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# Delta PQC Series Fixed Type Static VAR Generator

User Manual

## 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

- The Static VAR Generator ('SVG') shall be connected with a power grid system as a means for reactive power compensation.
- The SVG shall not be exposed to rain or wet conditions, and shall be away from any flammable fluid, gas or explosives.
- The SVG must be installed inside a cabinet that has protection and appropriate ventilation functions.
- Adequate space shall be left around the SVG for well ventilation and convenient maintenance.
- To minimize fire and electric shock hazards, installation must be conducted by the qualified personnel in a controllable working environment.
- To minimize electric shock hazards, all maintenance work must be carried out by the qualified technician, and be sure to cut off all power supply before maintenance.
- High voltage hazards! It takes over 15 minutes for the DC capacitor to discharge. Please make sure the device has discharged completely before carrying out any operation.
- To minimize electric shock hazards, please read this Manual carefully before switching the power on, and keep this Manual properly for permanent reference.

## 1.2. Wiring Warnings

- To prevent a possible risk of current leakage, the SVG shall be earthed properly.
- With regard to wiring, the compensation capacity and the current-carrying capacities of cables shall be taken into account.
- The incoming lines of the SVG shall be connected with appropriate protective devices. It is recommended to provide every module with an over-current protective device with a third-party certification. Besides, take the installation positions of auxiliary equipment into consideration and choose the protective devices with adequate breaking capacity.
- The capacity of the protective devices shall fit that of the SVG.
- To prevent scaling caused by high temperature, after the power is cut off, the operating switch shall be allowed to cool down before being operated again.
- The three-phase, four-wire SVG is applicable to the power grid system 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 reactive current from an external source for CT testing (CT: Current transformer)..
- To guarantee sound reliability and avoid overheating, do not block or cover the air inlet and outlet.
- The working temperature range of the SVG is -10°C - 50°C, beyond which the SVG will not work.

### 1.4. Storage Precautions

- Please use the original packing material to protect the SVG in order to avoid damage by rodents.
- If you will not install the SVG immediately after receiving the equipment, please be sure to store the SVG in a dry and ventilated indoor place, which shall be maintained between -40°C and 70°C with relative humidity no higher than 95%.

### 1.5. Symbols

Item	Symbol	Meaning
1	R	Phase R of three-phase power supply
2	S	Phase S of three-phase power supply
3	T	Phase T of three-phase power supply
4	N	Neutral line
5		Main grounding terminal
6		E.P.O key
7	XT	Terminal board
8	QF	Circuit breaker
9	XK	Auxiliary switch

## Chapter 2 : Introduction

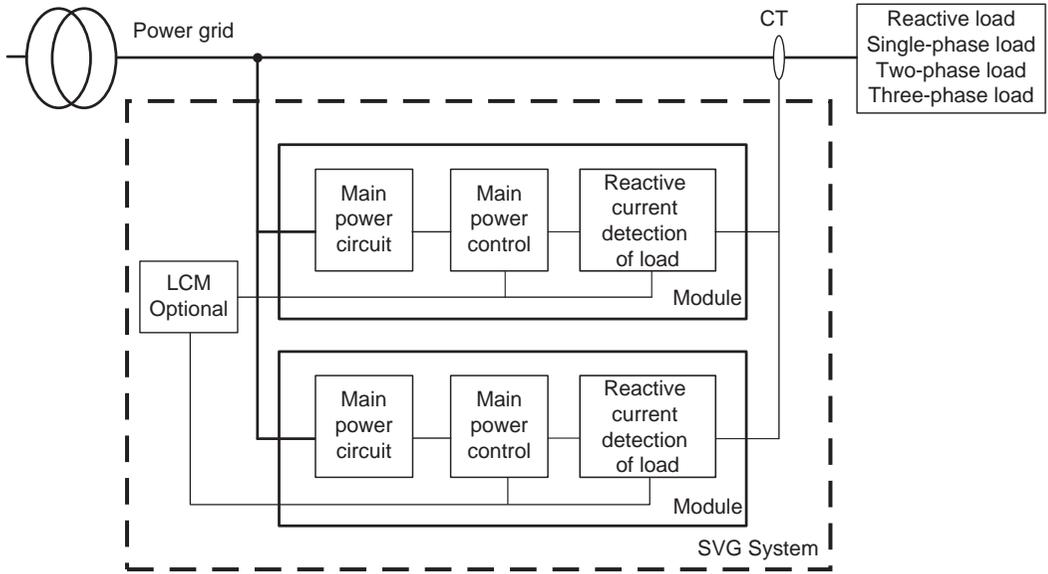
### 2.1 Product Introduction

The Static VAR Generator ('SVG'), a reactive power compensation device, is applied to the reactive power compensation for the three-phase power grid. Features of the device are shown as below:

- Settable reactive power compensation for capacitive, inductive, positive sequence , negative sequence and zero sequence loads.
- Rapid dynamic responses, stable parameters and high precision of reactive power compensation.
- High efficiency, low thermal loss and advanced ECO mode achieve intellectual energy saving.
- Modular design offers a variety of coordination with various compensation capacities.
- The system adopts an advanced 3-level structure and consists of digital signal processors (DSP),large programmable controllers and high power electronic devices, which has excellent performance and superior reliability.
- Supports remote power on/ off functions via computer monitoring.

Please see **Figure 2-1** for the SVG system block diagram. The SVG system is composed of a fixed-type SVG module, a LCM (Liquid Crystal Monitor) and a SVG system cabinet. The external CT is used for the detection of load current and extraction of reactive power that needs compensation, based on which, the SVG controller controls the main power circuit to generate reverse reactive current; in this way, the load-carrying reactive power are counteracted.

Each standard SVG system cabinet can be connected to up to 7 modules in parallel. As for the non-standard cabinet, the quantity of the modules installed inside could be varied according to different design. Please note that the fixed-type SVG module and the LCM are packed separately. If you would like to buy both of them, you should purchase them separately. The LCM monitors and controls the fixed-type SVG module online. If monitoring function is not required, there is no need to buy and install the LCM.



(Figure 2-1: SVG System Block Diagram)

## 2.2 SVG Series Product Category

The SVG series product includes the fixed-type SVG module and the LCM. **Table 2-1** lists the fixed-type SVG module's model, capacity and wiring system, as well as the LCM's model information.

**Table 2-1: PQC Series SVG\_ Fixed-type SVG Module & LCM Specifications**

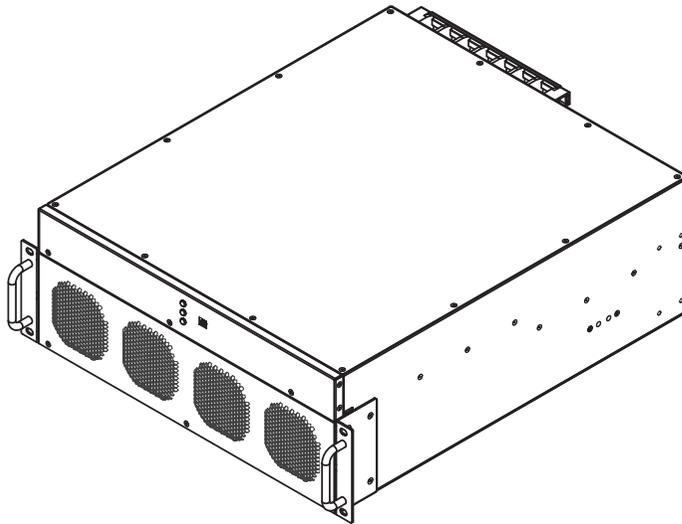
Product	Model	Capacity	Wiring System
Fixed-type SVG Module	PQCS-400-50-50FM4	50Kvar	3P4W
	PQCS-400-50-50FM3	50Kvar	3P3W
LCM	PQC-LCM	N/A	N/A



**NOTE:** The fixed-type SVG module mentioned above does not have harmonic filtering function. If you request for the product with harmonic compensation function, please refer to the user manual of APF.

- **Fixed-type SVG Module**

The fixed-type SVG module is available in two wiring modes with output capacity 50Kvar, i.e. 3P3W and 3P4W. The 3P4W module shall be connected to the neutral line, and it is able to compensate the zero sequence fundamental current; however, for the 3P3W module, it cannot connect to the neutral line, and is unable to compensate the zero sequence fundamental current. **Figure 2-2** shows the fixed-type SVG module.

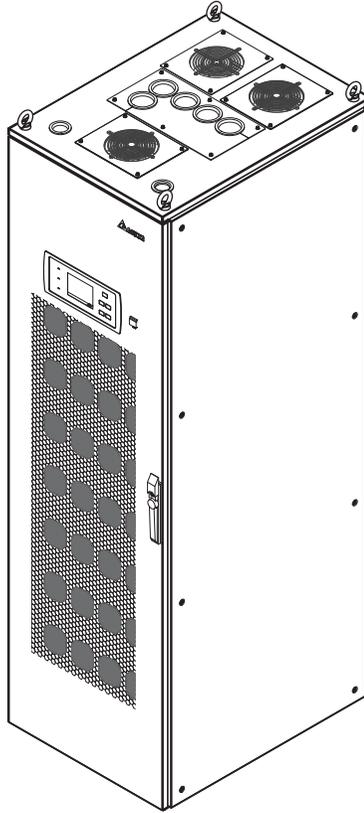


(Figure 2-2: External View of 50Kvar Fixed-type SVG Module)

- **SVG System Cabinet**

The fixed-type SVG module and LCM can be easily installed in any standard or non-standard SVG system cabinet that has the correct size. For 3P4W application, the cabinet must be connected to the neutral line and equipped with 3P4W SVG modules; for 3P3W application, the cabinet must be equipped with 3P3W SVG modules. **Figure 2-3** shows the standard SVG system cabinet.

The system capacity depends on the specifications & quantity of the SVG modules installed in the SVG system cabinet. Customers can depend on their capacity requirements to determine the required quantity of the SVG modules and the required SVG system cabinet, or consult the local distributor about the required capacity.



**(Figure 2-3: External View of the Standard SVG System Cabinet)**

- **LCM**

The LCM has embedded design, which can be easily installed and embedded into any SVG system cabinet. The LCM can monitor the fixed-type SVG module and you can set up relevant parameters via the monitor after you connect the LCM's DATABUS port with the fixed-type SVG module's communication terminals. For external view of the LCM, please refer to **2.4.1 LCM (Liquid Crystal Monitor)** and **3.3.2 LCM Structure**.

## 2.3 Functions & Features

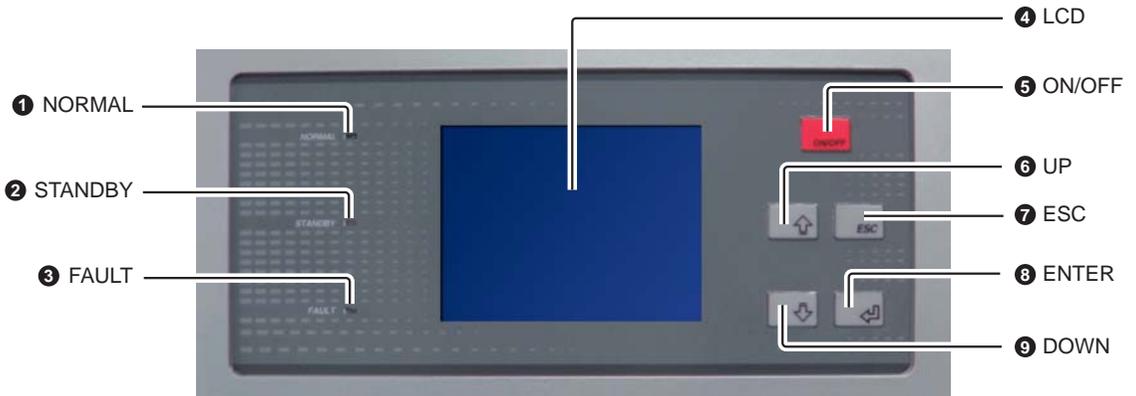
- Comprehensive reactive power compensation: the SVG can simultaneously realize the purpose of reactive power compensation for capacitive, inductive, positive sequence, negative sequence and zero sequence loads (three-phase unbalance).
- Superior compensation effects: up to 99% reactive power compensation.
- Rapid responses & high precision: the device can realize rapid (ms-grade full response & us-grade prompt response) and stepless compensation.
- Wide input voltage and frequency range, suitable for the applications with diesel generators and harsh power supply conditions.

Module Type	Upper Limit	Lower Limit
3P4W Module	Line Voltage: 456V	Line Voltage: 308V
3P3W Module	Line Voltage: 480V	Line Voltage: 308V

- Sound stability: the device acts as infinite impedance to the power grid system and has no effect on the impedance of the power grid system; it has no resonance risk, which has no effect on other equipment operation.
- Low power loss and ECO mode function save more energy.
- Closed-loop control: Current Transformer (CT) can be installed at the power grid side and current detection for three phase sampling or one phase sampling is flexible according to site conditions, which is more convenient and economical to user.
- Simple and flexible applications: thanks to the modular design, it can be easily embedded into other cabinets to work with PDU.
- Wide capacity coverage: for a single system cabinet, its capacity depends on the quantity of the installed SVG modules; for parallel, its capacity is unlimited since there is no limited connection for parallel system cabinets.
- User-friendly Chinese/ English LCM: event log, automatic fault alarm, alarm history and other parameter setting functions.
- Complete functions: automatic self-checking start, settable soft start time and limited rated output.

## 2.4 Mechanism & Appearance

### 2.4.1 LCM (Liquid Crystal Monitor)



(Figure 2-4: LCM\_ Front View)

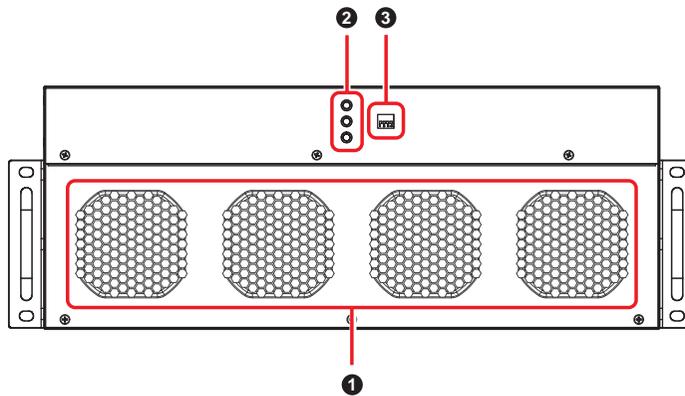
Item	Name	Description
①	NORMAL LED (green)	Illuminates when the SVG system is normal.
②	STANDBY LED (yellow)	Illuminates when the SVG system is in standby status.
③	FAULT LED (red)	Illuminates when the SVG system has abnormalities.
④	LCD Display	Displays both Chinese and English fonts.
⑤	ON/ OFF Key	Press and hold the key for 3 seconds to switch on/ off the SVG system.
⑥	UP Key	Press the key to move the menu items upward or to increase the parameter setting value.
⑦	ESC Key	Press the key to return to the previous menu or to save the parameter setting when exit.
⑧	ENTER Key	Press the key to go to the next page or to confirm the parameter setting.
⑨	DOWN Key	Press the key to move the menu items downward or to reduce the parameter setting value.



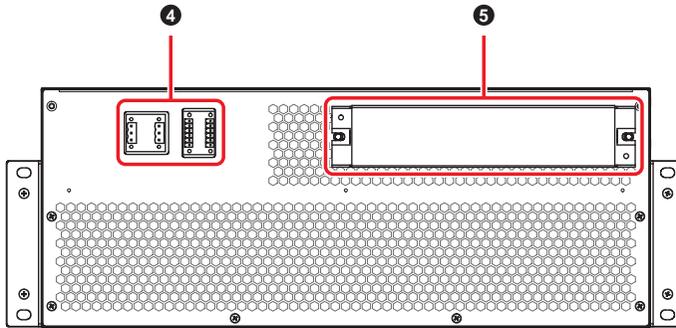
(Figure 2-5: LCM\_ Rear View)

Item	Name	Description
①	DATABUS	The communication interface between the LCM and the fixed-type SVG module.
②	RS232	The standard RS232 interface.

### 2.4.2 Appearance & Dimensions of the Fixed-type SVG Module



(Figure 2-6: Front View of the Fixed-type SVG Module)



(Figure 2-7: Rear View of the Fixed-type SVG Module)

Item	Name	Description
①	DC Fans	DC fans for heat dispersion.
②	LED Indicators	<ul style="list-style-type: none"> <li>Green (Normal): the module is functioning properly.</li> <li>Yellow (Standby): the module is in standby mode.</li> <li>Red (Fault): the module has abnormalities.</li> </ul>
③	DIP Switches	Set the module ID and terminal resistance.
④	Signal Transfer Terminals	Include communication terminals and CT terminals.
⑤	Main Power Input Terminals	For main power input wiring (R/ S/ T/ N/ PE)



**NOTE:** Since the DATABUS port is provided with insulation isolation, it is safe to touch it.

Table 2-2: PQC Series SVG\_ Fixed-type SVG Module Dimensions & Weight

Model	Dimensions (W×D×H)	Weight
PQCA-400-50-50FM4	440 x 522 x 174 mm	30Kg
PQCA-400-50-50FM3	440 x 522 x 174 mm	30Kg

## 2.5. Package Inspection



**NOTE:** The SVG includes the fixed-type SVG module and the LCM, which are packed separately. If you would like to buy both of them, you should separately purchase them.

- **Exterior**

Some unpredictable situations might occur during transportation. It is recommended that you inspect the exterior packaging after receiving the fixed-type SVG module and the LCM. If you notice any damage, please contact your supplier.

- **Interior**

1. Please check the rating labels of the fixed-type SVG module and the LCM to see if the products conform to your order.
2. Please check if any parts are damaged or loose.
3. Please check if the accessories are complete.
4. Please see the tables below for the standard accessories of the fixed-type SVG module and the LCM.
5. If any damage is found, please contact your supplier.
6. To return goods, please use the original packing material to pack the fixed-type SVG module, the LCM and all standard accessories.

**Table 2-3: Standard Accessories of the Fixed-type SVG Module**

No.	Item	Quantity
①	User Manual	1 PC
②	Terminal Block (3-pin)	2 PCS
③	Communication Terminal Block (6-pin)	2 PCS
④	Screw M6*16L	4 PCS

**Table 2-4: Standard Accessories of the LCM**

No.	Item	Quantity
①	LCM Connection Wire	1 PC
②	Fastening Screw	4 PCS

## Chapter 3 : Installation and Wiring

The SVG is applicable to many applications and can meet the particular installation requirements of industrial sites, power distribution rooms and IT data centers. According to different work conditions and environment requirements, the fixed-type SVG module can be installed in a customized cabinet or standard cabinet, and flexible configuration and on-site capacity expansion can be realized based on the current and subsequent capacity requirements.

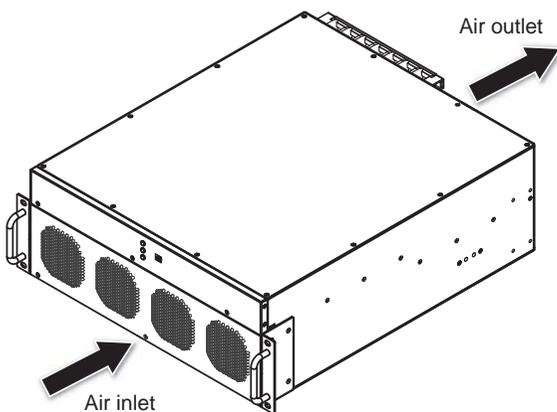
### 3.1 Pre-installation Confirmation

Since the installation environment varies for different users, please be sure to read this Manual carefully before installation. All installation, assembly and start-up work must be carried out by the qualified professional personnel. If the work is to be carried out by the customer, it shall be under the supervision of the qualified professional personnel. When a forklift or similar lifting equipment is used to handle the device, make sure the lifting capacity is sufficient. Please refer to **Table 2-2** for the SVG weight.

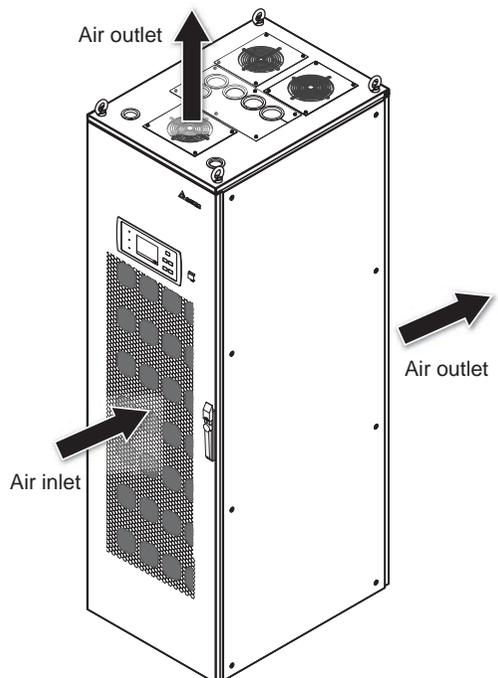
### 3.2 Installation Environment

1. The SVG device can only be installed indoors. Do not install the device for outdoor use. Be sure to consider the IP21 protection degree of the device while installing. For a higher protection degree requirement, please contact the distributor.
2. The SVG device shall not be installed in a place close to dust sources or subject to heavy environmental pollution. Because the conductive dust will damage the device, make sure the installation place is free of conductive dust.
3. Make sure the transport route and placement location are firm and big enough to accommodate the SVG system cabinet and forklift.
4. Since some noise can be generated during the operation of the SVG, please take the noise effects into account when choosing the installation position.
5. Keep the installation area clean. Please note that wiring routes must be hermetic to prevent possible damage from rodents.
6. Make sure enough space is left in the installation place for future maintenance. For the purpose of ventilation, avoid installing the SVG against the wall. A space of 1500mm shall be left in front of the device for front operation, maintenance and wiring.
7. Since some heat can be generated during the operation of the SVG, please make sure the cooling system of the installation environment is sufficient for heat dissipation, so that the ambient temperature will not exceed the normal working temperature of the device.

8. The device is equipped with cooling fans, and is designed with air inlet in the front and air outlet at the back; thus, it is recommended to leave at least a 500mm space both at the front and the back for ventilation purpose. **Figure 3-1** and **Figure 3-2** illustrate the air inlet & outlet schematic diagrams of the fixed-type module and system cabinet.
9. Every module and system cabinet have their minimum vent flow requirements, which shall be met to guarantee the normal cooling of the device. The air must be properly cooled and treated to be free of conductive particles, heavy dust or hazardous gas before being fed into the device through the air inlet.
10. The working temperature range of the SVG is  $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$ , beyond which the SVG will not work.
11. Do not use the device in a place above an altitude of 1000m. If such a installation place can not be avoided, please consider derating, or contact the distributor.
12. The fixed-type SVG module is recommended to be used in a customized system cabinet with at least IP20 protection degree, in which, a distance of at least 10mm shall be kept between the conductive metal cabinet parts and the live terminals of the module.
13. When the fixed-type SVG module is used separately, the live terminals at the back of the module must be provided with insulation caps. Please ask your supplier for insulation caps.



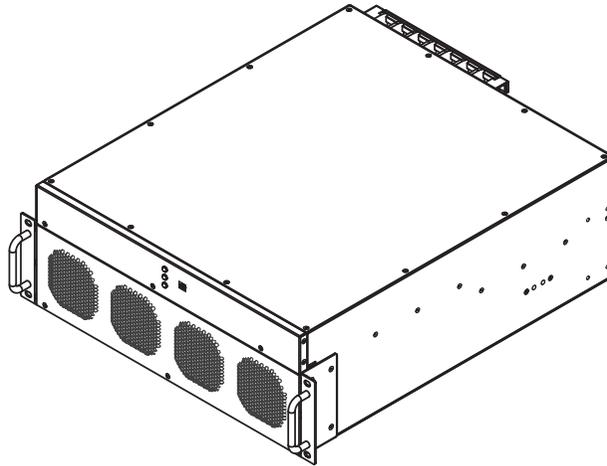
(Figure 3-1: Air Inlet & Outlet Schematic Diagram of the Fixed-type SVG Module)



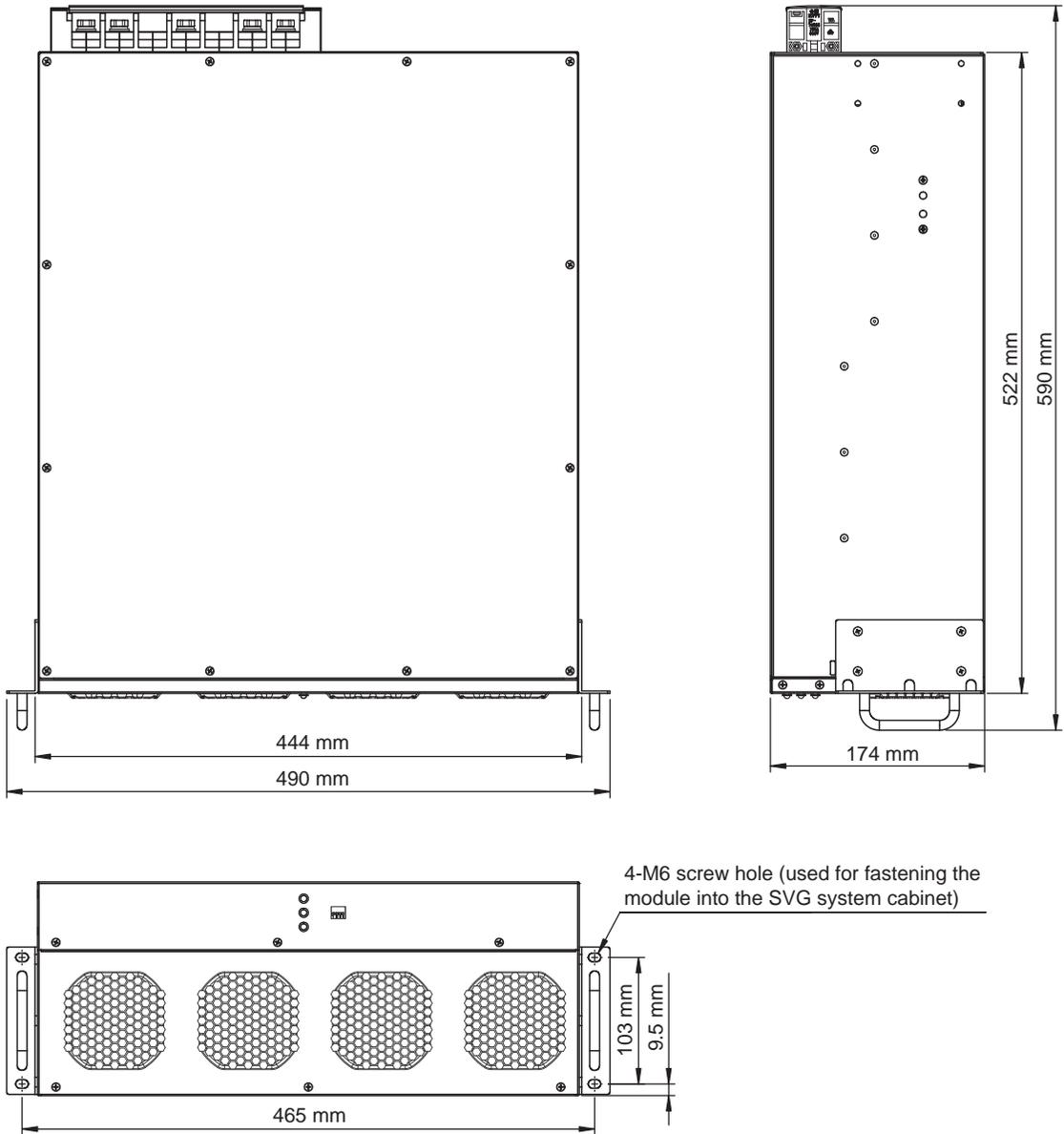
(Figure 3-2: Air Inlet & Outlet Schematic Diagram of the System SVG Cabinet)

### 3.3 Fixed-type SVG Module Structure & Wiring

#### 3.3.1 Fixed-type SVG Module Structure



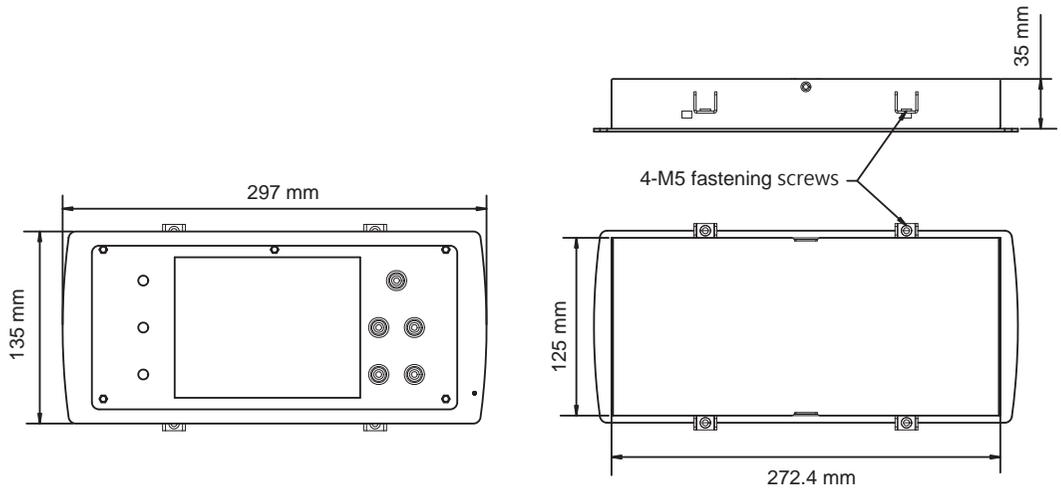
*(Figure 3-3: External View of the Fixed-type SVG Module)*



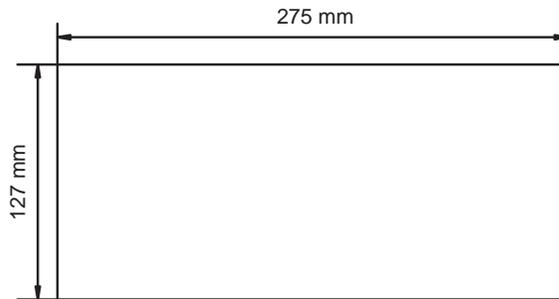
(Figure3-4: Installation Dimensions Diagram\_ Fixed-type SVG Module)

### 3.3.2 LCM Structure

When installation, please use the provided fastening screws (packed in the LCM package) to install the LCM on the system cabinet. After installation, use the provided LCM connection wire (packed in the LCM package) to connect the LCM's DATABUS port and the fixed-type SVG module's communication terminals.



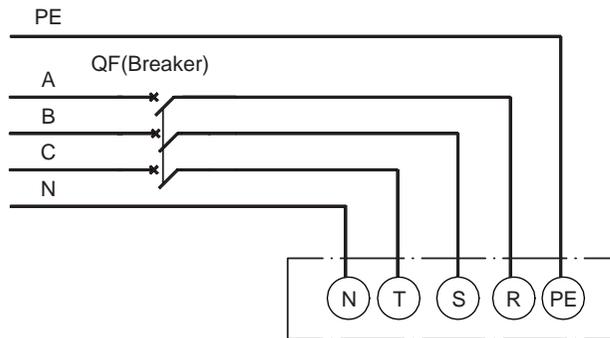
(Figure 3-5: LCM Structure and Dimensions)



(Figure 3-6: Mounting Hole Dimensions of the LCM)

### 3.3.3 Wiring of the Fixed-type SVG Module

1. Before connecting the cables or electronics, please be sure to cut off the input power of the fixed-type SVG module to avoid accidents.
2. The fixed-type SVG module must be grounded properly to avoid any possible damage caused by current leakage.
3. Check the diameter marking of the fixed-type SVG module's input wires, and make sure the wire diameter and phase sequence are correct. Please refer to **Figure 3-7** to perform wiring and refer to **Table 3-1** for the specifications of the power lines.



(Figure 3-7: Connection Diagram of Main Power Lines on Rear Panel of the Fixed-type SVG Module)

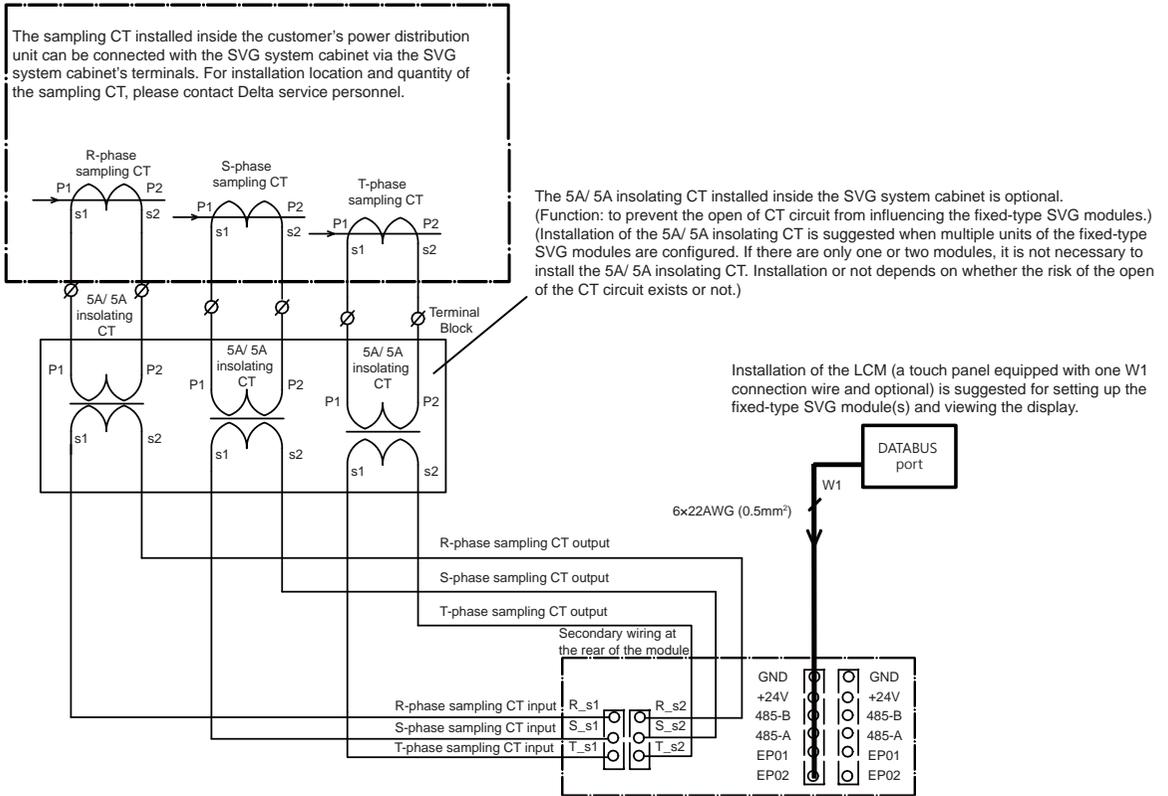
Table 3-1: Fixed-type SVG Module Wiring Table

Module Capacity	50Kvar
R/ S/ T Wire Diameter	35mm <sup>2</sup> (70°C )
N Wire Diameter	35mm <sup>2</sup> (70°C )
PE (protective earthing) Wire Diameter	16mm <sup>2</sup> (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-tie.

- Check the marking of wires connecting the fixed-type SVG module and the CT, and make sure the wire diameter and phase sequence are correct. Connect the input and output wires of the CT according to **Figure 3-8**.

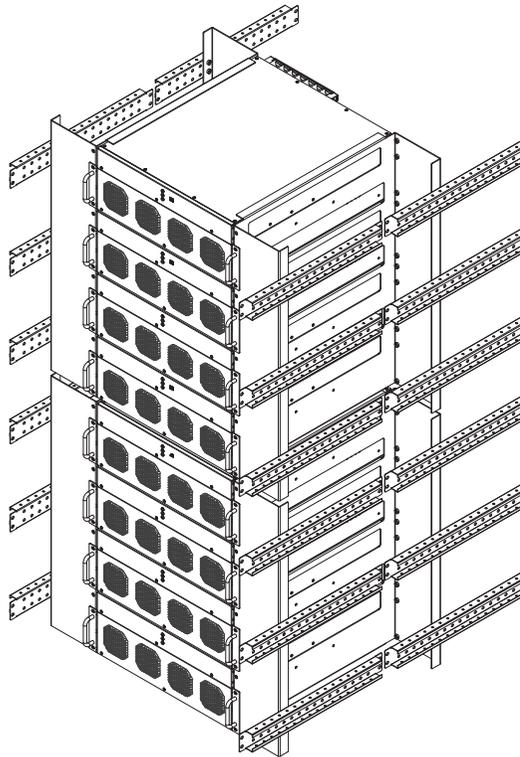


(Figure 3-8: Wiring Connection between the Rear of the Fixed-type SVG Module and the CT)

5. The fixed-type SVG modules can be directly stacked while installing with no upper limit of modules connected in parallel. Please define the upper limit of the fixed-type SVG modules installed in a single cabinet based on the installing height in the PDU cabinet. **Figure 3-9** is the installation diagram of multiple units of the fixed-type SVG modules. Please refer to **Figure 3-10** for the connection among the CT, fixed-type SVG modules and the LCM. Use the provided LCM connection wire (packed in the LCM package) to connect the LCM's DATABUS port and the fixed-type SVG module's communication terminals. When several fixed-type SVG modules are connected in parallel, it is unnecessary to connect other modules to the LCM connection wire; instead, the communication can be realized via the connection between the internal wires of the system.

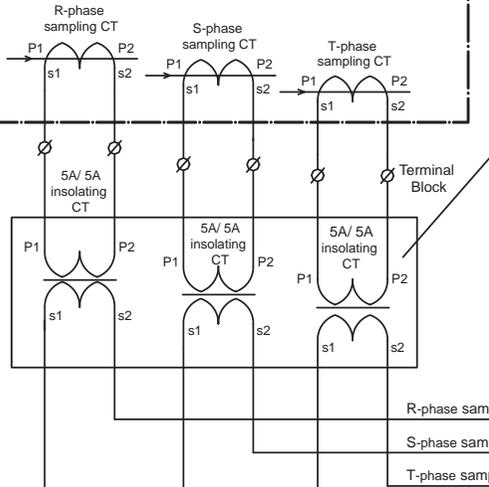
**NOTE:**

The LCM connection wire (packed in the LCM package) is part of the secondary circuit, and shall be kept an insulation distance no less than 5.5mm from the primary circuit of the main power.



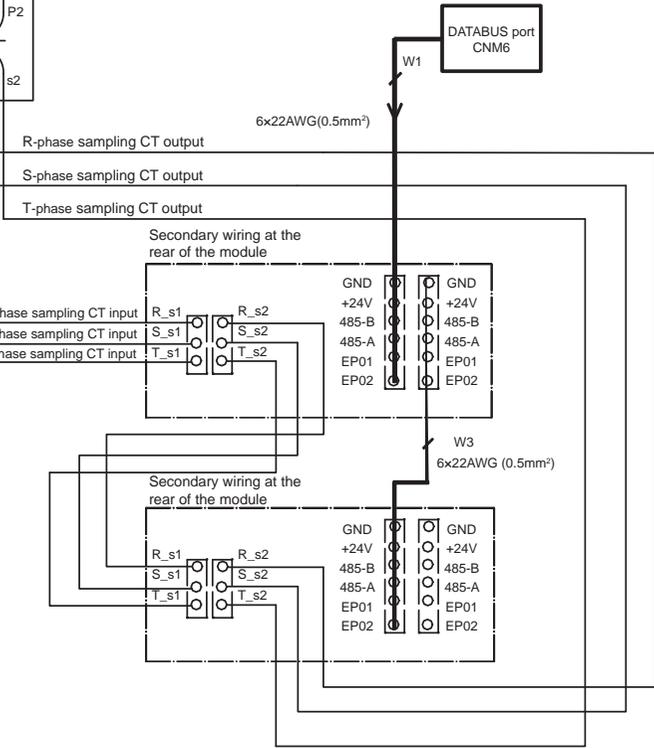
(Figure 3-9: Fixed-type SVG Modules & SVG System Cabinet Installation Diagram)

The sampling CT installed inside the customer's power distribution unit can be connected with the SVG system cabinet via the SVG system cabinet's terminals. For installation location and quantity of the sampling CT, please contact Delta service personnel.



The 5A/ 5A insulating CT installed inside the SVG system cabinet is optional. (Function: to prevent the open of CT circuit from influencing the fixed-type SVG modules.) (Installation of the 5A/ 5A insulating CT is suggested when multiple units of the fixed-type SVG modules are configured. If there are only one or two modules, it is not necessary to install the 5A/ 5A insulating CT. Installation or not depends on whether the risk of the open of the CT circuit exists or not.)

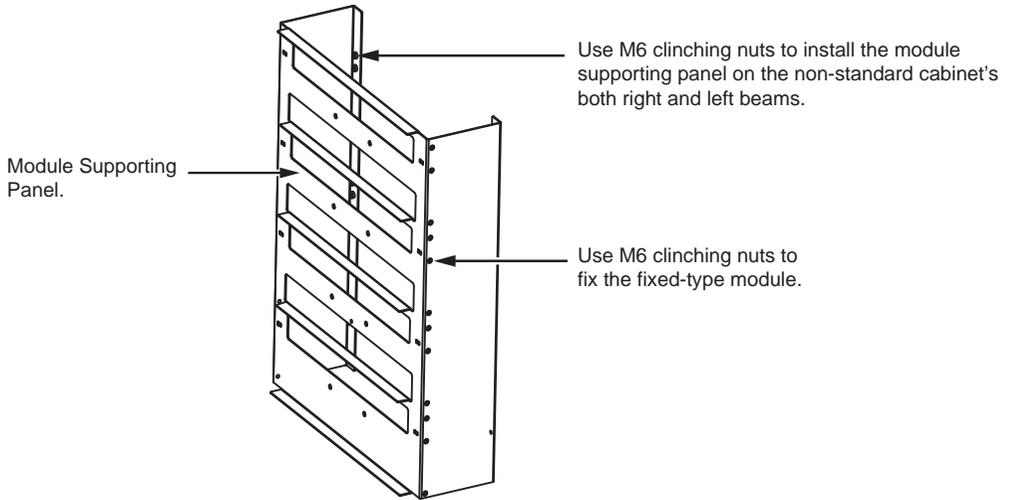
Installation of the LCM (a touch panel equipped with one W1 connection wire and optional) is suggested for setting up the fixed-type SVG module(s) and viewing the display.



(Figure 3-10: Wiring Connection among the Rear of the Fixed-type SVG Modules, the LCM and the CT)

6. Fixed-type SVG module's supporting methods and installation procedures:

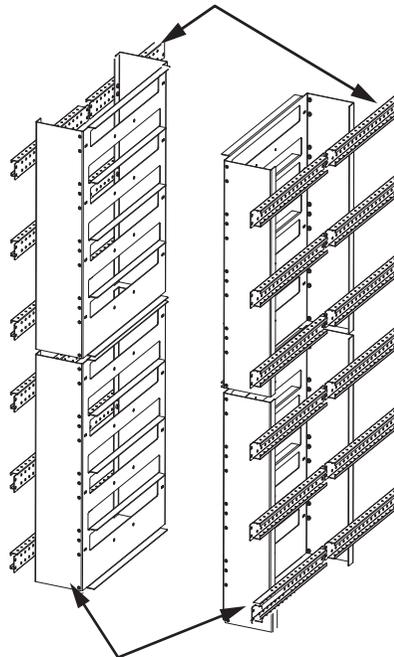
- 1) **Figure 3-11** shows the design of the module supporting panel, which is a C shape framework with a size of 800mm wide that can accommodate at maximum four fixed-type SVG modules.



(Figure 3-11: Fixed-type SVG Module Installation Step 1)

- 2) Install the module supporting panels on the non-standard cabinet's both right and left beams. Please see **Figure 3-12**.

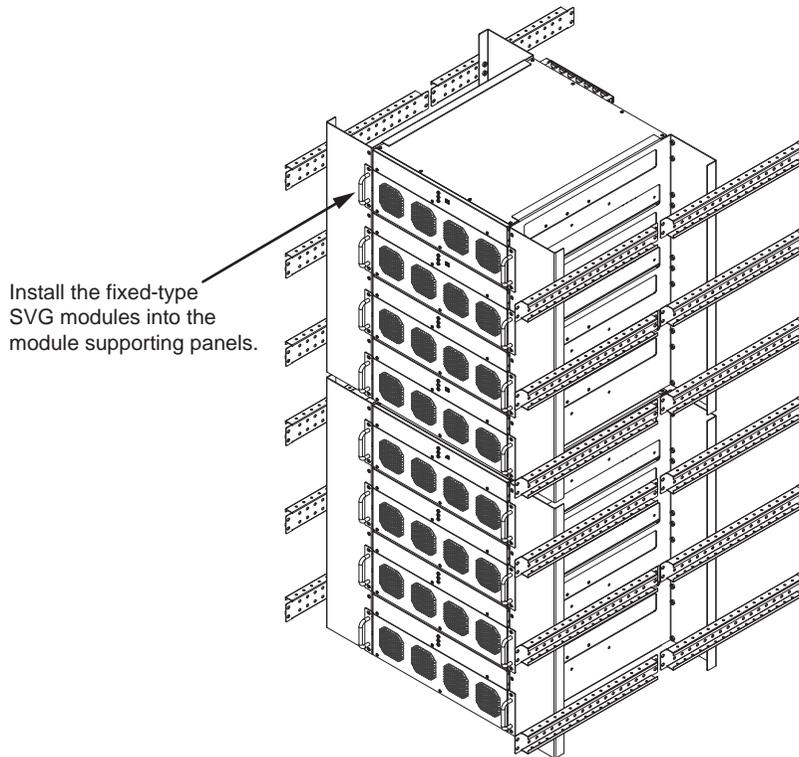
The non-standard cabinet's right and left beams are commonly used.



The module supporting panels can be installed on the right and left side of the non-standard cabinet.

(Figure 3-12: Fixed-type SVG Module Installation Step 2)

- 3) Install the fixed-type SVG modules into the module supporting panels. Please see **Figure 3-13**.



(Figure 3-13: Fixed-type SVG Module Installation Step 3)

## 3.4 CT Installation & Wiring for Reactive Current Detection of Load

### 3.4.1 CT Selection Precautions

1. The appropriate rated ratio of primary to secondary current shall be determined. The primary current is recommended to be  $1.6 \cdot I_n$  (the actual rated current of the testing point).
2. The rated voltage must be larger than or equal to the system voltage.
3. The secondary current is 5A or 1A.
4. The nominal secondary capacity (rated load) of the CT shall meet the requirement of secondary impedance ( $\geq 10VA$  when the secondary current is 5A). The capacity and the maximum one-way wiring length from the CT to the fixed-type SVG module shall be calculated according to the following formula:

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

Wherein:

Lmax:	The maximum one-way wiring length from the CT to the SVG system cabinet (m);
Pct:	The nominal secondary capacity of the CT (VA);
P1:	The capacity loss and the internal impedance of the SVG system cabinet (each module's internal loss is around 2VA);
I:	The secondary current of the CT (A);
S:	The cross-section area of the copper conductor (mm <sup>2</sup> );
ρ:	The resistivity of the copper conductor (calculated according to 0.0178 Ω × m/mm <sup>2</sup> );

### 3.4.2 Basic CT Installation & Wiring

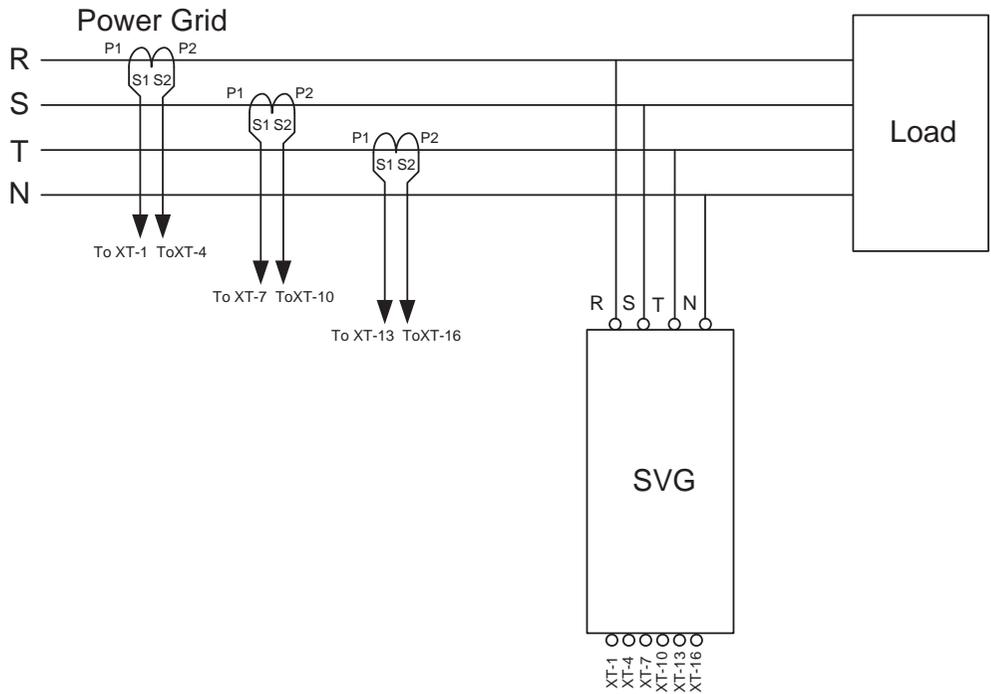
The CT for reactive current detection can be installed either at the power grid side or the load side, and the LCM's CT location setting must be corresponding to it. The default CT installation location is at the power grid side to feed the current signal to the SVG.

- For unbalanced system, a set of three CTs must be provided for reactive current detection and compensation, and the direction of each of these three CTs must be the same. Please refer to **Figure 3-14** and **Figure 3-15**.
- For 3-phase balanced system, only one CT is required for reactive current detection and compensation. Please refer to **Figure 3-16** and **Figure 3-17**.
- All CTs' direction must be correct. The default direction is P1 facing the power grid.
- The phase sequences of the detection signal of the CTs must not be exchanged.
  1. The secondary output S1 of CT<sub>1</sub> for R-phase detection must be connected to the terminal board XT-1, and the S2 outgoing line must be connected to the terminal board XT-4.
  2. The secondary output S1 of CT<sub>2</sub> for S-phase detection must be connected to the terminal board XT-7, and the S2 outgoing line must be connected to the terminal board XT-10.

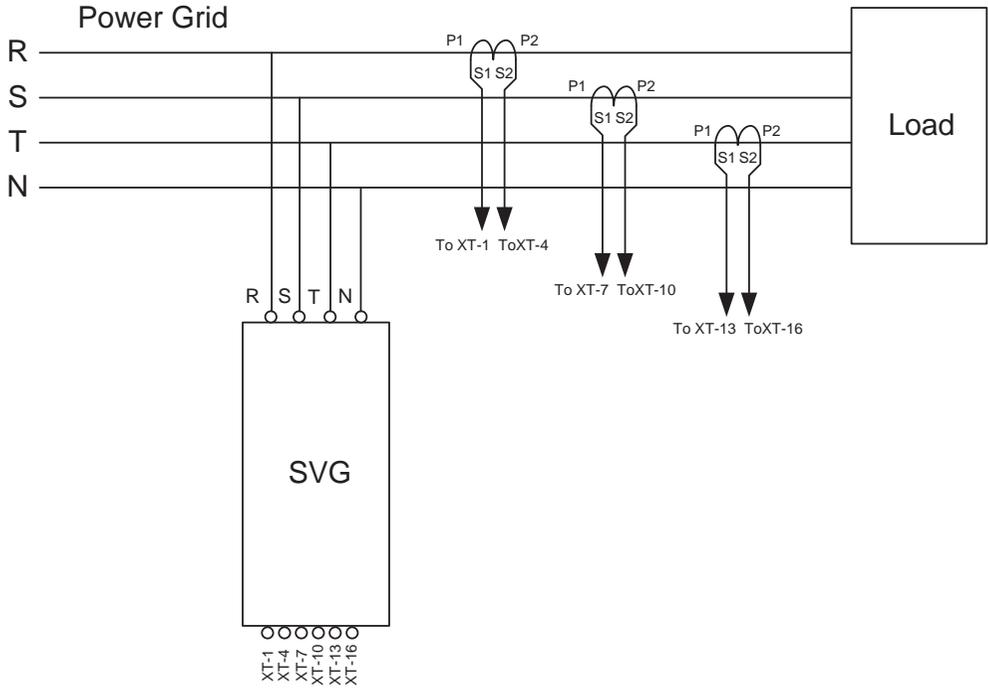
- The secondary output S1 of CT<sub>3</sub> for T-phase detection must be connected to the terminal board XT-13, and the S2 outgoing line must be connected to the terminal board XT-16.



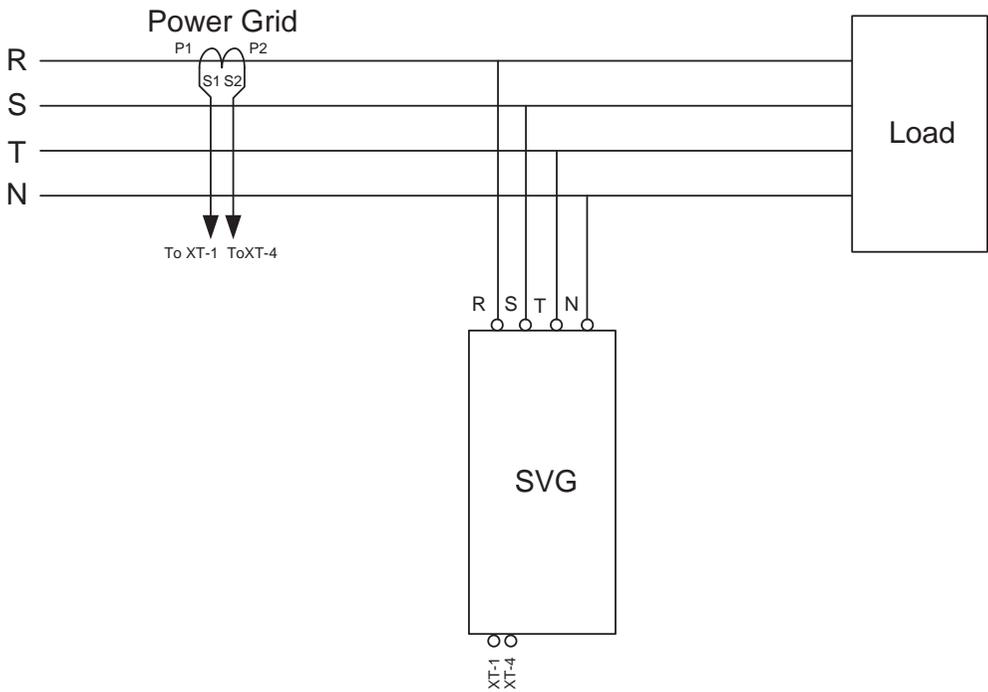
**NOTE:** If there is only one CT used for reactive current detection and compensation for the 3-phase balanced system, it can be installed at any of R/ S/ T-phase.



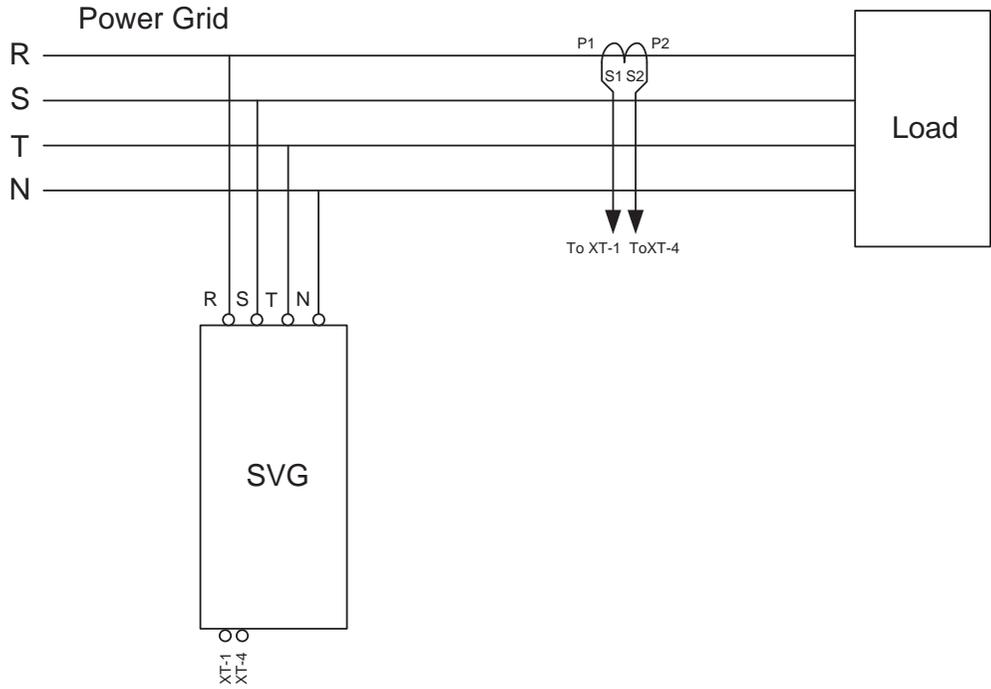
(Figure 3-14: Basic CT Installation and Wiring Diagram\_1)



(Figure 3-15: Basic CT Installation and Wiring Diagram\_2)



(Figure 3-16: Basic CT Installation and Wiring Diagram\_3)



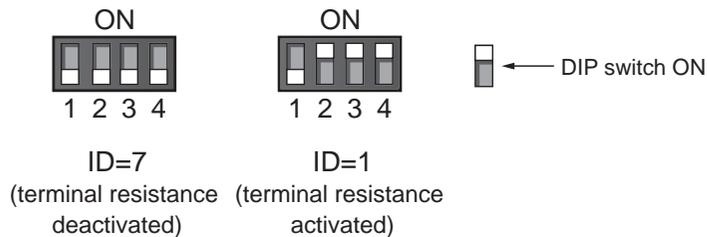
(Figure 3-17: Basic CT Installation and Wiring Diagram\_4)

# Chapter 4 : SVG Operation Procedures

## 4.1 Pre Start-up Check-up

- Make sure each module is plugged in the cabinet in place and all screws are firmly fixed.
- Make sure each module's ID and terminal resistance are set properly.

The DIP switches used to set the ID and terminal resistance are as shown in **Figure 4-1**. **Table 4-1** lists the positions of DIP switches 1~4.



(Figure 4-1: Schematic Diagram of DIP Switches)

**Table 4-1** Positions of DIP Switches

Position	Description
DIP Switch 1	Setting of the first digit of ID, which is valid when it is slid to the lower position
DIP Switch 2	Setting of the second digit of ID, which is valid when it is slid to the lower position
DIP Switch 3	Setting of the third digit of ID, which is valid when it is slid to the lower position
DIP Switch 4	Setting of the terminal resistance

The module ID setting of 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 locates, that is, PM1 ~ PM7 from top to bottom of the SVG system cabinet, and the ID shall be set accordingly. The terminal resistance DIP switches of all modules shall be set to the lower position, except that of the module PM7 which shall be set to the upper position, i.e., the terminal resistance DIP switch of the power module which locates the furthest from the LCM shall be set to the upper position.

If several SVG system cabinets are connected in parallel and the communication lines are interlinked, make sure the ID of all modules are not repeated, and the terminal resistance DIP switch of the module which locates the furthest from the LCM is set to the upper position.

- The ID of all modules are not repeated.
- The module quantity and compensation capacity are confirmed.
- The connections on the rear panel are made properly.
- The connections of the LCM communication ports are made properly.
- Close the front door.

## 4.2 Start-up Procedures

1. Switch the main breaker of the system to the ON position.
2. Switch the breakers corresponding to all the modules of the system to the ON position; here, the internal auxiliary power supply of the modules will be started, the fans will rotate, check if the yellow LED indicators in front of the modules are lit. The LCM will go into the Start screen, communicate with the modules, read the system messages and check there is no fault.
3. Close the front door.
4. Set the system into the operating mode. Please refer to **Chapter 5: LCM Display and Settings** for the detailed LCM settings.
5. Press and hold the ON/ OFF button on the LCM panel for 3 sec, and release it after the buzzer rings, now, the system starts.
6. When the system starts and works properly, the green LED indicator on the LCM will be lit.

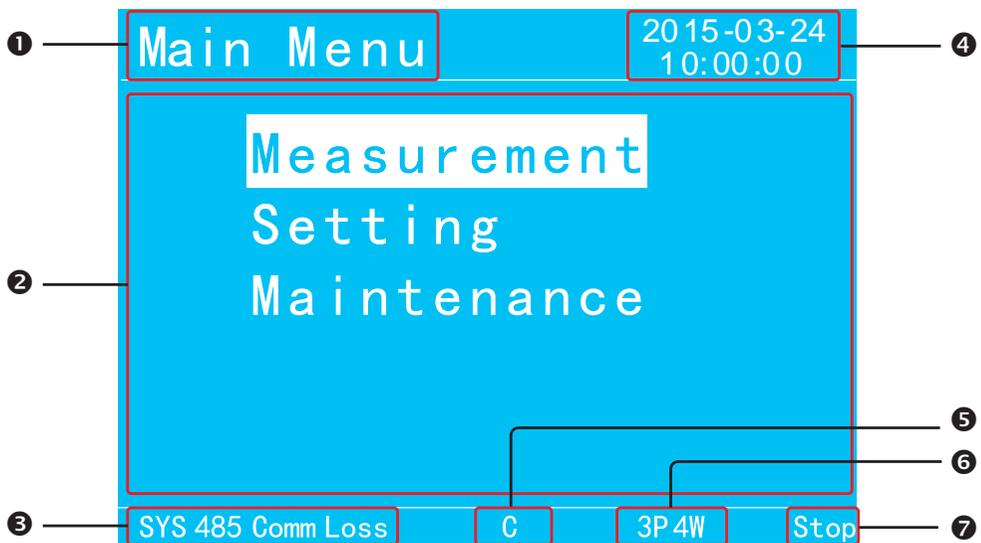
## Chapter 5 : LCM Display and Settings

The control panel is mainly used to monitor the SVG system parameters and display the status and settings of the system. It is available for two levels of user: User and Administrator.

The User is able to directly view the detailed displayed parameters in the measurement page and the user settings.

The Administrator is protected by password. The SVG settings and maintenance page can only be set and viewed after entering the Administrator password.

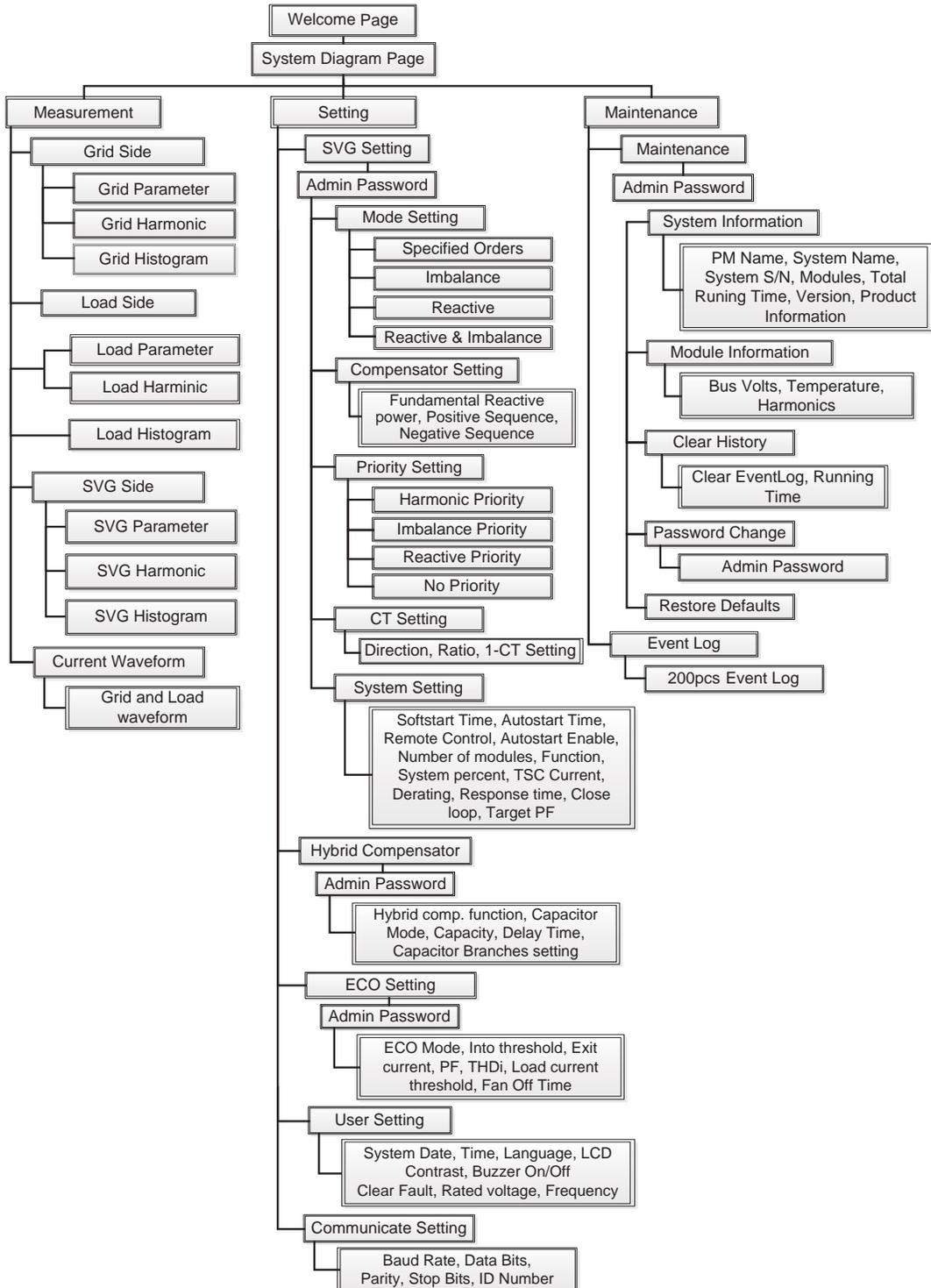
### 5.1 Description of LCM Display



(Figure 5-1: LCM Display)

Item	Description
①	Displays the title.
②	Displays the contents relevant to the title.
③	Displays the real-time fault message of the system.
④	Displays the time of the system.
⑤	Displays the system functions (C: Compensator/ S: Reactive Source).
⑥	Displays the system wiring mode (three-phase three-wire/ three-phase four-wire)
⑦	Displays the system operating status (running/ stop).

## 5.2 LCM Display Hierarchy



(Figure 5-2: LCM Display Hierarchy)

## Chapter 6 : Maintenance

- **Cleaning of the SVG:** please contact service personnel for regular cleaning of the SVG (every 6 months; however, it is recommended that the customer clean up the dust on the baffles of air inlet and outlet every 3 months).
- **Regular inspection of the SVG:** please contact service personnel for maintenance of the SVG (every 6 months).

## Chapter 7 : Troubleshooting

If any fault message is found, please refer to the table below for the corresponding solution.

Item	Fault message	Possible cause	Solution
1	SYS 485 Comm Loss	1. The communication lines are not connected properly. 2. There are repeated module IDs.	1. Check the communication lines for reliable connection. 2. Check the DIP switches of every module.
2	Grid Phase Seqen	Wrong wiring.	Please check the wiring and phase sequence. If anything wrong is found, please contact service personnel.
3	PM Numbers Error	1. Incorrect configuration of module quantity in the LCM. 2. There are repeated module IDs.	1. Compare the module quantity with the configuration of module quantity in the LCM. 2. Check the DIP switches of every module.
4	Fuse Blowout	The input fuse is broken.	Please contact service personnel.
5	Ambient OTP	1. The air vents are blocked. 2. The fans do not work. 3. The IGBT is damaged.	Please contact service personnel.
6	BUS OVP/ UVP	Failure of BUS capacitor.	Please contact service personnel.
7	Fan Fail	Failure of fans.	Please contact service personnel.
8	Curr Detect Fail	The CT is not connected properly.	Check the CT wiring according to the CT wiring diagram.

## 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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