MITSUBISHI Type QD75P/QD75D Positioning Module

User's Manual

(Hardware)

-JE

QD75P1, QD75D1 QD75P2, QD75D2 QD75P4, QD75D4

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.



Mitsubishi Programmable Controller

MODEL	QD75P-U-H		
MODEL	12 1072		
CODE	130013		

IB(NA)-0800063-H(0804)MEE

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SAFETY PRECAUTIONS

(Always read before starting use)

When using this equipment, thoroughly read this manual. Also pay careful attention to safety and handle the module properly.

These precautions apply only to this equipment.

Refer to the User's Manual of the CPU module to use for a description of the system safety precautions.

These "Safety Precautions" classify the safety precautions into two categories: "DANGER" and "CAUTION".



Depending on circumstances, procedures indicated by **CAUTION** may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Please keep this manual in a safe place for future reference and also pass this manual on to the end user.

[INSTALLATION PRECAUTION]

 Use the programmable controller in an environment that meets the general specifications contained in CPU module User's Manual to use. Using this programmable controller 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. Incorrect mounting 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. Overtightening can cause a drop, short circuit or malfunction. Not doing so could result in damage to the product. Do not directly touch the conductive area or electronic components of the module. Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTION]

 Completely turn off the externally supplied power used in the system when installing or placing wiring.

Not doing so may cause electric shock or damage to the product.

- Check the layout of the terminals and then properly route the wires to the module.
- Solder connectors for external device properly. Insufficient soldering may cause malfunction.
- Be careful not to let foreign matter 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 ventilation.
- Securely connect the connectors for the drive module to the connectors on the module and firmly tighten the two screws.
- Be sure to fix cables leading from the module by placing them in a 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.

• When removing the cable or power supply cable from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module.

Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.

 The cable used for connecting the QD75 external input/output signal and the drive module should not be routed near or bundled with the main circuit cable, power cable and/or other such load-carrying cables other than those for the programmable controller. These cables should be separated by at least 100 mm (3.94 in.). They can cause electrical interference, surges and inductance that can lead to mis-operation. Revisions

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

Print Date	*Manual Number	Revision
Oct., 1999	IB(NA)-0800063-A	First edition
Feb., 2000	IB(NA)-0800063-B	Addition
		"Confirmation to EMC directive"
Jun., 2001	IB(NA)-0800063-C	Modification
		About Manuals, Conformation to the EMC
		Directive and Low Voltage Instruction, Chapter 2, Chapter 4, Chapter 5
Nov., 2001	IB(NA)-0800063-D	Addition
,		Chapter 1 Chapter 2 Chapter 4
		Section 5.2, Section 5.3, Chapter 6
Jul., 2002	IB(NA)-0800063-E	Modification
		Chapter 1, Chapter 2, Section 5.2
Dec., 2004	IB(NA)-0800063-F	Modification
		SATFETY PRECAUTIONS, Chapter 3,
		Chapter 5
Dec., 2007	IB(NA)-0800063-G	Modification
		Conformation to the EMC AND LOW-
		VOLTAGE DIRECTIVES, Chapter 1, Chapter 4, Section 5.2, Chapter 6
Apr., 2008	IB(NA)-0800063-H	Modification
• •		Conformation to the EMC AND LOW
		VOLTAGE DIRECTIVES, Section 5.1,
		Section 5.2

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About Manuals

The following manuals are related to this product. Referring to this list, please request the necessary manuals.

Related Manual

Manual name	Manual No. (Model code)
Type QD75P/QD75D Positioning Module User's Manual	SH-080058 (13JR09)
GX Configurator-QP Version 2 Operating Manual (SW2D5C-QD75P-E)	SH-080172 (13JU19)

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

To make this product conform to the EMC and low voltage directives, please refer to Chapter 5 "Wiring".

1. Overview

This manual explains how to handle the Positioning Module, model numbers QD75P1, QD75P2, QD75P4, QD75D1, QD75D2 and QD75D4 (hereinafter collectively referred to as the QD75).

After unpacking the QD75, please verify that the corresponding product as listed below is enclosed in the package.

Model name	Description	Quantity		
QD75P1	QD75P1 Positioning Module (1-axis open-collector output system)	1		
QD75P2	QD75P2 Positioning Module (2-axes open-collector output system)	1		
QD75P4	QD75P4 Positioning Module (4-axes open-collector output system)	1		
	QD75D1 Positioning Module (1-axis differential driver output system)	1		
QD73D1	Differential driver common terminal	1		
007502	QD75D2 Positioning Module (2-axes differential driver output system)	1		
QD13D2	Differential driver common terminal			
007504	QD75D4 Positioning Module (4-axes differential driver output system)	1		
QD73D4	Differential driver common terminal	1		

A differential driver common terminal is packed with the QD75D1, QD75D2 and QD75D4.

The user should arrange for a connector for external wiring since it is not provided in the package.

* Connector type

- A6CON1 (Soldering type, straight out)
- A6CON2 (Crimping type, straight out)
- A6CON4 (Soldering type, usable for straight out and diagonal out)
- * A6CON2 crimping tool
 - Model name: FCN-363T-T005/H
 - Supplier's offices :
 - FUJITSU AMERICA, INC.
 250E Caribbean Drive Sunnyvale, CA 94089 U.S.A Tel: (1-408)745-4900
 - FUJITSU EUROPE B.V. Jupiterstaat 13-15, our 2132 Hoofddorp, The Netherland Tel: (31)23-5560910
 - FUJITŠU EUROPE B.V. Zweiniederlassung Deutschland Schatzbogen 86 D-81829 Munchen Germany Tel: (49)89-42742320
 - FUJITŠU EUROPE (UK) Network House, Morres Drive, Maidenhead, Berkshire, SL6 4FH United Kingdom Tel: (44)1628-504600
 - FUJITSU EUROPE B.V.
 127 Chemin Des Bassins, Europarc, Cleteril 94035 Cleterll 94035 France Tel: (33)145139940
 - FUJITSU ASIA PACIFIC PTE LIMITED 102E Pasir Panjang Road, #04-01 Citilink Warehouse Complex, Singapore 118529 Tel: (65)375-8560
 - FUJITŠU HONG KONG CO., LTD. Suite 913 Ocean Centre, 5 Canton Road, TST, Kowloon, Hong Kong Tel: (852)2881-8495

2. Performance Specifications

(1) The performance specifications for the QD75P1, QD75P2 and QD75P4

ltem	Specification				
ltem	QD75P1	QD75P2	QD75P4		
Number of axes	1 axis	2 axes	4 axes		
Maximum output pulse count	200 kpulse/s				
Maximum connection distance between servos		2m (6.56ft)			
Applicable wire size	0.3mm ² (AWG#22) or lower (when A6CON1or A6CON4 is used), AWG#24 (when A6CON2 is used)				
Applicable connector	A6CON1, A6	CON2, A6CON4 (sol	d separately)		
Number of I/O occupied		32 points			
points	(I/O assignment: 32 points for intelligent function module)				
5 V DC current consumption	0.40A 0.46A 0.58A				
Flash ROM write count	M write count Max. 100000 times				
Weight	0.15kg	0.15kg	0.16kg		

(2) The performance specifications for the QD75D1, QD75D2, and QD75D4

ltem	Specification				
lie	QD75D1	QD75D2	QD75D4		
Number of axes	1 axis	2 axes	4 axes		
Maximum output pulse count	1 Mpulse/s				
Maximum connection distance between servos		10m (32.81ft)			
	0.3mm ² (AWG#22) or lower				
Applicable wire size	(when A6CON1or A6CON4 is used),				
	AWG#24 (when A6CON2 is used)				
Applicable connector	A6CON1, A6	CON2, A6CON4 (sol	d separately)		
Number of I/O occupied	32 points				
points	(I/O assignment: 32 points for intelligent function module)				
DC5V current consumption	0.52A 0.56A 0.82A				
Flash ROM write count	Max. 100000 times				
Weight	0.15kg	0.15kg	0.16kg		

For the general specifications of the QD75, see User's Manual for CPU module used.

(3) Differential driver common terminal specifications (QD75D1, QD75D2, QD75D4 only)

Applicable wire size	12AWG
Rated multiple wire	Solid wire: 0.2 to 0.8 mm ² $ imes$ 2 pcs.
connection size	Stranded wire: 0.2 to 0.8 mm ² $ imes$ 2 pcs.
Screw tightening torque	0.5N·m

3. Handling

 Use the programmable controller in an environment that meets the general specifications contained in CPU module User's Manual to use. Using this programmable controller 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. Incorrect mounting 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.

Not doing so may cause damage to the module.

• Do not directly touch the conductive area or electronic components of the module.

Doing so may cause malfunction or failure in the module.

3.1 Handling Precautions

- (1) Since the module case is made of plastic, do not drop it or subject it to strong impact.
- (2) The module can easily be secured to the base unit using the hooks located at the top of the module. However, if the module is to be placed in an area that is subject to strong vibration or impact, we recommend that it is secured with module fixing screws (to be provided by the user). In this case, tighten the module fixing screws within the following torque range. Module fixing screws (M3 \times 12): Tightening torque range is from 0.36 to 0.48 N·m.

4. Part Identification Nomenclature

(1) Part identification nomenclature

(a) For QD75P4





No.	Name	Details
1) 2)	RUN indicator LED, ERR indicator LED Axis display LED (AX1 to AX4)	Refer to the next page.
3)	External device connector	Connector for connection with the drive unit, mechanical system input or manual pulse generator. (40-pin connector) AX1: Axis 1, AX2: Axis 2, AX3: Axis 3, AX4: Axis 4 For details, refer to Section 3.4.2 "Signal layout for external device connection connector".
4)	Differential driver common terminal (Differential driver output system (QD75D1, QD75D2, QD75D4) only)	Terminal connected to the differential receiver common of the drive unit. For details, refer to Section 4.3.2 "Wiring of the differential driver common terminal".
5)	Serial number plate	Indicates the serial No. of the QD75.

(2) LED display contents

	Details of indication	Points to be confirmed	Error	
QD75 04 RUN 0 AX1 AX2	RUN III IAX1 IAX2 IAX3 ERR.III IAX4	Extinguishment of RUN LED	The hardware is faulty or watch dog timer error occurs.	
ERR. AX3 ERR. AX4	RUN ■ □AX1 □AX2 □AX3 ERR.□ □AX4	Lighting of RUN LED, Extinguishment of ERR. LED	The module is normal.	
	RUN ■ □AX1 □AX2 □AX3 <u>ERR.■</u> □AX4	Lighting of ERR. LED	System error	
	RUN ■ □AX1 □AX2 □AX3 ERR.□ □AX4	Extinguishment of AX1 to AX4 LEDs	During axis stop, during axis standby	
	RUN ■ ■AX1 □AX2 □AX3 ERR.□ □AX4	Lighting of AX1 (Same even if the other axis is lit)	During axis operation	
	RUN ■ ◆AX1 □AX2 □AX3 FRR.◆ □AX4	Flashing of ERR. LED Flashing of AX1 LED (Same even if the other axis flashes)	Axis error	
	RUN AX1 AX2 AX3 FRR AX4	Lighting of all LEDs	The hardware is faulty	
	The symbols in	the Display column indicate the foll	owing statuses.	

The symbols in the Display column indicate the following statuses: □ : Turns OFF, ■ : Illuminates, ◆ : Flashes

		Ax	(is 4 (AX4)	Ах	is 3 (AX3)	A	(is 2 (AX2)	Ax	(is 1 (AX1)		
Pi	Pin layout Pin Signal na		Signal name	Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name		
			2B20	Vacant	2A20	Vacant	1B20	PULSER B-	1A20	PULSER B+	
				2B19	Vacant	2A19	Vacant	1B19	PULSER A-	1A19	PULSER A+
		*3	PULSE	*3	PULSE COM	*3	PULSE COM	*3	PULSE COM		
		2B18	COM	2A18		1B18		1A18			
D 20	n	"]	A 20		PULSE R-		PULSE R-		PULSE R-		PULSE R-
B19		0	A20 A19	*3	PULSE R	*3	PULSE R	*3	PULSE R	*3	PULSE R
B18	0	0	A18	2B17	PULSE R+	2A17	PULSE R+	1B17	PULSE R+	1A17	PULSE R+
B17	0	0	A17	*3	PULSE	*3	PULSE COM	*3	PULSE COM	*3	PULSE COM
B16			A16	2B16	COM	2A16		1B16		1A16	
B15			A15		PULSE F-		PULSE F-		PULSE F-		PULSE F-
B13		ō	A14 A13	*3	PULSE F	*3	PULSE F	*3	PULSE F	*3	PULSE F
B12	0	0	A12	2B15	PULSE F+	2A15	PULSE F+	1B15	PULSE F+	1A15	PULSE F+
B11	0	0	A11	2B14	CLRCOM	2A14	CLRCOM	1B14	CLRCOM	1A14	CLRCOM
B10	0		A10	2B13	CLEAR	2A13	CLEAR	1B13	CLEAR	1A13	CLEAR
B9		"	A9	2B12	RDYCOM	2A12	RDYCOM	1B12	RDYCOM	1A12	RDYCOM
B7		0	A0 A7	2B11	READY	2A11	READY	1B11	READY	1A11	READY
B6	0	0	A6	2B10	PGOCOM	2A10	PGOCOM	1B10	PGOCOM	1A10	PGOCOM
B5	0	0	A5	2B9	PGO5	2A9	PGO5	1B9	PGO5	1A9	PGO5
B4			A4	2B8	PGO24	2A8	PGO24	1B8	PGO24	1A8	PGO24
B3		"	A3	2B7	COM	2A7	COM	1B7	СОМ	1A7	COM
B1			A2 A1	2B6	COM	2A6	COM	1B6	СОМ	1A6	COM
			/ ()	2B5	CHG	2A5	CHG	1B5	CHG	1A5	CHG
				2B4	STOP	2A4	STOP	1B4	STOP	1A4	STOP
				2B3	DOG	2A3	DOG	1B3	DOG	1A3	DOG
				2B2	RLS	2A2	RLS	1B2	RLS	1A2	RLS
				2B1	FLS	2A1	FLS	1B1	FLS	1A1	FLS

(3) External device connector signal layout

- *1: The pin numbers represented by 1 indicate the pin numbers for the right side connector, while the pin numbers represented by 2 indicate the pin numbers for the left side connector.
- *2: For QD75P1 or QD75D1, 1B1 to 1B18 will be "vacant."
- *3: When signal names are shown in upper and lower rows, the upper row shows the signal name for the QD75P1, QD75P2 and QD75P4 and the lower row shows the signal name for the QD75D1, QD75D2 and QD75D4.

5. Wiring

 Completely turn off the externally supplied power used in the system when installing or placing wiring.

Not doing so may cause electric shock or damage to the product.

5.1 Wiring Precautions

- (1) Always confirm the terminal layout before connecting the wires to the QD75.
- (2) Correctly solder the external wiring connector. An incomplete soldering could lead to malfunctioning.
- (3) Make sure that foreign matter such as cutting chips and wire scraps does not enter the QD75. Failure to observe this could lead to fires, faults or malfunctioning.
- (4) A protective label is attached on the top of the QD75 to avoid foreign matter such as wire scraps from entering inside during wiring process. Do not remove the label until the wiring is completed. Before starting the system, however, be sure to remove the label to ensure heat radiation.
- (5) Securely mount the external device connector to the connector on the QD75 with two screws.
- (6) Do not disconnect the external wiring cable connected to the QD75 and the drive unit by pulling the cable section. When the cable has a connector, be sure to hold the connector connected to the QD75 and the drive unit. Pulling the cable while it is connected to the QD75 and the drive unit may lead to malfunctioning or damage of the QD75 and the drive unit or cable.
- (7) Do not bundle or adjacently lay the connection cable connected to the QD75 external I/O signals or drive unit with the main circuit line, power line, or the load line other than that for the programmable controller. Separate these by 100mm as a guide. Failure to observe this could lead to malfunctioning caused by noise, surge, or induction.
- (8) The shielded cable for connecting QD75 can be secured in place. If the shielded cable is not secured, unevenness or movement of the shielded cable or careless pulling on it could result in damage to the QD75 or drive unit or shielded cable or defective cable connections could cause mis-operation of the unit.

(9) If cables to connect to QD75 absolutely must be positioned near (within 100 mm) the power line, use a general shielded cable. The shield must be grounded on the QD75 side.



[Processing example of shielded cables]

Remove the covering from all shielded cables and bind the appeared shield with a conductive tape.





(10) To make this product conform to the EMC directive and low voltage instruction, be sure to use the AD75CK type cable clamp (manufactured by Mitsubishi Electric) for grounding to the control box.



Using the AD75CK, you can tie four cables of about 7mm (0.28inch) outside diameter together for grounding.

- (11) The influence of noise may be reduced by installing ferrite cores to the cable connected to the QD75 as a noise reduction technique. For the noise reduction techniques related to connection with the servo amplifier, also refer to the instruction manual of the servo amplifier.
- (12) If compliance with the EMC directive is not required, the influence of external noise may be reduced by making the configuration compliant with the EMC directive.For the configuration compliant with the EMC directive, refer to Chapter

9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QCPU User's Manual (Hardware Design, Maintenance and Inspection).

5.2 External Interface

The internal circuits of interface for connecting external devices to the QD75 are shown by the schematic diagrams in the tables below (for the QD75P1 and QD75D1).

(1) Input (common to QD75P1 and QD75D1)

External wiring	Pin number	Internal circuit	Signal name		Wiring requirement *1
When not using lower limit switch	1A3		Near-point dog signal	DOG	\bigtriangleup
When not using	1A1		Upper limit signal	FLS	0
higher limit switch	1A2		Lower limit signal	RLS	0
• • •••	1A4		Stop signal	STOP	\bigtriangleup
• • • • • • • • • • • • • • • • • • •	1A5		External command signal	CHG	\bigtriangleup
DC24 ¹ + - - +	1A6 1A7		Common	СОМ	\bigcirc
DC + SV - SV - B OV Manual pulse generator (MR-HDP01)	(+) 1A19	 ★_¥≠Ķ	Manual pulse	PULSER A+	
	(-) 1B19		phase	PULSER A-	Λ
	(+) 1A20		Manual pulse	PULSER B+	
	(-) 1B20		phase	PULSER B-	
	1A11		Drive unit Ready	READY	\bigcirc
	1A12	ੑ <u>ੑ</u> ੑੑੑੑ <u></u> ੑ ੑ	Drive unit Ready common	RDY COM	\bigcirc
	1A8 1A9		Zero signal	PG024 PG05	Λ
	1A10	╵╵╨╋ <u>╵╫╪</u> ╓╷ └──╋╋┙	Zero signal common	PG0 COM	\square

- *1: In the column indicating whether wiring is required, the symbol \bigcirc means "wiring is required" and \bigtriangleup means "wiring is required as needed."
- *2: Either polarity can be connected to the common (COM).

(2) Output (for QD75P1)

External wiring	Pin number	Internal circuit	Signal name		Wiring requirement *1
	1A13		Deviation counter clear	CLEAR	~
	1A14		Common	CLEAR COM	
	1A15		CW	PULSE F	
	1A16			PULSE COM	\bigcirc
	1A17		CCW R phase	PULSE R	\bigcirc
	1A18		SIGN	PULSE COM	

(3) Output (for QD75D1)

External wiring	Pin number	Internal circuit	Signal name		Wiring requirement *1
	1A13		Deviation counter clear	CLEAR	~
	1A14	Ĭ _ _ _	Common	CLEAR COM	
	1A15	╡	CW A phase	PULSE F+	
	1A16		PULSE	PULSE F-	\bigcirc
	1A17		CCW B phase	PULSE F+	\bigcirc
	1A18		SIGN	PULSE F-	
	*2 — *2		Differential driver common terminal	SG	\bigtriangleup

*1: In the column indicating whether wiring is required, the symbol ○ means "wiring is required" and △ means "wiring is required as needed."
*2: A terminal block at the bottom of the module.

5.3 Wiring of the differential driver common terminal

When the differential driver output type (QD75D1/QD75D2/QD75D4) is used, an inter-common potential difference may occur between the differential driver common terminal and the differential receiver common terminal of the drive unit.

To eliminate an inter-common potential difference, connect between the differential driver common terminal of the QD75D1/QD75D2/QD75D4 and the differential receiver common terminal of the drive unit.

When the common terminal of the drive unit is a photocoupler connection type, it need not be connected to the differential driver common terminal of the QD75D1/QD75D2/QD75D4 since an inter-common potential difference does not exist. (For the driver unit specifications, refer to the manual of the drive unit used.)

The following gives an example of wiring the differential driver common terminal of the QD75D1/QD75D2/QD75D4.

Up to two wires can be connected to one differential driver common terminal. (Refer to "2. Performance Specifications" for details.)



6. External Dimensions

(1) QD75P1/QD75P2/QD75P4



(2) QD75D1/QD75D2/QD75D4



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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