

# MITSUBISHI

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# FL-net(OPCN-2) Interface Module

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User's Manual  
(Hardware)

**QJ71FL71-T-F01**  
**QJ71FL71-B5-F01**  
**QJ71FL71-B2-F01**

Thank you for purchasing the Mitsubishi programmable controller  
MELSEC-Q series.

Prior to use, please read this and relevant manuals thoroughly to  
fully understand the product.

**MELSEC-Q**  
Mitsubishi Programmable  
Controller

MODEL	QJFL71-F01-U-HW
MODEL CODE	13JP09
IB(NA)-0800239-E(0809)MEE	

## ● SAFETY PRECAUTIONS ●

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For safety instructions of the programmable controller system, please read the CPU module user's manual.


In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the  **CAUTION** level may lead to serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

## [Design Precautions]

### CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause erroneous operation.

## [Installation Precautions]

### CAUTION

- Use the programmable controller in an environment that meets the general specifications contained in this manual. Using this programmable controller in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.
- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops. Then, securely mount the module with the fixing hole as a supporting point. Incorrect loading of the module can cause a malfunction, failure or drop. When using the programmable controller in the environment of much vibration, tighten the module with a screw.
- Tighten the screw in the specified torque range. Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.
- Before mounting or dismounting the module, make sure to shut off all phases of the external power supply and FL-net (OPCN-2) system's power supply. Failure to do so may damage the product.
- Do not directly touch the module's conductive parts or electronic components. Touching the conductive parts could cause an operation failure or give damage to the module.

## [Wiring Precautions]

### CAUTION

- When wiring the connectors for external cable connection, crimp or clamp the wires with a tool specified by the manufacture or solder them. An incomplete connection could cause malfunctions.
- Do not connect AUI cables when the programmable controllers on the station where the module is mounted and the FL-net (OPCN-2) system are powered ON.
- Install the connector to the module securely.
- Place the communication and power cables to be connected to the module in a duct or fasten them using a clamp. If not, dangling cables may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunctions due to poor cable contact.
- Tighten the terminal screws with the specified torque.  
If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation.  
Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- When disconnecting a communication or power cable from the module, do not pull the cable part by hand. When disconnecting a cable with a connector, hold the connector connected to the module by hand and pull it out. When disconnecting a cable connected to a terminal block, loosen the screws on the terminal block first before removing the cable. Failure to do so may cause a malfunction or damage to the module and/or cables.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module.  
Such debris could cause fires, damage, or erroneous operation.
- The module has an ingress prevention label on its top to prevent foreign matter, such as wire offcuts, from entering the module during wiring.  
Do not peel this label during wiring.  
Before starting system operation, be sure to peel this label because of heat dissipation.

## Revisions

\* The manual number is given on the bottom right of the cover.

Print Date	*Manual Number	Revision
June, 2002	IB(NA)-0800239-A	First printing
July, 2003	IB(NA)-0800239-B	<p><b>Correction</b></p> <p>About the Manuals, Chapter 1, Chapter 2, Section 3.1, Chapter 4, Section 5.1, 5.2, Chapter 6</p> <p><b>Model addition</b></p> <p>QJ71FL71-T-F01, QJ71FL71-B5-F01</p> <p><b>Model deletion</b></p> <p>QJ71FL71-F01</p>
Mar., 2006	IB(NA)-0800239-C	<p><b>Correction</b></p> <p>SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directive, Chapter 2, Chapter 4, Section 5.2, 5.4, Chapter 6</p>
Dec., 2007	IB(NA)-0800239-D	<p><b>Change of a term</b></p> <p>"PLC" was changed to "programmable controller".</p> <p><b>Correction</b></p> <p>SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directive, Chapter 2, Section 3.1, Chapter 4, Chapter 5, Chapter 6</p>
Sep., 2008	IB(NA)-0800239-E	<p><b>Correction</b></p> <p>Compliance with the EMC and Low Voltage Directives, Chapter 2, Section 3.1, Chapter 4, Section 5.2, Chapter 6</p>

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## About Manual

The following manual is also related to this product.  
If necessary, please place an order for it.

### Related Manual

Manual name	Manual No. (Model code)
FL-net(OPCN-2) Interface Module User's Manual QJ71FL71-T-F01, QJ71FL71-B5-F01, QJ71FL71-B2-F01	SH-080350E (13JR61)

## Compliance with the EMC and Low Voltage Directives

### (1) For programmable controller system

To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to Chapter 9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

### (2) For the product

For the compliance of this product with the EMC and Low Voltage Directives, refer to Section 9.1.3 "Cables" in Chapter 9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

## 1. Overview

This manual explains how to handle the FL-net (OPCN-2) interface module, model numbers QJ71FL71-T-F01, QJ71FL71-B5-F01 and QJ71FL71-B2-F01 (hereinafter referred to as the FL-net module).

(Product composition)

Model name	Product name	Quantity
QJ71FL71-T-F01	QJ71FL71-T-F01 FL-net (OPCN-2) interface module	1
QJ71FL71-B5-F01	QJ71FL71-B5-F01 FL-net (OPCN-2) interface module	1
QJ71FL71-B2-F01	QJ71FL71-B2-F01 FL-net (OPCN-2) interface module	1

## 2. Performance Specifications

The following are the performance specifications of the FL-net module.

Items		Specifications		
		QJ71FL71-B5-F01	QJ71FL71-T-F01	QJ71FL71-B2-F01
		10BASE5	10BASE-T/ 100BASE-TX	10BASE2
Transmission specifications	Data transmission speed	10 Mbps (Half duplex)	10 Mbps (Half duplex) 100 Mbps (Full duplex/ Half duplex)	10 Mbps (Half duplex)
	Transmission method	Base band		
	Electric interface	IEEE802.3 standard (CSMA/CD standard)		
	Transmission protocol	UDP/IP FA link protocol		
	Maximum distance between nodes	2500 m	—	925 m
	Maximum segment length	500 m	100 m	185 m
	Maximum number of nodes in system	254		
	Maximum number of nodes	100/segment	For 10BASE-T, Maximum 4 bases for Cascade connection For 100BASE-TX, Maximum 2 bases for Cascade connection	30/segment
	Minimum node interval	2.5 m	—	0.5 m
	Cyclic data volume	Maximum (8 k bits + 8 k words)/system Maximum (8 k bits + 8 k words)/node		
Message data volume	Maximum 1024 bytes			

Items		Specifications		
		QJ71FL71-B5 -F01	QJ71FL71-T -F01	QJ71FL71-B2 -F01
		10BASE5	10BASE-T/ 100BASE-TX	10BASE2
Link data specifications	Common memory area	Area 1 (bit area): 8 k bits Area 2 (word area): 8 k words		
	Virtual address space and physical memory	—		
	Error log memory area	512 words		
	Status memory area	Bit area: 2 k bits Word area: 2 k words		
	Local node network parameter setting area	128 words		
	Other node network parameter setting area	2048 words		
	Network parameter acquisition area	512 words		
	Device profile memory area	512 words		
	Message area (Transient area)	Maximum 1024 bytes × 2 (1 for each of transmit and receive)		
	Number of input/output points	32 points (I/O assignment: intelligent)		
5V DC internal current consumption	0.50 A	0.50 A	0.60 A (*2)	
Noise resistance	According to the power supply specifications of the station to which the FL-net module is mounted.			
Voltage resistance				
Insulation resistance				
External dimensions	98 (3.86 in.)(H) × 27.4 (1.08 in.)(W) × 90 (3.54 in.)(D) mm			
Weight	0.12 kg	0.11 kg	0.13 kg (*1)	

- \*1: The 5V DC internal current consumption and weight of the product whose first 5 digits of serial No. are 05079 or earlier are as follows:
- 5V DC internal current consumption : 0.70 A
  - Weight : 0.14 kg

For general specifications of the FL-net module, refer to the user's manual for the CPU module that is to be used.



## 3. Mounting and Installation

### 3.1 Precautions when handling

This section explains the precautions for the FL-net module itself.

- (1) The case for the FL-net module is plastic. Do not drop it or expose it to strong impact.
- (2) Before touching the module, always touch grounded metal, etc. to discharge static electricity from human body, etc. Not doing so can cause the module to fail or malfunction.
- (3) Tighten the screws such as module fixing screws within the following ranges.

Screw location	Tightening torque range
External power supply terminal screw (M2.5 screw) (*1)	0.40 N•m
Module fixing screw (Normally not required) (M3 screw) (*2)	0.36 to 0.48 N•m

\*1: External supply power input terminal to be used to supply power to the transceiver for connection to 10BASE5.

\*2: The module can be easily fixed onto the base unit using the hook at the top of the module.

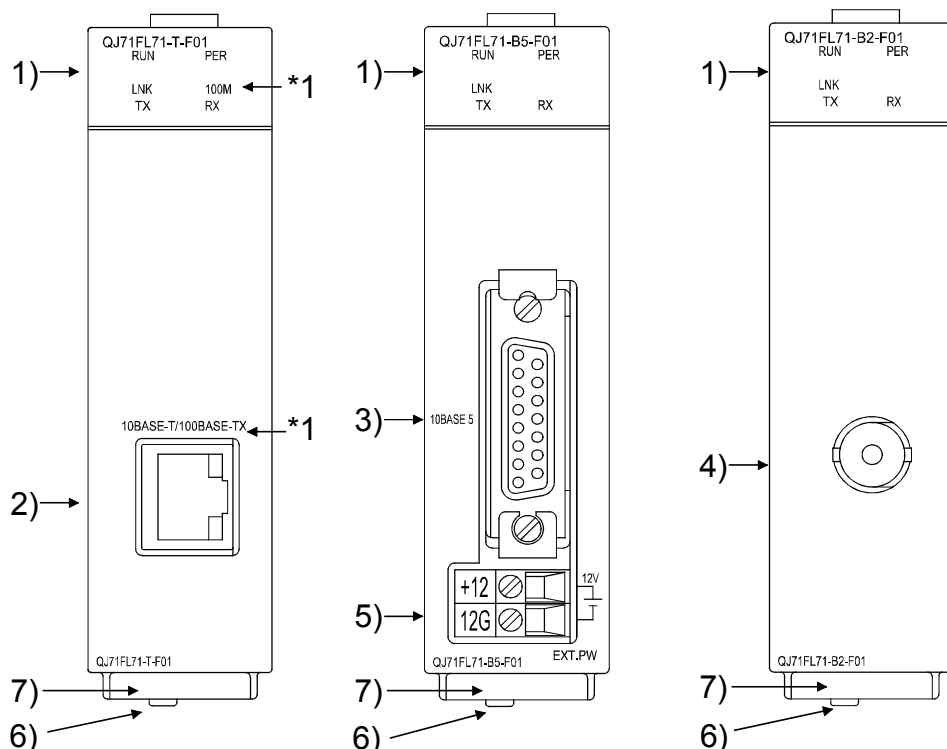
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

### 3.2 Installation environment

Refer to the user's manual for the CPU module that is to be used.

## 4. Name of Parts

The following introduces the functions and names of parts of the FL-net module.



	Name	Description
1)	LED indicator	Refer to (1) LED indication.
2)	10BASE-T/100BASE-TX connector (RJ45) (*2) (for QJ71FL71-T-F01 only)	Connector for connecting FL-net module to 10BASE-T/100BASE-TX. (The FL-net module detects the 10BASE-T or 100BASE-TX according to the hub.)
3)	10BASE5 connector (for QJ71FL71-B5-F01 only)	Connector for connecting FL-net module to 10BASE5. (For connecting 10BASE5 AUI cable (transceiver cable))
4)	10BASE2 connector (for QJ71FL71-B2-F01 only)	Connector for connecting FL-net module to 10BASE2. (For connecting 10BASE2 coaxial cable)
5)	External power supply terminal	Terminal for supplying power to the transceiver in the connection for 10BASE5. (13.28 V to 15.75 V)
6)	Lever for mounting module	Guide for correctly mounting FL-net module to base unit.
7)	Serial number plate	Indicates the serial No. of the FL-net module.

\*1: The following is printed on a product whose serial No. (the first 5 digits) is earlier than 10011.

Although the silkscreen print is different, the LED indications and connector functionality are the same.

Part name	Print
100M LED	No print
10BASE-T/100BASE-TX connector	10BASE-T

Since the high-speed cyclic transmission function (100Mbps) by 100BASE-TX connection has been certified by Japan Electrical Manufacture's Association (JEMA), it can be used from the first released products. (The QJ71FL71-T-F01 only)

\*2: The LED on the connector will not light up.

## (1) LED indications

### 1) LED indicators

QJ71FL71-T-F01

RUN   PER  
   
 LNK   100M  
 TX   RX

LED name	Indication	LED on	LED off
RUN (Green)	Normal operation	Normal	Error (*1)
LNK (Green)	Token passing indicator	Token passing status	No token passing
TX (Green)	Data send status indicator	Sending data	Not sending data
PER (Red)	Network parameter setting	Setting error (*2)	Setting normal
100M (Green)	Transmission speed	100Mbps	10Mbps/ Unconnected
RX (Green)	Data receiving status indicator	Receiving data	Not receiving data

\*1: [RUN]LED turns off under the following conditions.

- Hardware error
- Watchdog timer error

\*2: [PER]LED turns when:

- Setting is outside the range. (e.g. mode, node number, or allocation)
- A critical error is detected.

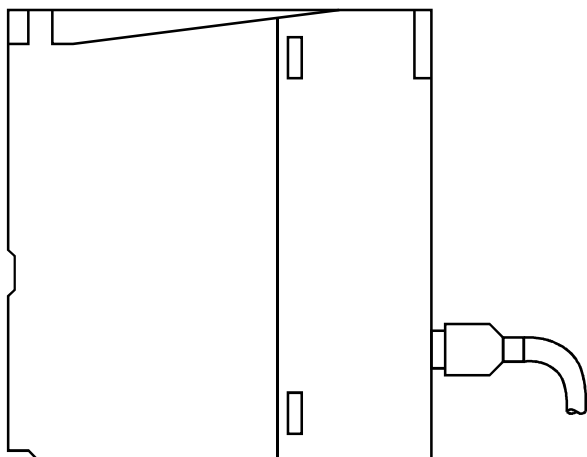
## 5. Connection to a Network

This chapter explains the methods of connecting the FL-net module to a 10BASE5, 10BASE-T/100BASE-TX or 10BASE2 network.

### POINT

The installation of 10BASE5, 10BASE-T/100BASE-TX or 10BASE2 network requires strict adherence to safety precautions. Consult a specialist when connecting cable terminals or installing trunk line cables, etc.

### 5.1 Connecting to 10BASE-T/100BASE-TX network



<Operating procedure>

(Step 1) Connect the twisted pair cable to the hub.

(Step 2) Connect the twisted pair cable to the FL-net module.

### POINT

During the high-speed communication (100 Mbps) via 100BASE-TX connection, a communication error may occur due to the effect of high frequency noise from devices other than programmable controllers in a given installation environment.

The following are countermeasures on the QJ71FL71-T-F01 side to prevent the effect of high frequency noise when constructing network systems.

#### (1) Wiring

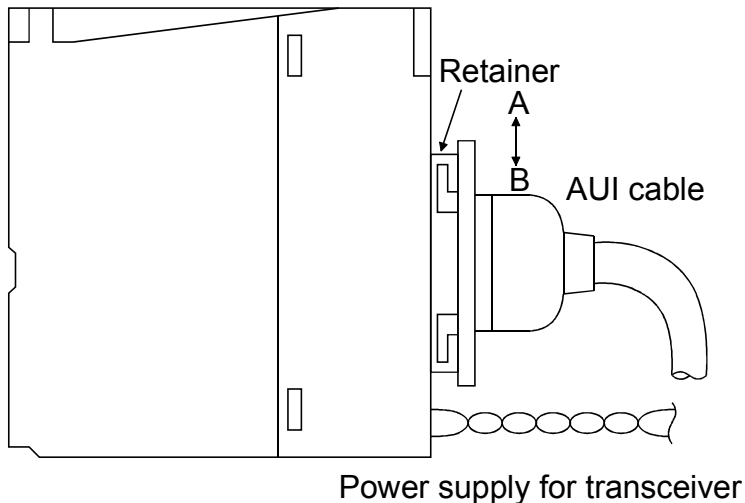
- Do not bundle the twisted pair cables with the main circuit and the power wires, and do not install them close to each other.
- Place the twisted pair cables in a duct.

#### (2) 10 Mbps communication

- Use a data transmission rate of 10 Mbps by changing the hub connected to the QJ71FL71-T-F01 to a 10 Mbps hub.

## 5.2 Connecting to 10BASE5 network

### (1) Connecting an AUI cable



#### <Operating procedure>

- (Step 1) Slide the retainer in direction B
- (Step 2) Insert the AUI connector all the way. (\*1)
- (Step 3) Slide the retainer in direction A
- (Step 4) Check that the AUI cable is locked.

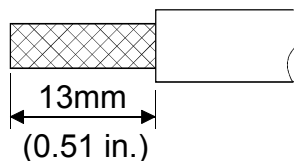
\*1: Never connect the AUI cable when the power to the station with a module mounted is on.

### (2) Wiring to the external power supply terminal (DC power supply for transceiver (\*1))

The following explains how to connect a cable to the external power supply terminal (DC power supply for transceiver).

- 1) Strip the cable jacket back 13mm. (\*2)

The applicable cable size is  $0.13\text{mm}^2$  (AWG26) to  $2.5\text{mm}^2$  (AWG14).



- 2) Loosen the terminal screw and insert the cable into the terminal.
- 3) Tighten the terminal screw within the torque range shown in Section 3.1.

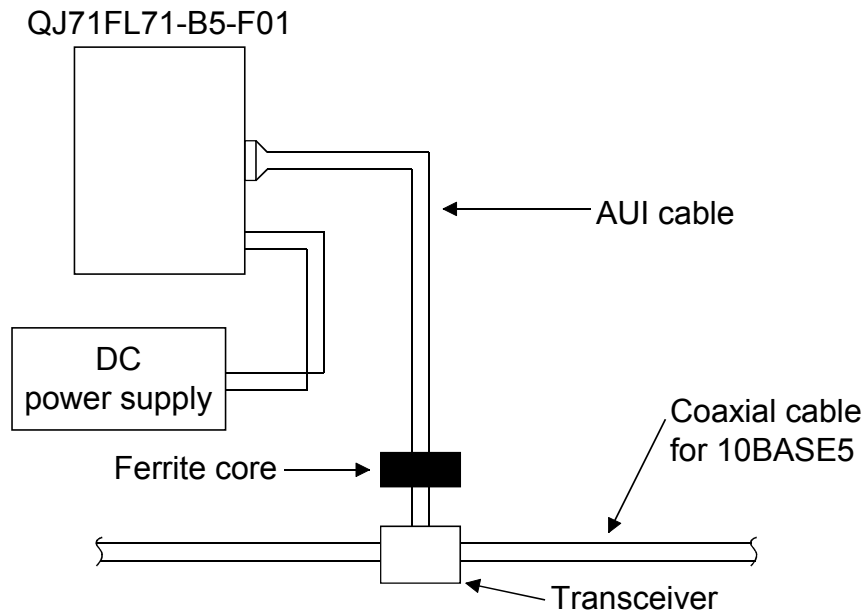
\*1: Use a transceiver that is equipped with a function generally called as SQE TEST or heartbeat (a signal that is used for checking normal transceiver operation after transmission).

\*2: If the wire strip length is too long, the conductive part is exposed and it may increase the risk of electric shock or short circuit between the adjacent terminals. If the wire strip length is too short, it may result in poor contact.

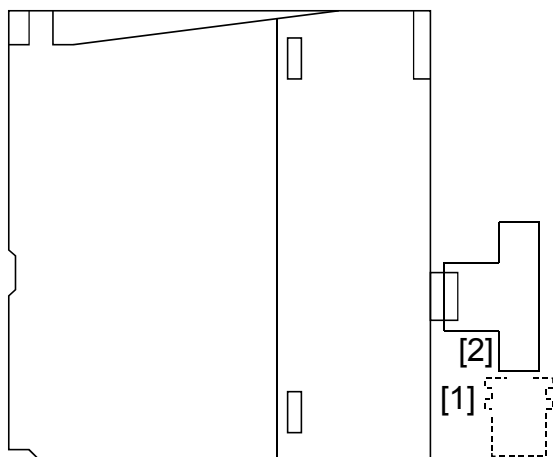
**POINT**

- (1) To prevent a communication error caused by high frequency noise in the installation environment, installing a ferrite core is one of the preventive measures.
- (2) When 10BASE5 is used and countermeasures against noise and high frequency waves are required for the installation environment of the QJ71FL71-B5-F01, attaching a ferrite core (\*1) to the transceiver side of the AUI cable is often effective.

\*1: Can use ZCAT 2032-0930, manufactured by TDK



### 5.3 Connecting to 10BASE2 network



<Operating procedure>

- 1) As shown in figure, align the grooves [1] and tab [2] and push in.
- 2) While pushing the connector in, turn the connector to the right until it locks.
- 3) Confirm that the connector has been locked.

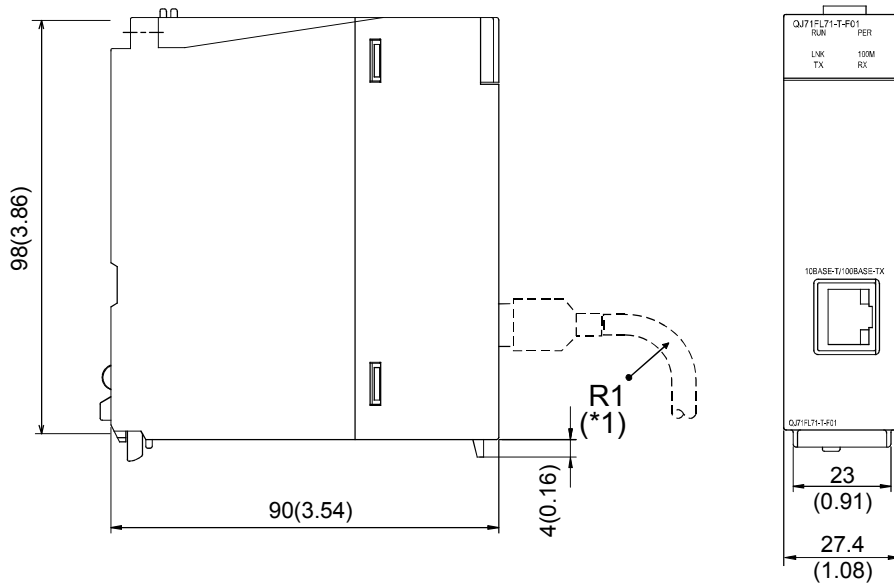
### 5.4 Switch settings for intelligent function module

Intelligent functional module switch settings are performed in "I/O allocation" of GX Developer (SW4D5C-GPPW or later).

	Contents
Switch 1	Set the first digit of the IP address. If set to "No setting (Blank)", the default setting is used. • Default value : 192
Switch 2	Set the second digit of the IP address. If set to "No setting (Blank)", the default setting is used. • Default value : 168 • Setting range : 0 to 255
Switch 3	Set the third digit of the IP address. If set to "No setting (Blank)", the default setting is used. • Default value : 250 • Setting range : 0 to 255
Switch 4	Set the fourth digit of the IP address. (This is the node number.) If set to "No setting (Blank)", the default setting is used. • Default value : 1 • Setting range : 1 to 254
Switch 5	Enter the operating mode of the FL-net module. 0: Online (10Mbps, half duplex) (Default) 1: Offline 2: Loopback test 3: Hardware test 4: Online (Auto negotiation) (Mode to be selected when using 100Mbps, the QJ71FL71-T-F01 only)

## 6. External Dimensions

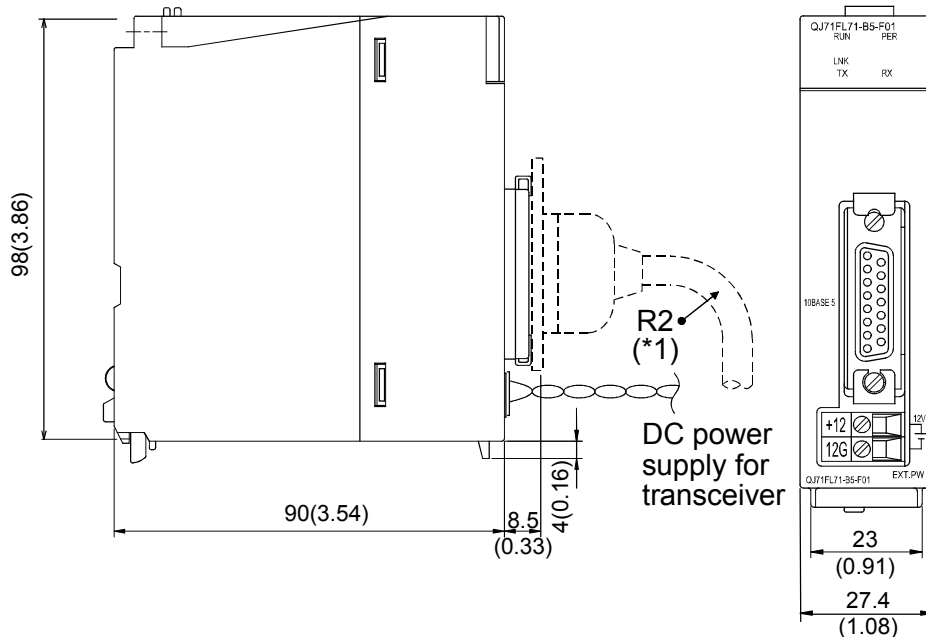
### (1) QJ71FL71-T-F01



(Unit :mm (in.))

\*1: When connecting a twisted pair cable, the bending radius near the connector (reference value: R1) must be four times the cable's outside diameter or larger.

### (2) QJ71FL71-B5-F01

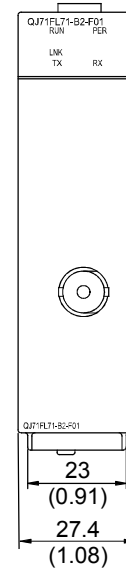
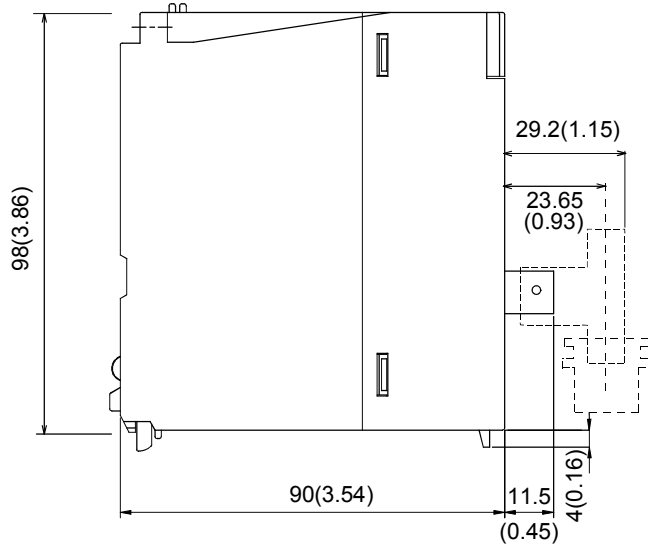


(Unit :mm (in.))

\*1: When connecting a AUI cable, the bending radius near the connector (reference value: R2) must be four times the cable's outside diameter or larger.



(3) QJ71FL71-B2-F01



(Unit :mm (in.))

## Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

### ⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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