF voltage/Max. OFF current		5 V/1.5 mA
Response time	OFF→ON	0.2 ms max. (changeable with constant switching function at time of input)
	ON→OFF	0.2 ms max. (changeable with constant switching function at time of input)
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (lit in ON state)
External connection method		Connector connections (40P conforming to MIL standards)
Weight (unit)		Approx. 95 g

■ Internal circuit diagram



■ Terminal layout



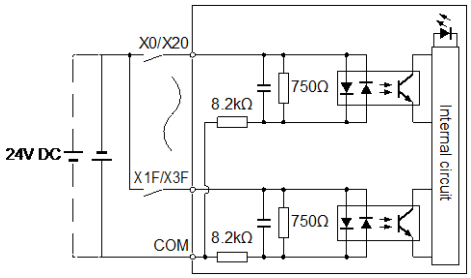
The COM terminals are connected internally.

2.2.3 64-point-type DC Input Unit

■ Description

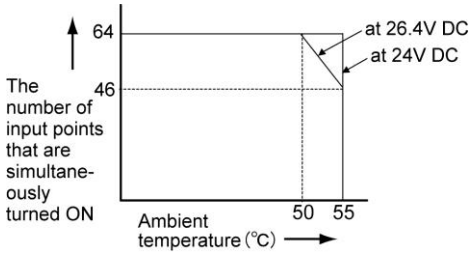
Items		AFP7X64D2
Insulation system		Optical coupler
Rated input voltage		24 V DC
Rated input current		Approx. 2.7 mA (at 24 V DC)
Input impedance		Approx. 8.2kΩ
Operating voltage range		20.4 to 26.4 V DC
Min. ON voltage/Min. ON current		19.2 V/2.5 mA
Max. OFF voltage/Max. OFF current		5 V/1.5 mA
Response time	OFF→ON	0.2 ms max. (changeable with constant switching function at time of input)
	ON→OFF	0.2 ms max. (changeable with constant switching function at time of input)
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (lit in ON state)
External connection method		Connector connections (40P conforming to MIL standards)
Weight (unit)		Approx. 110 g

■ Internal circuit diagram

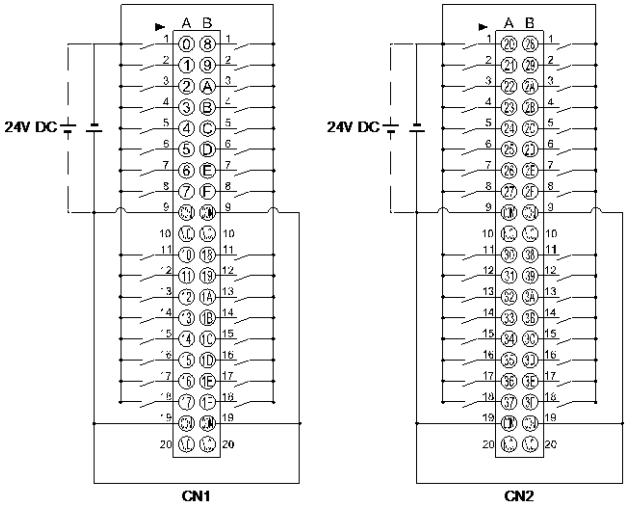


■ Limits on number of simultaneously ON points

Refer to the following figure and reduce the number of input points that are simultaneously turned ON.



■ Terminal layout



The COM terminals in the same connector are connected internally.

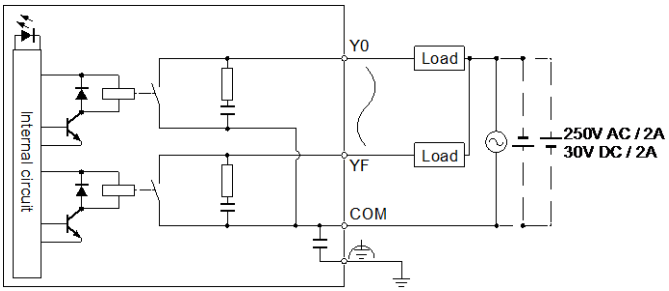
2.3 Output Unit Specifications

2.3.1 16-point-type Relay Output Unit

■ Description

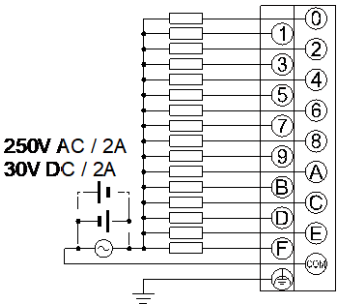
Items		AFP7Y16R
Insulation system		Relay insulation
Rated control capacity		2 A 250 V AC (5 A/common) and 2 A 30 V DC (5 A/common)
Minimum load		1 mA 100 mV (resistive load)
Response time	OFF→ON	Approx. 10 ms
	ON→OFF	Approx. 8 ms
Life	Mechanical lifetime	20 million times or more (Frequency of switching: 180 times/min.)
	Electrical lifetime	100,000 times or more (Frequency of switching: 20 times/min.)
Surge absorber		Snubber circuit (Leakage current: 0.2 mA or less)
Relay sockets		None
Input points per common		16 points/common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 180 g

■ Internal circuit Diagram



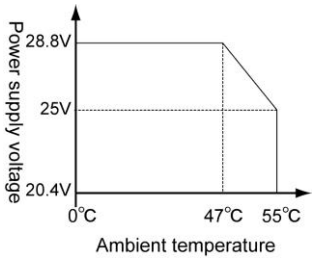
In order to avoid the effects of noise, be sure to ground the function earth terminal.

■ Terminal layout



■ Restriction on power supply voltage

Refer to the following figure and reduce the supply voltage according to the ambient temperature.

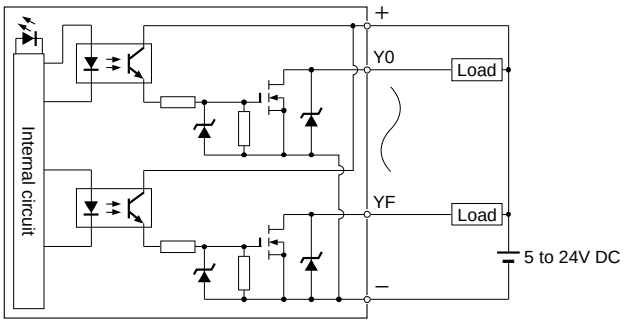


2.3.2 16-point Sink-type Transistor Output Unit

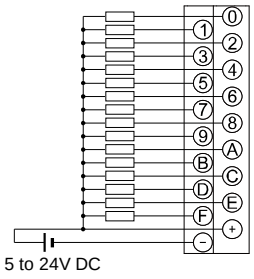
■ Description

Items		AFP7Y16T
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		1 A
Common limits		5 A/common
Max. inrush current		3 A
OFF state leakage current		1 μA max.
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.05 ms or less (Load current: 0.5 mA or more)
	ON→OFF	0.3 ms or less (Load current: 0.5 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	70 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		16 points/common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 125 g

■ Internal circuit diagram



■ Terminal layout

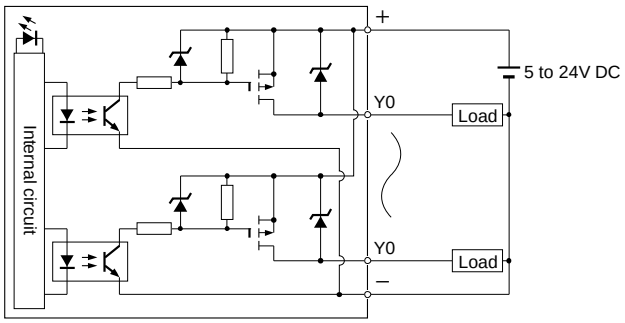


2.3.3 16-point Source-type Transistor Output Unit

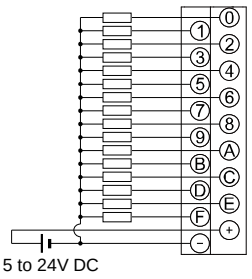
■ Description

Items		AFP7Y16P
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		1 A
Common limits		5 A/common
Max. inrush current		3 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.05 ms or less (Load current: 0.5 mA or more)
	ON→OFF	0.3 ms or less (Load current: 0.5 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	70 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		16 points/common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 125 g

■ Internal circuit diagram



■ Terminal layout



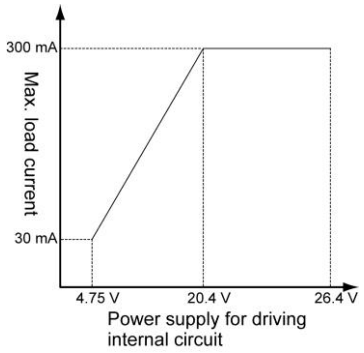
2.3.4 32-point Sink-type Transistor Output Unit

■ Description

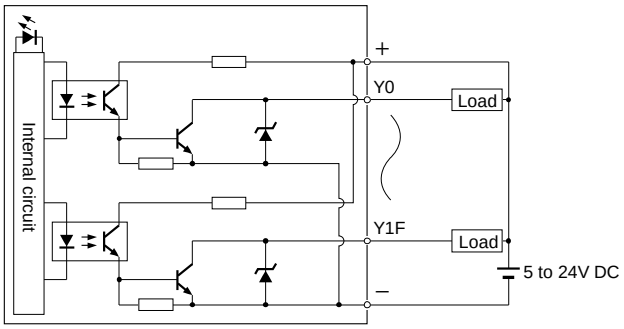
Items		AFP7Y32T
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
Common limits		3.2 A/common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 1 mA or more)
	ON→OFF	0.3 ms or less (Load current: 1 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	110 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (lit in ON state)
External connection method		Connector connections (40P conforming to MIL standards)
Weight (unit)		Approx. 95 g

■ Restriction on load current

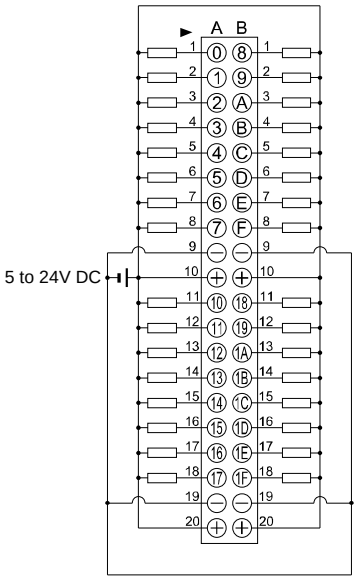
Refer to the following figure and reduce the load current according to the external power supply voltage.



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

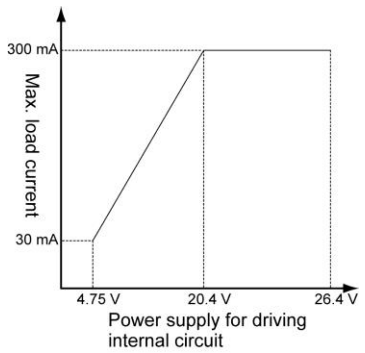
2.3.5 32-point Source-type Transistor Output Unit

■ Description

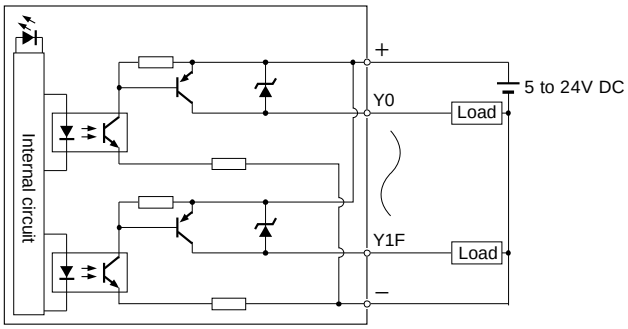
Items		AFP7Y32P
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		0.3 A (26.4 to 20.4 V DC) and 30 mA (4.75 V DC)
Common limits		3.2 A／common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
	ON→OFF	0.5 ms or less (Load current: 2 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	130 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (Lit in ON state)
External connection method		Connector connections (40P, conforming to MIL standards)
Weight (unit)		Approx. 95 g

■ Restriction on load current

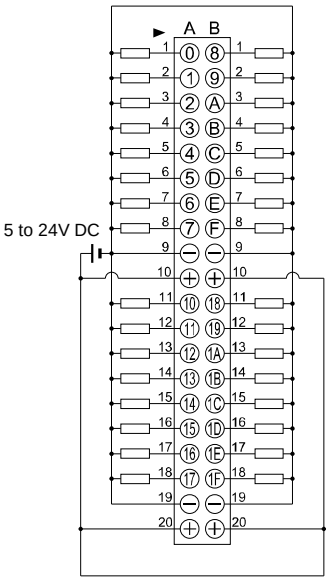
Refer to the following figure and reduce the load current according to the external power supply voltage.



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.3.6 64-point Sink-type Transistor Output Unit

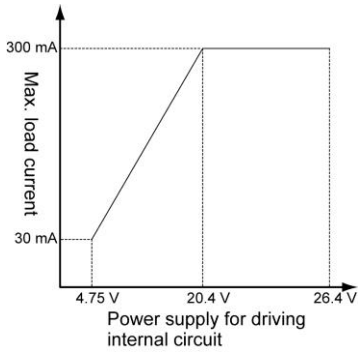
■ Description

Items		AFP7Y64T
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
	0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
Common limits		3.2 A/common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
	ON→OFF	0.3 ms or less (Load current: 2 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	70 mA/common (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (Lit in ON state, switchable)
External connection method		Connector connections (40P x 2, conforming to MIL standards)
Weight (unit)		Approx. 115 g

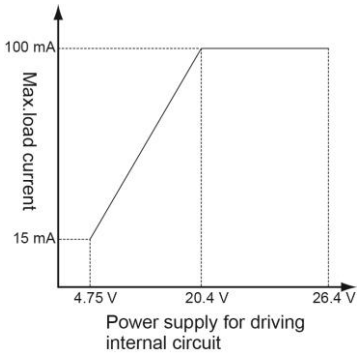
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

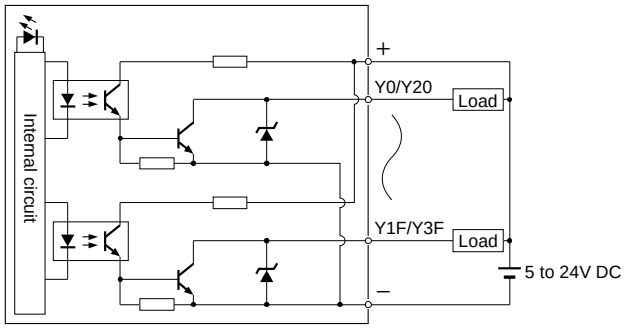
- 0.3 A specifications (Y0 to Y7)



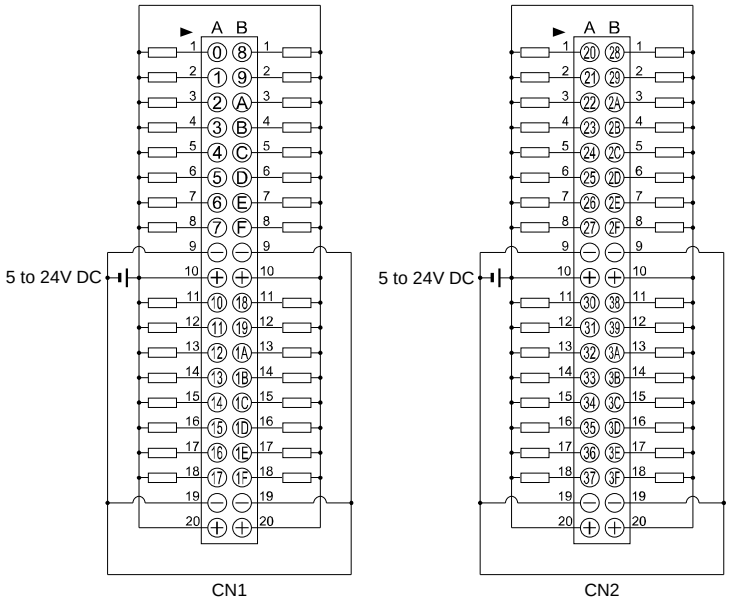
- 0.1 A specifications (other than Y0 to Y7)



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.3.7 64-point Source-type Transistor Output Unit

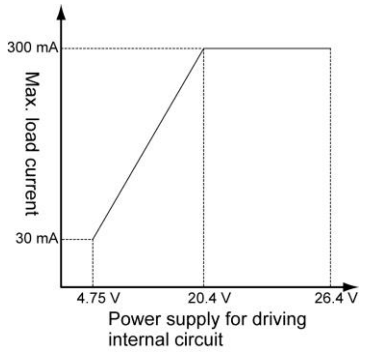
■ Description

Items		AFP7Y64P
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
	0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
Common limits		3.2 A/common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
	ON→OFF	0.5 ms or less (Load current: 2 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	90 mA/common (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (Lit in ON state, switchable)
External connection method		Connector connections (40P x 2, conforming to MIL standards)
Weight (unit)		Approx. 115 g

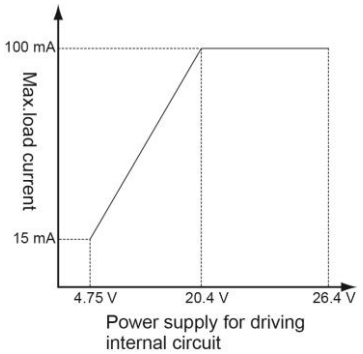
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

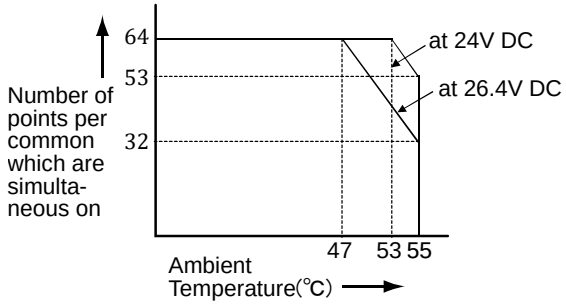
- 0.3 A specifications (Y0 to Y7)



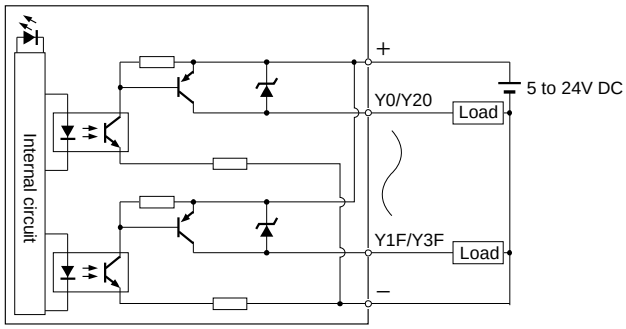
- 0.1 A specifications (other than Y0 to Y7)



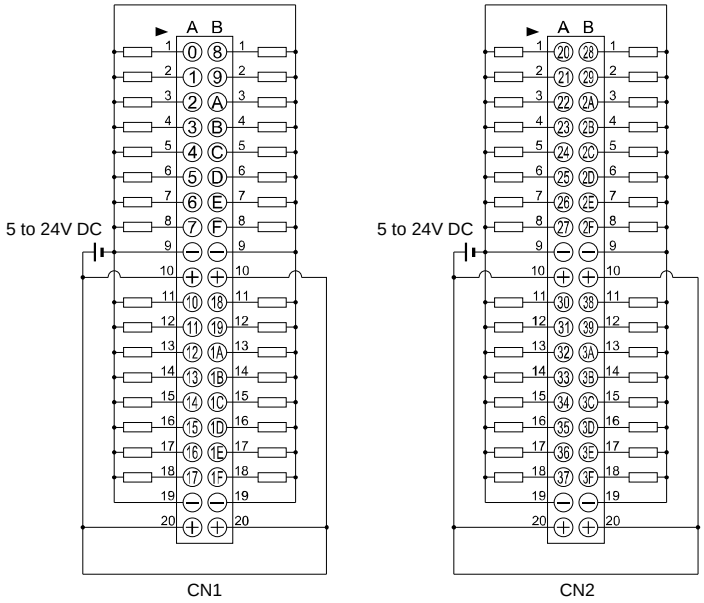
■ Limits on number of simultaneously ON points



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

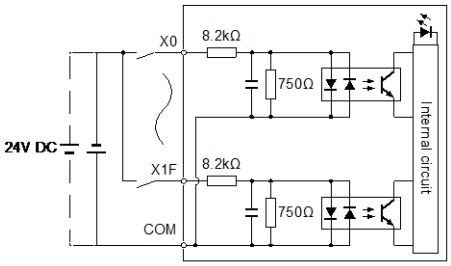
2.4 I/O Mixed Unit Specifications

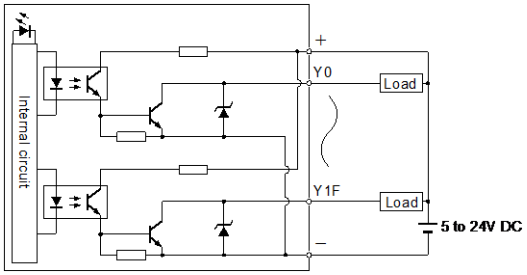
2.4.1 32-point DC Input/32-point Sink Type Transistor Output

■ **Description**

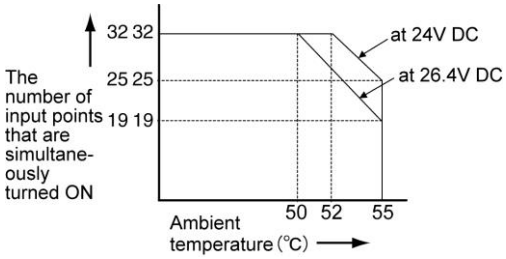
Items			AFP7XY64D2T
Input specifications	Insulation system		Optical coupler
	Rated input voltage		24 V DC
	Rated input current		Approx. 2.7 mA (at 24 V DC)
	Input impedance		Approx. 8.2kΩ
	Operating voltage range		20.4 to 26.4 V DC
	Min. ON voltage/Min. ON current		19.2 V/2.5 mA
	Max. OFF voltage/Max. OFF current		5 V/1.5 mA
	Response time	OFF→ON	0.2 ms or less (changeable with time constant switching function at time of input)
		ON→OFF	0.2 ms or less (changeable with time constant switching function at time of input)
	Input points per common		32 points/1 common
Output specifications	Insulation system		Optical coupler
	Output type		Open collector
	Rated load voltage		5 to 24 V DC
	Allowable load voltage range		4.75 to 26.4 V DC
	Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
		0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
	Common limits		3.2 A/common
	Max. inrush current		0.6 A
	OFF state leakage current		1 μA or less
	ON state max. voltage drop		0.5 V or less
	Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
		ON→OFF	0.3 ms or less (Load current: 2 mA or more)
	External power supply	Voltage	4.75 to 26.4 V DC
		Current	70 mA (at 24 V)
	Surge absorber		Zener diode
	Short-circuit protection		None
	Input points per common		32 points/1 common
Operating mode indicator			32-point LED indicator (lit in ON state)
External connection method			Connector connections (40P conforming to MIL standards)
Weight (unit)			Approx. 115 g

■ Internal circuit diagram





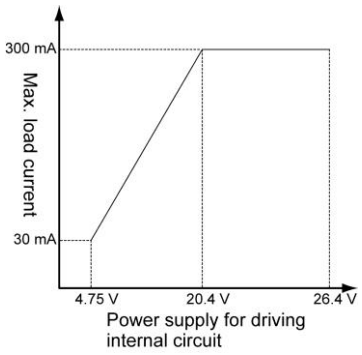
■ Limits on number of simultaneously ON points (common to input/output)



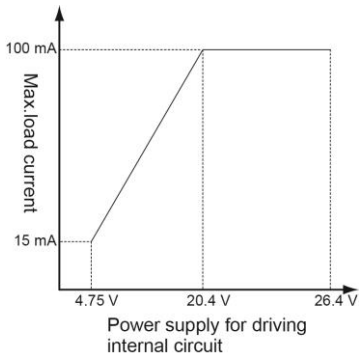
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

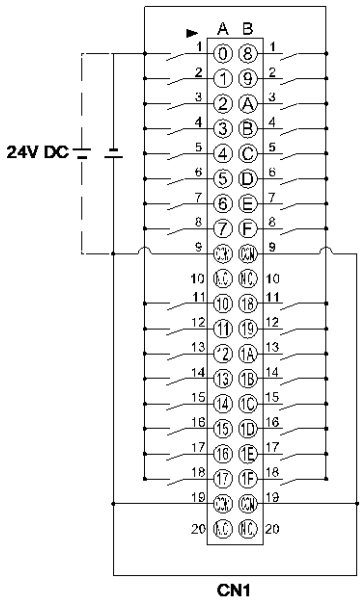
- 0.3 A specifications (Y0 to Y7)



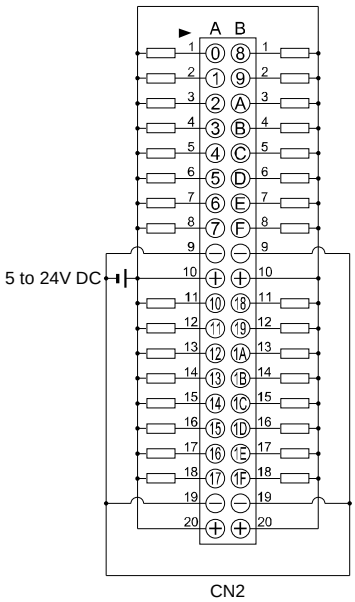
- 0.1 A specifications (other than Y0 to Y7)



■ Terminal layout



The COM terminals are connected internally.



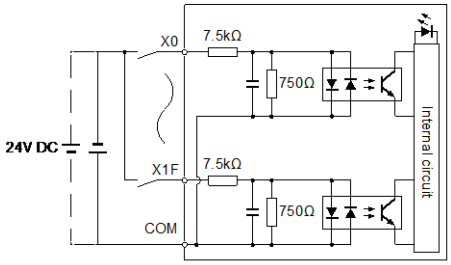
Although the positive and negative terminals are connected internally, connect these terminals externally as well.

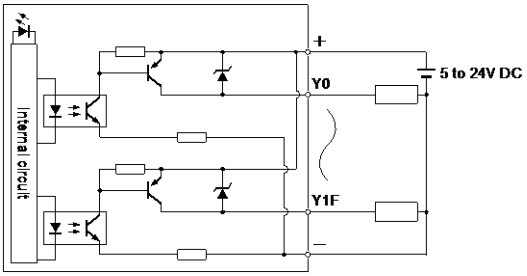
2.4.2 32-point DC Input/32-point Source Type Transistor Output

■ **Description**

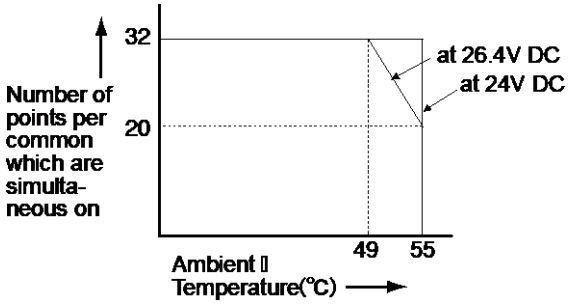
Items			AFP7XY64D2P
Input specifications	Insulation system		Optical coupler
	Rated input voltage		24 V DC
	Rated input current		Approx. 3.4 mA (at 24 V DC)
	Input impedance		Approx. 7.5kΩ
	Operating voltage range		20.4 to 26.4 V DC
	Min. ON voltage/Min. ON current		19.2 V/2.5 mA
	Max. OFF voltage/Max. OFF current		5 V/1.5 mA
	Response time	OFF→ON	0.2 ms or less (changeable with time constant switching function at time of input)
		ON→OFF	0.2 ms or less (changeable with time constant switching function at time of input)
	Input points per common		32 points/1 common
Output specifications	Insulation system		Optical coupler
	Output type		Open collector
	Rated load voltage		5 to 24 V DC
	Allowable load voltage range		4.75 to 26.4 V DC
	Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
		0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
	Common limits		3.2 A/common
	Max. inrush current		0.6 A
	OFF state leakage current		1 μA or less
	ON state max. voltage drop		0.5 V or less
	Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
		ON→OFF	0.5 ms or less (Load current: 2 mA or more)
	External power supply	Voltage	4.75 to 26.4 V DC
		Current	90 mA/common (at 24 V)
	Surge absorber		Zener diode
	Short-circuit protection		None
	Input points per common		32 points/1 common
Operating mode indicator			32-point LED indicator (Lit in ON state, switchable)
External connection method			Connector connections (40P x 2, conforming to MIL standards)
Weight (unit)			Approx. 115 g

■ Internal circuit diagram





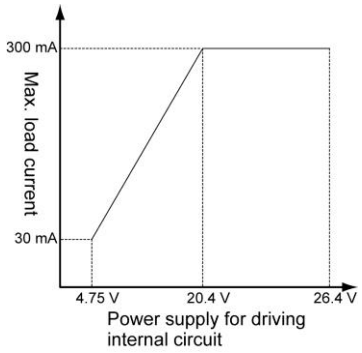
■ Limits on number of simultaneously ON points (common to input/output)



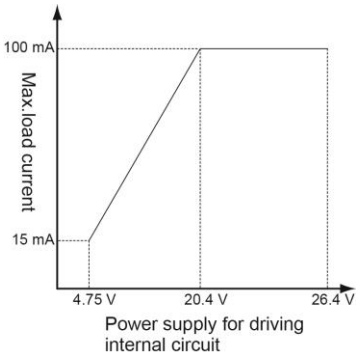
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

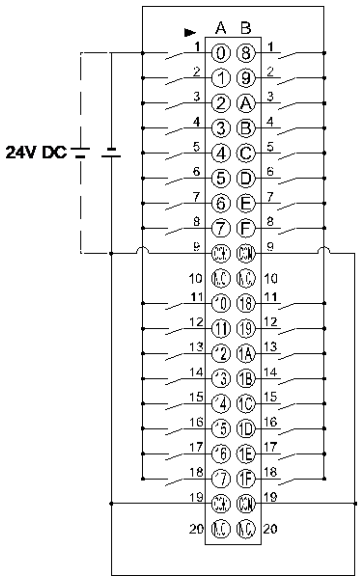
- 0.3 A specifications (Y0 to Y7)



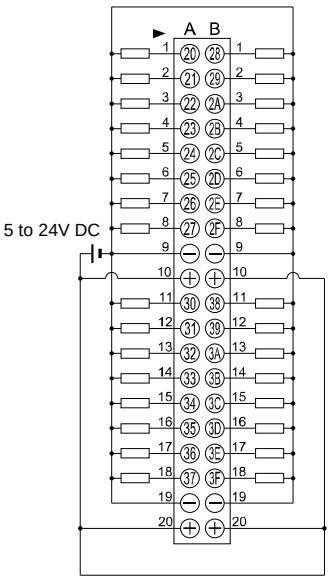
- 0.1 A specifications (other than Y0 to Y7)



■ Terminal layout



The COM terminals are connected internally.



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.5 Input Time Constant Switching Function

2.5.1 Overview of Function

Software tools can change the input time constant.
Select the set time from
None/0.1/0.5/1.0/5.0/10.0/20.0/70.0/[ms]
and set the selected set time on a unit-by-unit basis.

The set constant is added to the response time specific to the hardware of each unit.

Example) 16-point Input Unit
Specific response time OFF→ON: 0.1 ms, ON→OFF: 0.2 ms
If “1.0 ms” is set for this unit, the following overall response periods will result.
Response time after setting OFF→ON: 1.1 ms, ON→OFF: 1.2 ms

The time constant to be set has a margin of error, which should be kept in mind when selecting the set value. The accuracy of each time constant is shown in the table below.

Time constant / Setting	Min.	Max.
No time constant settings	—	—
0.1 ms	0.1 ms	0.2 ms
0.5 ms	0.3 ms	0.7 ms
1 ms	0.7 ms	1.3 ms
5 ms	3.0 ms	5.2 ms
10 ms	6.0 ms	10.4 ms
20 ms	12.1 ms	20.7 ms
70 ms	48.6 ms	82.8 ms

2.5.2 Setting by FPWIN7 Software Tool

The input time constant can be set in the I/O map of the FPWIN GR7 configuration menu.

◆ PROCEDURE

1. **Select “Options" → "FP7 Configuration" from the menu bar.**

   The FP7 Configuration dialog box is displayed.

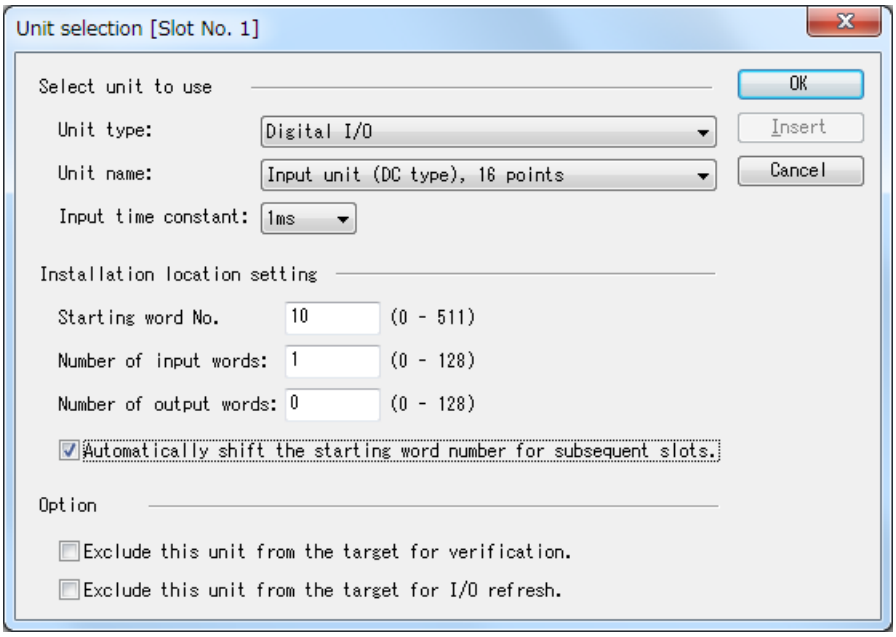
2. **Select "I/O Map."**

3. **Double-click the "Operating Unit" in the target slot.**

   The Select Unit dialog box is displayed.

4. **Select the target Digital I/O Unit and input time constant, and press the [OK] button.**

   The information set is registered with the I/O map.


Unit selection [Slot No. 1]
Select unit to use
OK
Unit type:
Digital I/O
Insert
Unit name:
Input unit (DC type), 16 points
Cancel
Input time constant:
1ms
Installation location setting
Starting word No.
10
(0 - 511)
Number of input words:
1
(0 - 128)
Number of output words:
0
(0 - 128)
Automatically shift the starting word number for subsequent slots.
Option
Exclude this unit from the target for verification.
Exclude this unit from the target for I/O refresh.

3
Wiring

3.1 Precautions on Wiring

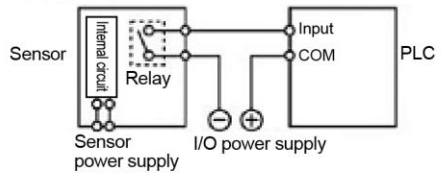
3.1.1 Before Wiring

- Before the wiring, carefully confirm the specifications of the unit to be wired.
- Each unit varies in ambient temperature, the number of simultaneously ON points, and supply voltage limitations.

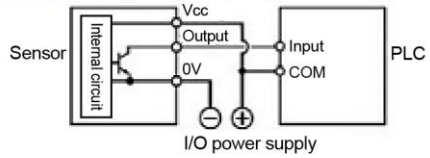
3.1.2 Precautions on Input Wiring

Connection of photoelectric sensor and proximity sensor

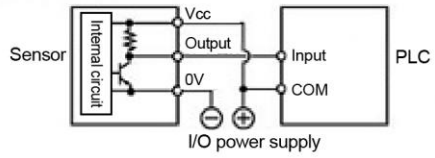
Relay output type



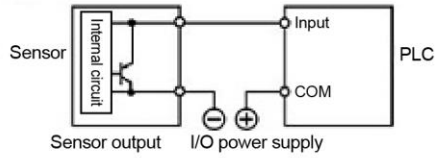
NPN open collector output type



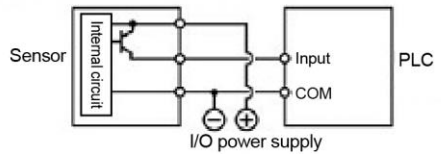
Voltage output type



Two-wire output type



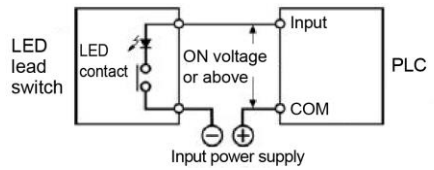
PNP open collector output type



Connection of LED-equipped reed switch

With a LED is connected to an input contact such as LED-equipped reed switch, make sure that the voltage value applied to the input terminal of PLC is greater than on voltage value.

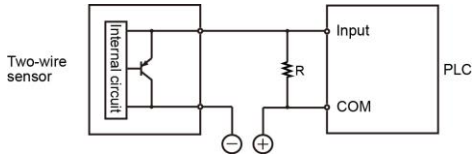
In particular, take care when connecting a number of switches in series.



Connection of two-wire type sensor

If the input of the PLC is not turned off because of leakage current from the two-wire type sensor, the connection of a bleeder resistor is recommended, as shown below.

Using 16-point type input unit (AFP7X16DW)
(Off voltage: 2.5 V; input impedance: 3.6kΩ)



I: Sensor‘s leakage current (mA)
R: Bleeder resistor (kΩ)

The off voltage of the input is 2.5 V. Therefore, select an R so that the voltage between the COM terminal and the input terminal will be less than 2.5 V.
The input impedance is 3.6kΩ.

$$I \times \frac{3.6R}{3.6+R} \leq 2.5. \text{ Therefore, } R \leq \frac{9}{3.6I-2.5} \text{ (k}\Omega\text{)}$$

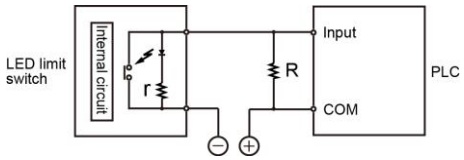
The wattage W of the resistor is: $W = \frac{(\text{Power supply voltage})^2}{R}$

In the actual selection, use a value that is 3 to 5 times the value of W.

Connection of LED-equipped limit switch

With the LED-equipped limit switch, if the input of the PLC is not turned off or if the LED of the limit switch is kept on because of the leakage current, the connection of a bleeder resistor is recommended, as shown below.

Using 16-point type input unit (AFP7X16DW)
(Off voltage: 2.5 V; input impedance: 3.6kΩ)



r: Internal resistor of limit switch (kΩ)
R: Bleeder resistor (kΩ)

The input off voltage is 2.5 V. Therefore, when the power supply voltage is 2.4 V, the input impedance is 3.6kΩ.

$$I \times \frac{2.4\text{-}2.5}{r} \text{ or more}$$

Obtain R so that the above current will flow. Obtain I in the same way as when using the above 2-wire sensor.

$$R \leq \frac{9}{3.6I\text{-}2.5}\ (k\Omega) \quad W = \frac{(\text{Power supply voltage})^2}{R} \times (3 \text{ to } 5)$$

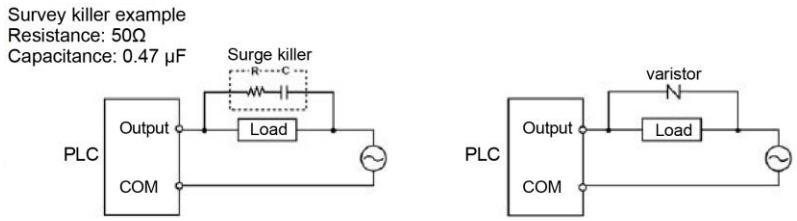
3.1.3 Precautions on Output Wiring

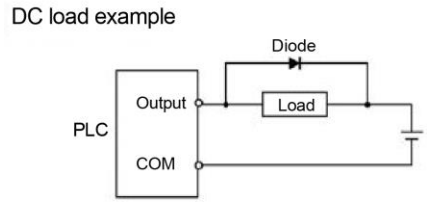
■ Connection of inductive loads

When connecting an inductive load, a protective circuit should be installed in parallel with the load.

When connecting the DC type inductive loads and relay type output unit, be sure to connect a diode for protective circuit across the ends of the load. This will affect the life of the relay.

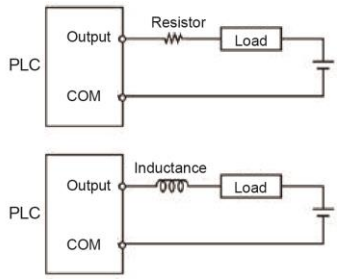
When using an AC inductive load (Relay output type)





■ Connection of capacitive loads

When connecting the loads with large in-rush currents, be sure to connect a protection circuit in series with the load.



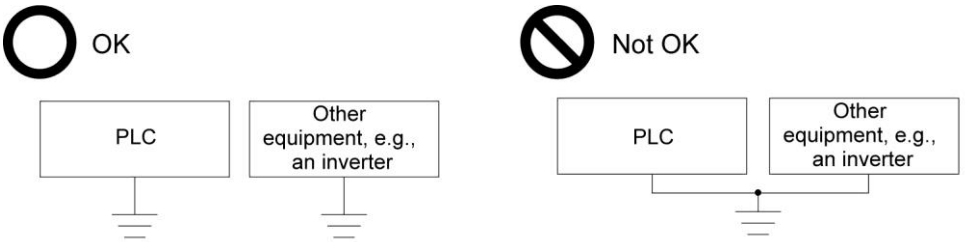
■ Precautions for overload

To protect the units from overloading, it is recommended to attach an external fuse for each point.

There are times that the elements for the output units cannot be protected even if external fuses are connected.

■ Earth

- In order to avoid the effects of noise, be sure to ground the AFP7Y16R terminal.
- The grounding connection should have a resistance not in excess of 100Ω.
- The point of grounding should be as close to the PLC as possible. The ground wire should be as short as possible.
- Sharing the ground with another device may have an adverse effect. Therefore, be sure that grounding is dedicated.



Notes:

Sharing the ground with another device may have an adverse effect. Therefore, be sure that grounding is dedicated.

3.2 Wiring I/O Unit of Terminal Block Type

3.2.1 Suitable Wires and Solderless Terminals

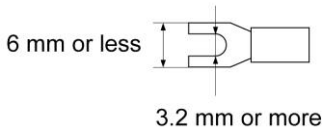
■ **Suitable wires**

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.5 to 0.6 N·m

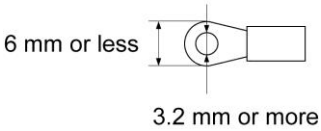
Solderless terminal

M3 terminal screws are used for the terminal. The following suitable solderless terminals are recommended for the wiring to the terminals.

●Fork type terminal



●Round type terminal

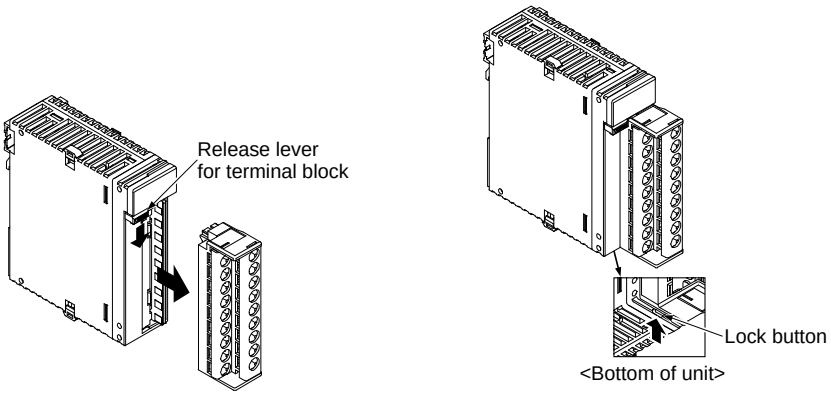


■ **Suitable solderless terminal**

Manufacturer	Shape	Part No.	Suitable wires
J.S.T. Mfg Co., Ltd.	Fork type	1.25-B3A	0.25 to 1.65 mm^2
	Round type	1.25-MS3	
	Fork type	2-N3A	1.04 to 2.63 mm^2
	Round type	2-MS3	

3.2.2 Wiring to Terminal Block

- Remove the terminal block before beginning the wiring operations.
- To remove the terminal block, push downward the release lever located at the top of the terminal block.



Note:

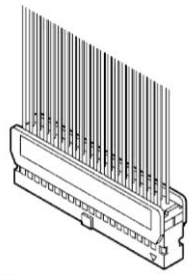
Install the terminal block by inserting it all the way to its original position and pressing the lock button on the bottom of the unit. Then confirm that the terminal block is securely attached and cannot be removed.

3.3 Wiring Connector-type I/O Unit

3.3.1 Wiring with Connectors for Wire-pressed Terminal Cable

■ Specifications of connectors for wire-pressed terminal cable

This is a connector allowing loose wires to be connected without removing the wire's insulation. A dedicated pressure connection tool is required to connect the loose wires.



Strand wire connector (40P)

■ Suitable wires (strand wire)

Size	Nominal cross-sectional area	Insulation thickness	Rated current
AWG22	0.3 mm^2	1.5 to 1.1 dia.	3 A
AWG24	0.2 mm^2		

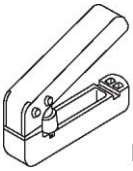
■ Wiring with connectors for wire-pressed terminal cable (provided with unit)

Manufacturer	Composition of components	Unit type and required quantity	
		32-point-type Input Unit 32-point-type Output Unit	64-point-type Input Unit 64-point-type Output Unit I/O Mixed Unit
Panasonic-made	Housing (40P)	1 x 1 set	1 x 2 sets
	Semi-cover (40P)	2 x 1 set	2 x 2 sets
	Contact (for AWG22 or 24) 5 pins	8 x 1 set	8 x 2 sets

(Note) The 32-point-type unit is provided with one set and the 64-point-type and I/O mixed units are provided with two sets each. If you need more connectors, purchase AFP2801 (2 sets/pack).

■ **Pressure connection tool**

Manufacturer	Product No.
Panasonic	AXY52000FP



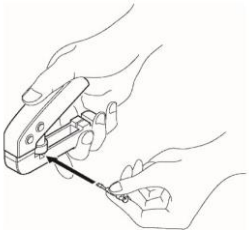
Pressure connection tool

3.3.2 Assembly of Connector for Wire-pressed Terminal Cable

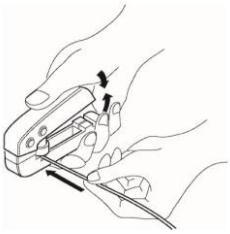
The wire end can be directly crimped without removing the wire's insulation, saving labor.

(Procedure)

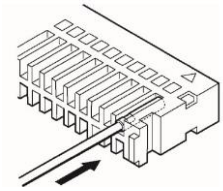
1. Bend the contact back from the carrier, and set it in the pressure connection tool.



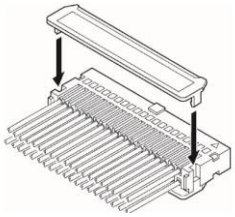
2. Insert the wire without removing its insulation until it stops, and lightly grip the tool.

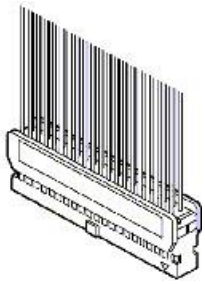


3. After press-fitting the wire, insert it into the housing.



4. When all wires have been inserted, fit the semi-cover into place.

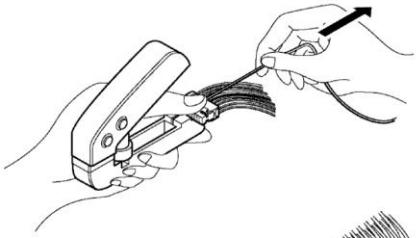


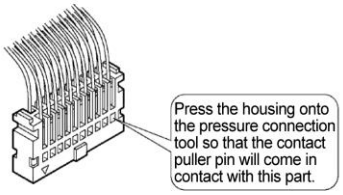


◆ **KEY POINTS**

Contact puller pin to redo wiring

If there is a wiring mistake or the wire is incorrectly pressure-connected, the contact puller pin provided with the fitting can be used to remove the contact.





3.3.3 Wiring with Flat Cable Connectors

Wiring with flat cable connectors

When connecting with a flat cable connector, the relationship between the cable number and I/O number is shown below.

Correspondence table of flat cable No. and I/O No. CN1 group

Cable No.	Input No.	Output No.
1	X0	Y0
2	X8	Y8
3	X1	Y1
4	X9	Y9
5	X2	Y2
6	XA	YA
7	X3	Y3
8	XB	YB
9	X4	Y4
10	XC	YC
11	X5	Y5
12	XD	YD
13	X6	Y6
14	XE	YE
15	X7	Y7
16	XF	YF
17	COM	-
18	COM	-
19	NC	+
20	NC	+

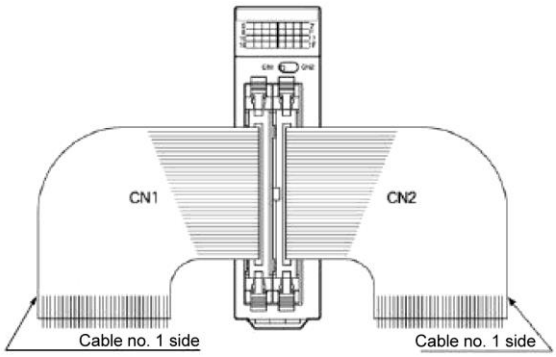
Cable No.	Input No.	Output No.
21	X10	Y10
22	X18	Y18
23	X11	Y11
24	X19	Y19
25	X12	Y12
26	X1A	Y1A
27	X13	Y13
28	X1B	Y1B
29	X14	Y14
30	X1C	Y1C
31	X15	Y15
32	X1D	Y1D
33	X16	Y16
34	X1E	Y1E
35	X17	Y17
36	X1F	Y1F
37	COM	-
38	COM	-
39	NC	+
40	NC	+

Correspondence table of flat cable No. and I/O No. CN2 group

Cable No.	Input No.	Output No.
1	X20	Y20
2	X28	Y28
3	X21	Y21
4	X29	Y29
5	X22	Y22
6	X2A	Y2A
7	X23	Y23
8	X2B	Y2B
9	X24	Y24
10	X2C	Y2C
11	X25	Y25
12	X2D	Y2D
13	X26	Y26
14	X2E	Y2E
15	X27	Y27
16	X2F	Y2F
17	COM	-
18	COM	-
19	NC	+
20	NC	+

Cable No.	Input No.	Output No.
21	X30	Y30
22	X38	Y38
23	X31	Y31
24	X39	Y39
25	X32	Y32
26	X3A	Y3A
27	X33	Y33
28	X3B	Y3B
29	X34	Y34
30	X3C	Y3C
31	X35	Y35
32	X3D	Y3D
33	X36	Y36
34	X3E	Y3E
35	X37	Y37
36	X3F	Y3F
37	COM	-
38	COM	-
39	NC	+
40	NC	+

Flat-cable connection diagram for 64-point-type input unit, 64-point-type output unit, I/O mixed unit



Suitable wires (strand wire)

Size	Pitch	Rated current
AWG28 (7 wires/0.127 dia.)	1.27 mm	1 A

Record of changes

Manual No.	Date	Record of Changes
WUME-FP7DIO-01	Mar.2013	First Edition
WUME-FP7DIO-02	Oct.2013	Second Edition
WUME-FP7DIO-03	Oct.2020	Third Edition - Error correction

Order Placement Recommendations and Considerations

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The Products are designed and manufactured for the industrial indoor environment use. Make sure standards, laws and regulations in case the Products are incorporated to machinery, system, apparatus, and so forth. With regard to the mentioned above, confirm the conformity of the Products by yourself.

Do not use the Products for the application which breakdown or malfunction of Products may cause damage to the body or property.
i) usage intended to protect the body and ensure security of life
ii)application which the performance degradation or quality problems, such as breakdown, of the Products may directly result in damage to the body or property

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ii) control equipment for transportation
iii) disaster-prevention equipment / security equipment
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v) nuclear control system
vi) aircraft equipment, aerospace equipment, and submarine repeater
vii) burning appliances
viii) military devices
ix) medical devices (except for general controls)
x) machinery and systems which especially require the high level of reliability and safety

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In connection with the Products you have purchased from us or with the Products delivered to your premises, please perform an acceptance inspection with all due speed and, in connection with the handling of our Products both before and during the acceptance inspection, please give full consideration to the control and preservation of our Products.

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Unless otherwise stipulated by both parties, the warranty period of our Products is 3 years after the purchase by you or after their delivery to the location specified by you.
The consumable items such as battery, relay, filter and other supplemental materials are excluded from the warranty.

[Scope of warranty]
In the event that Panasonic Industrial Devices SUNX confirms any failures or defects of the Products by reasons solely attributable to Panasonic Industrial Devices SUNX during the warranty period, Panasonic Industrial Devices SUNX shall supply the replacements of the Products, parts or replace and/or repair the defective portion by free of charge at the location where the Products were purchased or delivered to your premises as soon as possible.
However, the following failures and defects are not covered by warranty and we are not responsible for such failures and defects.
(1) When the failure or defect was caused by a specification, standard, handling method, etc. which was specified by you.
(2) When the failure or defect was caused after purchase or delivery to your premises by an alteration in construction, performance, specification, etc. which did not involve us.
(3) When the failure or defect was caused by a phenomenon that could not be predicted by the technology at purchasing or contracted time.
(4) When the use of our Products deviated from the scope of the conditions and environment set forth in the instruction manual and specifications.
(5) When, after our Products were incorporated into your products or equipment for use, damage resulted which could have been avoided if your products or equipment had been equipped with the functions, construction, etc. the provision of which is accepted practice in the industry.
(6) When the failure or defect was caused by a natural disaster or other force majeure.
(7) When the equipment is damaged due to corrosion caused by corrosive gases etc. in the surroundings.

The above terms and conditions shall not cover any induced damages by the failure or defects of the Products, and not cover your production items which are produced or fabricated by using the Products. In any case, our responsibility for compensation is limited to the amount paid for the Products.

[Scope of service]
The cost of delivered Products does not include the cost of dispatching an engineer, etc. In case any such service is needed, contact our sales representative.

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