MITSUBISHI
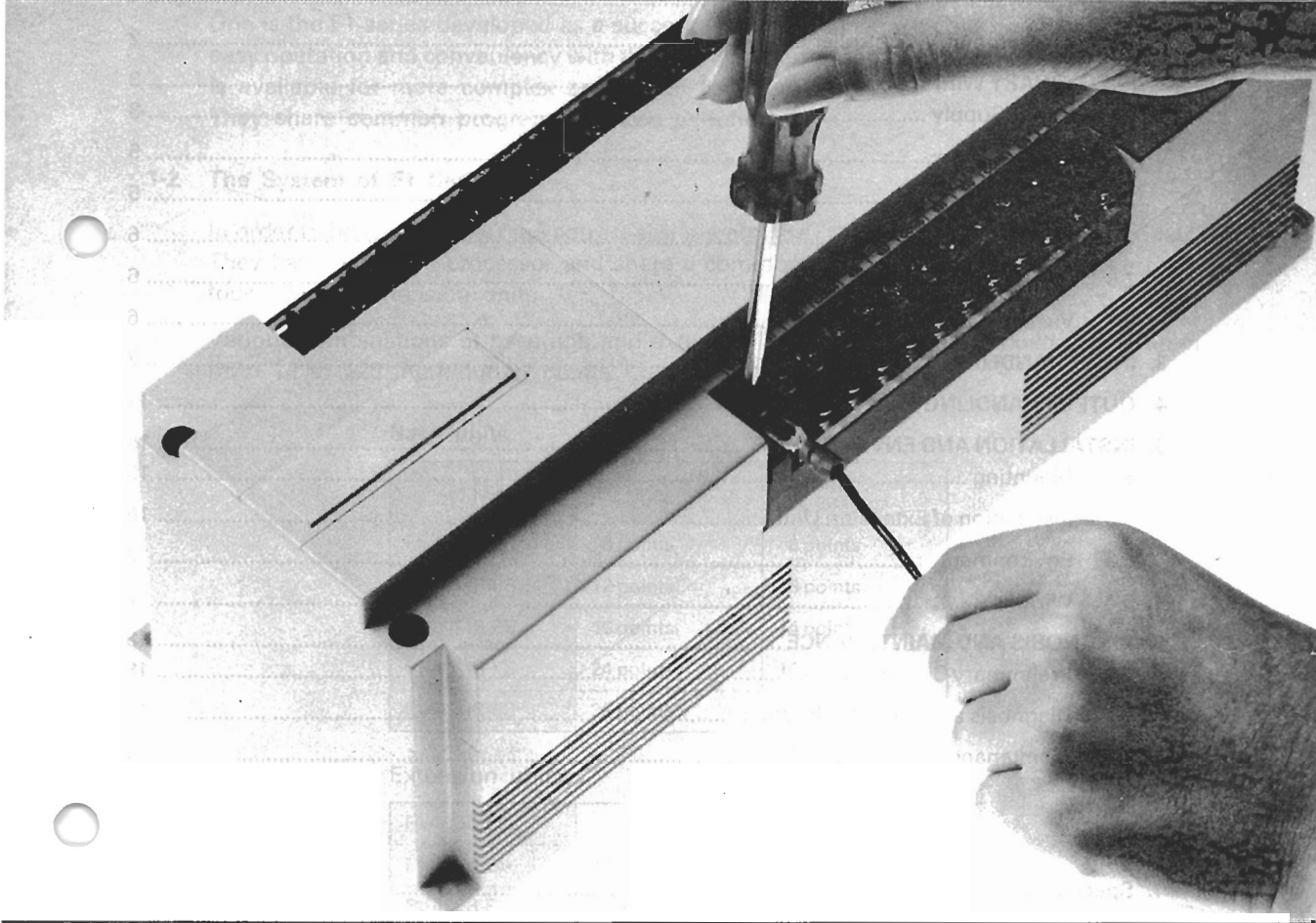**Programmable Controller**

MELSEC F1 SERIES

INSTRUCTION MANUAL (SOURCE INPUT TYPE)

- **This manual provides technical information and guidance on the installation and use of the Mitsubishi F₁ series Programmable Controller and its extension unit.**
- **Users should ensure that the detail of this manual is studied and understood before attempting to install or use the units.**
- **Information concerning the programming of the system, using the programmer unit, is covered in a separate manual.**

MITSUBISHI ELECTRIC CORPORATION

TABLE OF CONTENTS

1 | INTRODUCTION

1-1 MELSEC F Family

The Mitsubishi MELSEC F family of programmable controllers is ideal for small industrial process and machine control requirements and essentially there are two series in the family.

One is the F1 series developed as a successor to the F series which is emphasized on the easy operation and conveniency with the excellent performance. Other series, the F2 series, is available for more complex application requirements.
They share common programmers and peripherals.

1-2 The System of F1 Series

In order to be able to select the correct size system, the F1 series has five base unit models. They have the same processor and share a common programmer. In addition, there are four sizes of extension units.

Various combinations of base unit and extension unit may be used to build up a system from 12 to 120 input/output points.

Base units

Models	Number of inputs	Number of outputs
F1-12MR-ES	6 points	6 points
F1-20MR-ES	12 points	8 points
F1-30MR-ES	16 points	14 points
F1-40MR-ES	24 points	16 points
F1-60MR-ES	36 points	24 points

Extension units

F1-10ER-ES	4 points	6 points
F1-20ER-ES	12 points	8 points
F1-40ER-ES	24 points	16 points
F1-60ER-ES	36 points	24 points

1-3 Programmable Controller Layout

Power supply
110/120 VAC or
220/240 VAC

24 VDC power source for
input sensor devices

Input terminals of
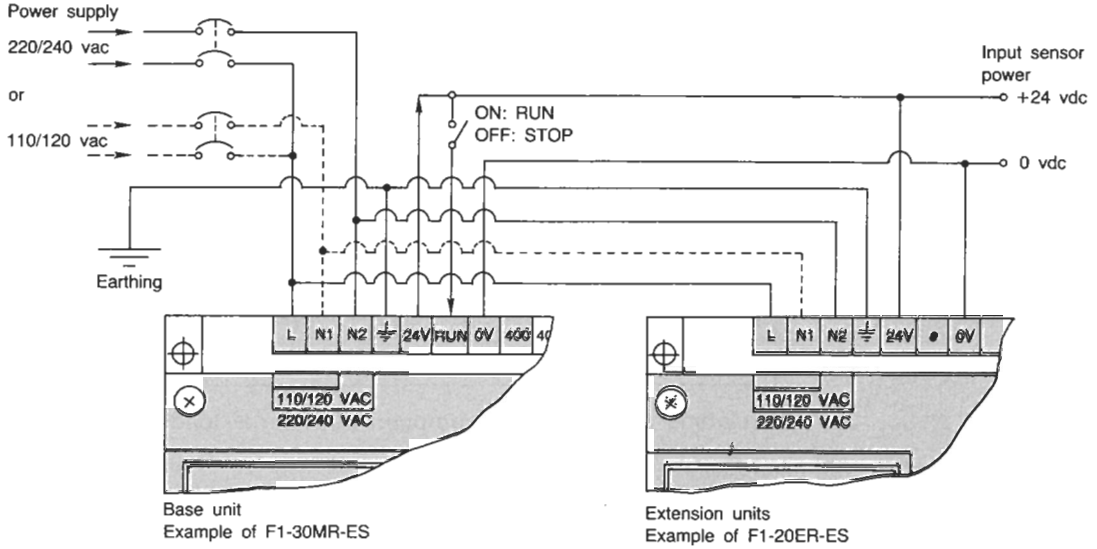removable terminal block
(F1-40 and F1-60) with
protection cover

Extension cable
connector
(Extension cable is
attached to the
extension unit)

RUN terminal
ON:RUN
OFF:STOP

Diagnostic LEDs
for inputs

Sensor power grounding

MELSEC F1-30MR

POWER
RUN
BATT·V
PROG·E
CPU·E

MITSUBISHI

Connector for
programming unit

Output terminals:
(Remarkable terminal
block (F1-40, F1-60)with
protection cover

Cover

Diagnostic LEDs for
• Power supply
• RUN/STOP
• Battery voltage
• Program error
• CPU error

Diagnostic LEDs for
outputs

ROM memory cassette
for EPROM or EEPROM
(RAM is built into
the PC)

Lithium battery for
retaining data upon
power failure

Connection example

Power supply
220/240 vac
or
110/120 vac

Earthing

ON: RUN
OFF: STOP

Input sensor power
+24 vdc

0 vdc

Base unit
Example of F1-30MR-ES

Extension units
Example of F1-20ER-ES

Reference) Inside connections

Example of F1-12MR, 20MR, 30MR

Example of F1-10ER, 20ER
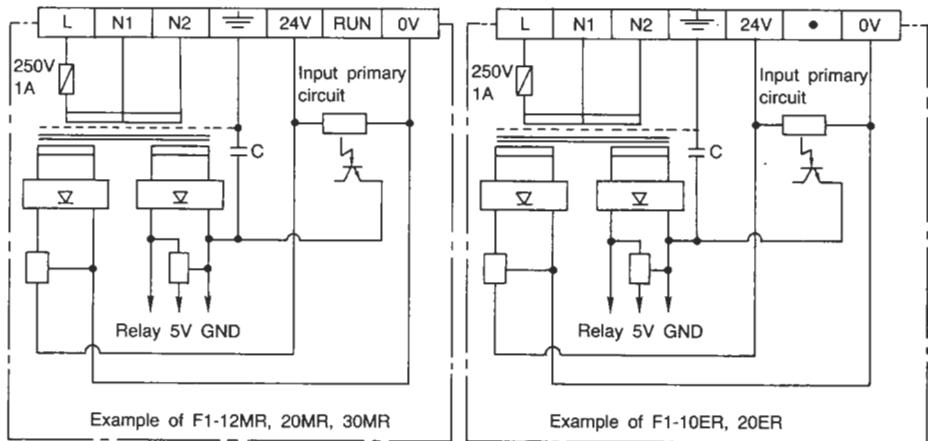
2-1 Power Supply

Connect a power supply cable of the correct rating (more than 2mm^2 wires are recommended) to the base unit and extension unit (if used) as illustrated.

The supply voltage shall be as specified.

Power Specifications

Supply voltage ....Co-use of

AC110-120V +10%, −15% (50/60Hz)
and AC220-240V +10%, −15% (50/60Hz)

Power consumptions............

Model	Consumption
F1-12MR-ES, F1-10ER-ES	18VA
F1-20MR-ES, F1-20ER-ES	20VA
F1-30MR-ES	22VA
F1-40MR-ES, F1-40ER-ES	25VA
F1-60MR-ES, F1-60ER-ES	40VA

Excluding any power consumption of external load

Instantaneous power failure......

Even if the instantaneous power interruption for less than 10ms. occurs, the programmable controller continues the operation.

Cautions

(1) The power must be switched off when the ROM cassette is loaded on the base unit or unloaded from the unit.

(2) The power to the base unit and extension unit shall be turned on/off at same time.

(3) If there occurs instantaneous power interruption for more than 10ms. or voltage drop failure, the programmable controller stops the operation and all outputs are turned off at same time.

When the power is restored, however, the operation is resumed automatically if the RUN input is turned on.

2-2 Earthing

Connect an earth wire to the earth terminal as illustrated. The earth terminals of base unit and extension unit (if used) shall be connected and execute the earth at the base unit side.

Where the execution of correct earthing is difficult, the unit may be used without earth.

Cautions

(1) Execute the earth with less than 100 ohms for the earth terminal by use of wire the more than 2mm^2.

(2) Earthing must not be shared with any high power equipment such as a motor system.

2-3 RUN/STOP

Connect a RUN/STOP selection switch to the RUN terminal of the base unit as illustrated. The device may be a key-switch or other suitable control device, and it is wired in same manner as other input devices.

When the RUN terminal is turned on, the PC will be in RUN mode to execute a program. When the RUN terminal is turned off, the PC will be in STOP mode to stop the program execution and all outputs are turned off.

Contactor for load power

It is recommended to feed the power to the external load of programmable controller through the contactor which is opened/closed by the pushbutton, by which the load can be stopped emergently without being depending upon the programmable controller.

In addition, the load will not be be re-started unless the start button is depressed after power restoration.
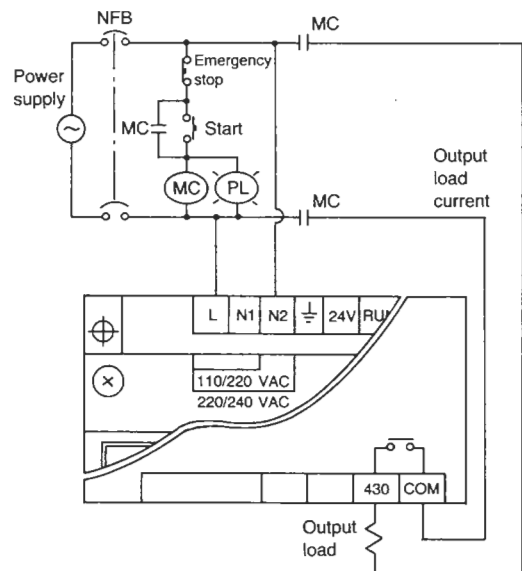
2-4 24V Terminal

When non-voltage contact is used as a input device, the 24V terminal supplys DC24V current of 7mA per point to the input terminal via the input device.

In addition to this power for all input terminals of the unit, the 24V terminal has extra power capacity of 0.1A (F1-10/12/20/30/40) or 0.2A (F1-60) for the sensor devices such as proximity switches or photo sensors.
In this case, sink the current to the 0V terminal (described in later).

Built-in DC24V power

Model	For inputs	For sensors
F1-12MR-ES	7mA×6	100mA
F1-20MR-ES	7mA×12	100mA
F1-30MR-ES	7mA×16	100mA
F1-40MR-ES	7mA×24	100mA
F1-60MR-ES	7mA×36	200mA
F1-10ER-ES	7mA×4	100mA
F1-20ER-ES	7mA×12	100mA
F1-40ER-ES	7mA×24	100mA
F1-60ER-ES	7mA×36	200mA

Cautions

(1) If the extension unit is used, connect the 24V terminals between the base unit and extension unit.

(2) Any external power must not be supplied to this terminal.

(3) If there occurs any overload, the voltage is dropped automatically, by which the input to the PC becomes inoperative.

In case that the number of inputs used is limited, the output current from the 24V terminal may be more used by the portion of 7mA per one un-used input point.

2-5 0V Terminal

The 0V terminal is a sink terminal for the DC24V current when the 24V terminal supplys the sensor power.

The 0V terminal is also used as a sink terminal when external power source is used in substitute of the 24V terminal. In this case, the supply voltage is specified from 16VDC to 32VDC.
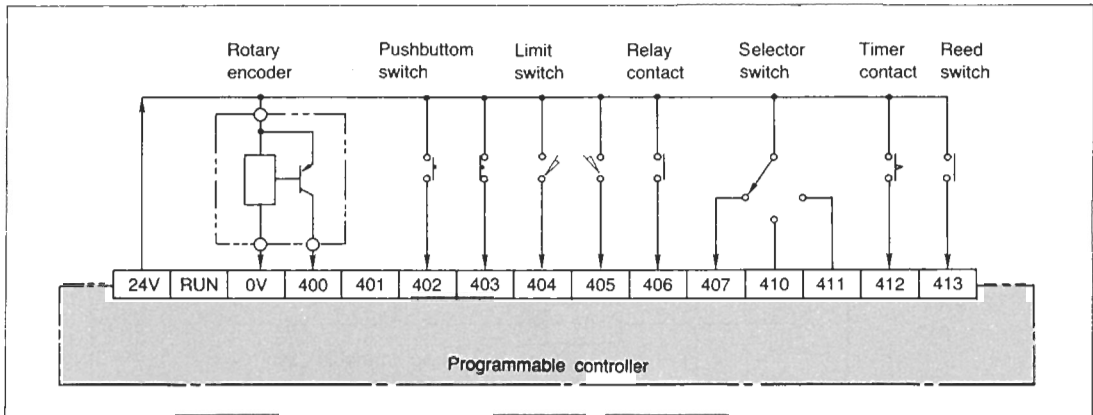
2-6 Vacant Terminals

Do not use any vacant terminal in any case.

Connection Example

Numberic Assignment of Inputs

(Octal number)

| Base unit	Numberic assignment	Number of points
F1-12MR-ES	400-405	6 points
F1-20MR-ES	400-413	12 points
F1-30MR-ES	400-413 500-503	16 points
F1-40MR-ES	400-413 500-513	24 points
F1-60MR-ES	000-013 400-413 500-513	36 points

Extension unit	Numberic assignment	Number of points
F1-10ER-ES	( ) 14-( ) 17	4 points
F1-20ER-ES	( ) 14-( ) 27	12 points
—	—	—
F1-40ER-ES	414-427 514-527	24 points
F1-60ER-ES	014-027 414-427 514-527	36 points

Note: The valvue in ( ) of the F1-10ER-ES and F1-20ER-ES may vary to '0', '4' or '5' depending upon to which connector (extension connector No. 000,400 or 500) the unit is connected.

Input Specifications (including RUN input)

Type of device		Non-voltage contacts or PNP open collector transistor
Isolation		Photo-coupler isolated
Input voltage		Built-in DC24V (+, −4V) or external power DC24V (+, −8V)
Input impedance		Approximately 3.3k ohms
Operation current	off to on	DC4mA minimum
	on to off	DC1.5mA maximum
Response time	off to on	Approximately 10ms (8 points can be changed (0-60ms))
	on to off	Approximately 10ms (8 points can be changed (0-60ms))

Reference) Internal Circuit

Proximity switch
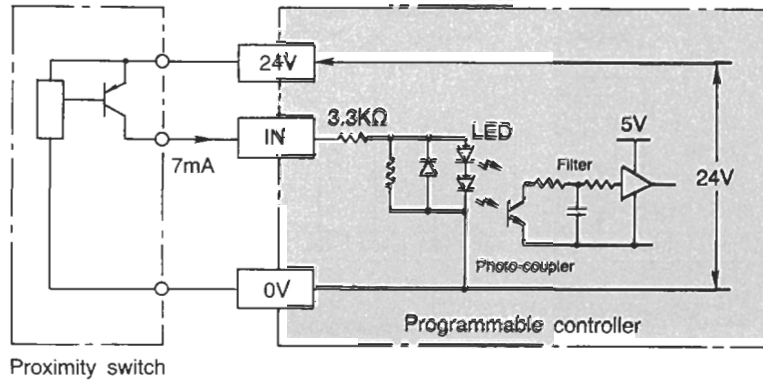
Connect input control devices as illustrated. The device may be any non-voltage contact or PNP open collector transistor device as specified.

The input is turned ON when the input device is turned ON to close the input circuits, and the input indication LED is turned ON at same time.

Input Response

The primary circuit of input is insulated from the secondary circuit by the photo-coupler. The secondary circuit is provided with C-R filter, which serves to prevent the PC from mal-operation due to chattering of input contact or invasion of niose from input line.

Consequently, there occurs a response lagging of approx. 10ms. against on/off state change of input device.

However, for 8 inputs of X400-X407, the response lagging due to filter can be changed in the range from 0ms. to 60ms. by the user's program.
(Response lagging of 0.2ms. still remains as fixed portion.)

Caution

> When the equipment is used with filter constant set at low level, special care needs to be paid to chattering of input contact, or invasion of noise.
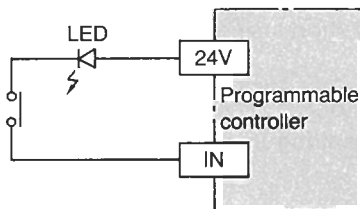
Input Sensitivity

To turn on/off the input securely, the input operation current is required as specified.

Cautions

Care needs to be taken to the following points when a series diode or resistor is connected (not turned off completely in this case) or there is any parallel resistance or leakage current in the input contact.
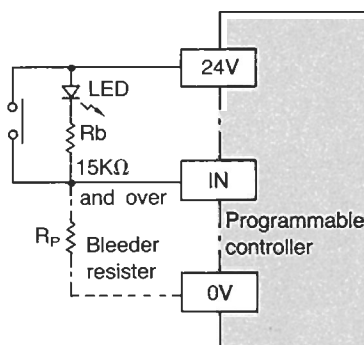
[In case diode is inserted]

Keep the voltage drop in series diode to less than approx. 4V.
In case the reed switch with series LED is used, therefore, limit the number of diode to be connected in series, to less than two.

[In case parallel resistor is inserted]

Keep the parallel resistance (Rp) to more than 15kΩ.
In case the parallel resistance is less than the above value, connect a bleeder resistor (Rb) of the following formula across 0V and IN terminals.

$$Rb \leqq \frac{4Rp}{15 - Rp} (k\Omega)$$

When the two-wire type proximity switch is turned off, keep the leakage current (Iℓ) to less than 1.5mA.
When the current exceeds the value, connect a bleeder resistor of the following formula.

$$Rb \leqq \frac{6}{I\ell - 1.5} (k\Omega)$$

High Speed Counter Input

When the special auxiliary relay M470 in the PC program is turned on, the X400 and X401 inputs are designated for count input and it's reset input of high speed counter.

If M470 is turned off, these terminals can be used as general inputs.

In case no reset input is used even while a high speed counter is used, the X401 input terminal may be used for general application by the functional instruction.

Cautions

(1) Since the input current is DC24V, 7mA., use the miniature type of input devices which are suitable to such small current.
(Bear in mid that the use of large current switch may result in contact failure.)

(2) When using the input filter of inputs X400-X407 for short, use non-contact type switches such as proximity switch, photo-electric switch.

(3) If the contact type switch is used, chattering (on/off is performed little by little repeatedly) may occur for a few ms., possibly resulting in a cause of mal-operation.

Connection Example
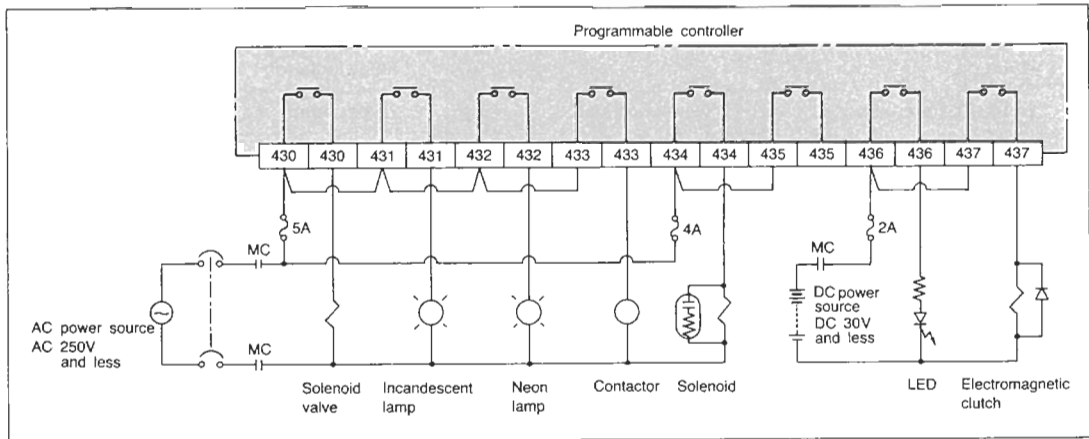
Output Terminals

All outputs for type F1-10/12/20 and two of outputs for type F1-30 are made up of common separate outputs, while all outputs of type F1-40/60 and other outputs of type F1-30 are made up of 4-point common outputs, each of which common terminal is assigned with different number such as COM1, COM2....COM12.

The type of output is relay contact output in the F1 series.
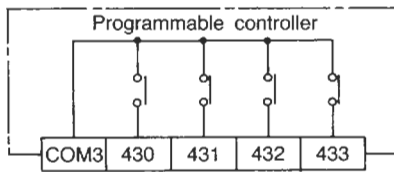
4-point common output type
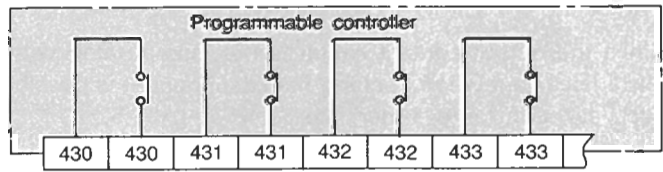
Common separate output type

Numeric Assignment of Outputs

Base unit	Numeric assignment	Number of points
F1-12MR-ES	430 − 435	6
F1-20MR-ES	430 − 437	8
F1-30MR-ES	430 − 437 530 − 535	14
F1-40MR-ES	430 − 437 530 − 537	16
F1-60MR-ES	30 − 37 430 − 437 530 − 537	24

Extension unit	Numeric assignment	Number of points
F1-10ER-ES	( )40 − ( )45	6
F1-20ER-ES	( )40 − ( )47	8
—	—	—
F1-40ER-ES	440 − 447 540 − 547	16
F1-60ER-ES	40 − 47 440 − 447 540 − 547	24

Note: The value in ( ) of the F1-10ER-ES and F1-20ER-ES may vary to '0', '4' or '5' depending upon to which connector (extension connector No. 000, 400 or 500) the unit is connected.

Output Specifications

Type of output		Relay contact
Isolation		Relay isolation
Output load maximum	Resistance load	2A per point
	Inductive load	500, 000 operations/35VA
	Lamp load	100 watts
Rush current		10A/Cycle
Output load minimum (inductive load)		0.2VA/110VAC 0.8VA/220VAC
Leakage current		0mA
Response time	off to on	Approximately 10ms.
	on to off	Approximately 10ms.

Note: Circuit voltage .... AC250V and less or DC30V and less
　　　DC inductive load .... Necessity to insert a free-wheel diode externally

Connect external load devices e.g. contactors, pilot lamps, solenoid valves, etc., to output terminals as illustrated.

It is recommended to feed the power to the output loads through the contactor as described in former section 2-3.

Leakage Current

Since the output contact circuit is not incorporated with C-R absorber, there will not be any leakage current when opening the circuit, and it is possible to directly drive small current loads such as neon lamp, timer, etc.

Operation Indication

the output ON indication LED is turned on when the output relay coil is energized.

Cautions

(1) For the loads over the rated maximum limits, the operation should be performed through an extra contactor, capable of handling the load.

(2) The output circuit of the programmable controller is not incorporated with any fuse, therefore, insert a fuse of 5 to 10A to every four points to prevent the PC from burning due to short-circuitted load, etc.

Output Contact Capacity

The output loads are specified in the table on page 12.
The applicable loads to the relay contact, however, are subject to the frequency of operations.
The outline life of the relay based on Mitsubishi's life test is as shown in the following table;

Inductive load	Contact life
Less than 35VA	Up to 3,000,000 operations
Less than 80VA	Up to 1,000,000 operations
Less than 120VA	Up to 200,000 operations

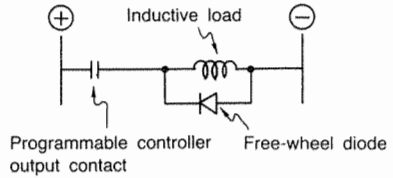The test is performed by turning on/off the relay every second alternately.

Caution

Bear in mind that the life of relay may be greatly deteriorated when the rushing current is turned on/off.
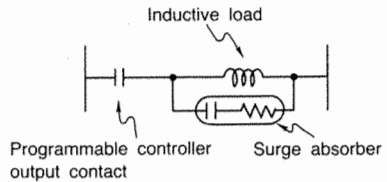
NOTE: Output Circuit Configurations

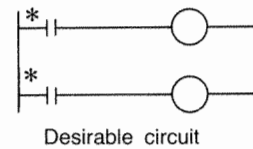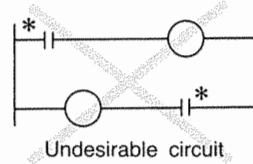| DC load | Connect a free-wheel diode in parallel to the DC inductive load.
Otherwise, the life of contact may be greatly shortened. | |
AC load	Noise generation can be reduced by preparing a surge absorber in parallel to the AC inductive load. Surge absorber $(0.1\mu F + 100 \sim 120\Omega)$	
Use of same phase	It is recommended to use the output contact (*) of programmable controller at the same phase side.	
Interlock	It is advised to provide the interlock function externally to the loads such as forward/backward contactors which may be accompanied by danger when turned on at the same time, in addition to the internal interlock function in the programmable controller by program.	
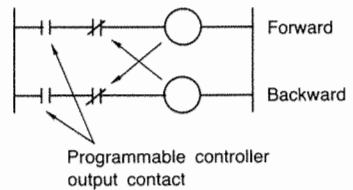
5-1 Mounting

(1) Direct Mounting

$A \pm 0.2$

M4 fitting screw
(M5 for F1-60)

$B \pm 0.2$
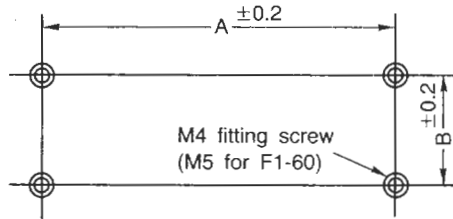
(mm)

Model	A	B	Applicable DIN Rail Kit
F1-12MR-ES, F1-10ER-ES	155	70	
F1-20MR-ES, F1-20ER-ES	240	70	F-20D
F1-30MR-ES	265	70	
F1-40MR-ES, F1-40ER-ES	290	100	F-40D
F1-60MR-ES, F1-60ER-ES	335	125	—

For direct mounting, drill the installation holes with dimensions shown in the table, depending upon the model of the unit.

Each unit may be installed to longitudinal direction with the extension connector directed downward.

(2) DIN Rail Mounting

DIN rail
(DIN46277 width:35mm)
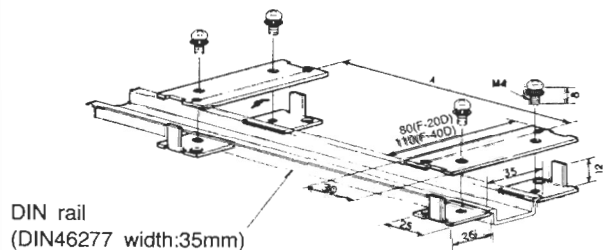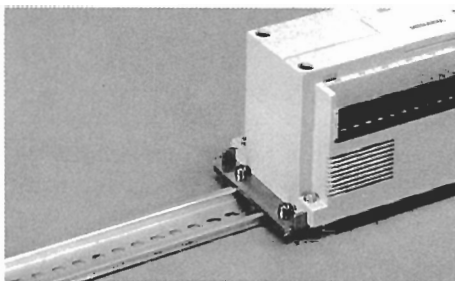
DIN rail installation kit is prepared a pair of right and left.
Set these temporarily at right and left on the rail respectively, install the programmable controller and then tighten the screws securely.
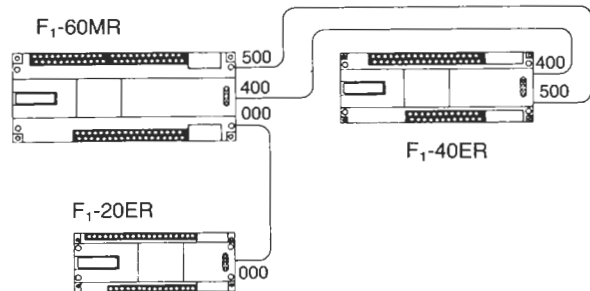
Caution

Do not attempt to install the equipment on the floor surface or ceiling to avoid temperature rise.
Do not fail to install the equipment on the wall surface.

5-2 Installation of Extension Unit

Installation example:

The extension unit is mounted at the upper, lower or right side of the base unit.
The extension unit is prepared with the extension cable, and the cable length is 450mm for
type F1-10/20 extension unit, and 600mm for type F1-40/60 unit.

Each unit may be installed at any place within the reach of the cable.

Caution

> It is advised to secure a space of more than 50mm around each unit for ventilation, and
> further a proper space (more than 50mm) required for attaching/detaching of the extension
> cable.

5-3 Environment

While the F1 series PC is suitable for most industrial situations, the unit should be installed
in the desirable environment.

Cautions

> (1) The unit should not be installed in the excessively hostile environments
>   associated with extremes of damp, dust, temperature, corrosive gases, vibration
>   or mechanical impact.
>
> (2) The unit should not be installed near the heatgenerating source, or in a situation
>   where the temperature is likely to rise to above 50 deg. C.
>   A space of some 50mm should be allowed around the unit for heat dissipation.

5-4 Wirings

Use the wires with solderless terminals to connect with the PC's terminals, and tighten the terminal screws at the torque of 5~8 kg.cm.

It is recommended that input and output wires are not longer than 20 meters for the general use. However, when special care is paid to the noise interference, the length can be longer up to approx. 100 meters.

Cautions

(1) To avoid electrical noise interference from some external apparatus, the unit should not be installed near high voltage supply cables or such electrical apparatus.

(2) Input and output wires must be kept separate and away from any power supply cables or high voltage cables.
The DC cables and AC cables should not be bound together.

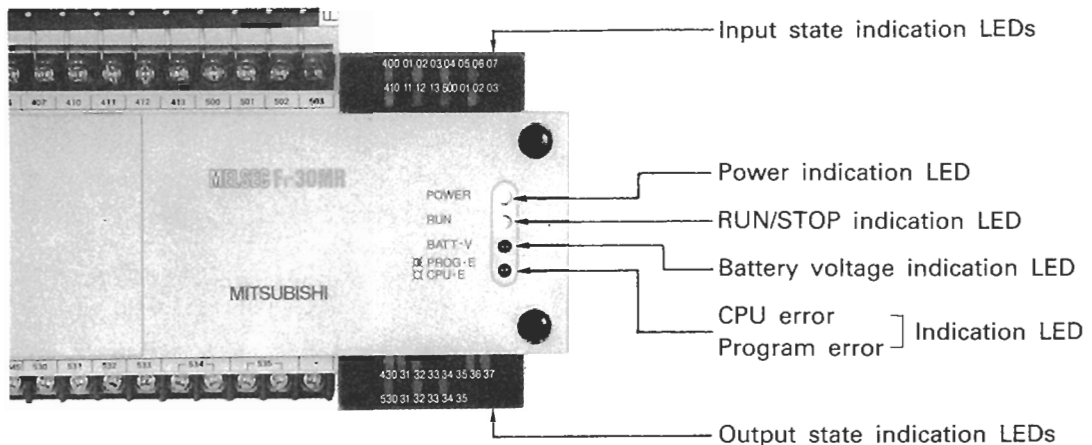## 6 | DIAGNOSIS AND MAINTENANCE

6-1 Preliminary Checks

Before operating the unit, it is advisable to carry out the following checks;

(1) That the power and ground leads are properly connected

(2) That input and output leads are properly connected and not entangled

(3) That output loads and input contacts are within the specification limits

Programs can be checked and monitored by using the facility available on the programming panel or handy graphic programming panel for this purpose.

6-2 Diagnosis and Trouble-shooting

Whether the trouble lays in the programmable controller itself or external devices can be determined by the lighting condition of various LEDs arranged on the programmable controller.

- Input state indication LEDs
- Power indication LED
- RUN/STOP indication LED
- Battery voltage indication LED
- CPU error / Program error ⌉ Indication LED
- Output state indication LEDs

(1) Power Indication

In case the LED will not come on even if the power is turned on, measure across the terminals L/N1 (or across terminals L/N2) for energization condition by the use of a tester, and check the fuse.

If there is no voltage energized, the fuse is assumed to be blown probably due to application of overvoltage or failure falling conductive debris into the PC etc.
In this case, the PC will not recover by replacing the fuse.

Fuse: Dia. 5mm × 20mm glass tube fuse
     250V/1A for F1-10/12/20/30/40
     250V/2A for F1-60 type

Fuse Replacement:

When the top cover is opened with screws at 4 corners removed, the fuse is found on the input/output circuit board incorporated in the case.

If the power LED is not turned on when the fuse is not blown, the PC unit may be faulty.

(2) Battery Voltage Indication

If the battery voltage is dropped when the PC power is turned on, the LED indication is turned on, and the special auxiliary relay M76 is actuated.

Bear in mind that the program contents and a part of other memories backed by battery may not remain upon elapse of approximately. one month after the LED has been turned on. However, regardless of its condition, it is recommended that the battery be replaced every five years.
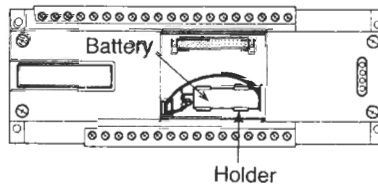
Battery replacement procedure

1. Turn off the power to the programmable controller.

2. Open the panel cover prepared on the front surface of the programmable controller.
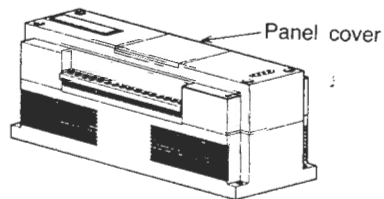
Type F₁ programmable controller

3. Remove the battery from the holder.

Holder

※ The battery unit fitted in Type F1 programmable controller is soldered on a small circuit board, but is compatible with F2-40BL. (spare battery).

4. Make it a rule to keep the battery removed within 3 minutes. Since the battery used is a connector type battery, 30 seconds will be enough time after removing the old battery until inserting a new battery connector.

5. Insert a new battery into the holder, and fit the panel cover.

(3) Program Error Indication

The LED flickers when there occurs negligence of timer/counter constant setting or program circuit failure, or when the program contents are changed due to battery voltage drop, noise interference or invasion of conductive debris falling into the PC. (.....sum check error)
In such a case, re-check the program, and further check the cause of the error.

(4) CPU Error Indication

CPU error is caused by noise interference, conductive debris fallen into the unit or the operation cycle to exceed 0.15 second (the watch-dog-timer error).

This error may also occur in such case when the ROM cassette is plugged/unplugged while the power is applied.

Should the LED comes on, turn off the power to the PC temporarily, and then restore the PC again.

— If the unit is returned to the normal condition by taking above procedure, check the unusual noise generating source, grounding condition, conductive debris, etc.

— In case the LED flickers, perform the check of program error described previously.

Since it is possible that there occurs some memory failure due to execution error of the CPU, it is recommended to check the entire program.

(5) Input Indication

In case of failure of the input LEDs to illuminate, check the on/off status monitoring with programming panel, and check whether input switching device works properly.

Cautions

(1) Bear in mind that the excessive current capacity of input switch may cause contact failure. In addition, the contact failure may occur due to invasion of oil or water etc.

(2) In case the resistor to turn on other LED is prepared in parallel to the input switch, the input to the PC may operate through the parallel circuit even if the input switch is turned off.

(3) Bear in mind that any input to be turned on/off at shorter time than the cycle time of the PC may not be accepted.

(4) Since the occurence of any overload or short-circuit in the DC24V sensor power may actuate the protective circuit, resulting in automatically dropped voltage, thereby all the inputs are inoperative.

In such a case, attempt to disconnect the wiring from 24V terminal.

(6) Output Indication

In case the load will not turn on (or off) whether the output LED is turned on (or off), the following causes can be considered;

(1) The output contact may be melted due to overload, short-circuit, etc. or to roughed contact surface.

(2) Also, make it a rule to check the output terminal or output device for absence of looseness sometimes, as may result in the contact failure.

6-3 Maintenance

The PC does not contain wasting component except a lithium battery.
It is recommended to renew the battery every 5 years as described in former section.

The output relay life is subjected to the frequency of the operations and the load current described in the "Output Handling" section.

The unit installation should be checked to ensure that it has not been contaminated by dust or other contaminations, also that all terminal connections are still tight.

SPECIFICATIONS—Base Unit/Extension Unit

GENERAL SPECIFICATIONS

Power supply	AC110-120V/220-240V single phase 50/60Hz
Power fluctuation	AC93.5-132V/187-264V, power failure 10m sec.
Ambient temperature	0-55°C
Ambient humidity	45-95%, No condensation
Vibration resistance	10-55Hz, 0.5mm (maximum 2G)
Impact resistance	10G, 3 timer to XYZ
Noise immunity	1000VP-P, 1μsec. 30-100Hz (noise simulator)
Insulation withstand voltage	AC1500V, 1 minu. (between earth terminal and all other terminals)
Insulation resistance	5MΩ, 500VDC (between earth terminal and all other terminals)
Grounding	Less than 100Ω (grounding are not required if impossible)
Environment	No corrosive gas, no conductive debris

FUNCTIONAL SPECIFICATIONS (BASE UNIT)

Execution method		Stored programmed cycle execution, collective input/output
Execution speed		Average 12μ seconds/step
Programme language		Relay and logic symbols
Programme capacity		1000 steps
Instructions	Basic sequence	20 instructions (including MC/MCR, CJP/EJP, S/R)
	Stepladder	2 instructions (STL, RET)
	Function block	87 instructions (including +, −, ×, ÷, >, =, <, etc.)
Programme memory		RAM built in, EPROM/EEPROM cassette (option)
Auxiliary relays	Non-retentive	128 points
	Retentive	64 points
	State (retentive)	64 points (can be used as normal keep relays)
	Special relays	16 points
Data register		64 points
Timers	0.1 sec timers	24 points, on-delay timers (0.1-999 seconds)
	0.01 sec timers	8 points, on-delay timers (0.01-99.9 seconds)
Counters (retentive)		30 points, down counter (0-999)
High speed counter (retentive)		1 point, up/down counter (0-999999), maximum 2kHz
Battery back-up		Lithium battery approximately five years life
Diagnosis		Programme check (sum, syntax, circuit, check), watch-dog timer, battery voltage, power supply voltage

INPUT SPECIFICATIONS

| Input device		Non-voltage contacts on PNP open collector transistor
Isolation		Photo-cupler isolated
Input voltage		Built-in power DC24V+4V external power DC24V+8V
Input impedance		Approximately 3.3kΩ
Operation current	OFF→ON	DC 4mA minimum
	ON→OFF	DC 1.5mA maximum
Response time	OFF→ON	Approximately 10ms. (8 points can be changed from 0 to 60ms.)
	ON→OFF	Approximately 10ms. (8 points can be changed from 0 to 60ms.)

OUTPUT SPECIFICATIONS

Output type		Relay output
Isolation		Relay isolated
Output load	Resistance load	2A/point
	Inductive load	35VA/up to 500,000 operations
	Lamp load	100W
Leakage current		0mA
Response time	OFF→ON	Approximately 10m sec
	ON→OFF	Approximately 10m sec

INDIVIDUAL SPECIFICATIONS

Models	F1-12MR-ES F1-10ER-ES	F1-20MR-ES F1-20ER-ES	F-30MR-ES	F1-40MR-ES F1-40ER-ES	F1-60MR-ES F1-60ER-ES
Number of inputs	6 points (F1-12) 4 points (F1-10)	12 points	16 points	24 points	36 points
Number of outputs	6 points	8 points	14 points	16 points	24 points
Terminal block	Fixed terminals			Removable terminals	
Power consumption	18VA	20VA	22VA	25VA	40VA
Input sensor power	0.1A	0.1A	0.1A	0.1A	0.2A

Outlines and Dimensions

M3.5 terminal screws   4-φF
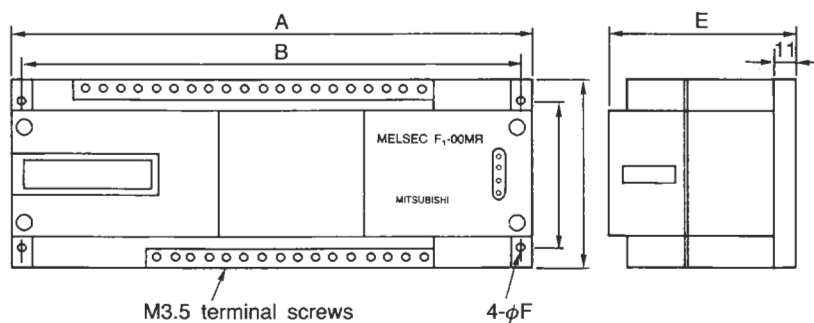
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Weight (kg)
F1-12MR-ES, F1-10ER-ES	165	155	90	70	90	5	Approx. 1.2
F1-20MR-ES, F1-20ER-ES	250	240	90	70	90	5	Approx. 1.5
F1-30MR-ES	275	265	90	70	90	5	Approx. 1.9
F1-40MR-ES, F1-40ER-ES	300	290	110	100	100	5	Approx. 2.3
F1-60MR-ES, F1-60ER-ES	350	335	140	125	100	6	Approx. 3.5