MITSUBISHI

PROFIBUS-DP Slave Module

User's Manual

(Hardware)

QJ71PB93D

Thank you for buying the Mitsubishi general-purpose programmable controller MELSEC-Q Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

MELSEC-Q
Mitsubishi Programmable Controller

MODEL	QJ71PB93D-U-H-JE
MODEL CODE	13JT96
IB(NA)-0800230-C(0808)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.
These instructions apply only to this product.
Refer to the user's manual of the CPU module to use for a description of the programmable controller system safety instructions.
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.

[Installation Precautions]

⚠CAUTION

- Use the programmable controller under the environment specified in the user's manual of the CPU module to be used.
  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.
- 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. Failure to do so may result in failure or malfunctions 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

* The manual number is noted at the lower left of the back cover.

Print Date	*Manual Number	Revision
Apr., 2002	IB(NA)-0800230-A	First printing
Apr., 2004	IB(NA)-0800230-B	Partial correction Conformation to the EMC Directive and Low Voltage Instruction, Chapter 2, Section 3.1
Aug., 2008	IB(NA)-0800230-C	Partial correction SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directives, Chapter 2, Section 3.1, 5.1, 5.2

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 Slave Module User's Manual	SH-080318E (13JR57)

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 is the user's manual for the QJ71PB93D PROFIBUS-DP slave module (hereafter abbreviated as "QJ71PB93D"), which is used to connect a MELSEC-Q series programmable controller to a PROFIBUS-DP network.
The QJ71PB93D operates as a slave station in the PROFIBUS-DP network.
After unpacking QJ71PB93D, verify that the following parts are contained.

Model	Product name	Quantity
QJ71PB93D	QJ71PB93D PROFIBUS-DP slave module	1

2. Performance Specifications

The performance specifications of the QJ71PB93D are indicated below.
For the general specifications of the QJ71PB93D, refer to the user's manual of the used CPU module.

Item		Specifications
PROFIBUS-DP station type		Slave station (Complies with EN50170 Volume2 (Part 1, 2, 3, 4, 8))
Station numbers that may be set		0 to 125 *2
Max. number of data that may be communicated		Number of I/O data is 192 words in total. (Size of I/O data is up to 122 words.)
Transmission specifications	Electrical standard/characteristics	Complies with EIA-RS485
	Medium	Shielded twisted pair cable (Type A) (Refer to Section 5.2)
	Network topology	Bus topology (Tree topology when repeaters are used)
	Data link method	Polling method
	Encoding 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)
	Maximum number of repeaters	3 units (Refer to (1) in this section)
	Number of connectable modules (Per segment)	32 units (including repeaters)
Flash ROM write count		Max. 10000 times
Number of occupied I/O points		32 points (I/O assignment : 32 intelligent points)
5VDC Internal power consumption		0.44 A
External dimensions		98(3.86) (H) x 27.4(1.08) (W) x 90(3.55) (D) [mm(inch)]
Weight		0.11 kg

*1: Transmission speed control within +/- 0.3% (EN50170 Volume 2 compliant)
*2: Factory-set to "126" (EN50170 Volume 2 compliant)
Set a station number within 0 to 125 for I/O data communication.

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 repeater + 1) x Transmission distance [m/segment]

3. Installation

The following section explains the precautions when handling the QJ71PB93D, from the time they are unpacked until they are installed.
For more details on the module installation, refer to the user's manual for the CPU module used.

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 burrs enter the module during wiring. In the event any foreign object enters, remove it immediately.

(4) 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.

(5) 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.

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

Screw location	Tightening torque range
Module fixing screws (M3 screws)*1	0.36 to 0.48 N · m
PROFIBUS cable connector screws (#4 - 40UCN screws)	0.20 to 0.28 N · m

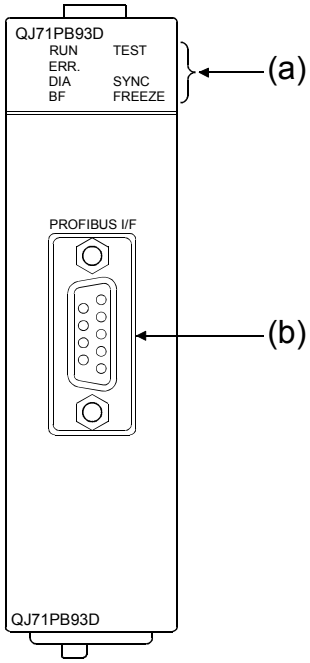
*1: The module can be easily fixed onto the base unit using the hook at the top of the module.
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

3.2 Installation environment

Refer to user’s manual of the CPU module used.

4. Part Names and Settings

Following is an explanation of the QJ71PB93D part names and settings.



No.	Name	Description		Remark
(a)	LED	Displays the QJ71PB93D status.		-
		Name	Display description	
		RUN	ON : Normal OFF : Hardware error (module watchdog timer error) or power failure	
		ERR.	ON : Parameter setting error or module error occurrence OFF : Normal	
		SYNC	ON : During SYNC mode	
		FREEZE	ON : During FREEZE mode	
		DIA	ON : Extended trouble information present OFF : Extended trouble information absent (Related item: Section 3.4.2 (9))	
		BF	ON : Before data communication or communication error detected OFF : During data communication	
		TEST	ON : During execution of self-diagnostics	
(b)	PROFIBUS interface connector	Connector for connecting the table for the PROFIBUS-DP network.		*1

*1: For the connector type, use a male D-Sub 9 pin. The PROFIBUS cable must be created by the user. (for information regarding the cable wiring, refer to Item 5.5.)
The size of the screw which can be used for the connector is #4-40 UNC.

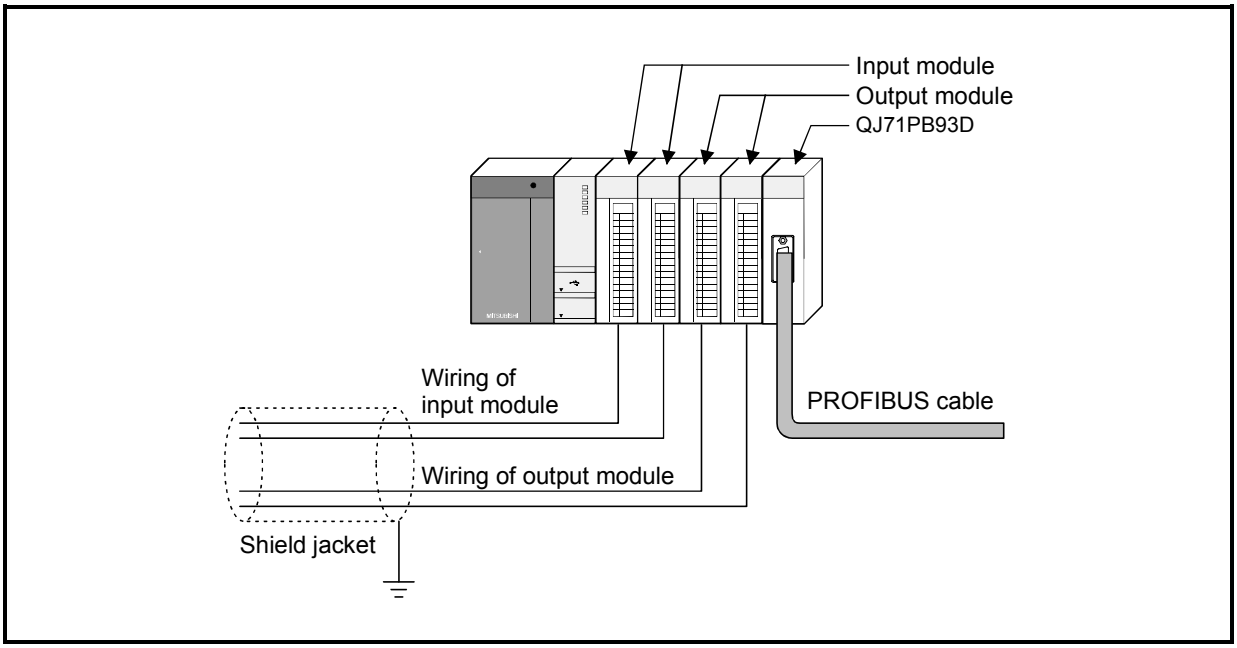
5. Wiring

5.1 Precautions against wiring

As one of the requirements to give full play to QJ71PB93D'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 QJ71PB93D is described below.

(1) Do not install the QJ71PB93D communication cable together with the main circuit, power lines and/or load carrying wires for other than the programmable controller, or bring them close.
Doing so may cause the QJ71PB93D to be affected by noise and surge induction.

(2) The wires from the input/output modules of the programmable controller should be away from the communication cable as far as possible as shown in the figure below.



(3) Grounding

(a) When using the QJ71PB93D, basically ground the FG and LG terminals of the power supply module of the programmable controller.

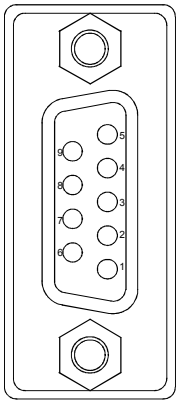
(b) Grounding the module and other device with the same FG terminal may apply noise through the FG terminal and result in a communication error. If this error occurs, disconnect the FG terminal from the module.

5.2 PROFIBUS cable wiring

The following describes the pin assignments of the PROFIBUS interface connector on the QJ71PB93D, 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 QJ71PB93D.



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: Signal used to connect the bus terminator.

(2) PROFIBUS cable

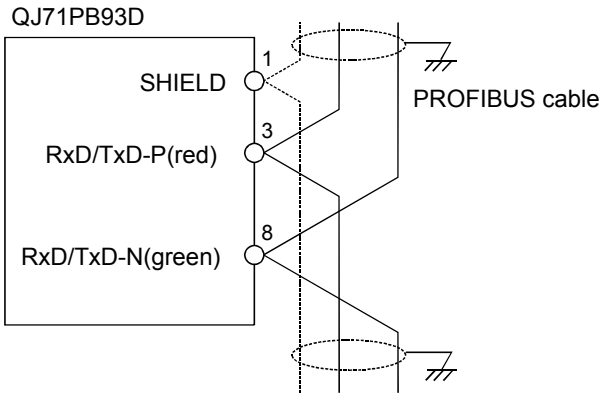
The following shows the PROFIBUS cable and wiring specifications.

(a) PROFIBUS cable

Use a PROFIBUS cable that meets the following specifications (EN50170 Volume 2: Type A compliant).

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

(b) Wiring specifications

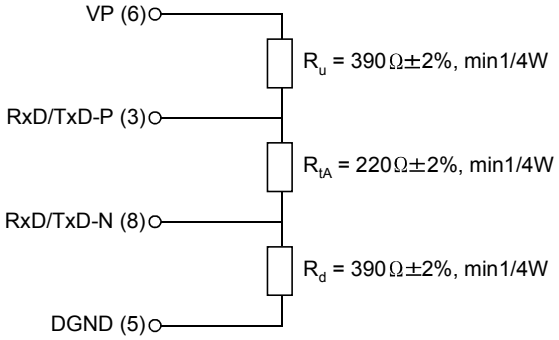


(3) Connector

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

(4) Wiring specifications for bus terminator

When the QJ71PB93D is a terminal station, use a connector with built-in bus terminator that meets the following wiring specifications.

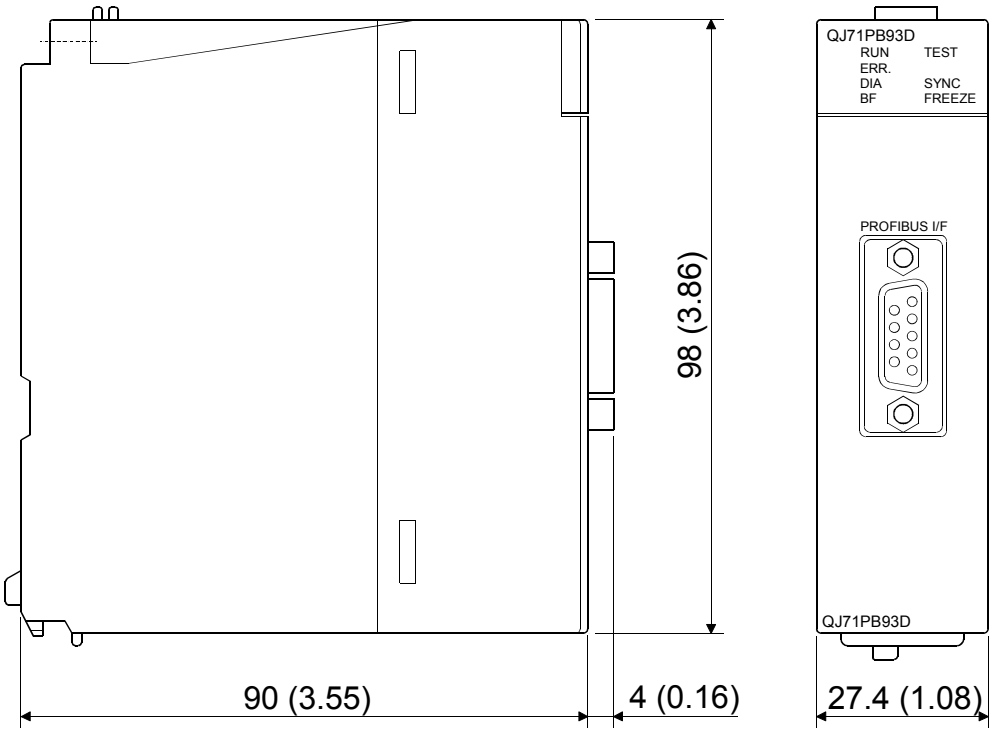


(5) PROFIBUS equipment

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/

6. External Dimensions



Unit: mm (inch)

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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