# 400V Static Var Generator
# Small Type
# User’s Manual

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**User's Manual**

Material Version V1.0



The company is committed to the continuous improvement of power quality products, therefore the information provided is subject to change without notice.

# Directory

# Preface

Welcome to use the 400V Static Var Generator module, hereinafter referred to as SVG.SVG products use state-of-the-art digital signal processors as a controller, the IGBT semiconductor as a switching device, and the industry advanced three-level topology for the best compensation results.

## Unboxing inspection precautions

Please carefully confirm the following items when unboxing:

1.Whether the product is damaged;

2.Whether the rating of the local nameplate is consistent with your order requirements;

The company has strictly inspected the manufacturing and packaging of the products. If you find any omission,please contact the company or the supplier to solve it quickly.

# I. Safety instructions

## 1. Safety precautions

1. Static Var Generator may not be exposed to rain or wet places and it must be kept away from flammable liquids,combustible gases,corrosive substances or explosives.
2. High pressure danger,containing a large number of capacitance,the discharge time exceeds 5 minutes and we confirm the full discharge,then the disassembly operation can be conducted.
3. Wiring operations must be carried out by professionally qualified persons, otherwise there is a risk of electric shock.
4. Make sure the input power is completely disconnected before wiring, otherwise there is a risk of electric shock; after power is applied, it is forbidden to touch other parts of the SVG equipment except the operation panel.
5. When handling, do not lift or pull the SVG equipment through the front panel puller to avoid personal injury or object damage.
6. Do not drop screws, gaskets and metal foreign objects into the SVG equipment, otherwise there is a risk of fire and damage to the device.

## 2. Precautions for wiring

1. The grounding terminal of SVG equipment must be grounded reliably, poor grounding will easily lead to abnormal operation and the risk of electric shock.

2. The exposed part of the cable terminal for the main circuit wiring must be well insulated to avoid safety hazards.

3. The main circuit terminal and the wire nose must be firmly connected.

## 3. Use precautions

1. When the SVG is installed and applied incorrectly (e.g. output transformer is reversed), it will increase the reactive power content on the power system.

2. Please use the SVG equipment within the rated voltage range of the SVG equipment. In special cases, please use step-up or step-down devices.

3. To ensure the excellent reliability of the SVG and to avoid overheating, do not block the air inlet and outlet.

4．The working environment requires no corrosive gas, no conductive dust, and the ambient temperature is -20℃～40℃; beyond this temperature range, the SVG may not work normally.

## 4. Storage precautions

1．Use the original packaging material to seal the SVG to prevent damage caused by rodent intrusion.

2．If immediate installation is not required, be sure to store the SVG in a dry and ventilated indoor environment, where the storage temperature needs to be maintained between -40° C and 70° C and the relative humidity needs to be between 5% and 95%.

# Ⅱ. Product Specifications

## 1. Technical specifications

**Table 2-1 Product technical specifications**

| Projects | | Project Description |
|---|---|---|
| Electrical specifications | Input Line Voltage | 400V ±15% |
| | Phase number | 3 phase 4 wire； |
| | Capacity | 30kvar |
| | Frequency | 50/60±5Hz (Settable) |
| | Response time | <10ms |
| | Power Factor Correction | -1 to 1 adjustable |
| | Parallel operation | Up to 8 modules can be connected in parallel |
| | Module power consumption | <3% |
| | Efficiency | Up to 97% |
| | CT Ratio Range | 50:5~10000:5 |
| Communication Interface | Dry contact | EPO/DI/DO |
| | Communication | RS485 |
| Environmental specifications | Place of use | Indoor, not subject to direct sunlight, no dust, corrosive, flammable gas, oil mist, water vapor, dripping water or salt, etc. |
| | Working altitude | 1500 meters, more than 1500 meters in accordance with GB/T3859.2 derating. |
| | Storage temperature | -40ºC ~ +70ºC |
| | Operating temperature | -25ºC ~ +55ºC(> 40 ℃ reduction, more than 40 ℃, in accordance with the ratio of 1 ℃ reduction of 2% reduction in the use of) |
| | Humidity | Less than 95% RH, no condensation of water droplets |
| | Vibration | Less than 5.9 m/s2 (0.6g) |
| Structure | Protection level | IP20 |
| | Color | 7035 off-white/black (customized) |
| | Size | W×H×D：502×88×478mm |
| | Net weight | 11.6kg |
| | Cooling method | Intelligent air cooling |

## 2. Appearance size

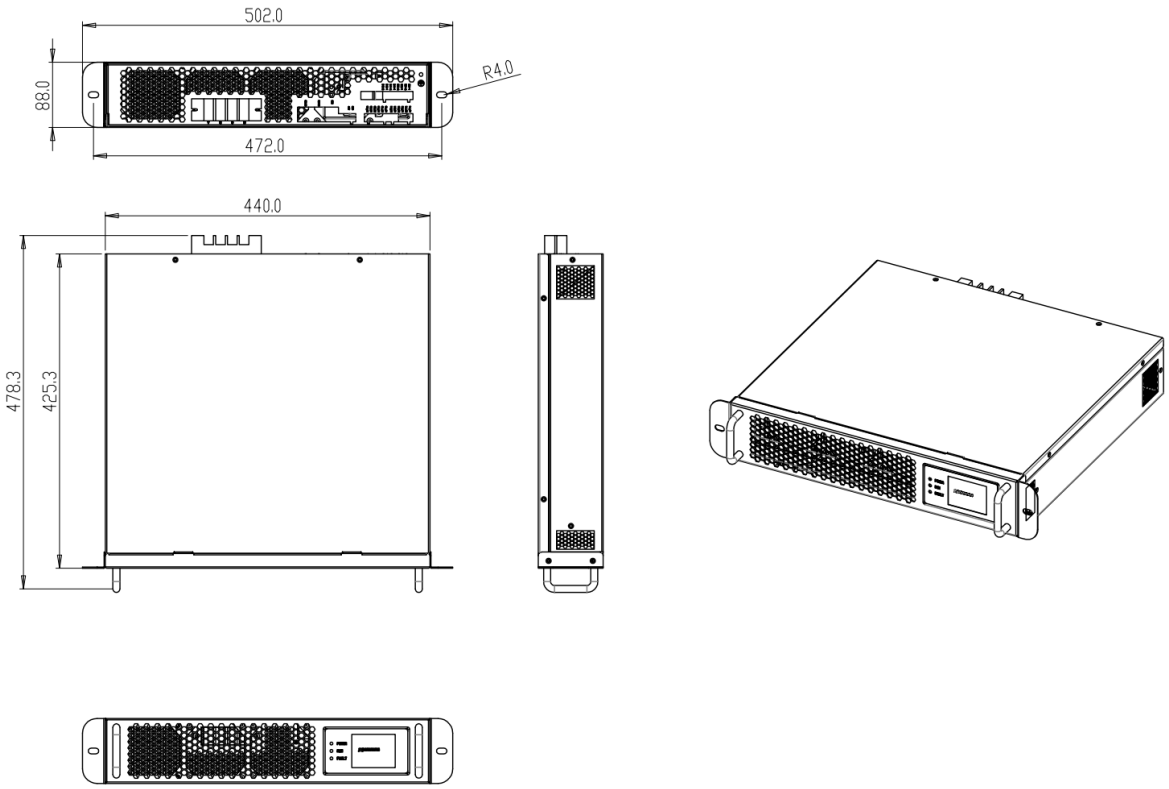


Figure 2-1 30kvar dimensional drawing

## 3. Terminal block

The module power distribution ports are divided into power ports and signal ports, as shown in Figure 2-2.

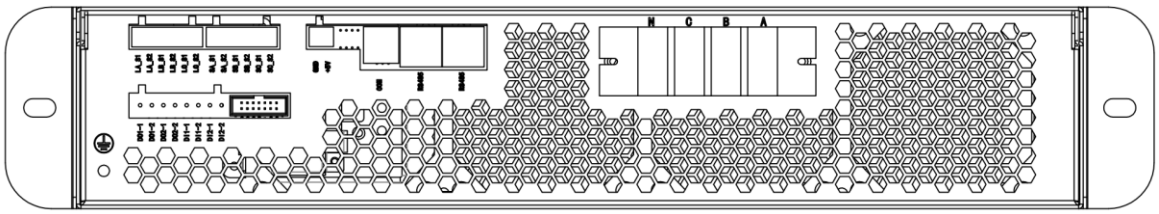


**Figure 2-2 Port Configuration Diagram**

**Table 2-2 Power Port Description**

| Terminal Symbols | Terminal Function Description |
|---|---|
| A | A-phase input |
| B | B-phase input |
| C | C-phase input |
| N | Three-phase four-wire mid-line input |

The signal ports are shown in Figure 2-3, and the description of each port signal is shown in Table 2-3.

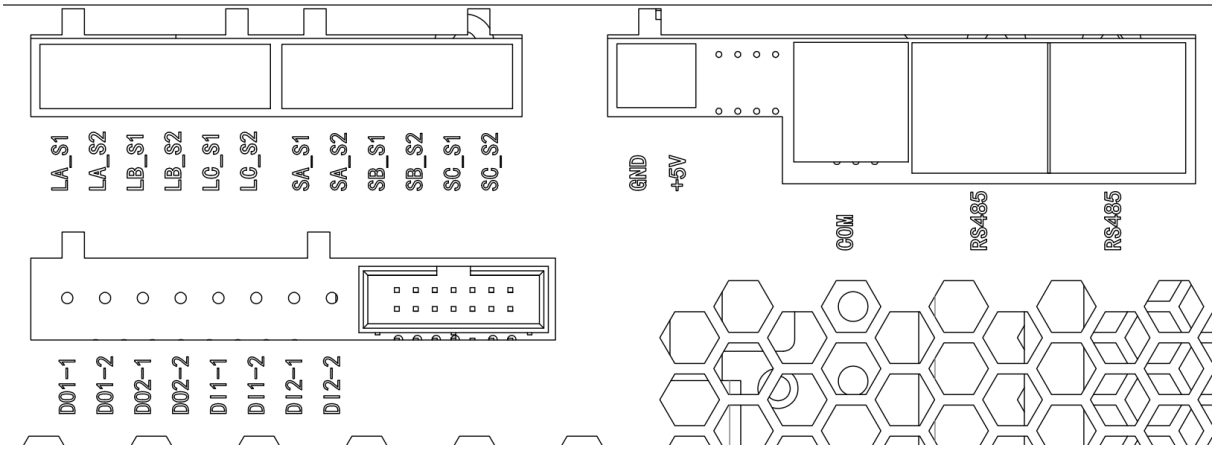


**Figure 2-3 Signal port configuration diagram**

**Table 2-3 Description of CT and control terminals**

| | | |
|---|---|---|
| LA_S1 | LA_S2 | Load side - transformer signal access terminal<br>Phase A: LA_S1/LA_S2<br>Phase B: LB_S1/LB_S2<br>Phase C: LC_S1/LC_S2 |
| LB_S1 | LB_S2 | |
| LC_S1 | LC_S2 | |
| SA_S1 | SA_S2 | Net side - transformer signal access terminal<br>Phase A: SA_S1/SA_S2<br>Phase B: SB_S1/SB_S2<br>Phase C: SC_S1/SC_S2 |
| SB_S1 | SB_S2 | |
| SC_S1 | SC_S2 | |
| GND | +5V | DC5V output |
| COM | | Capacity control interface |
| RS485 | RS485 | Communication network cable interface |
| DO1-1 | DO1-2 | Dry node: Output |
| DO2-1 | DO2-2 | |
| DI1-1 | DI1-2 | Dry node: Input |
| DI2-1 | DI2-2 | |

# Ⅲ. Installation and Power Distribution

## 1. Confirmation before installation

1. Visually inspect the exterior and interior of the SVG for shipping damage. If there is any damage, please inform the carrier immediately.
2. Check the product label to confirm the correctness of the equipment. Equipment labels are attached to the equipment, and the labels indicate the equipment model, capacity and main parameters.

## 2. Electrical installation

The normal operation of the single module requires wiring and installation of the three-phase power cable, N cable, PE cable, and external CT cable.

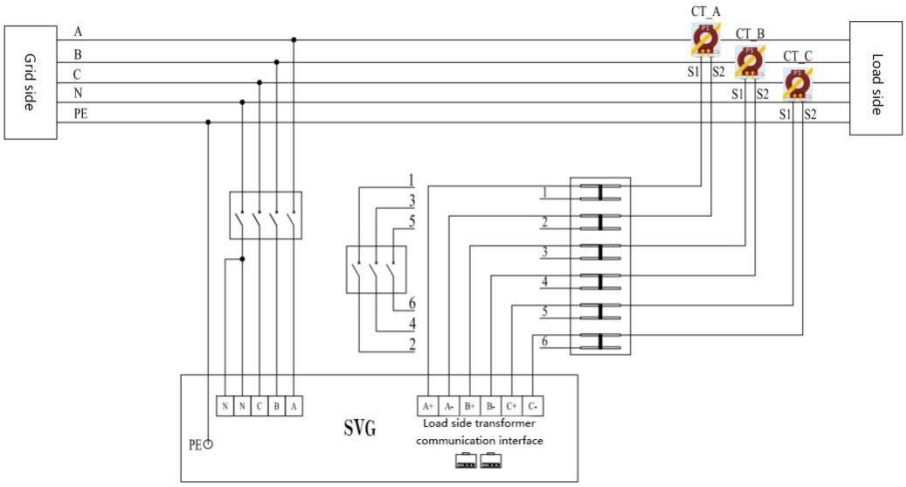


**Figure 3-1 Module power distribution wiring diagram**

**1、The P1 end of CT faces the grid side and the P2 end faces the load side**

**2、CT is installed on the load side after the device is in the network**

# IV. External large screen use instructions

## 1. External dimensions

**The opening size is 215 x 152.**

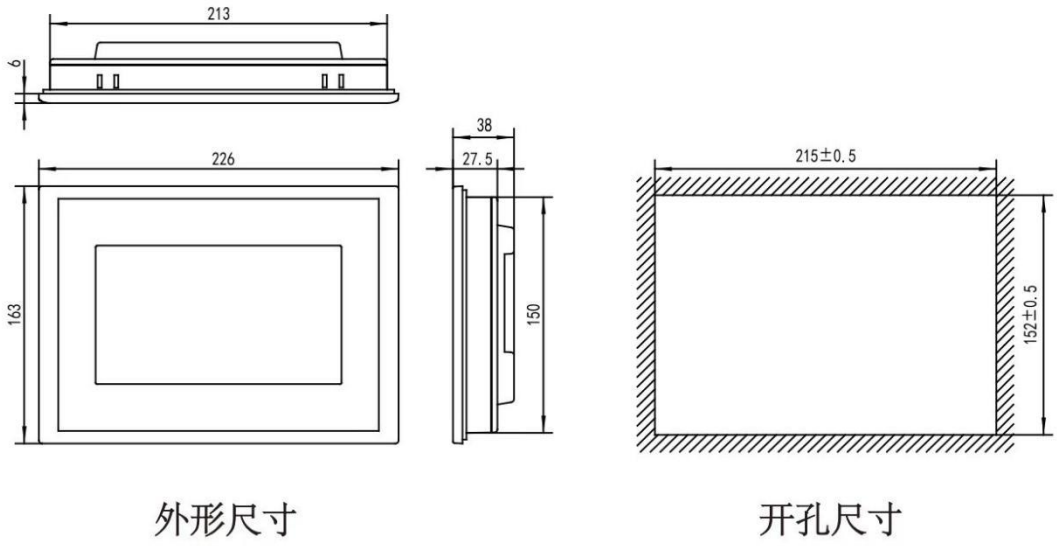


**Figure 4-1 Integrated touch screen shape and size (front, back, side)**

## 2. Wiring instructions

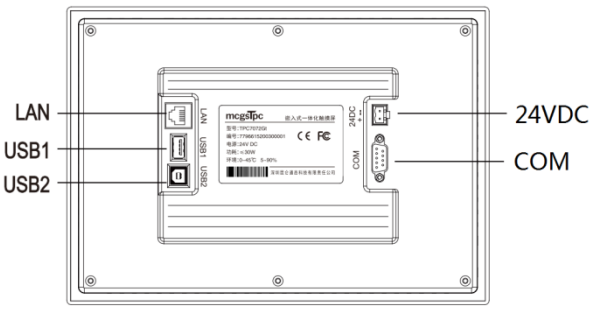


**Figure 4-2 Integrated touch screen back interface distribution**

All terminals of the screen are on the back of the module, and the main terminals are:

**DC 24V**：24V DC power supply interface;

**COM1 port:** communication interface, factory are equipped with communication adapter board, used to install category 6 8-core network cable, and module connected.

**Note: The rest of the ports do not require wiring.**

# Ⅴ、Human-machine interface operation (for embedded touch screen in the module)

## 1. Quick Use Guide

For the general use site,after the module is installed,you connect the power line,transformer sampling cable and other cables.You can start to use.Please communicate with the product engineer when setting up.Specific operation steps are as follows:

1、Close the isolation switch or circuit breaker between the grid and all modules;

2、power on the touch screen, at this time the screen began to initialize. (If the screen is powered on first, then the module will be powered on, after all modules are powered on, you need to click on the **communication detection** in the upper right corner of the main screen interface, to the left of the word "**communication connection is normal**" can be);

3、After the initialization of the touch screen, click on **the user settings** at the bottom of the screen, check whether the **CT ratio setting** is consistent with the actual installation, if not, set it to the actual value, and click save after setting (any jump interface that pops up).

4、If it is multiple parallel machines, you need to **repeat step 3** to check the parameter setting of each module, you can click the "←" or "→" button above the **user setting** interface to turn the page;

5、Return to **the main interface**, confirm that the status of all modules is "**ready**", click on **power on**, and click on the pop-up dialog box to confirm, then wait for the system to start.

## 2. Main interface

The title bar is located in the bar area at the top of the screen. The title bar in the home page is shown in Figure 5-1.


Figure 5-1 The title bar of the main interface

The title bar mainly has the current time and the interface title,with 

button and communication status on the right side of the title bar of the main interface.

Among them, 

button: it is used to re-detect communication to each module and touch screen and set up connection;

About 10S after the touch screen is started, it will automatically enter the main interface, as shown in Figure 5-4.

In the main interface, the three-phase THDi (harmonic current distortion rate), the total module output current, and the current operation status of each module are displayed in real time after the device is running. Among them, the module operation status is divided into the following six types:

1、No communication: indicates that there is an abnormality in the communication between the module and the touch screen;

2、In preparation, please wait: the module is in preparation for pre-charging;

3, ready to complete: the module has been pre-charged and is in standby mode;

4, has been turned on: the module is in normal working condition and running;

5、Module failure: the module has failed and is in the shutdown state;

6、Power on, negative sequence of power grid: the module is running, but there is negative sequence of power grid three phases.

Among them, status 2, 3 and 4 are normal conditions, the rest are problems with the use of the equipment, please contact the product engineers to deal with them in time.


**Figure 5-4 Main interface (with 4 parallel machines as an example)**

Note: If the number of control modules shown on the controller does not match the actual number installed, please contact your product engineer.

If a fault is reported on the control panel or the module LED fault indicator lights up during power-up preparation and parameter setting, please do not turn on the device and contact the product engineer in time.

## 3. User setting interface


Figure 5-5 User Settings

In any page, click "**User Setting**" in the menu bar below to enter the user setting interface. In general, users only need to check whether the **CT ratio parameters** are consistent with the actual parameters of the current transformer used. If it is not consistent, click the value box directly to make corresponding changes, and then click any interface or jump to **have the setting save** interface pop up, click to confirm.

If it is more than one unit, you need to page through the user setting interface by "←" or "→" above to check the parameter setting of each module, such as **the total system share** is the total capacity of all active filter modules under a single transformer, and **the local share** is the capacity size of this module. capacity of this module. (For example, Figure 5-5 shows four modules with a single capacity of 100A in parallel, and their total capacity is 400A.) Make sure that **the CT ratio** and **system share** of all modules are consistent with the actual parameters.

## 4. Data display interface


Figure 5-7 Data display interface

In any page, click "**Data Display**" in the menu bar below to enter the data display interface, as shown in Figure 5-7.

In this interface, users can see the field working data such as voltage, current, load power factor, etc. They can also know the current operation status of the module, such as output current, internal temperature of the module, etc. Users can switch to different modules through the "←" and "→" buttons on the left and right side of the page in order to view the relevant data of each module. Among them, the information code is used to judge the current status of the corresponding module, and the general code can be checked as shown in Table 5-1 below.

**Table 5-1 Module common information code**

| Information code | Controller interface description | Conclusion |
|---|---|---|
| 0000 0902 0000 | Grid is in positive order. Modules are being prepared. | Normal |
| 0000 0002 0000 | Grid is in positive order and the module is ready to complete. | |
| 0000 0102 0000 | | |
| 0000 0003 0000 | Grid is in positive order and the module starts up and runs. | |
| 0000 0083 0000 | Positive power grid order, module full power output. | |
| 0000 0900 0000 | Negative grid order, the module is in preparation. | Main power line is disconnected. |
| 0000 0000 0000 | Negative order of the grid, and the module is ready to complete. | |
| 0000 0100 0000 | | |
| 0000 0000 0400 | Module failure | Load voltage / current |

| | | |
|---|---|---|
| 0000 0000 0800 | | fluctuates greatly, triggering the system protection. |
| 8240 0000 0000 | | Module hardware failure,it needs to be replaced. |

## 5. Advanced setup

Advanced setups are not required in common use.To prevent misoperations from affecting the normal operation of the device,do not enable this function for users.

# VI. Care and maintenance

## 1.Notes

400V SVG is modular design, daily maintenance only need to observe the LCD display data is correct. If any exception occurs, disconnect the power supply immediately and contact the product engineer. To ensure the safety of maintenance personnel, do not touch any live part of the product during normal operation. For harsh daily environments, such as high temperature, humidity, conductive dust more environment, should contact the product engineer to develop specific solutions.

## 2.Common fault judgment

Common machine failures and solutions, please refer to Table 7-1, some common failures, alarm information, the user can site their own troubleshooting solutions, if you can not solve their own, please contact the product engineers directly.

Failures caused by user error use, such as CT line reversed, power line phase sequence reversed or missing, wrong parameter settings, etc. Such failures can be found by paying attention to each data during power-on commissioning. If there is a poor compensation effect, but no warning message, please contact the product engineer.

## Attention:

For your personal safety, no matter what kind of fault, without the permission of the company shall not privately dismantle the machine, tear, destroy the label of the product is not in the warranty.

**Table 7-1 Common faults and solutions**

| No. | Faults and alarms | Possible Causes | Solutions |
|---|---|---|---|
| 1 | Communication failure | 1. there is an abnormality in the communication network cable connection between the controller and the module (poor contact at the interface);<br>2. Modules with the same communication address exist. | Check whether the communication line is reliably connected, re-unplug the network cable, and re-power the module and screen, or click "communication detection" on the screen, and observe whether the communication is normal. |
| 2 | Temperature over-temperature | 1. High ambient temperature;<br>2. Air ducts are blocked；<br>3. Fan failure; | Check the causes one by one. |
| 3 | Abnormal input voltage | 1.incorrect wiring system of power cables;<br>2.Input voltage overvoltage or undervoltage; | Check whether the model is wired according to the corresponding wiring system, check whether the power cable is reliably connected, and check whether the input phase voltage is within the rated range. |
| 4 | Input | The input frequency exceeds the | Check whether the AC input frequency |

| | | | |
|---|---|---|---|
| | frequency abnormal | limit causing the converter to turn off or not on. | is 40.5 to 62.5 Hz. |
| 5 | No compensation current | 1.Module is not turned on;<br>2.Problems with the CT safety assembly line;<br>1、3.CT circuit control micro circuit breaker is not disconnected; | Check whether the module is powered on.The CT installation position, the connection mode and the CT line are connected reliably and disconnect the CT loop micro circuit breaker. |
| 6 | Fan failure | Fan failed. | Please contact the product engineer. |