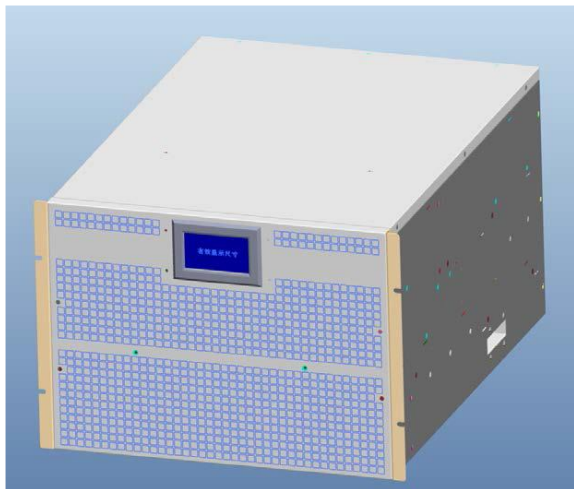




Sinexcel SVG 200kVar

User's Manual



Sinexcel Electric Co., Ltd.

Sinexcel SVG 200kVar

User's Manual

Data Version: Beta 1.0

Filing Date: 2019/7/24

BOM No.:

Sinexcel Electric Co., Ltd. provides full technical supports for clients. Users may contact the local agent or customer service center of the company, or the headquarters directly for help.

All rights reserved, the contents of this manual shall be subject to change without any further notice.

Shenzhen Sinexcel Electric Co., Ltd.

Add: 6th Building, 2nd District, Baiwangxin High-tech Industry Park, Songbai Road, Nanshan District, Shenzhen.

Postcode: 518000

Website: www.sinexcel.com

Hotline: +86-755-86511588

Fax: +86-755-86513100

E-mail: service@sinexcel.com

Customer Notice

Sinexcel SVG 200kVar has the following models for customers' selection:

	Type	Remark
1	Sinexcel 200 SVG 43L/RE	Rack-mounted LED, 3phase 3wire, applicable to centralized monitoring parallel operation.
2	Sinexcel 200 SVG 44L/RE	Rack-mounted LED, 3phase 4wire, applicable to centralized monitoring parallel operation.
3	Sinexcel 200 SVG 43L/RL	Rack-mounted LCD, 3phase 3wire, built-in LCD and monitoring in single device.
4	Sinexcel 200 SVG 44L/RL	Rack-mounted LCD, 3 phase 4wire, built-in LCD and monitoring in single device.
5	Sinexcel 200 SVG 43L/HL	Wall-mounted LCD, 3phase 3wire, built-in LCD and monitoring in single device.
6	Sinexcel 200 SVG 44L/HL	Wall-mounted LCD, 3 phase 4wire, built-in LCD and monitoring in single device.

Note: When ordering goods and receiving the product, please confirm the model!

Safety Precautions

This Manual describes installation and operation of Sinexcel SVG 200kVar system.

Please read this Manual before installation, and read all safety precautions in this Manual carefully. Sinexcel 400V SVG must be commissioned and maintained by the engineer designated by the manufacturer or its agent. Otherwise, it might endanger the personal safety and result in equipment failure. SVG damage caused thereby is beyond the warranty scope.

Sinexcel 400V SVG is only for commercial/industrial purpose and cannot be used as a life support equipment and relevant equipment.

This product is Class-A SVG device and might have radio interference when being used for saving residential electricity.



Normative References

This equipment meets CE 73/23 & 93/68 (low voltage safety) , 89/336 (EMC), and the EMC standards (C-Tick) of Australia and New Zealand:

See Chapter I *Product Technical Parameters* for the details.

Please install the equipment according to requirements stated above and use the accessories appointed by the manufacturer.



User Serviceable Parts

The maintenance of the internal parts of the equipment shall be conducted upon some tools by professional personnel. All components and parts that are kept in the protected containers and must be opened by tools, are user nonserviceable.

This SVG fully meets the equipment's safety standards in working zone.

There is dangerous voltage with SVG but that only maintenance personnel can access.

As the components with dangerous voltage has protective cap which must be opened by tools, thus the possibility of touching dangerous high voltage is very small.

There is no any danger when you operate the equipment according to relevant regulations and the procedures specified in the manual.

Contents

Chapter I Overview	1
1.1 Product description	1
1.2 Technical parameters	1
Chapter II System Installation	3
2.1 Installing dimension.....	3
2.2 System wiring	4
2.3 Selection for power distribution interfaces and wire diameters	5
2.4 Selection of the current transformer.....	6
2.4.1 Precision requirements of the current transformer	6
2.4.2 Ratio selection of the current transformer	7
2.4.3 Connection of the current transformer	7
2.4.4 Parallel operation system	8
Chapter III Monitoring Module	10
3.1 Electrification steps	12
3.1.1 Startup Steps	12
3.1.2 Shutdown Steps	13
3.1.3 Automatic Startup.....	13
3.2 Fault information	13
3.3 Trouble shooting.....	14

Chapter I Overview

1.1 Product description

Sinexcel SVG 200kVar is mainly used for harmonic compensation of 400V low voltage distribution network; the compensation capacity of single module is 200kVar; it could output the compensating current with controllable amplitude and phase position to improve power quality.

1.2 Technical parameters

Table 1-1 Environmental characteristics

Environmental characteristic	Unit	Sinexcel SVG 200kVar
Altitude	m	<1,500m; if the altitude is above 1,500m, derate referring to GB/T3859.2
Relative humidity	%	5%~95%, no condensation
Operating temperature	°C	-10~40
SVG storage/transportation temperature	°C	-40~70

Table 1-2 SVG AC input (mains supply)

Parameters of electricity system	Unit	Sinexcel SVG 200kVar
Rated voltage of AC input line	Vac	400V
Range of input phase current	Vac	138V~265V
Input frequency	Hz	50Hz/60Hz
Range of input frequency	Hz	45Hz~62Hz

Table 1-3 Overall efficiency and ventilation quantity

	Unit	Sinexcel SVG 200kVar
Overall efficiency	%	>97
Ventilation volume	L/sec	500

Table 1-4 SVG mechanical characteristics

Mechanical characteristics	Unit	Sinexcel SVG 200kVar
Weight	kg	110
Gross weight	kg	115
Color	N/A	RAL 7035
Protection level, IEC (60529)	N/A	IP20

Table 1-5 European and international standards

Items	Standards
General safety requirements for SVG use and operation area	EN 50178:1997/IEC 50178:1997
SVG EMC requirements	EN 61000_6_2(2005)/EN55011,GROUP1,CALSSA
	IEC 61000_6_2(1999)/CISPR11,GROUP1,CLASSA
SVG performance requirements	EN 50091-3/IEC 62040-3/AS 62040-3(VFI SS 111)

Chapter II System Installation

2.1 Installing dimension

Parallel connection of multiple rack-mounted modules, installation of single power module and wall-mounted installation are available.

The heat-dissipating method is intelligent air cooling; the air duct of rack-mounted module is equipped with the front air inlet and rear air outlet; the air duct of wall-mounted module is equipped with the bottom air inlet and top air outlet; the overall dimension and installing dimension are shown in Table 2-1 and Figure 2-1 respectively:

Table 2-1 Mechanical dimension

Dimension (mm)	wall-mounted LCD	rack-mounted LCD	rack-mounted LED
SVG 200	500*690*370	500*690*370	590*692*370

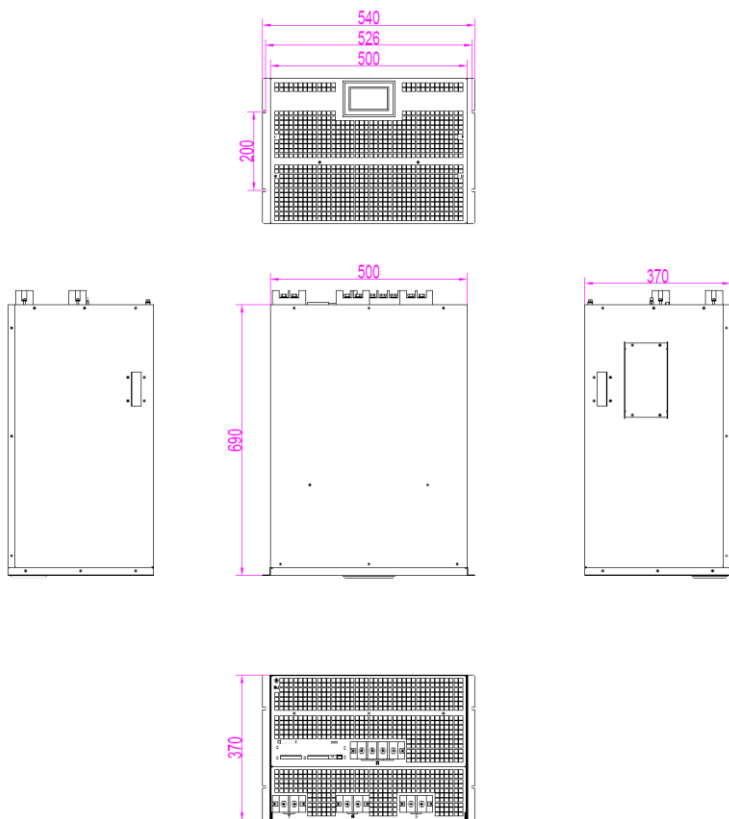


Figure 2-1-1 Sinexcel SVG 200kVar rack-mounted LCD

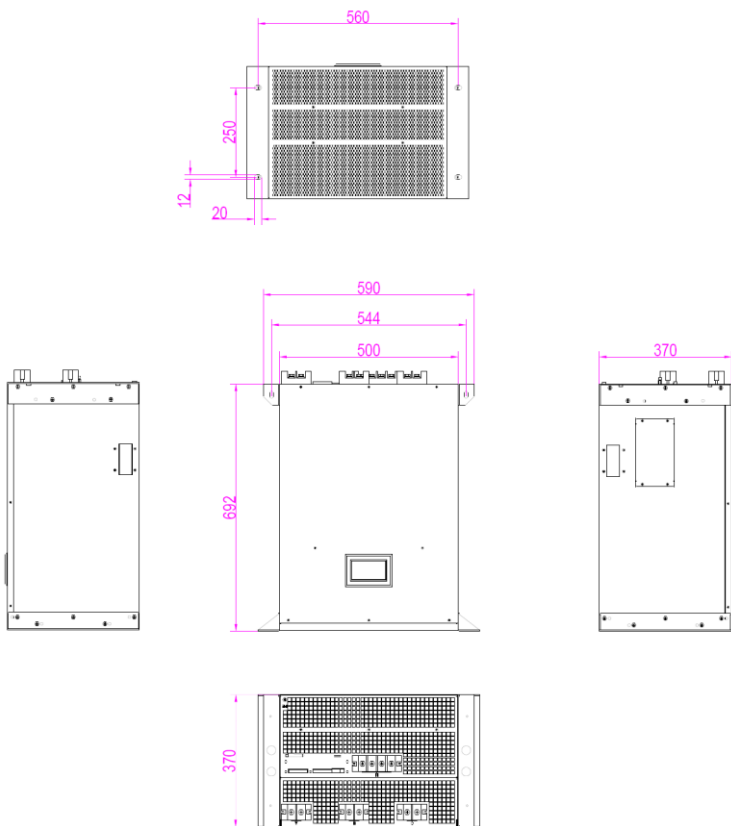


Figure 2-1-2 Sinexcel SVG 200kVar wall-mounted LCD

2.2 System wiring

For Sinexcel SVG 200kVar single module, 3-phase power cable, N cable, PE wire and external CT wire shall be used for wiring and installation. See Figure 2-2 for the details about overall frame diagram.

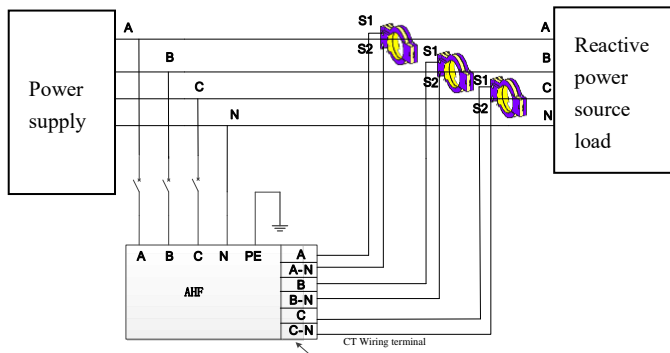


Figure 2-2 Wiring frame diagram of Sinexcel SVG single power module

2.3 Selection for power distribution interfaces and wire diameters

During field wiring, the user only need to select the suitable wire for the fixed wiring terminal according to the power requirement; see Figure 2-3 for wiring of each terminal. Refer to the model selection table 2-2 recommended by our company for selection of the wire diameter of Sinexcel SVG 200kVar A/B/C/N/PE power wire.

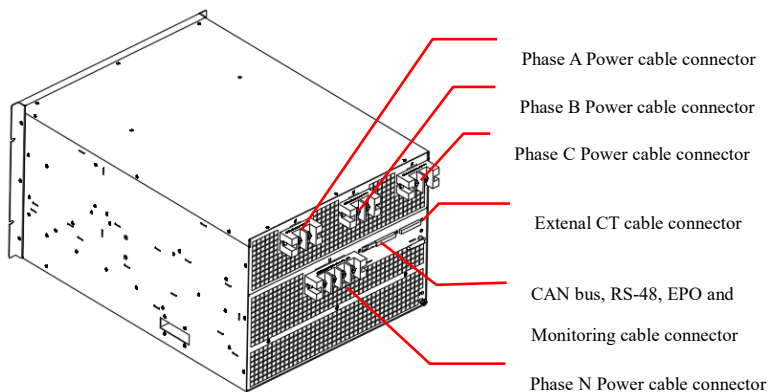


Figure 2-3 Wiring diagram of Sinexcel SVG single power module

Table 2-2 Model selection table

Rated current	200kVar
Power cable	Phase A/B/C: 70mm ² x2; Neutral: 70mm ² x4; PE: 16 mm ² recommended
CT cable	Below 15m: RVVSP 2×2.5 mm ² ; 15m-30m: RVVSP 2×4 mm ² ; above 30m: Please contact Sinexcel.
Ratio range of CT	600/5~10000/5
NFB rating	400A
Remark	If there is some requirement about the temperature of cable, the specification of cable shall be added

External wiring terminals of Sinexcel SVG are shown as follows

- Input A – 400V A-phase input terminal
- Input B – 400V B-phase input terminal
- Input C – 400V C-phase input terminal
- N- neutral input terminal (For 3P4W system only)
- PE—Ground terminal; as the metal enclosure is used in the system, the system must be grounded through the terminal to avoid any accident endangering personal safety.
- The allowable maximum current of CT wiring terminal strip is 5A.

Note: Large monitoring system is the integrated monitoring system used externally in multiple parallel connections; wiring terminals EPO and RS-485 are used as the communication cable for the centralized monitoring system in parallel connection of multiple devices; the dial switch is used by the monitoring system to identify the settings of each device and monitor the working condition of each module; these terminals aren't used in operation of single module.

2.4 Selection of the current transformer

2.4.1 Precision requirements of the current transformer

As an external component of Sinexcel SVG 200kVar, the current transformer plays a key role for compensation precision of the system in normal operation of Sinexcel SVG 200kVar; the precision of an external current transformer shall be level 0.2 (closed) or above level 0.5 (split); if a lower precision is selected, the compensation precision of Sinexcel SVG 200kVar may be affected.

2.4.2 Ratio selection of the current transformer

In the model of Sinexcel SVG 200kVar the allowable minimum value of ratio of external CT is 600:5; the allowable maximum value is 10000:5; the ratio may be set between such two limits according to the actual CT; the suitability is wider. The ratio of CT shall be selected according to the current of actual load; generally, 1.5 times of maximum current occurred in operation shall be selected; and the suitable allowance may be reserved. After such configuration, Sinexcel SVG 200kVar will have more precise reactive power compensation to realize ideal compensation of client terminal. For example: The maximum load current of client terminal is 1000A, the value between 1500:5 and 2000:5 shall be selected to ensure precise measurement.

Note: As an optional part, the current transformer has open and closed types for your selection. The open CT is installed easily, while the closed CT must be installed when power cut occurs in the client terminal. In selection of a CT, the ratio of CT shall be the allowable value of Sinexcel SVG 200kVar; prior to startup, inspect whether the ratio of external CT of Sinexcel SVG 200kVar is in conformity with that of actual CT or not.

2.4.3 Connection of the current transformer

A CT cable of Sinexcel SVG 200kVar is manufactured as an optional part. It is recommended to select a shielded twisted pair as a CT cable, respectively consisting of three groups of cables, i.e. yellow + black, green + black and red + black. Each group has 2 cables which are twisted together to form a CT cable. When an external CT is connected, the yellow twisted cable shall be connected with A-phase, the green twisted cable shall be connected with B-phase, and the red twisted cable shall be connected with C-phase. The yellow twisted cable is exemplified to explain the connection: The yellow cable is connected with terminal S1 of CT1 and the black cable is connected with terminal S2 of CT1 to ensure consistent direction of the current through CT; otherwise, the compensation effect cannot be realized. Figure 2-4 is the schematic diagram of CT and signal interfaces. Specification selection of CT cables mainly depends on the length of cables.

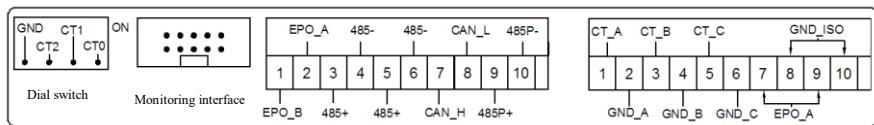


Figure 2-4 Interfaces of external CT terminal strip

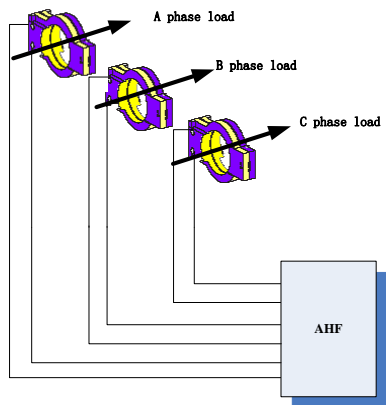


Figure 2-5 CT installing direction diagram

2.4.4 Parallel operation system

In case of parallel operation of multiple power modules, 485+ and 485- shall be respectively connected in parallel, and GND_EPO also shall be connected among the modules used for parallel operation; a 120 Ohm resistance shall be connected in series between 485+ and 485- of the top device and the bottom device in case of parallel operation of multiple modules.

If centralized monitoring is required, only connect the large monitoring system and the monitoring interface shown in Figure 2-4.

Two connection methods are available for EPO:

For one method, Sinexcel large monitoring system is used; at this moment, only connect the emergency stop button and the emergency stop button interface on the large monitoring system and then respectively connect EPO_A and GND_EPO of the modules connected in parallel.

For the other method, the large monitoring system isn't used; at this moment, only connect the emergency stop button with EPO_A and EPO_B shown in Figure 2-4 to realize emergency stop.

In parallel operation, the device number of each module connected in parallel shall be set via the dial switch shown in Figure 2-4; the dial switch has 4 digits, but its valid digits go between the 1st-3rddigit, and the 4th digit is reserved by the manufacturer.

The relation between dial switch and device number is expressed by binary system, as shown in Table 2-3: ("1" indicates "on", and "0" indicates "off").

Table 2-3 Description of dial switch

CT2	CT1	CT0	Device number
0	0	0	1
0	0	1	2
0	1	0	3
0	1	1	4
1	0	0	5
1	0	1	6
1	1	0	7
1	1	1	8

Chapter III Monitoring Module

The display interface of LCD mainly consists of boot interface, main interface, real-time information display interface, parameter setting interface, alarm information interface, on/off interface and version information interface. SVG, after being powered on, shall firstly enter into boot interface as shown in Fig. 3-1 and then enter into the main interface as shown in Fig. 3-2 in a few seconds.



Figure 3-1 Boot interface

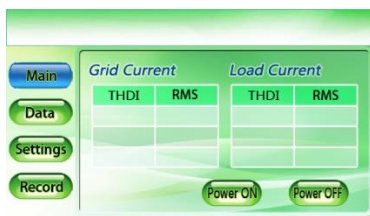


Figure 3-2 Main interface

For specific interface information, please refer to **Table3-1**.

The detail of menu is explained in the following table 3-1:

Table 3-1 SVG menu window and data window items description

Menu Name	Items		Description	
Voltage	RMS Voltage	Voltage (V)	Phase voltage	
		Frequency (Hz)	Frequency	
		THDU (%)	Total harmonic distortion of Voltage	
	L1/L2/L3 - Waveform		Phase voltage waveform	
Current	Load Current (A)	RMS Load Current	Load I	Load phase current
			Load PF	Power factor of load phase
			THDI	Load phase current THDi
		Waveform	current waveform of L1/L2/L3	
	Compensated Current (A)	RMS Comp. Current	Comp. I	System compensated current of L1/L2/L3
			Load Rate	Proportion of the compensation current in the rated output current
		Waveform	Current waveform of L1/L2/L3	
	Grid Current (A)	RMS Grid Current	Grid I	Grid phase current
			Grid PF	Power factor of grid phase
			THDI	Grid phase current THDi

Menu Name	Items		Description
		Waveform	Current waveform of L1/L2/L3
Harmonic Analysis	THD Voltage & Current	Grid THDI	Grid phase current THDi
		Load THDI	Load phase current THDi
		THDU	Load THDi and column diagram
	Harmonic Spectrum		Harmonic spectrum before and after compensation
Temperature	Internal Temp. [1] to [3]		The inverters temp. of L1/L2/L3
	Internal Temp. [4] to [6]		Reserved
Settings	System Parameter Settings	Op. Mode	Setup the operation mode of SVG, harmonic compensation, harmonic and reactive power compensation, load balancing and auto-aging (this mode CANNOT be selected by costumers).
		CT Ratio	External CT ration , such as 300:5 or 600:5...
		CT Location	Should be selected in the load side or supply side
		PT Ratio	The ratio of the transformer
		Harmonic comp. setting	Should be selected in sequential, intelligent or all.
		Individual	Selecte the 2nd to 50th order harmonic
		Slave Module Quantity	Setup the quantity of slave module
		Total Capacity Setting	The total capacity of milt-set system
		Power ON Mode Setting	Should be selected in auto or manual
	System Display Settings	LCD Brightness Setting	Adjust the LCD screen brightness
		Time	Setup the time
		Date	Setup the date
		language	Chinese or English are available
	System Communication Settings	RS485 Adress	Monitoring address
		RS485 Band Rate	The transformation times of carrier wave in unit time

Menu Name	Items	Description
	RS485 Protocol	China TelCom or Modbus are available
	IP Address	Matches to the setting in computer
	Gateway IP	Matches to the setting in computer
	Subnetmask IP	Matches to the setting in computer
Alarm Events	Active Alarm Events	The active alarm events No., name and occurrence time
	History Alarm Events	The history alarm events No., name, occurrence time and end time
Power ON/OFF	Power ON	Confirm power ON
	Power OFF	Confirm power OFF
	Clear Fault	Clear the fault in order to restart the SVG

3.1 Electrification steps

After fixing the device, please confirm electrical connection of Sinexcel SVG 200kVar is completed or not; Sinexcel SVG 200kVar may be electrified after completing the following electrical connection.

1. Confirm all input distribution switches of Sinexcel SVG 200kVar are disconnected completely and marked with warning signs to prevent others from operating.
2. Confirm 3-phase wiring terminal of Sinexcel SVG 200kVar is connected properly, the CT is corresponding with all phases, and all connections meet the installation standard to avoid electric shock hazard.
3. The protective ground and other necessary ground cables are connected with PE of Sinexcel SVG 200kVar to avoid any danger caused by electrification of the enclosure.

3.1.1 Startup steps

After completing the safety inspection for electrification, the engineer debugs it to be in normal condition, and then it may be started as follows.

1. Connect the connecting switch between mains supply and SVG.
2. After normal electrification, provided that SVG is set with “Automatic Startup”, when the startup condition is satisfied, the system will send out the startup command automatically to start up; provided that SVG is set with “Manual Startup”, the user may send out the startup command to start up the system by clicking the startup icon in the on/off interface of LCD after a while of electrification (it takes a while for the system to build up voltage).

3.1.2 Shutdown steps

There are two shutdown methods. One is to directly disconnect the disconnecting switch between SVG and mains supply. This mode is a full shutdown mode. That is, the system is not electrified, and relevant maintenance for the system can be carried out. The other is to conduct shutdown by clicking the shutdown button in on/off interface of LCD. In this shutdown mode, only the operation of power component is closed in the system. Since the system bus and auxiliary power supply are still electrified, the relevant control system is in a standby state. Therefore, maintenance or cabinet opening are not allowed in this mode.

3.1.3 Automatic startup

After electrifying SVG, two startup modes are available, i.e. manual and automatic mode. Such two modes may be set through the monitoring system or backstage. If SVG is set with automatic startup, SVG will be started automatically after electrification.

3.2 Fault information

Table 3-2 Fault information description of Sinexcel SVG

Fault type	Fault decoding	Description
Short fault of the inverter	0X01	The over current of IGBT will activate alarm. For example: The bridge arm is short-circuited.
The fault of auxiliary power supply	0X03	The voltage of auxiliary power supply is lower than the set value. When the valid value is within 8us in case of the fault of auxiliary power supply, CPLD will directly block IGBT trigger pulse.
Over temperature of the inverter	0X06	When the temperature of the base plate, the inverter will stop operating.

Ratio setting fault of CT	0X07	If the current is more than 1.5 times of rated current of CT, the phase sequence of CT is reversed
Overload fault of the inverter	0X08	The output current is more than 150% of rated current
System fault	0X09	DC bus voltage is abnormal
Reading fault of local capacity	0X10	The local capacity is not 200kVar
EPO fault	0X11	Report EPO fault
Abnormal input frequency	0X0A	AC input frequency is out of 45Hz-62Hz
Abnormal input voltage	0X0B	The input phase voltage is out of 138V~265V.
Software version fault	0X0D	DSP software isn't matched with CPLD software
Parameter setting fault of the controller	0X0F	<ol style="list-style-type: none"> 1) The side of CT source; and the capacity of parallel operation is more than that of single device 2) The local capacity is more than the capacity of parallel operation 3) The local capacity is not 145A 4) The input voltage level is not 380V

3.3 Trouble shooting

Device failures can be divided as follows:

1. Failure caused by user's wrong operation: If CT cable is connected reversely, phase sequence of power line is reverse or reference setting is wrong, observe whether this kind of failure can be found during startup commissioning. If the compensation effect is poor but there is no warning information, please contact Sinexcel product engineer.
2. If warning information is displayed on LCD, please contact Sinexcel product engineer directly.

3. If no response after electrification, please contact Sinexcel product engineer directly.

