

mitsubishi

DeviceNet Master -Slave Module

User's Manual
(Hardware)

QJ71DN91

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

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

MELSEC-Q
Mitsubishi Programmable
Logic Controller

MODEL	QJ71DN91-U-H-JE
MODEL CODE	13JT21
IB(NA)-0800149-B(0603)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 User's Manual of the CPU module to use.

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

- If a communications error occurs to a device network, the node in such a communications error will be in a state as follows:
 - (1) The master node (QJ71DN91) maintains input data which had been received from the slave node before the error occurred.
 - (2) Whether the slave node's output signal is turned off or maintained is determined by the slave node's specifications or the parameters set at the master node. When using QJ71DN91 as a slave node, the entered data from master node before the faulty node is maintained.By referring to communications states of the slave node, arrange an interlock circuit in a sequential program and provide safety mechanism externally of the slave node in order the system to operate safely.

[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 300 mm (11.8 inch) or more from each other. Not doing so could result in noise that may cause malfunction.

[INSTALLATION PRECAUTIONS]

CAUTION

- Use the PLC in an environment that meets the general specifications contained in the CPU User's Manual to use. Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, 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. If the module is not installed properly, it may cause the module to malfunction, fail or fall off. Secure the module with screws especially when it is used in an environment where constant vibrations may occur.
- Tighten the screws within the range of specified torque. If the screws are loose, it may cause fallout, short circuits, or malfunction. If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Before mounting/dismounting the module, be sure to shut off all phases of external power supply used by the system. Failure to do so may cause product damage.
- Do not directly touch the conductive area or electronic components of the module. Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

DANGER

- Make sure to shut off all the phases of the external power supply before starting installation or wiring. Otherwise, the personnel may be subjected to an electric shock or the product to a damage.

CAUTION

- Be careful not to let foreign matters such as sawdust or wire chips get inside the module.
These may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when 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.
- Be sure to fix communication cables or power supply cables leading from the module by placing them in the duct or clamping them.
Cables not placed in the duct or without clamping may hang or shift, allowing them to be accidentally pulled, which may cause a module malfunction and cable damage.
- Do not pull cables by holding them with a hand for removing the cables that are connected to the module. To remove a cable having a connector, hold the connector connected to the module with a hand. To remove a cable not having a connector, loosen the screws fastening to connect the module. The cables being pulled while they are still connected to the module could break the module or cables, or cause an operation error resulting from a contact error.

Revisions

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

Print Date	*Manual Number	Revision
Nov., 2000	IB(NA)-0800149-A	First edition
Mar., 2006	IB(NA)-0800149-B	<div style="border: 1px solid black; display: inline-block; padding: 2px;">Model addition</div> SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directives, Section 3.1

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

© 2000 MITSUBISHI ELECTRIC CORPORATION

CONTENTS

1. Overview.....	1
2. Performance Specification.....	2
2.1 Performance specifications.....	2
2.1.1 Maximum transmitting distance when thick and thin cables coexist...	3
3. Loading and Installation.....	3
3.1 Handling precautions.....	3
3.2 Installation environment.....	4
4. Component Names and Settings.....	4
4.1 Meanings of the LED displays.....	5
4.2 Node number setting switch.....	5
4.3 Mode switch.....	6
5. Wiring.....	7
5.1 Wiring the communications cable.....	7
6. External Dimension Diagram.....	8

About the Manuals

The following manuals are also related to this product.
Order them if necessary.

Relevant Manual

Manual name	Manual No. (Model code)
DeviceNet Master/Slave Module User's Manual QJ71DN91/GX Configurator-DN(SW1D5C-QDNU-E)	SH-080143 (13JR32)

Compliance with the EMC and Low Voltage Directives

When incorporating the Mitsubishi PLC into other machinery or equipment and keeping compliance with the EMC and low voltage directives, refer to Chapter 3, "EMC Directives and Low Voltage Directives" of the User's Manual (Hardware) included with the CPU module or base unit used.

The CE logo is printed on the rating plate of the PLC, indicating compliance with the EMC and low voltage directives.

By making this product conform to the EMC and low voltage directives, it is not necessary to make those steps individually.

1. Overview

This manual explains the specifications and name of each part for QJ71DN91 type device net master/slave module (hereinafter abbreviated as QJ71DN91) that is used in combination with MELSEC-Qseries PLC CPU.

Please see DeviceNet Specification Manual (Release 2.0), Volumes 1 and 2, for the specifications of DeviceNet.

DeviceNet is a registered trademark of Open DeviceNet Vendor Association, Inc.

First, open the package of the QJ71DN91 and check that the following is included.

Model	Product name	Quantity
QJ71DN91	QJ71DN91 DeviceNet Master/Slave Module	1
	Terminal resistor 121Ω, 1/4W	2
	Connector	1

2. Performance Specification

2.1 Performance specifications

The performance specifications of the QJ71DN91 are shown below.

Refer to the User's Manual of the CPU in use for the general specifications of the QJ71DN91.

Item		Specifications					
Communications specifications	When master function	Node type		Device net master (Group 2 only client)			
		Node numbers which can be set		0 to 63			
		Number of connections that can be created	Message connection		63		
			I/O connection		63 (polling, bit strobe, change of state, cyclic)		
		Amount of communication data	I/O communication	Send	Max. 4096 points (512bytes), max.256 bytes per 1 node		
				Receive	Max. 4096 points (512bytes), max.256 bytes per 1 node		
			Message communication	Send	Max. 240 bytes		
	Receive			Max. 240 bytes			
	When slave function	Node type		Device net slaves (Group 2 server)			
		Setting possible node number		0 to 63			
Number of connections that can be created		I/O connection		1 (polling)			
		Amount of communication data	I/O communication	Send	Max. 1024 points (128 bytes)		
Receive	Max. 1024 points (128 bytes)						
Communications speed		One speed can be selected from 125kbps, 250kbps, and 500kbps.					
Maximum cable length		Communi-cations speed	Maximum transmitting distance of trunk line			Length of drop line	
			Thick Cables	Thick and Thin Cables	Thick and thin cables coexist	Maximum	Total
				500m	6m		
250m	78m						
100m	39m						
Current consumption required on the network		0.03A					
Number of times to write flash ROM		Max. 100000 times					
No. of I/O occupied points		32 points (I/O allocation: Intelligent 32 points)					
5VDC internal current consumption		0.17A					
Weight		0.11kg					

*1: The maximum cable length complies with that in the device net specification (Release 2.0) Volumes 1 and 2.

2.1.1 Maximum transmitting distance when thick and thin cables coexist

The table below lists both the maximum transmitting distance when thick and thin cables coexist.

Communications speed	Maximum transmitting distance of trunk line when thick and thin cables coexist
125kbaud	Thick cable length+5 × Thin cable length \leq 500m
250kbaud	Thick cable length+2.5 × Thin cable length \leq 250m
500kbaud	Thick cable length+Thin cable length \leq 100m

3. Loading and Installation

The following section explains the precautions when handling the QJ71DN91 from the time they are unpacked until they are installed.

For more details on the loading and installation of the module, refer to the User's Manual for the PLC CPU used.

3.1 Handling precautions

- (1) Do not drop the module casing or connector, or do not subject it to strong impact.
- (2) Do not remove the printed-circuit board 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 get inside the module.
These may cause fire, breakdown or malfunction.
- (4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire chips 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 fixing screws using the torque within the range listed below.
If the screws are not tightened securely, it may cause short-circuit, breakdown or malfunction.

Screw location	Tightening torque range
Module fixing screws (M3 screws)	0.36 to 0.48N•m
DeviceNet connector mounting screw	0.353 to 0.480N•m
DeviceNet connector wire mounting screw	0.608 to 0.823N•m

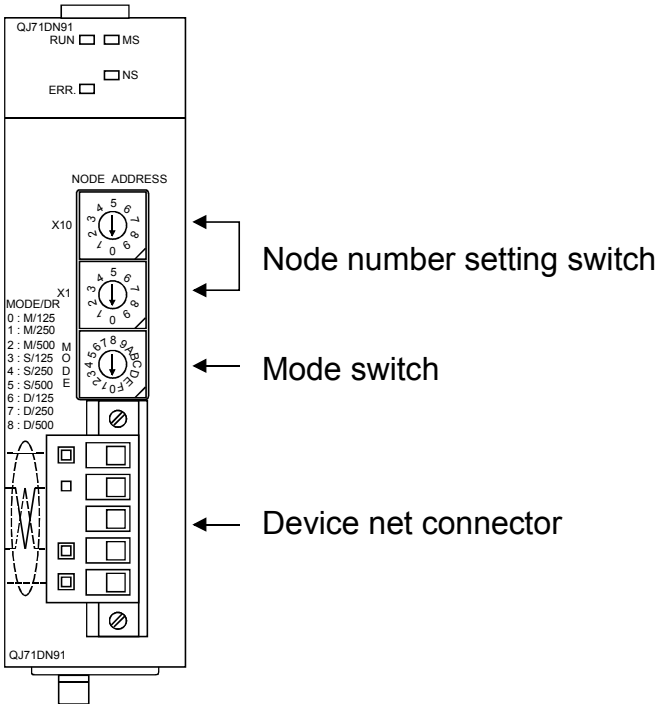
- (7) To mount the module on the base unit, securely insert the module mounting latches into the mounting holes on the base unit.
Improper installation may result in a malfunction or breakdown of the module, or may cause the module to fall off.

3.2 Installation environment

For more details on the installation environment, refer to the User's Manual for the PLC CPU module used.

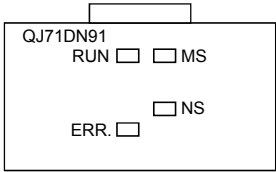
4. Component Names and Settings

The following chapter describes the component names of the QJ71DN91, the meanings of the LED displays, and the setting procedure of the switches.



4.1 Meanings of the LED displays

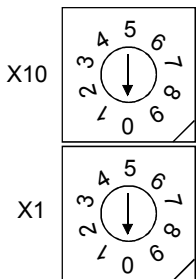
The following explains the names and meanings of the LEDs located on the top surface of the QJ71DN91 when the mode is set to 0 to 8. For the meanings of the LEDs when the mode is set to 9 to C, refer to the User's Manual for the PLC CPU module used.



LED name	Color	State of LED
RUN	Green	On: In normal operation
		Off: Watchdog timer error
ERR.	Red	On: Node number setting error
		Flashing: The node number setting switch or mode setting switch was changed during module operation.
MS	Green	On: Communication is enabled
		Flashing: Parameter error
NS	Green	On: Communication in progress
		Flashing: Waiting for communication (waiting for an I/O communication request from the PLC CPU, or waiting for communication startup of the opposite device)
	Red	On: The node number is duplicate with the node number of other node. Bus off error (communication line error)
		Flashing: <For master> A node that does not respond exists. <For slave> Communication with the master node is interrupted.
Green /Red	Off: Power to the network is not being supplied.	

4.2 Node number setting switch

This following explains the node number setting switch of the QJ71DN91.



Name	Contents
Node number setting switch	<p>Sets the node number of the module. (Setting at the time of shipment from the factory:0)</p> <p>Since the node number is recognized when the module is powered on or reset, do not change the node number during module operation.</p> <p>If changed, the "ERR." LED will flash.</p> <p>Setting range: 0 to 63 (if a number other than 0 to 63 is set, the "ERR." LED will be lit.)</p> <p>* Exercise caution so that the node number does not duplicate with that of other node.</p>

POINT

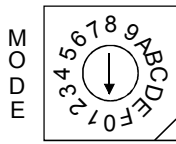
If the module is used as both the master and slave nodes, the same node number is used for the master and slave nodes.

Although the node number can be set between 0 and 63, smaller node numbers have higher communication priority as a communication characteristic of a DeviceNet network.

Thus, set the smallest node number for the master node as much as possible.

4.3 Mode switch

This following explains the mode switch of the QJ71DN91.



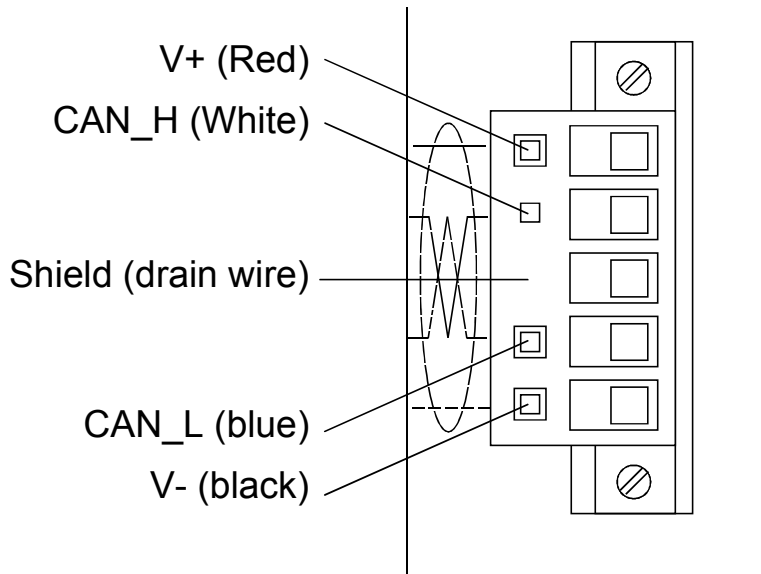
Name	Setting	Function	Contents
Mode switch	0	Master function	Operates as a master node, communication speed 125 kbaud (setting at shipment)
	1		Operates as a master node, communication speed 250 kbaud
	2		Operates as a master node, communication speed 500 kbaud
	3	Slave function	Operates as a slave node, communication speed 125 kbaud
	4		Operates as a slave node, communication speed 250 kbaud
	5		Operates as a slave node, communication speed 500 kbaud
	6	Master function and slave function*	Operates as both the master node and slave node, communication speed 125 kbaud
	7		Operates as both the master node and slave node, communication speed 250 kbaud
	8		Operates as both the master node and slave node, communication speed 500 kbaud
	9	Hardware test	Performs the ROM/RAM check and self-loop test
	A	Communication test	Performs the transmission and reception test, communication speed 125 kbaud
	B		Performs the transmission and reception test, communication speed 250 kbaud
	C		Performs the transmission and reception test, communication speed 500 kbaud
	D to F	Use prohibited	

* Select a mode between 6 and 8 when both the master function and slave function are used.

5. Wiring

5.1 Wiring the communications cable

The following explains the connection method of the communication cables to the QJ71DN91.

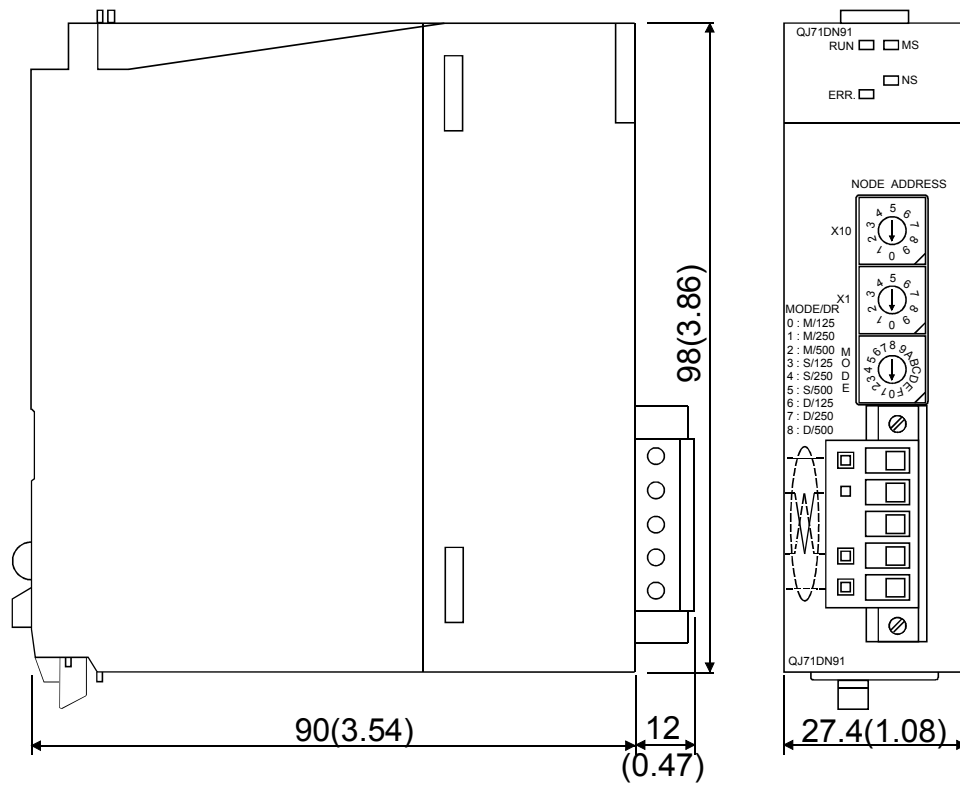


The figure above shows the QJ71DN91's DeviceNet connectors. A sticker in the corresponding cable color is pasted on each connector.

Connect the communication cables by making sure that the colors of the connector and cable match.

6. External Dimension Diagram

The following figure shows an external dimension diagram of the QJ71DN91:



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.

Country/Region	Sales office/Tel	Country/Region	Sales office/Tel
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061 Tel : +1-847-478-2100	Hong Kong	Ryoden Automation Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, HongKong Tel : +852-2887-8870
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Rua Correia Dias, 184, Edificio Paraiso Trade Center-8 andar Paraiso, Sao Paulo, SP Brazil Tel : +55-11-5908-8331	China	Ryoden Automation Shanghai Ltd. 3F Block5 Building Automation Instrumentation Plaza 103 Cao Bao Rd. Shanghai 200233 China Tel : +86-21-6120-0808
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0	Taiwan	Setsuyo Enterprise Co., Ltd. 6F., No.105 Wu-Kung 3rd.RD, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Herts., AL10 8XB,UK Tel : +44-1707-276100	Korea	HAN NEUNG TECHNO CO.,LTD. 1F Dong Seo Game Channel Bldg., 660-11, Deungchon-dong Kangsec-ku, Seoul, Korea Tel : +82-2-3660-9552
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Dir. Colleoni, Pal. Perseo-Ingr.2 Via Paracelso 12, 20041 Agrate B., Milano, Italy Tel : +39-039-6053344	Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 Alexandra Road #05-01/02, Mitsubishi Electric Building Singapore 159943 Tel : +65-6473-2308
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi 76-80 08190 Sant Cugat del Valles, Barcelona, Spain Tel : +34-93-565-3131	Thailand	F. A. Tech Co.,Ltd. 898/28,29,30 S.V.City Building,Office Tower 2,Floor 17-18 Rama 3 Road, Bangkokpang, Yannawa, Bangkok 10120 Tel : +66-2-682-6522
France	Mitsubishi Electric Europe B.V. French Branch 25 Boulevard des Bouvets, F-92741 Nanterre Cedex, France TEL: +33-1-5568-5568	Indonesia	P.T. Autoteknindo SUMBER MAKMUR Jl. Muara Karang Selatan Block a Utara No.1 Kav. No.11 Kawasan Industri/ Pergudangan Jakarta - Utara 14440 Tel : +62-21-663-0833
South Africa	Circuit Breaker Industries LTD. Tripswitch Drive, Elandsfontein Gauteng, South Africa Tel : +27-11-928-2000	India	Messung Systems Put,Ltd. Electronic Sadan NO:111 Unit No15, M.I.D.C BHOSARI,PUNE-411026, India Tel : +91-20-712-2807
		Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, PostalBag, No 2, Rydalmere, N.S.W 2116, Australia Tel : +61-2-9684-7777

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.
Printed in Japan on recycled paper.