MITSUBISHI
PROGRAMMABLE CONTROLLERS
MELSEC-F

Changes for the Better

FX1N JAPANESE SPECIFICATION UNITS

HARDWARE MANUAL

JY997D07901A

This manual contains safety information, associated manual listings, specifications and terminal layouts and wiring for Japanese specification FX1N PLC main units.
For complete operation, mounting and programming instructions please refer to the FX1N HANDY MANUAL (JY992D87501 JAPANESE ONLY) and PROGRAMMING MANUAL.
These manuals should be read and understood before attempting to install or use the unit.

Guidelines for the Safety of the User and Protection of the FX1N PLC

This manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows:

a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual, should be of a competent nature, trained and qualified to the local and national standards. These engineers should be fully aware of all aspects of safety with regards to automated equipment.

b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards. These engineers should also be trained in the use and maintenance of the complete product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices

c) All operators of the completed equipment should be trained to use that product in a safe and co-ordinated manner in compliance to established safety practices. The operators should also be familiar with documentation which is connected to the actual operation of the completed equipment

Note: The term 'completed equipment' refers to a third party constructed device which contains or uses the product associated with this manual.

Note's on the Symbols Used in this Manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment.

1) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.

2) Indicates a point of further interest or further explanation.

- Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.
- All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the productbased on these illustrative examples.
- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

Further Information Manual Lists

The following manuals are recommended as essential reference material for the correct operation of an FX1N series Programmable Controller

Manual name	Manual No.	Description
FX1N HANDY MANUAL	JY992D87501 (JAPANESE ONLY)	Describes contents related to hardware of world specification FX1N series PLCs such as specifications, wiring and installation.
FX1S, FX1N, FX2N, FX2NC PROGRAMMING MANUAL	JY992D62001 (JAPANESE ONLY)	Programming manual for FX1S, FX1N, FX2N and FX2NC series Programmable Logic Controllers

1. Introduction

This manual covers basic hardware details for the FX1N Series Programmable Logic Controller.

MODEL	INPUT		OUTPUT		POWER SUPPLY	DIMENSIONS mm (inches)			WEIGHT kg (lbs)
	QTY	TYPE	QTY	TYPE					
FX1N-24MR	14 (16)	24V DC SINK	10 (16)	Relay	100-240 VAC +10% -15% 50/60Hz	90 (3.6)	90 (3.5)	75 (3.0)	0.45 (0.99)
FX1N-24MT				Transistor					
FX1N-40MR	24		16	Relay		130 (5.2)			0.65 (1.44)
FX1N-40MT				Transistor					
FX1N-60MR	36 (40)		24	Relay		175 (7.0)			0.80 (1.77)
FX1N-60MT				Transistor					
FX1N-24MR-D	14 (16)	24V DC SINK	10 (16)	Relay	12V DC -15% to 24V DC +20%	90 (3.6)	90 (3.5)	75 (3.0)	0.45 (0.99)
FX1N-24MT-D				Transistor					
FX1N-40MR-D	24		16	Relay		130 (5.2)			0.65 (1.44)
FX1N-40MT-D				Transistor					
FX1N-60MR-D	36 (40)		24	Relay		175 (7.0)			0.80 (1.77)
FX1N-60MT-D				Transistor					

1.1 World Specification

Input - Sink/Source	World Spec models: SINK/SOURCE. Japanese models: ALWAYS SINK
Output - Transistor	World Spec models: ALWAYS SOURCE. Japanese models: ALWAYS SINK

2. Specifications

The installation of FX1N products has been designed to be safe and easy. When the products associated with this manual are used as a system or individually, they must be installed in a suitable enclosure. The enclosure should be selected and installed in accordance to the local and national standards.

Item	Description
Operating Temperature	0 to 55 °C (32 to 131 °F)
Storage Temperature	-20 to 70 °C (-4 to 158 °F)
Operating Humidity	35 to 85% Relative Humidity, No condensation
storage Humidity	35 to 90% Relative Humidity, No condensation
Vibration Resistance - Direct Mounting	Conforms to IEC 68-2-6; 10 - 57 Hz: 0.75 mm Half Amplitude 57 - 150 Hz: 9.8 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)

Item	Description
Vibration Resistance - DIN rail Mounting	Conforms to IEC 68-2-6; 10 - 57 Hz: 0.035 mm Half Amplitude 57 -150 Hz: 4.9 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)
Shock Resistance	Conforms to IEC 68-2-27: 147m/s^2 Acceleration, Action Time: 11ms 3 times in each direction X, Y, and Z
Noise Immunity	1000 Vp-p, 1microsecond, 30 - 100 Hz, tested by noise simulator
Dielectric Withstand Voltage	AC unit = 1500 V AC > 1 min, tested between all points, terminals and ground DC unit = 500 V AC > 1 min, tested between all points, terminals and ground.
Insulation Resistance	5 MΩ > at 500 V DC, tested between all points, terminals and ground
Grounding 	Grounding resistance 100 Ω or less Use a cable of at least 0.2mm^2 (AWG24) to ground equipment. Note that ground cable must not be connected to the same ground as power circuits. Grounding is recommended but if a proper ground cannot be provided, the PLC will operate correctly without.

2.1 Power Specifications

AC Powered Units	FX1N-24M	FX1N-40M	FX1N-60M
Power Supply	100-240V AC +10% -15%, 50-60 Hz		
Max. allowable momentary power failure	10ms; If less than 10ms, PLC continues operation		
Fuse (size) rating	250V 1A	250V 3.15A (3A)	
In-rush current	100V AC - Max. 30A for 5ms 200V AC - Max. 50A for 5ms		
Power Consumption *1	30W	32W	35W

*1 Includes the input current (7 or 5 mA per point)

DC Powered Units	FX1N-24M	FX1N-40M	FX1N-60M
Power Supply	24V DC + 20% - 12V DC -15% (28.8 ~ 10.2 V DC)		
Max. allowable momentary power failure	5ms; If less than 5ms, PLC continues operation		
Fuse (size) rating	125V 3.15A (3A)		
In-rush current	24V DC - Max. 25A for 1ms 12V DC - Max. 22A for 0.3ms		
Power Consumption	15W	18W	20W

2.2 Input Specifications

		FX1N Main unit		FX0N, FX2N Extension block
		X0 → X7	X10 → ∞	
Input voltage		24V DC ±10%		
Input current		24V DC, 7mA	24V DC, 5mA	24V DC, 5mA
Input switching current	OFF → ON	>4.5mA	>3.5mA	>3.5mA
	ON → OFF	<1.5mA		
Response time		10ms		
Variable response time		0-15ms	---	
Circuit isolation		Photocoupler		
Operation indication		LED is lit		

2.3 Output Specifications

Description		Relay Output	Transistor Output
Switched voltages (resistive load)		≤ 240V AC, ≤ 30V DC	5-30V DC
Rated current / N points (resistive load)		2A/1 point, 8A/COM	0.5A/1 point, 0.8A/COM
Max. Inductive load		80VA, 120/240V AC	12W/24V DC
Max. lamp load (tungsten load)		100W (1.17A/85V AC, 0.4A/ 250V AC)	1.5W/24V DC
Minimum load		When supply voltage < 5V DC allow at least 2mA flow	----------
Response time (approx.)	OFF → ON	10ms	< 0.2ms; < 5µs (Y0,Y1 only)
	ON → OFF	10ms	< 0.2ms (I > 0.2A); <5µs (Y0,Y1 only)
Circuit isolation		By Relay	PhotoCoupler
Open circuit current leakage		----------	0.1mA/30V DC
Operation indication		LED is lit when coil is energized	

3. Installation Notes

The installation of FX1N products has been designed to be safe and easy. If during the installation of these products or associated products concern is felt, please contact a professional electrician who is trained to the local and national standards applicable to the installation site.

FX1N Main PLC units can be either directly or DIN rail mounted. For details of either method, and installation guidelines please refer to the FX1N HANDY MANUAL JY992D87501 (JAPANESE ONLY).

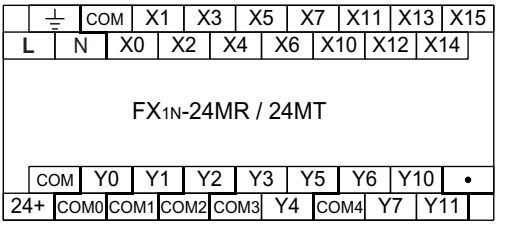
Mounting Cautions

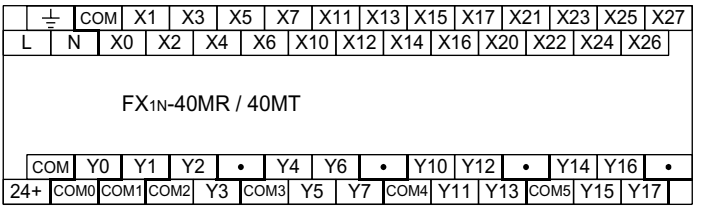
- Units should not be installed in areas subject to the following conditions: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.
- Take special care not to allow debris to fall inside the unit during installation e.g. cut wires, shavings etc. Once installation is complete remove the protective paper band, to prevent overheating.

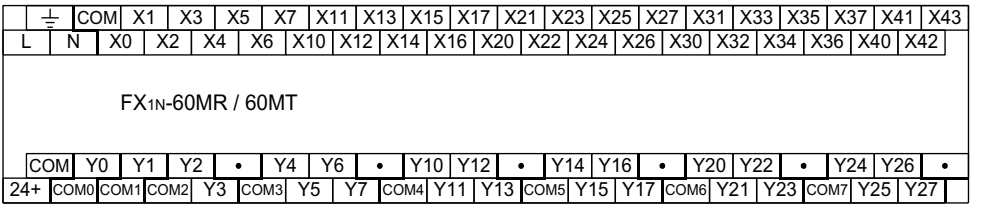
4. Terminal Layouts

The following selection of terminal layouts are taken from the FX1N product range.
Note: All layouts are diagrammatic and are only intended to aid the creation of wiring diagrams.

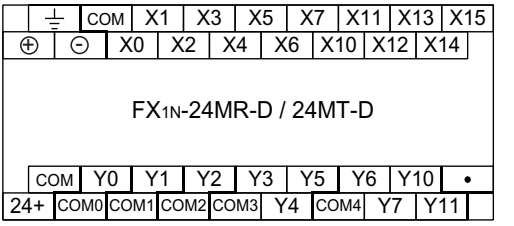
4.1 AC Powered Main Units

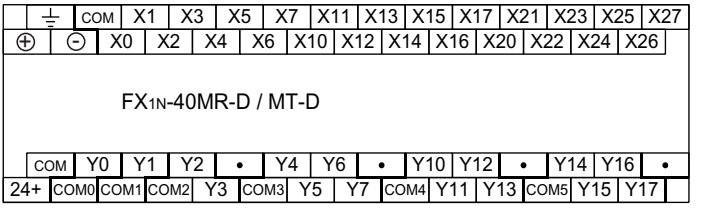


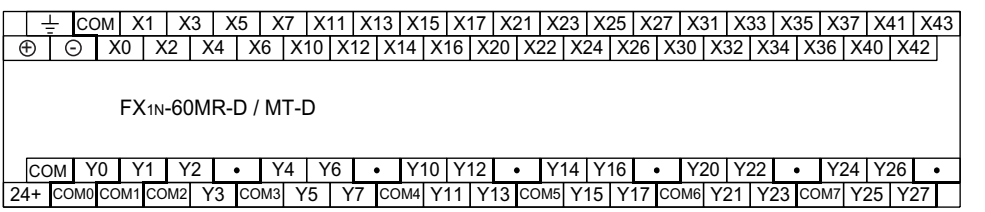




4.2 DC Powered Main Units







5. Example Wiring

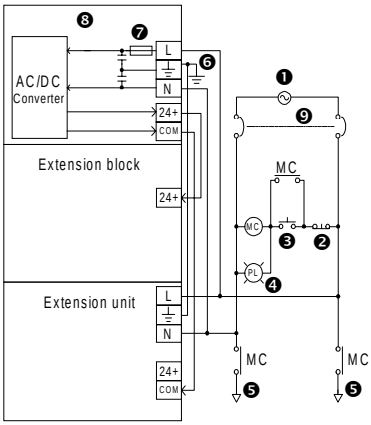
If during the wiring of these products or associated products concern is felt, please contact a professional electrician who is trained in the local and national standards applicable to the installation site.

Wiring cautions

- Do not run input signals in the same multicore cable as output signals or allow them to share the same wire.
- Do not lay I/O signal cables next to power cables or allow them to share the same trunking duct. Low voltage cables should be reliably separated or insulated with regard to high voltage cabling.
- Where I/O signal lines are used over an extended distance consideration for voltage drop and noise interference should be made.
- Always ensure that mounted units and blocks are kept as far as possible from high-voltage cables, high-voltage equipment and power equipment.

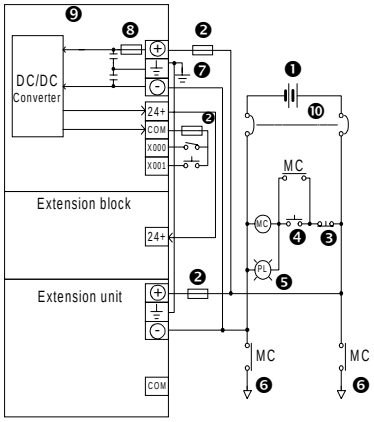
Both Japanese and World Specification Extension blocks/units and special function blocks can be used with these main units.

5.1 AC Power Supply



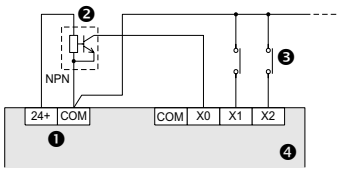
❶	Power supply 100-240V AC +10% -15% 50-60Hz
❷	Emergency stop
❸	Power supply switch
❹	Power ON pilot indicator
❺	Power supply for loads
❻	Ground
❼	Fuse
❽	Main unit
❾	Breaker

5.2 DC Power Supply



❶	Power supply 12-24V DC +20% -15% 20.4-28.8V DC when using extension unit.
❷	Circuit protector or fuse
❸	Emergency stop
❹	Power supply switch
❺	Power ON pilot indicator
❻	Power supply for loads
❼	Ground
❽	Fuse
❾	Main unit
❿	Breaker

5.3 Input



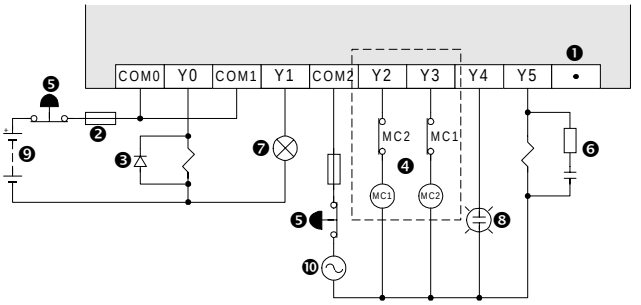
❶	AC Model - Service supply DC Model - Input circuit power supply
❷	NPN Sensor
❸	Input Device Contact
❹	Main unit

Note

- When using a DC powered unit, the input circuit power supply should be used. If an external 24V DC supply is used, the FX1N will not operate correctly.
- Japanese specification models are ALWAYS SINK input

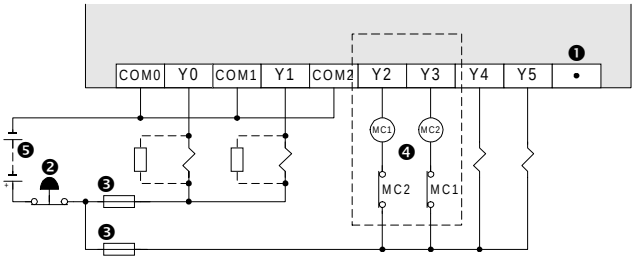
5.4 Output

Typical Relay



❶	Do not use this terminal
❷	Fuse
❸	Surge absorbing Diode
❹	External Mechanical Interlock
❺	Emergency Stop
❻	Noise Suppressor 0.1μF capacitor + 100-200Ω resistor Contactor
❼	Valve
❽	Incandescent Lamp
❾	DC Power Supply
❿	AC Power Supply

Japanese model Transistor



❶	Do not use this terminal
❷	Emergency Stop
❸	Fuse
❹	External Mechanical Interlock
❺	DC Power Supply

Additional information

Additional information regarding:

- Product Outline
- World Specification Extension Units / Blocks and Special Function Blocks
- Configuration Schematics
- Current Consumption and Rules of Expansion
- Back up Data procedure and details
- Diagnostic information, Instruction and Device lists

Can be found in the FX1N HANDY MANUAL (JY992D87501 JAPANESE ONLY). It is strongly recommended that this manual is read and understood before the use or configuration of this product.

Manual number : JY997D07901

Manual revision : A

Date : November 2002

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : MITSUBISHI DENKI BLDG MARUNOUTI TOKYO 100-8310 TELEX : J24532 CABLE MELCO TOKYO
HIMEJI WORKS : 840, CHIYODA CHO, HIMEJI, JAPAN

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FX1N-60MR	36 (40)		24	Relay		175 (7.0)			0.80 (1.77)
FX1N-60MT				Transistor					
FX1N-24MR-D	14 (16)	24V DC SINK	10 (16)	Relay	12V DC -15% to 24V DC +20%	90 (3.6)	90 (3.5)	75 (3.0)	0.45 (0.99)
FX1N-24MT-D				Transistor					
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FX1N-60MR-D	36 (40)		24	Relay		175 (7.0)			0.80 (1.77)
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1.1 World Specification

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2. Specifications

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Item	Description
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Vibration Resistance - Direct Mounting	Conforms to IEC 68-2-6; 10 - 57 Hz: 0.75 mm Half Amplitude 57 - 150 Hz: 9.8 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)

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Vibration Resistance - DIN rail Mounting	Conforms to IEC 68-2-6; 10 - 57 Hz: 0.035 mm Half Amplitude 57 -150 Hz: 4.9 m/s^2 Acceleration Sweep Count for X, Y, Z: 10 times (80 min in each direction)
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Noise Immunity	1000 Vp-p, 1microsecond, 30 - 100 Hz, tested by noise simulator
Dielectric Withstand Voltage	AC unit = 1500 V AC > 1 min, tested between all points, terminals and ground DC unit = 500 V AC > 1 min, tested between all points, terminals and ground.
Insulation Resistance	5 MΩ > at 500 V DC, tested between all points, terminals and ground
Grounding STOP	Grounding resistance 100 Ω or less Use a cable of at least 0.2mm^2 (AWG24) to ground equipment. Note that ground cable must not be connected to the same ground as power circuits. Grounding is recommended but if a proper ground cannot be provided, the PLC will operate correctly without.

2.1 Power Specifications

AC Powered Units	FX1N-24M	FX1N-40M	FX1N-60M
Power Supply	100-240V AC +10% -15%, 50-60 Hz		
Max. allowable momentary power failure	10ms; If less than 10ms, PLC continues operation		
Fuse (size) rating	250V 1A	250V 3.15A (3A)	
In-rush current	100V AC - Max. 30A for 5ms 200V AC - Max. 50A for 5ms		
Power Consumption *1	30W	32W	35W

*1 Includes the input current (7 or 5 mA per point)

DC Powered Units	FX1N-24M	FX1N-40M	FX1N-60M
Power Supply	24V DC + 20% - 12V DC -15% (28.8 ~ 10.2 V DC)		
Max. allowable momentary power failure	5ms; If less than 5ms, PLC continues operation		
Fuse (size) rating	125V 3.15A (3A)		
In-rush current	24V DC - Max. 25A for 1ms 12V DC - Max. 22A for 0.3ms		
Power Consumption	15W	18W	20W

2.2 Input Specifications

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Input voltage		24V DC ±10%		
Input current		24V DC, 7mA	24V DC, 5mA	24V DC, 5mA
Input switching current	OFF → ON	>4.5mA	>3.5mA	>3.5mA
	ON → OFF	<1.5mA		
Response time		10ms		
Variable response time		0-15ms	---	
Circuit isolation		Photocoupler		
Operation indication		LED is lit		

2.3 Output Specifications

Description		Relay Output	Transistor Output
Switched voltages (resistive load)		≤ 240V AC, ≤ 30V DC	5-30V DC
Rated current / N points (resistive load)		2A/1 point, 8A/COM	0.5A/1 point, 0.8A/COM
Max. Inductive load		80VA, 120/240V AC	12W/24V DC
Max. lamp load (tungsten load)		100W (1.17A/85V AC, 0.4A/ 250V AC)	1.5W/24V DC
Minimum load		When supply voltage < 5V DC allow at least 2mA flow	----------
Response time (approx.)	OFF → ON	10ms	< 0.2ms; < 5µs (Y0,Y1 only)
	ON → OFF	10ms	< 0.2ms (I > 0.2A); <5µs (Y0,Y1 only)
Circuit isolation		By Relay	PhotoCoupler
Open circuit current leakage		----------	0.1mA/30V DC
Operation indication		LED is lit when coil is energized	

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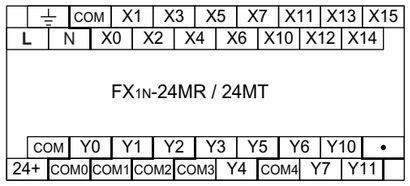
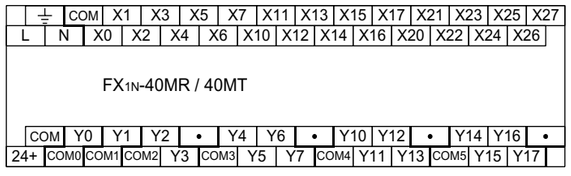
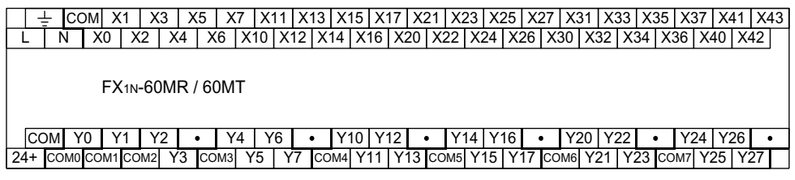
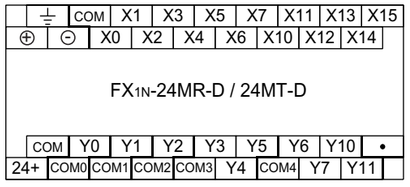
4.1 AC Powered Main Units

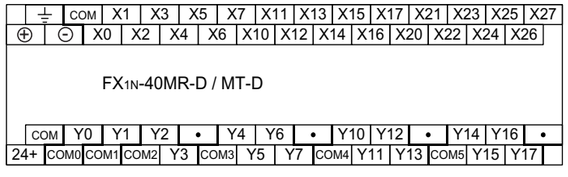


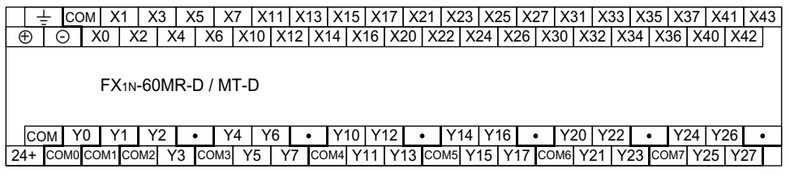




4.2 DC Powered Main Units







5. Example Wiring

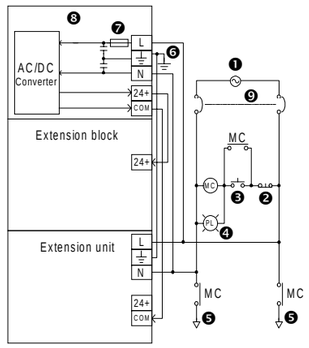
If during the wiring of these products or associated products concern is felt, please contact a professional electrician who is trained in the local and national standards applicable to the installation site.

Wiring cautions

- Do not run input signals in the same multicore cable as output signals or allow them to share the same wire.
- Do not lay I/O signal cables next to power cables or allow them to share the same trunking duct. Low voltage cables should be reliably separated or insulated with regard to high voltage cabling.
- Where I/O signal lines are used over an extended distance consideration for voltage drop and noise interference should be made.
- Always ensure that mounted units and blocks are kept as far as possible from high-voltage cables, high-voltage equipment and power equipment.

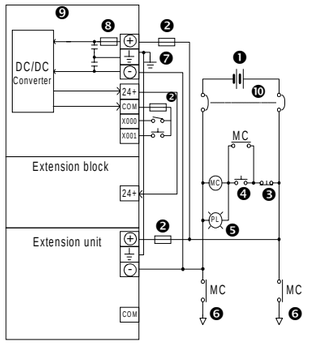
Both Japanese and World Specification Extension blocks/units and special function blocks can be used with these main units.

5.1 AC Power Supply



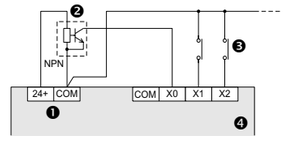
❶	Power supply 100-240V AC +10% -15% 50-60Hz
❷	Emergency stop
❸	Power supply switch
❹	Power ON pilot indicator
❺	Power supply for loads
❻	Ground
❼	Fuse
❽	Main unit
❾	Breaker

5.2 DC Power Supply



❶	Power supply 12-24V DC +20% -15% 20.4-28.8V DC when using extension unit.
❷	Circuit protector or fuse
❸	Emergency stop
❹	Power supply switch
❺	Power ON pilot indicator
❻	Power supply for loads
❼	Ground
❽	Fuse
❾	Main unit
❿	Breaker

5.3 Input



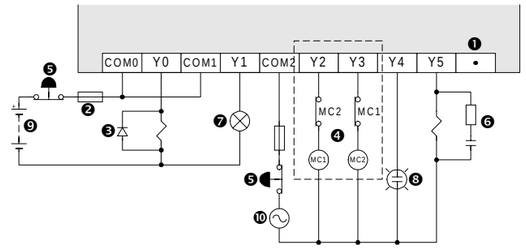
❶	AC Model - Service supply DC Model - Input circuit power supply
❷	NPN Sensor
❸	Input Device Contact
❹	Main unit

Note

- When using a DC powered unit, the input circuit power supply should be used. If an external 24V DC supply is used, the FX1N will not operate correctly.
- Japanese specification models are ALWAYS SINK input

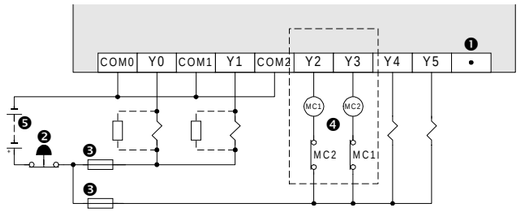
5.4 Output

Typical Relay



❶	Do not use this terminal
❷	Fuse
❸	Surge absorbing Diode
❹	External Mechanical Interlock
❺	Emergency Stop
❻	Noise Suppressor 0.1μF capacitor + 100-200Ω resistor Contactor
❼	Valve
❽	Incandescent Lamp
❾	DC Power Supply
❿	AC Power Supply

Japanese model Transistor



❶	Do not use this terminal
❷	Emergency Stop
❸	Fuse
❹	External Mechanical Interlock
❺	DC Power Supply

Additional information

Additional information regarding:

- Product Outline
- World Specification Extension Units / Blocks and Special Function Blocks
- Configuration Schematics
- Current Consumption and Rules of Expansion
- Back up Data procedure and details
- Diagnostic information, Instruction and Device lists

Can be found in the FX1N HANDY MANUAL (JY992D87501 JAPANESE ONLY). It is strongly recommended that this manual is read and understood before the use or configuration of this product.

Manual number : JY997D07901
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Date : November 2002

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JY997D07901A

Effective November 2002
Specifications are subject to change without notice