

MITSUBISHI

Type QD70

Positioning Module

User's Manual
(Hardware)

QD70P4
QD70P8

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

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

MELSEC-Q
Mitsubishi
Programmable Controller

MODEL	QD70P-U-H-JE
MODEL CODE	13JT42
IB(NA)-0800169-F(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 Mitsubishi equipment. Refer to CPU module User's Manual for a description of the programmable controller system safety instructions.

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 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 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 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.
Securely fix the module with screws if it is subject to vibration or shock during use.
Tighten the screw in the specified torque range.
Undertightening can cause a drop, short circuit or malfunction.
Overtightening of screws can cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- Completely turn off the externally supplied power used in the system when mounting or removing the module.
Not doing so may cause damage to the module.
- 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]

DANGER

- 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.

CAUTION

- 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 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.
- Securely connect the connectors for the drive module to the connectors on the module and firmly tighten the two screws.
- 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 QD70 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 PLC. 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
Mar., 2001	IB(NA)-0800169-A	First edition
Jun., 2001	IB(NA)-0800169-B	<div style="border: 1px solid black; padding: 2px;">Addition</div> About Manuals <div style="border: 1px solid black; padding: 2px;">Partial correction</div> Section 2.2
Dec., 2001	IB(NA)-0800169-C	<div style="border: 1px solid black; padding: 2px;">Partial correction</div> Chapter 1, Section 2.1
Jul., 2002	IB(NA)-0800169-D	<div style="border: 1px solid black; padding: 2px;">Partial correction</div> Chapter 1, Section 2.1
Feb., 2007	IB(NA)-0800169-E	<div style="border: 1px solid black; padding: 2px;">Partial correction</div> Section 2.2, Chapter 3, Chapter 5
Aug., 2008	IB(NA)-0800169-F	<div style="border: 1px solid black; padding: 2px;">Partial correction</div> SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directives, ABOUT MANUAL, Chapter 1, Chapter 2, Chapter 3, Chapter 4, Chapter 5, Chapter 6, Chapter 7

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ABOUT MANUAL

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

Detailed Manual

Manual name	Manual No. (Model code)
Type QD70 Positioning Module User's Manual	SH-080171 (13JR39)

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 directive and low voltage instruction, please refer to Chapter 5 "Wiring".

1. Overview

This manual explains how to handle the Positioning Module, model numbers QD70P4 and QD70P8 (hereinafter collectively referred to as the QD70). After unpacking the QD70, please verify that the corresponding product as listed below is enclosed in the package.

Type	Component	Quantity
QD70P4	Type QD70P4 Positioning Module (4-axis open-collector output type)	1
QD70P8	Type QD70P8 Positioning Module (8-axis open-collector output type)	1
SW1D5C-QPTU-E	GX Configurator-PT Version 1 (1-license product) (CD-ROM)	1
SW1D5C-QPTU-EA	GX Configurator-PT Version 1 (Multiple-license product) (CD-ROM)	1

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

* Connector types

- A6CON1 (Soldering type, straight out)
- A6CON2 (Pressure displacement type, straight out)
- A6CON4 (Soldering type, usable for straight out and diagonal out)

* Pressure-displacement 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
 - FUJITSU EUROPE B.V. Zweiniederlassung Deutschland
Schatzbogen 86 D-81829 Munchen Germany
Tel: (49)89-42742320
 - FUJITSU 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 Cleteril 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
 - FUJITSU HONG KONG CO., LTD.
Suite 913 Ocean Centre, 5 Canton Road, TST, Kowloon, Hong Kong
Tel: (852)2881-8495

2. Specifications

2.1 Performance Specifications

Item	Specification	
	QD70P4	QD70P8
No. of control axes	4 axes	8 axes
Pulse output method	Open collector output	
Max. output pulse	200 kpps	
Max. connection distance between QD70 and drive unit	2m	
Applicable wire size	0.3 mm ² (for use of A6CON1 or A6CON4), AWG#24 (for use of A6CON2)	
External device connection connector	A6CON1, A6CON2, A6CON4 (option)	
No. of occupied I/O points	32points (I/O assignment: intelligent function module 32 points)	
Internal current consumption (5VDC)	0.55A	0.74A
External 24V current consumption (24VDC)	0.065A	0.12A
Weight	0.15kg	0.17kg

2.2 Electrical Specifications

(1) Input specifications

Signal name	Rated input voltage /current	Working voltage range	ON voltage /current	OFF voltage /current	Input resistance	Response time
Zero signal (PG0)	5VDC /18mA	4.5 to 5.5VDC	2.7VDC or more/5.5mA or more	1.0VDC or less/0.5mA or less	Approx. 270Ω	0.1ms or less
Near-point dog signal (DOG) Speed-position switching signal(CHG)	24VDC/5mA	19.2 to 26.4VDC	17.5VDC or more/3mA or more	7VDC or less /0.9mA or less	Approx. 6.8kΩ	1ms or less

(2) Output specifications

Signal name	Rated load voltage	Working load voltage range	Max. load current/rush current	Max. voltage drop at ON	Leakage current at OFF	Response time
Pulse output (CW/PULSE)	5 to 24VDC	4.75 to 30VDC	50mA/1 point/ 200mA 10ms or less	0.5VDC(TYP)	0.1mA or less	-
Deviation counter clear (CLEAR)	5 to 24VDC	4.75 to 30VDC	0.1A/1 point/ 0.4A 10ms or less	1VDC(TYP) 2.5VDC(MAX)	0.1mA or less	2ms or less (resistance load)

(3) External power source (For driving the pulse output circuit)

Signal name	Rated input voltage	Current consumption
External power source input (+24V/24G)	24VDC (+20%/-15)(Ripple rate within 5%)	QD70P4:0.065A, QD70P8:0.12A

For the general specifications of the QD70, see User's Manual for the CPU module used.

3. Handling

DANGER

- Install a safety circuit external to the programmable controller that keeps the entire system safe even when there are problems with the external power supply or the programmable controller. Otherwise, trouble could result from erroneous output or erroneous operation.
 - (1) Configure an emergency stop circuit and interlock circuit such as a positioning upper limit/lower limit to prevent mechanical damage outside the programmable controller.
 - (2) The machine OPR operation is controlled by the OPR direction and OPR speed data. Deceleration starts when the near-point dog turns ON. Thus, if the OPR direction is incorrectly set, deceleration will not start and the machine will continue to travel. Configure an interlock circuit to prevent mechanical damage outside the programmable controller.
 - (3) When the module detects an error, deceleration stop will take place. Make sure that the OPR data and positioning data are within the parameter setting values.

CAUTION

- Use the programmable controller in an environment that meets the general specifications contained in CPU module 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 module in the environment subject to much vibration, secure the module with a screw.
Tighten the screw in the specified torque range.
Insufficient tightening may lead to dropping, short-circuit, or malfunctioning.
Excessive tightening may damage the screw or module, leading to dropping, short-circuit, or malfunctioning.
- Completely turn off the externally supplied power used in the system before mounting or removing the module. Not doing so may cause damage to the module.
- 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.

3.1 Handling Precautions

- (1) Since the module case is made of resin, do not drop it or subject it to strong impact.
- (2) Tighten the screws such as module fixing screws within the following ranges.

If the screw is too loose, it may cause the module to 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.

Screw location	Tightening torque range
Module fixing screws (M3 screw)*1	0.36 to 0.48 N m
Connector screw (M2.6 screw)	0.20 to 0.29 N m

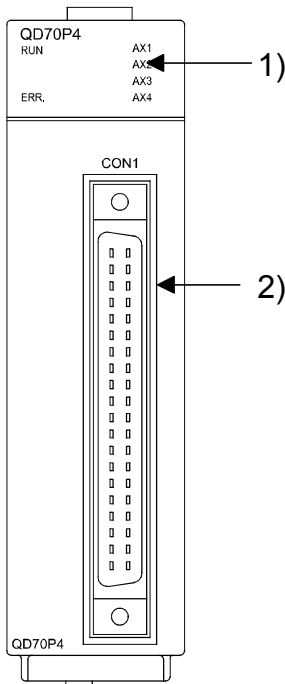
*1 The module can be easily fixed onto the base unit using the hook at the top of the module.

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

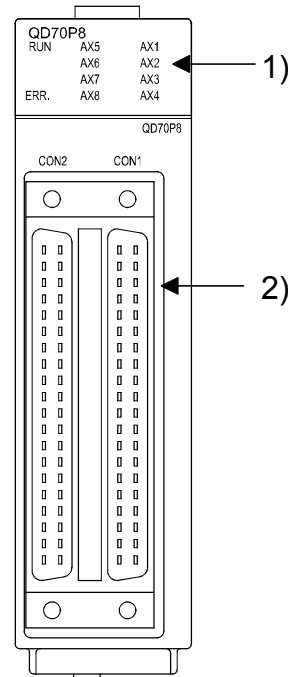
4. Part Identification Nomenclature

(1) Part identification nomenclature

(a) QD70P4

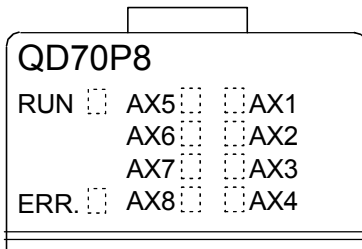


(b) QD70P8



No.	Name	No.	Name
1)	Axis display LED	2)	External device connection connector

(2) LED display contents



Display	Attention point	Description
RUN <input type="checkbox"/> AX5 <input type="checkbox"/> AX1 AX6 <input type="checkbox"/> AX2 AX7 <input type="checkbox"/> AX3 ERR. <input type="checkbox"/> AX8 <input type="checkbox"/> AX4	RUN is OFF. ERR. and AX1 to AX8 states are unfixed.	Hardware failure.
RUN <input checked="" type="checkbox"/> AX5 <input type="checkbox"/> AX1 AX6 <input type="checkbox"/> AX2 AX7 <input type="checkbox"/> AX3 ERR. <input type="checkbox"/> AX8 <input type="checkbox"/> AX4	RUN illuminates. ERR. is OFF.	The module operates normally.
RUN <input checked="" type="checkbox"/> AX5 <input type="checkbox"/> AX1 AX6 <input type="checkbox"/> AX2 AX7 <input type="checkbox"/> AX3 ERR. <input checked="" type="checkbox"/> AX8 <input type="checkbox"/> AX4	ERR. illuminates.	System error.
RUN <input checked="" type="checkbox"/> AX5 <input type="checkbox"/> AX1 AX6 <input type="checkbox"/> AX2 AX7 <input type="checkbox"/> AX3 ERR. <input type="checkbox"/> AX8 <input type="checkbox"/> AX4	AX1 to AX8 are OFF.	The axes are stopped or on standby.
RUN <input checked="" type="checkbox"/> AX5 <input checked="" type="checkbox"/> AX1 AX6 <input type="checkbox"/> AX2 AX7 <input type="checkbox"/> AX3 ERR. <input type="checkbox"/> AX8 <input type="checkbox"/> AX4	AX1 (or other axis) illuminates.	The corresponding axis is in operation.
RUN <input checked="" type="checkbox"/> AX5 <input checked="" type="checkbox"/> AX1 AX6 <input type="checkbox"/> AX2 AX7 <input type="checkbox"/> AX3 ERR. <input checked="" type="checkbox"/> AX8 <input type="checkbox"/> AX4	ERR. flashes. AX1 (or other axis) flashes.	An error occurs on the corresponding axis.

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

(3) External device connector signal layout

Pin layout	CON2 (for axis5 to axis8)				CON1 (for axis1 to axis4)					
	Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name	Pin No.	Signal name		
B20	□ □	A20	B20	PG06 COM ^{*1}	A20	PG08 COM ^{*1}	B20	PG02 COM ^{*1}	A20	PG04 COM ^{*1}
B19	□ □	A19	B19	PG06	A19	PG08	B19	PG02	A19	PG04
B18	□ □	A18	B18	PG05 COM ^{*1}	A18	PG07 COM ^{*1}	B18	PG01 COM ^{*1}	A18	PG03 COM ^{*1}
B17	□ □	A17	B17	PG05	A17	PG07	B17	PG01	A17	PG03
B16	□ □	A16	B16	CLEAR6 COM ^{*2}	A16	CLEAR8 COM ^{*2}	B16	CLEAR2 COM ^{*2}	A16	CLEAR4 COM ^{*2}
B15	□ □	A15	B15	CLEAR6	A15	CLEAR8	B15	CLEAR2	A15	CLEAR4
B14	□ □	A14	B14	CLEAR5 COM ^{*2}	A14	CLEAR7 COM ^{*2}	B14	CLEAR1 COM ^{*2}	A14	CLEAR3 COM ^{*2}
B13	□ □	A13	B13	CLEAR5	A13	CLEAR7	B13	CLEAR1	A13	CLEAR3
B12	□ □	A12	B12	CHG6	A12	CHG8	B12	CHG2	A12	CHG4
B11	□ □	A11	B11	CHG5	A11	CHG7	B11	CHG1	A11	CHG3
B10	□ □	A10	B10	DOG6	A10	DOG8	B10	DOG2	A10	DOG4
B9	□ □	A9	B9	DOG5	A9	DOG7	B9	DOG1	A9	DOG3
B8	□ □	A8	B8	COM 5-6 ^{*3}	A8	COM 7-8 ^{*3}	B8	COM 1-2 ^{*3}	A8	COM 3-4 ^{*3}
B7	□ □	A7	B7	PULSE F6	A7	PULSE F8	B7	PULSE F2	A7	PULSE F4
B6	□ □	A6	B6	PULSE COM6 ^{*4}	A6	PULSE COM8 ^{*4}	B6	PULSE COM2 ^{*4}	A6	PULSE COM4 ^{*4}
B5	□ □	A5	B5	PULSE R6	A5	PULSE R8	B5	PULSE R2	A5	PULSE R4
B4	□ □	A4	B4	PULSE F5	A4	PULSE F7	B4	PULSE F1	A4	PULSE F3
B3	□ □	A3	B3	PULSE COM5 ^{*4}	A3	PULSE COM7 ^{*4}	B3	PULSE COM1 ^{*4}	A3	PULSE COM3 ^{*4}
B2	□ □	A2	B2	PULSE R5	A2	PULSE R7	B2	PULSE R1	A2	PULSE R3
B1	□ □	A1	B1	Vacant	A1	Vacant	B1	+24V ^{*5}	A1	+24G ^{*5}

*1: Common for PG0□. (Axis No. 1 to 8 goes into □).

*2: Common for CLEAR□. (Axis No. 1 to 8 goes into □).

*3: Common for DOG□, CHG□.(Axis No. 1 to 8 goes into □).

*4: Common for PULSE F□, PULSE R□. (Axis No. 1 to 8 goes into □).

*5: The external power source (24VDC) should be connected in order to output a command pulse.

(When outputting a command pulse of axis 5 to 8, the external power source (24VDC) should be connected to A1 and B1 of the connector CON1 (for axis 1 to 4 use).)

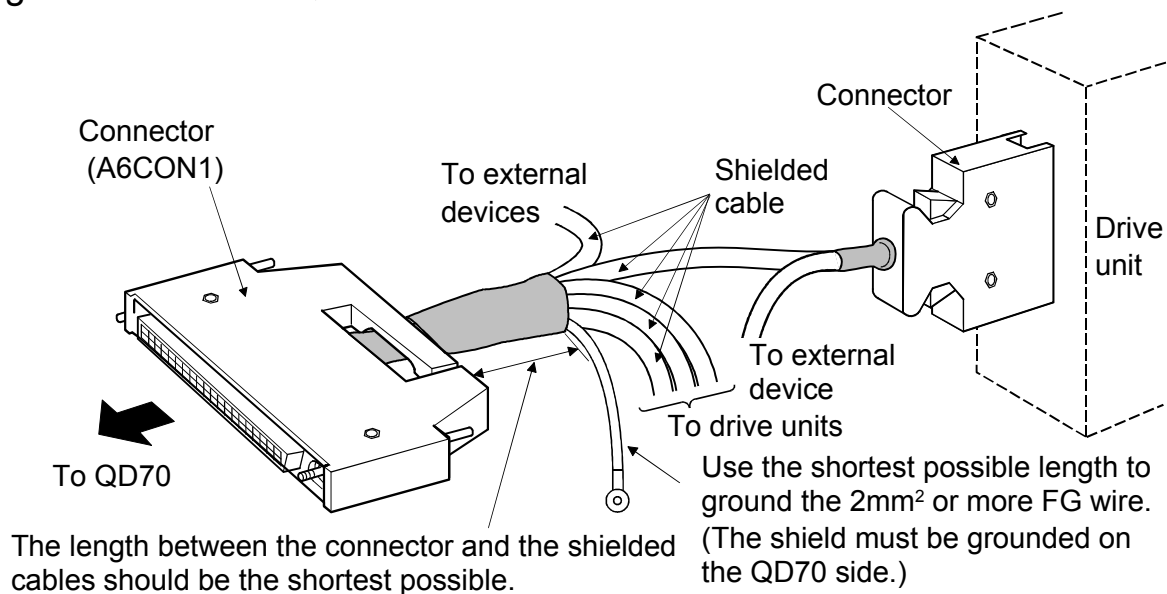
5. Wiring

⚠ DANGER

- Completely turn off the externally supplied power used in the system when installing or placing wiring.
Not completely turning off all power could result in electric shock or damage to the product.

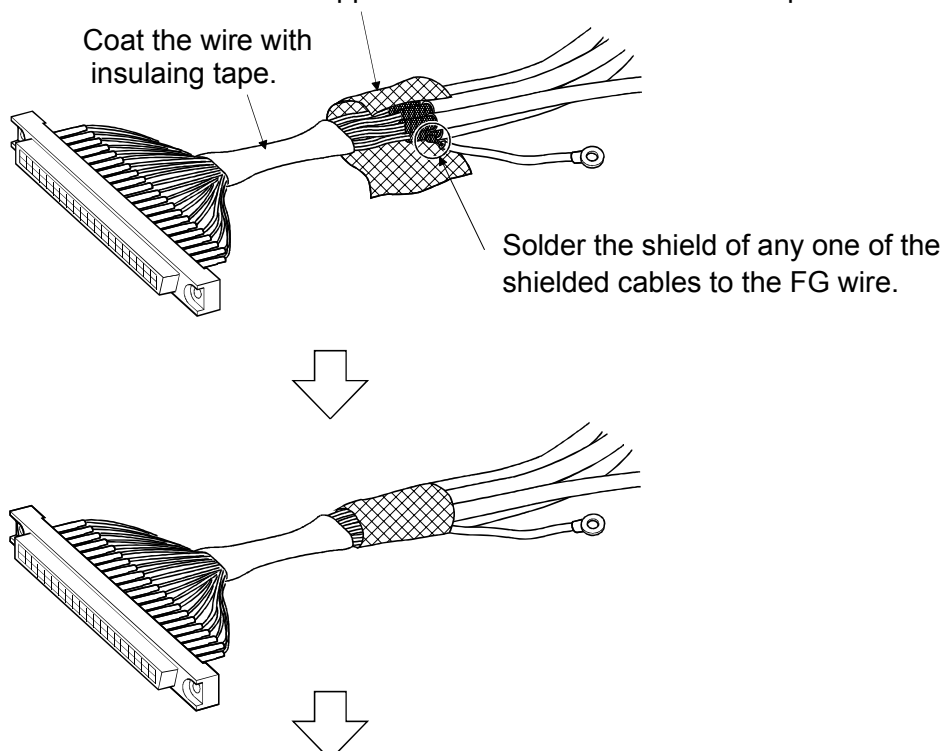
5.1 Wiring Precautions

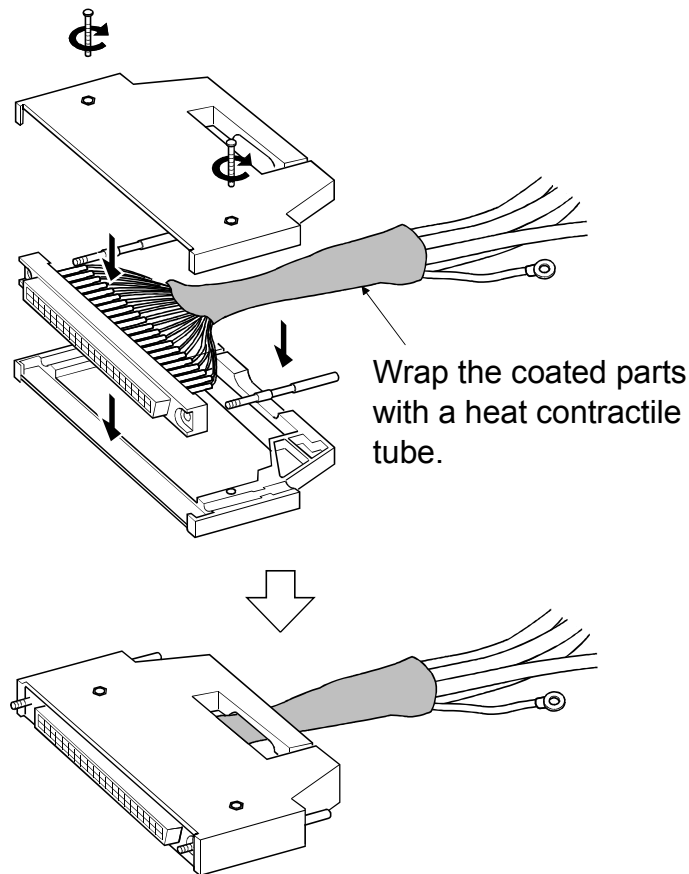
- (1) If cables to connect to QD70 absolutely must be positioned near (within 100 mm) the power line, use a general shielded cable. The shield must be grounded on the QD70 side.



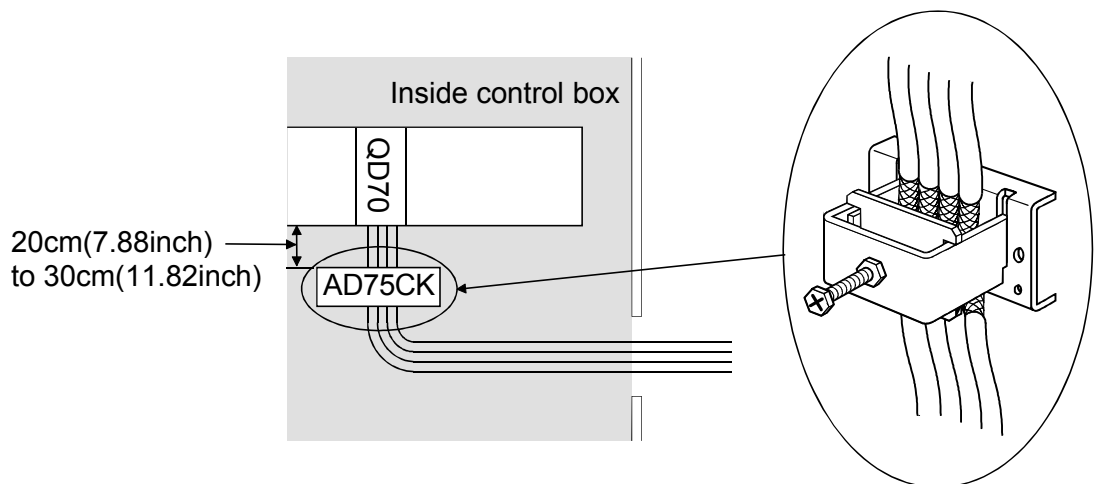
[Processing example of shielded cables]

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





- (2) The cables connected to the QD70 should be placed in a duct or fixed. Not doing so can cause the QD70, drive unit or cables to be damaged when the cables swing, move or are pulled carelessly, for example, or to malfunction due to poor cable connection.
- (3) To comply with the EMC Directive and Low-Voltage Directive, always ground the QD70 to the control box using the shielded cables and AD75CK cable clamping (Mitsubishi Electric make).



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

5.2 Input/output interface internal circuit

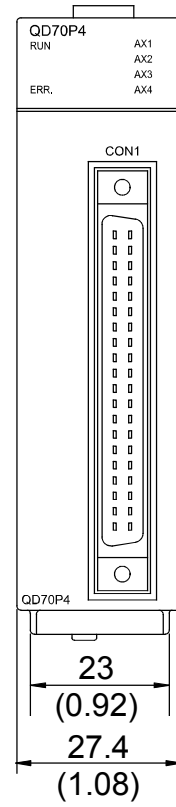
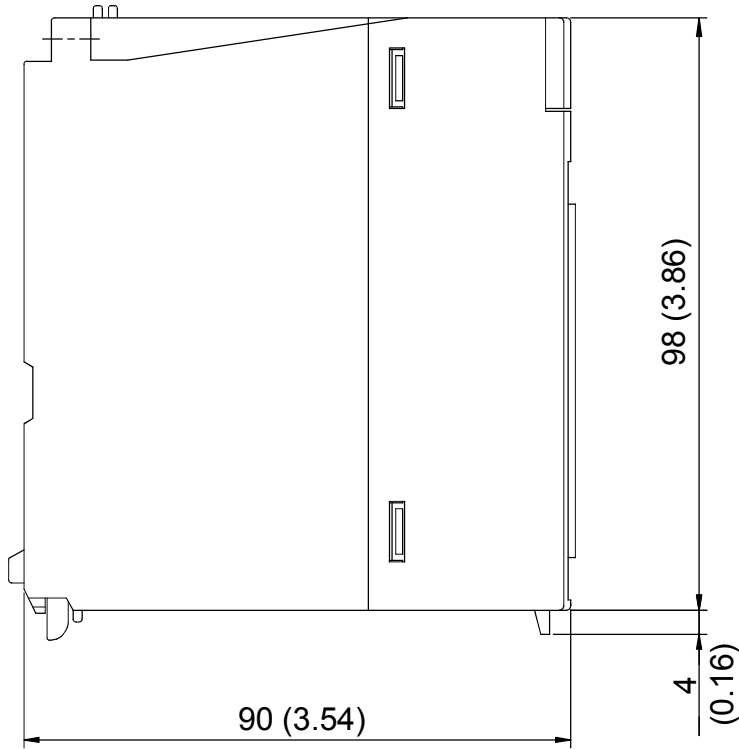
Shows summary image of the internal circuit of the interface for connection to external devices of the QD70. (for QD70P4, axis 1).

Input/output class	External wiring	Pin No.	Internal circuit	Signal name	
Input		B9		Near-point dog signal	DOG1
		B11		Speed-position switching signal	CHG1
		B8		Common	COM1-2
		B17		Zero signal	PG01
		B18		Zero signal common	PG01 COM
		A1		External power input (0V)	24G
		B1		External power input (24VDC)	+24V
		Output			B4
B2	Pulse output R (CCW/SIGN)		PULSE R1		
B3			Pulse output common		PULSE COM1
B13			Deviation counter clear		CLEAR1
B14			Deviation counter clear common		CLEAR1 COM

*: Either polarity can be connected to the common (COM1-2).

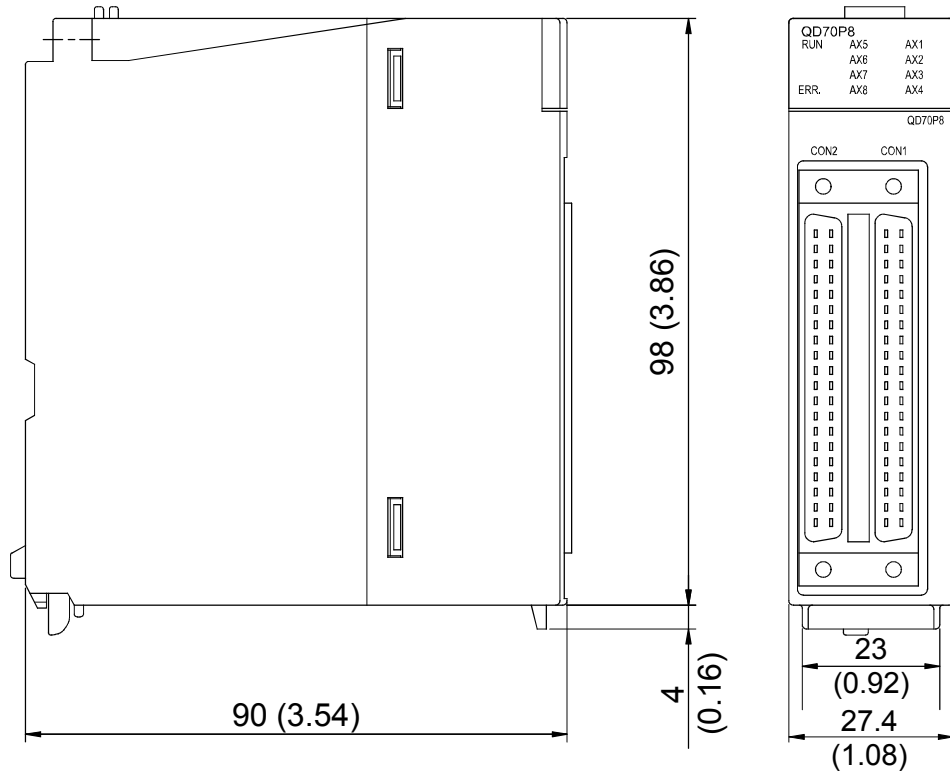
7. External Dimensions

(1) QD70P4



Unit:mm (in.)

(2) QD70P8



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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