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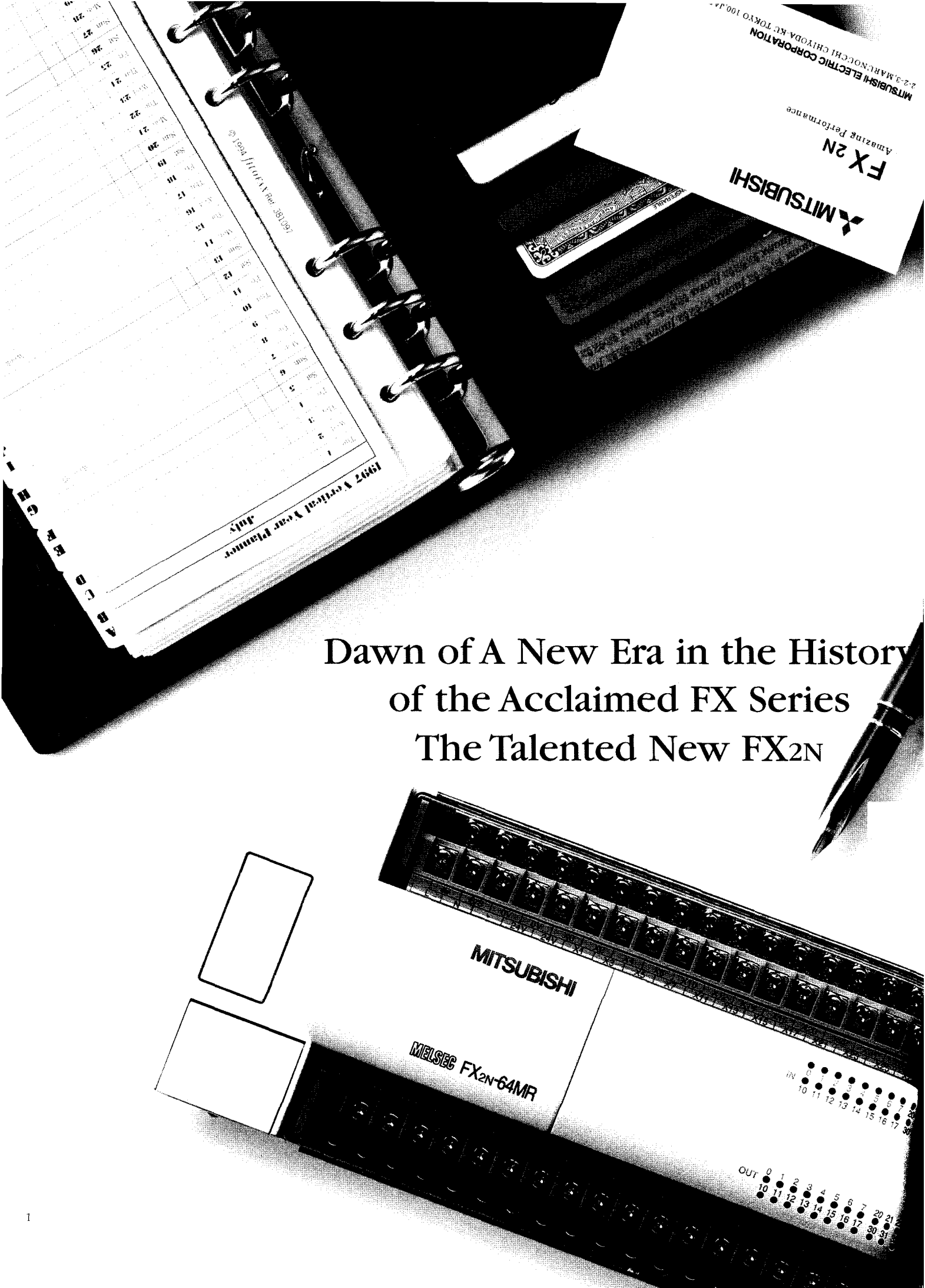
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MITSUBISHI
PROGRAMMABLE CONTROLLERS

FX2N SERIES



Amazing Performance in a Compact Body



Dawn of A New Era in the History of the Acclaimed FX Series The Talented New FX2N

Features

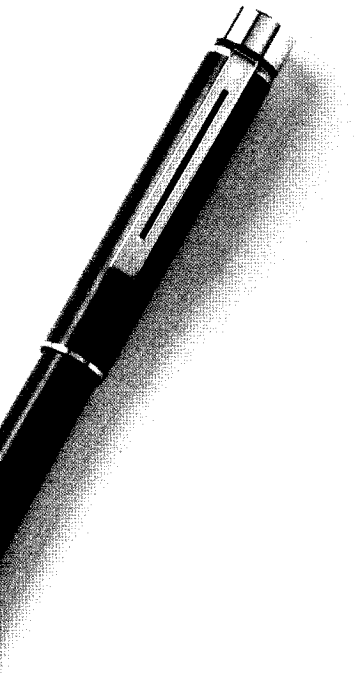
Amazingly Compact

Compared with the models in the FX Series, the FX2N is approximately half the size.
Sample comparison:

FX-64M	FX2N-64M
Dimensions (WxHxD mm)	
(270x140x95)	(220x90x87)(H and D same as FX0N Series)

High-speed Processing at 0.08μ sec Per Instruction

The unit handles basic instructions 6 times faster, and applied instruction several times faster than earlier models.(FX: 0.74μs, Enhanced FX: 0.48μs, FX2N : 0.08μs)



Even Higher Performance (see p 6, 7, 8 for details)

• 27 basic instructions

7 new basic instructions have been added:

- Leading and trailing pulse contacts: LDP, LDF, ANDP, ANDF, ORP, ORF
- Invert operation result: INV

• 125 applied instructions for wide-ranging control

- Dedicated floating point instructions including trigonometrical calculations, Gray code read instructions, and in-line comparison contacts have been added.

• Conventional functions upgraded

- High-speed counter:
  1-phase: 60kHz - 2 points 10kHz - 4 points
  2-phase: 30kHz - 1 point 5kHz - 1 point
- High-speed pulse output
  Simple positioning operations at up to 10kHz are possible thanks to the availability of a pulse output instruction equipped with a speed acceleration/deceleration function.
  Time control is made easy by the availability of numerous applied instructions that access the built in real time clock.

Full Range of Communications Functions

Optional function expansion cards make it possible for the FX2N to communicate with various kinds of external devices.

• Serial communication to printers, barcode readers and other RS-232C devices. Programming from a personal computer is also possible even remotely via a modem.
• Multi drop connection to a master computer or 1:1, N:N data transfer with other FX2N units.
• A second programming port allowing two OITs or one OIT and a programming tool to be connected at the same time.
(One unit of any type may be used at one time.)

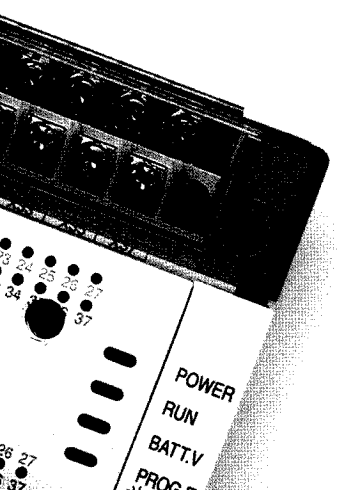
Interchangeable Programs

The new units are program-compatible with earlier models in the FX Series, allowing you to make use of all existing programs.

Common Peripherals

All the programming tools available for the FX Series may be used interchangeably, although software upgrades will be necessary when using newer devices and instructions.

• Personal computer software packages and the FX-10P-E / FX-20P-E and other tools.
• Data access units (DU)



Possible to Use Existing FX Special Units

The FX2N-CNV-IF converter cable makes it possible to use the special units and blocks available from the whole FX Family.

Compact, Versatile and Flexible

Overview

Wide Tolerance Power Supply

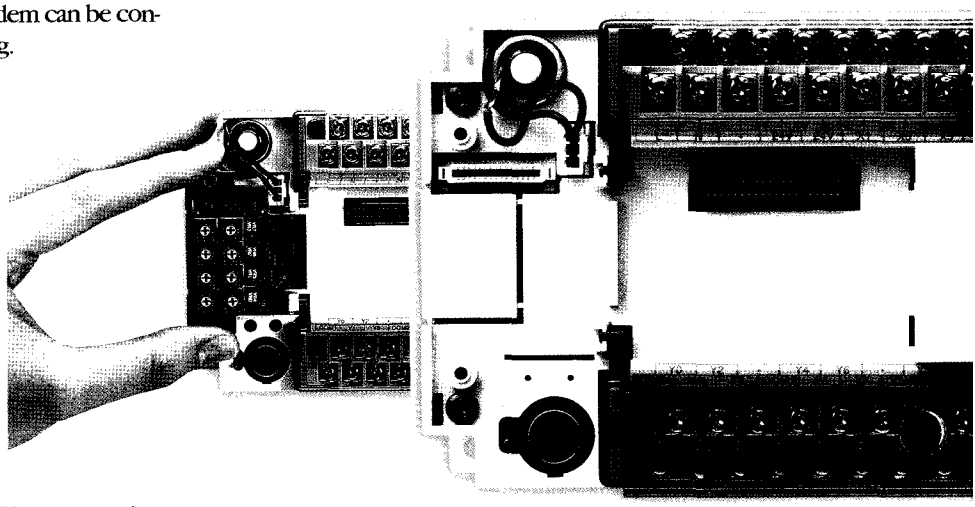
For trouble-free use anywhere in the world, these programmable controllers come with 100-240 VAC or 24 VDC supply.

Convenient Service Supply

A DC24V (460mA*) service supply is available to provide power for sensors and other peripherals.
(*250mA in the case of 32 I/Os or less.)

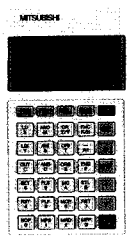
Function Cards Extend Capabilities

- Adding optional function cards allows communications with external devices such as personal computers, printers, displays and measuring instruments, as well as analog timer control using potentiometers.
  In addition to the dedicated programming port, an additional communication card can also be added.
- RS232C Communication Card
  The FX2N-232-BD allows communications with personal computers, printers and other devices using user defined protocols. Also, with the modem set-up parameters, a modem can be configured for remote programming or monitoring.
- RS485 Communication Card
  This card makes it possible to connect the unit to a master computer via the 1:N FX data network. Providing support for the dedicated protocol, it allows the FX2N to be connected together with FX0N, FX and A Series programmable controllers using the 1:N computer link. Parallel link (1:1) and peer is peer (N:N) networks are also available with the card.
- RS422 Communication Card Enables data exchange with measuring instruments, displays and other devices using RS422 communications. This card can also be used as an alternate programming port for use with the FX programming tools
- Opto-isolation
  For improved system protection the FX2N-CNV-BD can be used to allow the connection of the opto-isolated FX0N communication adapters.
- FX2N-8AV-BD
  This analog controller can be used as an analog timer or a series of selector switches via its 8 built-in potentiometers.

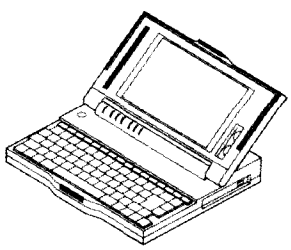


Common Peripherals

- So long as the devices and instructions fall within the scope of those used with the FX Series, existing peripherals can be used without upgrading (Connection cables for FX0, FX0S, FX0N are necessary).



FX-10P-E, FX-20P-E



Personal Computer

- Windows based software offers multi-window displays of circuitry, lists, sequential function charts (SFCs), greatly facilitating the program editing and monitoring process.

Circuitry SFC Lists



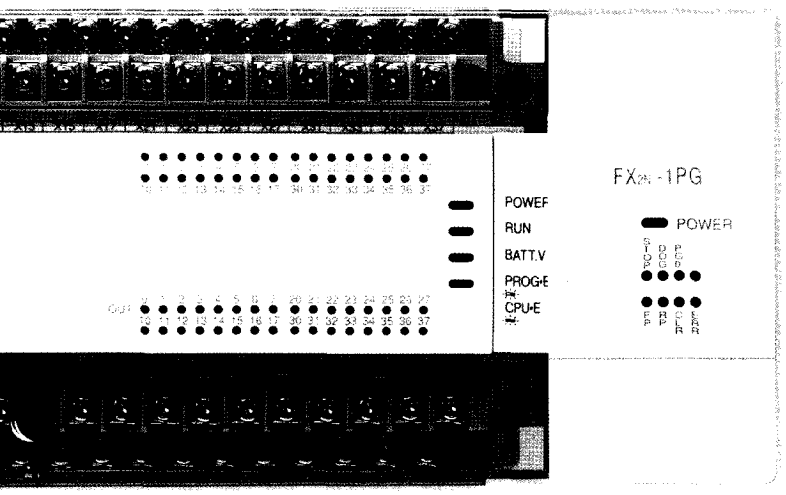
Comments Device monitor

Built-in RUN/STOP Switch

- The operation of the programmable controller is controlled by a built-in RUN/STOP switch. Using personal computer software, it is possible to make programming changes in RUN mode. In such cases, either RAM or EEPROM can be used as program memory.
  One of the first 16 inputs (X000-X017; X000-X007 in the case of FX2N-16M) can also be selected for use as the RUN/STOP switch.

Wide Range of Models Available

- 17 Main processing units, AC or DC supply, DC input. The FX2N range of MPU's starts at just 16 I/O points and, with both relay and transistor outputs, increases to an incredible 128 I/O in a single compact unit.
- AC input types will be available from summer '98.



- AC or DC powered expansion units increase expandability. Available in both relay and transistor output types the FX2N expansion units quickly add both inputs and outputs to an FX2N system. Also, when the expansion capacity of an MPU is exhausted these units add extra power allowing the system to be expanded even further.

- Flexibility with input and output expansion blocks.
  Drawing their power from the MPU or expansion unit these small input and output blocks provide flexibility to create systems with I/O ratio suitable for any application. Not only does the FX2N have its own range of expansion blocks but the existing FX0N range of blocks can also be used, increasing the types of inputs and outputs available.

Memory Cassettes

The FX2N comes with 8K-steps of RAM already built-in, but additional memory can be added as an option.

FX-RAM-8 (16k also possible)
FX-EPROM-8 (16k also possible)
FX-EEPROM-4
FX-EEPROM-8
FX-EEPROM-16 (new)

Existing memory cassettes can also be used as-is.

Expandable through Special Function Blocks

In order to give the user more flexibility, the expandable FX2N can have a combination of special function blocks added which provide special applications. The range of applications is extensive including Analogue control, Temperature control, positioning and a whole range of communications and network possibilities.

Easy Installation

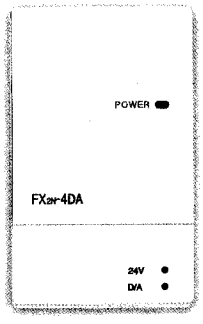
These programmable controllers can be attached to control panels by means of a DIN rail or screws.

Special Applications

The FX2N series of controllers has an extensive range of special function blocks available. This range includes all of the FX0N special function blocks and, with the addition of the FX2N-CNV-IF, all of the FX special function blocks as well! Each base unit can support up to 8 special function blocks, power supply permitting, so the possibilities and combinations are practically limitless. These blocks simply plug into the base unit and can be addressed using standard TO/FROM commands.

Analogue Control

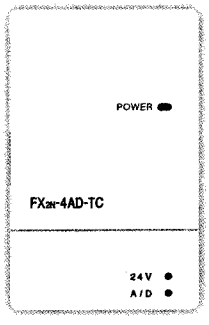
A full range of modules exist which can read assorted analogue signals and produce controlled analogue outputs. Maximum of 12 bit resolution, with user adjustable gain and offsets. These modules vary from 4 channel operation, either analog to digital or digital to analog conversion, to a 3 channel combined, 2 channel analog to digital and 1 channel digital to analog conversion.



FX2N-4AD	with FX2N-CNV-IF
FX2N-4DA	FX-4AD
FX0N-3A	FX-2DA

Temperature Control

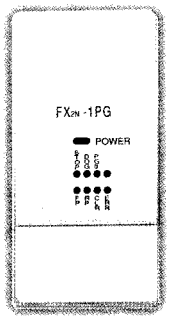
There are two temperature control methods available either FX2N-4AD-TC, J or K type thermocouple module or the FX2N-4AD-PT, PT100 thermocouple module. The 4AD module has 4 channels, 12 bit resolution, which can be used in any configuration of J and K type thermocouples. The PT100 has 4 channel 12 bit resolution which can be used with Platimun temperature PT 100 sensors.



	with FX2N-CNV-IF
FX2N-4AD-TC	FX-4AD-TC
FX2N-4AD-PT	FX-4AD-PT

Positioning Control

For use in positioning applications there are many different options available. The 1HC provides a high speed counting function up to 50 Khz allowing fast response, whereas the 1PG outputs a 100kpps pulse train allowing accurate positioning control. The FX2N-1RM-E-SET is a programmable cam-switch system which connects directly to the FX2N base unit. The advantage of this system over a traditional cam switch are the ease and speed with which applications can be programmed and changed, simply by loading a new program.



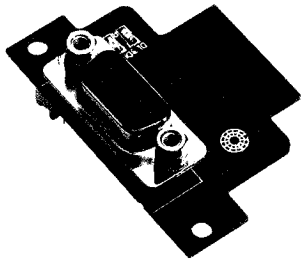
FX2N-1PG	with FX2N-CNV-IF
FX2N-1HC	FX-10GM
FX2N-1RM-E	FX-20GM

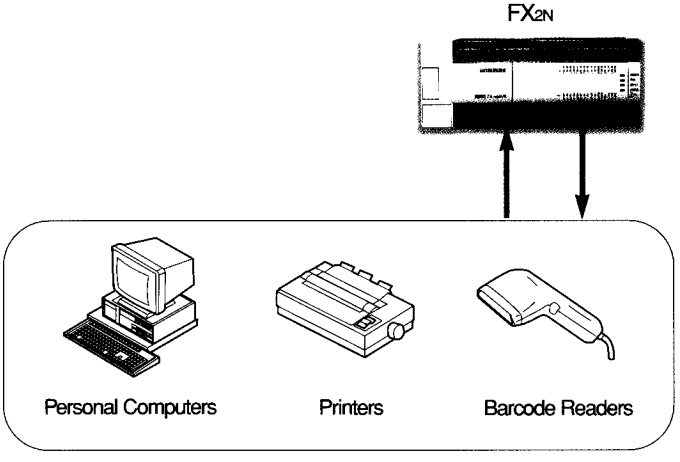
Communication and Control

Serial communication has always been an important part of system control. The FX2N serial boards offer a variety of ways to connect the programmable controller to special devices, personal computers and other programming controllers, while leaving the main programming port free for other uses.

Point to Point Flexible Communication

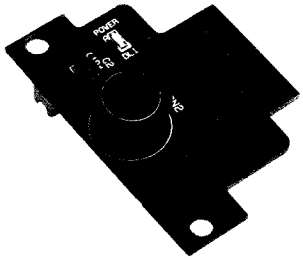
Direct connection with a personal computer is an essential function for any programmable controller. With the FX2N-232-BD, RS232C serial card an FX2N can easily be connected with special devices such as printers and bar code readers. But more importantly this card allows the FX2N to transfer data to a personal computer.With its built in setup parameters it is also possible to have the FX2N configure a modem for remote programming or monitoring.
(User configured serial communications is also possible with the FX2N-232IF special function block meaning a further 8 serial devices can be connected to one FX2N system.)

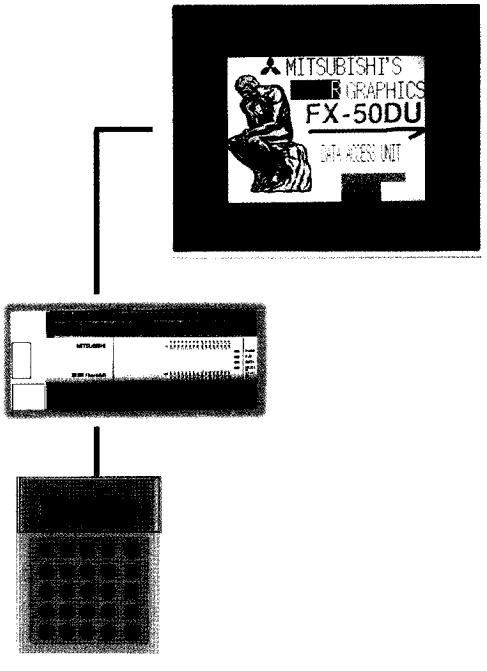




Dual Port Access

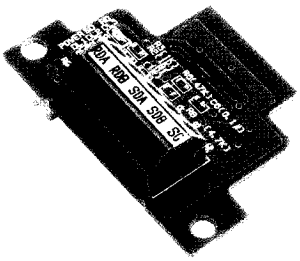
The FX2N-422-BD is essentially a second programming port for the FX2N main processor. With this board attached two operator interfaces can be connected to a single unit or connect just one OIT and keep the other port free for maintenance programming. Any existing programming or monitoring tools can be connected. However, to access the full range of instructions and devices it might be necessary to upgrade the unit for FX2N support.

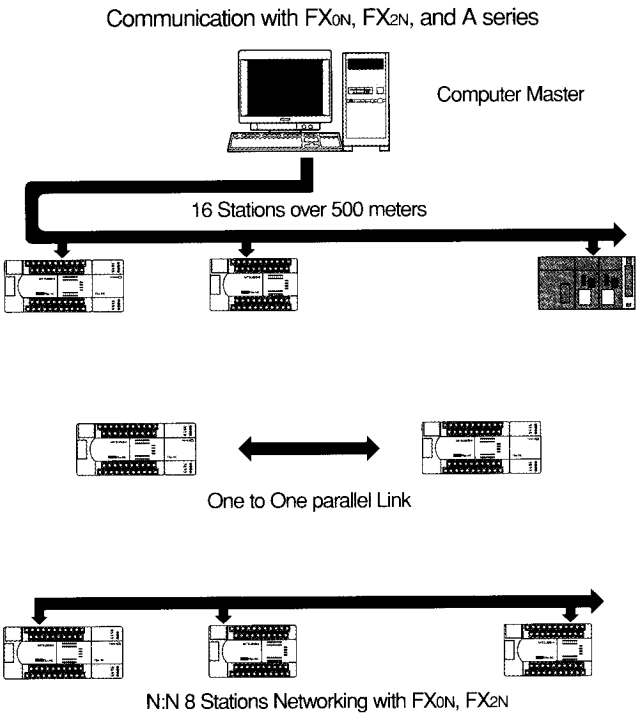




Network Connectivity Distributed Control

It is sometimes necessary for two or more machines to have their operations synchronized or coordinated. This is especially true if they utilize some common equipment and/or data. Adding an FX2N-485-BD to the main processor up to 8 FX2N systems can transfer register and bit data in a peer to peer network, and still perform independent, yet related tasks.
When a computer or similar intelligent device is set up as master the FX2N-485-BD connects the FX2N to a multi drop network. A total of 16 FX2N or FX0N processors may be attached and communicate to the master using one of two dedicated protocols. These protocols are also used by the Mitsubishi A-series computer link units meaning the FX2N can easily be added to any existing AJ71C24 or A1SJ71C24 network.





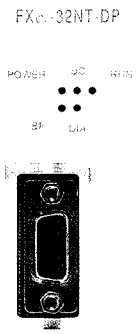
Open Networks

Linking to Open Networks

The integration of different control systems is often achieved through the use of open networks which provide a common link between the systems. Open Networks are non-proprietary networks which many manuafacturers equipment can connect to. Presently FX0N and FX2N base units can connect to Profibus-DP and CC-Link, however this line of products is constantly expanding so contact your Mitsubishi dealer for the latest news.

Profibus-DP

There are 2 options for connecting to Profibus-DP; the FX0N-32NT-DP and the FX2N-32DP-IF.

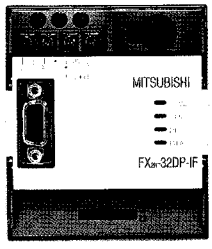


FX0N-32NT-DP

The FX0N-32NT-DP module can be used to connect an FX0N/FX2N base unit onto an existing Profibus DP network as an intelligent slave. Up to 20 words of data may be sent/received to/from a master, and speeds of up to 12 Mbaud are supported. This module uses standard TO/FROM commands to communicate with the PLC.

FX2N-32DP-IF

The FX2N-32DP-IF module be used to connect FX2N/ FX0N digital I/O and special function block directly to an existing PROFIBUS-DP network. Digital and Analogue from a profibus-DP master PLC can be sent/received to/from any of the supported I/O blocks and special function blocks. Up to 256 I/O points or 8 special function blocks can be connected to this unit, limited only by the power supply and the data capability of the master. Baud rates of up to 12 Mbps are supported.



CC-Link

FX2N-32-CCL

The FX2N-32-CCL connects the FX2N/FX0N programmable controller to the CC-link and is regarded as a remote device station in the CC-link network. The data transfer rate, the station number and the number of occupied stations are set using built in rotary switches. Data is transferred via the buffer memory using standard TO/FROM instructions. Baud rates of up to 10 Mbps are supported.



Programming Tools

Computer Based Programming

Mitsubishi offers a selection of programming tools and operation panels which are designed to be easy to use, practical and common to all its controllers. Both computer software and hand held devices for programming and simple text or more advanced graphic display units for operator control.

Programming and Documentation Software

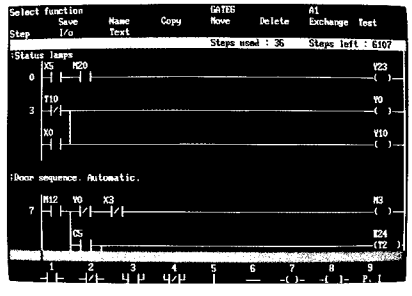
MEDOC'S simple program structuring and documentation make programs easy to understand, debug, and edit. By using MEDOC to comment a program when it is written, users can separate each program routine clearly. Additionally comments also help in the understanding of program functions, especially if an old program is being revisited.

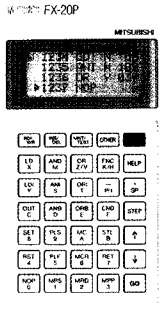
Two windows based software packages are available to program the FX2N series. The sophisticated Melsec Medoc Plus (MM+) for programming in IEC standard programming language or for those already familiar with the earlier MELSEC MEDOC, MM+ can also program in "MELSEC" mode.
A simple but no-less functional package is the FX-PCS-WIN-E software for the FX family. Easily program in instruction list, familiar ladder or SFC (sequence function chart) simultaneously for any FX controller.

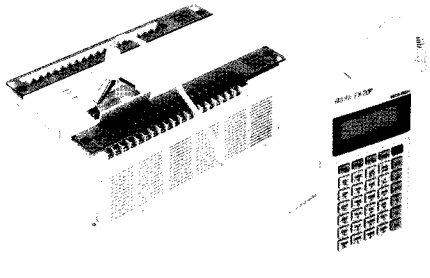
All the software packages include the following features;

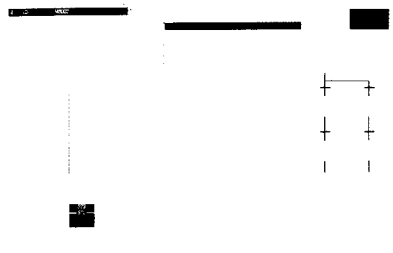
- Full-time help facility provides an explanation at any stage of any process.
- Simple graphical ladder and direct instruction/list programming / monitoring capabilities.
- Programming during RUN allows changes to be made to the program without having to STOP the machine
- Powerful moving and copying utilities and time saving editing functions.
- 'Hot' key quick access to features.
- Extensive professional printing capabilities provide printouts of ladder, lists, device names, comments and program explanations as required.
- Easy printer setup routines to help the first time user.

As well as computer software there are two hand held pendant style programming devices for the FX-series. Although these will need to be up graded to support the full range of FX2N devices and instructions they can still be used with the FX2N as is up to the instruction and device range of the existing FX-series.



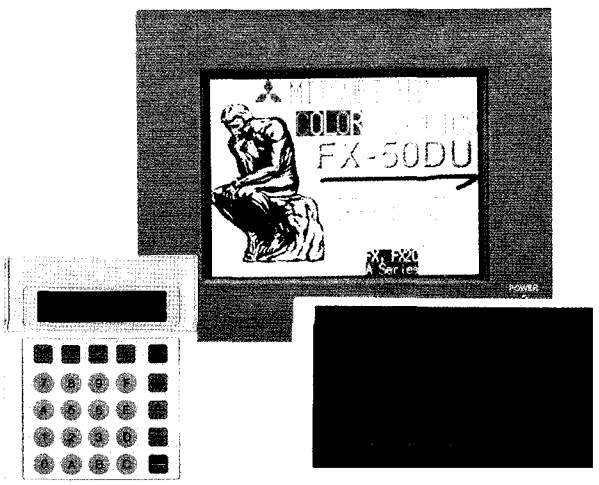






FX-50DU-TK-E and FX50DU-TKS-E: Touch Screen Graphic Display Units

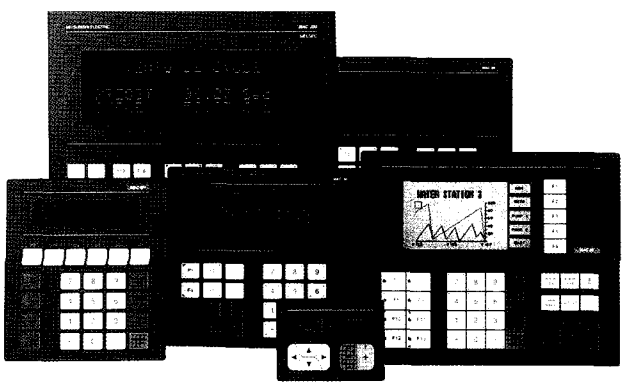
Both FX-50DU models have touch screen operation. There is a choice of monochrome (FX-50DU-TK-E) and color display (FX-50DU-TKS-E) capabilities to enable users to create better, clearer operating systems. In fact up to 500 individual screens can be constructed by the user, these are in addition to many standard 'built-in' screens. Simple text and device monitoring display units are also available.



- The sampling function, where two data devices can be sampled and have their data stored and displayed in either tabuler or graphical formats.
- Graph mode, where four data devices can be read for 'live' data from the programable controller.
- Alarm setting and alarm history displays, where users can set up error conditions/warnings and view past or active alarms from a 'history' of occurences.
- Use and display of bit map images.
- Automatic 'text' diagnostics for the "parent" programmable controller identifying the current operational status of the monitored unit.
- FX0s, FX0N, FX2N and A series compatibility.

The MAC (MTA) Family: Text and Graphical Operator Interfaces

Seldom is one type of operator interface or data access unit acceptable for all applications. Some require simple text and data display, some require text, data, and function keys, and some require graphics and animation to effectively show what is happening in a process. This is where the MAC (MTA) family of OI products excels. Configured with an easy-to-use Windows-based programming software, and Ranging from simple text and data displays to high function graphic terminals, there's an MTA perfect for any control application.



Full Range of Programming Instruction

List of Instructions - 27 Basic instructions

Mnemonic	Function	Target Element
LD	Normally-open initial contact	X,Y,M,S,T,C
LDI	Normally-closed initial contact	X,Y,M,S,T,C
OUT	Output coil	X,Y,M,S,T,C
AND	Normally-open contact in series	X,Y,M,S,T,C
ANI	Normally-closed contact in series	X,Y,M,S,T,C
OR	Normally-open contact in parallel	X,Y,M,S,T,C
ORI	Normally-closed contact in parallel	X,Y,M,S,T,C
ANB	Serial connection of circuit blocks	None
ORB	Parallel connection of circuit blocks	None
NOP	No-operation	None
SET	Latched output drive ON	Y,M,S
RST	Latched output drive OFF	Y,M,S,T,C,D
PLS	Pulse output (OFF/ON trigger)	Y,M
PLF	Pulse output (ON/OFF trigger)	Y,M

Mnemonic	Function	Target Element	
MC	Beginning of master control	Y,M	
MCR	End of master control	None	
MPS	Result store (Push)	None	
MRD	Result read (Read)	None	
MPP	Result clear (Pop)	None	
END	End of program	None	
LDP	Initial ON pulse operation	X,Y,M,S,T,C	NEW
LDF	Initial OFF pulse operation	X,Y,M,S,T,C	NEW
ANDP	Serial connection of ON pulse	X,Y,M,S,T,C	NEW
ANDF	Serial connection of OFF pulse	X,Y,M,S,T,C	NEW
ORP	Parallel connection of ON pulse	X,Y,M,S,T,C	NEW
ORF	Parallel connection of OFF pulse	X,Y,M,S,T,C	NEW
INV	Result invert	None	NEW

27 Basic Instructions

• ON/OFF Contact Instructions

Conventional contact instructions like LD, AND, and OR have been supplemented by several new ON/OFF pulse contact instructions, such as LDP and LDF. Prior to this, the input contact point was detected separately, then the contact of a pulse instruction was used to drive the final instruction. The additional instructions help to simplify programming by allowing operations to be performed at a single instruction.

New instructions

ON detect	OFF detect
LDP	LDF
ANDP	ANDF
ORP	ORF

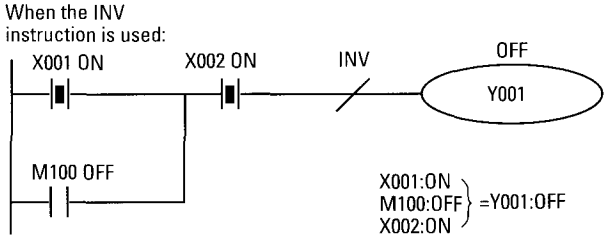
• Invert Operation Result Instruction

This instruction inverts the ON or OFF image during an operation and reflects it in the next step.

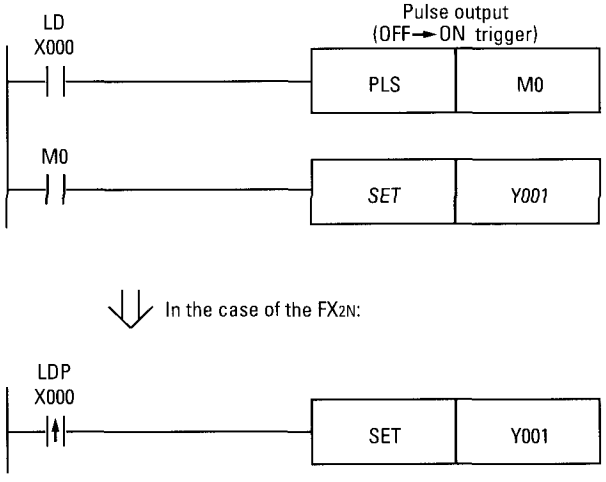
In the circuit below when X001 is ON, M100 is OFF and X002 is ON, Y001 is OFF.

Using the INV instruction inverts the results of the operation so far, so that Y001 becomes OFF.

This allows the simple negation of complex circuits or an inverse function for the new LDP, LDF pulse contact instructions.



• Conventional sequence program



In the case of the FX2N:

125 Applied Instructions

• 18 Additional Compare Instructions

Compare instructions which can be used as contact instructions have been added to the existing Compare instructions (FNC 10 CMP) and Zone Compare (FNC 11 ZCP). =, <, >, ≠, ≤, and ≥ can also be used as LD, AND and OR contacts. Since the new instruction treats the results as contacts, it does not monopolize them.

• Other New Instructions

Several other applied instructions have been added.

- 3 trigonometrical functions: SIN, COS, TAN
- 2 Gray code convert instruction: Convert, Reverse Convert
- 6 Real time data instructions: Time value Read/Write, Compare, Zone Compare, Add, Subtract

18 New Compare Instructions

1= Mnemonic 2= 32-bit Operation 3=Pulse Operation

FNC. No.	1	2	3	Details	
224	LD=	Yes		Initial Comparison contact - active when (S1) = (S2)	NEW
225	LD>	Yes		Initial Comparison contact - active when (S1) > (S2)	NEW
226	LD<	Yes		Initial Comparison contact - active when (S1) < (S2)	NEW
228	LD<>	Yes		Initial Comparison contact - active when (S1) ≠ (S2)	NEW
229	LD<=	Yes		Initial Comparison contact - active when (S1) ≤ (S2)	NEW
230	LD>=	Yes		Initial Comparison contact - active when (S1) ≥ (S2)	NEW
232	AND=	Yes		Comparison contact in series - active when (S1) = (S2)	NEW
233	AND>	Yes		Comparison contact in series - active when (S1) > (S2)	NEW
234	AND<	Yes		Comparison contact in series - active when (S1) < (S2)	NEW
236	AND<>	Yes		Comparison contact in series - active when (S1) ≠ (S2)	NEW
237	AND<=	Yes		Comparison contact in series - active when (S1) ≤ (S2)	NEW
238	AND>=	Yes		Comparison contact in series -active when (S1) ≥ (S2)	NEW
240	OR=	Yes		Comparison contact in parallel - active when (S1) = (S2)	NEW
241	OR>	Yes		Comparison contact in parallel - active when (S1) > (S2)	NEW
242	OR<	Yes		Comparison contact in parallel - active when (S1) < (S2)	NEW
244	OR<>	Yes		Comparison contact in parallel - active when (S1) ≠ (S2)	NEW
245	OR<=	Yes		Comparison contact in parallel - active when (S1) ≤ (S2)	NEW
246	OR>=	Yes		Comparison contact in parallel - active when (S1) ≥ (S2)	NEW

107 Applied Instructions

1= Mnemonic 2= 32-bit Operation 3=Pulse Operation

FNC. No.	1	2	3	Details	
0	CJ		Yes	Conditional Jump - Skip instruction	
1	CALL		Yes	Sub-routine Call - Call routine outside main program	
2	SRET			Sub-Routine Return - Return to main program	
3	IRET			Interrupt Return - Return from an interrupt routine	
4	EI			Interrupt Enable - Enable interrupt processing	
5	DI			Interrupt Disable - Disable interrupt processing	
6	FEND			First End - End main program	
7	WDT		Yes	Watchdog Timer - Refresh error detector	
8	FOR			For - Begin repeat loop	
9	NEXT			Next - End repeat loop	
10	CMP	Yes	Yes	Compare - Compare to obtain <, =, > results	
11	ZCP	Yes	Yes	Zone Compare - Compare range of data to one value	
12	MOV	Yes	Yes	Move - Copy data	
13	SMOV		Yes	Shift Move - Manipulate decimal digit	
14	CML	Yes	Yes	Complement - Invert value	
15	BMOV		Yes	Block Move - Copy a block of data	
16	FMOV	Yes	Yes	Fill Move - Copy one data to multiple locations	
17	XCH	Yes	Yes	Exchange - Swap data	
18	BCD	Yes	Yes	Binary Coded Decimal - Convert binary into BCD	
19	BIN	Yes	Yes	Binary - Convert BCD into binary	
20	ADD	Yes	Yes	Add - Add two values and store result	
21	SUB	Yes	Yes	Subtract - Subtract one value from another and store result	
22	MUL	Yes	Yes	Multiply - Multiply two values and store result	
23	DIV	Yes	Yes	Divide - Divide one value by another and store result	
24	INC	Yes	Yes	Increment - Increment a value by 1	
25	DEC	Yes	Yes	Decrement - Decrement a value by 1	
26	WAND	Yes	Yes	Word and - Logical and between data words	
27	WOR	Yes	Yes	Word or - Logical or between data words	
28	WXOR	Yes	Yes	Word Exclusive or - Logical X or operation	
29	NEG	Yes	Yes	Negation - Invert sign of complement+1	
30	ROR	Yes	Yes	Rotation Right - Rotate bit devices to right	
31	ROL	Yes	Yes	Rotation Left - Rotate bit devices to left	
32	RCR	Yes	Yes	Rotation Right with Carry - ROR + store carry bit	
33	RCL	Yes	Yes	Rotation Left with Carry - ROL + store carry bit	
34	SFTR		Yes	Shift Right - Shift content of bit device stack to right	
35	SFTL		Yes	Shift Left - Shift content of bit device stack to left	
36	WSFR		Yes	Word Shift Right - Shift content of word device stack to right	
37	WSFL		Yes	Word Shift left - Shift content of word device stack to left	
38	SFWR		Yes	Shift Register Write - Write to FIFO stack	
39	SFRD		Yes	Shift Register Read -Read from FIFO stack	
40	ZRST		Yes	Zone Reset - Reset a range of consecutive devices	
41	DECO		Yes	Decode - Decode a data value to a single data bit	
42	ENCO		Yes	Encode - Find which bit is ON	
43	SUM	Yes	Yes	Sum - Count the number of ON bits	
44	BON	Yes	Yes	Bit on Check - Check status of a bit device	
45	MEAN	Yes	Yes	Mean - Calculate mean	
46	ANS			Annunciator Set - Start a timing sequence to set an alarm bit ON	
47	ANR		Yes	Annunciator Reset - Reset lowest active alarm bit	
48	SQR	Yes	Yes	Square Root - Return square root of source data (integer result)	
49	FLT	Yes	Yes	Floating Point - Convert integer to floating point notation	
50	REF		Yes	Refresh - Refresh I/Os	
51	REFF		Yes	Refresh and Filter Adjust - Refresh, and adjust input filter	
52	MTR			Matrix - Multiplex I/Os to Read more inputs than the number of I/Os available	
53	HSCS	Yes		High Speed Counter Set - Compare HSC data to a set value to set a bit ON	
54	HSCR	Yes		High Speed Counter reset - Compare HSC data to a set value to reset a bit OFF	
55	HSZ	Yes		HSC Zone Compare - Compare HSC data to a selected range to set a bit ON	
56	SPD			Speed Detect - Detect speed by measuring pulse train	
57	PLSY	Yes		Pulse Y - Produce a pulse train output consisting of a set number of pulses	
58	PWM			Pulse Width Modulation - Produce a pulse train with variable pulse characteristics	
59	PLSR	Yes		Pulse R - Produce a pulse train output with acceleration/deceleration control	NEW
60	IST			Initial State - Additional control for stepladder program flow	
61	SER	Yes	Yes	Search - Search for data	
62	ABSD	Yes		Absolute Drum Sequence - CAM switch control (absolute setting)	
63	INCD			Incremental Drum Sequence - CAM switch control (relative setting)	
64	TTMR			Teaching Timer - Measure duration of signal, use data to set timer	
65	STMR			Special Timer - Provide special timer functions	
66	ALT		Yes	Alternate - Alternate state of bit device on receipt of input	
67	RAMP			Ramp - Calculate linear rate of change between data values	
68	ROTC			Rotary Table Control - Provide positioning control for rotary table	
69	SORT			Sort - Sort tabulated data	
70	TKY	Yes		Ten Key - Read selected inputs as though coming from a ten-key keypad	
71	HKY	Yes		Hexadecimal Key - Read selected inputs as though coming from a HEX keypad	
72	DSW			Digital Switch - Multiplex read of digital switches	
73	SEGD		Yes	Seven Segment Decoder - Decode stored data to drive 7-segment display directly	
74	SEGL			Seven Segment With Latch - Multiplexed 7-segment display output	
75	ARWS			Arrow Switch - Create user-defined numeric data entry panel	
76	ASC			ASCII Code - Convert 8-character string to ASCII	
77	PR			Print - Output ASCII data to displays, etc.	
78	FROM	Yes	Yes	From - Read from special function block	
79	TO	Yes	Yes	To - Write to special function block	
80	RS			RS Communications - Serial communication control	
81	PRUN	Yes	Yes	Parallel Running - Octal data bit transfer	
82	ASCI		Yes	ASCII Conversion - Convert from HEX to ASCII	
83	HEX		Yes	Hex Conversion - Convert from ASCII to HEX	
84	CCD		Yes	Check Code - Perform and end bit sum check	
85	VRRD		Yes	Variable Read - Read analog values from FX2N-8AV-BD potentiometers	
86	VRSC		Yes	Variable Scale - Read position values from FX2N-8AV-BD potentiometers	
87					
88	PID			PID Loop - Proportional, integral, Derivative control loop	
89					
118	EBCD	Yes	Yes	Extended BCD - Convert floating point value to decimal value	NEW
119	EBIN	Yes	Yes	Extended Binary - Convert decimal value to floating point value	NEW
120	EADD	Yes	Yes	EADD - Add two floating point values	NEW
121	ESUB	Yes	Yes	ESUB - Subtract one floating point value from another	NEW
122	EMUL	Yes	Yes	EMUL - Multiply two floating point values	NEW
123	EDIV	Yes	Yes	EDIV- Divide one floating point value by another	NEW
127	ESQR	Yes	Yes	Extended SQR - Return the square root of a floating point value	NEW
129	INT	Yes	Yes	Integer - Convert a floating point value to an integer	NEW
130	SIN	Yes	Yes	Sine - SIN trigonometrical function	NEW
131	COS	Yes	Yes	Cosine - COS trigonometrical function	NEW
132	TAN	Yes	Yes	Tangent - TAN trigonometrical function	NEW
160	TCMP		Yes	Time Compare - Compare clock data	NEW
161	TZCP		Yes	Time Zone Compare - Compare range of time data to one time value	NEW
162	TADD		Yes	Time Add - Add two time values	NEW
163	TSUB		Yes	Time Subtract - Subtract one time value from another	NEW
166	TRD			Time Read - Read time data	NEW
167	TWR			Time Write - Write time data	NEW
170	GRY	Yes	Yes	Gray - Convert to Gray code	NEW
171	GBIN	Yes	Yes	Gray Binary - Reverse Gray code conversion to binary	NEW

The FX2N Product Range

Available Models - Units

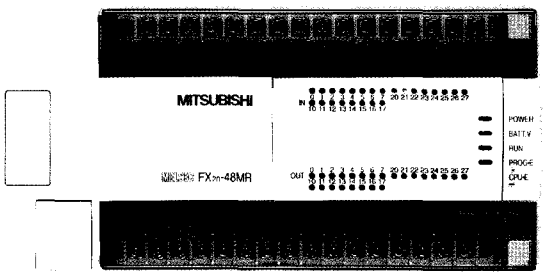
Power supply	Model	Total Number of I/O	Inputs		Outputs		Dimensions (mm)	Dimensions (inches)
			Number of	Transistor Type	Number of	Type		
AC	FX2N-16MR-ES/UL	16	8	Sink/Source selectable	8	Relay	87 × 90 × 130	3.4 × 3.5 × 5.12
	FX2N-32MR-ES/UL	32	16		16		87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48MR-ES/UL	48	24		24		87 × 90 × 182	3.4 × 3.5 × 7.2
	FX2N-64MR-ES/UL	64	32		32		87 × 90 × 220	3.4 × 3.5 × 8.7
	FX2N-80MR-ES/UL	80	40		40		87 × 90 × 280	3.4 × 3.5 × 11.2
	FX2N-128MR-ES/UL	128	64		64	Source Transistor	87 × 90 × 350	3.4 × 3.5 × 13.8
	FX2N-16MT-ESS/UL	16	8		8		87 × 90 × 130	3.4 × 3.5 × 5.12
	FX2N-32MT-ESS/UL	32	16		16		87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48MT-ESS/UL	48	24		24		87 × 90 × 182	3.4 × 3.5 × 7.2
	FX2N-64MT-ESS/UL	64	32		32		87 × 90 × 220	3.4 × 3.5 × 8.7
	FX2N-80MT-ESS/UL	80	40		40		87 × 90 × 280	3.4 × 3.5 × 11.2
	FX2N-128MT-ESS/UL	128	64		64		87 × 90 × 350	3.4 × 3.5 × 13.8

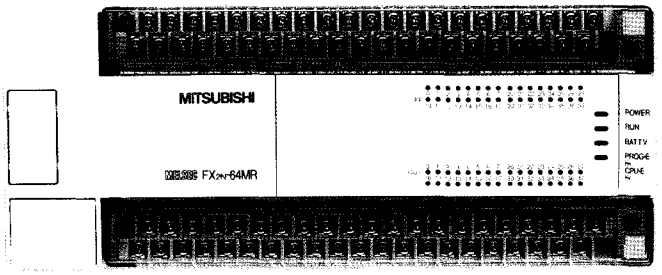
Power Supply: AC 100-240V, +10%/-15%, 50/60Hz.

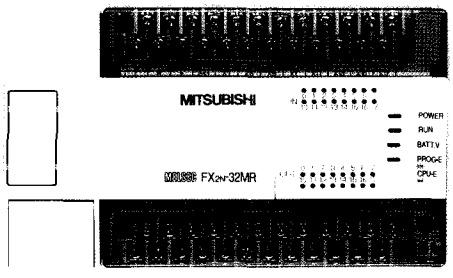
DC Powered Base Unit

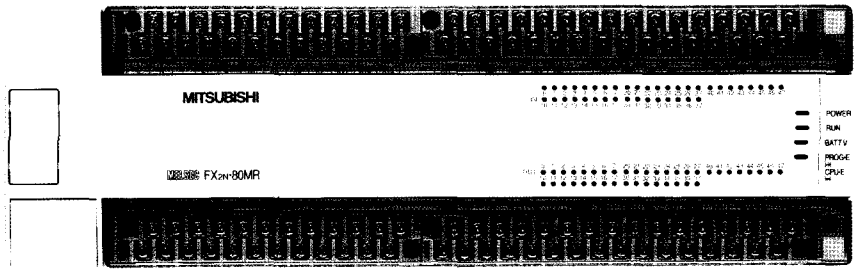
Power supply	Model	Total Number of I/O	Inputs		Outputs		Dimensions (mm)	Dimensions (inches)
			Number of	Transistor Type	Number of	Type		
DC	FX2N-32MR-DS	32	16	Sink/Source selectable	16	Relay	87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48MR-DS	48	24		24		87 × 90 × 182	3.4 × 3.5 × 7.2
	FX2N-64MR-DS	64	32		32		87 × 90 × 220	3.4 × 3.5 × 8.7
	FX2N-80MR-DS	80	40		40		87 × 90 × 280	3.4 × 3.5 × 11.2
	FX2N-32MT-DSS	32	16		16	Source Transistor	87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48MT-DSS	48	24		24		87 × 90 × 182	3.4 × 3.5 × 7.2
	FX2N-64MT-DSS	64	32		32		87 × 90 × 220	3.4 × 3.5 × 8.7
	FX2N-80MT-DSS	80	40		40		87 × 90 × 280	3.4 × 3.5 × 11.2

Power Supply: DC 24V, +20%, -30%


MITSUBISHI
POWER
BATT V
RUN
PROG-E
CPU-E


MITSUBISHI
MELSEC FX2N-64MR
POWER
RUN
BATT V
PROG-E
CPU-E


MITSUBISHI
MELSEC FX2N-32MR
POWER
RUN
BATT V
PROG-E
CPU-E


MITSUBISHI
MELSEC FX2N-80MR
POWER
RUN
BATT V
PROG-E
CPU-E

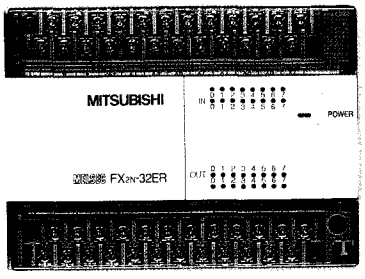
Available Models - Powered Extension Units

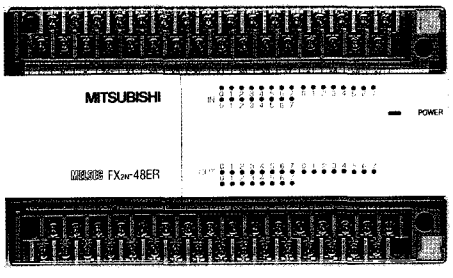
Power supply	Model	Total Number of I/O	Inputs		Outputs		Dimensions (mm)	Dimensions (inches)
			Number of	Type	Number of	Type		
AC	FX2N-32ER-ES/UL	32	16	Sink/Source selectable	16	Relay	87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48ER-ES/UL	48	24		24		87 × 90 × 182	3.4 × 3.5 × 7.2
	FX2N-32ET-ESS/UL	32	16		16	Source Transistor	87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48ET-ESS/UL	48	24		24		87 × 90 × 182	3.4 × 3.5 × 7.2

Power Supply: AC 100-240V, +10%/–15%, 50/60Hz.

Power	Model	Total Number of I/O	Inputs		Outputs		Dimensions (mm)	Dimensions (inches)
			Number of	Type	Number of	Type		
DC	FX2N-48ER-DS	48	24	Sink/Source selectable	24	Relay	87 × 90 × 150	3.4 × 3.5 × 5.9
	FX2N-48ET-DSS	48	24		24	Source Transistor	87 × 90 × 150	3.4 × 3.5 × 5.9

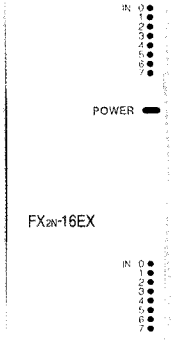
Power Supply: DC 24V, +20%, -30%





Available Models - Unpowered Extension Blocks

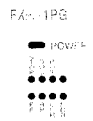
Power supply	Model	Total Number of I/O	Inputs		Outputs		Dimensions (mm)	Dimensions (inches)
			Number of	Transistor Type	Number of	Type		
Power from Main Unit of Extension Unit	FX2N-16EX-ES/UL	16	16	24V DC Sink/Source selectable	–	–	87 × 90 × 40	3.4 × 3.5 × 1.6
	FX2N-16EYR-ES/UL	16	–	–	16	Relay	87 × 90 × 40	3.4 × 3.5 × 1.6
	FX2N-16EYT-ESS/UL	16	–	–	16	SourceTransistor	87 × 90 × 40	3.4 × 3.5 × 1.6
	FX0N-8EX-ES/UL	8	8	24V DC Sink/Source selectable	–	–	87 × 90 × 43	3.4 × 3.5 × 1.7
	FX0N-16EX-ES/UL	16	16		–	–	87 × 90 × 70	3.4 × 3.5 × 2.76
	FX0N-8EYR-ES/UL	8	–	–	8	Relay	87 × 90 × 43	3.4 × 3.5 × 1.7
	FX0N-16EYR-ES/UL	16	–	–	16		87 × 90 × 70	3.4 × 3.5 × 2.76
	FX0N-8EYT-ESS/UL	8	–	–	8	SourceTransistor	87 × 90 × 43	3.4 × 3.5 × 1.7
	FX0N-16EYT-ESS/UL	16	–	–	16		87 × 90 × 70	3.4 × 3.5 × 2.76
	FX0N-8ER-ES/UL	8	4	24V DC Sink/Source selectable	4	Relay	87 × 90 × 43	3.4 × 3.5 × 1.7
	FX0N-8EX-UAI/UL	8	8	110V AC	–	–	87 × 90 × 43	3.4 × 3.5 × 1.7

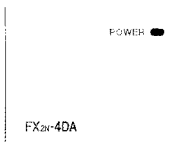


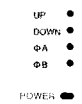


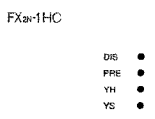
Available Models - Special Function Block

Power supply 24V DC	Model	Unit Description	Total Number of occupied I/O	5V DC requirements	Dimensions (mm)	Dimensions (inches)
55mA	FX2N-4AD	Analog input block(4ch)	8	30mA	87 × 90 × 55	3.4 × 3.5 × 2.1
200mA	FX2N-4DA	Analog output block(4ch)	8	30mA	87 × 90 × 55	3.4 × 3.5 × 2.1
50mA	FX2N-4AD-PT	PT100 input block(4ch)	8	30mA	87 × 90 × 55	3.4 × 3.5 × 2.1
50mA	FX2N-4AD-TC	K and J type thermocouple input block(4ch)	8	40mA	87 × 90 × 55	3.4 × 3.5 × 2.1
–	FX2N-1HC	High speed counter block(1ch)	8	70mA	87 × 90 × 55	3.4 × 3.5 × 2.1
40mA	FX2N-1PG-E	Pulse train output block(1ch)	8	60mA	87 × 90 × 43	3.4 × 3.5 × 1.7
80mA	FX2N-232IF	RS232 communication block(1ch)	8	40mA	87 × 90 × 43	3.4 × 3.5 × 1.7
90mA	FX0N-3A	Combined analog input (2ch) output (1ch) block	8	30mA	87 × 90 × 43	3.4 × 3.5 × 1.7
20mA	FX0N-16NT	MELSEC Net/Mini interface block(wire link)	16	60mA	87 × 90 × 43	3.4 × 3.5 × 1.7
20mA	FX0N-32NT-DP	Profibus DP interface block	8	170mA	87 × 90 × 43	3.4 × 3.5 × 1.7
AC power supply	FX2N-32DP-IF	Profibus DP interface block	8	–	87 × 90 × 75	3.4 × 3.5 × 2.9
30mA	FX2N-32CCL	CC-Link interface block	8	120mA	87 × 90 × 42	3.4 × 3.5 × 1.7







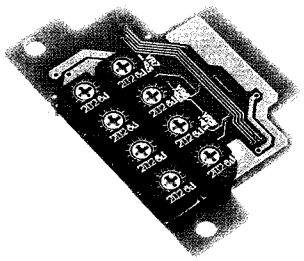


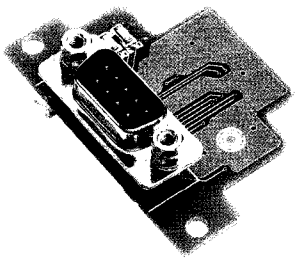


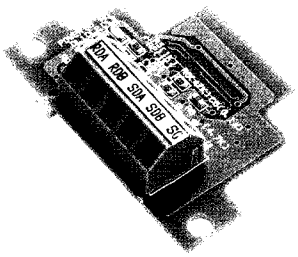


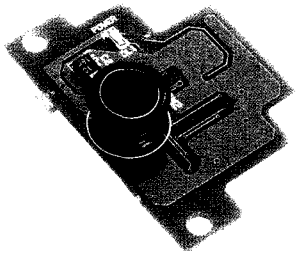
Available Models - Special Extension Boards

Power supply	Model	Unit Description	Suggested Use
Power from Main Unit	FX2N-8AV-BD	Manually adjustable Potentiometer input Board	Setting data for timer or counters, 10 position selection switch
	FX2N-232-BD	RS-232C Serial Port(1ch)	Communication with any RS-232C device such as Printers, Barcode readers
	FX2N-422-BD	RS-422 Serial Port(1ch)	Alternate programming port for OITs and HHPs
	FX2N-485-BD	RS-485 Serial Port(1ch)	Multidrop Network, Parallel Link, *Peer to Peer Network*









Specifications

Environmental Specifications

Ambient Temperature	0-55C (in operation) -20 - +70C (in storage).	
Ambient Humidity	35-85%RH, no condensation (in operation).	
Vibration Resistance	Conforms to JIS CO911. 10-55Hz 0.5mm (0.02 in.) (Max. 2G) 2 hours in each of 3 axis directions (0.5G on DIN rail).	
Shock Resistance	Conforms to JIS CO912 (10G 3 times in 3 directions).	
Noise Durability	By noise simulator of 1000 Vpp noise voltage, 1μ s noise width at 30-100Hz	
Dielectric Withstand Voltage	1500V AC for 1 minute.	Between all terminals and ground.
Insulation Resistance	5MΩ or larger by 500V DC insulation resistance tester.	
Ground	Class 3 ground. (100Ω or less)	
Operating Ambience	Must be free from corrosive gases. Dust should be minimal.	

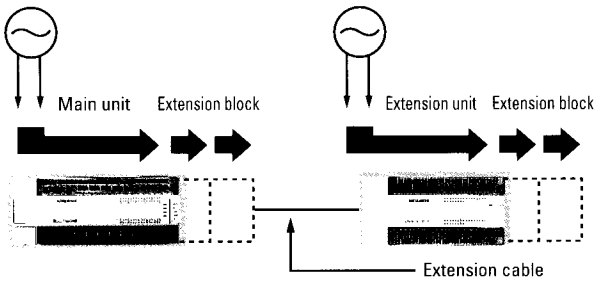
Power Specifications

Model \ Item		Supply Voltage	Power Break Reset	Power Supply Fuse	Sensor Service Supply
AC Power Supply (basic unit)	FX2N-16M	100V to 240V +10% - 15% AC 50/60Hz	Continues operations for momentary power interruptions of 10ms max. (100ms max. when supply voltage is 200V).	250V 3A	24V DC 250mA max.
	FX2N-32M				
	FX2N-48M			250V 5A	24V DC 460mA max.
	FX2N-64M				
	FX2N-80M				
	FX2N-128M				
AC Power Supply (extension unit)	FX2N-32E			250V 3A	24V DC 250mA max.
	FX2N-48E			250V 5A	24V DC 460mA max.

Additional Blocks and 24V DC Service Supply

Additional special function blocks obtain their power from the main unit or the extension unit. The capacity of the 24V DC sensor service supply from the main or extension unit is as shown in the tables on the right.

48MR **48ER**



5V DC for Special Blocks	
FX2N-□□M	290mA
FX2N-□□E	690mA

AC power supply, DC input type

FX2N-16M~32M
FX2N-32E

Eg. If 8 inputs and 8 outputs are added, the DC service current is 125mA max.

Number of addition outputs ↑	0	8	16	24	32
24	25				
16	100	50	0		
8	175	125	75	25	
0	250	200	150	100	50

→ Number of additional inputs

FX2N-48M~128M
FX2N-48E

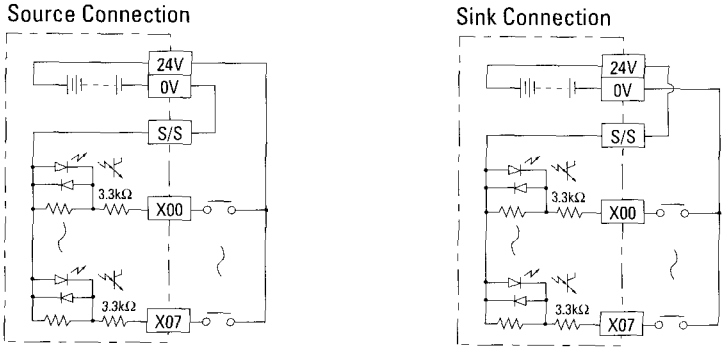
Eg. If 16 inputs and 16 outputs are added, the DC service current is 210mA max.

Number of addition outputs ↑	0	8	16	24	32	40	48	56	64
48	10								
40	85	35							
32	160	110	60	10					
24	235	185	135	85	35				
16	310	260	210	160	110	60	10		
8	385	335	285	235	185	135	85	35	
0	460	410	360	310	260	210	160	110	60

→ Number of additional inputs

Input Specifications

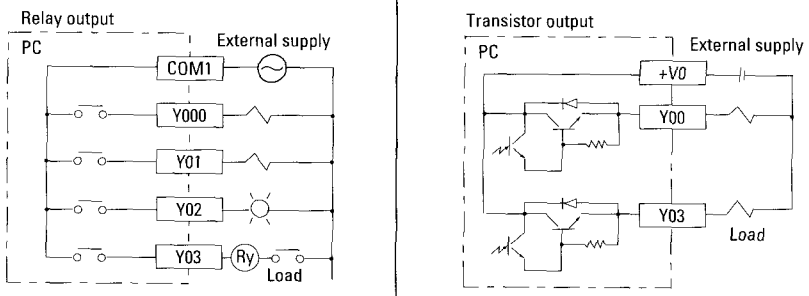
Item	DC input	
Model	X0~X7	X10~
Input Signal Voltage	DC24V±10%	
Input Signal Current	7mA	5mA
Input ON Current	4.5mA min.	3.5mA min.
Input OFF Current	1.5mA max.	1.5mA max.
Input Response Time	Approx. 10ms (inputs X0 to X17 can be adjusted by program instruction to give a 50μs-60ms response).	
Circuit Isolation	Photocoupler	
Input Operation Indicator	LED lights up when input is ON	
Circuit Configuration	Source Connection / Sink Connection	



X10~ : internal resistance 4.3kΩ

Output Specifications

Item		Relay Output	Transistor Output
Maximum Load	Load Voltage	250V AC 30V DC max. (surge diode required)	DC5V~30V
	Resistive Load	2A/pt. 8A/4 pts. common 8A/8 pts. common	0.5A/pt. 0.8A/4pts.
	Inductive Load	80VA	12W/DC24V
Lamp Load		100W	1.5W/DC24V
Leakage Current		-	0.1mA max.
Response Time		Approx. 10ms	ON: 0.2ms max. OFF: 0.2ms max. Y0, Y1 ON: 0.03ms OFF: 0.03ms
Circuit Isolation		Mechanical	Photocoupler
Output Operation Indicator		LED lights up when voltage flows through relay coil	LED lights up when photocoupler operates
Circuit Configuration		Relay output	Transistor output



Performance Specifications and Dimensions

Performance Specifications

Operation control method			Cyclic operation by stored program, performed by dedicated LSI	
I/O refresh method			Batch processing when END instruction is executed. I/O refresh instructions available.	
Operation processing time	Basic instruction		0.08μs per instruction	
	Applied instruction		1.52 μs - several 100μs per instruction	
Programming language			Relay symbolic language + Stepladder. SFC expression possible.	
Program capacity and memory type			Built-in 8K-step RAM; 16K-step max. RAM, EPROM, EEPROM memory cassettes can be installed.	
Number of instructions	Basic, stepladder		Basic (sequence): 27; stepladder: 2	
	Applied		125	
Input relay			184 points X0-X267	Total 256 points
Output relay			184 points Y0-Y267	
Auxiliary relay	General use		500 points M0-M499	Total 3072 points
	Latch*		2572 points M500-M3071 (Note)	
	Special purpose		256 points M8000-M8256	
State	General use		490 points S10-S499	Total 1000 points
	Latch*		400 points S500-S899	
	Annunciator		100 points S900-S999	
Timer	100ms		200 points T0-T199	Total 256 points
	10ms		46 points T200-T245	
	1ms retentive		4 points T246-T249	
	100ms retentive		6 points T250-T255	
	Real time clock		1 point(Year, Month, Date, Day, Hour, Minute, Seconds Vaild 1980 to 2079)	
Counter	Up counter	General use	100 points (16-bit) C0-C99	Total 256 points
		Latch*	100 points (16-bit) C100-C199	
	Up-down counter	General use	20 points (32-bit) C200-C219	
		Latch*	15 points (32-bit) C220-C234	
	High-speed counter		1-phase: 60kHz - 2 points10Khz - 4 points 2-phase: 30kHz - 1 point 5hHz - 1 point	
Data register	General-purpose data register	General use	200 points (16-bit) D0-D199	Total 8000 points
		Latch*	7800 points (16-bit) D200-D7999 (Note)	
	Special register		256 points (16-bit) D8000-D8255	
	Index		16 points (16-bit) V0-V7, Z0-Z7	
	File register 16-bit		File registers can be set in 500-register units from general-purpose register D1000 and above.	
Pointer	For JUMP/CALL		128 points P0-P127	
	Interrupt		15 points I00□ - I05□, I6□□ - I8□□, I010 - I060	
Nesting			8 points N0-N7	
Number Ranges	Decimal (K)		16 bits: -32,768 - +32,767; 32 bits: -2,147,483,648 - +2,147,483,647	
	Hexadecimal (H)		16 bits: 0-FFFF(H); 32 bits: 0-FFFFFFFF(H)	
	Floating point		32bits: 0, ±1.175X 10^{-38} to ±3.403 X 10^{38}	

Battery backup

*: Parameters for scope of battery backup adjustable. Note: Fixed battery backup for M1024-M3071, D512-D7999.

Terminal Layouts

FX2N-16MR

⏚	S/S	0V	X0	X2	X4	X6	•	•	•
L	N	•	24V	X1	X3	X5	X7	•	•

•	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	•
•	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	•

FX2N-32MR

⏚	S/S	0V	X0	X2	X4	X6	X10	X12	X14	X16	•
L	N	•	24V	X1	X3	X5	X7	X11	X13	X15	X17

Y0	Y2	•	Y4	Y6	•	Y10	Y12	•	Y14	Y16	•
COM1	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	COM4	Y15	Y17

FX2N-48MR

⏚	S/S	0V	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26	•
L	N	•	24V	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25	X27

Y0	Y2	•	Y4	Y6	•	Y10	Y12	•	Y14	Y16	Y20	Y22	Y24	Y26	COM5
COM1	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	COM4	Y15	Y17	Y21	Y23	Y25	Y27

FX2N-64MR

⏚	S/S	0V	0V	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26	X30	X32	X34	X36	•
L	N	•	24V	24V	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25	X27	X31	X33	X35	X37

Y0	Y2	•	Y4	Y6	•	Y10	Y12	•	Y14	Y16	•	Y20	Y22	Y24	Y26	Y30	Y32	Y34	Y36	COM6
COM1	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	COM4	Y15	Y17	COM5	Y21	Y23	Y25	Y27	Y31	Y33	Y35	Y37

FX2N-80MR

⏚	S/S	0V	0V	X0	X2	X4	X6	X10	X12	X14	X16	•	X20	X22	X24	X26	•	X30	X32	X34	X36	•	X40	X42	X44	X46	•
L	N	•	24V	24V	X1	X3	X5	X7	X11	X13	X15	X17	•	X21	X23	X25	X27	•	X31	X33	X35	X37	•	X41	X43	X45	X47

Y0	Y2	•	Y4	Y6	•	Y10	Y12	•	Y14	Y16	•	Y20	Y22	Y24	Y26	•	•	Y30	Y32	Y34	Y36	•	Y40	Y42	Y44	Y46	•
COM1	Y1	Y3	COM2	Y5	Y7	COM3	Y11	Y13	COM4	Y15	Y17	COM5	Y21	Y23	Y25	Y27	•	COM6	Y31	Y33	Y35	Y37	COM7	Y41	Y43	Y45	Y47

FX2N-128MR

⏚	S/S	0V	0V	X0	X2	X4	X6	X10	X12	X14	X16	X20	X22	X24	X26
L	N	•	24V	24V	X1	X3	X5	X7	X11	X13	X15	X17	X21	X23	X25

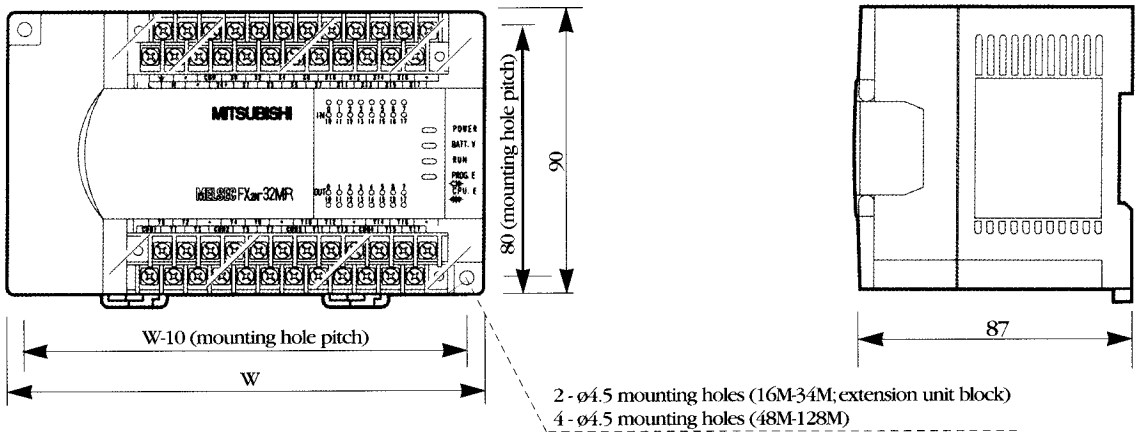
X30	X32	X34	X36	X40	X42	X44	X46	X50	X52	X54	X56	X60	X62	X64	X66	X70	X72	X74	X76	•
X27	X31	X33	X35	X37	X41	X43	X45	X47	X51	X53	X55	X57	X61	X63	X65	X67	X71	X73	X75	X77

Y0	Y2	COM2	Y5	Y7	Y10	Y12	COM4	Y15	Y17	Y20	Y22	Y24	Y26	COM6	Y31	Y33	Y35	Y37	Y40	Y42
COM1	Y1	Y3	Y4	Y6	COM3	Y11	Y13	Y14	Y16	COM5	Y21	Y23	Y25	Y27	Y30	Y32	Y34	Y36	COM7	Y41

Y44	Y46	COM8	Y51	Y53	Y55	Y57	Y60	Y62	Y64	Y66	COM10	Y71	Y73	Y75	Y77
Y43	Y45	Y47	Y50	Y52	Y54	Y56	COM9	Y61	Y63	Y65	Y67	Y70	Y72	Y74	Y76

For transistor output units the common terminals are labeled +V0, +V1, etc.All other terminals are the same.

External Dimensions



Type	W(mm)	Mass (kg)
FX2N-16M	130	0.60
FX2N-32M	150	0.65
FX2N-48M	185	0.85
FX2N-64M	220	1.0

Type	W(mm)	Mass (kg)
FX2N-80M	285	1.2
FX2N-128M	350	1.8
FX2N-16E(X,YR,YT)	40	0.3
FX2N-32E	150	0.6

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