MITSUBISHI

Mitsubishi Safety Programmable Controller

MELSEC QS series

CC-Link Safety System Master Module

User's Manual

(Hardware)

QS0J61BT12

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

Prior to use, please read both this manual and detailed manual thoroughly to fully understand the product.

CC-Link Safety

SAFETY FA NETWORK SERIES

MODEL	QS0J61BT12-U-HW
MODEL CODE	13JP95
IB(NA)-0800344-B(0804)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 standards 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.

[Design Precautions]

DANGER

- Create short current protection for a safety relay, and a protection circuit such as a fuse, and breaker, outside a safety programmable controller.

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 erroneous operation.

[Installation Precautions]

CAUTION

- Use a safety programmable controller in the environment that meets the general specifications described in the QSCPU User's Manual (Hardware Design, Maintenance and Inspection). 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 externally supplied 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

- 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.

CAUTION

- 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.
- Be sure to fix the communication cables or power cables by ducts or clamps when connecting them to the module.
  Failure to do so may cause damage of the module or cables due to a wobble, unintentional shifting, or accidental pull of the cables, or malfunctions due to poor contact of the cable.
- When removing the connected communication cables or power cables, do not pull the cable with grasping the cable part.
  Remove the cable connected to the terminal block after loosening the terminal block screws.
  Pulling the cable connected to a module may result in malfunctions or damage of the module or cable.

Revisions

* The manual number is noted at the lower right of the top cover.

Print Date	*Manual Number	Revision
Sep., 2006	IB(NA)-0800344-A	First edition
Apr., 2008	IB(NA)-0800344-B	Correction Compliance with the EMC and Low Voltage Directives, WARRANTY

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About Manual

The following manual is also related to this product.
Order them necessary.

Detailed Manual

Manual name	Manual No. (Model code)
CC-Link Safety System Master Module User's Manual QS0J61BT12	SH-080600ENG (13JR88)

Compliance with the EMC and Low Voltage Directives

To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to Chapter 9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QSCPU User's Manual (Hardware Design, Maintenance and Inspection).
The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

1. Overview

This manual describes the specifications, part names, and settings of the QS0J61BT12 CC-Link Safety System Master Module (hereinafter referred to as QS0J61BT12), which is intended for use with MELSEC-QS series programmable controller CPUs.
After unpacking, confirm that the following items are enclosed.

Part name	Qty.
QS0J61BT12	1
Terminating resister 110Ω 1/2W (brown, brown, brown)	2
CC-Link Safety System Master Module User's Manual (Hardware) QS0J61BT12	1

1.1 Compatibility with CC-Link

This product supports the following CC-Link functions and performance.

- Cyclic transmission
- Less restrictions on the station-to-station cable length
- CC-Link Safety

2. Specifications

2.1 Performance Specifications

Table 2.1 shows the performance specifications of the QS0J61BT12. Refer to the User's Manual of the CPU for the general specifications of the QS0J61BT12.

Table 2.1 Performance Specifications

Item		Specifications				
Transmission rate		Select from 156kbps/625kbps/2.5Mbps/5Mbps/10Mbps				
Maximum overall cable distance (Maximum transmission distance)		Differs according to transmission rate (Refer to section 2.2)				
Maximum No. of connectable modules		64 modules				
Maximum No. of link points per system		Remote I/O (RX, RY) : 2048 points Remote register (RWr) : 256 points (remote device station → master station) Remote register (RWw): 256 points (master station → remote device station)				
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
	RWr	0 points	4 points	8 points	12 points	16 points
	RWw	0 points	4 points	8 points	12 points	16 points
Communication method		Broad cast polling method				
Synchronization method		Flag synchronous system				
Coding method		NRZI method				
Transmission path		Bus (RS-485)				
Transmission format		HDLC compliant				
Error control system		CRC32 *2 ($X^{32}+X^{26}+X^{23}+X^{22}+X^{16}+X^{12}+X^{11}+X^{10}+X^{8}+X^{7}+X^{5}+X^{4}+X^{2}+X+1$)				
		CRC16 ($X^{16}+X^{12}+X^{5}+1$)				
Recommended connection cable		Version 1.10 compatible CC-Link dedicated cable *1				

Table 2.1 Performance Specifications

Item	Specifications
No. of I/O occupied points	32 points (I/O assignment: 32 intelligent points)
5V DC internal current consumption	0.46A
Weight	0.12kg

*1 CC-Link dedicated cable (Ver.1.00) or CC-Link dedicated high-performance cable can be also used. Using a cable together with another type of cable is not allowed. Attach terminating resisters which match the cable type.(Refer to section 5.1)

*2 Error detection using CRC32 is not performed for communication with standard remote I/O stations or remote device stations.

2.2 Maximum Overall Cable Distance

The maximum overall cable distance differs according to the transmission rate.
For the relation between the transmission rate and the maximum overall cable distance, refer to the following:
CC-Link Partner Association website: http://www.cc-link.org/

2.3 CC-Link Dedicated Cable Specifications

Use CC-Link dedicated cables in the CC-Link Safety systems.
Performance of the CC-Link Safety system cannot be guaranteed if any cables other than CC-Link dedicated cables are used.
For the specifications and any inquiries on the CC-Link dedicated cables, refer to the following:
CC-Link Partner Association website: http://www.cc-link.org/

Remarks

For details, refer to the CC-Link Cable Wiring Manual issued by the CC-Link Partner Association.

3. Mounting and Installation

3.1 Handling Precautions

The handling precautions for the module are given below.

(1) The module case is made of resin, so do not drop it or apply strong impacts on it.

(2) Do not remove the PCB of each module from its case. This may cause a failure in the module.

(3) Be careful not to let foreign matter such as wire offcuts enter the module during wiring. In the event any foreign matter enters, remove it immediately.
Otherwise, it may cause a fire, failure or malfunction.

(4) The top surface of the module is covered with an ingress prevention label to prevent foreign matter such as wire offcuts from entering the module during wiring. Do not remove this label until the wiring is complete. Before operating the system, be sure to remove the label to allow adequate heat dissipation.

(5) Crimp terminals with insulated sleeves cannot be used with the terminal block. Covering the wiring parts for the crimp terminals with mark tubes or insulated tubes is recommended.

(6) Always touch a grounded metal to discharge the static electricity charged in the human body before handling the module.
Failure to do so may cause a failure or malfunctions of the module.

(7) Tighten the module mounting screws within the following ranges.

Screw name	Tightening torque range
Module mounting screw (M3 screw)	0.36 to 0.48N•m
Terminal block terminal screw (M3 screw)	0.42 to 0.58N•m
Terminal block mounting screw (M3.5 screw)	0.66 to 0.89N•m

(8) To mount the module on a base unit, fully insert the module fixing tab into the fixing hole in the base unit and press the module into position.
Be sure to tighten the module mounting screws within the specified tightening torque range.
Improper installation may result in malfunction, failure, or drop of the module.

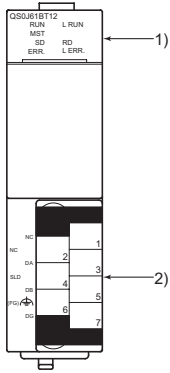
POINT

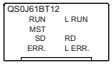
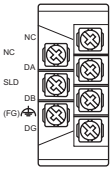
(1) Always turn the power of the corresponding station OFF before mounting or removing the terminal block. If it is mounted or removed without turning OFF the power, correct data transmission by the mounted or removed station will not be guaranteed.
(2) Always power off the system in advance when removing the terminating resistor to change the system. If it is removed and mounted while the system is energized, correct data transmission will not be guaranteed.

3.2 Installation Environment

For the installation environment, refer to the QSCPU User's Manual (Hardware Design, Maintenance and Inspection).

4. Part Names and Settings



<table>
<tr><th>No.</th><th>Name</th><th colspan="2">Details</th></tr>
<tr><td rowspan="8">1)</td><td rowspan="8">LED indicators
 
</td><td colspan="2">Indicates the data link state by turning the LEDs ON or OFF.</td></tr>
<tr><td>LED name</td><td>Details</td></tr>
<tr><td>RUN</td><td>ON: Module is normal
OFF: Watch dog timer error</td></tr>
<tr><td>ERR.</td><td>ON: Communication error in all stations
Turns ON when the following type of error occurs.
• When master station is duplicated on the same line
• When there is an error in the parameter settings
• When the data link monitor timer timed out
• When the cable is disconnected, or the transmission route is being affected by noise, etc.
Flicker: A communication error station identified, or remote station No. duplicated.</td></tr>
<tr><td>MST</td><td>ON: Operating as master station (during data link control)</td></tr>
<tr><td>L RUN</td><td>ON: Executing data link</td></tr>
<tr><td>L ERR.</td><td>ON: Communication error (host)
Flickering of inconsistent intervals:
The terminating resistor is not attached. Or, the module and CC-Link dedicated cable are affected by noise.</td></tr>
<tr><td>SD</td><td>ON: Sending data</td></tr>
<tr><td>RD</td><td>ON: Receiving data</td></tr>
<tr><td>2)</td><td>Terminal block
 
</td><td colspan="2">Connect the CC-Link dedicated cable for the data link.
Refer to section 5.1 for details on the connection methods.
The terminals SLD and FG are connected inside the module.
This is a 2-piece terminal block, and the module can be replaced without disconnecting the signal wires connected to the terminal block. (Replace the module after turning its power OFF.)</td></tr>
</table>

5. External Wiring

5.1 CC-Link Dedicated Cable Wiring

This section explains how to connect the safety master module, safety remote I/O module, standard remote I/O module and/or remote device module with CC-Link dedicated cables.

(1) The cable connecting sequence is not related with the station No.

(2) Be sure to connect the "terminating resistors" compatible with the cable type to the modules on both ends of the CC-Link Safety system. Connect each terminating resistor between "DA" and "DB".

(3) In the CC-Link Safety system, the terminating resistor to be used is different depending on the applied cable.

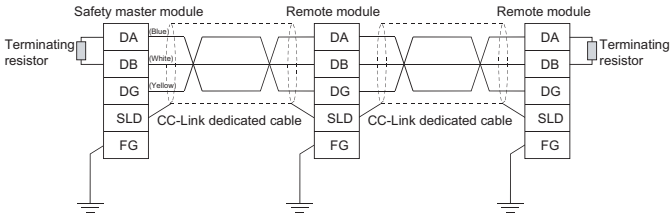
Cable type	Terminating resister
Version 1.10 compatible CC-Link dedicated cable	110Ω 1/2 W * (brown-brown-brown)
CC-Link dedicated cable (Ver.1.00)	
CC-Link dedicated high-performance cable	130Ω 1/2 W (brown-orange-brown)

* This resisters are encosed with QS0J61BT12

(4) The safety master module can be connected to any location other than both ends.

(5) Star topology is not allowed.

(6) A connection method is shown below.



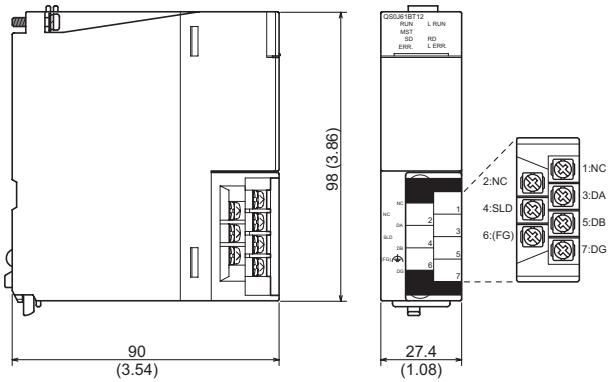
IMPORTANT

Each of the CC-Link dedicated cables (for Ver.1.10, Ver.1.00, and high-performance cables) cannot be used together with another type of cable.
If used together, correct data transmission will not be guaranteed.

POINT

Connect the shielded wire of the CC-Link dedicated cable to "SLD" of each module, and ground the both ends of the shielded wire via "FG". The SLD and FG are connected in the module.

6. Extermal Dimensions



Unit: mm (inch)

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 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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South Africa	Circuit Breaker Industries Ltd. Private Bag 2016, ZA-1600 Isando, South Africa Tel : +27-11-928-2000

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