MITSUBISHI

Type QD75P/QD75D Positioning Module

User's Manual

(Hardware)

QD75P1, QD75D1
QD75P2, QD75D2
QD75P4, QD75D4

Thank you for buying the Mitsubishi general-purpose programmable logic 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 Programma
Logic Controller

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

⚠DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury, if not carried out properly.
⚠CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

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.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[INSTALLATION PRECAUTION]

⚠CAUTION

- Use the PLC in an environment that meets the general specifications contained in CPU module 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.
- When installing the module, securely insert the module fixing tabs into the mounting holes of the base module while pressing the installation lever located at the bottom of the module downward.
  Improper installation may result in malfunction, breakdown or the module coming loose and dropping.
  Securely fix the module with screws if it is subject to vibration or shock during use.
  Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout or malfunction.
- Switch all phases of the external power supply off when mounting or removing the module.
  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.

[WIRING PRECAUTION]

DANGER

- Switch all phases of the external power supply off 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 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 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
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, 2. Performance Specification, 4. Part Identification Nomenclature, 5.Wiring
Nov., 2001	IB(NA)-0800063-D	Addition 1. Overview, 2. Performance Specifications, 4. Part Identification Nomenclature, 5.2 External Interface, 5.3 Wiring of the differential driver common terminal, 6. External Dimensions

CONTENTS

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)

Conformation to the EMC Directive and Low Voltage Instruction

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please refer to Chapter 3, "EMC Directive and Low Voltage Instruction" of the using PLC CPU module User's Manual(Hardware).
The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction
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 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	QD75D1 Positioning Module (1-axis differential driver output system)	1
	Differential driver common terminal	1
QD75D2	QD75D2 Positioning Module (2-axes differential driver output system)	1
	Differential driver common terminal	1
QD75D4	QD75D4 Positioning Module (4-axes differential driver output system)	1
	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 TAKAMISAWA AMERICA,INC.
      250E Caribbean Drive Sunnyvale, CA 94089 U.S.A
      Tel: (1-408)745-4900
    - FUJITSU TAKAMISAWA EUROPE B.V.
      Jupiterstaat 13-15, our 2132 Hoofddorp, The Netherland
      Tel: (31)23-5560910
    - FUJITSU TAKAMISAWA EUROPE B.V. Zweiniederlassung Deutschland
      Schatzbogen 86 D-81829 Munchen Germany
      Tel: (49)89-42742320
    - FUJITSU TAKAMISAWA EUROPE (UK)
      Network House, Morres Drive, Maidenhead, Berkshire, SL6 4FH United Kingdom
      Tel: (44)1628-504600
    - FUJITSU TAKAMISAWA EUROPE B.V.
      127 Chemin Des Bassins, Europarc, Cleteril 94035 Cleterll 94035 France
      Tel: (33)145139940
    - FUJITSU TAKAMISAWA ASIA PACIFIC PTE LIMITED
      102E Pasir Panjang Road, #04-01 Citilink Warehouse Complex, Singapore 118529
      Tel: (65)375-8560
    - FUJITSU TAKAMISAWA 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

Item	Specification		
	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	0.3 mm^2 (when A6CON1 is used), AWG#24 (when A6CON2 is used), AWG#23 (when A6CON4 is used)		
Applicable connector	A6CON1, A6CON2, A6CON4 (sold separately)		
Number of I/O occupied points	32 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	Max. 100000 times		
Weight	0.15kg (0.33lb.)	0.15kg (0.33lb.)	0.16kg (0.35lb.)

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

Item	Specification		
	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)		
Applicable wire size	0.3 mm^2 (when A6CON1 is used), AWG#24 (when A6CON2 is used), AWG#23 (when A6CON4 is used)		
Applicable connector	A6CON1, A6CON2, A6CON4 (sold separately)		
Number of I/O occupied points	32 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 (0.33lb.)	0.15kg (0.33lb.)	0.16kg (0.35lb.)

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 connection size	Solid wire: 0.2 to 0.8 mm^2 × 2 pcs.
	Stranded wire: 0.2 to 0.8 mm^2 × 2 pcs.
Screw tightening torque	50N·cm

3. Handling

⚠CAUTION
● Use the PLC in an environment that meets the general specifications contained in CPU module 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. ● When installing the module, securely insert the module fixing tabs into the mounting holes of the base module while pressing the installation lever located at the bottom of the module downward. Improper installation may result in malfunction, breakdown or dropping out of the module. Securely fix the module with screws if it is subject to vibration or shock during use. Tighten the screws within the range of specified torque. If the screws are loose, it may cause fallout or malfunction. If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout or malfunction. ● Switch all phases of the external power supply off when mounting or removing the module. 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

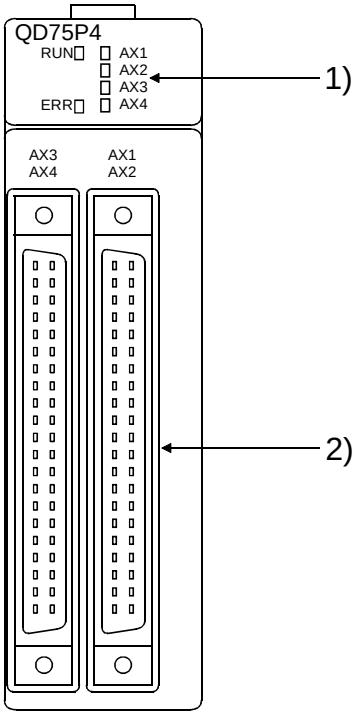
(1) Since the module case is made of resin, do not drop it or subject it to strong impact.

(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 mounting screws (to be provided by the user). In this case, tighten the module mounting screws within the following torque range.
Module mounting screws (M3 × 12): Tightening torque range is from 36 to 48 N·cm.

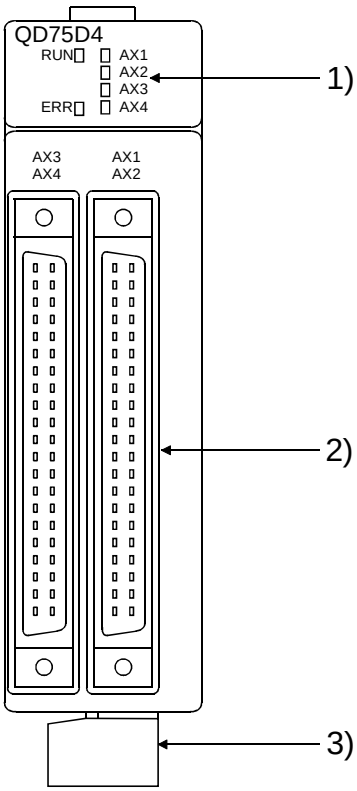
4. Part Identification Nomenclature

(1) Part identification nomenclature

(a) For QD75P4

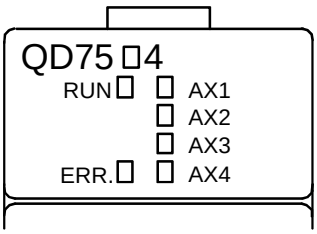


(b) For QD75D4



Number	Name	Number	Name
1)	LED Display	2)	External device connector (The QD75P1, QD75P2, QD75D1 and QD75D2 have the right-hand side connector only.)
3)	Differential driver common terminal		

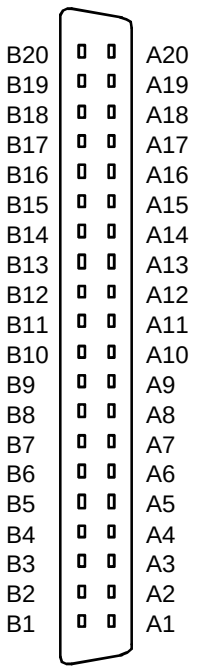
(2) LED display contents



Details of indication	Points to be confirmed	Error
RUN ☐ ☐AX1 ☐AX2 ☐AX3 ERR.☐ ☐AX4	Extinguishment of RUN LED	The hardware is faulty or watch dog timer error occurs.
RUN ■ ☐AX1 ☐AX2 ☐AX3 ERR.☐ ☐AX4	Lighting of RUN LED, Extinguishment of ERR. LED	The module is normal.
RUN ■ ☐AX1 ☐AX2 ☐AX3 ERR.■ ☐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 ERR.◆ ☐AX4	Flashing of ERR. LED Flashing of AX1 LED (Same even if the other axis flashes)	Axis error
RUN ■ ■AX1 ■AX2 ■AX3 ERR.■ ■AX4	Lighting of all LEDs	The hardware is faulty

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

(3) External device connector signal layout

Pin layout	Axis 4 (AX4)		Axis 3 (AX3)		Axis 2 (AX2)		Axis 1 (AX1)	
	Pin No.	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 COM	*3	PULSE COM	*3	PULSE COM	*3	PULSE COM
	2B18	PULSE R-	2A18	PULSE R-	1B18	PULSE R-	1A18	PULSE R-
	*3	PULSE R	*3	PULSE R	*3	PULSE R	*3	PULSE R
	2B17	PULSE R+	2A17	PULSE R+	1B17	PULSE R+	1A17	PULSE R+
	*3	PULSE COM	*3	PULSE COM	*3	PULSE COM	*3	PULSE COM
	2B16	PULSE F-	2A16	PULSE F-	1B16	PULSE F-	1A16	PULSE F-
	*3	PULSE F	*3	PULSE F	*3	PULSE F	*3	PULSE F
	2B15	PULSE F+	2A15	PULSE F+	1B15	PULSE F+	1A15	PULSE F+
	2B14	CLRCOM	2A14	CLRCOM	1B14	CLRCOM	1A14	CLRCOM
	2B13	CLEAR	2A13	CLEAR	1B13	CLEAR	1A13	CLEAR
	2B12	RDYCOM	2A12	RDYCOM	1B12	RDYCOM	1A12	RDYCOM
	2B11	READY	2A11	READY	1B11	READY	1A11	READY
	2B10	PGOCOM	2A10	PGOCOM	1B10	PGOCOM	1A10	PGOCOM
	2B9	PGO5	2A9	PGO5	1B9	PGO5	1A9	PGO5
	2B8	PGO24	2A8	PGO24	1B8	PGO24	1A8	PGO24
	2B7	COM	2A7	COM	1B7	COM	1A7	COM
	2B6	COM	2A6	COM	1B6	COM	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

*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.”

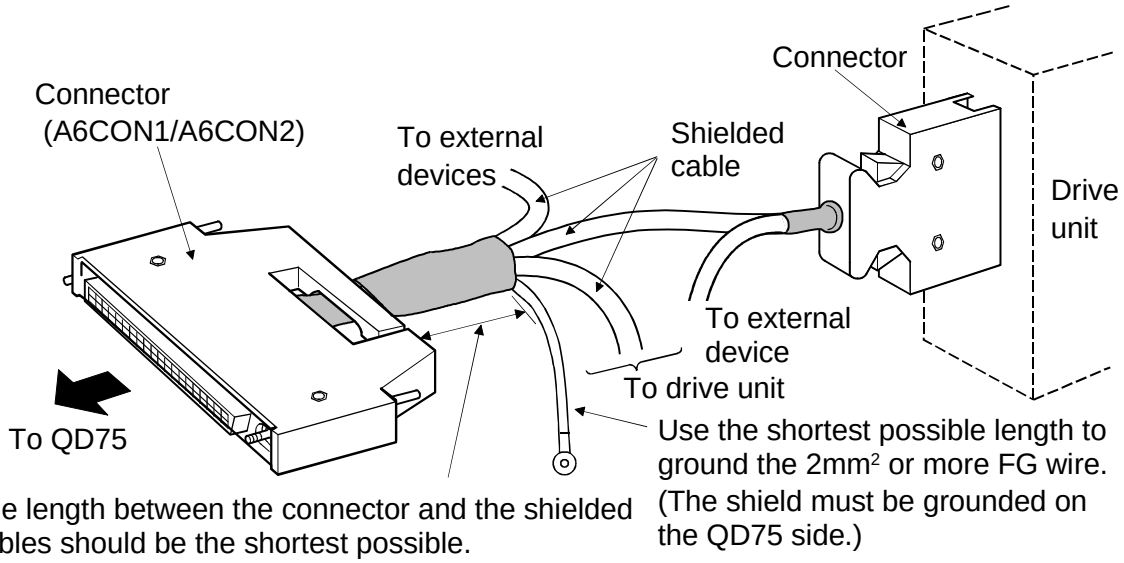
*3: When signal names are shown in upper and lower rows, the upper row shows the signal name for the QD75P1, QD75P2 and QD75P4 and the lower row shows the signal name for the QD75D1, QD75D2 and QD75D4.

5. Wiring

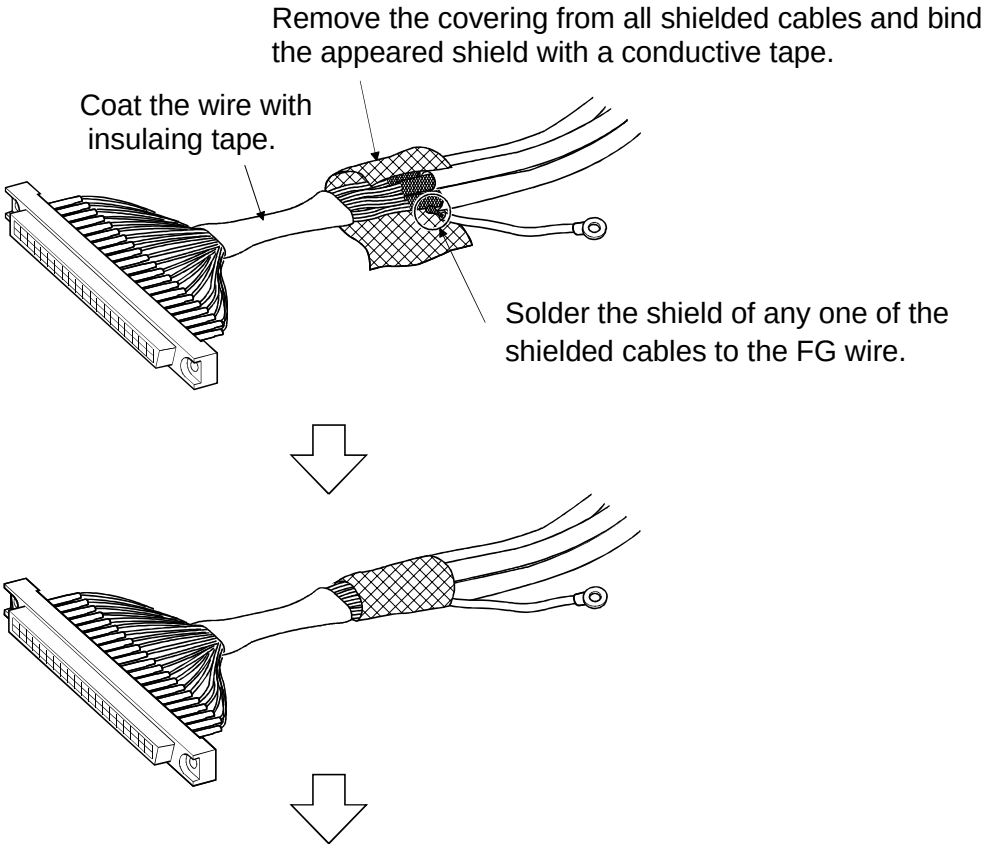
⚠DANGER
● Switch all phases of the external power supply off when installing or placing wiring. Not doing so may cause electric shock or damage to the product.

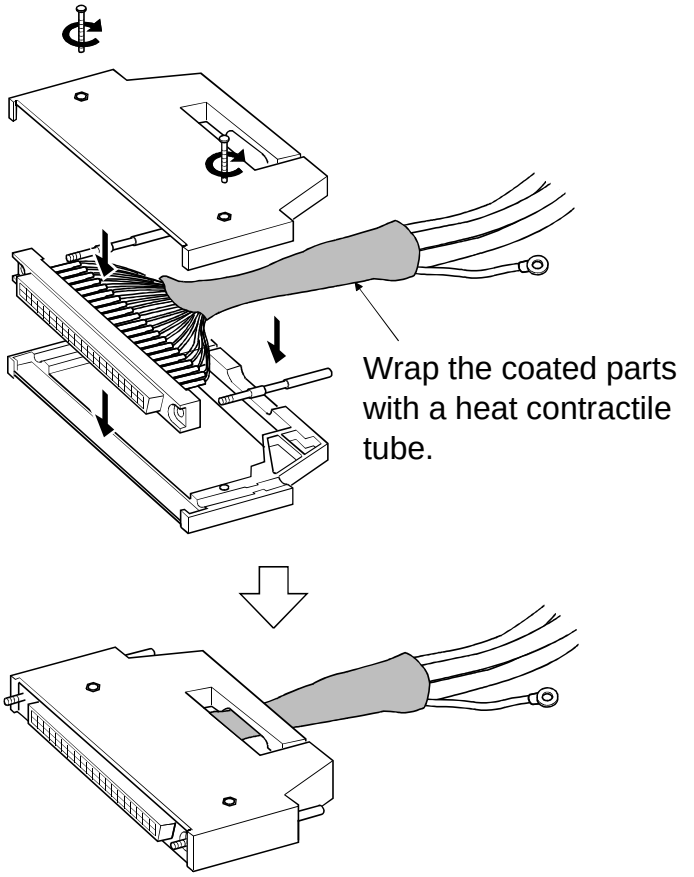
5.1 Wiring Precautions

(1) 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.



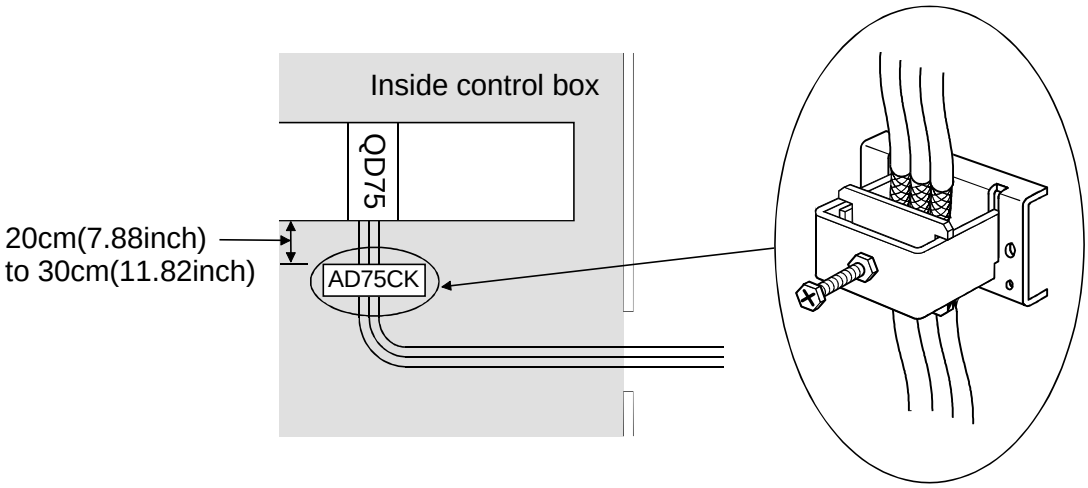
[Processing example of shielded cables]





(2) 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.

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

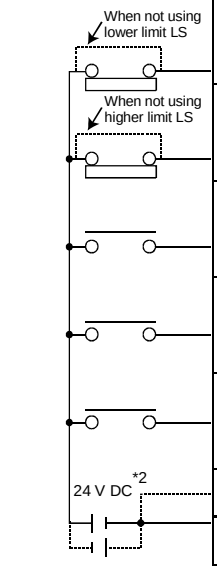
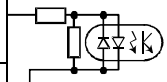
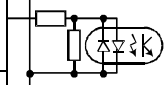
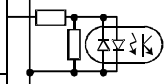
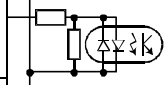
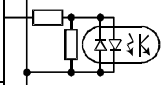
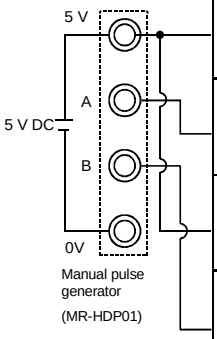
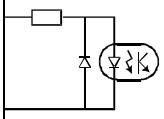
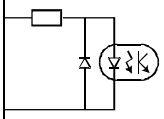
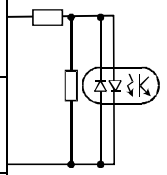
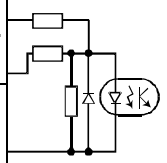


Using the AD75CK, you can tie four cables of about 7mm outside diameter together for grounding.

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).

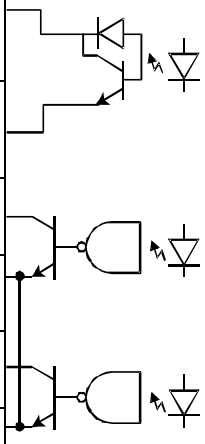
(1) Input (common to QD75P1 and QD75D1)

External wiring	Pin number	Internal circuit	Signal name		Wiring requirement *1
	1A1		Upper-limit LS signal	FLS	○
	1A2		Lower-limit LS signal	RLS	○
	1A3		Near-point dog signal	DOG	△
	1A4		Stop signal	STOP	△
	1A5		External command signal	CHG	△
	1A6 1A7		Common	COM	○
	1A19		Manual pulse generator A phase	PULSER A+	△
	(+) 1B19			PULSER A-	
	(-) 1A20		Manual pulse generator B phase	PULSER B+	
	(+) 1B20			PULSER B-	
	(-) 1A11		Drive unit Ready	READY	○
	1A12		Drive unit Ready common	RDY COM	○
	1A8 1A9		Zero signal	PG024 PG05	△
	1A10		Zero signal common	PG0 COM	

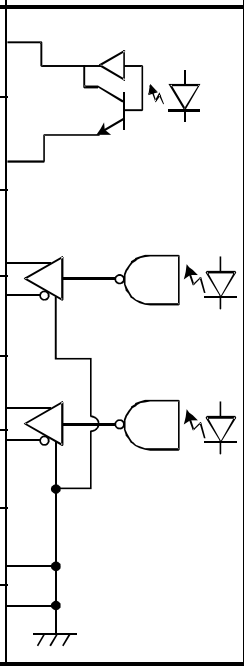
*1: In the column indicating whether wiring is required, the symbol ○ means "wiring is required" and △ means "wiring is required as needed."

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

(2) Output (for QD75P1)

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

(3) Output (for QD75D1)

External wiring	Pin number	Internal circuit	Signal name		Wiring requirement *
	1A13		Deviation counter clear	CLEAR	△
	1A14		Common	CLEAR COM	
	1A15		CW A phase PULSE	PULSE F+	○
	1A16			PULSE F-	
	1A17		CCW B phase SIGN	PULSE F+	
	1A18			PULSE F-	
	—		Differential driver common terminal	—	△
	—				

*: In the column indicating whether wiring is required, the symbol ○ means "wiring is required" and △ means "wiring is required as needed."

5.3 Wiring of the differential driver common terminal

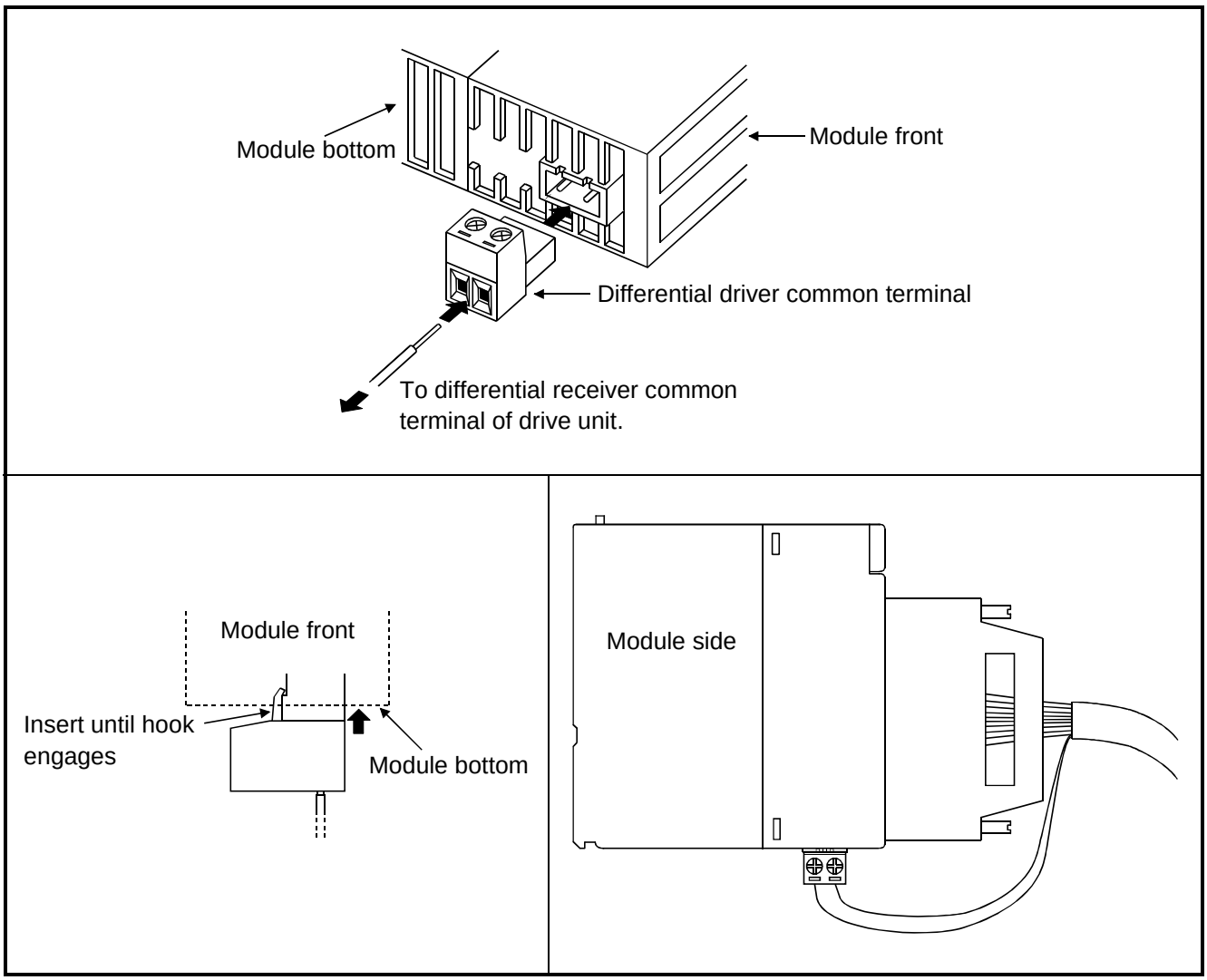
When the differential driver output type (QD75D1/QD75D2/QD75D4) is used, an inter-common potential difference may occur between the differential driver common terminal and the differential receiver common terminal of the drive unit.

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.)

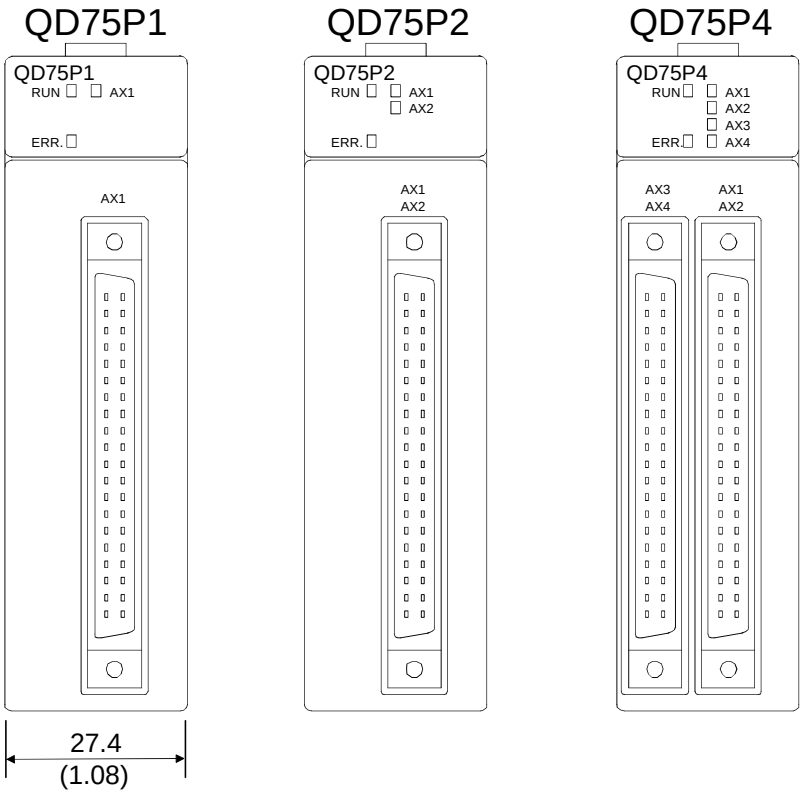
The following gives an example of wiring the differential driver common terminal of the QD75D1/QD75D2/QD75D4.

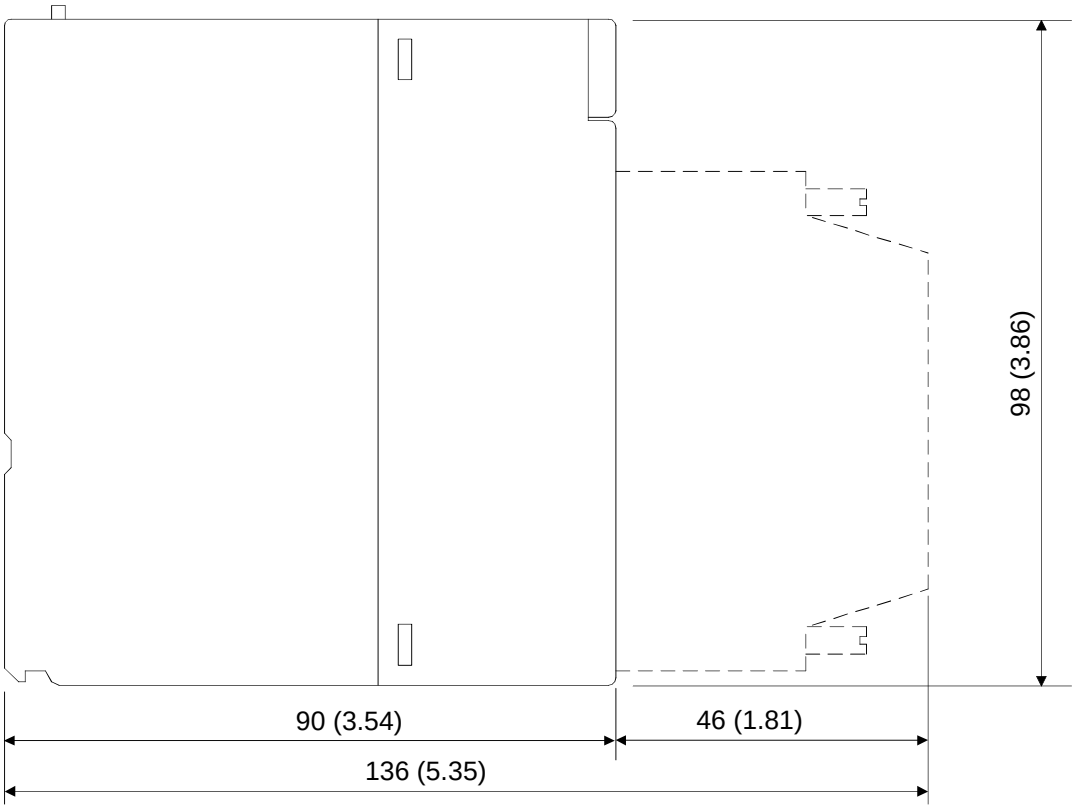
Up to two wires can be connected to one differential driver common terminal. (Refer to "2. Performance Specifications" for details.)



6. External Dimensions

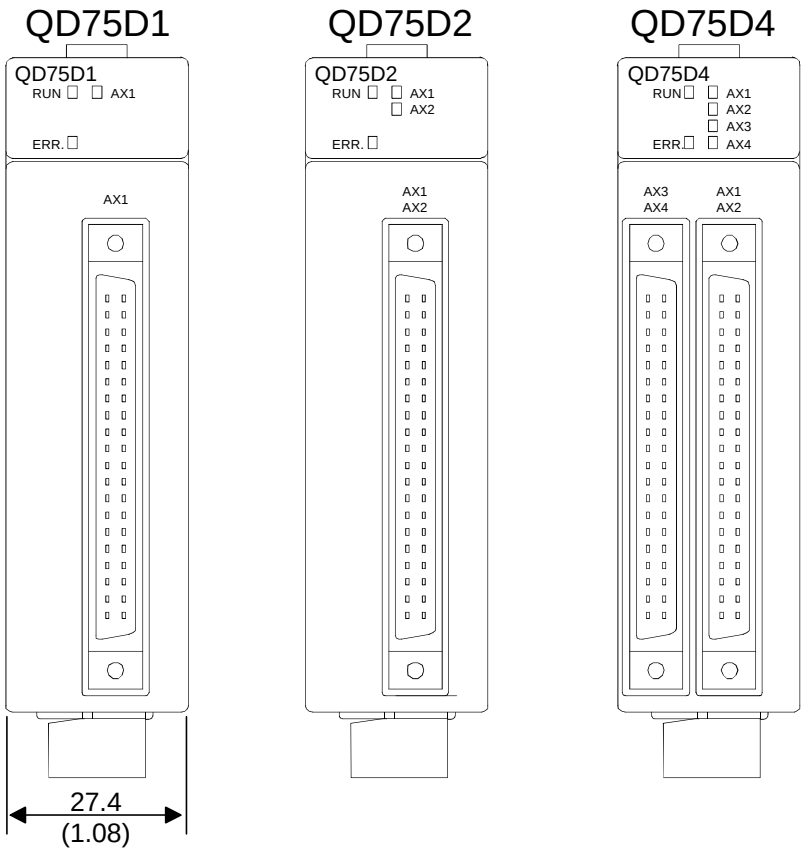
(1) QD75P1/QD75P2/QD75P4

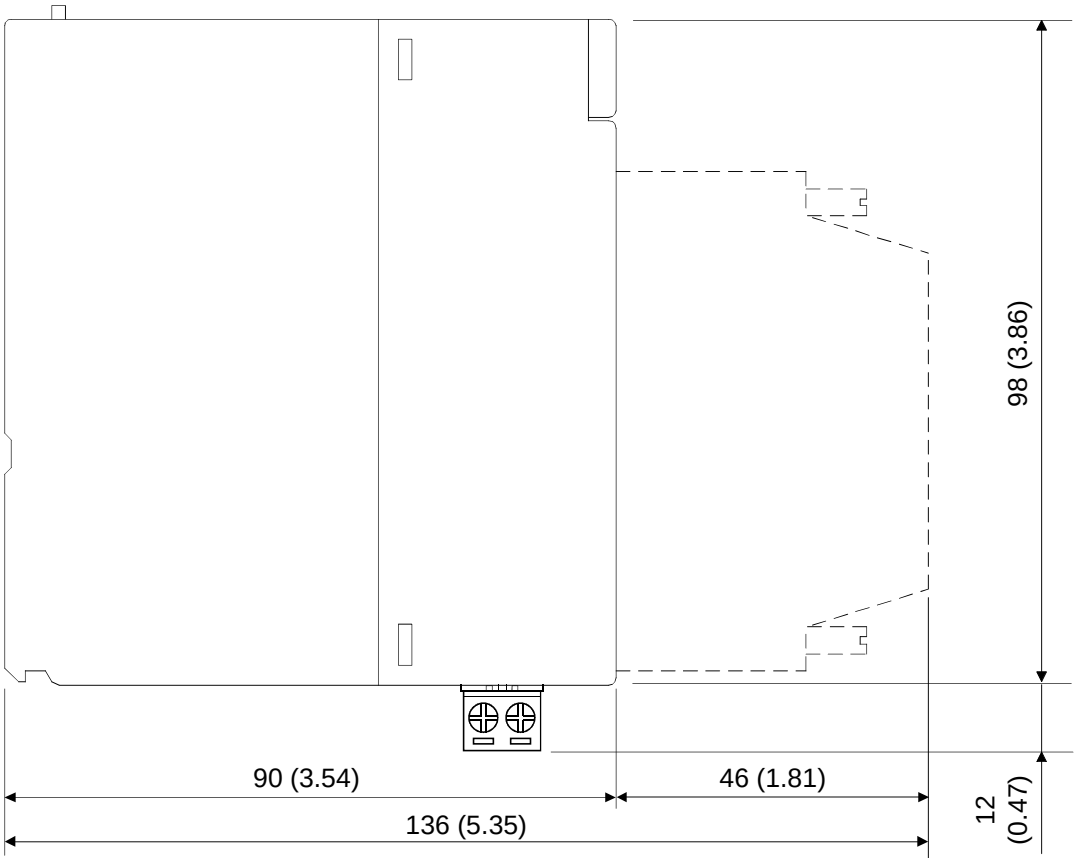




Unit : mm (inch)

(2) QD75D1/QD75D2/QD75D4





Unit : mm (inch)

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- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
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