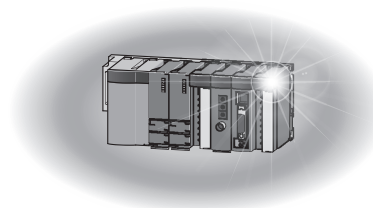


Programmable Controller

MELSEC **Q** series

Type QD75P/QD75D Positioning Module User's Manual

-QD75P1N
-QD75P2N
-QD75P4N
-QD75D1N
-QD75D2N
-QD75D4N
-QD75P1
-QD75P2
-QD75P4
-QD75D1
-QD75D2
-QD75D4



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

Print Date	* Manual Number	Revision
Nov., 2004	SH (NA)-080058-G	Partial corrections and additions SAFETY INSTRUCTIONS, Section 1.4, Section 2.3, Section 2.4, Section 4.2.1, Section 4.3.1, Section 4.5.1, Section 5.1.7, Section 5.2.1, Section 5.2.6, Section 5.6.2, Section 6.1, Section 9.2.19, Section 12.2.1, Section 12.4.4, Section 12.7.4, Appendix 1.1, Appendix 9.1
Jun., 2005	SH (NA)-080058-H	Partial corrections and additions Section 5.1.2, Section 9.1.2, Section 9.2.10, Section 9.2.21, Section 10.3.8, Section 11.4.1, Section 12.5.2, Section 12.7.1, Section 12.7.6, Section 15.1, Section 15.2
Aug., 2006	SH (NA)-080058-I	Partial corrections and additions Section 3.4.4, Section 5.2.1, Section 14.5 to 14.7, Appendix 6.1, INDEX
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Apr., 2011	SH (NA)-080058-L	Partial corrections and additions Section 3.4.1, Section 4.3.1, 4.3.2, Section 5.6.1, 5.7.2, Section 6.2, 6.4, Section 7.2, Section 8.2.7, 8.2.8, Section 9.2.3, 9.2.16, 9.2.18, Section 10.5, Section 11.2.1, Section 12.4.2, 12.6, 12.7.4, Section 13.2, 13.3, 13.5, Section 14.3, Appendix 3, Appendix 9.2, Appendix 10, 10.2, 10.3 Additions Appendix 10.4 Changed item numbers Appendix 10.4 to 10.12 → Appendix 10.5 to 10.13
Sep., 2011	SH (NA)-080058-M	Partial corrections and additions Generic Terms and Abbreviations, Component List, Section 1.1.1, 1.2.1, Section 2.2, 2.3, 2.4, Section 3.1, 3.4.1 to 3.4.4, Section 4.1.2, 4.3.2, Section 5.1.1, 5.1.7, 5.2.1 to 5.2.4, 5.3, 5.4, 5.6.1, 5.6.2, 5.7.1, 5.7.2, Section 6.1, 6.4, 6.5.3, Section 7.1.1, 7.1.2, Section 8.2.2, 8.2.5, 8.3.1, Section 9.1.2, 9.1.4, 9.2.9, 9.2.16 to 9.2.18, Section 11.1.1, 11.2.1, 11.3.1, 11.3.4, 11.4.1, 11.4.4, Section 12.3.2, 12.7.5, 12.7.7, Section 13.5, Section 14.3, 14.6, Section 15.3, 15.4, Appendix 1.1, Appendix 2.2, Appendix 10.1 to 10.13, Appendix 12 to 14 Additions Appendix 1.2 Addition model QD75P1N, QD75P2N, QD75P4N, QD75D1N, QD75D2N, QD75D4N

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi Electric programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- Safety Guidelines (this manual is included with the CPU module or base unit)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

To ensure that this product maintains EMC and Low Voltage Directives, please refer to Section 4.3.1.

GENERIC TERMS AND ABBREVIATIONS

Unless specially noted, the following generic terms and abbreviations are used in this manual.

Generic term/abbreviation	Details of generic term/abbreviation
CPU module	Generic term for CPU module on which QD75 can be mounted.
QD75	Generic term for positioning module QD75P1N, QD75P2N, QD75P4N, QD75D1N, QD75D2N, QD75D4N, QD75P1, QD75P2, QD75P4, QD75D1, QD75D2, and QD75D4. The module type is described to indicate a specific module.
QD75P□N	Generic term for positioning module QD75P1N, QD75P2N, QD75P4N.
QD75D□N	Generic term for positioning module QD75D1N, QD75D2N, QD75D4N.
QD75P□	Generic term for positioning module QD75P1, QD75P2, QD75P4.
QD75D□	Generic term for positioning module QD75D1, QD75D2, QD75D4.
Peripheral device	Generic term for DOS/V personal computer that can run the following "GX Developer" and "GX Configurator-QP".
GX Configurator-QP	Abbreviation for GX Configurator-QP (SW2D5C-QD75P-E or later).
GX Developer	Abbreviation for GX Developer (SW4D5C-GPPW-E or later).
GX Works2	Product name of the software package for the MELSEC programmable controllers.
Drive unit (servo amplifier)	Abbreviation for pulse input compatible drive unit (servo amplifier).
Manual pulse generator	Abbreviation for manual pulse generator (prepared by user).
DOS/V personal computer	IBM PC/AT® and compatible DOS/V compliant personal computer.
Personal computer	Generic term for personal computer which supports Windows®.
Workpiece	Generic term for moving body such as workpiece and tool, and for various control targets.
Axis 1, axis 2, axis 3, axis 4	Indicates each axis connected to QD75.
1-axis, 2-axis, 3-axis, 4-axis	Indicates the number of axes. (Example: 2-axis = Indicates two axes such as axis 1 and axis 2, axis 2 and axis 3, and axis 3 and axis 1.)

LIST OF DISCONTINUED MODELS

The following table lists discontinued models described in this manual. For onerous repair term after discontinuation of production, refer to WARRANTY in this manual.

Model	Production discontinuation
QD75P1	September 2021
QD75P2	September 2021
QD75P4	September 2021
QD75D1	September 2021
QD75D2	September 2021
QD75D4	September 2021

COMPONENT LIST

The table below shows the component included in respective positioning modules:

Module name	Description	Quantity
QD75P1N	QD75P1N Positioning Module(1-axis open collector output system)	1
QD75P2N	QD75P2N Positioning Module(2-axes open collector output system)	1
QD75P4N	QD75P4N Positioning Module(4-axes open collector output system)	1
QD75D1N	QD75D1N Positioning Module(1-axis differential driver output system)	1
	Differential driver common terminal	1
QD75D2N	QD75D2N Positioning Module(2-axes differential driver output system)	1
	Differential driver common terminal	1
QD75D4N	QD75D4N Positioning Module(4-axes differential driver output system)	1
	Differential driver common terminal	1
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

1 PRODUCT OUTLINE

MELSEC-Q

1.1 Positioning control

1.1.1 Features of QD75

The features of the QD75 are shown below.

(1) Availability of one, two, and four axis modules

- (a) The pulse output types of the available modules are either the open collector output system or the differential driver output system. A module can be selected from the following depending on the drive unit type and the number of axes. (Refer to Section 2.2.)
 - Open collector output system:
QD75P1N/QD75P2N/QD75P4N (QD75P1/QD75P2/QD75P4)
 - Differential driver output system:
QD75D1N/QD75D2N/QD75D4N (QD75D1/QD75D2/QD75D4)
- (b) For connecting any of the QD75 modules to the base unit, a single slot and 32 dedicated I/O channels are required.
Within the limit imposed by the maximum number of inputs and outputs supported by the CPU module, up to 64 modules can be used. (Refer to Section 3.1.)

(2) Wide variety of positioning control functions

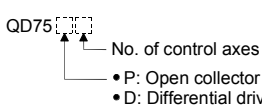
- (a) A wide variety of positioning control functions essential to any positioning system are supported: positioning to an arbitrary position, fixed-feed control, equal-speed control, and so on. (Refer to Section 5.3 and 9.2.)
 - 1) Up to 600 positioning data items, including such information as positioning addresses, control systems, and operation patterns, can be prepared for each axis.
Using the prepared positioning data, the positioning control is performed independently for each axis. (In addition, such controls as interpolation involving two to four axes and simultaneous startup of multiple axes are possible.)
 - 2) Independent control of each axis can be achieved in linear control mode (executable simultaneously over four axes).
Such control can either be the independent positioning control using a single positioning data or the continuous positioning control enabled by the continuous processing of multiple positioning data.
 - 3) Coordinated control over multiple axes can take the form of either the linear interpolation through the speed or position control of two to four axes or the circular interpolation involving two axes.
Such control can either be the independent positioning control using a single positioning data or the continuous positioning control enabled by the continuous processing of multiple positioning data.
- (b) For each positioning data, the user can specify any of the following control systems: position control, speed control, speed-position switching control, position-speed switching control, and so on. (Refer to Section 5.3 and 9.2.)

2 SYSTEM CONFIGURATION

MELSEC-Q

2.2 Configuration list

The positioning system using the QD75 is configured of the following devices.

No.	Part name	Type	Remarks
1	Positioning module	QD75P1N QD75P2N QD75P4N QD75D1N QD75D2N QD75D4N QD75P1 QD75P2 QD75P4 QD75D1 QD75D2 QD75D4	 Refer to Appendix 1.2 for differences between QD75P□N/QD75D□N and QD75P□/QD75D□.
2	GX Configurator-QP	SW□D5C- QD75P-E	Refer to GX Configurator-QP Operating Manual for details.
3	Personal computer	Personal computer which supports Windows®.	(Prepared by user) Refer to GX Configurator-QP Operating Manual for details.
4	RS-232 cable	QC30R2	(Prepared by user) An RS-232 cable is needed for connecting the CPU module with a personal computer. For details, refer to GX Configurator-QP Operating Manual.
5	USB cable	—	(Prepared by user) A USB cable is needed for connecting the CPU module with a personal computer. For details, refer to GX Configurator-QP Operating Manual.
6	Drive unit	—	(Prepared by user)
7	Manual pulse generator	—	(Prepared by user) Recommended: MR-HDP01 (Mitsubishi Electric)
8	Connection cable (For connecting between the QD75 and the drive unit)	—	(Prepared by user) Cables are needed to connect the QD75 with the drive unit, manual pulse generator, and input devices in the machine system. (Prepare them referring to the manuals for the connected devices and information given in 3.4.2 of this manual.)

3 SPECIFICATIONS AND FUNCTIONS

MELSEC-Q

3.1 Performance specifications

■ QD75P□N/QD75D□N

Model		QD75P1N *1 QD75D1N	QD75P2N *1 QD75D2N	QD75P4N *1 QD75D4N
Item				
No. of control axes		1 axis	2 axes	4 axes
Interpolation function		None	2-axis linear interpolation 2-axis circular interpolation	2-, 3-, or 4-axis linear interpolation 2-axis circular interpolation 3-axis helical interpolation
Control system		PTP (Point To Point) control, path control (all of linear, circular, and helical can be set), speed control, speed-position switching control, position-speed switching control		
Control unit		mm, inch, degree, pulse		
Positioning data		600 data /axis (Can be set with peripheral device or sequence program.)		
Backup		Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup)		
Positioning	Positioning system	PTP control: Incremental system/absolute system Speed-position switching control: Incremental system/absolute system *2 Position-speed switching control: Incremental system Path control: Incremental system/absolute system		
	Positioning range	In absolute system • -214748364.8 to 214748364.7 (μm) • -21474.83648 to 21474.83647 (inch) • 0 to 359.99999 (degree) • -2147483648 to 2147483647 (pulse) In incremental system • -214748364.8 to 214748364.7 (μm) • -21474.83648 to 21474.83647 (inch) • -21474.83648 to 21474.83647 (degree) • -2147483648 to 2147483647 (pulse) In speed-position switching control (INC mode) / position-speed switching control • 0 to 214748364.7 (μm) • 0 to 21474.83647 (inch) • 0 to 21474.83647 (degree) • 0 to 2147483647 (pulse) In speed-position switching control (ABS mode) *2 • 0 to 359.99999 (degree)		
	Speed command	0.01 to 2000000.00 (mm/min) 0.001 to 2000000.000 (inch/min) 0.001 to 2000000.000 (degree/min) 1 to 4000000 (pulse/s)		
	Acceleration/ deceleration process	Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration		
	Acceleration/ deceleration time	1 to 8388608 (ms) Four patterns can be set for each of acceleration time and deceleration time		
	Sudden stop deceleration time	1 to 8388608 (ms)		

*1: QD75P□N represents the open collector output system, and QD75D□N represents the differential driver output system.

*2: In speed-position switching control (ABS mode), the control unit available is "degree" only. (For details, refer to Section 9.2.19 "Speed-position switching control (ABS mode)".)

3 SPECIFICATIONS AND FUNCTIONS

MELSEC-Q

Item	Model	QD75P1N *1 QD75D1N	QD75P2N *1 QD75D2N	QD75P4N*1 QD75D4N
Starting time *3	1-axis linear control		1.5ms	Factors in starting time extension The following times will be added to the starting time in the described conditions: • S-curve acceleration/ deceleration is selected: 0.1ms • Other axis is in operation: 0.5ms • During continuous positioning control: 0.3ms • During continuous path control: 0.3ms
	1-axis speed control		1.5ms	
	2-axis linear interpolation control (Composite speed)		1.5ms	
	2-axis linear interpolation control (Reference axis speed)		1.5ms	
	2-axis circular interpolation control		2.0ms	
	2-axis speed control		1.5ms	
	3-axis linear interpolation control (Composite speed)		1.7ms	
	3-axis linear interpolation control (Reference axis speed)		1.7ms	
	3-axis helical interpolation control		2.6ms	
	3-axis speed control		1.7ms	
	4-axis linear interpolation control		1.8ms	
4-axis speed control		1.8ms		
External wiring connection system	40-pin connector			
Applicable wire size	0.3mm ² (22AWG) (for A6CON1 or A6CON4), 0.088 to 0.24mm ² (28 to 24AWG) (for A6CON2)			
Applicable connector for external device	A6CON1, A6CON2, A6CON4 (sold separately)			
Max. output pulse	QD75P1N, QD75P2N, QD75P4N: 200kpps QD75D1N, QD75D2N, QD75D4N: 4Mpps			
Max. connection distance between servos	QD75P1N, QD75P2N, QD75P4N: 2m QD75D1N, QD75D2N, QD75D4N: 10m			
Internal current consumption (5VDC)	QD75P1N: 0.29A QD75D1N: 0.43A	QD75P2N: 0.30A QD75D2N: 0.45A	QD75P4N: 0.36A QD75D4N: 0.66A	
Flash ROM write count	Max. 100000 times			
No. of occupied I/O points	32 points (I/O assignment: intelligent 32 points)			
Outline dimensions	98 (H) × 27.4 (W) × 90 (D) mm			
Weight	QD75P1N: 0.14kg QD75D1N: 0.15kg	QD75P2N: 0.14kg QD75D2N: 0.15kg	QD75P4N: 0.16kg QD75D4N: 0.16kg	

* 1: QD75P□N represents the open collector output system, and QD75D□N represents the differential driver output system.

* 3: Using the "Pre-reading start function", the virtual start time can be shortened. (For details, refer to Section 12.7.7 "Pre-reading start function".



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