

MITSUBISHI

Mitsubishi Safety Programmable Controller

MELSEC **QS** series

Safety Guidelines

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.

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

MODEL	QS-SR-U-HW
MODEL CODE	13JZ09
IB(NA)-0800411-E(1110)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before using this product.)

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

In this manual, the safety precautions are classified into two levels:

"⚠ WARNING" 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 minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

This instruction is the original version.

[Design Precautions]

WARNING

- A safety relay module turns OFF all outputs by safety input or a failure of external power supply. Create an external circuit to securely stop the power of hazard by turning OFF the outputs.
Incorrect configuration may result in an accident.
- When a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Create short-circuit current protection for a safety relay and a protection circuit such as a fuse and breaker, outside a safety relay module.

[Design Precautions]

WARNING

- To inhibit a restart without manual operation after safety function of the safety relay module was performed and outputs were turned OFF, create reset start-up circuit using such as a reset switch outside the safety relay module.
- The safety relay module may consume excessive current due to a failure. If this occurs, the DC power supply connected to the safety power supply part (+24V (SAFETY) and 24G (SAFETY) terminals) of the module detects an overcurrent and may shut off the output.
To the DC power supply connected to the safety relay module, connect only the equipment and the devices that will not affect the system even if they are simultaneously stopped due to power-off.
- Use an extension module whose input type is the same as that of the main module.
The modules of different input types (input P and N types) cannot be connected.

[Design Precautions]

CAUTION

- The safety category is evaluated by the whole equipment. Make sure that the whole equipment meets the requirements before use.
- Use the module in an environment that meets the general specifications in this manual.
Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- The life of safety relay used for the safety relay module depends on the open-close condition and load. Be sure to operate the equipment by use conditions to make sure that the number of allowable times that the relay opens/closes.
- Do not install the cables of external devices or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Keep a distance of 100mm (3.94 inch) or more between them. Failure to do so may result in malfunction due to noise.

[Installation Precautions]

WARNING

- Do not use the product in flammable gas atmosphere or explosive gas atmosphere. Doing so may result in fire or explosion due to such as an arc caused by opening/closing the relays.

[Installation Precautions]

CAUTION

- To mount the Q series safety relay module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
Incorrect mounting may cause malfunction, failure, or drop of the module.
When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
Tighten the screw within the specified torque range.
Undertightening can cause drop of the screw, short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Make sure to fix CC-Link safety relay module and extension safety relay module with a DIN rail fixing bracket.
- Shut off the external power supply for the system in all phases before mounting or removing the module.
Failure to do so may result in damage to the product.
- When mounting a module, make room for 5cm (1.97 inch) or more at above and below of the module for ventilation.
When powering ON a contact at 3A or more consecutively, make room for 5mm (0.20 inch) or more at the sides of the contact for ventilation.
- Do not directly touch any conductive part of the module. Doing so can cause malfunction or failure of the module.
- Securely connect connectors for each cable to the applied parts.
Poor contact may cause malfunction.

[Wiring Precautions]

WARNING

- Shut off the external power supply for the system in all phases before wiring. Failure to do so may result in electric shock or damage to the product.
- After installation and wiring, close the included terminal block cover to the module before turning it on for operation. Failure to do so may result in electric shock.

[Wiring Precautions]

CAUTION

- Ground the FG and LG terminals to the protective ground conductor dedicated to the programmable controller. Failure to do so may result in electric shock or malfunction.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
- 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.
- Place the communication cables or power cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- When disconnecting the communication cable or power cable from the module, do not pull the cable by the cable part.
For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Use applicable solderless terminals and crimp them with a tool specified by maker. Incomplete connections may cause short circuit, fire, or malfunction.

[Wiring Precautions]

CAUTION

- A protective film is attached to the top of the Q series safety relay module to prevent foreign matter such as wire chips from entering the module during wiring. Do not remove the film during wiring. Remove it for heat dissipation before system operation.
- Install our programmable controller in a control panel complying with the IP standard of 54 or more.
Connect the main power supply to the power supply module in the control panel through a relay terminal block.
Wiring and replacement of a power supply module must be performed by qualified maintenance personnel with knowledge of protection against electric shock.
For wiring methods, refer to the QCPU User's Manual (Hardware Design, Maintenance and Inspection).
- Do not install the control lines together with the communication cables or bring them close to each other.
Doing so may cause a malfunction due to noise.
- Pay attention when using a flathead screwdriver to push the open/close button of the spring clamp terminal block. Failure to do so can result in an injury.

[Startup and Maintenance precautions]

WARNING

- Do not touch any terminal while power is on.
Doing so will cause electric shock.
- 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 and module mounting screw within the specified torque range. If the terminal block mounting 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

- Do not disassemble or modify the module. Doing so may cause failure, malfunction, injury, or a fire.
If the product is repaired or remodeled by other than the specified FA centers or us, the warranty is not covered.
- A electric fuse for overcurrent prevention is incorporated in the control circuit part of the safety relay module.
If the electric fuse operates, power OFF the module once, and power it ON again after resolving the failure.
- After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction.
- Do not drop or apply strong shock to the module case since it is made from resin. Doing so may damage the module.
- Completely turn off the externally supplied power used in the system before mounting or removing the module to/from the panel.
Not doing so may result in a failure or malfunctions of the module.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm (9.85 inch) away in all directions from the programmable controller. Failure to do so may cause malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.
Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.

● CONDITIONS OF USE FOR THE PRODUCT ●

- (1) Although MELCO has obtained the certification for Product's compliance to the international safety standards IEC61508, 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.
- (2) MELCO prohibits the use of Products with or in any application involving, and MELCO shall not be liable for a default, a liability for defect warranty, a quality assurance, negligence or other tort and a product liability in these applications.
- (a) power plants,
 - (b) trains, railway systems, airplanes, airline operations, other transportation systems,
 - (c) hospitals, medical care, dialysis and life support facilities or equipment,
 - (d) amusement equipments,
 - (e) incineration and fuel devices,
 - (f) handling of nuclear or hazardous materials or chemicals,
 - (g) mining and drilling,
 - (h) and other applications where the level of risk to human life, health or property are elevated.

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ABOUT MANUALS

Introduction Manual

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

Manual name	Manual number (Model code)
Safety Relay Module User's Manual Explains the specifications, procedures and settings before system operation, parameter setting, and troubleshooting of the Safety relay module. (Sold separately)	SH-080746ENG (13JY62)

COMPLIANCE WITH THE EMC, LOW VOLTAGE, AND MACHINERY DIRECTIVES

- (1) Method of ensuring compliance
To ensure that Mitsubishi programmable controllers maintain EMC, Low Voltage, and Machinery Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to the manual included with the base unit. The CE mark on the side of the programmable controller indicates compliance with EMC, Low Voltage, and Machinery Directives.
- (2) Additional measures
This product complies with the EMC, Low Voltage, and Machinery Directives. Before using this product, please read this manual, the relevant manuals, the manuals for standard programmable controllers, and the safety standards carefully and pay full attention to safety to handle the product correctly.
The descriptions are based on the requirements of the Directives and the harmonized standards. However, they do not guarantee that the entire machinery constructed according to the descriptions complies with the EMC, Low Voltage, and Machinery Directives. The manufacture of the machinery must determine the testing method for compliance and declare conformity to the EMC, Low Voltage, and Machinery Directives.

1. OVERVIEW

This manual explains precautions for using the safety relay module in safety.

1.1 Included Parts

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

(1) Q series safety relay module

Product Name	Quantity
Module	1
This manual	1

(2) CC-Link safety relay module

Product Name	Quantity
Module	1
This manual	1

(3) Extension safety relay module

Product Name	Quantity
Module	1
This manual	1

1.2 Product List

Product Name	Model	Description
Q series safety relay module	QS90SR2SP-Q	Safety relay module for MELSEC-Q series. Dual input with positive commons.
	QS90SR2SN-Q	Safety relay module for MELSEC-Q series. Dual input with positive common and negative common.
CC-Link safety relay module	QS90SR2SP-CC	Safety relay module for CC-Link field network. Dual input with positive commons.
	QS90SR2SN-CC	Safety relay module for CC-Link field network. Dual input with positive common and negative common.
Extension safety relay module	QS90SR2SP-EX	Safety relay module for extension. Dual input with positive commons.
	QS90SR2SN-EX	Safety relay module for extension. Dual input with positive common and negative common.

2. GENERAL SPECIFICATIONS

This section explains specifications common to various modules.

Item	Specification					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-25 to 75°C *3					
Operating ambient humidity	30 to 85%RH, non-condensing					
Storage ambient humidity						
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2	Under intermittent vibration	Frequency	Constant Acceleration	Half amplitude	Sweep count
			5 to 8.4Hz	----	3.5mm	10 times each in X, Y, Z directions
		8.4 to 150Hz	9.8m/s ²	----		
		Under continuous vibration	5 to 8.4Hz	----	1.75mm	----
8.4 to 150Hz	4.9m/s ²	----				
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147m/s ² , 3 times each in 3 directions X, Y, Z)					
Operating atmosphere	No corrosive gases					
Operating altitude *4	0 to 2000m					
Installation location	Inside a control panel					
Overvoltage category *1	III or less					
Pollution degree *2	2 or less					
Equipment class	Class I					

- *1 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category III applies to devices in fixed equipment such as switching device and industrial machine. The surge voltage withstand level for up to the rated voltage of 300V is 4000V.
- *2 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.
- *3 The storage ambient temperature is -20 to 75 if the system includes any CC-Link safety relay modules or extension safety relay modules.
- *4 Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction.
When using the programmable controller under pressure, please consult your local Mitsubishi Electric representative.

2.1 Safety Standards

Use the product according to the following safety standards.

Region	Safety Standards
International	ISO13849-1:2006, IEC60204-1:2005, IEC61496-1:2004
Europe	EN954-1:1996, EN50178:1997, EN55011/A2:3002, EN61000-6-2:2005
North America	UL508

2.2 Module Replacement

Replace the module according to the following replacement cycle.

Module	Replacement Cycle
Safety relay module	10 years

3. 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) Q Series safety relay module

No.	Name	Application
1)	PW LED	Indicates the status of module power supply. On: Power is being supplied. Off: Power is not supplied or an electric fuse has blown.
2)	ERR. LED	Indicates the host station error status. Flashing: A self-diagnostics error has occurred or power is not supplied. Off: The module is operating normally.
3)	Z LED	Indicates the status of the safety output. On: The module is outputting a safety signal. Off: The module is not outputting a safety signal.
4)	X0, X1 LED	Indicates the status of safety power supply. On: Power is being supplied. Off: Power is not supplied or an electric fuse has blown.
5)	S PW LED	Indicates the status of safety power supply. On: Power is being supplied. Off: Power is not supplied or an electric fuse has blown.
6)	K0, K1 LED	Indicates the operating status (coil status) of the internal safety relay (K0, K1). On: The operating status of the internal safety relay is on. Off: The operating status of the internal safety relay is off.

(2) CC-Link safety relay module

No.	Name	Application
1)	PW LED	Refer to Q series safety relay module.
2)	ERR. LED	Refer to Q series safety relay module.
3)	L RUN LED	Indicates the communication status in the CC-Link system. On: The module is communicating normally. Off: The module is not communicating. (A timeout error has occurred.)
4)	SD LED	On: The module is sending data.
5)	RD LED	On: The module is receiving data.
6)	L ERR. LED	Indicates a communication error in the CC-Link system. On: A setting value of the station number setting switch or the transmission speed setting switch is out of range. Flashing regularly: A setting value of the station number setting switch or the transmission speed setting switch has been changed during operation. Flashing irregularly: A terminating resistor is not attached or is wrongly attached. Or, the module is affected by noise. Off: The module is communicating normally.
7)	S PW LED	Refer to Q series safety relay module.
8)	Z LED	Refer to Q series safety relay module.
9)	X0, X1 LED	Refer to Q series safety relay module.
10)	K0, K1 LED	Refer to Q series safety relay module.

(3) Extension safety relay module

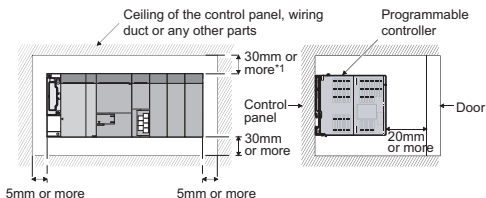
No.	Name	Application
1)	PW LED	Refer to Q series safety relay module.
2)	ERR. LED	Indicates the host station error status. Flashing: A self-diagnostics error has occurred, power is not supplied, or communication with upper module(s) is disabled. Off: The module is operating normally.
3)	Z LED	Refer to Q series safety relay module.
4)	X0, X1 LED	Refer to Q series safety relay module.
5)	K0, K1 LED	Refer to Q series safety relay module.

4. 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 Safety Relay Module User's Manual.

(1) Installation position

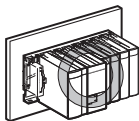
Keep the clearances shown below between the top/ bottom faces of the modules and the control panel or other parts so that good ventilation is ensured and the modules can be easily replaced.



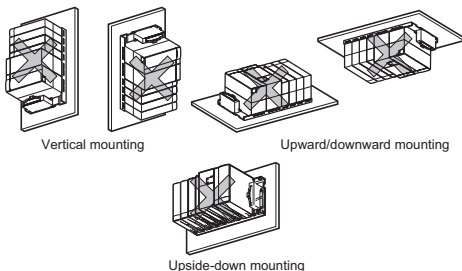
*1: A clearance required when the wiring duct is 50mm or less in height.
A 40mm or more clearance is required when the wiring duct is longer.

(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.



(3) Installation precautions

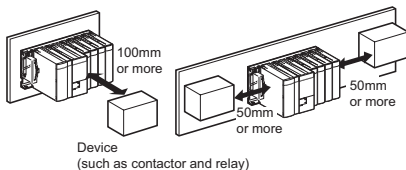
(a) Install a base unit on a flat surface.

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



(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.

5. 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 relay module and safety components. To establish a safety system, calculate the target performance level (PL) for each safety application (safety function) based on the MTTFd and DCavg values of the safety relay module and connected safety components. The calculation equation is shown in ISO13849-1:2006.

MTTFd and DCavg of the safety relay module are shown in following.

Module	PL	MTTFd(year)	DCavg(%)
Safety relay module	e	>100	0.99

6. EC DECLARATION OF CONFORMITY FOR MACHINERY DIRECTIVE

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: Safety relay modules
(Open Type equipment, Installation category II)
Model: QS9-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-P9999-0622).

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

TUV SÜD PRODUCT SERVICE GMBH Ridlerstraße 65 80339 München Germany phone: +49 (0)89 5008-40 fax: +49 (0)89 5008-4222 email: PS.Empfang@tuev-sued.de Website : http://www.tuev-sued.de	NB 0123
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Authorised Signature:

T. Takahashi
Senior Manager, FA System Department

Date:

(signature)

2.6.2010



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

Signature:

H. Pütz
Executive Vice President &
Deputy Product Marketing Director,
FA European Business Group

Date:

(signature)

28-05-2010



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.

BCN-P9999-0621-A

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 eighteen (18) months after date of delivery from the point of manufacture or one year from date of Customer's purchase, whichever is less, Mitsubishi Safety relay module (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 be 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 onsite 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 such as relay, batteries, backlights, or fuses were not tested, serviced or replaced;
 - (6) operated or used with equipment, production lines or systems that do not meet applicable and commensurate legal, safety and industry-accepted standards;
 - (7) operated or used in abnormal applications;
 - (8) 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;
 - (9) used with obsolete technologies or technologies not fully tested and widely accepted and in use at the time of the Product's manufacture;
 - (10) subjected to excessive heat or moisture, abnormal voltages, shock, excessive vibration, physical damage or other improper environment; or
 - (11) 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 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.

Country/Region	Sales office/Tel	Country/Region	Sales office/Tel
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Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Rua Correia Dias, 184, Edificio Paraiso Trade Center-8 andar Paraiso, Sao Paulo, SP Brazil Tel : +55-11-5908-8331	Taiwan	Setsuyo Enterprise Co., Ltd. 6F No.105 Wu-Kung 3rd.Rd, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0	Korea	Mitsubishi Electric Automation Korea Co., Ltd. 1480-6, Gayang-dong, Gangseo-ku Seoul 157-200, Korea Tel : +82-2-3660-9552
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire., AL10 8XB, U.K. Tel : +44-1707-276100	Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 Alexandra Road #05-01/02, Mitsubishi Electric Building, Singapore 159943 Tel : +65-6470-2480
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