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Delta PQC Series Front Connection Type Static VAR Generator

User Manual

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Save This Manual

This manual contains important instructions and warnings that you should follow during the installation, operation, storage and maintenance of this product. Failure to heed these instructions and warnings will void the warranty.

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Chapter 1: Important Safety Instructions

1.1 Safety Precautions

- This static var generator (SVG) and the system's load are connected to the power grid in parallel to provide reactive power compensation.
- The SVG cannot be exposed to rain or high humidity levels, and it must be kept at a safe distance from flammable fluids, gases, or explosives.
- The SVG must be installed inside a cabinet with proper protection ratings and ventilation/cooling channels.
- The area surrounding the SVG must be kept clear of objects to allow ventilation and easy access for operating the machine.
- In order to reduce the risk of fire and electric shock, installation must be performed by a qualified technician under a well-controlled working environment.
- To reduce the risk of electric shock, all maintenance work must be performed by a qualified technician. All power must be turned off before conducting any maintenance work.
- It will take more than 15 minutes for the DC capacitor to discharge. To reduce high voltage risks, please make sure that proper discharging has taken place before commencing work.
- To reduce the risk of electric shock, please read this manual carefully before connecting to a power source. Please keep this manual in a safe place so that it can be used as a reference in the future.
-  The operating noise level exceeds 70dB, so please wear earmuffs to prevent hearing loss.

1.2 Wiring Precautions

- Please make sure that the SVG is grounded properly to prevent potential hazards caused by leakage current.
- When connecting wires, please consider the compensation capacity and current carrying capacity of the wires carefully.
- The SVG's power inlet must be connected to a protective device. It is recommended that each module is equipped with over-current protection certified by a third party. Please also consider the location of equipment installation and select protective devices with sufficient breaking capacity.
- The capacity of protective devices must comply with the capacity of the SVG.

- To prevent burning injuries caused by high temperature, please wait for the temperature to cool off before operating the switch.
- The three-phase, four-wire SVG is applicable to power grid systems with neutral grounding.



1.3 Usage Warnings

- Since the SVG is used for reactive power compensation of the power grid, the capacity selection of the SVG shall be subject to the capacity of reactive power to avoid poor compensation due to insufficient capacity.
- Since the SVG is used for reactive power compensation, it shall be connected to the reactive current via an external source for CT testing.
- To ensure the SVG's high reliability and prevent it from overheating, do not block or cover the ventilation openings.
- The temperature of the SVG's operating environment should be between -25°C and 50°C . Once the temperature range has been exceeded, the SVG will not be able to operate.
- The SVG meets IEC 62477 overvoltage category 3 requirements. To prevent damaging the SVG by exceeding its load capacity, please select appropriate surge protection circuit or device according to the actual model of the power system. Please contact Delta if you feel uncertain about something.

1.4 Storage Precautions

- To prevent rats from entering and damaging the unit, please use the original packing materials to seal the SVG.
- If you do not plan to install the SVG right away upon receiving the unit, please make sure that you store the SVG inside a dry and well-ventilated room indoors. The temperature must be within the range of -40°C and 70°C , and the relative humidity must be less than 95%.

1.5 Symbols

Item	Symbol	Meaning
1	R	The "R" phase of the three-phase power supply
2	S	The "S" phase of the three-phase power supply
3	T	The "T" phase of the three-phase power supply
4	N	Neutral line
5		Main grounding terminal
6		EPO key
7	XT	Terminal board
8	QF	Breaker
9	XK	Auxiliary switch

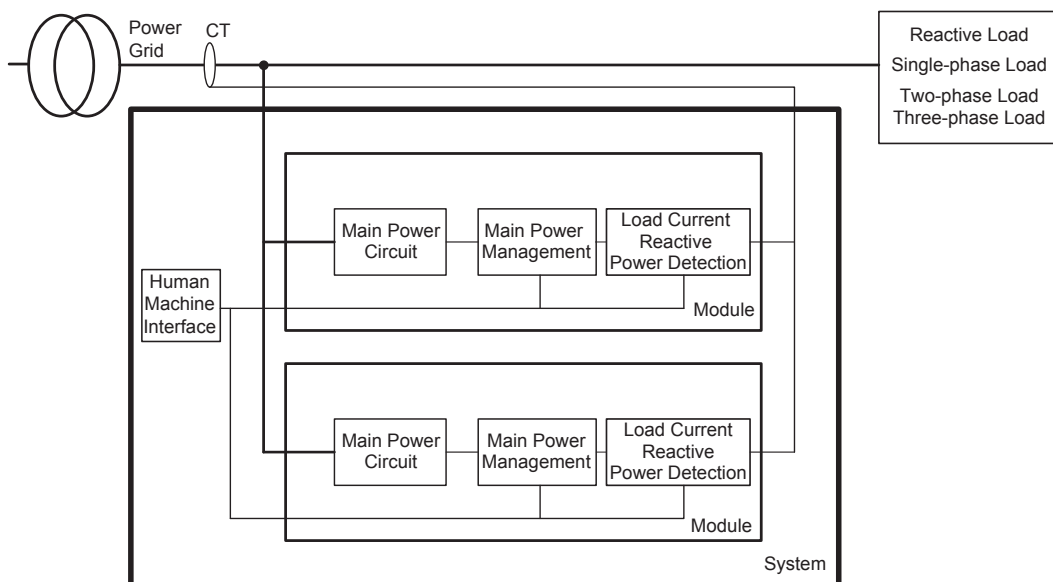
Chapter 2: Introduction

2.1 Product Information

The static VAR generator (SVG) is a reactive power compensation device, it is used for reactive power compensation for the three-phase power grid. The device has the following characteristics:

- Configurable reactive power compensation for capacitive, inductive, positive-sequence , negative-sequence, and zero-sequence loads.
- Rapid dynamic responses, stable parameters, and highly precise reactive power compensation.
- The unit offers high efficiency and low wear and tear. Under the advanced ECO energy saving mode, the unit can operate smarter while consuming less power.
- Based on a modular design, mix and match units to suit your compensation capacity needs.
- The system adopts an advanced three-level topology and consists of digital signal processors (DSP), large programmable controllers, and high-power electronic devices, which offers superior performance and high reliability.
- Supports remote power on/off operations via computer monitoring.

The system's block diagram is shown in **Figure 2-1**. The system is made up of modules and the system cabinet. Inside the module, load current is detected via an external CT and extract the reactive components which need to be compensated. Based on this information, the main power controller manages the inverse reactive current released by the main power circuit to offset the load's reactive components. Each system cabinet can independently control up to seven modules in parallel. Information from each module can be displayed and the operation of each module can be controlled via the human-machine interface installed in each system cabinet.



(Figure 2-1: The SVG system's block diagram)

2.2 SVG Module Product Categories

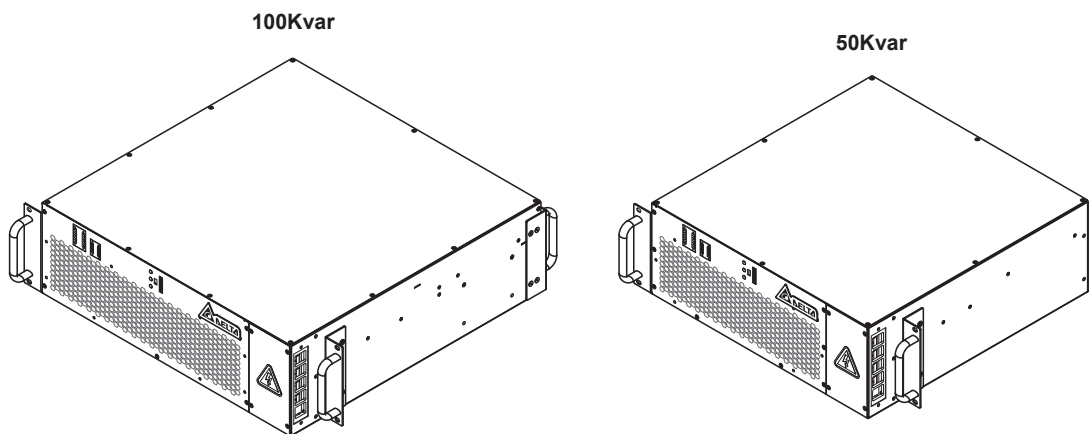
Delta's PQC series front connection type SVG is categorized based on capacity and wiring format. **Table 2-1** lists the models in the front access series:

Table 2-1: SVG module specifications for the front connection type

Series	Model	Capacity	Wiring Format
SVG Module	PQCS-400-50-50FM4	50Kvar	3P4W
	PQCS-400-50-50FM3	50Kvar	3P3W
	PQCS-400-100-100FM4	100Kvar	3P4W
	PQCS-400-100-100FM3	100Kvar	3P3W
Accessories	PQC-LCM	NA	NA

- **SVG Module**

Delta's PQC series front connection type SVG is available in two different wiring formats. The output capacities of the 3P3W and 3P4W models are 100Kvar and 50Kvar, respectively. The 3P4W module must be connected to the neutral line; it can increase the compensation capacity of the zero sequence fundamental current. The 3P3W module does not have to be connected to the neutral line; it cannot compensate for the zero-sequence fundamental current. **Figure 2-2** shows the external view of the Delta SVG module.



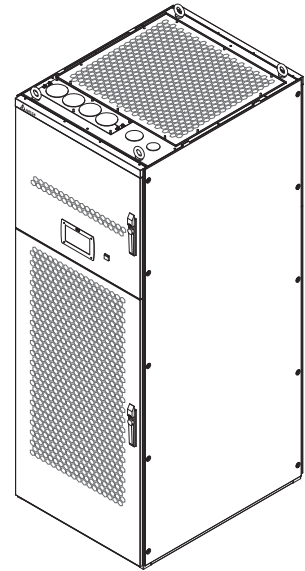
(Figure 2-2: External view of the SVG module)

- **SVG System Cabinet**

SVG modules and the LCM can be installed inside any standard or non-standard cabinet that meets the size requirements. For 3P4W system applications, the cabinet must be connected to the neutral line and equipped with 3P4W SVG modules. For 3P3W system applications, the cabinet does not need to be connected to the neutral line but must be equipped with 3P3W SVG modules. **Figure 2-3** shows the SVG system cabinet.

System capacity is determined by the specifications and number of medium-power modules installed in the system. Customers are able to select the quantity of power modules as well as the system cabinet they need based on the capacity requirements. Customers can also contact local dealers to verify the capacity required.

Delta's embedded human-machine interface connects with SVG modules via internal ports. The embedded design is capable of monitoring module operations and configuring various parameters, and can be easily embedded into any other system cabinet. **Figure 2-4** shows the human-machine interface.



(Figure 2-3: External view of the SVG system cabinet)

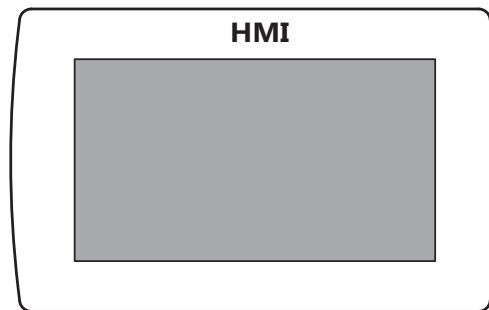
2.3 Functions and Features

- Comprehensive reactive power compensation: One active SVG module is capable of handling inductive/capacitive reactive power as well as zero-phase and negative-phase reactive power simultaneously (an unbalanced three-phase system).
- Superb compensation performance: The system's reactive power compensation rate can be as high as 98%.
- Rapid response time and highly accurate: Capable of achieving rapid (a full response within ms and an instantaneous response within us) and stepless compensation.
- Input a wide range of voltages and frequencies, suitable for working with diesel generators and under harsh power supply conditions. For the 3P4W product line, the upper and lower line voltage limits are 456V and 304V, respectively. For the 3P3W product line, the upper and lower line voltage limits are 480V and 304V, respectively.
- Great stability: The device acts as infinite impedance to the power grid system and has no effect on the impedance of the power grid system. There are no resonance risks and will not impact the operation of other equipment.
- Low power loss; save even more on energy costs with the ECO energy saving mode.
- Closed-loop control: Current detection for three-phase or one-phase sampling can be selected based on site conditions, which is even more convenient as well as economical.

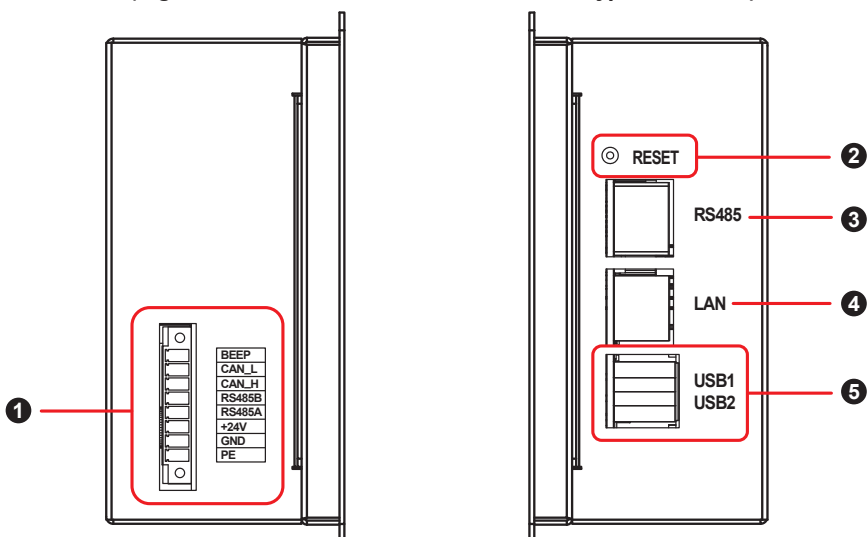
- Unified control: Offers outstanding compatibility by being controllable with the same controller as the active filter or the capacitor compensation device.
- Simple and flexible applications: The modular design allows SVG units to be easily embedded into other cabinets to work with the PDU.
- Covers a wide range of capacities: For a single system cabinet, the capacity is determined by the number of SVG modules installed. For cabinets connected in parallel, the capacity is unlimited.
- User-friendly Chinese/English interface: Parameter settings for event logs, automatic malfunction alerts, error history, and other functions.
- Comprehensive features: Automatic self-testing, soft starting time, and limited rated output can be configured.

2.4 Machine Structure and Appearance

2.4.1 Control panel



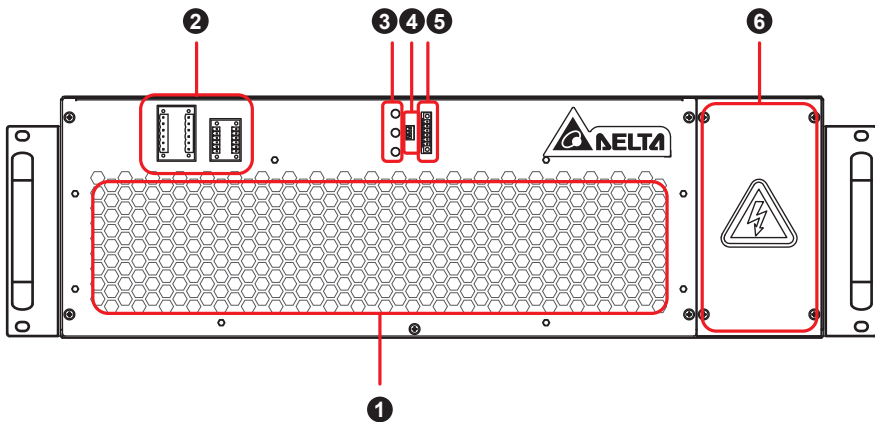
(Figure 2-4: Front view of the touchscreen type HMI / LCM)



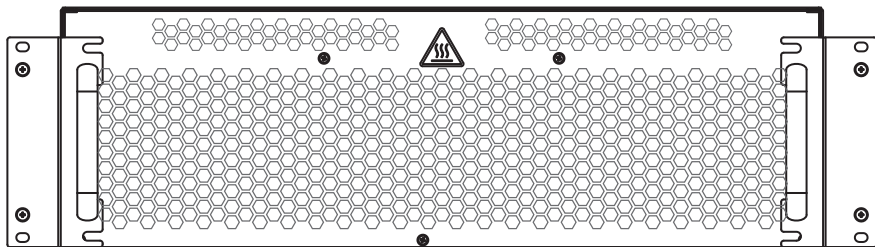
(Figure 2-5: (Left and right views of the touchscreen type HMI / LCM)

Item	Name	Description
①	ModBus	Control panel and communication interface on the module.
②	RESET	Resets the control panel.
③	RS485	Standard RS485 port, able to communicate with the host machine.
④	LAN	Standard Ethernet port, able to communicate with the host machine.
⑤	USB	USB expansion port.

2.4.2 The Module's Appearance and Dimensions



(Figure 2-6: Front view of the SVG module)



(Figure 2-7: Rear view of the SVG module)

Item	Name	Description
①	DC fans	DC fans for cooling.
②	Signal transfer terminals	Connection terminals for communication and CT signals.
③	LED indicators	The module's LED status indicators. <ul style="list-style-type: none"> • Green (Normal): the module is operating normally. • Yellow (Standby): the module is currently idle. • Red (Fault): The module has malfunctioned.
④	DIP switches	Set the module's ID and terminal resistance.
⑤	Communication terminal	For internal testing.
⑥	Main Power Input Terminal	Main power R/S/T/N/PE wiring terminal.



NOTE: Communication ports can be touched since they are insulated as well as isolated.

Table 2-2: Dimensions and weight of the SVG module

Model	Dimensions (WxDxH)	Weight (Kg)
PQCS-400-50-50FM4	520 × 530 × 190 mm	39Kg
PQCS-400-50-50FM3	520 × 530 × 190 mm	38Kg
PQCS-400-100-100FM4	600 × 606 × 190 mm	57Kg
PQCS-400-100-100FM3	600 × 606 × 190 mm	56Kg

2.5 Package Inspection

• External Packaging

1. The SVG may have encountered unexpected circumstances during shipping. Upon the unit's arrival, it is recommended that you inspect the external packaging of the SVG for damages. If the external packaging is damaged, please contact your supplier.
2. The SVG system cabinet and power module are packed separately.

• Internal Packaging

1. Please check the rating label on the SVG to verify that the SVG unit is identical to the product you purchased.
2. Please check if there are damaged or loose parts.
3. Please check if there are any components missing.
4. Standard accessories included with the SVG module are listed in the following table.

Table 2-3: Accessories included with the SVG module

Item	Name	Quantity
1	User manual	1
2	HMI / LCM display module	Based on customer requirements
3	CT line terminal	1
4	Communication line terminal	2
5	M6*16L	4

5. Please contact your supplier if damages are found.
6. If you need to return the product, please pack the SVG and all accessories carefully with the original packing materials.

Chapter 3: Installation and Wiring

The PQC series SVG is the best solution for a number of different applications, including industrial sites, power distribution rooms, and data centers. Depending on different work conditions and environmental requirements, SVG modules can be installed in a customized or standard cabinet. Flexible configurations and on-site capacity expansion can also be achieved based on current and subsequent capacity requirements.

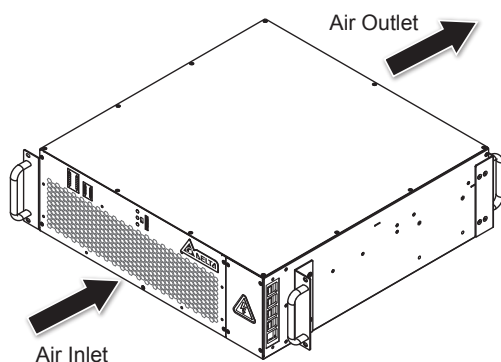
3.1 Pre-installation Confirmation

Due to the fact that every user's installation environment is different, please read this manual carefully before installing and commissioning the unit. All installation, assembly and commissioning must be performed by a qualified professional. If you are performing these operations on your own, you must have on-site supervision from a qualified professional. Before using a forklift or other machinery to move the equipment, please verify that the machine has a sufficient load capacity. Please refer to **Table 2-2** for the weight of the SVG module.

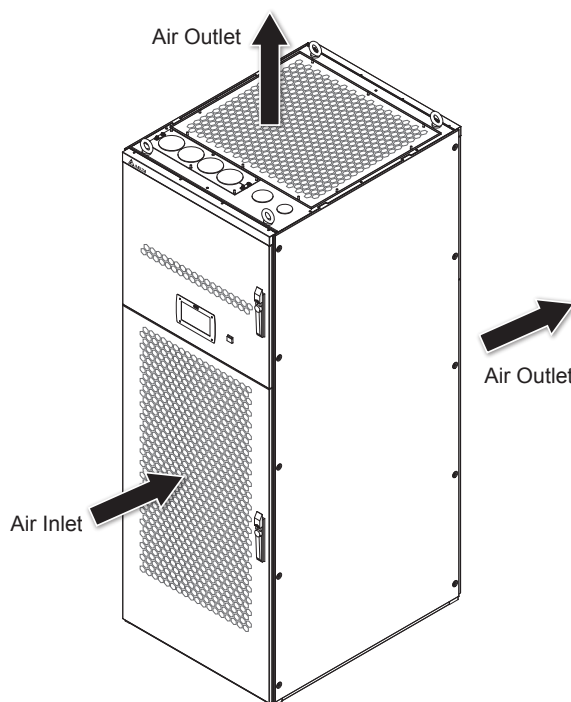
3.2 Installation Environment

1. SVG equipment must be installed indoors, outdoor installation is strictly prohibited. Please take into full consideration the equipment's standard IP30 protection rating. If you have higher safety and protection requirements, please contact the dealer.
2. SVG equipment should not be placed in a sandy/dusty area or a heavily polluted environment. Electrically conductive dust particles can damage the equipment. Please make sure that there are no such particles present inside the installation area.
3. Please make sure that the passageways and the placement location are large enough to accommodate the forklift and system cabinet, and verify that the installation location is capable of withstanding the weight.
4. While the SVG is operating, it will produce sound at a certain noise level. Please take the noise into consideration when deciding where to install and place the unit.
5. The installation location must be kept clean and tidy. Please make sure that the input wires are properly sealed to prevent rats from entering.
6. Please make sure that the installation area is large enough for conducting maintenance and repair work. It is recommended to keep the SVG away from the wall so that air can enter from the front and exit out the back. Maintain a clearance of 1,500 mm in the front to operate, maintain, and wire the unit. If it is necessary that the SVG must be placed against a wall, please confirm the cabinet design with the supplier's FAE to ensure that air flow can enter from the front of the cabinet and exit out the top, and the number of ventilation fans meets the SVG's air flow requirements.

7. During operation, the SVG product will generate a certain amount of heat. Please ensure that the working environment is equipped with a proper cooling system to dissipate the heat so that the surrounding environment can maintain a normal operating temperature.
8. This equipment already has built-in cooling fans, and air flows in from the front and exits out the back; therefore, it is recommended that a minimum distance of 500mm must be kept for ventilation and cooling. As for units which must be installed against a wall, the cabinet must be designed so that it has a certain amount of space in the back with powerful exhaust fans at the top to meet the equipment's wind pressure and air volume requirements. **Figure 3-1** and **Figure 3-2** show the air flow diagrams of the module and the system, respectively.
9. Each module and system has its own minimum ventilation requirements, these requirements must be met in order to ensure proper cooling. The air entering the ventilation opening must be cooled properly and free of electrically conductive particles, dust, and harmful gases.
10. The SVG's operating environment should be between -25 and 50°C, otherwise it can no longer operate once the temperature has exceeded this range.
11. This equipment cannot be used at an elevation of more than 1,000m. Please derate or contact the dealer if the elevation limit is exceeded.
12. It is recommended to place SVG modules inside customized system cabinets with a minimum protection rating of IP30, and a minimum distance of 10mm shall be kept between the cabinet's conductive metal parts and the module's live terminals.



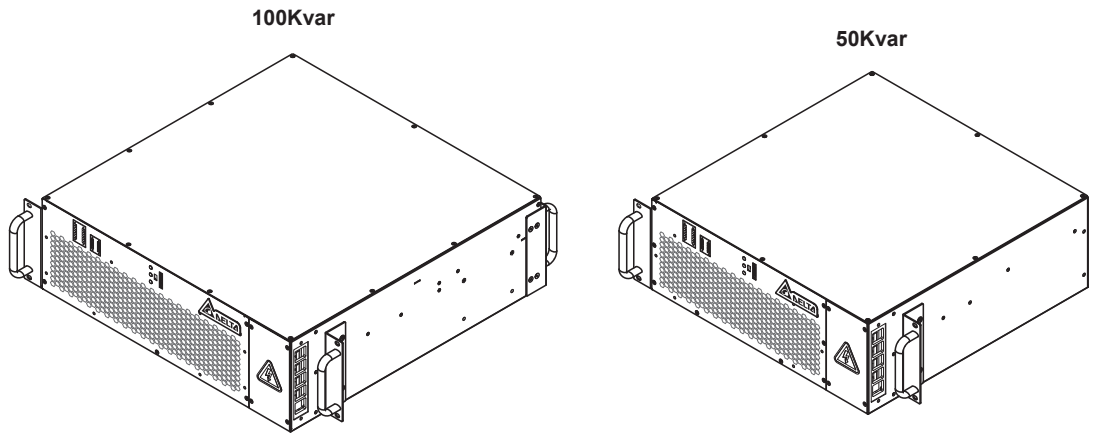
(Figure 3-1: The module's air inlet and outlet schematic diagram)



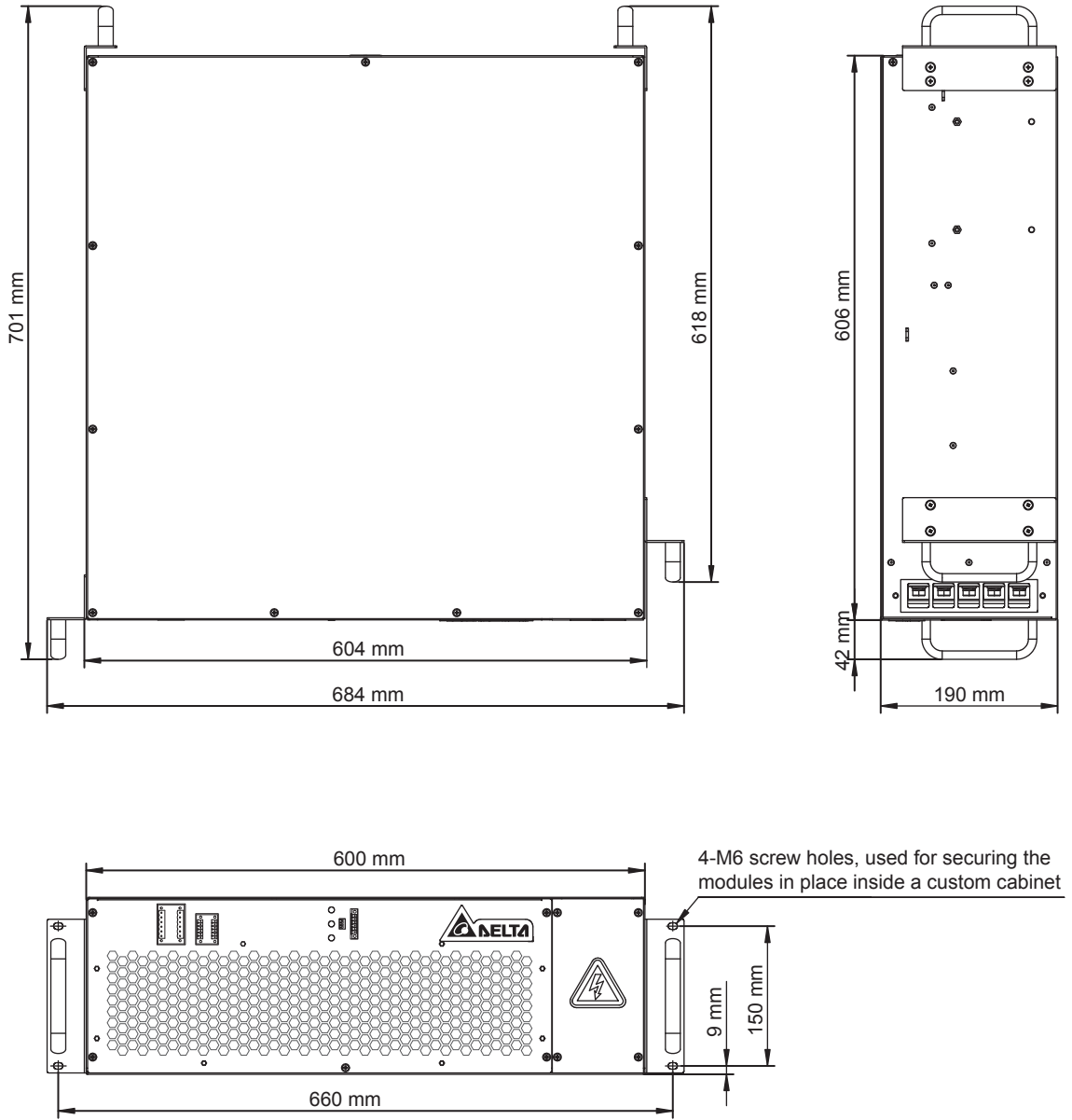
(Figure 3-2: The cabinet system's air inlet and outlet schematic diagram)

3.3 Module Installation

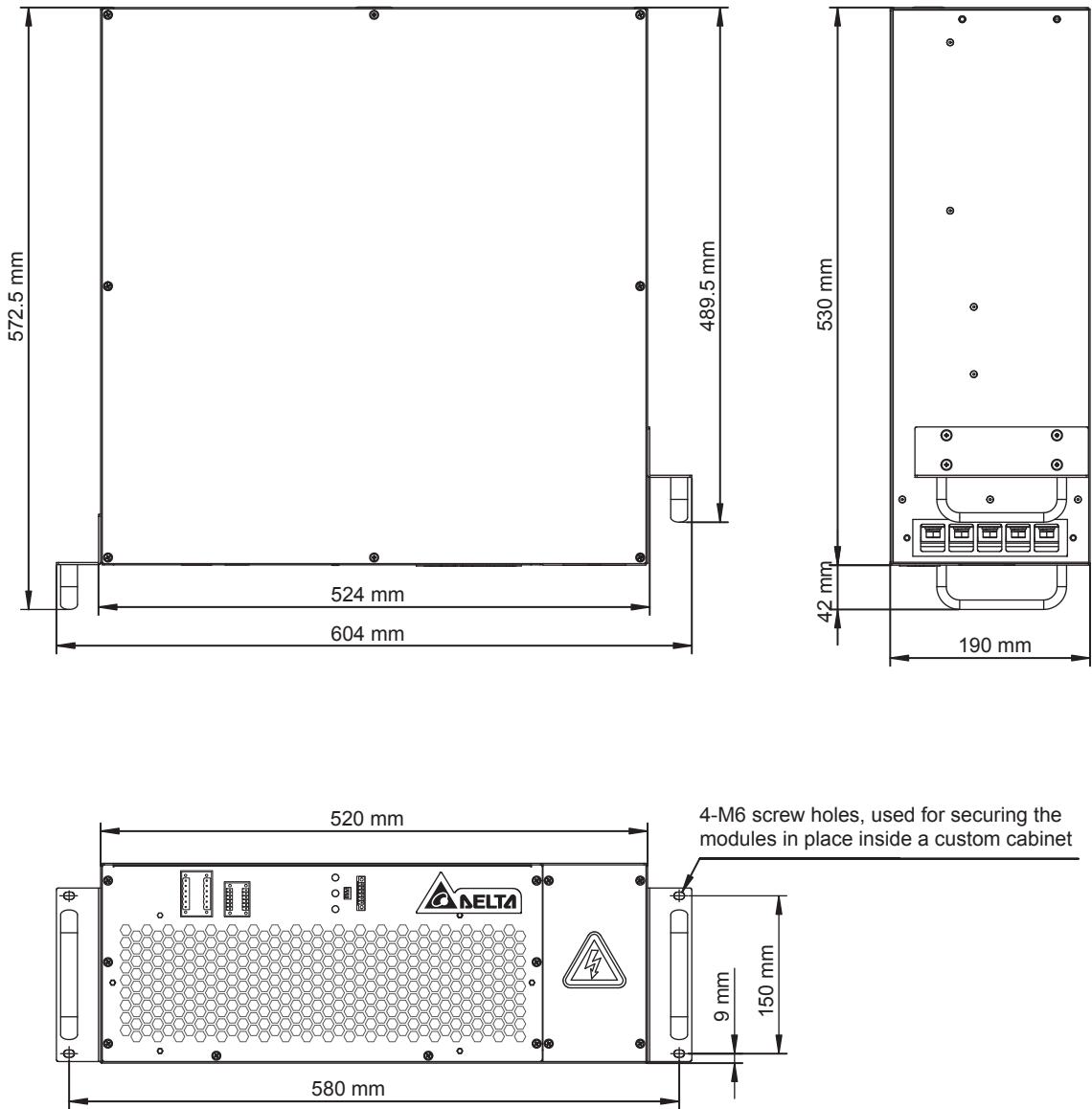
3.3.1 SVG Module Structure



(Figure 3-3: The module's side view)



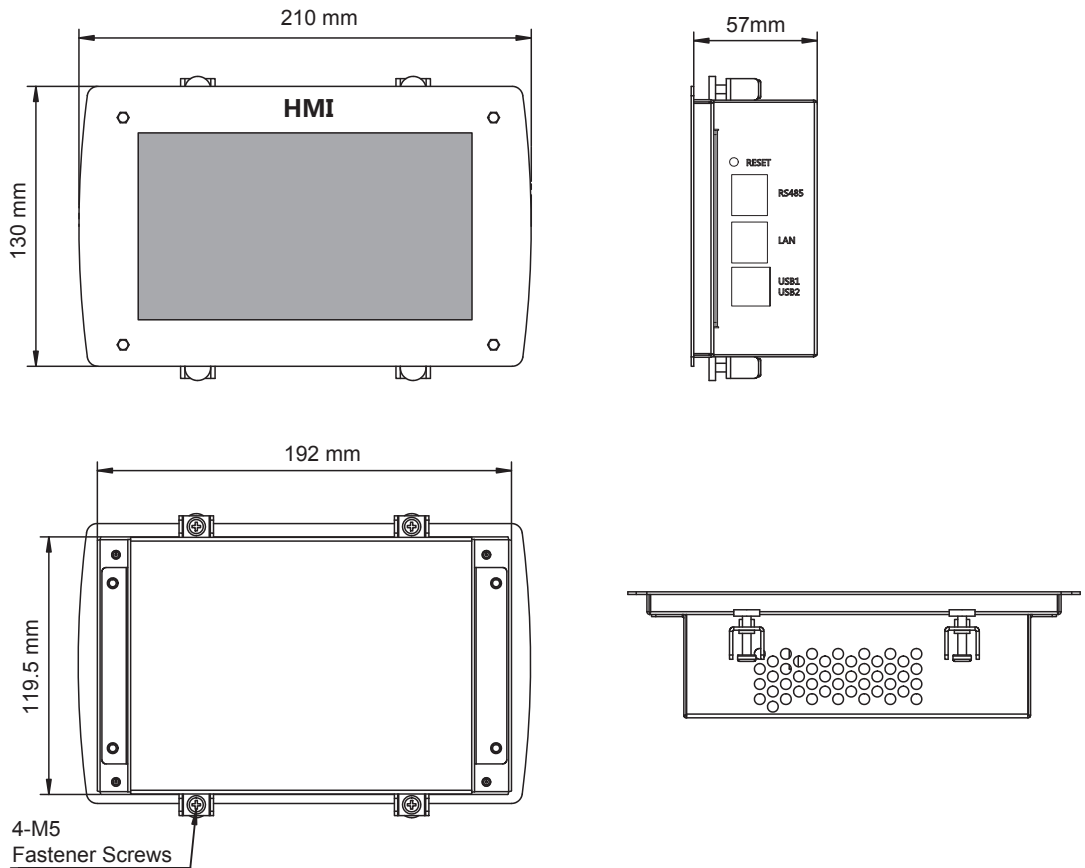
(Figure 3-4: Size chart for front installation - 100Kvar)



(Figure 3-5: Size chart for front installation - 50Kvar)

3.3.2 LCM Module Structure

To install the human-machine interface module, insert the module into the mounting holes then tighten the four screws.



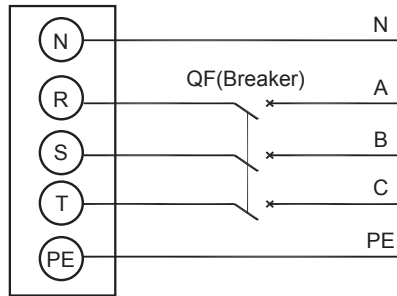
(Figure 3-6: Dimensions of the LCM module structure)



(Figure 3-7: Drilling dimensions for installing the LCM module)

3.3.3 Module Installation and Wiring

1. Before installing wires or connecting to other electronic devices, please make sure that the system power of the input of the SVG is turned off to avoid accidents.
2. The SVG must be grounded properly to prevent potential hazards caused by leakage current.
3. Check the diameter markings on the SVG module's input wires, and verify that the wire diameter and phase sequence are correct. Please follow **Figure 3-8** to perform wiring and refer to **Table 3-1** for power line specifications.



(Figure 3-8: Connection diagram of the main power line to the front panel of the SVG module)

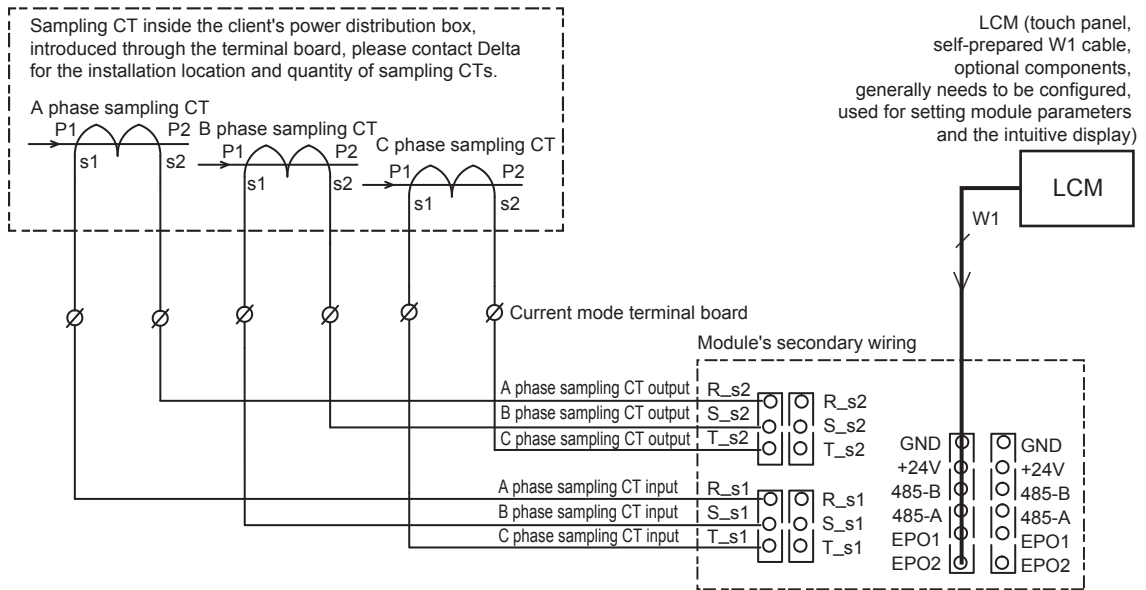
Table 3-1: Specifications of the module's main electrical wires

Module Capacity	50Kvar	100Kvar
Cross sectional area of the R/S/T phase wire	35mm ² (70°C)	70mm ² (70°C)
Cross sectional area of the N wire	35mm ² (70°C)	70mm ² (70°C)
Cross sectional area of the PE protective wire	16mm ² (70°C)	35mm ² (70°C)



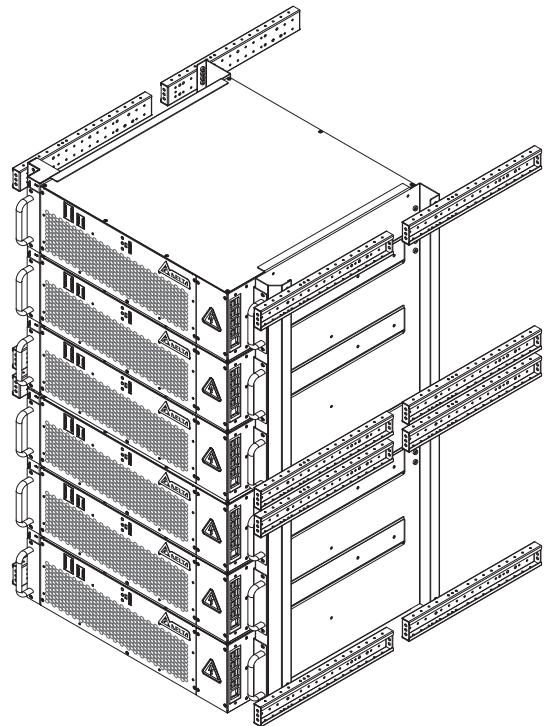
NOTE: Connect the power lines to the switchgear of the PDU cabinet, and finally, to the electrical access point of the equipment on the bus-bar.

4. Check the markings on the wires connected to the SVG module and the CT, and make sure that wire diameters and phase sequence are correct. Connect the CT inlet/outlet wires according to **Figure 3-9**.



(Figure 3-9: CT connection diagram)

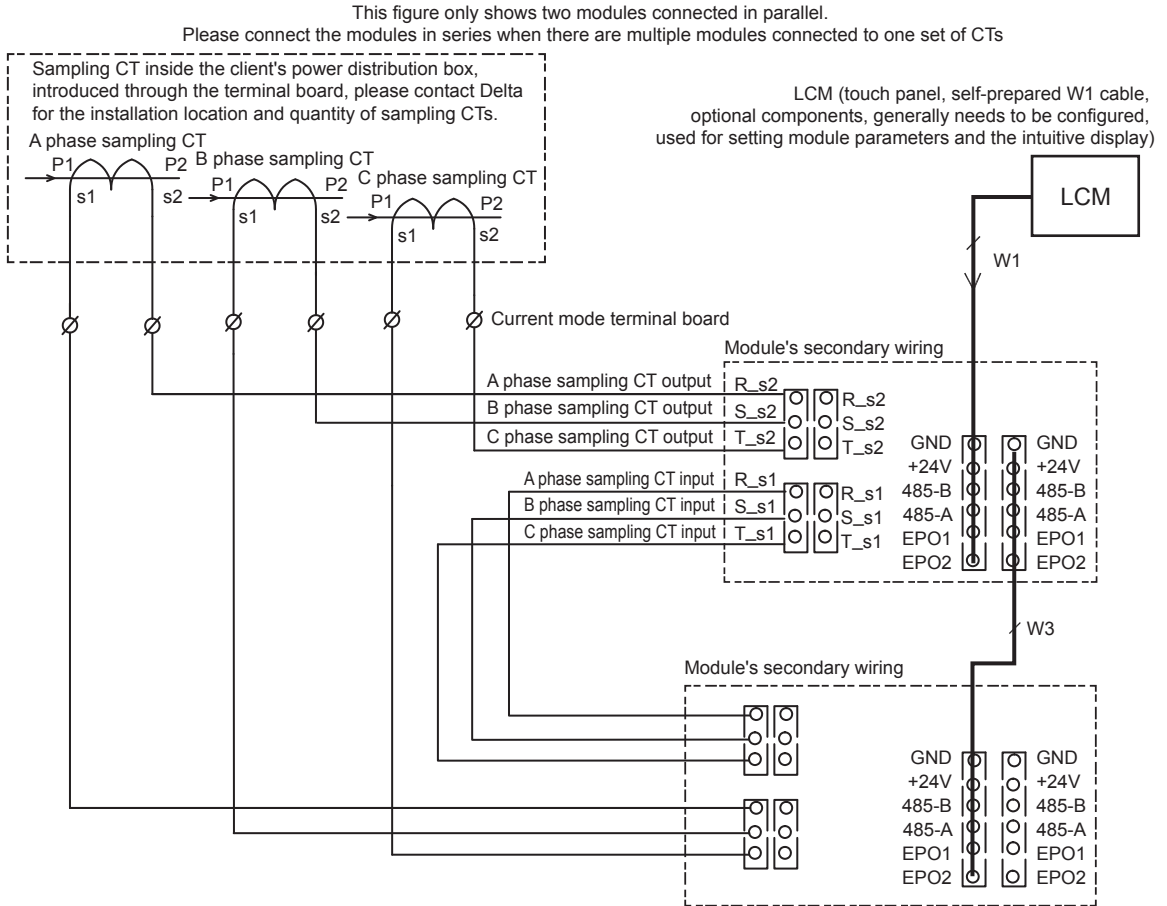
- SVG modules can be stacked directly during installation, and there is no upper limit for the number of modules connected in parallel. Please determine the upper limit for the number of SVG modules installed inside a single cabinet based on the height of the cabinet. **Figure 3-10** is the module installation diagram. Please refer to **Figure 3-11** for making CT and communication wire connections. Make a connection from the LCM's DATABUS port to any communication port on the SVG module. When several SVG modules are connected in parallel, it is unnecessary to connect other modules to the LCM connection wire; instead, communication can be established via connections between the system's internal wires.



(Figure 3-10: System installation schematic)

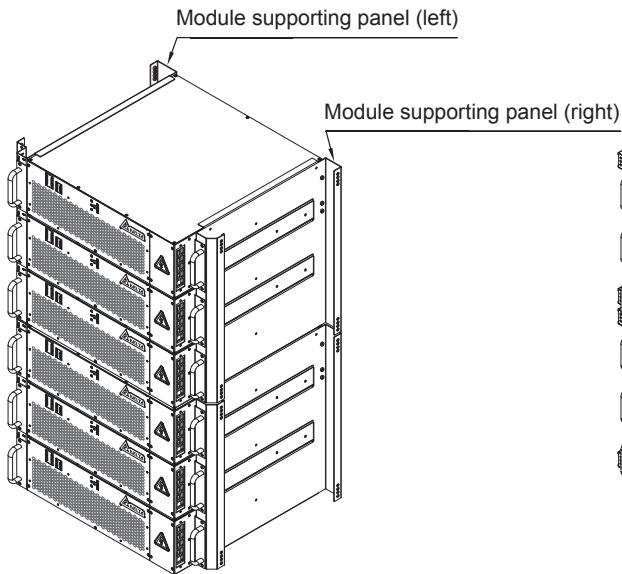


NOTE: The LCM connection wire is part of the secondary circuit; it shall be kept at an insulation distance of no less than 5.5mm from the primary circuit of the main power.

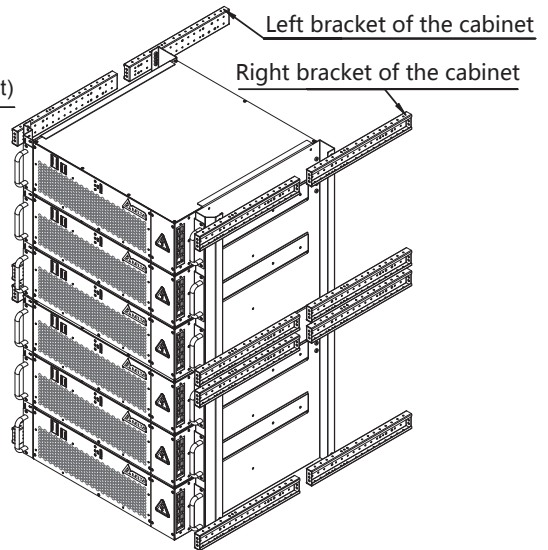


(Figure 3-11: Connection diagram between the SVG module, LCM, and the CT)

6. Supporting panel and installation procedures for the SVG module:
 - 1) **Figure 3-12** shows how to secure SVG modules onto the module supporting panel.
 - 2) Secure the module supporting panels onto the cabinet's left and right brackets. Please see **Figure 3-13**.

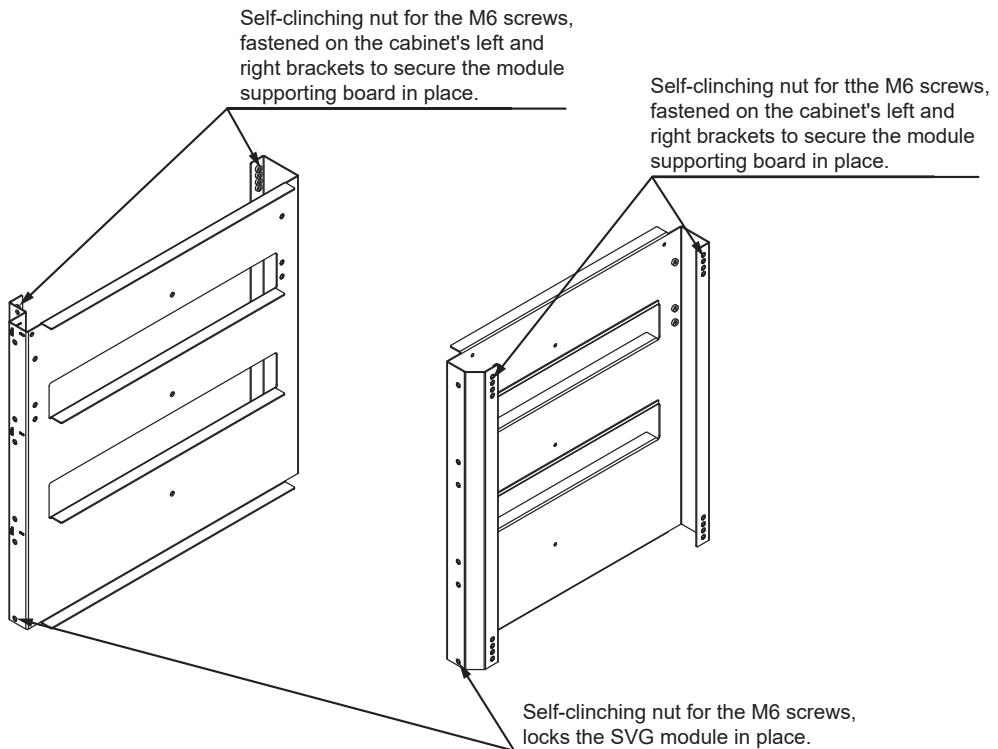


(Figure 3-12: Module installation diagram 1)



(Figure 3-13: Module installation diagram 2)

- 3) **Figure 3.14** shows the design of the module supporting panel (the example shown here is a “C” shaped framework with a width of 800mm on the left and right sides which can accommodate up to four SVG modules).



(Figure 3-14: Module installation diagram 3)

3.4 Installing and Wiring the Load Current Detection CT

3.4.1 Precautions for Selecting a CT Model

1. Rated primary/secondary current must be selected wisely. It is recommended that the choice for primary current is $1.5 \cdot I_n$ (the actual load current);
2. The rated voltage is greater or equal to system voltage;
3. The selection for secondary current should be 5A or 1A;
4. The nominal secondary capacity (rated load) of the CT shall meet the requirements of secondary impedance ($\geq 5\text{VA}$ when the secondary current is 5A). The capacity and the maximum one-way wiring length from the CT to the SVG module shall be calculated according to the following equation:

$$L_{\max} = \frac{P_{ct} - P_1}{I^2} \cdot \frac{S}{\rho} \cdot \frac{1}{2}$$

Wherein:

L_{\max} ---The maximum one-way wiring length from the CT to the SVG system cabinet (m);

P_{ct} -----The CT's nominal secondary capacity;

P_1 -----The capacity loss and the internal impedance of the SVG system cabinet (each module's internal loss is approximately 2VA);

I -----The CT's secondary current;

S -----The cross-sectional area of the conductor wire (mm^2);

ρ -----The resistivity of the copper conductor (calculated based on $0.0178\Omega \times \text{meters}/\text{mm}^2$);

3.4.2 Basic CT Installation and Wiring

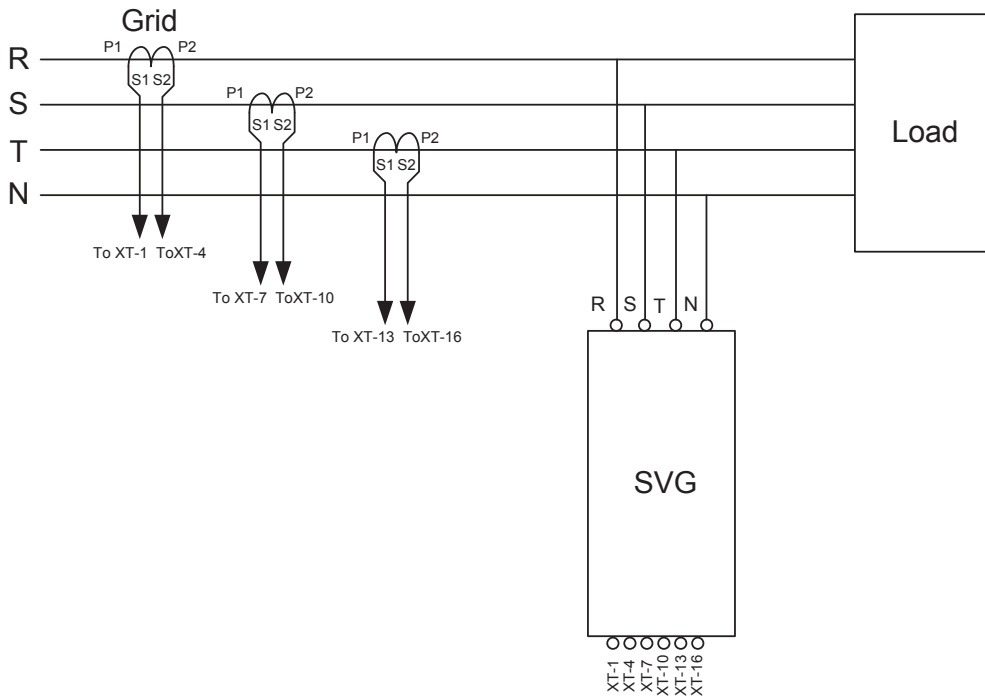
The CT can be installed either at the power grid side or the load side, and the LCM's CT location setting must correspond to your selection. The default CT installation location is at the power grid side to feed the current signal to the SVG.

- For an unbalanced system, a set of three CTs must be provided for reactive current detection and compensation, and the direction of each of the three CTs must be identical. Please refer to **Figure 3-15** and **Figure 3-16** for more details.
- For a three-phase balanced system, only one CT is required for reactive current detection and compensation. Please refer to **Figure 3-17** and **Figure 3-18** for more details.
- The CT's direction must be correct; the default setting is P1 facing the power grid.

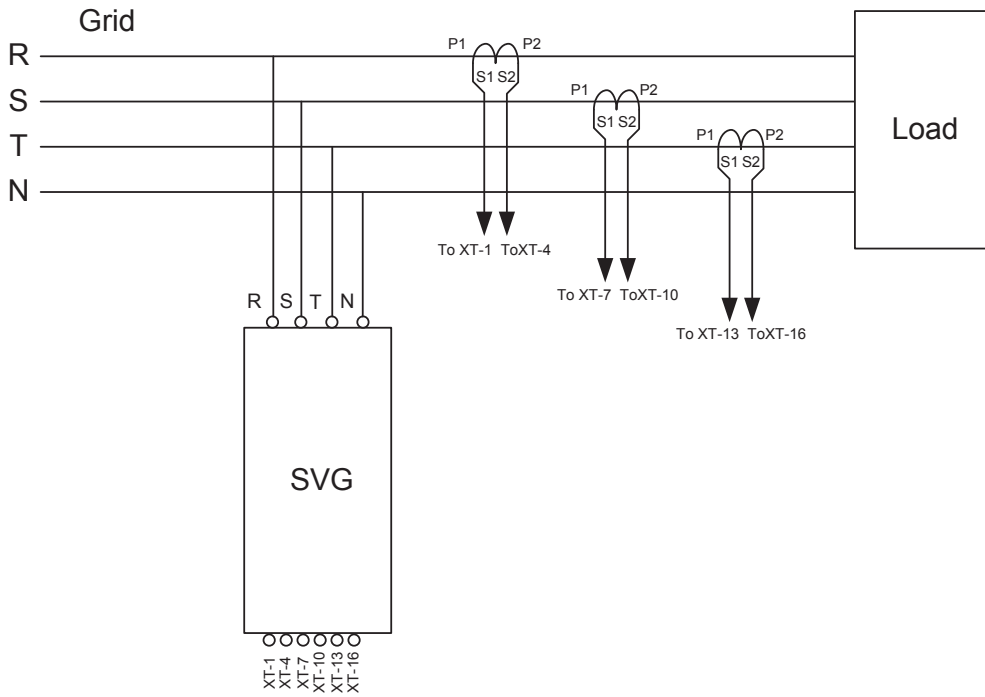
- CT's detection signal phase sequence cannot be swapped.
 1. The secondary output S1 of CT1 for R-phase detection must be connected to the terminal board XT-1, and the outgoing line S2 must be connected to the terminal board XT-4.
 2. The secondary output S1 of CT2 for S-phase detection must be connected to the terminal board XT-7, and the outgoing line S2 must be connected to the terminal board XT-10.
 3. The secondary output S1 of CT3 for T-phase detection must be connected to the terminal board XT-13, and the outgoing line S2 must be connected to the terminal board XT-16.



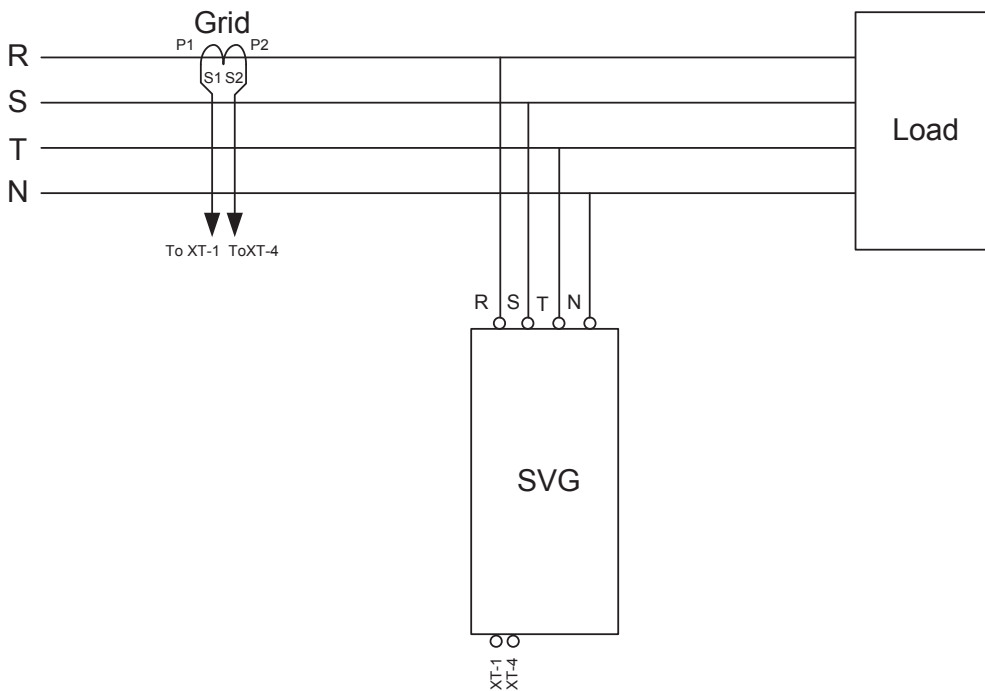
NOTE: If there is only one CT used for reactive current detection and compensation for the 3-phase balanced system, only connect the R-phase.



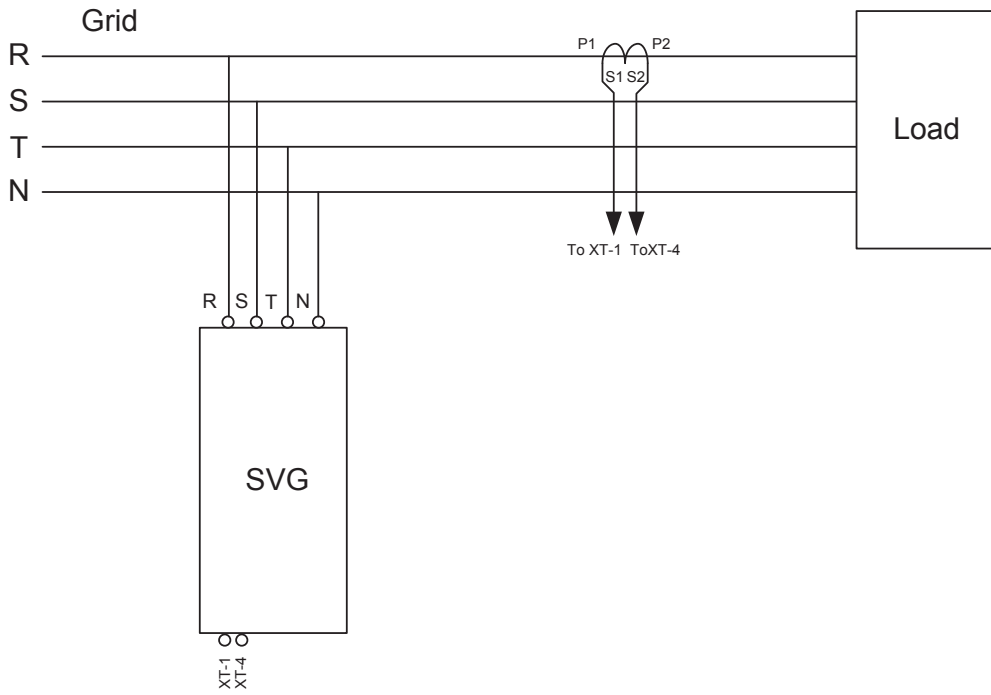
(Figure 3-15: Basic CT installation and wiring diagram 1)



(Figure 3-16: Basic CT installation and wiring diagram 2)



(Figure 3-17: Basic CT installation and wiring diagram 3)



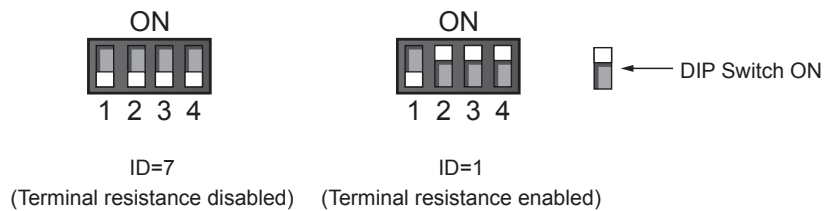
(Figure 3-18: Basic CT installation and wiring diagram 4)

Chapter 4: PQC Operating Procedures

4.1 Verifications Before Starting Up

- Make sure each module is inserted into the proper slot inside the cabinet and all screws are firmly fixed.
- Make sure each module's ID and terminal resistance are set properly.

DIP switches used for setting the ID and terminal resistance are shown in **Figure 4-1**. **Table 4-1** lists the positions of DIP switches 1 to 4.



(Figure 4-1: Schematic diagram of the DIP switches)

Table 4-1: DIP Switch Positions

Position	Description
1	Sets the first digit of the ID, which is valid when the switch is flipped to the lower position
2	Sets the second digit of the ID, which is valid when the switch is flipped to the lower position
3	Sets the third digit of the ID, which is valid when the switch is flipped to the lower position
4	Sets the terminal resistance

The setting of each module's ID for the SVG system cabinet shall be made in the sequence of the module No. marked on the side of the SVG system cabinet where the module is located (from PM1 to PM7 counting from the top). IDs shall be set in the same order. The terminal resistance DIP switches of all modules shall be set to the lower position, except for module PM7, which shall be set to the upper position. In other words, the terminal resistance DIP switch of the power module which is located furthest away from the LCM shall be set to the upper position.

If several SVG system cabinets are connected in parallel and the communication lines are interconnected, please make sure that there are no duplicate IDs and the terminal resistance DIP switch of the module which is located furthest away from the LCM is set to the upper position.

- Each module has a unique ID.
- Verify the number of modules and compensation capacity.
- Parallel communication terminals are connected properly.
- LCM communication ports are connected properly.
- Close the front door.

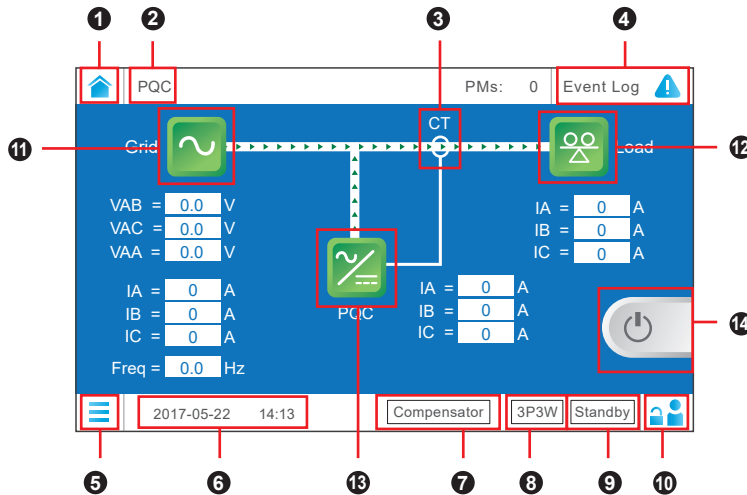
4.2 Start-up Procedures

1. Switch the system's main breaker to the ON position.
2. Switch each module's breakers to the ON position. Auxiliary power inside the module will activate and cooling fans will start to spin; verify if the yellow LED lights in front of the module are lit. The LCM will enter the start-up screen then proceed to communicate with the modules; it will retrieve system information to confirm that there are no errors.
3. Close the front door.
4. Set the system's operating mode. For information on LCM settings, please refer to **Chapter 5: LCM Display and Configurations**.
5. Lightly press the **On/Off** button on the LCM display, then select **"Yes"** in the **"Power on the machine?"** dialog window to turn on the system.
6. Once the system is up and running, the LCM's green LED will light up.

Chapter 5: LCM Display and Configurations

The control panel is mainly used to monitor the SVG system's parameters and display the current status and settings of the system. User levels are divided into two categories: regular users and administrators. Regular users are able to view the parameters listed under the measurement page, user settings, communication settings, and event logs. Administrator access is protected by a password. The SVG's settings and system/module information page can only be accessed after entering the correct password.

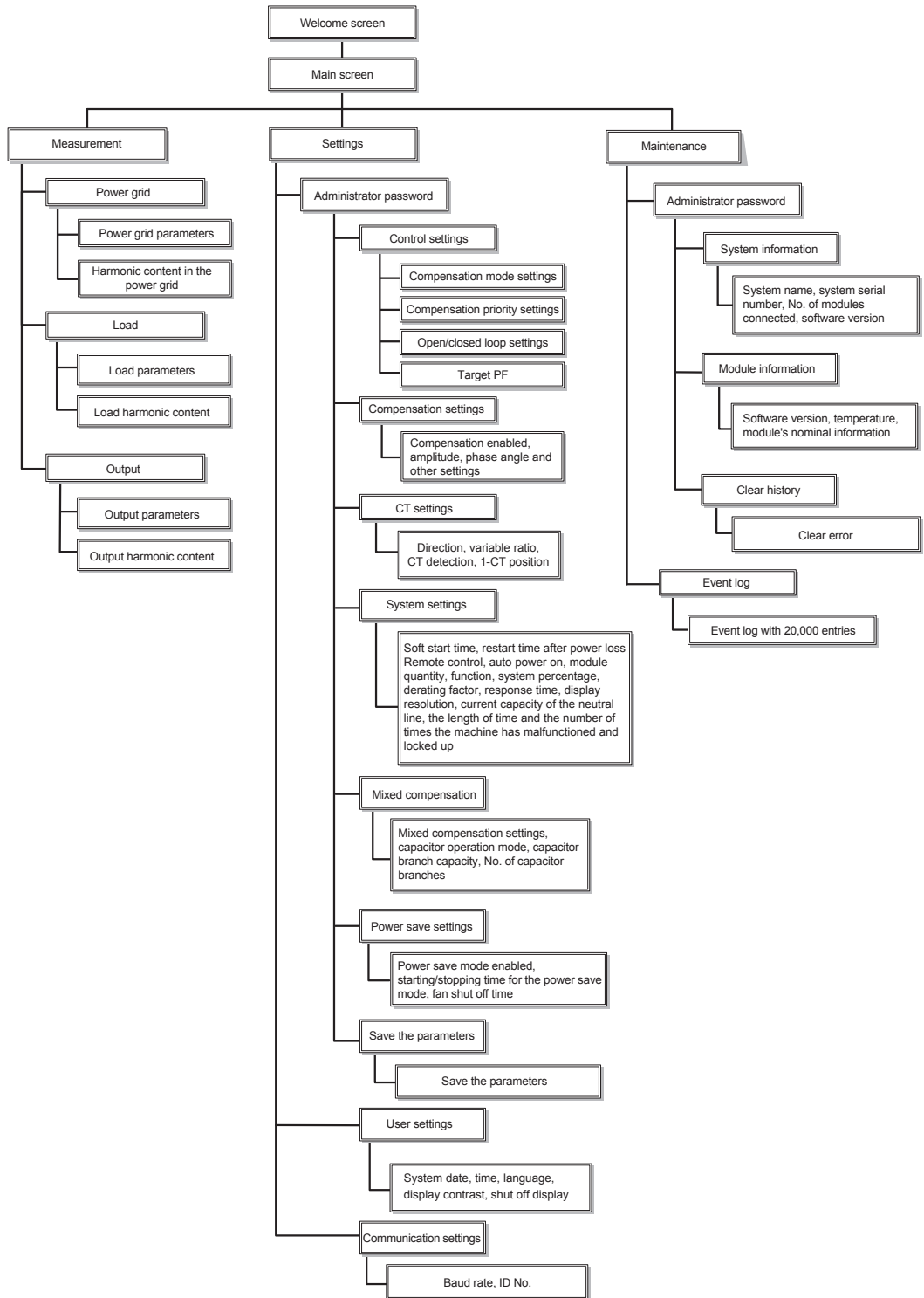
5.1 LCM Screen Display



(Figure 5-1: LCM display)

Item	Description	Item	Description
①	Click on the "Home" button to return to the display shown in the figure above.	⑧	Display the wiring format of client machines (ex: 3P3W, 3P4W).
②	Display product name (PQC).	⑨	Display the working status of client machines (ex: idle, working, energy-saving).
③	Display the set position of the current CT (current transformer).	⑩	The "Log In" button, click to display the log in dialog box. Enter the correct user name and password to execute functions that require a higher level of authority.
④	The "Event Log" button, click to display a history of events in the "Event Log" window.	⑪	Press the "Power Grid" control key to display detailed data related to the power grid.
⑤	Press the "Show Menu" button to display the first level of the human-machine interface.	⑫	Press the "Load" button to display relevant data in detail.
⑥	Displays the current time.	⑬	Press the "PQC" button to display relevant data in detail.
⑦	Display the current operating mode of the client machine (ex: compensator, harmonic source).	⑭	Press the "On/Off" button to power on or shut down the machine.

5.2 SVG System Menu Hierarchy



(Figure 5-2: System menu hierarchy)

Chapter 6: Service and Maintenance

- **Cleaning the SVG:** Please contact your supplier for scheduled cleaning.
- **Regular inspection of the SVG:** Please contact your supplier for system maintenance.

Chapter 7: Troubleshooting

When you see the error messages listed below, please follow the corresponding troubleshooting steps.

Item	Error message	Possible cause	Solution
1	System Communication Error	<ol style="list-style-type: none"> 1. Communication cables are not connected properly. 2. The module has duplicate IDs. 	<ol style="list-style-type: none"> 1. Check the connection of communication cables to make sure they are secure. 2. Check every module's DIP switches.
2	Grid Phase Sequ	The wiring is incorrect.	Please check the wiring and phase sequence, contact the dealer if errors are discovered.
3	The number of modules is incorrect	<ol style="list-style-type: none"> 1. The LCM is showing an incorrect number for the total number of modules in the system. 2. The module has duplicate IDs. 	<ol style="list-style-type: none"> 1. Count the actual number of modules in the system and compare it with the number shown by the LCM. 2. Check every module's DIP switches.
4	Fuse Blowout	The input fuse is broken.	Please contact the dealer for repairs.
5	Over Temperature Protection (OTP)	<ol style="list-style-type: none"> 1. The ventilation opening is obstructed. 2. The fan is not spinning. 3. IGBT is damaged. 	Please contact the dealer for repairs.
6	DC BUS OVP/UVP	BUS capacitor failure.	Please contact the dealer for repairs.
7	Fan Fail	The fan has stopped working.	Please contact the dealer for repairs.
8	Curr Detect Fail	The CT is not connected properly.	Please refer to the CT wiring diagram to check CT wiring.

Chapter 8: Warranty

Seller warrants this product, if used in accordance with all applicable instructions, to be free from original defects in material and workmanship within the warranty period. If the product has any failure problem within the warranty period, Seller will repair or replace the product at its sole discretion according to the failure situation.

This warranty does not apply to normal wear or to damage resulting from improper installation, operation, usage, maintenance or irresistible force (i.e. war, fire, natural disaster, etc.), and this warranty also expressly excludes all incidental and consequential damages.

Maintenance service for a fee is provided for any damage out of the warranty period. If any maintenance is required, please directly contact the supplier or Seller.



WARNING!

The individual user should take care to determine prior to use whether the environment and the load characteristic are suitable, adequate or safe for the installation and the usage of this product. The User Manual must be carefully followed. Seller makes no representation or warranty as to the suitability or fitness of this product for any specific application.

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