

# MITSUBISHI

Mitsubishi Safety Programmable Controller

MELSEC **QS** series

## Safety Guideline

Thank you for purchasing the Mitsubishi safety programmable controller MELSEC-QS Series.

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

MODEL	QS03NB-U-HW
MODEL CODE	13JY84
IB(NA)-0800424-B(0809)MEE	

## ● SAFETY PRECAUTIONS ●

(Always read these instructions before using this equipment.)

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

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".




**DANGER**

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



**CAUTION**

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.

## [Design Precautions]

### DANGER

- When a safety programmable controller detects an error in an external power supply or a failure in programmable controller main module, it turns off all the outputs. Create an external circuit to securely stop the power of hazard by turning off the outputs. Incorrect configuration may result in an accident.
- Create short current protection for a safety relay, and a protection circuit such as a fuse, and breaker, outside a safety programmable controller.
- When data/program change, or status control is performed from a PC to a running safety programmable controller, create an interlock circuit outside the sequence program and safety programmable controller to ensure that the whole system always operates safely.  
For the operations to a safety programmable controller, pay full attention to safety by reading the relevant manuals carefully, and establishing the operating procedure.  
Furthermore, for the online operations performed from a PC to a safety CPU module, the corrective actions against a communication error due to a cable connection fault, etc. should be predetermined as a system.
- All output signals from a safety CPU module to the CC-Link Safety system master module are prohibited to use. These signals can be found in the CC-Link Safety System Master Module User's Manual.  
Do not turn ON or OFF these signals by sequence program, since turning ON/OFF these output signals of the programmable controller system may cause malfunctions and safety operation cannot be guaranteed.
- When a safety remote I/O module has detected CC-Link Safety error, it turns off all the outputs. Note that the outputs in a sequence program are not automatically turned off. If CC-Link Safety error has been detected, create a sequence program that turns off the outputs in the program. If the CC-Link Safety is restored with the outputs on, it may suddenly operate and result in an accident.
- To inhibit restart without manual operation after safety function was performed and outputs were turned OFF, create an interlock program which uses a reset button for restart.

## [Design Precautions]

### CAUTION

- Do not bunch the wires of external devices or communication cables together with the main circuit or power lines, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause malfunctions.

## [Installation Precautions]

### CAUTION

- Use a safety programmable controller in the environment that meets the general specifications described in this 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 failure or drop. Secure the module to the base unit with screws. Tighten the screw in the specified torque range. If the screws are too loose, it may cause a drop of the screw or module. Over tightening may cause a drop due to the damage of the screw or module.
- Completely turn off the external supply power used in the system before mounting or removing the module. Not doing so could result in damage to the product.
- Do not directly touch the module's conductive parts or electronic components. Doing so may cause malfunctions or a failure.

## [Wiring Precautions]

### **DANGER**

- Be sure to shut off all phases of the external supply power used by the system before wiring.  
Not completely turning off all power could result in electric shock or damage to the product.
- When energizing or operating the module after installation or wiring, be sure to close the attached terminal cover.  
Not doing so may result in electric shock.

## [Wiring Precautions]

### CAUTION

- Ground the FG and LG terminals correctly.  
Not doing so could result in electric shock or malfunctions.
- Use a solderless terminal with insulation sleeve for wiring of a terminal block.  
Use up to two solderless terminals for a single terminal.
- Use applicable solderless terminals and tighten them with the specified torque.  
If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in a failure.
- Wire the module correctly after confirming the rated voltage and terminal layout.  
Connecting a power supply of a different rated voltage or incorrect wiring may cause a fire or failure.
- Tighten a terminal block mounting screw, terminal screw, and module mounting screw within the specified torque range.  
If the terminal block mounting screw or terminal screw is too loose, it may cause a short circuit, fire, or malfunctions.  
If too tight, it may damage the screw and/or the module, resulting in a drop of the screw or module, a short circuit or malfunctions.  
If the module mounting screw is too loose, it may cause a drop of the screw or module.  
Over tightening the screw may cause a drop due to the damage of the screw or module.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause a fire, failure, or malfunctions.
- 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.
- Install our programmable controller in a control panel for use.  
Wire the main power supply to the power supply module installed in a control panel through a distribution terminal block.  
Furthermore, the wiring and replacement of a power supply module have to be performed by a maintenance worker who acquainted with shock protection.  
(For the wiring methods, refer to the QSCPU User's Manual (Hardware Design, Maintenance and Inspection).)

## [Startup and Maintenance precautions]

### DANGER

- Do not touch the terminals while power is on.  
Doing so could result in electric shock.
- Correctly connect the battery. Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery.  
Mishandling of battery can cause overheating, cracks, or ignition which could result in injury and fires.
- Turn off all phases of the external supply power used in the system when cleaning the module or retightening the terminal block mounting screws, terminal screws, or module mounting screws.  
Not doing so could result in electric shock. Tighten a terminal block mounting screw, terminal screw, and module mounting screw within the specified torque range.  
If the terminal block mounting screw or terminal screw is too loose, it may cause a short circuit, fire, or malfunctions.  
If too tight, it may damage the screw and/or the module, resulting in a drop of the screw or module, a short circuit or malfunctions.  
If the module mounting screw is too loose, it may cause a drop of the screw or module.  
Over tightening the screw may cause a drop due to the damage of the screw or module.

## [Startup and Maintenance precautions]

### CAUTION

- The online operations performed from a PC to a running safety programmable controller (Program change when a safety CPU is RUN, device test, and operating status change such as RUN-STOP switching) have to be executed after the manual has been carefully read and the safety has been ensured. Following the operating procedure predetermined at designing, the operation has to be performed by an instructed person.  
When changing a program while a safety CPU is RUN (Write during RUN), it may cause a program breakdown in some operating conditions.  
Fully understand the precautions described in the GX Developer's manual before use.
- Do not disassemble or modify the modules.  
Doing so could cause a failure, malfunctions, injury, or fire.  
If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.
- Use any radio communication device such as a cellular phone or a PHS phone more than 25cm (9.85 inch) away in all directions of safety programmable controller.  
Not doing so can cause malfunctions.
- Completely turn off the external supply power used in the system before mounting or removing the module.  
Not doing so may result in a failure or malfunctions of the module.
- Restrict the mounting/removal of a module, base unit, and terminal block up to 50 times (IEC61131-2-compliant), after the first use of the product.  
Failure to do so may cause the module to malfunction due to poor contact of connector.
- Do not drop or give an impact to the battery mounted to the module.  
Doing so may damage the battery, causing the battery fluid to leak inside the battery.  
If the battery is dropped or given an impact, dispose of it without using.
- Before touching the module, always touch grounded metal, etc. to discharge static electricity from human body, etc.  
Not doing so may result in a failure or malfunctions of the module.



## [Disposal Precautions]

### CAUTION

- When disposing of this product, treat it as industrial waste.  
When disposing of batteries, separate them from other wastes according to the local regulations. (For details of the battery directive in EU member states, refer to QSCPU User's Manual (Hardware Design, Maintenance and Inspection).

## [Transportation Precautions]

### CAUTION

- When transporting lithium batteries, make sure to treat them based on the transport regulations.  
(For details of the controlled models, refer to the QSCPU User's Manual (Hardware Design, Maintenance and Inspection).)



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## About Manual

### Introduction Manual

Before constructing or designing the safety-related system, be sure to read the following manual.

Manual name	Manual No. (Model code)
<b>Safety Application Guide</b> Explains the overview and construction method of the safety-related system, laying and wiring examples, application programs, etc. <p style="text-align: right;">(Sold separately)</p>	SH-080613ENG (13JR90)

Before using this product, always read the following detailed manuals.

### Detailed Manual

Manual name	Manual No. (Model code)
<b>QSCPU User's Manual (Hardware Design, Maintenance and Inspection)</b> Explains the specifications of the QSCPU, safety power supply module, safety base unit, etc. <p style="text-align: right;">(Sold separately)</p>	SH-080626ENG (13JR92)
<b>QSCPU User's Manual (Function Explanation, Program Fundamentals)</b> Explains the functions, programming methods, devices, etc. that are necessary to create programs with the QSCPU. <p style="text-align: right;">(Sold separately)</p>	SH-080627ENG (13JR93)

### Relevant Manual

Manual name	Manual No. (Model code)
<b>QSCPU Programming Manual (Common Instructions)</b> Explains how to use the sequence instructions and application instructions. <p style="text-align: right;">(Sold separately)</p>	SH-080628ENG (13JW01)

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# 1. OVERVIEW

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This manual describes the precautions for using the QS series module in safety.

## 1.1 Included Parts

The following tables list the parts included with the corresponding modules.

### (1) Safety CPU module

Product Name	Quantity
Module	1
Battery (Q6BAT)	1

### (2) Safety main base unit for QS series

Product Name	Quantity
Unit	1
Base unit mounting screw (M4 × 14 screw)	4
This manual	1

### (3) Safety power supply module

Product Name	Quantity
Module	1

## 2. GENERAL SPECIFICATIONS

### 2.1 General Specifications

The performance specifications of QS series programmable controller are shown in Table 3.1.

Table 3.1 General Specifications

Item	Specifications					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-40 to 75°C					
Operating ambient humidity	5 to 95%RH, non-condensing					
Storage ambient humidity	5 to 95%RH, non-condensing					
Vibration resistance	Conforming to JIS B 3502, IEC 61131-2		Frequency range	Constant acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 9Hz	----	3.5mm (0.14inch)	10 times each in X, Y, Z directions
			9 to 150Hz	9.8m/s <sup>2</sup>	----	
		Under continuous vibration	5 to 9Hz	----	1.75mm (0.07inch)	
9 to 150Hz	4.9m/s <sup>2</sup>		----			
Shock resistance	Conforming to JIS B 3502, IEC 61131-2 (147 m/s <sup>2</sup> , duration of action 11ms, three times in X, Y, Z directions respectively by sine half-wave pulse)					
Operating ambience	No corrosive gases					
Operating altitude <sup>*3</sup>	2000m (6562ft.) max.					
Installation location	Inside control panel					
Overvoltage category <sup>*1</sup>	II max.					
Pollution level <sup>*2</sup>	2 max.					
Equipment category	Class I					

# **WARRANTY**

Please confirm the following product warranty details before using this product.

## **1. Limited Warranty and Product Support.**

- a. Mitsubishi Electric Company ("MELCO") warrants that for a period of forty two(42) months after date of delivery from the point of manufacture or three(3) years from date of Customer's purchase, whichever is less, Mitsubishi MELSEC Safety programmable controllers (the "Products") will be free from defects in material and workmanship.
- b. At MELCO's option, for those Products MELCO determines are not as warranted, MELCO shall either repair or replace them or issue a credit or return the purchase price paid for them.
- c. For this warranty to apply:
  - (1) Customer shall give MELCO (i) notice of a warranty claim to MELCO and the authorized dealer or distributor from whom the Products were purchased, (ii) the notice shall describe in reasonable details the warranty problem, (iii) the notice shall be provided promptly and in no event later than thirty (30) days after the Customer knows or has reason to believe that Products are not as warranted, and (iv) in any event, the notice must given within the warranty period;
  - (2) Customer shall cooperate with MELCO and MELCO's representatives in MELCO's investigation of the warranty claim, including preserving evidence of the claim and its causes, meaningfully responding to MELCO's questions and investigation of the problem, grant MELCO access to witnesses, personnel, documents, physical evidence and records concerning the warranty problem, and allow MELCO to examine and test the Products in question offsite or at the premises where they are installed or used; and
  - (3) If MELCO requests, Customer shall remove Products it claims are defective and ship them to MELCO or MELCO's authorized representative for examination and, if found defective, for repair or replacement. The costs of removal, shipment to and from MELCO's designated examination point, and reinstallation of repaired or replaced Products shall be at Customer's expense.
  - (4) If Customer requests and MELCO agrees to effect repairs onsite at any domestic or overseas location, the Customer will pay for the costs of sending repair personnel and shipping parts. MELCO is not responsible for any re-commissioning, maintenance, or testing on-site that involves repairs or replacing of the Products.
- d. Repairs of Products located outside of Japan are accepted by MELCO's local authorized service facility centers ("FA Centers"). Terms and conditions on which each FA Center offers repair services for Products that are out of warranty or not covered by MELCO's limited warranty may vary.
- e. Subject to availability of spare parts, MELCO will offer Product repair services for (7) years after each Product model or line is discontinued, at MELCO's or its FA Centers' rates and charges and standard terms in effect at the time of repair. MELCO usually produces and retains sufficient spare parts for repairs of its Products for a period of seven (7) years after production is discontinued.
- f. MELCO generally announces discontinuation of Products through MELCO's Technical Bulletins. Products discontinued and repair parts for them may not be available after their production is discontinued.

## **2. Limits of Warranties.**

- a. MELCO does not warrant or guarantee the design, specify, manufacture, construction or installation of the materials, construction criteria, functionality, use, properties or other characteristics of the equipment, systems, or production lines into which the Products may be incorporated, including any safety, fail-safe and shut down systems using the Products.
- b. MELCO is not responsible for determining the suitability of the Products for their intended purpose and use, including determining if the Products provide appropriate safety margins and redundancies for the applications, equipment or systems into which they are incorporated.
- c. Customer acknowledges that qualified and experienced personnel are required to determine the suitability, application, design, construction and proper installation and integration of the Products. MELCO does not supply such personnel.
- d. MELCO is not responsible for designing and conducting tests to determine that the Product functions appropriately and meets application standards and requirements as installed or incorporated into the end-user's equipment, production lines or systems.
- e. MELCO does not warrant any Product:
  - (1) repaired or altered by persons other than MELCO or its authorized engineers or FA Centers;
  - (2) subjected to negligence, carelessness, accident, misuse, or damage;
  - (3) improperly stored, handled, installed or maintained;
  - (4) integrated or used in connection with improperly designed, incompatible or defective hardware or software;
  - (5) that fails because consumable parts were not tested, serviced or replaced;
  - (6) exchange of a consumable part such as batteries, backlights, or fuses;
  - (7) operated or used with equipment, production lines or systems that do not meet applicable and commensurate legal, safety and industry-accepted standards;
  - (8) operated or used in abnormal applications;
  - (9) installed, operated or used in contravention of instructions, precautions or warnings contained in MELCO's user, instruction and/or safety manuals, technical bulletins and guidelines for the Products;
  - (10) used with obsolete technologies or technologies not fully tested and widely accepted and in use at the time of the Product's manufacture;
  - (11) subjected to excessive heat or moisture, abnormal voltages, shock, excessive vibration, physical damage or other improper environment; or
  - (12) damaged or malfunctioning due to Acts of God, fires, acts of vandals, criminals or terrorists, communication or power failures, or any other cause or failure that results from circumstances beyond MELCO's control.
- f. All Product information and specifications contained on MELCO's website and in catalogs, manuals, or technical information materials provided by MELCO are subject to change without prior notice.
- g. The Product information and statements contained on MELCO's website and in catalogs, manuals, technical bulletins or other materials provided by MELCO are provided as a guide for Customer's use. They do not constitute warranties and are not incorporated in the contract of sale for the Products.
- h. These terms and conditions constitute the entire agreement between Customer and MELCO with respect to warranties, remedies and damages and supersede any other understandings, whether written or oral, between the parties. Customer expressly acknowledges that any representations or statements made by MELCO or others concerning the Products outside these terms are not part of the basis of the bargain between the parties and are not factored into the pricing of the Products.
- i. THE WARRANTIES AND REMEDIES SET FORTH IN THESE TERMS ARE THE EXCLUSIVE AND ONLY WARRANTIES AND REMEDIES THAT APPLY TO THE PRODUCTS.
- j. MELCO DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



### **3. Limits on Damages.**

- a. MELCO'S MAXIMUM CUMULATIVE LIABILITY BASED ON ANY CLAIMS FOR BREACH OF WARRANTY OR CONTRACT, NEGLIGENCE, STRICT TORT LIABILITY OR OTHER THEORIES OF RECOVERY REGARDING THE SALE, REPAIR, REPLACEMENT, DELIVERY, PERFORMANCE, CONDITION, SUITABILITY, COMPLIANCE, OR OTHER ASPECTS OF THE PRODUCTS OR THEIR SALE, INSTALLATION OR USE SHALL BE LIMITED TO THE PRICE PAID FOR PRODUCTS NOT AS WARRANTED.
- b. Although MELCO has obtained the certification for Product's compliance to the international safety standards IEC61508 and EN954-1/ISO13849-1 from TUV Rheinland, this fact does not guarantee that Product will be free from any malfunction or failure. The user of this Product shall comply with any and all applicable safety standard, regulation or law and take appropriate safety measures for the system in which the Product is installed or used and shall take the second or third safety measures other than the Product. MELCO is not liable for damages that could have been prevented by compliance with any applicable safety standard, regulation or law.
- c. MELCO prohibits the use of Products with or in any application involving power plants, trains, railway systems, airplanes, airline operations, other transportation systems, amusement equipments, hospitals, medical care, dialysis and life support facilities or equipment, incineration and fuel devices, handling of nuclear or hazardous materials or chemicals, mining and drilling, and other applications where the level of risk to human life, health or property are elevated.
- d. MELCO SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL, INDIRECT OR PUNITIVE DAMAGES, FOR LOSS OF PROFITS, SALES, OR REVENUE, FOR INCREASED LABOR OR OVERHEAD COSTS, FOR DOWNTIME OR LOSS OF PRODUCTION, FOR COST OVERRUNS, OR FOR ENVIRONMENTAL OR POLLUTION DAMAGES OR CLEAN-UP COSTS, WHETHER THE LOSS IS BASED ON CLAIMS FOR BREACH OF CONTRACT OR WARRANTY, VIOLATION OF STATUTE, NEGLIGENCE OR OTHER TORT, STRICT LIABILITY OR OTHERWISE.
- e. In the event that any damages which are asserted against MELCO arising out of or relating to the Products or defects in them, consist of personal injury, wrongful death and/or physical property damages as well as damages of a pecuniary nature, the disclaimers and limitations contained in these terms shall apply to all three types of damages to the fullest extent permitted by law. If, however, the personal injury, wrongful death and/or physical property damages cannot be disclaimed or limited by law or public policy to the extent provided by these terms, then in any such event the disclaimer of and limitations on pecuniary or economic consequential and incidental damages shall nevertheless be enforceable to the fullest extent allowed by law.
- f. In no event shall any cause of action arising out of breach of warranty or otherwise concerning the Products be brought by Customer more than one year after the cause of action accrues.
- g. Each of the limitations on remedies and damages set forth in these terms is separate and independently enforceable, notwithstanding the unenforceability or failure of essential purpose of any warranty, undertaking, damage limitation, other provision of these terms or other terms comprising the contract of sale between Customer and MELCO.

#### **4. Delivery/Force Majeure.**

- a. Any delivery date for the Products acknowledged by MELCO is an estimated and not a promised date. MELCO will make all reasonable efforts to meet the delivery schedule set forth in Customer's order or the purchase contract but shall not be liable for failure to do so.
- b. Products stored at the request of Customer or because Customer refuses or delays shipment shall be at the risk and expense of Customer.
- c. MELCO shall not be liable for any damage to or loss of the Products or any delay in or failure to deliver, service, repair or replace the Products arising from shortage of raw materials, failure of suppliers to make timely delivery, labor difficulties of any kind, earthquake, fire, windstorm, flood, theft, criminal or terrorist acts, war, embargoes, governmental acts or rulings, loss or damage or delays in carriage, acts of God, vandals or any other circumstances reasonably beyond MELCO's control.

#### **5. Choice of Law/Jurisdiction.**

These terms and any agreement or contract between Customer and MELCO shall be governed by the laws of the State of New York without regard to conflicts of laws. To the extent any action or dispute is not arbitrated, the parties consent to the exclusive jurisdiction and venue of the federal and state courts located in the Southern District of the State of New York. Any judgment there obtained may be enforced in any court of competent jurisdiction.

#### **6. Arbitration.**

Any controversy or claim arising out of, or relating to or in connection with the Products, their sale or use or these terms, shall be settled by arbitration conducted in accordance with the Center for Public Resources (CPR) Rules for Non-Administered Arbitration of International Disputes, by a sole arbitrator chosen from the CPR's panels of distinguished neutrals. Judgment upon the award rendered by the Arbitrator shall be final and binding and may be entered by any court having jurisdiction thereof. The place of the arbitration shall be New York City, New York. The language of the arbitration shall be English. The neutral organization designated to perform the functions specified in Rule 6 and Rules 7.7(b), 7.8 and 7.9 shall be the CPR.



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When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.