MANUFACTURER DECLARATIONS
FOR SG150CX

VERSION	DATE	VERSION DESCRIPTION
REV_1.0	2025/04/27	ORIGINAL

INDEX

1 GENERAL INFORMATION

This document will focus on the information required by means of a manufacturer's declaration for certification for the VDE-AR-N 4105:2018 and VDE V 0124-100:2020 standards.

Declaration for SG150CX inverter, to whom it may concern:
We 'Sungrow Power Supply Co., Ltd.', hereby confirm that SG150CX inverter, type designation as SG150CX, parameters including nominal data details as below:

Model or Type designation	SG150CX
PV input parameters:	
VMAX PV [Vd.c.]	1100
MPP Voltage Range [Vd.c.]	180-1000
Max. PV Input Current [Ad.c.]	48A*7
DC Short-circuit current [Ad.c.]	66A*7
AC output (Grid Side) parameters:	
Rated Output Voltage [Va.c.]	3L/N/PE, 220/380V, 230V/400V
Rated Output Frequency [Hz]	50/60
Rated Output Power [kW]	150
Max. Apparent Power [kVA]	165
Rated Output Current [Aa.c.]	216.5
Max. Output Current [Aa.c.]	240.6
Initial short-circuit AC current [Aa.c.]	259.8
Power Factor cosφ [λ]	0.8 leading…0.8 lagging
System:	
Protective Class	Class I
Topology	Transformerless
Operation Temperature Range [°C]	-30~60
Ingress Protection	IP66
Overvoltage-Category	DC (PV) II, AC (Main) III
Max. Operating Altitude [m]	4000
Dimensions (L x W x H) (mm)	1025*795*360
Weight (kg)	≤100

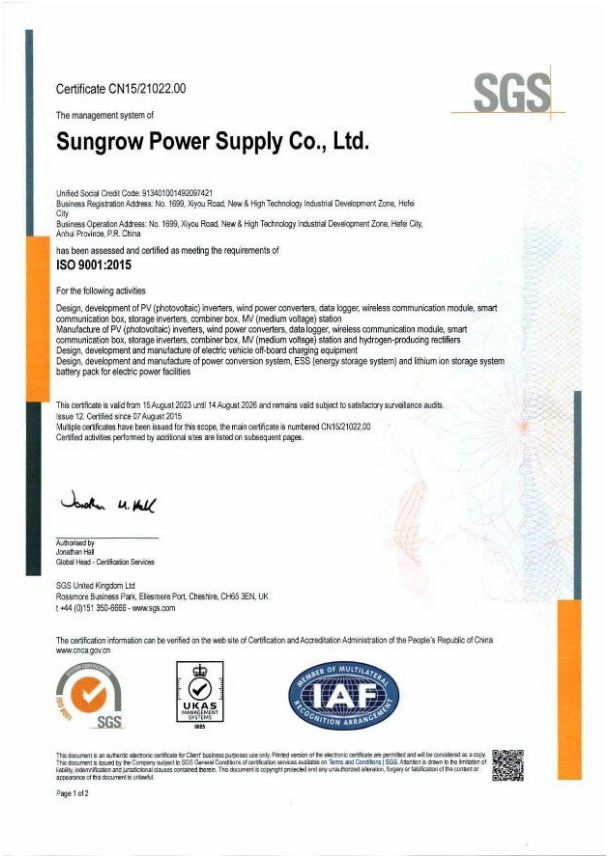
Table 1

2 USE OF COMPONENT CERTIFICATES

Component certificates, please refer to our CDF report of IEC 62109.

3 CERTIFICATE HOLDER

Company: Sungrow Power Supply Co., Ltd.
Address: No. 1699 Xiyou Rd., New & High Technology Industrial Development Zone Hefei, Anhui 230088, P. R. China



Certificate CN15/21022.00

The management system of

Sungrow Power Supply Co., Ltd.

Unified Social Credit Code: 91340100452097421
Business Registration Address: No. 1699, Xiyou Road, New & High Technology Industrial Development Zone, Hefei City
Business Operation Address: No. 1699, Xiyou Road, New & High Technology Industrial Development Zone, Hefei City, Anhui Province, P.R. China

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities

Design, development of PV (photovoltaic) inverters, wind power converters, data logger, wireless communication module, smart communication box, storage inverters, combiner box, MV (medium voltage) station
Manufacture of PV (photovoltaic) inverters, wind power converters, data logger, wireless communication module, smart communication box, storage inverters, combiner box, MV (medium voltage) station and hydrogen-producing rectifiers
Design, development and manufacture of electric vehicle off-board charging equipment
Design, development and manufacture of power conversion system, ESS (energy storage system) and lithium ion storage system battery pack for electric power facilities

This certificate is valid from 15 August 2023 until 14 August 2026 and remains valid subject to satisfactory surveillance audits.
Issue 12. Certified since 07 August 2015
Multiple certificates have been issued for this scope, the main certificate is numbered CN15/21022.00
Certified activities performed by additional sites are listed on subsequent pages.

Authorised by
Jonathan Hall
Global Head - Certification Services

SGS United Kingdom Ltd
Rossmore Business Park, Ellesmere Port, Cheshire, CH65 3EN, UK
t: +44 (0)151 350-6666 - www.sgs.com

The certification information can be verified on the web site of Certification and Accreditation Administration of the People's Republic of China
www.cnca.gov.cn

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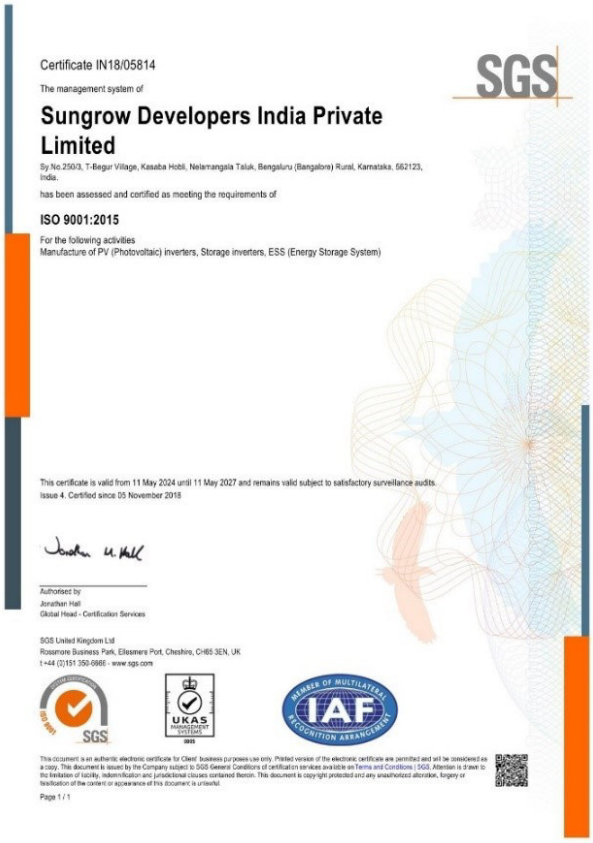
Figure 1



Certificate IN18/05814

The management system of

Sungrow Developers India Private Limited

Sy.No.250/3, T-Begur Village, Kasaba Hobli, Nelamangala Taluk, Bengaluru (Bangalore) Rural, Karnataka, 562123, India.

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities
Manufacture of PV (Photovoltaic) inverters, Storage inverters, ESS (Energy Storage System)

This certificate is valid from 11 May 2024 until 11 May 2027 and remains valid subject to satisfactory surveillance audits.
Issue 4. Certified since 05 November 2018

Authorised by
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Global Head - Certification Services

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Figure 2

Certificate TH22/00000293

The management system of

SUNGROW DEVELOPERS (THAILAND) CO., LTD.

224 Moo 16, Tumbon Nongkham, Amphur Sriracha, Chonburi 20230, Thailand

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities
Manufacture of Photovoltaic Inverters and Energy Storage System

This certificate is valid from 16 August 2022 until 28 March 2025 and remains valid subject to satisfactory surveillance audits.
Issue 2. Certified since 28 March 2022.

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Figure 3

We Sungrow Power Supply Co., Ltd. declare that all of our production procedures for Inverter will be in accordance with ISO9001 during the 5 years that ISO9001 is in force, and that we will continue to produce and develop in accordance with ISO9001 even after the 5-year validity period has expired.

4 PROOF OF TYPE TESTING / FAMILY FORMATION

Type model is SG150CX, It use IGBT with the following specifications:
The specific specifications of IGBT are as follows:

Type / IGBT module	HF5G060N120FT2& GD600TLA120L6L_B20
Quantity DC Link Capacitor	36
Clock frequency	100MHz
Type of power control	SVPWM, DPWM
Max. Output current	400A

Table 2

Hardware version: SG150CX
Software version:
LCD_MARBLE-S_V11_V01_A
MDSP_MARBLE-S_V11_V01_A

Block diagram:

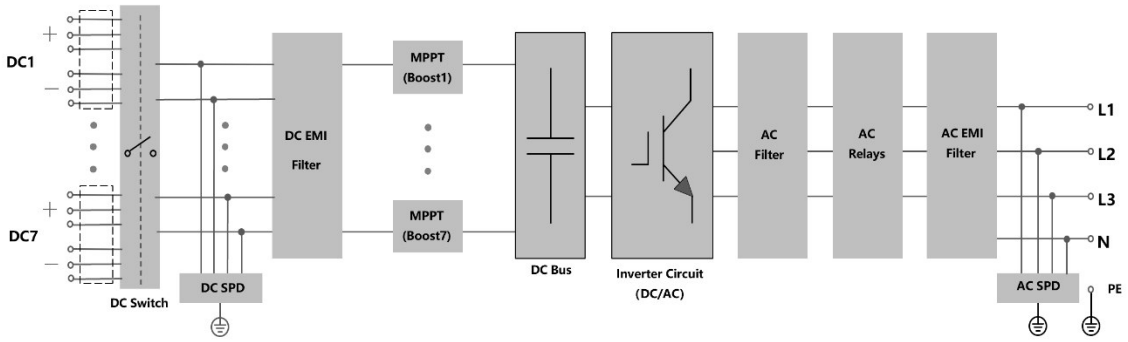

Figure 4

5 QUASI-STEADY-STATE OPERATION

SG150CX inverte meet the operating range of quasi-static operation as described Figure 5 as below:

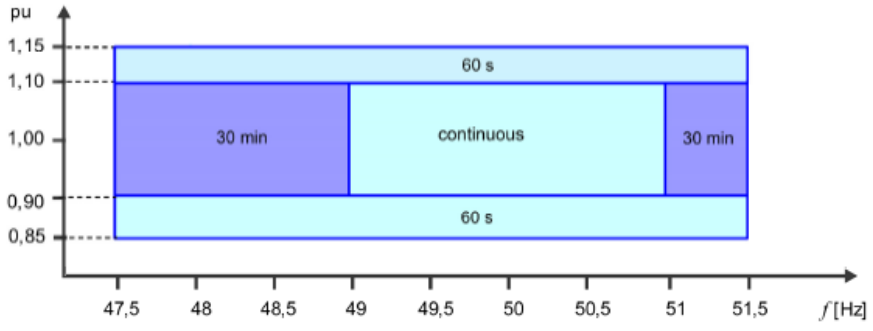

Figure 4 – Requirements for the quasi-steady-state operation of power generating plants

Figure 5

Beyond the above operating range, for SG150CX, maixmal duration of voltage and frequency:
85% Un < U <115% Un Continues,
47.5 Hz < Freq < 51.5 Hz Continues,
U≤0.8: 3.0s,
U≥1.25: 0.1s,
Freq≤47.5Hz: 0.10s,
Freq≥51.5Hz: 0.10s
The unit can be continuously operated within the voltage/frequency range of 80%Un and 120%Un/47.5Hz and 52Hz. The operating range of voltage and frequency can also be limited using the protection functions
Remark: When the internal protection and FVRT functions are disabled, the machine cannot be operated outside the range.
All adjustments outside of the recommended settings of VDE-AR-N 4105 should be approved by the gird provider and Sungrow Power Supply Co., Ltd.

6 COMMUTATION

Interface:RS485/WLAN Communication/Ethernet Communication
There is single interface for network security management integrated in each unit and only one command from network or third party can be responded a time. At the same time, only one communication method can be used.

7 REACTIVE POWER

Before the machine leaves the factory, the reactive power control curves are all disabled, qualified personnel can use iSolarCloud App to enable them. For SG150CX, without setting reactive power control, the PGU shouldn't be able to feed-in. iSolarCloud App is an application used to communicate with the inverter via RS485/WLAN Communication/Ethernet Communication. Commonly used functions:

7.1 STATIC VOLTAGE MAINTENANCE/REACTIVE POWER SUPPLY

For SG150CX inverter, there are four modes for reactive power control:
1. Displacement factor/active power characteristic curve cos ϕ (P).
2. Fixed displacement factor cos ϕ.
3. Specified reactive power percentage of maximum apparent power.
4. Reactive power voltage characteristic curve Q(U)

All these models will be disabled by default and only one module can be enabled at a time. The reactive power injection function will only take effect when the current active power is at 10% of the maximum active power. The adjustment range of the power factor is from 0.90 under-excited to 0.90 over-excited. The reactive power adjustment range is ±0.436 times the maximum active power. When the Q(U) curve test is enabled for SG150CX, when the voltage is 0.97~1.03Un, the reactive power is 0. When U=0.93Un, the minimum reactive power is 0.436*S_{max}, and when U=1.07Un, the maximum reactive power is the reactive power is - 0.436*S_{max}.
SG150CX inverter meet VDE4105 5.7.2.2. please refer to the blew Figure 6 to Figure 9.

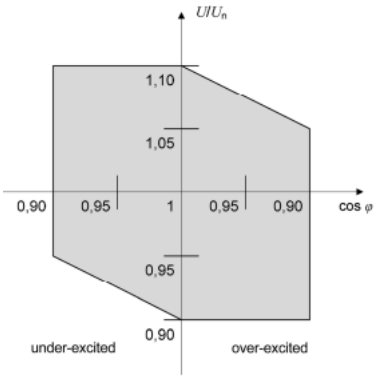

Figure 3 – Requirements for power generation units regarding the reactive power supply at the generator terminals ($\sum S_{Emax} > 4{,}6$ kVA)

Figure 6

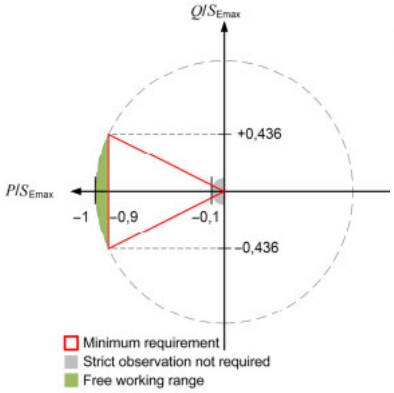

Figure 6 – *P*/*Q* diagram for type 2 (inverters only) $\sum S_{Emax} > 4{,}6$ kVA at the generator terminals in the passive sign convention system

Figure 7

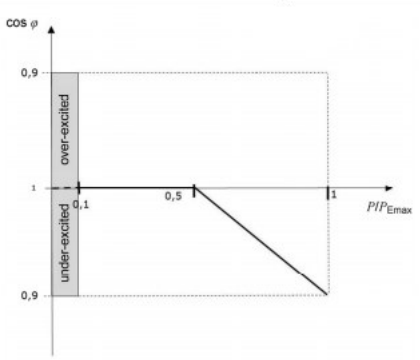

Figure 9 – Standard characteristic curve for type 2 (inverters only) $\sum S_{Emax} > 4{,}6$ kVA

Figure 8

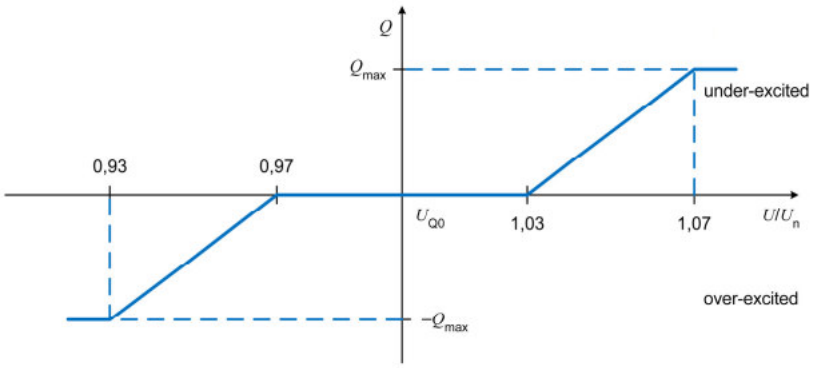

Figure 7 – Standard *Q*(*U*) characteristic curve

Figure 9

Since the P_{Amax} of SG150CX is greater than 135kW, the settable values of Q (U) curve and cos φ (P) also satisfy VDE4105 8.4 at the same time.

When selecting the operating mode “reactive power characteristic curve Q(U)”, it shall be parametrised as specified in Figure 7 in 5.7.2.4 of this VDE application guides (e. g. by applying the method “reactive power with voltage limiting function” according to VDE-AR-N 4110). For this purpose, Qmax = P_{Emax} × 0,33 shall be set.

When selecting the operating mode “displacement factor/active power characteristic curve cos ϕ (P)” according to this application guide, the method “reactive power/active power characteristic curve Q(P)” according to VDE-AR-N 4110 shall be selected. For this purpose, the following support points shall be parametrised in accordance with VDE-AR-N 4110, Figure 9: P1 (0,0/0,0), P2 (– 0,5/0,0), P3 (– 1,0/0,33).

For SG150CX, Q (U) curve, Fix cos φ, cos φ (P), their setpoint and range as follows

Function	Default set point	Set range	Minimal step
Fixed cos φ			
Power factor	1.00	-1.000~-0.800 0.800~1.000	0.001
Fixed Q			
Reactive Power	0.0% Pn	-100%~100% Pn	0.1% Pn
Q(U) - VDE-AR-N 4110			
QU Curve	OFF	ON/OFF	/
U1	93.0% Un	77.0%~123.0% Un	0.1%Un

Q1	-48.4%*Pn -36.3%* Pn (For P_{Amax}>135kW)	-66.0%~0.0% Pn	0.1%Pn
U2	97.0% Un	77.0%~123.0% Un	0.1%Un
Q2	0.0% Pn	-66.0%~66.0% Pn	0.1%Pn
U3	103.0% Un	77.0%~123.0% Un	0.1%Un
Q3	0.0% Pn	-66.0%~66.0% Pn	0.1%Pn
U4	107.0% Un	77.0%~123.0% Un	0.1%Un
Q4	48.4%* Pn 36.3%* Pn (For P_{Amax}>135kW)	0.0%~66.0% Pn	0.1%Pn
Setting Time Reactive Response Time	10s	0.1~600.0	0.1
cos φ(P) - VDE-AR-N 4110			
cos φ Curve	OFF	ON/OFF	/
Point A power	20.0% Pn	0.0%~100.0%Pn	0.1% Pn
Point A cosφ	1.000	-1.000~-0.800 0.800~1.000	0.001
Point B power	50.0% Pn	0.0%~100.0%Pn	0.1% Pn
Point B cosφ	1.000	-1.000~-0.800 0.800~1.000	0.001
Point C power	100.0% Pn	0.0%~100.0%Pn	0.1% Pn
Point C cosφ	0.900	-1.000~-0.800 0.800~1.000	0.001
Setting Time Reactive Response Time	10s	0.1~600.0	0.1
Q(P) - VDE-AR-N 4110			
cos φ Curve	OFF	ON/OFF	/
Point A power	20.0% Pn	0.0%~100.0%Pn	0.1% Pn
Point A Reactive	0.000Pn	-0.660~0.660Pn	0.001 Pn
Point B power	50.0% Pn	0.0%~100.0%Pn	0.1% Pn
Point B Reactive	0.000Pn	-0.660~0.660Pn	0.001 Pn
Point C power	100.0% Pn	0.0%~100.0%Pn	0.1% Pn
Point C Reactive	0.330Pn	-0.660~0.660Pn	0.001 Pn
Setting Time Reactive Response Time	10s	0.1~600.0	0.1

Table 3

8 ACTIVE POWER OUTPUT AND NETWORK SECURITY MANAGEMENT

8.1 GENERAL INFORMATION AND GRID SAFETY MANAGEMENT

For SG150CX inverter, active power level as below.

The lowest active power can be set to 0%P_{rE}.

The reduction request of the grid operator can be set via the following communications and read the acive power of the inverter by the time：

Power gradients of SG150CX inverter shall be observed for increasing/reducing the active power output of (minimum technical power or 5 % P_{Amax} ↔ 100 % P_{Amax})

- at a maximum rate of 0.66 % P_{Amax} per s.
- at a minimum rate 0.33 % P_{Amax} per s.

The priority of the command execution of SG150CX inverter

1) avoidance or limitation of any damage to systems and equipment, in particular, at overload and short-circuit protection;

2) compliance with the requirements for dynamic network stability according to 5.7.3;

3) specifications by the network security management of the network operator according to 5.7.4.2;

4) compliance with the requirements for PAV, E monitoring according to 5.5.2;

5) compliance with the requirements for the reaction to over-frequency and under-frequency according to 5.7.4.3;

6) compliance with the requirements for the reactive power operating mode for steady-state voltage stability according to 5.7.2.2;

7) frequency control (control power) according to 6.6.1 and 6.6.2.

Prioritization does not restrict any requirements for the design of the system and its protective devices. The requirements of lower priority are to be implemented unless in conflict with the requirements of higher priority.

Communication Wiring Area

Communication port RS485_1 and RS485_2 can be used for remote setting of power control and other functions. RS485_2 used for the cascading of wireless communication module. RS485_1 used to connect an external intelligent communication box. The wireless communication module and the intelligent communication box cannot be used together, only one RS485 can be actived at a time. RS485/WLAN Communication/Ethernet Communication are all connected to RS485_2.

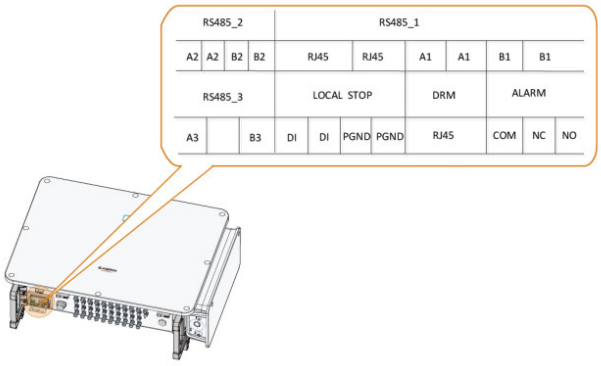

Figure 10

No.	Label	Description
1	RS485_2	Used for the cascading of wireless communication module or connecting an external intelligent communication box. Fast dispatch can be enabled if an external intelligent communication box is connected.

2	RS485_1	Used to connect an external intelligent communication box for data interaction with the upper computer or other monitoring devices. It can be used for the parallel connection of multiple inverters.
3	RS485_3	Used for connecting an external energy meter.
4	LOCAL STOP	Emergency stop.
5	DRM	For external Demand Response Enabling Device ("AU"/ "NZ")
6	ALARM	It can be used to connect an external LED indicator or other indication device to show whether the inverter is in the fault state

Table 4

8.2 ACTIVE POWER OUTPUT AS A FUNCTION OF GRID FREQUENCY

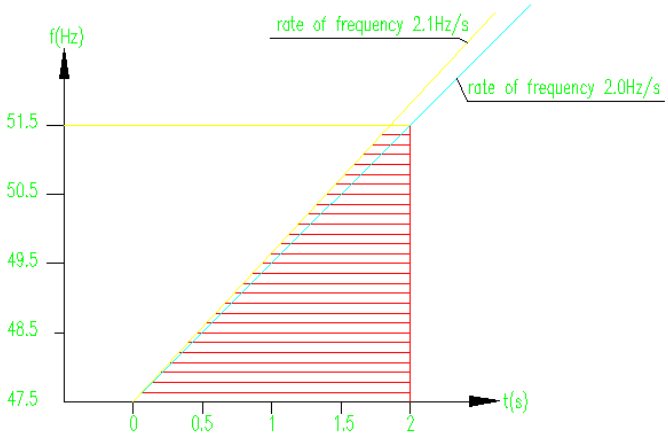

Figure 11

SG150CX inverter cpmply with VDE4105 Cap 5.7.1

1. ±2 Hz/s for a moving time slot of 0.5s was programmed in the DSP,
2. if the value of 2.1Hz/s is exceeded, then the inverter will be triped,
3. the inverter will be able to ride through the “worst case” of the frequency change (min:47.5Hz, max:51.5Hz, Change at the rate of 2Hz/s)

The ability to ride through rates of change of frequency (RoCoF) of SG150CX inverter:
±2 Hz/s for a moving time slot of 0.5s;
or ±1.5 Hz/s for a moving time slot of 1s;
or ±1.25 Hz/s for a moving time slot of 2s

RoCoF of SG150CX inverter fulfill the requirement of chap. 5.7.1 in VDE4105.
– Sample rate for frequency measurement: 100ms,
– Measure accuracy of frequency: 10mHz in steady-state, 50mHz in dynamic-state

SG150CX inverter do not reduce its specified active power output in the following curve:

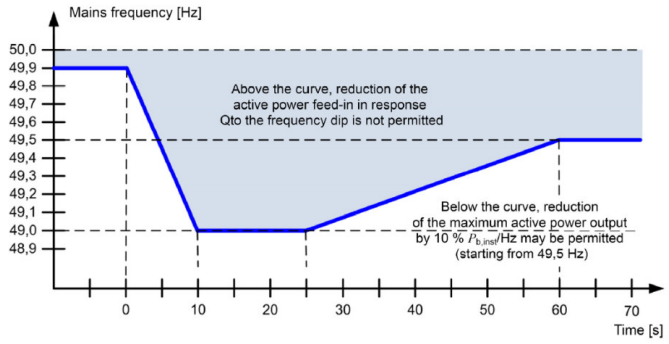

Figure 12

P(f)-diagram of SG150CX inverter meets the requirement of figure below.

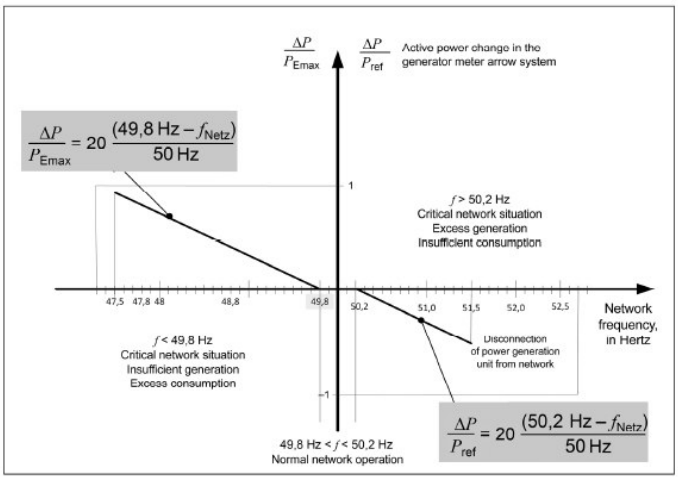

Figure 13

For SG150CX inverter, the set point and range as below

Function	Default set point	Set range	Minimal step size
Active power feed-in at overfrequency			
Active power feed-in at overfrequency	ON	ON/OFF	--
Over frequency threshold	50.20 Hz	50.02~55.00 Hz	0.01 Hz
Droop	5%(40%P_{ref}/Hz)	0.0%~100.0% P_{ref}/Hz	0.1% P_{ref}/Hz
Deactivation Upper threshold	50.20 Hz	50.02~55.00 Hz	0.01 Hz
The 10-min Ramp-Limitation	10% Pn/min	1~6000% Pn/min	1% Pn/min
Active power feed-in at underfrequency			
Active power feed-in at underfrequency	ON	ON/OFF	--
Under frequency threshold	49.80 Hz	45.00~49.98 Hz	0.01 Hz
Droop	5%(40%P_{ref}/Hz)	0.0%~100.0% P_{ref}/Hz	0.1% P_{ref}/Hz
Deactivation Lower threshold	49.80 Hz	45.00~49.98 Hz	0.01 Hz
The 10-min Ramp-Limitation	10% Pn/min	1~6000% Pn/min	1% Pn/min

Table 5

In the event of overfrequency outside the controllable range, conditionally controllable DCIs keep the power fed in when leaving the control range constant until it is switched off, In the case of condition all controllable

DCIs, there is no switch-off at underfrequency between 49.8 Hz and 47.5 Hz. But The generation unit is not a conditionally controllable type.

9 CONNECTION AND RECONNCETION

9.1 SWITCHING-IN CONDITIONS

This chapter can be separated in two different parts, as different requirements are presented for connection with or without a previous protection trip.

Connection without prior protection trip: For SG150CX inverter, the connect condition as follow, Lower frequency 47.5 Hz, Upper frequency 50.1 Hz, Lower voltage 0.85 Un and Upper voltage 1.1 Un. For a normal switch off, the U and F of grid is measured for 60s long, that is to say the observation time should > 60s and then resumes connecting to the grid at 10% Pn/min.

Connection after a protection trip: For SG150CX inverter, the connect condition as follow, Lower frequency 47.5 Hz, Upper frequency 50.1 Hz, Lower voltage 0.85 Un and Upper voltage 1.1 Un. Observation time should > 60s. After protective tripping, DSP program continuous monitoring the voltage and frequency for 60s to ensure the voltage and frequency return to the normal range and then reconnect the inverter to grid. The machine waits for 60s and then resumes grid connection at 10%Pn/min;

Since the P_{Amax} of SG150CX is greater than 135kW, the Lower voltage limit of reconnection also satisfy VDE4105 8.4 at the same time.
Connection condition: The connection of a power generation system or storage unit in accordance with VDE-AR-N 4110 is conducted at an operating voltage between 90 % Un and 110 % Un at the generator terminals of the power generation unit with the permissible power gradients as specified in VDE-AR-N 4110.

For SG150CX inverter, Grid reconnection, default setting as follows,

Function	Reconnection
Lower voltage limit	0.85Un (0.90Un for P_{Amax}>135kW)
Voltage upper limit	1.10Un
Lower frequency limit	47.50
Upper frequency limit	50.10

Table 6

10 FRT

For SG150CX inverter operate stable and not disconnect from the network throughout the operating range as shown in ficture below.

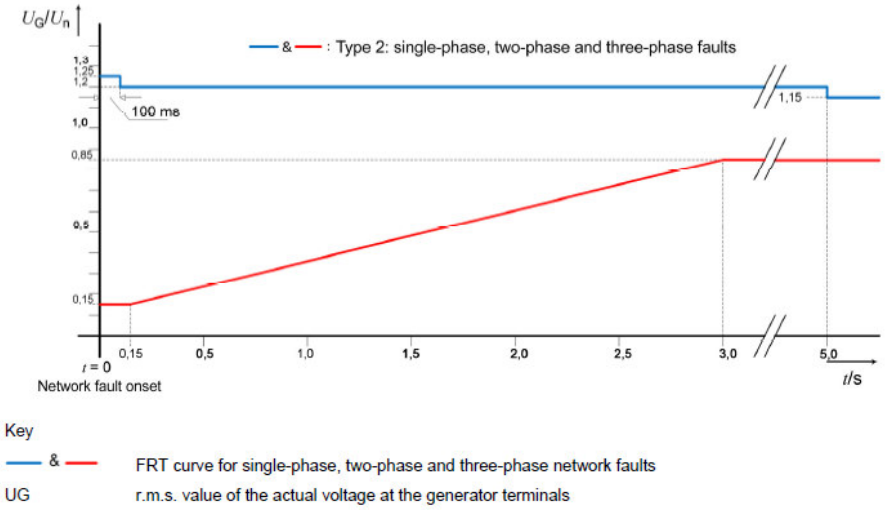

Figure 14

Voltage-Time-Diagram for SG150CX inverter of LVRT and HVRT:

LVRT	Time [s]	U [p.u.]
	0.00	15% Un
	0.15	15% Un
	3.00	85% Un
HVRT	Time [s]	U [p.u.]
	0.00	125% Un
	0.15	125% Un
	3.00	120% Un

Table 7

There is no injection either active or reactive current during a line voltage of SG150CX inverter at the PGUs terminals below 0.8 Un and above 1.15 Un. After the end of a fault, reaction time of active power up to 1 s, reaction time of reactive power with 3 tau = 10 s.

For SG150CX inverter, when the fault ride-through function is enabled, if hardware overvoltage and overcurrent protections are not continuously triggered within 2 seconds, there will be no limit on the number of times the ride-through can occur within the specified time. Otherwise, it will immediately report the corresponding hardware fault and initiate protection.

Since the P_{Amax} of SG150CX is greater than 135kW, the dynamic network stability also satisfy VDE4105 8.4 at the same time.

For the dynamic network stability, type 2 power generation systems shall be set to the operating mode “limited dynamic network stability” in accordance with VDE-AR-N 4110, 10.2.3.3.2.

– From the onset of the fault, the generating units must support the voltage by adjusting (increasing or decreasing) the reactive current IB (by adding an additional reactive current IB).
– The additional reactive current △IB of the generating unit must be proportional to the voltage deviation △u (△IB = k *△u), where k is the amplification factor. The additional reactive current in the co-system △IB1 is proportional to the change in the co-system voltage △u1, the additional reactive current in the counter system △IB2 is proportional to the change of the counter system voltage △U2. The gain factor k must be adjustable between 2 and 6 in steps of 0.5 in relation to the terminals of the generating units.

11 SHORT-CIRCUIT CONTRIBUTION

RMS value of the initial symmetrical short circuit current (Ik") for phase short circuit fault at the connection point, please refer to Table 1 on page 3

12 PROTECTION

The SG150CX inverter is equipped with comprehensive hardware protections, including over-limit protection for the primary current, DC bus voltage, and output current, as well as undervoltage protection for the auxiliary power source. They also feature relay stick detection and insulation fault detection capabilities. The software protections encompass high and low voltage safeguards for the DC input, high and low temperature

protections, and defenses against various grid anomalies. Additionally, the system includes a self-inspection function for the inverter's sampling modules, auxiliary power source voltage, and storage modules upon power-up. There are Main DSP and Slave DSP for SG150CX inverter, and they can operate independent for control functions.

All other protective functions described in VDE-AR-N 4105:2018-11, 6.5 are either fixed or protected against unauthorised access by additional and Voltage protection fuction evaluation at condition 50 Hz fundamental oscillation, separate protection.

The grid protection setting as follow,

Function	Default value	Minimal step size	Set range	Trip time
UV stage1 trip value	184.0V	0.1 V	11.5~229.9 V	3s
UV stage2 trip value	103.5V	0.1 V	11.5~229.9 V	0.3s
OV stage1 trip value	287.5V	0.1 V	230.2~332.0 V	0.1s
OV stage2 trip value	253.0V	0.1 V	230.2~332.0 V	10min (3s)
UF stage1 trip value	47.50Hz	0.01Hz	45.00~49.96 Hz	0.1s
OF stage1 trip value	51.50Hz	0.01Hz	50.04~55.00 Hz	0.1s

Table 8

For SG150CX inverter, the unit has two relays on each L line and N line in the AC side as auto switch device.

In the event of a fault, the protection command from DSP will open the relay to disconnect inverter from the network.

The tie switch has a control voltage which disconnects the generation unit from the mains when it is interrupted.

The coupling switch used complies with the requirement of IEC 62109.

When the power grid is abnormal or the machine fails, the CPU and the fault protection circuit will double block off the front stage boost IGBT and the backstage inverter drive, which can ensure the realization of fast and safe cut-off of the power circuit. It also controls the relays to disconnect fromthe grid for protection redundancy.

In addition to the internal integrated relay, an independent three or four pole circuit breaker for each inverter must be installed at the outputside to ensure that the inverter can be securely disconnected from the grid.

Inverter model	Recommended nominal current of AC breaker
SG150CX	300A(Single)

Table 9

The following single failure will not lead to loss of safety function.

a) Error of an AD converter. voltage measurement card;

b) malfunction or freezing of a microprocessor or PLC;

c) melting or jamming the contacts of the switching output;

d) supply voltage overvoltage;

e) line break in connecting lines between measurement input and control output to the dome switch;

f) Supply voltage failure (auxiliary voltage)

Inventers meet VDE 0124 5.5.9.2 and VDE4105 4.3 requirements.

The first-level basic settings have an initial setting password. You can use it to set some basic parameters. Some protection and related function settings require a second-level password.

12.1 OWN AND AUXILIARY POWER SUPPLY

The protection system is powered by auxiliary power which is supplied by PV side and grid side. If failure of the auxiliary power of the protective devices, the SG150CX inverter will switching off.

12.2 ERROR MESSAGES

9 Troubleshooting and Maintenance

9.1 Troubleshooting

Once the inverter fails, the fault information is displayed on the App interface. If the inverter is equipped with an LCD screen, the fault information can be viewed on it.
The fault codes and troubleshooting methods of all PV inverters are detailed in the table below, and only some of the faults may occur to the model you purchased. When a fault occurs, you can check the fault information according to the fault code on the mobile app.

Fault Code	Fault Name	Corrective Measures
2, 3, 14, 15	Grid Overvoltage	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage, and contact the local electric power company for solutions if the grid voltage is higher than the set value. 2. Check whether the protection parameters are appropriately set via the App or the LCD. Modify the overvoltage protection values with the consent of the local electric power operator. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
4, 5	Grid Undervoltage	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage, and contact the local electric power company for solutions if the grid voltage is lower than the set value. 2. Check whether the protection parameters are appropriately set via the App or the LCD. 3. Check whether the AC cable is firmly in place. 4. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.

Fault Code	Fault Name	Corrective Measures
8	Grid Overfrequency	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid frequency, and contact the local electric power company for solutions if the grid frequency is beyond the set range. 2. Check whether the protection parameters are appropriately set via the App or the LCD. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
9	Grid Underfrequency	
10	Grid Power Outage	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Check whether the grid supplies power reliably. 2. Check whether the AC cable is firmly in place. 3. Check whether the AC cable is connected to the correct terminal (whether the live wire and the N wire are correctly in place). 4. Check whether the AC circuit breaker is connected. 5. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
12	Excess Leakage Current	1. The fault can be caused by poor sunlight or damp environment, and generally the inverter will be reconnected to the grid after the environment is improved. 2. If the environment is normal, check whether the AC and DC cables are well insulated. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
13	Grid Abnormal	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid, and contact the local electric power company for solutions if the grid parameter exceeds the set range. 2. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.

Fault Code	Fault Name	Corrective Measures
17	Grid Voltage Imbalance	Generally, the inverter will be reconnected to the grid after the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage. If grid phase voltages differ greatly, contact the electric power company for solutions. 2. If the voltage difference between phases is within the permissible range of the local power company, modify the grid voltage imbalance parameter through the App or the LCD. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
28, 29, 208, 212, 448-479	PV Reserve Connection Fault	1. Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the string current drops below 0.5 A. 2. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists. *The code 28 to code 29 are corresponding to PV1 to PV2 respectively. *The code 448 to code 479 are corresponding to string 1 to string 32 respectively.
532-547, 564-579	PV Reverse Connection Alarm	1. Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the string current drops below 0.5 A. 2. Contact Sungrow Customer Service if the preceding causes are ruled out and the alarm persists. *The code 532 to code 547 are corresponding to string 1 to string 16 respectively. *The code 564 to code 579 are corresponding to string 17 to string 32 respectively.

Fault Code	Fault Name	Corrective Measures
548-563, 580-595	PV Abnormal Alarm	Check whether the voltage and current of the inverter is abnormal to determine the cause of the alarm. 1. Check whether the corresponding module is sheltered. If so, remove the shelter and ensure module cleanness. 2. Check whether the battery board wiring is loose, if so, make it reliably connected. 3. Check if the DC fuse is damaged. If so, replace the fuse. 4. Contact Sungrow Customer Service if the preceding causes are ruled out and the alarm persists. *The code 548 to code 563 are corresponding to string 1 to string 16 respectively. *The code 580 to code 595 are corresponding to string 17 to string 32 respectively.
37	Excessively High Ambient Temperature	Generally, the inverter will resume operation when the internal or module temperature returns to normal. If the fault persists: 1. Check whether the ambient temperature of the inverter is too high; 2. Check whether the inverter is in a well-ventilated place; 3. Check whether the inverter is exposed to direct sunlight. Shield it if so; 4. Check whether the fan is running properly. Replace the fan if not; 5. Contact Sungrow Power Customer Service if the fault is due to other causes and the fault persists.
43	Excessively Low Ambient Temperature	Stop and disconnect the inverter. Restart the inverter when the ambient temperature rises within the operation temperature range.

Fault Code	Fault Name	Corrective Measures
39	Low System Insulation Resistance(Earth Fault)	Wait for the inverter to return to normal. If the fault occurs repeatedly: 1. Check whether the ISO resistance protection value is excessively high via the app or the LCD, and ensure that it complies with the local regulations. 2. Check the resistance to ground of the string and DC cable. Take corrective measures in case of short circuit or damaged insulation layer. 3. If the cable is normal and the fault occurs on rainy days, check it again when the weather turns fine. 4. If there are batteries, check whether battery cables are damaged and whether terminals are loose or in poor contact. If so, replace the damaged cable and secure terminals to ensure a reliable connection. 5. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
106	Grounding Cable Fault	1. Check whether the AC cable is correctly connected. 2. Check whether the insulation between the ground cable and the live wire is normal. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
88	Electric Arc Fault	1. Disconnect the DC power supply, and check whether any DC cable is damaged, the connection terminal or fuse is loose or there is a weak contact. If so, replace the damaged cable, fasten the terminal or fuse, and replace the burnt component. 2. After performing step 1, reconnect the DC power supply, and clear the electric arc fault via the App or the LCD, after that the inverter will return to normal. 3. Contact Sungrow Customer Service if the fault persists.

Fault Code	Fault Name	Corrective Measures
84	Reverse Connection Alarm of the Meter/CT	1. Check if the meter is wrongly connected. 2. Check if the input and output wiring of the meter is reversed. 3. If the existing system is enabled, please check if the rated power setting of the existing inverter is correct.
514	Meter Communication Abnormal Alarm	1. Check whether the communication cable and the terminals are abnormal. If so, correct them to ensure reliable connection. 2. Reconnect the communication cable of the meter. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the alarm persists.
323	Grid Confrontation	1. Check whether the output port is connected to actual grid. Disconnect it from the grid if so. 2. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.
75	Inverter Parallel Communication Alarm	1. Check whether the communication cable and the terminals are abnormal. If so, correct them to ensure reliable connection. 2. Reconnect the communication cable of the meter. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the alarm persists.
7, 11, 16, 19–25, 30–34, 36, 38, 40–42, 44–50, 52–58, 60–69, 85, 87, 92, 93, 100–105, 107–114, 116–124, 200–211, 248–255, 300–322, 324–328, 401–412, 600–603, 605, 608, 612, 616, 620, 622–624, 800, 802, 804, 807, 1096–1122	System Fault	1. Wait for the inverter to return to normal. 2. Disconnect the AC and DC switches, and disconnect the battery side switches if there are batteries. Close the AC and DC switches in turn 15 minutes later and restart the system. 3. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists.

Fault Code	Fault Name	Corrective Measures
59, 70–74, 76–83, 89, 216–218, 220–233, 432–434, 500–513, 515–518, 635–638, 900, 901, 910, 911, 996	System Alarm	1. The inverter can continue running. 2. Check whether the related wiring and terminal are abnormal, check whether there are any foreign materials or other environmental abnormalities, and take corresponding corrective measures when necessary. 3. If the fault persists, please contact Sungrow Power Customer Service.
264-283	MPPT Reverse Connection	1. Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the string current drops below 0.5 A. 2. Contact Sungrow Customer Service if the preceding causes are ruled out and the fault persists. *The code 264 to code 279 are corresponding to string 1 to string 20 respectively.
332-363	Boost Capacitor Overvoltage Alarm	1. The inverter can continue running. 2. Check whether the related wiring and terminals are abnormal, check whether there are any foreign materials or other environmental abnormalities, and take corresponding corrective measures when necessary. If the fault persists, please contact Sungrow Power Customer Service.
364-395	Boost Capacitor Overvoltage Fault	1. Disconnect the AC and DC switches, and disconnect the battery side switches if there are batteries. Close the AC and DC switches in turn 15 minutes later and restart the system. 2. If the fault persists, please contact Sungrow Power Customer Service.

Fault Code	Fault Name	Corrective Measures
1548-1579	String Current Reflux	1. Check whether the number of PV modules of the corresponding string is less than other strings. If so, disconnect the DC switch and adjust the PV module configuration when the string current drops below 0.5 A. 2. Check whether the PV module is shaded; 3. Disconnect the DC switch to check whether the open circuit voltage is normal when the string current drops below 0.5 A. If so, check the wiring and configuration of the PV module, 4. Check whether the orientation of the PV module is abnormal.
1600 - 1615, 1632 - 1655	PV Grounding Fault	1. When the fault occurs, it is forbidden to directly disconnect the DC switch and unplug PV terminals when the direct current is greater than 0.5 A; 2. Wait until the direct current of the inverter falls below 0.5 A, then disconnect the DC switch and unplug the faulty strings; 3. Do not reinsert the faulty strings before the grounding fault is cleared; 4. If the fault is not caused by the foregoing reasons and still exists, contact Sungrow Customer Service.
1616	System Hardware Fault	1. It is prohibited to disconnect the DC switch when the DC current is greater than 0.5 A when the fault occurs. 2. Disconnect the DC switch only when the inverter DC side current drops below 0.5 A. 3. It is prohibited to power up the inverter again. Please contact Sungrow Customer Service.

Contact the dealer if the measures listed in the "Troubleshooting Method" column have been taken but the problem persists. Contact SUNGROW if the dealer fails to solve the problem.

Figure 15

12.3 COUPLING SWITCH

The SG150CX uses the CHAR-112A270C miniature high-power relay from Churod Electronic Co.,Ltd. to achieve fault-tolerant automatic disconnection functionality. This relay has passed multiple certifications including UL, TUV SUD, and CQC, ensuring reliable quality. The relay has a maximum switching current of

275A and can handle a maximum switching Voltage 1000Vac. Under conditions of 1000Vac voltage, 270A current, and 85 degrees Celsius temperature, it can achieve 1 Million cycle counts. Its excellent mechanical and electrical endurance ensures a long service life for this series of products. The operating time of this relay is up to 45ms, and the release time is up to 10ms, meeting the requirements of clause 6.5 of VDE-AR-N 4105:2018-11.

RELAY OF SPECIFICATION

继电器规格书

(File No.: 001294 / Version: 12 / Issued Date:Oct. 19th, 2020 / Updated Date: Nov.06th, 2023)

Product Description（品名） **CHAR-112A270C**
Part Number（编码）
Customer name（客户） 合肥阳光电源

Customer Approval （客户批准）

STAMPING AREA （盖章处）

Issued（发行）	Checked（审核）	Approved（承认）
Lights.Li	Wenjun.Wang	Andy.Tang

变更记录			
序号	更改内容	更改原因	更改时间
01	1、品名由：CHAR-112A250C 变更为 CHAR-112A270C。 2、额定电流由 250A 变更为 270A。 3、电寿命 1：1000VAC，Current：Making 50A/0.15s→Carrier 250A /0.7s → Break 50A/0.15s 变更为：1000VAC,Current：Making 55A/0.15s→Carrier 270A/0.7s→Break 55A/0.15s。 4、电寿命 2：1000VAC，Current：Make-Break250A/1s 变更为：1000VAC，Current：Make-Break270A/1s 5、介电强度：由 4000VAC 1 分钟（线圈与触点间）变更为 5000VAC 1 分钟（线圈与触点间）。 6、增加满载 270A 客户使用注意事项。 7、优化外形尺寸与公差。	提升产品能力 提升产品能力 提升产品能力 提升产品能力 依据客户要求 增加注意事项 优化方便使用	2020-12-28
02	V2-V3：变更主端子尺寸和线圈端子尺寸。 接线图刷新。	依客户要求 优化方便使用	2021-03-12
03	1、修改塑胶部件清单中的基座材料； 2、新增绝缘距离和、电压类别和结构示意图；	更新和完善规格书	2021-04-30
04	修正绝缘距离数值	绝缘距离错误	2021-05-24
05	1、修正绝缘距离数值； 2、捺印图墙加安规标志 3、注意事项第 11 条中的：客户整机工况需确保端子温升不超过 50K（电寿命后）变更为客户整机工况需确保端子温升不超过 50K 4、接线图更新	绝缘距离错误 依客户要求 依客户要求 与安规一致	2021-06-01
06	删除注意事项第 11 条内容	依客户要求	2021-06-17
07	1、产品外形尺寸图增加局部标注； 2、增加胶水信息。	依客户要求	2021-08-03
08	释放时间由 ≤30ms 变更为 ≤10ms ，	依客户要求	2021-08-17
09	修改塑胶部件清单中的基座材料	更新规格书	2022-01-07
10	修改塑胶部件清单中的基座材料	更新规格书	2022-01-10
11	增加英文版变更记录	依客户要求	2023-08-14
12	捺印增加产品应用环境温度 T85℃	依安规要求	2023-11-06

SAFETY STANDARD			
No.	Description of changes	Reason of changes	time
01	1.Product Family: CHAR-112A250C→CHAR-112A270C. 2.Rated current: 250A→270A. 3.Electrical endurance1: 1000VAC,Current:Making 55A/0.15s→Carrier 270A/0.7s→Break 55A/0.15s. 4.Electrical endurance2: 1000VAC,Current: Make-Break270A/1s 5.Dielectric strength:4000VAC/1min→ 5000VAC/1min(between coil to contacts). 6. Add Enginering notes. 7.Changing outline dimension and reference tolerance.	Enhance capabilities Enhance capabilities Enhance capabilities Enhance capabilities Enhance capabilities Customer requirements Add Enginering notes Customer requirements	2020-12-28
02	1.Changing outline dimension of coil-terminal and main terminal. 2.Changing wiring diagram.	Customer requirements Customer requirements	2021-03-12
03	1.Changing material of base. 2.Adding creep age diseance、Overvoltage category and Schematic diagram.	Customer requirements	2021-04-30
04	1.Changing creepage diseance.	Error correction	2021-05-24
05	1.Changing creepage diseance. 2.Changing Trade mark. 3.Changingthe NO.11 of enginering notes:≤50K（Electrical endurance1）→≤50K. 4.Changing wiring diagram.	Error correction Customer requirements Customer requirements Safety certification	2021-06-01
06	1.Deleting the NO.11 of enginering notes.	Customer requirements	2021-06-17
07	1.Adding outline dimension. 2.Changing type of glue.	Customer requirements	2021-08-03
08	1.Changing release time:≤30m → ≤10ms.	Customer requirements	2021-08-17
09	1.Changing material of base.	Changing material	2022-01-07
10	1.Changing material of base.	Changing material	2022-01-10
11	1.Adding safety standard in English.	Customer requirements	2023-08-14
12	1.Adding T85℃ in Marking.	Safety certification	2023-11-06

Standard 符合标准

According to 符合标准	GB/T 21711.1-2008 IEC61810-1-2015

COIL CHARACTERISTICS 线圈特性

Coil resistance 线圈电阻	36±10%Ω
Rated voltage 额定电压	12VDC
Max. allowable voltage 最大允许电压	130% of rated coil voltage
Rated power 额定功率	4W
Operate voltage 吸合电压	≤9.0VDC(at 25℃)
Release voltage 释放电压	≥0.6VDC
Hold voltage 保持电压	≤6.6V(at 85℃)

NOTES 备注
吸合电压≤9.0 是指产品性能，使用时，吸合电压则需≥9.0V，保持电压亦同，使用时需在 6.6V~12V 范围内。
The operate voltage is less than 9.0V, which means that the product performance meets the requirements. When using, the operate voltage should be greater than 9.0V, as the same. When using, it should be in the range of 6.6V~12V.

CONTACT RATINGS 触点规格

Contact configuration(Normally Open) 触点结构（常开触点）	1 Form X
Contact Gap 触点间隙	≥4.0mm
Contact material 触点材料	Ag alloy
Initial voltage drop 初始接点压降	≤100mV at 270A
Initial Contact resistance 初始接触电阻	≤1mΩ at 6V/20A
Rated insulation voltage 额定绝缘电压	1000VAC
Rated switching voltage 额定切换电压	1000VAC
Rated current	270A

额定电流	
Max. breaking current 最大切换电流	275A
Max. switching power 最大切换功率	275,000VA
Rated switching power 额定切换功率	270,000VA
Minimum applicable load 最小使用负载	48VAC 100mA
Operate time 吸合时间	≤45ms(at 85℃), excluding bounce time ≤45ms(at 85℃)，不含触点抖动时间
Operate bounce time 吸合回跳时间	≤3ms
Release time 释放时间	≤10ms, excluding bounce time ≤10ms，不含触点抖动时间
Release bounce time 释放回跳时间	≤3ms
Mechanical endurance 机械寿命	1 Million cycles, 150 cycles/minute
Electrical endurance (Resistive Load) 电气寿命 1（阻性负载）	1000VAC,Current：Making 55A/0.15s→Carrier 270A /0.7s→Break 55A/0.15s，Coil:1s（12VDC/0.1s, → 6.6VDC~12VDC/0.9s）/ 9s OFF，30K cycles Ambient temperature 85℃ 1000VAC，电流：启动时 55A/0.15s→通电时 270A /0.7s→分断时 55A/0.15s，线圈通电 1s(12VDC/0.1s 后下降至 6.6VDC~12VDC/0.9s 保持）/ 9s OFF,30K 次，环境温度 85℃
Electrical endurance (Full Resistive Load) 电气寿命 2（满载阻性负载）	1000VAC,Current：Make-Break270A/1s Coil: 1s（12VDC/0.1s,→ 6.6VDC~12VDC/0.9s）/ 9s OFF，100 cycles Ambient temperature 85℃ 1000VAC，电流：接通 分断 270A/1s 线圈通电 1s(12VDC/0.1s 后下降至 6.6VDC~12VDC/0.9s 保持) / 9sOFF,100 次 环境温度 85℃

INSULATION PERFORMANCE 绝缘性能

Dielectric strength 介电强度	2500VAC 1minute, between open contacts 2500VAC 1 分钟（断开触点间） 5000VAC 1minute, between coil to contacts 5000VAC 1 分钟（线圈与触点间）
Impulse withstand voltage	6KV (1.2/50μs), between coil to contacts

耐浪涌电压	6KV（线圈与触点间）
Insulation resistance 绝缘电阻	≥100MΩ at 1000VDC, between open contacts and coil to contacts ≥100MΩ at 1000VDC（断开触点间及线圈与触点间）
Insulation systems (UL) 绝缘系统	155 (F) File No. E341422
Insulation type 绝缘类型	Functional insulation, between open contacts 功能绝缘（断开触点间） Basic insulation, between coil to contacts 基本绝缘（线圈与触点间）
Pollution degree 污染等级	2
Overvoltage category 过电压类别	III

INSULATION DISTANCE 绝缘距离

Creep age diseance 爬电距离 between open contacts 断开触点间 between coil to contacts 线圈与触点间	Internal 19.7 mm (reference) , external 11 mm 内部 19.7 mm（参考），外部 11 mm Internal 15.9 mm, external 38.5 mm 内部 15.9 mm，外部 38.5 mm
Electric clearance 电气间隙 between open contacts 断开触点间 between coil to contacts 线圈与触点间	Internal 4.4 mm (reference) , external 7.7 mm 内部 4.4 mm（参考），外部 7.7 mm Internal 11.5 mm , external 25.5 mm 内部 11.5 mm，外部 25.5 mm
Category of protection (IEC61810-1) 密封类型	RT II (Flux proof) 防助焊剂渗入
Operating temperature 工作温度	-40~85℃
Operating humidity 工作湿度	20~85%RH at25℃
Storage temperature 储藏温度	-40~85℃
Storage humidity 储藏湿度	20~85%RH at25℃
Vibration resistance 耐振动	(1) Capability to function during vibration No opening or closing of any closed or opened contact circuit respectively exceed 1ms when the relay is subjected to vibration of 10~55Hz and 1.5mm dual amplitude in each of three mutually

	perpendicular axes for 10 minutes respectively, while it is in operate condition and in release condition. 抗误动作能力 动作/释放状态下，继电器在三个轴向耐受频率 10~55Hz及振幅1.5mm的振动各10分钟，触点误动作不超过1毫秒。 (2) Capability to function after vibration No trouble on structure and characteristics after the relay is subjected to vibration of 10~55Hz and 1.5mm dual amplitude in each of three mutually perpendicular axes for 2 hours respectively. 振动耐久能力 继电器在三个轴向耐受振幅 1.5mm 及频率 10~55Hz 的振动各 2 小时，产品构造和性能无异常发生。
Shock resistance 耐冲击	(1) Capability to function during shock No opening or closing of any closed or opened contact circuit respectively exceed 1ms when the relay is subjected to shock of 98.1m/s² for 11ms in both directions of each of three mutually perpendicular axes for 3 times respectively, while it is in operate condition and in release condition. 抗误动作能力 动作/释放状态下，继电器在三轴六方向耐受加速度 98.1m/s²及作用时间11毫秒的冲击各3次，触点误动作不超过1毫秒。 (2) Capability to function after shock No trouble on structure and characteristics after the relay is subjected to shock of 981m/s² for 6ms in both directions of each of three mutually perpendicular axes for 3 times respectively. 冲击耐久能力 继电器在三轴六方向耐受加速度981m/s²及作用时间6毫秒的冲击各 3 次，产品构造和性能无异常发生。
Cold resistance 耐低温	No trouble on structure and characteristics after placed at -40℃ for 168 hours and 2 hours recovery in standard atmospheric conditions. -40℃中放置168小时并在标准大气条件中恢复2小时后继电器构造和特性无异常。

Thermal resistance 耐高温	No trouble on structure and characteristics after placed at 120℃ for 168 hours and 2 hours recovery in standard atmospheric conditions. 120℃中放置168小时并在标准大气条件中恢复2小时后继电器构造和特性无异常。
Humidity resistance 耐湿度	No trouble on structure and characteristics after placed at 40℃ &95%RH for 168 hours and 2 hours recovery in standard atmospheric conditions. 40℃及95%相对湿度中放置168小时并在标准大气条件中恢复2小时后继电器构造和特性无异常。
Thermal shock resistance 耐冷热冲击	No trouble on structure and characteristics after endure 100 cycles of cyclic temperature and 2 hours recovery in standard atmospheric conditions, which the temperature cycle consists of -40℃ for 0.5 hour and 85℃ for 0.5 hour. -40℃和 85℃中各放置 0.5 小时为一个温度周期，循环 100 次，在标准大气条件中恢复 2 小时后继电器构造和特性无异常。
Terminal robustness 引出端强度	No trouble on structure and characteristics after endure axial pushing/pulling force of 50N for 10 seconds. 继电器引出端承受50牛顿的轴向压入、拔出力，延时10秒，构造和性能无异常。

MARKING 产品标识

Position of marking 标识位置	Top of relay cover 外壳顶面
Cover color 外壳颜色	Black 黑色
Mark type 丝印类型	Laser 激光标印
Trade mark 商标	Churod

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Resistance to soldering heat 耐焊接热	270℃ for 15 seconds Max. 300℃ for 8 seconds Max. 350℃ for 5 seconds Max.
Standard direction 标准方向	Relay PCB terminals downward (recommend) 继电器 PCB 型引出端朝下（推荐）
Terminals assignment and outline dimensions 引出端脚位和外形尺寸	Refer to APPENDIX 请参考附件

ENGINEERING NOTES 注意事项

Unless otherwise explicitly stated, the standard environment conditions for measurement or testing are listed as followings:
除非特别申明，测量或试验的标准环境条件如下：

(1) Ambient temperature is 23+5℃;
环境温度为 23+5℃;

(2) Atmospheric pressure is 96+10% kPa;
大气压力为 96+10% kPa;

(3) Relative humidity is 50%+25% RH.
相对湿度为 50%+25% RH.

(4) Please related test when samples used.
产品使用前请进行相关实验验证.

(5) Consider the heat of PCB is necessary, please check the actual condition of PCB.
必须考虑 PCB 板温度，请检查实际 PCB 板条件状态。

(6) Do not use diode for this relay. The life expectancy will be lower when a diode is used. To use a DC36V varistor (ZNR) could absorb the coil surge of relay that is recommended.
尽可能不使用二极管，若使用二极管会缩短预期寿命，建议使用 DC36V 突波吸收器(ZNR)来吸收继电器的线圈脉冲。
（Example）(实施例)

(7) Do not use the relay exceeding the coil rating, contact rating and life expectancy , or this may cause the risk of overheating.
使用继电器请勿超过线圈规格、触点额定负载和预期寿命，否则可能会造成过热的风险。

(8) To assure optimum performance, avoid the relay from dropping, hitting, or other unnecessary shocks.
为保障继电器的理想性能，请避免继电器遭受摔落，碰撞以及不发必要的冲击。

(9) Do not switch the contacts without any load as the contact resistance may become increased rapidly.
请勿在无通负载条件下开闭触点，以免接触阻抗快速增加。

(10)After applying the rated voltage above 100ms, the coil voltage can be reduced to more than 6.6V for saving energy
线圈施加额定电压 100ms 以上后，可下降到 6.6V 以上达到节能效果。

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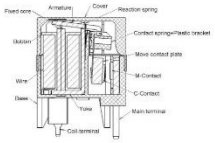
Plastic material List:
塑胶部件清单:

NO.	部件名称	材料名称	RTI(℃)	CTI	UL card No.	UL 绝缘系统
1	Base	Vicnyl R61(f)NH	155	0	E171666	—
2	Cover	PBT RG301	130	2	E171666	—
3	Bobbin	PBT RG301	130	2	E171666	155 ℃(F) File No. E341422
4	Plastic bracket	Vicnyl R61(f)NH	155	0	E171666	—
5	Glue	6060RP-AR-50K（显利） 流长 15~30mm	—	—	—	—

Schematic diagram:
结构示意图:



OUTLINE DIMENSION（REFERENCE）
outline dimension ≤1mm, reference tolerance is ±0.2mm;
outline dimension >1mm and ≤5mm, reference tolerance is ±0.3mm;
outline dimension >5mm, reference tolerance is ±0.5mm.
外形尺寸图(参考)，尺寸≤1mm，未注公差为±0.2mm；尺寸>1mm 且≤5mm，未注公差为±0.3mm；
尺寸>5mm，未注公差为±0.5mm。

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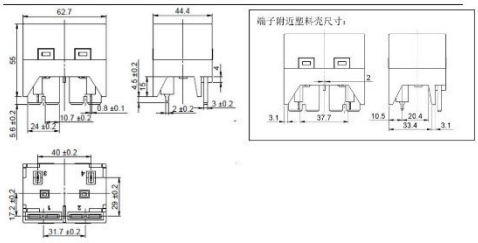

Wiring diagram (bottom view)
接线图（底视图）

Mounting dimensions (Bottom View) , Tolerance: ±0.2mm
安装孔 尺寸图（底视图），公差：±0.2mm

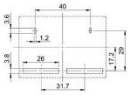

Figure 16

12.4 ISLANDING-MODE

Implementation of active islanding protection: Add a frequency disturbance at the output end. When the grid is normal, the influence of the disturbance will be eliminated due to the clamping effect of the grid. When the power grid is abnormal, the accumulation of disturbances increases, which ultimately affects the output current frequency and phase abnormalities, thereby triggering frequency protection and other protection items. In this way, island protection is achieved.

12.5 $P_{AV,E}$-CONTROL

If the r.m.s. value of the active power measured exceeds the active power $P_{AV,E}$, the active power fed in by SG150CX will be reduced. Power generation systems will not exceed the active power limit curve shown below.

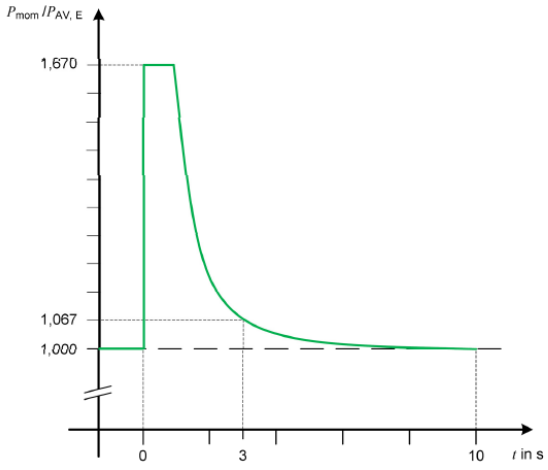

Figure 1 – Active power limit curve for power generation systems

Figure 17

According to the manufacturer's declaration, $P_{AV.E}$ monitoring function is not integrated in the Generation unit. The function can be implemented according to the specifications of the VDE-AR-N 4105 Chapter 5.5.2 in a stand-alone equipment. It requires to add an external CT when installation.

Users can choose between the following smart meters：

Table 1 Recommended Smart Energy Meters and CTs

Meter Model	Type	Manufacturer	Current Transformer (CT)
UMG604-24	3-Phase	Janitza	Customers can purchase CTs of appropriate specifications on their own.
Energy Meter 610-230	3-Phase	Weidmüeller	Customers can purchase CTs of appropriate specifications on their own.
DTSD1352-C/1(6)A	3-Phase	Acrel	Customers can purchase CTs of appropriate specifications on their own.

3.2.2 Single Inverter + WiNet-S/ WiNet-S2/WiFi-P2/EyeS4+DTSD1352-C/1(6)A

The DTSD1352-C/1(6)A uses an external CT, as shown in the figure below.

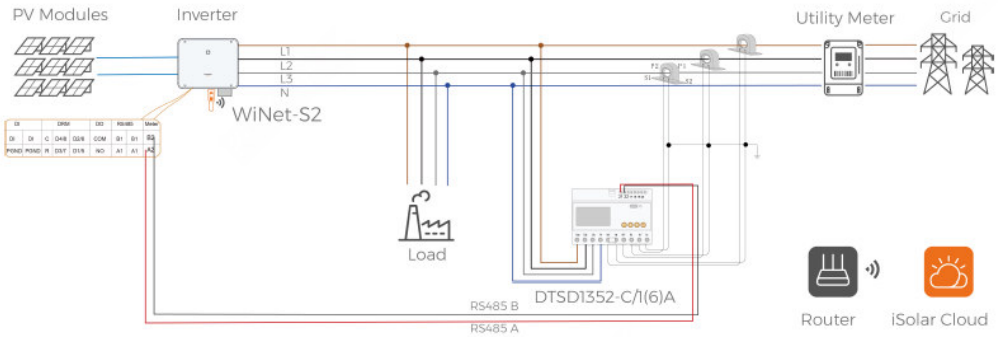

Figure 4 Single inverter + WiNet-S/ WiNet-S2/WiFi-P2/EyeS4+DTSD1352-C/1(6)A（E.g., SG50CX-P2)

Figure 18

The end!

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Signature: