STATIC VAR GENERATOR User Manual



3P400V 35~100kVar

static var generator

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Preface

This device utilities the advanced DSP as main controller, and IGBTs to form NPC topology to achieve better performance.

Unpacking and Inspection

Upon unpacking, please check for:

Any damage occurred during transportation;

Check whether the rated values on the nameplate of the drive are in accordance with your order.

Our product is manufactured and packed at the factory with great care. If there is any error, please contact any of our distributors or us.

The user manual is subjected to change without notifying the customers due to the continuous process of product improvements.

1 Safety information

1.1 Danger and Warning Definitions



1.2 Notes for Installations

Please read the manual carefully before installation.

The debugging and maintenance of SVG shall be conducted by engineer(s) appointed by the manufacturer or the agent, otherwise personal injury and device damages might be caused; the maker shall not be responsible for such kinds of damages.

SVG is only for commercial/industrial use, it can't be used as energy-saving equipment related with any

Life-support devices.



There are AC capacitors & DC capacitors connected inside this filter. Before performing any maintenance work, please short and ground the three line terminals. The DC capacitor needs 10 mins to discharge after disconnection. Please wait for this duration before touching any live parts or maintaining SVG, even after discharging the AC capacitors, to avoid electrical shock. Never discharge DC capacitors through short circuit.

1.3 Disposing

When disposing, pay attention to the following factors:

The capacitors may explode when they are burnt.

Poisonous gas may be generated when the plastic parts like front covers are burnt.

Disposing method: Please dispose the Drive as industrial waste.

2 Specifications

2.1 Electrical Specifications

		Tab. 2-1 Specifications
	Item	Description
	Rated voltage	380/400Vac
	Wiring	3P3W/3P4W
	Frequency	50/60Hz
Electrical	Capacity	20~100kVar(According to SVG type)
	Efficiency	Up to 97.5%
	Response time	<7.8ms
	CT ratio	150:5~6000:5
	Relay output	Max 2, default 1
Terminals	Digital input	Max 2, default 1
	Communication	RS485
	Operating environment	In-door, free from moisture, dust, corrodent or flammable gases, oil mist, vapor, water leakage or salt water.
	Altitude	<1500m, use as per GB/ T3859.2 above 1500m
Environm ent	Work temperature	-10°C~+40°C(derating is required from 40°C to 50°C, increase every 1°C above 40°C, derate 2%, highest temperature allowed: 50°C)
	Humidity	Less than 95%RH, no condensing
	Storage temperature	-40°C~+70°C
	Vibration	Less than 5.9m/s2 (0.6g)
	Protection degree	IP20
Enclosura	Colour	7035 grey
Enclosure	Size	According to SVG type
	Cooling	Fan cooling

Tab. 2-1 Specifications

2.2 SVG Dimensions



Rack mounted type dimensions is shown in figure 2-1.

Fig.2-1 Dimensions of rack mounted type

Wall mounted type dimensions is shown in figure 2-2.





4-Ø12*18 Mounting hole

Fig.2-2 Dimensions of wall mounted type Tab. 2-2 SVG Dimensions and weight

						-		
(mm)	Rack mounted		Wall mounted					
(mm)	35kVar	50kVar	75kVar	100kVar	35kVar	50kVar	75kVar	100kVar
A	359	399	484	554	521.5	545	611	621
В	341	381	466	536	500	520	575	585
C	315	355	440	510	300	360	300	300
D	200	200	232	250	120.5	85.5	137.5	142.5
E	89	89	89	89	379	419	500	570
F	55.5	55.5	71.5	80.5	350	390	475	545
G	556.5	611.5	646	656	315	355	440	510
Н	500	555	575	585	200	200	232	250
K	35	35	35	35				
Weight								
(kg)	23	28	38	47	23	28	38	47

2.3 SVG terminals

Power connectors (A, B, C, N, N) and control connectors in SVG are shown as Fig. 2-3.

Note:

The AC supply to SVG' power connectors must be installed with suitable protection against overload and short circuits. Failure to observe this requirement will cause risk of fire or damage to other equipment.



Fig.2-3 Connectors

Tab.	2-3	Power	connectors
rao.	2-5	1 0 11 01	connectors

Mark	Definition
A/B/C	3-phase AC connectors
N	3P4W Neutral connectors
PE	Protective earth

Control connectors is shown as Fig2-3. RS485 and CAN are used for communication during parallel operation. TEST is used for debugging of SVG. CT is used for load current acquisition. There are 2 digital inputs and relay outputs respectively, DI1~2 and DO1~2.

Note:

- 1. DO1,DO2,DI1,DI2 terminals are optional.
- 2. Relay of DO1 is set up as a status relay, NC contacts (DO1_TB) is opened and NO contact (DO1_TC) is closed when SVG is tripped.
- 3. TEST should be only used by authorized personnel of the supplier.



Fig.2-4 Control connectors and definition

	Mark	Definition		
	CT_A	Connect to S1 of phase A CT		
	GND_A	Connect to S2 of phase A CT		
CT	CT_B	Connect to S1 of phase B CT		
CI	GND_B	Connect to S2 of phase B CT		
	CT_C	Connect to S1 of phase C CT		
	GND_C	Connect to S2 of phase C CT		
RS485	RS485	Connector for remote monitor		
CAN	CAN	Connector for model parallel		
TEST	TEST	Connector for user debug		

Tab. 2-4 Control connectors and definition



Fig.2-5 Optional control connectors and definition

	Mark	Definition
	DO1_TA	Common contacts of status relay1
DO	DO1_TC	Normally open contacts of status relay1
DO	DO2_TA	Common contacts of status relay2
	DO2_TC	Normally open contacts of status relay2
	D1_1	Digital input channel 1 (9~30V)
DI	COM	Digital input 0V common
	DI_2	Digital input channel 2 (9~30V)
	232_TXD	RS232 transmit data
RS232	GND_ISO	RS232 0V common
	232_RXD	RS232 receive data
24V	24V+	24V output positive(<500mA)
OUT	24V-	24V output negative(<500mA)

Tab. 2-5	Optional	control	connectors	and	definition
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3 Electrical Installation

3.1 Electrical Installation

SVG module can be installed individually (one-set) or parallel (multi-set). Installation of one-set type is included in this guide. For multi-set installation, please contact the supplier.

3.2.1 Electrical Installation for one-set type

For installation of one-set type, please refer to Fig.3-1. CT connection is detailed in chapter 2.3. Please do remember the direction of CT is in accord with that shown in Fig.3-1. CTs are place between power supply and load, and P2 of CT is to load side and P1 of CT to supply side. S1 and S2 of each CT should be connected according to Tab. 2-3.

NOTE:

Make sure the direction and connection of CT are in accord with Fig.3-1, especially the direction, otherwise the harmonic would be enlarged.



Fig.3-1 Quick start commissioning of one-set SVG

3.2.2 Install Multi-Set System

Multi-Set system wiring

Place all one-sets in a row and connect them according to Figure 3-2. For the convenience of maintenance and system testing, electric power distribution cabinet is advised. Theoretically speaking, the quantity of SVGs in Multi-Set system isn't limited. However, in consideration of the circuit testing precision, six units are advised at most, and thus a better equal current of each SVG in the Multi-Set system can be realized.



Fig.3-2 Multi-Set SVG system wiring

Multi-Set CT wiring

Take 2-set SVG system as an example, phase A CT wiring is given in Fig.3-3. Phase B and Phase C's connection is as phase A. The CT connection terminals on SVG is in series with the next in multi-set system and the first SVG's CT_A and the last SVG's CT_A_GND connect to CT's S1 and S2 respectively, as the figure shows.



Fig.3-3 Multi-Set SVG system CT wiring

Central monitor wiring and setting

The central monitor is a 7 inches LCD HMI used to monitor all the SVGs in multi-set system. But it is not indispensable as each SVG has a 4.3 inches HMI already. Following are the parameters on SVG' HMI that is needed to be set with or without the central monitor.

Without the central monitor, set "Sys Capacity" to the demanded value. For example, in a 400V 100kVar SVG system with two 50kVar SVGs in parallel, each SVG is rated current is 75A, so set this value to 150.

When using the central monitor, "Sys Capacity" is set as above. Expect that, "MODBUS Addr" is also needed to change for the monitor. For example, in a 2 SVG in parallel system, set this value to 1 in the 1st SVG and 2 for the 2nd one.

4 Operation of SVG

This chapter introduces power ON/OFF steps and user interfaces of SVG module.

4.1 Power ON/OFF of SVG

4.1.1 Power ON steps

It's applicable to the power-on operation when SVG is in power-off state.

- 1. Fix the power and control cables correctly.
- 2. Close the breaker between SVG and power supply.

At this moment, power LED at front panel is turned on (green). If SVG is tripped, FAULT LED would be light up (red).

FAULT	\bigcirc
RUN	0
POWER	0

Fig.4-1 Status LED of SVG

4.1.2 Power OFF steps

There are two kinds of power-off modes, first is to disconnect the breaker between SVG and power supply. In this mode, the SVG would be thoroughly powered off and then may carry out maintenance and setup work. Another one is to press the stop button on HMI panel. In this mode, SVG only stop compensating, but the power terminals are still live, so it's not allowed to carry out maintenance or setup work.

NOTE:

Please wait for at least 10 mins before touching any live parts or maintaining SVG.

4.2 Operation of HMI panel

SVG module contains a 4.3 inch LCD panel as user interface, from which user can set parameters or read grid, load and output information etc.

Main page of LCD is shown in Fig.4-1.

Typical page of LCD is shown in Fig.4-2. It can be divided into 3 areas. Main parameters of grid and SVG itself are displayed in area 2. Buttons in area 3 are for switching to other pages.



Fig.4-2 Typical page of LCD

Note:

1. For simple use of one-set SVG, the only parameter needed to be set is CT ratio in Setting page.

2. If Auto mode is on, SVG would start automatically when power on.

3. When press start button, number beside it will increase every second, and SVG will run after 30 seconds, RUN LED will be light up meanwhile.

4. Use Cure Para button to save parameter i.e. CT ratio.

4.2.1 Parameters displayed in LCD

Page	Parameter	Definition	Туре
Main	Status	Ready, Run, Fault	R
	Login	If password is needed, input 1111	В
Data	Rate Voltage	Rate voltage of SVG	R
	Capacity	Nominal output current of SVG	R
	Phase A/B/C Volt	AC voltage of phase A B C	R
	DC bus Volt	Internal DC bus voltage of SVG	R
	IGBT Temp	Max temperature of IGBT in SVG	R
Setting	Start	Manually run the SVG	В
	Stop	Manually stop the SVG	В
	MODBUS Addr	Set MODBUS address in multi-set mode	W
	CT Ratio	Set the CT Ratio uses in load side	W
	Sys Capacity	Set the whole SVG capacity in multi-set mode	W
	Cure Para	Save changed parameter	В
Fault	Fault ID	All fault information are readable, if SVG is tripped please contact the supplier.	R
About	Model	SVG Model	R
	DSP/FPGA Ver.	Internal DSP/FPGA software version of SVG	R

All parameters displayed in LCD are listed in Tab.4-1.

Note:

R: Read; W: Write; B: Button