MITSUBISHI

PROFIBUS-DP Interface Module

User's Manual

(Hardware)

QJ71PB92D

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	QJ71PB92D-U-HW-JE
MODEL CODE	13JT22
IB(NA)-0800150-F(0807)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

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 the 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".

◇**DANGER**	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠**CAUTION**	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 a 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]

◇**DANGER**

- When a communication error occurs in the PROFIBUS-DP, the status of the faulty station is as follows. Configure an interlock circuit in the sequence program using the communication status information (input X1, buffer memory 2040 (7F8$_H$) to 2079 (81F$_H$)) so that the system can operate safely. Erroneous outputs and mis-operation could cause accidents.
  (1) The input data of the master station maintains the data before abnormality of the communication.
  (2) When the master station is down, the output state of each slave station will be in accordance with the parameter settings.
  (3) When any slave station is down, the output state of other slave stations will be in accordance with the parameter settings of the master station.
- Do not output the "prohibited to use" signal as the output signal to an intelligent function module from the programmable controller CPU.
  Writing data into the "system area" or outputting a signal for "prohibited to use" may cause system malfunction in the programmable controller.

[Design Precautions]

◇DANGER

● When a stop error has occurred to the CPU module, the communication status varies depending on the intelligent function module switch setting of GX Developer as shown below. Set the communication status for when a stop error has occurred to the CPU module according to the system specifications.
(1) When no setting (blank) is made to the switch 1 of the intelligent function module switch setting
    (a) Since the communication with the slave station is continued, values at the time of the CPU module stop error occurrence are held as the output data sent to the slave station from the QJ71PB92D.
    (b) Input data received from slave stations are updated into the buffer memory of the QJ71PB92D.
(2) When 0001H is set to the switch 1 of the intelligent function module switch setting
    (a) Communications with slave stations are interrupted, and output data are not sent.
    (b) Input data received from slave stations are held in the buffer memory of the QJ71PB92D.

[Installation Precautions]

⚠CAUTION
● Use the programmable controller in an environment that meets the general specifications contained in the CPU user's 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.

[Installation Precautions]

⚠CAUTION
● 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. ● Completely turn off the externally supplied power used in the system before mounting or removing the module. Not doing so could result in damage to 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
● Be sure to shut off all phases of the external power supply used by the system before wiring PROFIBUS cables. If you not switch off the external power supply, it will cause failure or malfunction of the module. ● 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. ● Be sure to place the PROFIBUS cables in a duct or clamp them. If not, dangling cables may be shifted or inadvertently pulled, resulting in damages to the module or cables or malfunctions due to poor cable contact. ● When disconnecting the PROFIBUS cable from the module, do not pull by holding the cable section. To disconnect the cable, make sure to hold the connector which is coupled with the module. Do not attempt to pull the cable to disconnect it from the module. It could damage the module or the cable, or cause malfunction due to a poor contact of the cable. ● 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

CONTENTS

About Manual

The following manual is also related to this product.
In necessary, order it by quoting the details in the table below.

Related Manual	

Manual name	Manual No. (Model code)
PROFIBUS-DP Interface Module User's Manual	SH-080127 (13JR22)

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
No additional measures are necessary for the compliance of this product with the EMC and Low Voltage Directives.

1. OVERVIEW

This manual explains how to handle the PROFIBUS-DP Interface module, model numbers QJ71PB92D (hereinafter referred to as QJ71PB92D).
After unpacking QJ71PB92D, confirm that the following products are enclosed.

Model number	Description	Quantity
QJ71PB92D	Model QJ71PB92D PROFIBUS-DP Interface module	1

2. PERFORMANCE SPECIFICATIONS

The performance specifications of the QJ71PB92D are indicated below.

Item			Specifications
PROFIBUS-DP station type			Class 1 master station
Transmission specifications	Electrical standard/characteristics		EIA-RS485 compliant
	Medium		Shielded twisted pair cable (Refer to Section 5.5.1)
	Network topology		Bus topology (Tree topology when repeaters are used)
	Data link method		• Between master station and master station: Token passing method • Between master station and slave station: Polling method
	Encording method		NRZ
	Transmission speed *1		9.6 kbps to 12 Mbps (Refer to (1) in this section)
	Transmission distance		Differs depending on the transmission speed (Refer to (1) in this section)
	Max. No. of repeaters		3 repeaters
	Number of connectable modules (Per segment)		32 per segment*2 (including repeater(s))
	Number of connectable modules (Per network)		126 per network*2 (total of master stations and slave stations)
	Max. No. of slave stations (Per QJ71PB92D)		60 per QJ71PB92D
	I/O data size	Input data	• Normal service mode: 32 bytes per slave station • Extended service mode: Max. 1920 bytes (Max. 244 bytes per slave station)
		Output data	• Normal service mode: 32 bytes per slave station • Extended service mode: Max. 1920 bytes (Max. 244 bytes per slave station)
Number of writes to flash ROM			Max. 100000 times
No. of occupied I/O points			32 (I/O assignment: 32 intelligent points)
Internal current consumption (5VDC)			0.57 A
External dimensions			98(3.86 in.) (H) $\times$ 27.4(1.08 in.) (W) $\times$ 90(3.54 in.) (D) [mm]
Weight			0.15 kg

*1: Transmission speed control within +/- 0.3% (PROFIBUS part 1)

*2: When a slave used is greater than 32 bytes in the maximum data length of the error information, Max. No. of stations and the Max. No. of slave stations may be less than the above values.
For details, refer to the PROFIBUS-DP Interface Module User's Manual.

For the noise immunity, withstand voltage, insulation resistance and others in the programmable controller system using this module, refer to the power supply module specifications given in the used CPU module user's manual.

(1) Transmission distance

Transmission speed	Transmission distance	Max. Transmission distance when repeater is used [1]
9.6 kbps	1200 m (3937 ft.)/segment	4800 m (15748 ft.)/network
19.2 kbps		
93.75 kbps		
187.5 kbps	1000 m (3281 ft.)/segment	4000 m (13123 ft.)/network
500 kbps	400 m (1312 ft.)/segment	1600 m (5249 ft.)/network
1.5 Mbps	200 m (656 ft.)/segment	800 m (2625 ft.)/network
3 Mbps	100 m (328 ft.)/segment	400 m (1312 ft.)/network
6 Mbps		
12 Mbps		

*1: The max. transmission distance in the table above is based on the case where 3 repeaters are used.
The calculation formula for the transmission distance extended using a repeater(s) is:
Max. transmission distance [m/network] = (Number of repeaters + 1) $\times$ Transmission distance [m/segment]

3. INSTALLATION

This chapter provides the handling precautions, from unpacking to installation of the QJ71PB92D.
For details on implementation and installation of the QJ71PB92D, refer to the "QCPU User's Manual (Hardware Design, Maintenance and Inspection)."

3.1 Handling Precautions

(1) Do not drop the module case or subject it to heavy impact since it is made of resin.

(2) Do not remove the PCB of each module from its case. This may cause a failure in the module.

(3) Be careful not to let foreign objects such as wire chips enter the module during wiring. In the event any foreign object enters, remove it immediately.

(4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire burrs from entering the module during wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.

(5) Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
Failure to do so may cause a failure or malfunctions of the module.

(6) Tighten the screw such as module fixing screws within the following ranges.

Screw location	Tightening torque range
Module fixing screw (M3 screw) [1]	0.36 to 0.48 N • m
PROFIBUS cable connector mounting screws (#4 - 40UCN)	0.20 to 0.28 N • m

*1: The module can be easily fixed onto the base unit using the hook at the top of the module.
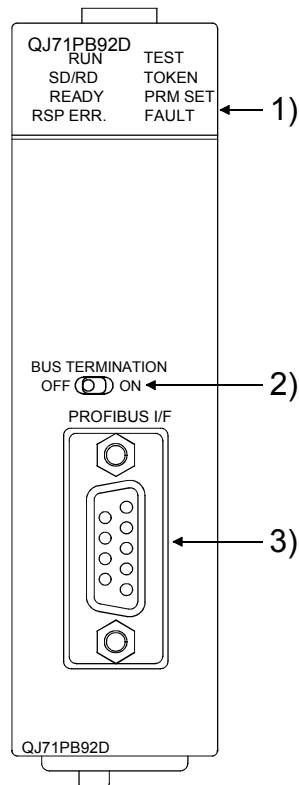However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

3.2 Installation Environment
Refer to QCPU User's Manual (Hardware Design, Maintenance and Inspection).

4. PART NAMES AND SETTINGS

Following is an explanation of the QJ71PB92D part names and settings.

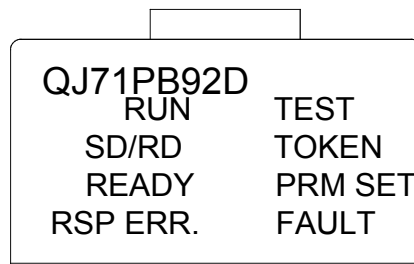| No.	Name	Description
1)	LED	These LEDs indicate the operation status of the QJ71PB92D. For details, refer to (1) in this chapter.
2)	PROFIBUS network terminal resistance setting switch[1]	The switch for setting the bus terminator built in the QJ71PB92D. (Default: OFF) ON : Bus terminator OFF: No bus terminator For details, refer to Section 5.2.
3)	PROFIBUS interface connector[2]	This connector connects the PROFIBUS cable to the QJ71PB92D.

*1: Operate the PROFIBUS network terminating resistor setting switch with your fingertips. Do not use a screwdriver or similar tool. To do so may damage the switch.

*2: For the connector type, use a male D-Sub 9 pin. The user creates the PROFIBUS cable.
(for information regarding the cable wiring, refer to Section 5.1.)
The size of the screw which can be used for the connector is #4-40 UNC.

(1) LED

```
         ┌────┐
  ┌──────┴────┴──────┐
  │ QJ71PB92D         │
  │  RUN      TEST    │
  │  SD/RD    TOKEN   │
  │  READY    PRM SET │
  │  RSP ERR. FAULT   │
  └──────────────────┘
```

LED	Status	Description
RUN	ON	Normally operating
	OFF	Hardware error (watchdog timer error) or power failure
SD/RD	ON	Exchanging I/O data*1
	Flashing	
	OFF	Not communicating with slave station
READY	ON	Ready to communicate or communication being performed
	OFF	Not ready to communicate or no communication
RSP ERR.	ON	A communication error has occurred
	OFF	No communication error
TEST	ON	Executing self-diagnosis or flash ROM initialization
	Flashing	Executing self-diagnosis
	OFF	Not executing self-diagnosis or flash ROM initialization
TOKEN	ON	Token being passed *2
	Flashing	
	OFF	No token passing *2
PRM SET	ON	Operating in Parameter setting mode (MODE 1)
	Flashing	The written parameters are invalid
	OFF	Operating in operation mode other than Parameter setting mode (MODE 1)
FAULT	ON	An error has occurred
	OFF	Normally operating

*1: The LED flashes at intervals based on the value set in "Data control time" in Master Parameters.
*2: The LED status during token passing varies depending on the number of DP-Masters within the same network and the transmission speed setting. For details, refer to (2) in this chapter.

(2) TOKEN LED status

| No. of master station within the same network	Transmission speed	
	19.2k bps or less	93.75k bps or more
1	ON	
More than 1	Flashing	ON or OFF

5. WIRING

5.1 PROFIBUS Cable Wiring

The following describes the pin assignments of the PROFIBUS interface connector on the QJ71PB92D, the PROFIBUS cable wiring specifications, bus terminator and other information.

(1) Pin assignments of the PROFIBUS interface connector

The following shows the pin assignments of the PROFIBUS interface connector (D-sub 9-pin female connector) on the QJ71PB92D.
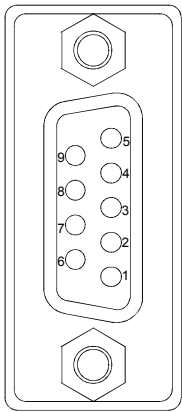
Pin No.	Signal code	Name	Description	Cable color
1	—	SHIELD [1]	Shield, Protective Ground	—
2	—	—	Open	—
3	B/B'	RxD/TxD-P	Receive/send data-P	Red
4	—	—	Open	—
5	C/C'	DGND[2]	Data Ground	—
6	—	VP[2]	Voltage +	—
7	—	—	Open	—
8	A/A'	RxD/TxD-N	Receive/send data-N	Green
9	—	—	Open	—

[1]: Optional signal.

[2]: When the terminal resistance value of building into is mode it is, signal is used. Wiring is not needed.
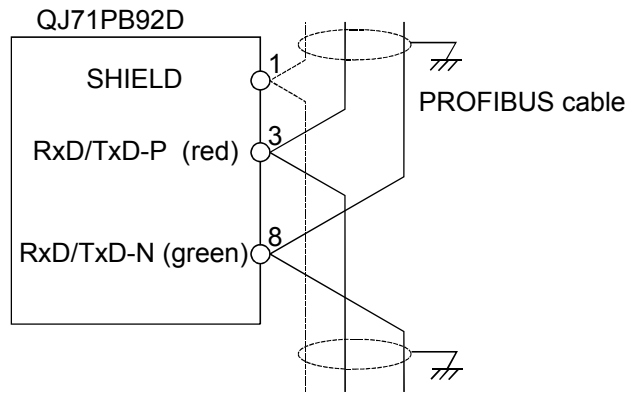
(2) PROFIBUS cable

The following shows the PROFIBUS cable and wiring specifications.

(a) PROFIBUS cable

Use a PROFIBUS cable that meets the following specifications (EN 50170 Volume 2 Type A compliant).

Item	Transmission line
Applicable cable	Shielded twisted pair cable
Impedance	135 to 165 Ω (f=3 to 20 MHz)
Capacity	Less than 30 pF/m
Conductor resistance	Less than 110 Ω /km
Cross-sectional area	0.34mm^2 or more (22AWG)

(b) Wiring specifications

QJ71PB92D

SHIELD — 1
RxD/TxD-P (red) — 3
RxD/TxD-N (green) — 8

PROFIBUS cable

(3) Connector
Use a D-sub 9-pin male connector for the PROFIBUS cable.
The applicable screw size is #4-40 UNC.

(4) PROFIBUS equipment
The PROFIBUS cables, connectors and other PROFIBUS equipment must be purchased or obtained at user's discretion.
For details on PROFIBUS equipment, access the following website.
• PROFIBUS International: http://www.profibus.com/

5.2 Terminator Switch

(1) Terminator switch
Whether or not to set the built-in module terminal resistance (1/2W 220 Ω x 2 units) can be selected by connecting a switch. (The stations on both ends of the PROFIBUS segment must be connected with terminal resistor.)

BUS TERMINATION
OFF ⊙ ON
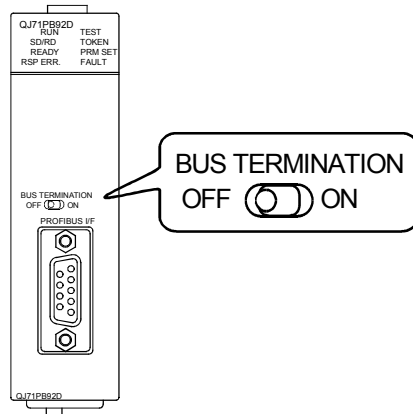
Silk display	OFF	ON
BUS TERMINATION	Disconnects terminal resistor (setting at time of shipment)	Connects terminal resistor

(2) When the QJ71PB92D's bus termination switch is set to on (has terminal resistor).
Do not remove the PROFIBUS cable from the QJ71PB92D during PROFIBUS-DP network operation. If the cable is removed, then the terminal resistor in the network will disappear, causing an error and bringing down the network.

5.3 Precautions Against Wiring

As one of the requirements to give full play to QJ71PB92D's functions and make up the system with high reliability, it is necessary to have an external wiring unsusceptible to an influence of noise. Precautions against external wiring of QJ71PB92D is described below.

(1) Communication cable wiring
Do not route the wire of QJ71PB92D close to or bundle it together with the main circuit and high-tension lines, or the load-carrying lines from other than the programmable controller. Otherwise, the module may be susceptible to an influence of noise and surge induction.

(2) Wiring from I/O modules among programmable controllers
Keep the PROFIBUS cable away from I/O module cables as much as possible.
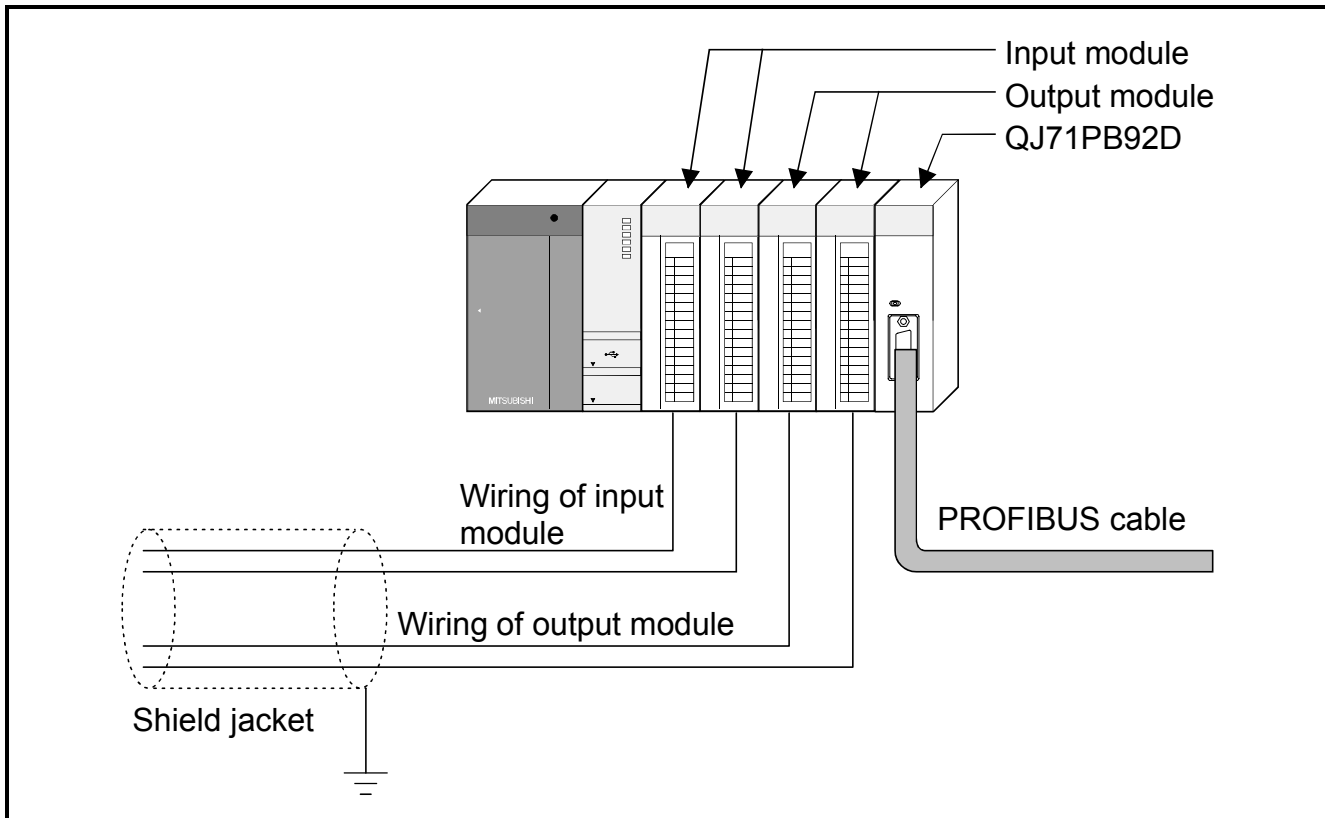
(3) Grounding
(a) When using the QJ71PB92D, ground the FG and LG terminals of the power supply module of the programmable controller.

(b) Grounding the module and other device with the same FG terminal may apply noise through the FG terminal and result in a communication error. If this error occurs, disconnect the FG terminal from the module.
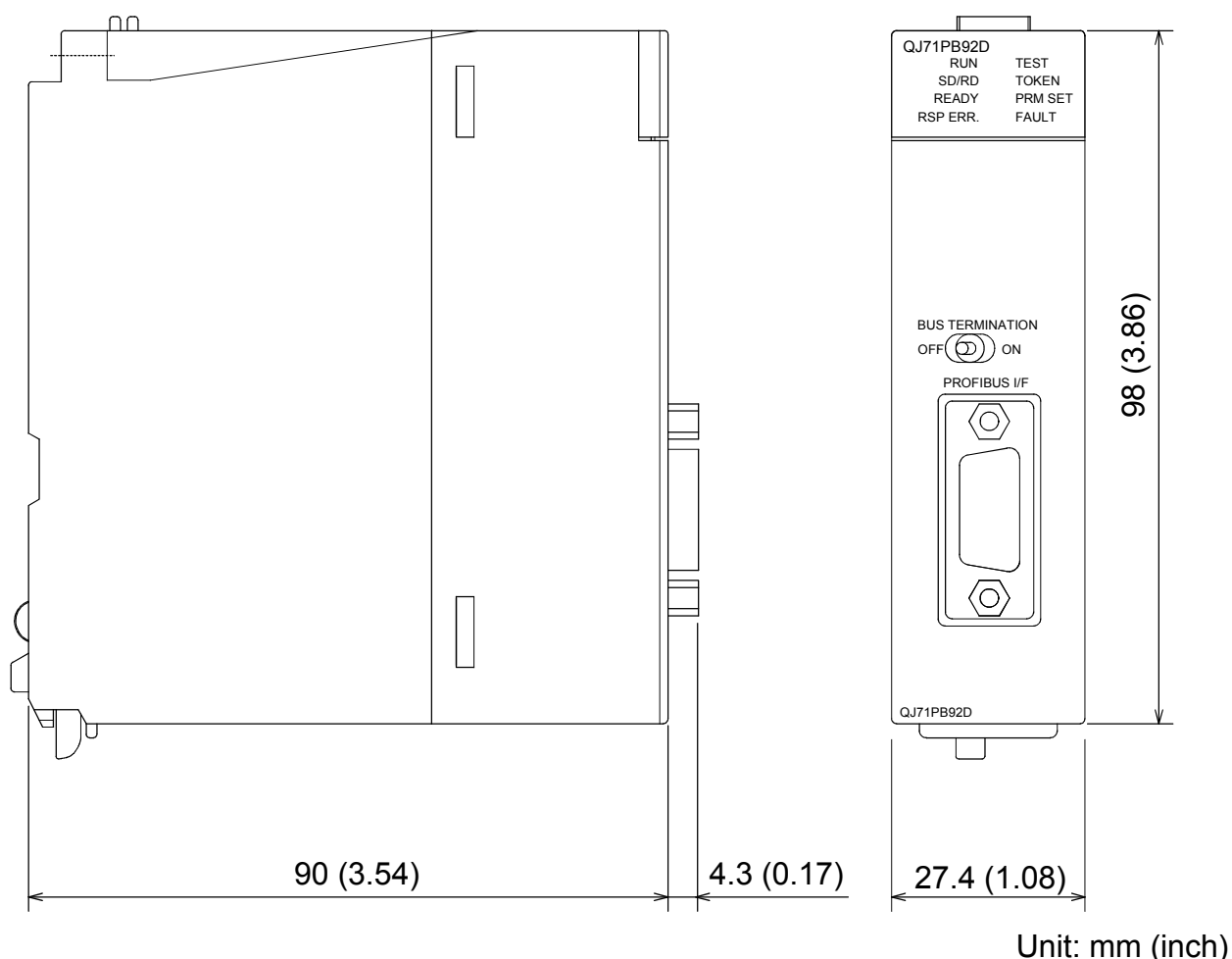
6. SETTING FROM GX DEVELOPER

Whether to continue or stop the I/O data communication with the slave station when the CPU stop error occurs is set by the intelligent function module switch setting.

Switch No.	Description
Switch 1	Set whether to continue or stop the I/O data communication with the slave station when the CPU stop error occurs.[1] Continue : No setting (blank) Stop : 0001H
Switch 2	No setting (blank). If any setting exists, delete it.
Switch 3	
Switch 4	
Switch 5	

[1] Select the QJ71PB92D whose serial No. (first 5 digits) is 06042 or later.

7. EXTERNAL DIMENSIONS

QJ71PB92D	
RUN	TEST
SD/RD	TOKEN
READY	PRM SET
RSP ERR.	FAULT

BUS TERMINATION
OFF ON

PROFIBUS I/F

QJ71PB92D

98 (3.86)

90 (3.54) 4.3 (0.17) 27.4 (1.08)

Unit: mm (inch)

All other company names and product names used in this manual are trademarks or registered trademarks of their respective companies.

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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