Mitsubishi Safety Programmable Controller MELSEC-QS Series
Machinery Directive (2006/42/EC) Compliance

BCN-P5767-A

Thank you for purchasing the Mitsubishi safety programmable controller MELSEC-QS series.
The MELSEC-QS series programmable controller is suitable for establishing safety functions for general industrial machinery and complies with the Machinery Directive (2006/42/EC).

Before using this product, please read this manual, the relevant manuals, the manuals for standard programmable controller, and the safety standards carefully and pay full attention to safety to handle the product correctly.

1. Safety Programmable Controller Product List

Product Name	Model	Description
Safety main base unit	QS034B	A unit where a safety CPU module, safety power supply module, and CC-Link Safety system master module are mounted
	QS034B-K	An S-mark[*1] certified safety main base unit
Safety power supply module	QS061P-A1	A module which is mounted on a safety main base unit and supplies 100VAC to the system
	QS061P-A2	A module which is mounted on a safety main base unit and supplies 200VAC to the system
	QS061P-A1-K	An S-mark[*1] certified safety power supply module (100VAC)
	QS061P-A2-K	An S-mark[*1] certified safety power supply module (200VAC)
Safety CPU module	QS001CPU	A module which is mounted on a safety main base unit and performs logic operations for safety control
	QS001CPU-K	An S-mark[*1] certified safety CPU module
CC-Link Safety system master module	QS0J61BT12	A module which is mounted on a safety main base unit and establishes connection to CC-Link Safety
	QS0J61BT12-K	An S-mark[*1] certified CC-Link Safety system master module
CC-Link Safety system remote I/O module	QS0J65BTB2-12DT	A safety I/O module connected to external devices. The module has eight safety input points and four safety output points, and sends/receives safety data to/from the safety programmable controller over CC-Link Safety.
	QS0J65BTB2-12DT-K	An S-mark[*1] certified CC-Link Safety system remote I/O module
	QS0J65BTS2-8D	A safety input module connected to external devices. The module has eight safety input points and sends/receives safety data to/from the safety programmable controller over CC-Link Safety.
CC-Link Safety system remote I/O module	QS0J65BTS2-4T	A safety output module connected to external devices. The module has four safety output points and sends/receives safety data to/from the safety programmable controller over CC-Link Safety.

*1 S-mark is a safety certification issued by Korea Occupational Safety and Health Agency (KOSHA).

2. Relevant Manuals

The following lists the safety programmable controller relevant manuals.
Order each manual as needed, referring to the list.

Manual Name	Manual Number (Model Code)
Safety Application Guide	SH-080613ENG-D (13JR90)
QSCPU User's Manual (Hardware Design, Maintenance and Inspection)	SH-080626ENG (13JR92)
QSCPU User's Manual (Function Explanation, Program Fundamentals)	SH-080627ENG (13JR93)
CC-Link Safety System Master Module User's Manual	SH-080600ENG (13JR88)
CC-Link Safety System Remote I/O Module User's Manual	SH-080612ENG (13JR89)
GX Developer Version 8 Operating Manual	SH-080373E (13JU41)
GX Developer Version 8 Operating Manual (Function Block)	SH-080376E (13JU44)
GX Developer Version 8 Operating Manual (Safety Programmable Controller)	SH-080576ENG (13JU53)
QSCPU Programming Manual (Common Instructions)	SH-080628ENG (13JW01)
QSCPU Programming Manual (Safety FB)	SH-080744ENG (13JW05)

3. Safety Standards

Use the product according to the following safety standards.

| Region	Safety Standards
International	IEC61508:1998 to 2000, ISO13849-1:2006, IEC61131-2:2007, IEC61000-6-2:2005, IEC61000-6-4:2006
Europe	EN954-1:1996, EN ISO13849-1:2008, EN61131-2:2007, EN61000-6-2:2005, EN61000-6-4:2007
North America	UL508

4. Module/Unit Replacement

Replace the module or unit according to the following replacement cycle.

| Module/Unit	Replacement Cycle
Safety power supply module	5 years
Safety CPU module	10 years
Safety main base unit	10 years
CC-Link Safety system master module	10 years
CC-Link Safety system remote I/O module	5 years

5. Installation

When installing a programmable controller to a control panel or similar, fully consider its operability, maintainability, and environmental resistance. For details, refer to the QSCPU User's Manual (Hardware Design, Maintenance and Inspection).

(1) Installation position
Keep the clearances shown below between the top/bottom faces of the modules and the control panel or other parts so that good ventilation is ensured and the modules can be easily replaced.
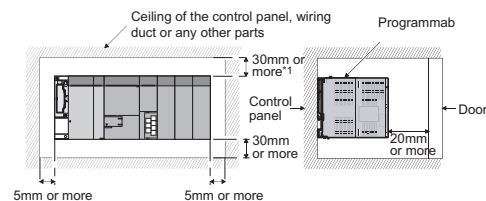
*1 A clearance required when the wiring duct is 50mm or less in height. A 40mm or more clearance is required when the wiring duct is longer.

(2) Module mounting orientation

(a) Mount modules in the following orientation to ensure good ventilation for heat release.

(b) Do not mount modules in the following orientations.

Vertical mounting   Upward/downward mounting

Upside-down mounting
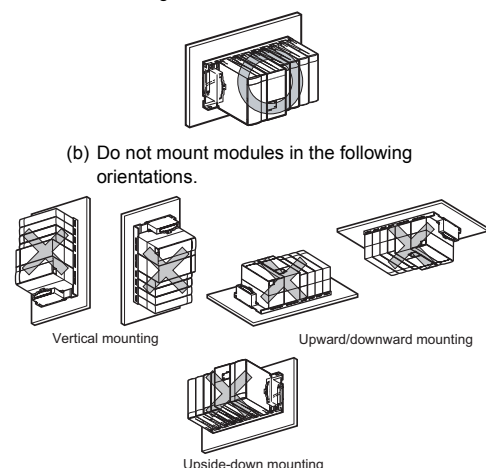
(3) Installation precautions

(a) Install a base unit on a flat surface.
If the surface is not flat, the printed circuit board is distorted, resulting in malfunction of the modules mounted.

(b) If there is a vibration source, such as an electromagnetic contactor or no fuse breaker, separate the control panel or keep enough clearance from the vibration source to install the programmable controller.

In addition, keep the clearances shown below between the programmable controller and devices (such as contactors and relays) to avoid being affected by radiated noise or heat.
- In front of the programmable controller: 100mm or more
- On the right or left of the programmable controller: 50mm or more

Device (such as contactor and relay)
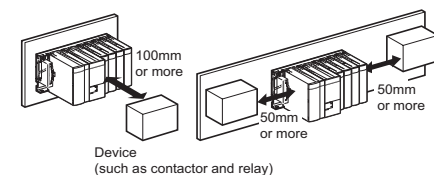
(c) When installing a programmable controller to a control panel, do not mount any module in the rightmost slot of the base unit.
Before uninstalling, remove the module mounted in the rightmost slot of the base unit.

(4) CC-Link Safety system remote I/O module
For the installation of CC-Link Safety system remote I/O modules, refer to the user's manual (hardware) provided with each module.

6. Module Status after Power-on and LED Indication

A safety programmable controller performs initial processing (such as self-diagnostics) after power-on or reset. The LEDs of each module indicate the module operating status after initial processing.

(1) Safety power supply module

No.	Name	Application
1)	POWER LED	On (green): The module is operating normally. (5VDC output or momentary power failure within 20ms) Off: • AC power is supplied, but the module has been failed. (5VDC output failure, overload, internal circuit failure or fuse blown) • AC power is not supplied. • Power has been failed (including momentary power failure 20ms or longer).

(2) Safety CPU module

No.	Name	Application
1)	ALIVE LED (green)	On: The module is operating normally.[*1] Off: The module has detected a hardware WDT error. (The ERR. LED turns on.)
2)	TEST LED (yellow)	Indicates the operating mode of the CPU module. On: The module is in TEST MODE.[*1] Flashing: The mode is switched from TEST MODE to SAFETY MODE. The LED turns off after the module is reset. (Flashing interval: on 200ms/off 200ms) Off: The module is in SAFETY MODE.

No.	Name	Application
3)	RUN LED (green)	Indicates the operating status of the CPU module. On: The module is in the RUN status (the module is in operation).[*1] Off: The module is in the STOP status (the module is not operating) or a stop error has been detected. Flashing: A program and parameters are written to the module which is in the STOP status and then the RUN/STOP/RESET switch is changed from STOP to RUN. (Flashing interval: on 200ms/off 200ms)
4)	ERR. LED (red)	On: A self-diagnostics error that will not stop module operation, except for a battery error, has been detected.[*1] Off: The module is operating normally. Flashing: A self-diagnostics error that will stop module operation has been detected. (Flashing interval: on 200ms/off 200ms) Or, the module has been reset. (Flashing interval: on 60ms/off 60ms)
5)	USER LED (red)	On: The annunciator (F) turns on.[*1] Off: The module is operating normally.
6)	BAT. LED (yellow)	On: A battery error has occurred due to the CPU battery voltage drop.[*1] Off: The module is operating normally.

*1 The LED also turns on during the initial processing (such as self-diagnostics) immediately after power-on or reset.

(3) CC-Link Safety system master module

No.	Name	Application
1)	RUN LED	On: The module is operating normally. Off: The module has detected a WDT error.
2)	ERR. LED	Off: Communication has been failed in all stations. This LED turns on when one of the following errors has occurred. •There are more than one master station on the same network. •Parameter setting is wrong. •The data link monitoring timer timed out. •The cable is disconnected or the transmission path is affected by noise. Flashing: A communication failure has been detected in one of the stations or the remote station numbers are overlapped.
3)	MST LED	On: The module is operating as master station. (The module is controlling data link.)
4)	L RUN LED	On: The module is performing data link.
5)	L ERR. LED	On: A communication error has occurred in the master station. Flashing irregularly: A terminating resistor is not attached or the module and/or the CC-Link dedicated cable is affected by noise.
6)	SD LED	On: The module is sending data.
7)	RD LED	On: The module is receiving data.

(4) CC-Link Safety system remote I/O module
Refer to the user's manual (hardware) provided with each CC-Link Safety system remote I/O module.

7. Precautions for Use

Users must prove that their entire safety system complies with the safety standards and the Machinery Directive. The third-party certification organization will validate the safety of product for the entire safety system, including a safety programmable controller and safety components.
To establish a safety system, calculate the target failure measure (PFD/PFH) for each safety application (safety function) based on the PFD/PFH values of the safety programmable controller and connected safety components. The target failure measure (PFD/PFH) is the reliability target value for each Safety Integrity Level (SIL) defined in IEC61508 and can be calculated by the following formula.

$$PFD/PFH = A + B + C + D \quad \text{....Calculation formula of PFD/PFH}$$

Variable	Definition
A	Total PFD/PFH of the safety CPU module, safety power supply module, safety main base unit, and CC-Link Safety system master module
B	PFD/PFH of the CC-Link Safety system remote I/O module (1) When safety input device(s) and safety output device(s) are connected to the same CC-Link Safety system remote I/O module: B=B1 (2) When safety input device(s) and safety output device(s) are connected to different CC-Link Safety system remote I/O modules: B=B1+B2
B1	PFD/PFH of the CC-Link Safety system remote I/O module to which safety input device(s) is connected
B2	PFD/PFH of the CC-Link Safety system remote I/O module to which safety output device(s) is connected
C[*1]	PFD/PFH of safety input device(s)
D[*1]	PFD/PFH of safety output device(s)

*1 For the values, refer to the manual for the safety component used.

The following tables show the PFD/PFH values for the safety programmable controller.

Module/Unit		PFD	PFH(/h)
Total PFD/PFH of the safety CPU module, safety power supply module, safety main base unit, and CC-Link Safety system master module[*2]		1.39×10^{-4}	4.95×10^{-9}
PFD/PFH of the CC-Link Safety system remote I/O module	QS0J65BTB2-12DT	2.57×10^{-5}	1.15×10^{-9}
	QS0J65BTS2-8D	1.68×10^{-5}	7.46×10^{-10}
	QS0J65BTS2-4T	1.68×10^{-5}	7.46×10^{-10}

Module/Unit		PFD	PFH(/h)
Total PFD/PFH of the S-mark certified safety CPU module, safety power supply module, safety main base unit, and CC-Link Safety system master module[*2]		1.28×10^{-4}	4.72×10^{-9}
PFD/PFH of the S-mark certified CC-Link Safety system remote I/O module	QS0J65BTB2-12DT-K	0.27×10^{-4}	1.21×10^{-9}

*2 The number of CC-Link Safety system master modules does not affect the PFD and PFH values.

For details on the target failure measure (PFD/PFH), refer to the Safety Application Guide.

8. EC Declaration of Conformity

EC Declaration of Conformity

Manufacturer: Mitsubishi Electric Corporation, Nagoya Works
Address: 1-14, 5-chome, Yada-Minami, Higashi-ku, Nagoya 461-8670,Japan
Products: Type: Programmable Controller (Open Type equipment, Installation category II)
Model: QS-Series (Applicable units identified in Appendix)

These products comply with the following European directives:

Directive	Name
2006/42/EC	Machinery Directive

*Further details of conformity to these directives are contained in the appendices (BCN-P9999-****).*

This declaration is based on the conformity assessment of following Notified Body:

TÜV RHEINLAND INDUSTRIE SERVICE GMBH - TÜV Rheinland Group Am Grauen Stein D-51105 Köln Germany Phone : +49:221:8060 Fax : +49:221:806114 Email : is@de.tuv.com Website : http://www.tuv.com	NB 0035

Authorised Signature:

(First name, Last name)
Senior Manager, FA System Department

Date: (date)   (signature)

Authorised Representative: Mitsubishi Electric Europe BV
in the European Community Gothaer Strase 8, 40880 Ratingen, Germany
through Responsible person
Signature:

(First name, Last name)
Division Manager,
FA European Development Center
FA European Business Group

Date: (date)   (signature)

The appendices are part of this declaration. This declaration certifies the conformity with the directives mentioned, but does not contain any warranted qualities. The installation, usage and safety directions of the product documentation have to be observed.

Appendix
QS-Series Programmable Controllers
Range of products:

QS001CPU	5	QS0J65BTB2-12DT	5	QS001CPU-K	5
QS034B	5	QS0J65BTS2-8D	5	QS034B-K	5
QS034B-E	5	QS0J65BTB2-4T	5	QS061P-A1-K	5
QS061P-A1	5			QS061P-A2-K	5
QS061P-A2	5			QS0J61BT12-K	5
QS0J61BT12	5			QS0J65BTB2-12DT-K	5

The conformity of the above mentioned products with the regulations of the directive 2006/42/EC for machinery is shown by the application of a Technical Construction File. This is supported by selected product tests to the following standards directly and indirectly (when Generic standards are used).
Note: The mentioned products must be used as directed by the associated documentation in order to provide full compliance.

Harmonized European Standards

Reference No.	Date of Issue
EN ISO13849-1	2008

Modules marked with a mark 5 have been tested to EN ISO13849-1(2008)

Revision Record
*   15/12/09   The list is created.

Signature

BCN-P9999-****