

Mitsubishi Safety Programmable Controller MELSEC-QS Series
(Digest Version)



MELSEC Safety
MITSUBISHI SAFETY FA SOLUTION



Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems)





International safety standards conformance,
Mitsubishi Electric's optimal solution for
industrial safety in Factory Automation.



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Humans make mistakes.
Machines break down.



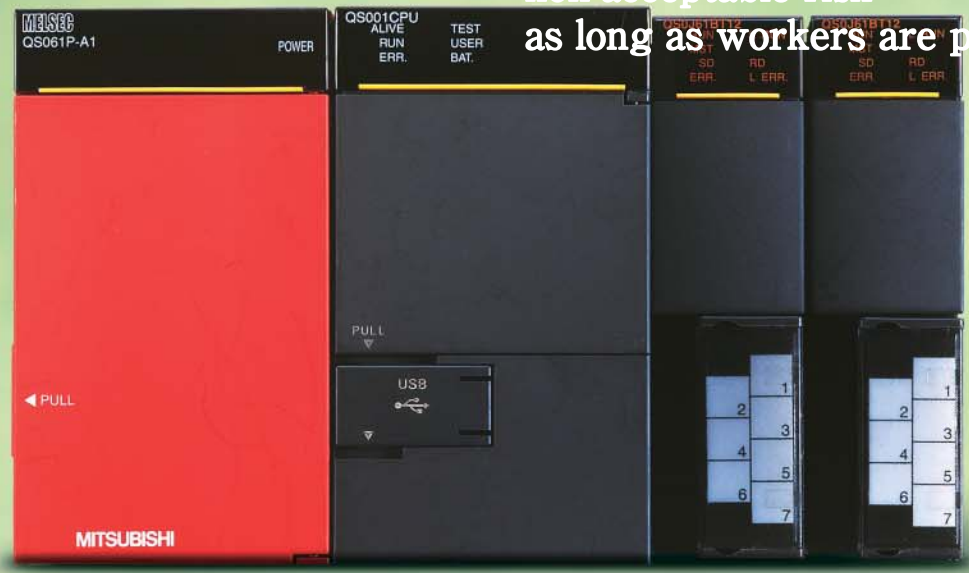
With the enactment of international safety standards including ISO12100, production sites are now hustling to establish safety systems based on safety technology that does not rely on human intervention.

The solution introduced by Mitsubishi Electric is the safety PLC "MELSEC Safety." Inheriting various technologies and know-how cultivated through total FA support. This solution conforms to international safety standards and maintains compatibility with other MELSEC programmable controllers while opening the way to a new field called safety control.





At the production site,
 all possible measures
 must be taken against
 non-acceptable risk
as long as workers are present.



Inherits existing MELSEC-Q series
 advantages into a safety control.



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In the past hard-wired safety relay panels were used for the safety control of devices such as robots and press machines. As relay panels have evolved to PLCs, safety relay panels are now taken over by safety PLCs. The safety PLC requires not only stringent performance but also capability to be linked to other MELSEC PLCs, which perform machinery control, and operability similar to conventional MELSEC PLCs.

MELSEC Safety is the ideal solution that meets these requirements.

Concepts of Mitsubishi Safety PLC

Excellent compatibility with the MELSEC PLC

- Based on the reliable and proven MELSEC-Q Series platform.
- Enhancement and inheritance of the engineering environment.
- Safety system monitoring available from the MELSEC PLC.
- Safety remote I/O stations and standard remote I/O stations can be used together in the CC-Link Safety system.

Pursuing cost effectiveness

- Safety functions using a program, reducing the engineering time such as system configuration and modifications.
- Safety remote I/O can be spread out, minimizing wiring between remote I/O and safety devices.
- Improved maintainability by the operation/error history function, which facilitates identification of errors.

Realizing safety functions applicable to machine safety

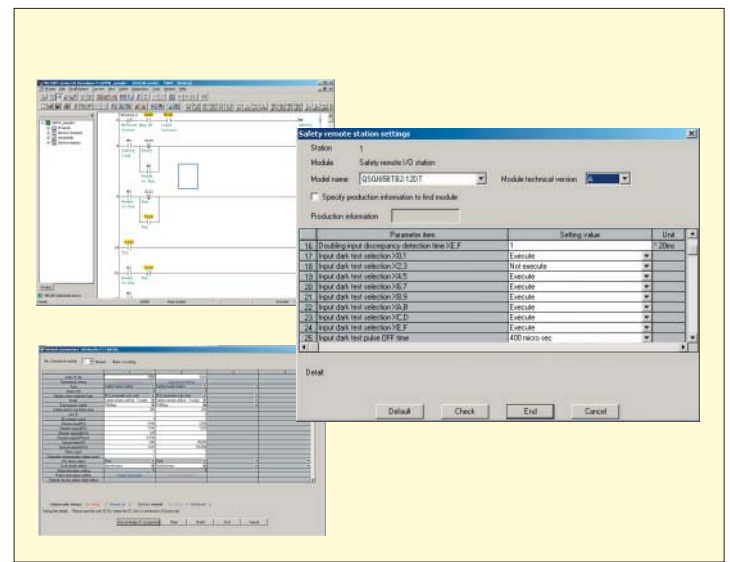
- Certified for international safety standards IEC61508 SIL3 and EN954-1/ISO13849-1, category 4.
- Diagnostics functions suitable for machine safety.



Enhanced engineering environment, supports CC-Link Safety, improved error diagnostics and security . . . Refined the safety control solution from every aspect.

Integrating safety PLC and MELSEC PLC engineering environment

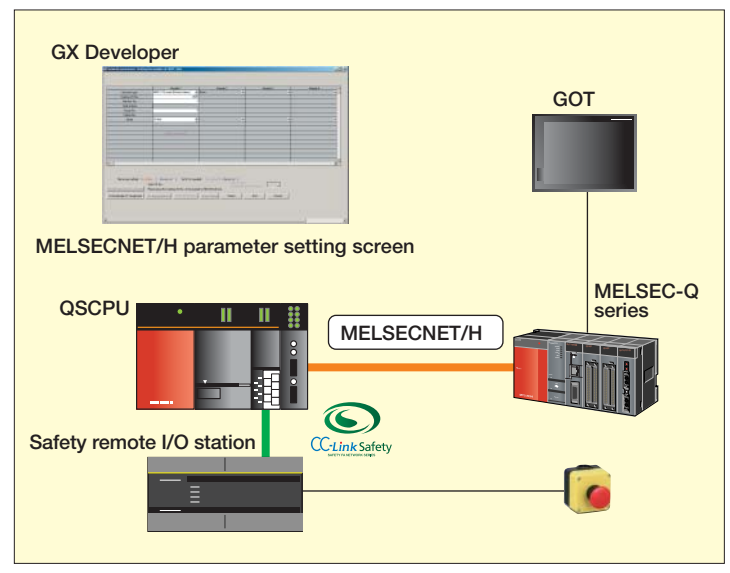
- MELSEC Safety does not require a separate safety control dedicated engineering environment. GX Developer can be utilized for safety control in the same manner as standard control. As a result, the Mitsubishi solution offers comfort in operation with familiar screens and operability. Safety control circuits are created using a ladder program. Wiring changes are no longer needed at the time of system changes, whereas they were needed with safety relay-based systems.
- CC-Link Safety and safety remote I/O station parameters are also set from GX Developer. There is no need to switch the engineering environment based on setting contents.



Safety PLC monitoring available from MELSEC PLC

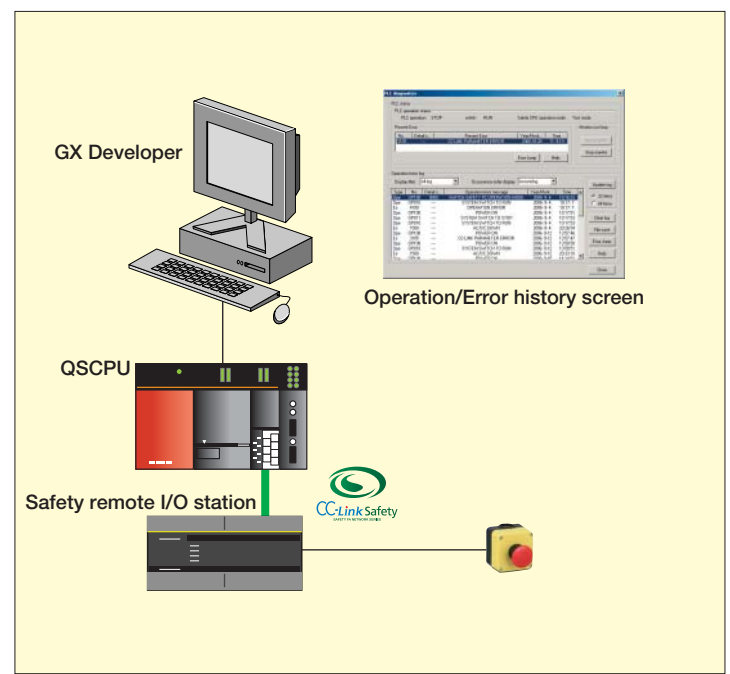
The safety PLC can be monitored from a MELSEC PLC via the network (MELSECNET/H).

- MELSEC Safety can support the MELSEC-Q Series MELSECNET/H network modules. Safety PLC data can easily be monitored from MELSEC-Q series using the MELSECNET/H cyclic transmission function. Safety control and standard control can be linked without any difficulty.



Improved maintainability by operation/error history

- A total of 3,000 safety CPU module operations performed by the user and errors occurred on the Safety CPU module and CC-Link Safety system can be recorded as the operation/error history.
- The sequence in which the operations and errors occurred is clarified in the operation/error history, enabling easy troubleshooting.



CC-Link Safety compatible safety field network

The safety field network CC-Link Safety is a network that:

- Has been developed based on the open field network CC-Link, which originates from Japan. Including enhanced RAS functions.
- Expanded to ensure machine safety.
- Complies with international safety standards IEC61508 SIL3 and EN954-1/ISO13849-1, category 4.

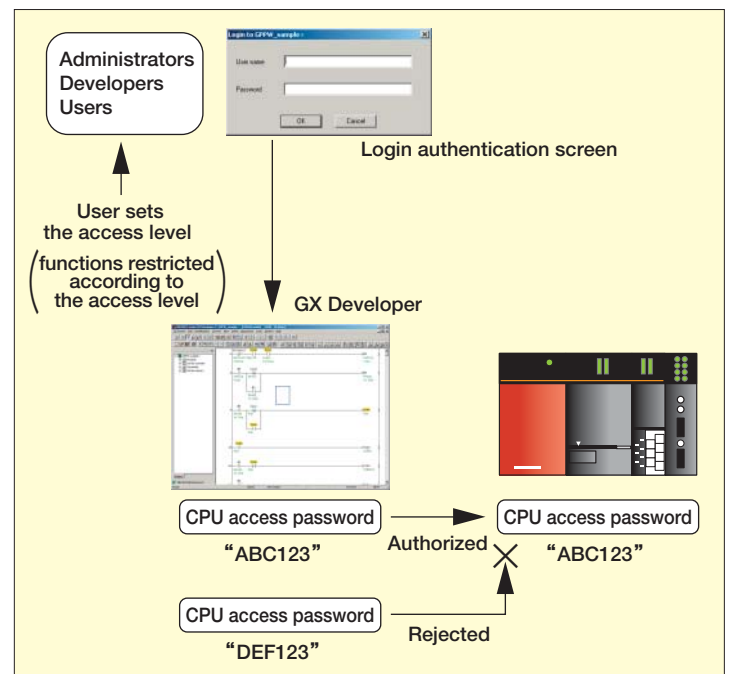
The CC-Link Safety specifications have been made public by the CC-Link Partner Association (CLPA). Therefore, light curtains, robots, and other devices connectable to CC-Link Safety will be available in the near future.

Inheritance of existing functions	Transmission speed of 10 Mbps equivalent to CC-Link is realized, allowing use of the same CC-Link cables.
Enhanced RAS function	Detects communication errors such as communication delays and loss of messages and then stops the system completely.
Identifying the communication target station (safety remote I/O station)	Model name and production information of safety remote I/O stations can be set by parameters. Hence, an error can be detected if an incorrect safety remote I/O station is connected.
Flexible safety system configuration	Safety remote I/O stations can be spread out, thereby minimizing wiring for I/O. Extending I/O stations is also easy.



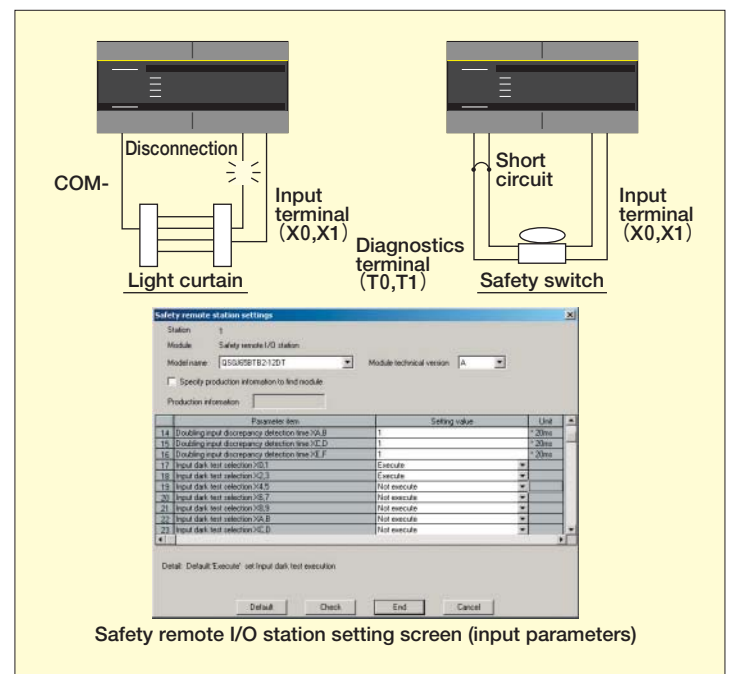
Provided with security functions that ensure safety

- Login authentication prevents illegal access of unauthorized users to GX Developer project files.
 - User information required for login authentication is registered in the project in advance. At the time of registration, three access levels (Administrators, Developers, and Users) can be set. This enables to manage function restrictions for each user.
- CPU access password prevents project files from being incorrectly written when a control change such as a program change is performed for the safety CPU module from GX Developer.
 - The CPU access password is pre-registered for both the GX Developer project and safety CPU module. Writing is allowed only when the verification result matches.



Safety input diagnostics function

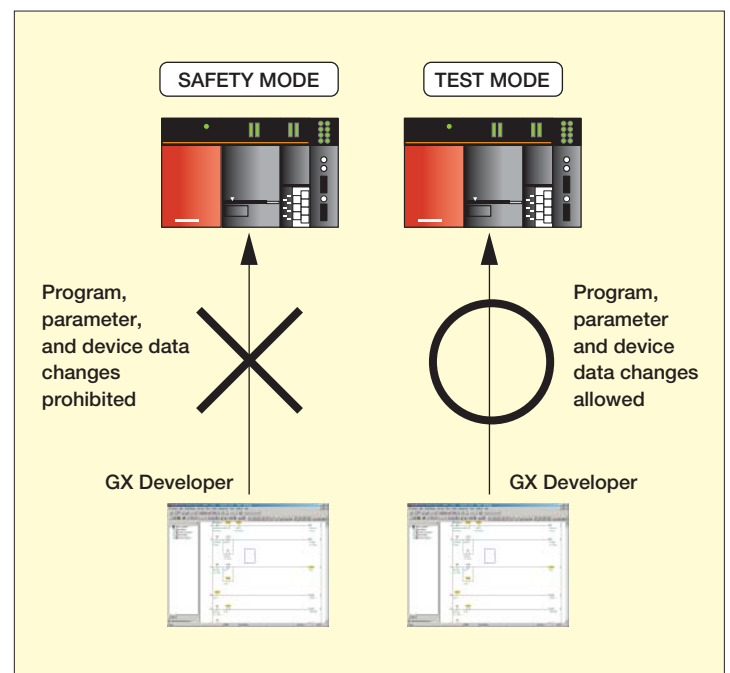
- Diagnostic errors including those of external devices by verifying input signals of dual input wiring. Disconnection etc. can be detected.
 - Diagnostic contact errors including those of external devices using "the input dark test" function. Short circuit etc. can be detected.
- The "input dark test function" outputs a pulse that is OFF when input is ON and diagnoses contact errors including those of external devices. This function is settable via the parameters.



Safety and user-friendliness achieved by two safety CPU operation modes

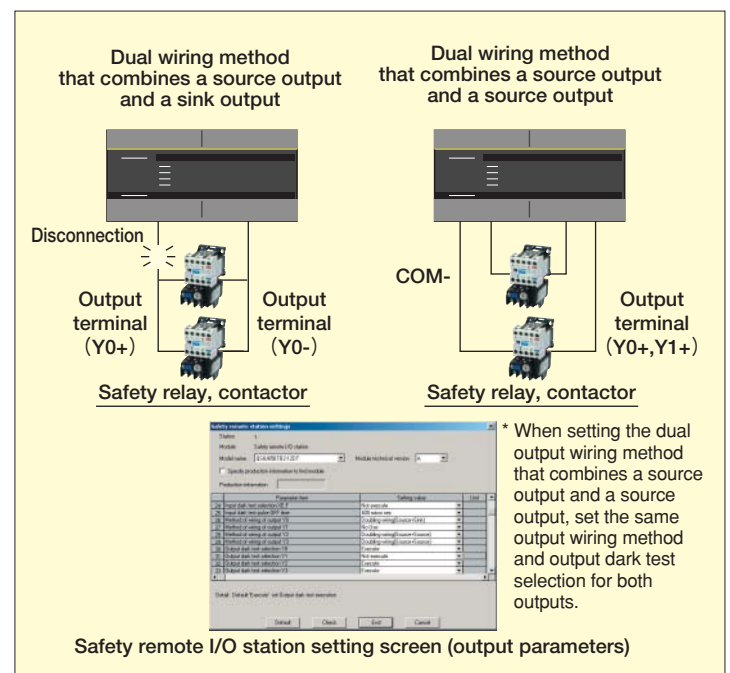
The safety CPU module is designed to operate in two operation modes, enabling use of the existing convenient debug functions (device test and write to PLC during RUN) while maintaining safety.

- SAFETY MODE : SAFETY MODE is used during actual safety system operation. This mode prohibits operations that change safety PLC control, such as write to PLC and device test, in order to protect the system during operation.
- TEST MODE : TEST MODE is used at system design and during maintenance. This mode allows users at the access level of Developers or higher to use all GX Developer's functions such as write to PLC and device test.



Safety output diagnostics function

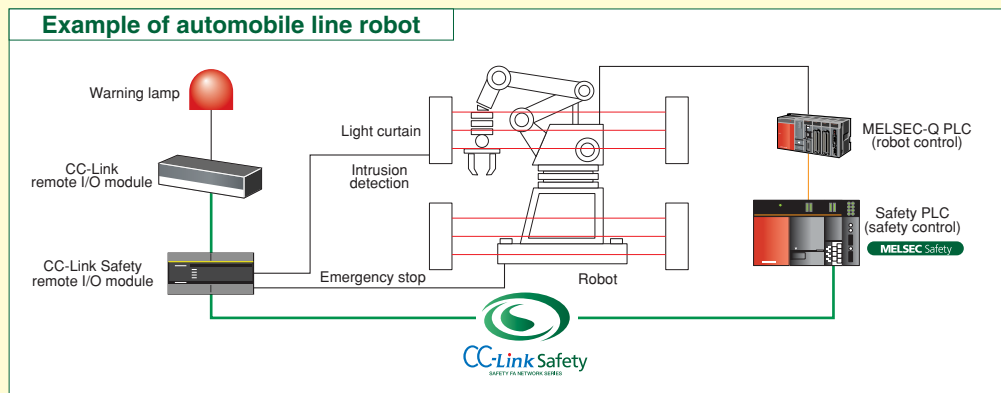
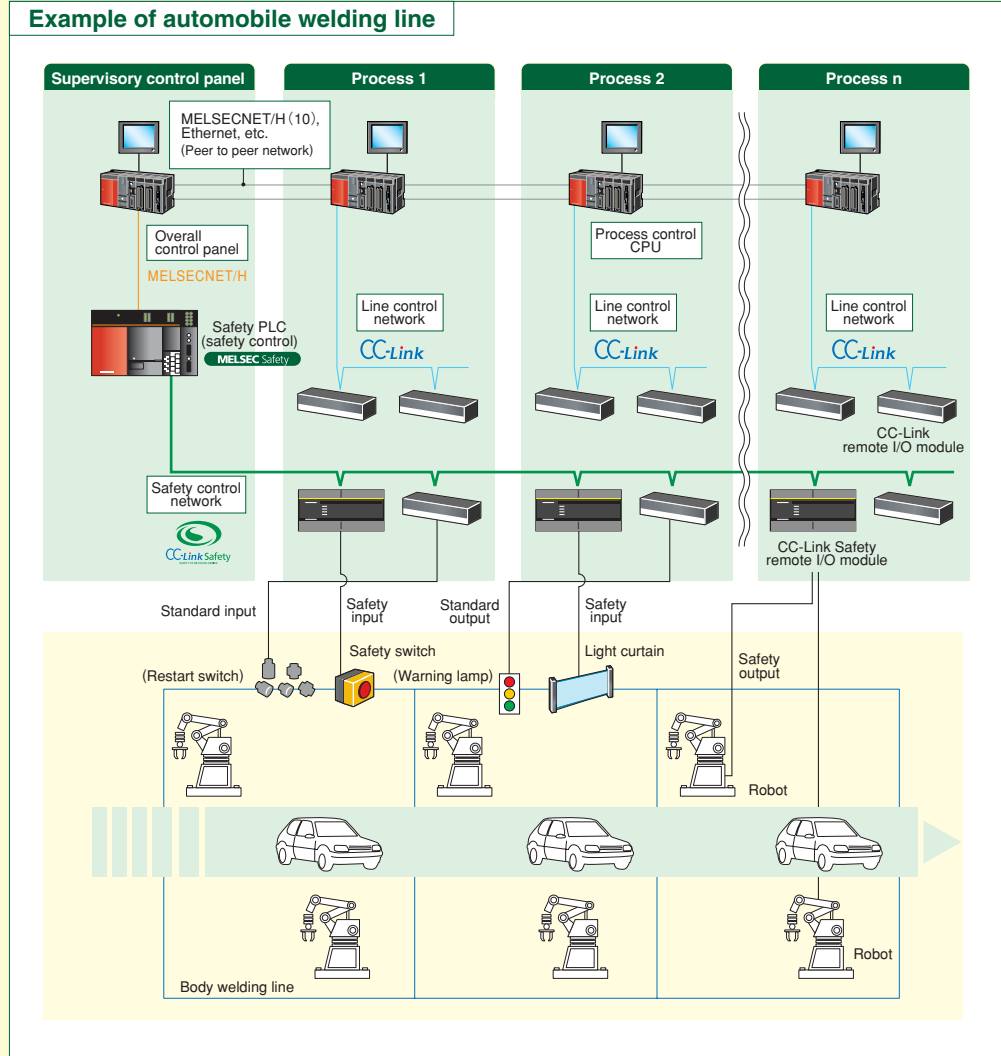
- Immediately detects output errors by verifying output signals of dual output wiring. Two types of wiring methods are selectable by parameters.
 - Dual wiring method that combines a source output and a sink output
 - Dual wiring method that combines a source output and a source output
 Unless both outputs are ON, external output is OFF.
 - Diagnostic contact errors including those of external devices using the output dark test function. Disconnection etc. can be detected.
- The "output dark test function" outputs a pulse that is OFF when output is ON and diagnoses contact errors including those of external devices. This function is settable via the parameters.





Higher level safety for your manufacturing line . . . MELSEC Safety application example

Realizing MELSEC Safety in an automotive production line.



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 IEC61131-2	
	Under intermittent vibration	Frequency range: 5 to 9 Hz, Constant acceleration: —, Half amplitude: 3.5 mm (0.14 inch), Sweep count: 10 times each in X, Y, Z directions
	Under continuous vibration	Frequency range: 9 to 150 Hz, Constant acceleration: 9.8 m/s ² , Half amplitude: —, Sweep count: —
	Under continuous vibration	Frequency range: 5 to 9 Hz, Constant acceleration: —, Half amplitude: 1.75 mm (0.07 inch), Sweep count: —
Shock resistance	Conforming to JIS B3502, IEC61131-2 (147 m/s ² , shock pulse duration: 11 ms, Sine half-wave pulse is applied 3 times each in X, Y, Z directions)	
Operating ambience	No corrosive gases	
Operating altitude ^{*3}	2000m (6562 ft.) or less	
Installation location	Inside control panel	
Overvoltage category ^{*1}	II or less	
Pollution degree ^{*2}	2 or less	
Equipment category	Class I ^{*4}	

^{*1} : This indicates the section of power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within the premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

^{*2} : This index indicates the degree to which conductive material is generated in the environment where the equipment is used. Pollution degree 2 is when only non-conductive pollution occurs. Temporary conductivity caused by condensation is to be expected.

^{*3} : Do not store or use the PLC under the pressure higher than the atmospheric pressure of altitude 0 m. Doing so can cause a malfunction. When using the PLC under pressure, please consult your local sales representative.

^{*4} : The equipment category of CC-Link Safety system remote I/O module is Class III.

Safety CPU Module Specifications

Item	QS001CPU
Control method	Cyclic program execution
I/O control mode	Refresh
Program language	Relay symbol language, function block
Processing speed (Sequence instruction)	LD X0: 0.10 μs MOV D0 D1: 0.35 μs
Constant scan (Function that keeps scan time constant)	1 to 2000 ms (Setting unit: 1 ms)
Program capacity ^{*1}	14 k steps (56 KB)
Memory capacity	Program memory (Drive 0)
	Standard ROM (Drive 4)
Maximum number of stored files	3 files ^{*2}
Number of writes to standard ROM	Max. 100,000 times
Number of I/O device points	6144 points (X/Y0 to 17FF) (Changeable)
Number of I/O points	1024 points (X/Y0 to 3FF)
Number of device points	Internal relay [M]
	Link relay [B]
	Timer [T]
	Retentive timer [ST]
	Counter [C]
	Data register [D]
	Link register [W]
	Annunciator [F]
	Edge relay [V]
	Link special relay [SB]
Link special register [SW]	
Special relay [SM]	
Special register [SD]	
RUN/PAUSE contact	RUN contact: 1 point can be set in the rage of X0 to 17FF PAUSE contact: None
Clock function	Year, month, date, hour, minute, second, day (Automatic leap-year detection) Accuracy: -3.18 to +5.25 s (TYP. 2.14 s/d at 0°C) Accuracy: -3.18 to +2.59 s (TYP. 2.07 s/d at 25°C) Accuracy: -12.97 to +3.63 s (TYP. -3.16 s/d at 55°C)
5V DC internal current consumption	0.43 A
External dimensions	H
	W
	D
Weight	0.29 kg
Level of protection	IP2X

Safety Power Supply Module Specifications

Item	QS061P-A1	QS061P-A2
Mounting position on base	QS Series power supply module mounting slot	
Applicable base unit	QS034B	
Input power supply	100 to 120 V AC ^{+10%} / _{-15%} (85 to 132 V AC)	200 to 240 V AC ^{+10%} / _{-15%} (170 to 264 V AC)
Input frequency	50/60 Hz ±5%	
Input voltage distortion factor	5% or less	
Maximum input apparent power	125 VA	
Inrush current	20 A 8 ms or less	
Rated output current	5V DC	6 A
		6.6 A or more
		5.5 to 6.5 V
Efficiency	70% or more	
Allowable momentary power failure period	20 ms or less	
Dielectric withstand voltage	Across inputs/LG and outputs/FG 1780 Vrms AC/3 cycles (2000 m [6562 ft.]	Across inputs/LG and outputs/FG 2830 Vrms AC/3 cycles (2000 m [6562 ft.]
	Across inputs/LG and outputs/FG, across inputs and LG, across outputs and FG 10MQ or more by 500 V DC insulation resistance tester	
Noise immunity	·By noise simulator of 1500 Vp-p noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency ·Noise voltage IEC61000-4-4, 2 kV	
Operation indication	LED indication (Normal: ON [green], Error : OFF)	
Fuse	Built-in (Unchangeable by user)	
Contact output section	Application	ERR. contact
	Rated switching voltage, current	24 V DC, 0.5 A
	Minimum switching load	5 V DC, 1 mA
	Response time	OFF to ON: 10 ms or less ON to OFF: 12 ms or less
Life	Mechanical: 20,000,000 times or more	
	Electrical: 100,000 times or more at rated switching voltage/current	
Surge suppressor	No	
Fuse	No	
Terminal screw size	M3.5 screw	
Applicable wire size	0.75 to 2 mm ²	
Applicable crimping terminal	RAV1.25 to 3.5, RAV2 to 3.5 (0.8 mm or less thick)	
Applicable tightening torque	0.66 to 0.89 N·m	
External dimensions	H	98 mm (3.86 inch)
	W	55.2 mm (2.17 inch)
	D	115 mm (4.53 inch)
Weight	0.40 kg	

^{*1} : The maximum number of executable sequence steps is calculated using the following formula:
(Program capacity) - (File header size [Default: 34 steps])
For details of program capacity and files, refer to the following manual.
☞ QSCPU User's Manual (Function Explanation, Program Fundamentals)
^{*2} : The memory stores 1 file for each of parameter, sequence program, and device comment.



Safety Main Base Unit Specifications

Item	QS034B
Number of I/O modules mounted	4 modules
Possibility of extension	Unextendable
Applicable modules	QS series modules
5V DC internal current consumption	0.095 A
Mounting hole size	M4 screw hole or Φ 4.5 hole (for M4 screw)
External dimensions	H 98 mm (3.86 inch)
	W 245 mm (9.65 inch)
	D 44.1 mm (1.74 inch)
Weight	0.28 kg
Attachment	Mounting screw M4 x 14: 4 pieces (DIN rail mounting adapter to be sold separately)
DIN rail mounting adapter type	Q6DIN2

CC-Link Safety System Master Module Specifications

Item	QS0J61BT12
Transmission speed	Selectable from 156 kbps/625 kbps/2.5 Mbps/5 Mbps/10 Mbps Version 1.10 compatible, CC-Link dedicated cable (Terminating resistor of 110 Ω is used)
Maximum overall cable distance (maximum transmission distance)	Transmission speed Station to station cable length Maximum overall cable distance
	156 kbps 1200m
	625 kbps 900 m
	2.5 Mbps 20 cm or longer 400 m
	5 Mbps 160 m
10 Mbps 100 m	
Maximum number of connectable modules	64 modules (42 modules for safety remote stations)
Maximum number of link points per system	Remote I/O (RX, RY): 2048 points
	Remote register (RW): 256 points (remote device station \rightarrow master station)
	Remote register (RWw): 256 points (master station \rightarrow remote device station)
Number of link points per remote station	Station type Safety remote station Standard remote station
	Number of occupied stations 1 station 1 station 2 stations 3 stations 4 stations
	RX 32 points 32 points 64 points 96 points 128 points
	RY 32 points 32 points 64 points 96 points 128 points
	RWw 0 points 4 points 8 points 12 points 16 points
RWw 0 points 4 points 8 points 12 points 16 points	
Communication method	Broadcast polling method
Synchronization method	Flag synchronous method
Coding method	NRZI method
Transmission path	Bus (RS-485)
Transmission format	HDLC compliant
Error control system	CRC32 ^{*2} ($X^{32}+X^{26}+X^{23}+X^{22}+X^{16}+X^{12}+X^{11}+X^{10}+X^6+X^5+X^4+X+1$)
	CRC16 ($X^{16}+X^{12}+X^2+1$)
Connection cable	Version 1.10 compatible, CC-Link dedicated cable ^{*1}
Number of occupied I/O points	32 points (I/O assignment: 32 intelligent points)
5V DC internal current consumption	0.46 A
Weight	0.12 kg

^{*1} : CC-Link dedicated cable (Ver.1.00) or CC-Link dedicated high-performance cable can also be used. Using a cable together with another type of cable is not allowed. Attach terminating resistors that match the cable type. Two terminating resistors (110 Ω) are included with the CC-Link Safety system master module.
^{*2} : Error detection using CRC32 is not performed for communication with standard remote I/O stations or remote device stations.

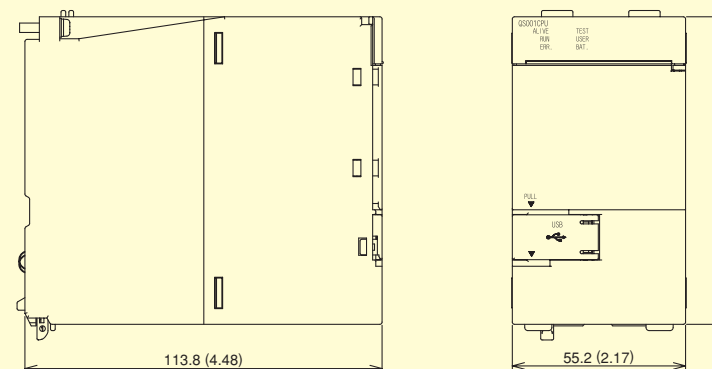
CC-Link Safety System Remote I/O Module Specifications

Item	QS0J65BTB2-12DT			
Input specifications		Output specifications		
Number of input points	8 points (Input terminals: 16 points ^{*2})	Number of output points	4 points (source + sink type) 2 points (source + source type)	
Isolation method	Photocoupler	Isolation method	Photocoupler	
Rated input voltage	24 V DC	Rated load voltage	24 V DC	
Rated input current	Approx. 4.6 mA	Operating load voltage range	19.2 to 28.8 V DC (Ripple ratio: 5% or less)	
Operating voltage range	19.2 to 28.8 V DC (Ripple ratio: 5% or less)	Maximum load current	0.5 A/point	
Maximum number of simultaneous input points	100%	Maximum inrush current	10 A/10 ms or less	
ON voltage/ON current	15 V DC/2 mA or more	Leakage current at OFF	0.5 mA or less	
OFF voltage/OFF current	5V DC/0.5 mA or less	Maximum voltage drop at ON	1.0 V DC or less	
Input resistance	Approx. 56 K Ω	Protection function	Output overload protection function	
Input type	Negative common	Output type	Source + sink type Source + source type	
Response time	OFF \rightarrow ON	0.4 ms or less (at 24 V DC)	OFF \rightarrow ON	0.4 ms or less (at 24 V DC)
	ON \rightarrow OFF	0.4 ms or less (at 24 V DC)	ON \rightarrow OFF	0.4 ms or less (at 24 V DC)
Safety remote station input response time	32 ms or less + filter-out time (1 ms, 5 ms, 10 ms, 20 ms, 50 ms)	Safety remote station output response time	32 ms or less	
		Surge suppressor	Zener diode	
External power supply ^{*1}	Voltage	19.2 to 28.8 V DC (Ripple ratio: 5% or less)		
	Current	60 mA (24 V DC, with all points ON, excepting for external load current)		
	Protection function	External power supply overvoltage/overcurrent protection function		
	Fuse	8 A (Not replaceable)		
Wiring method for common	16 input points/common, 4 output points/common (Terminal block 2-wire type)			
Common current	Maximum 4 A (Total of inputs and outputs)			
Number of stations occupied	1 station			
Number of writes to nonvolatile memory inside module	10 ¹² times			
Safety refresh response processing time	38 ms			
Module power ^{*1}	Voltage	19.2 to 28.8 V DC (Ripple ratio: 5% or less)		
	Current	140 mA or less (24 V DC, with all points ON)		
	Protection function	Module power overvoltage/overcurrent protection function		
	Fuse	0.8 A (Not replaceable)		
	Momentary power failure period	10 ms or less		
Level of protection	IP2X			
Weight	0.67 kg			
External connection system	Communication section, module power section	7-point detachable terminal block [Transmission circuits, module power, FG], M3 x 5.2 Tightening torque: 0.425 to 0.575 N·m, 2 crimping terminals or less		
	External power supply section, I/O section	18-point detachable terminal block x 3 [External power supply, I/O signals], M3 x 5.2 Tightening torque: 0.425 to 0.575 N·m, 2 crimping terminals or less		
Module mounting screw	M4 screw with polished and round flat washer (Tightening torque: 0.824 to 1.11 N·m) Mountable with a DIN rail, and in 6 orientations.			
Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al (Compliant with JIS C 2812)			
Applicable wire size	0.3 to 2.0 mm ²			
Applicable crimping terminal	·RAV1.25-3 (Compliant with JIS C 2805) [Applicable wire size: 0.3 to 1.25 mm ²] ·V2-MS3 (JST Mfg. Co., Ltd.), RAP2-3SL (Nippon Tanshi Co., Ltd.), TGV2-3N (Nichifu) [Applicable wire size: 1.25 to 2 mm ²]			

^{*1} : The power supply connected to the QS0J65BTB2-12DT must satisfy the following conditions:
 (1) Reinforced insulation
 SELV (Safety Extra Low Voltage): Hazardous potential part (48 V or more)
 (2) Compliance with the LVD (Low Voltage Directive)
 (3) Output voltage: 19.2 to 28.8 V DC (Ripple ratio: 5% or less)
^{*2} : Two inputs terminals are assigned for each input since dual wiring is supported.

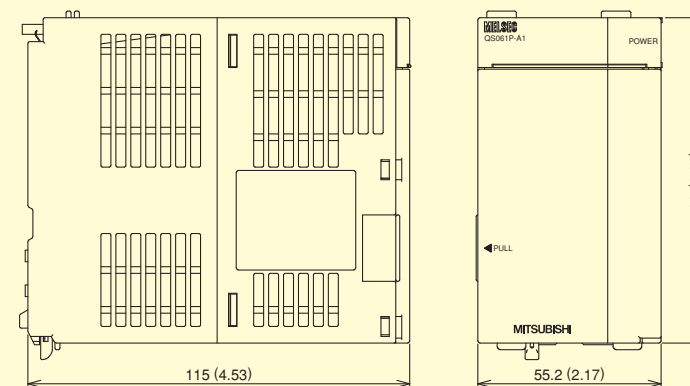
External Dimensions of Safety CPU Module

Unit: mm(inch)



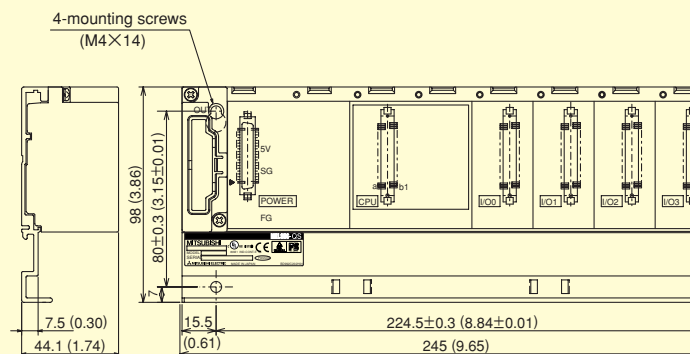
External Dimensions of Safety Power Supply Module

Unit: mm(inch)



External Dimensions of Safety Main Base Unit

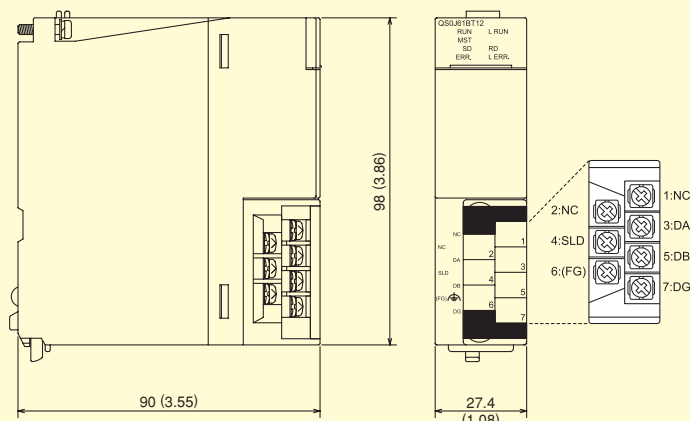
Unit: mm(inch)





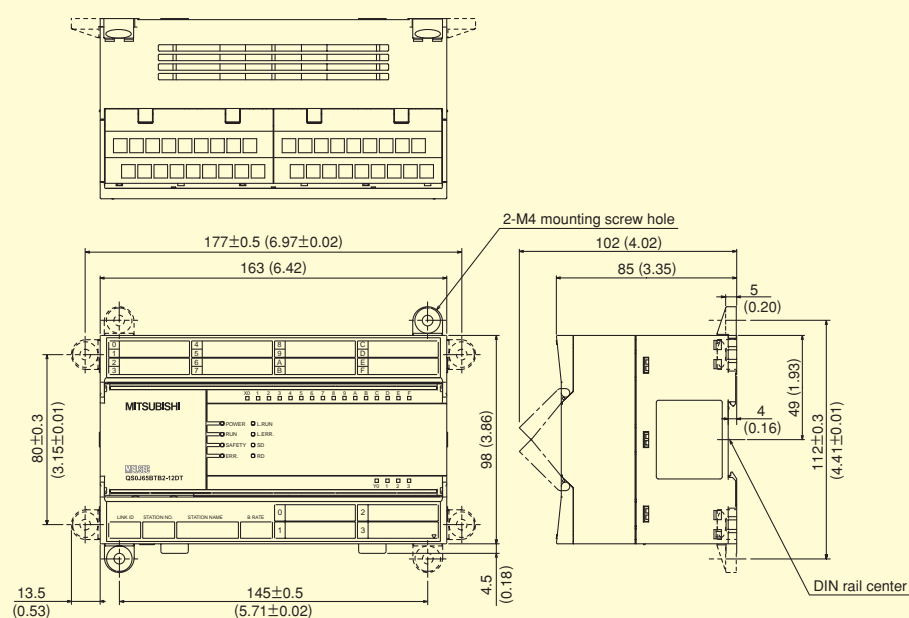
External Dimensions of CC-Link Safety System Master Module

Unit: mm(inch)



External Dimensions of CC-Link Safety System Remote I/O Module

Unit: mm(inch)



Product name	Model name	Outline
Safety CPU module	QS001CPU	Program capacity: 14 K steps, number of I/O device points: 6144 points, operation/error history: 3000 records
Safety main base unit	QS034B-E	4 slots, for QS Series and MELSECNET/H modules
Safety power supply module	QS061P-A1	Input: 100 to 120 V AC, 50/60 Hz; output: 5 V 6 A; with overvoltage/overcurrent protection and shutdown circuit diagnostics
	QS061P-A2	Input: 200 to 240 V AC, 50/60 Hz; output: 5 V 6 A; with overvoltage/overcurrent protection and shutdown circuit diagnostics
CC-Link Safety system master module	QS0J61BT12	Maximum number of connectable modules: 64 (42 modules for safety remote stations), safety station information management
CC-Link Safety system remote I/O module	QS0J65BTB2-12DT	Safety input: 8 points (dual input), safety output: 4 points (dual output)
GX Developer	SW8D5C-GPPW-E	Applicable Version: Version 8.40S or later

Warranty

1. Limited Warranty and Product Support

- Mitsubishi Electric Corporation ("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 MELSEC Safety programmable controllers (the "Products") will be free from defects in material and workmanship.
- 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.
- For this warranty to apply:
 - 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;
 - 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
 - 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.
 - 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.
- 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.
- 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.
- 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

- 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.
- 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.
- 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.
- 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.
- MELCO does not warrant any Product:
 - repaired or altered by persons other than MELCO or its authorized engineers or FA Centers;
 - subjected to negligence, carelessness, accident, misuse, or damage;
 - improperly stored, handled, installed or maintained;
 - integrated or used in connection with improperly designed, incompatible or defective hardware or software;
 - that fails because consumable parts such as batteries, backlights, or fuses were not tested, serviced or replaced;
 - operated or used with equipment, production lines or systems that do not meet applicable and commensurate legal, safety and industry-accepted standards;
 - operated or used in abnormal applications;
 - 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;
 - used with obsolete technologies or technologies not fully tested and widely accepted and in use at the time of the Product's manufacture;
 - subjected to excessive heat or moisture, abnormal voltages, shock, excessive vibration, physical damage or other improper environment; or
 - 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.

- 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.
- 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.
- 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.
- THE WARRANTIES AND REMEDIES SET FORTH IN THESE TERMS ARE THE EXCLUSIVE AND ONLY WARRANTIES AND REMEDIES THAT APPLY TO THE PRODUCTS.
- MELCO DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

3. Limits on Damages

- 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.
- Although MELCO has obtained the certification for Product's compliance to the international safety standards IEC61508 and EN954-1/ISO13849-1 from TÜV 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.
- 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.
- 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.
- 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.
- 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.
- 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

- 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.
- Products stored at the request of Customer or because Customer refuses or delays shipment shall be at the risk and expense of Customer.
- 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.

Local sales office warranty conditions also apply. Please contact your local Mitsubishi Electric sales office or sales representatives.

Mitsubishi Safety Programmable Controller MELSEC-QS Series (Digest Version)

Country/Region	Sales office	Tel/Fax
USA	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061, USA	Tel : +1-847-478-2100 Fax : +1-847-478-2396
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 Fax : +55-11-5574-5296
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-7170
UK	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Herts., AL10 8XB, UK	Tel : +44-1707-276100 Fax : +44-1707-278695
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Dir. Colleoni, Pal. Perseo - Ingr.2 Via Paracelso 12, 20041 Agrate B., Milano, Italy	Tel : +39-039-60531 Fax : +39-039-6053312
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi 76-80 08190 Sant Cugat del Valles, Barcelona, Spain	Tel : +34-93-565-3131 Fax : +34-93-589-2948
France	Mitsubishi Electric Europe B.V. French Branch 25 Boulevard des Bouvets, F-92741 Nanterre Cedex, France	Tel : +33-1-5568-5568 Fax : +33-1-5568-5685
South Africa	Circuit Breaker Industries LTD Private Bag 2016, 1600 Isando, Tripswitch Drive, Elandsfontein Gauteng, South Africa	Tel : +27-11-928-2000 Fax : +27-11-392-2354
Hong Kong	Mitsubishi Electric Automation (Hong Kong) Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, Hong Kong	Tel : +852-2887-8870 Fax : +852-2887-7984
China	Mitsubishi Electric Automation (Shanghai) Ltd. 80 Xin Chang Road, 4th Floor Shanghai Intelligence Fortune Leisure Plaza, Huang Pu district Shanghai 200003, China	Tel : +86-21-6120-0808 Fax : +86-21-6121-2424
Taiwan	Setsuyo Enterprise Co., Ltd. 6F., No.105 Wu-Kung 3rd.RD, Wu-Ku Hsiang, Taipei Hsine, Taiwan	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	Mitsubishi Electric Automation Korea Co., Ltd. B1F, 2F, 1480-6, Deungchon-Dong, Kangseo-Ku, Seoul, 157-200, Korea	Tel : +82-2-3660-9607 Fax : +82-2-3664-0475
Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 Alexandra Road #05-01/02, Mitsubishi Electric Bulding Singapore 159943	Tel : +65-6470-2460 Fax : +65-6476-7439
Thailand	F.A. Tech Co., Ltd. 896/19, 20, 21, 22, S. V. City Building, Office Tower 1, Floor 12 Rama III Rd, Bangpongpan, Yannawa, Bangkok 10120, Thailand	Tel : +66-2-682-6522 Fax : +66-2-682-6020
Indonesia	Indonesia P.T. Autoteknindo SUMBER MAKMUR Muara Karang Selatan Block A/Utara No.1 Kav. No.11 Kawasan Industri/Pergudangan Jakarta-Utara 14440, Indonesia	Tel : +62-21-663-0833 Fax : +62-21-663-0832
India	Messung Systems Pvt, Ltd. Electronic Sadan NO:111 Unit No15, M.I.D.C Bhosari, Pune-411026, India	Tel : +91-20-2712-3130 Fax : +91-20-2712-8180
Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, Rydalmere, NSW 2116, Australia	Tel : +61-2-9684-7777 Fax : +61-2-9684-7245



HEAD OFFICE: TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14,YADA-MINAMI 5, HIGASHI-KU, NAGOYA, JAPAN

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