



Photovoltaic Inverters SVT

Make your installation efficient and reliable

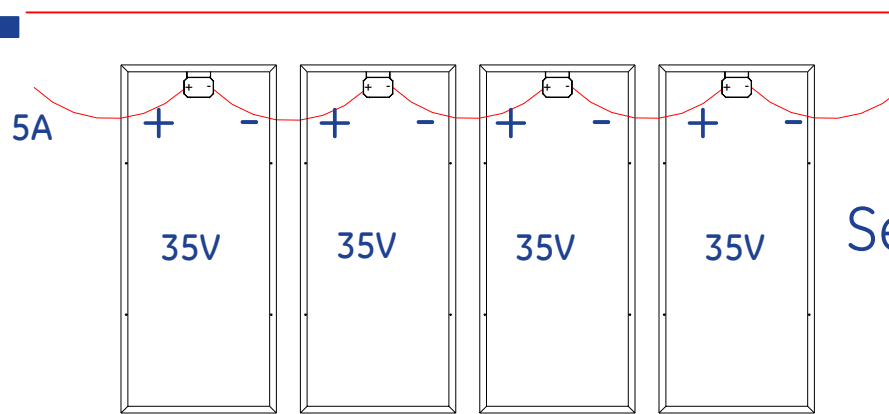


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Serie / Paralel

Modules 5A @ 35V (nominal)

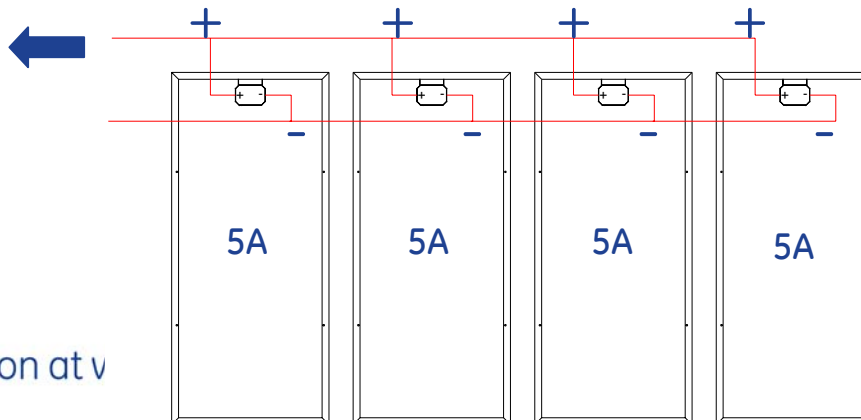
5A / 140V ←



Serie

Increase voltage

20A / 35V ←



Paralel

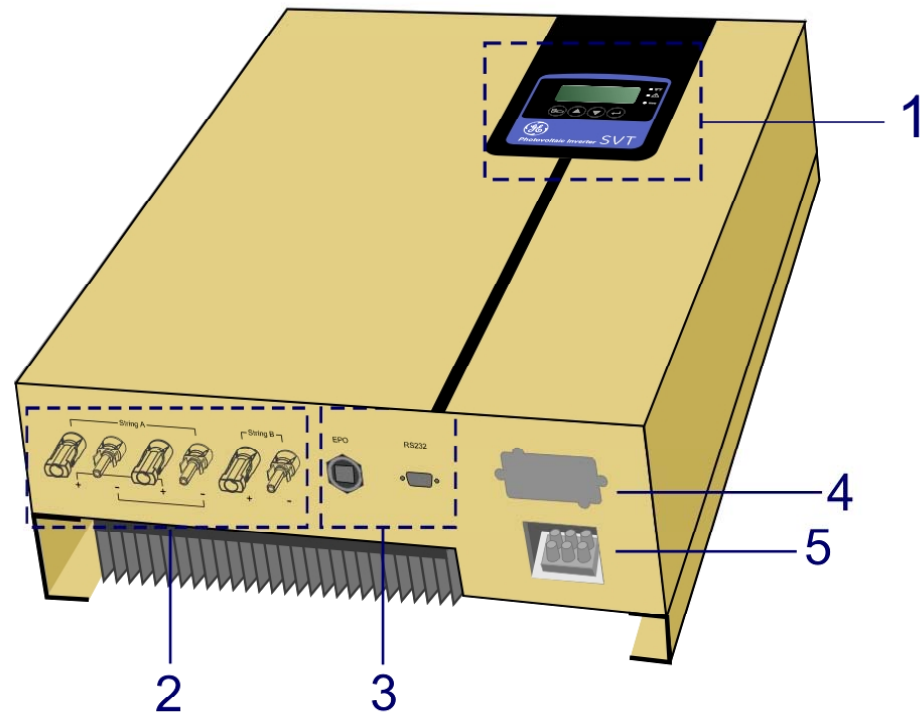
Increase current



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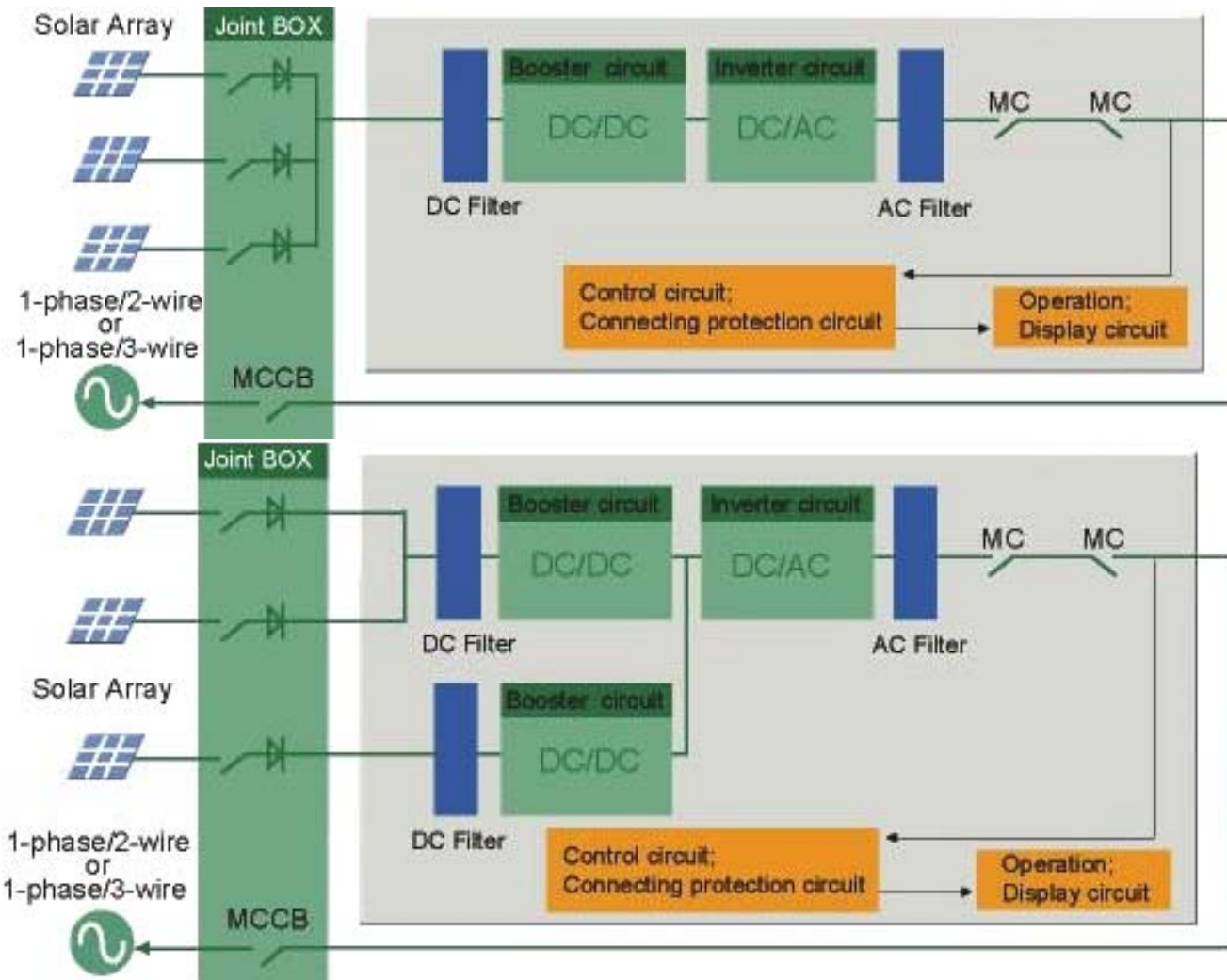
SVT General Information

1. LCD screen, LED, Keypad
2. DC connectors (input)
3. Serial communication (EPO & RS232)
4. Ethernet communication
5. AC output (Grid)



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Operational diagram

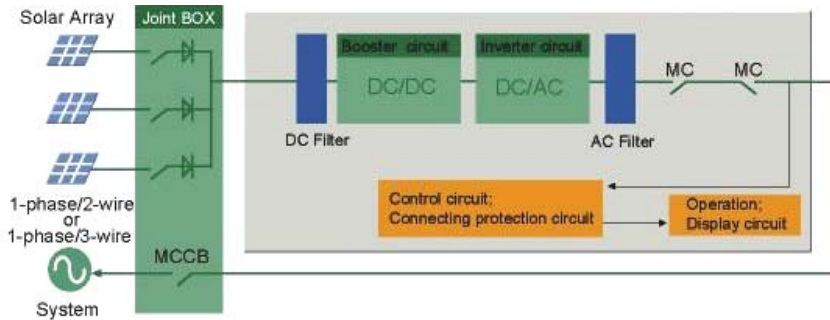


SVT

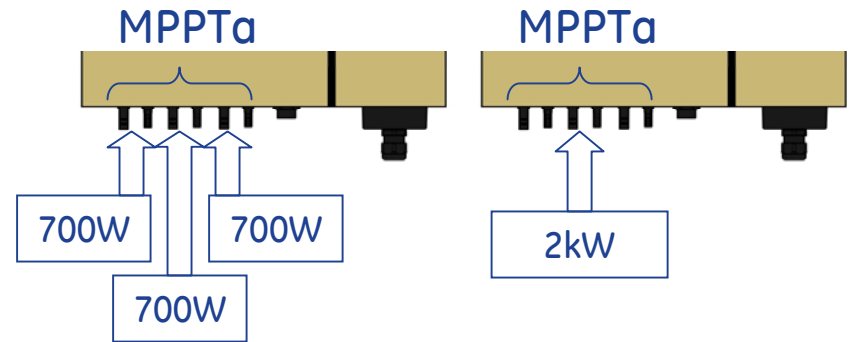


PVIN02KS-03KS

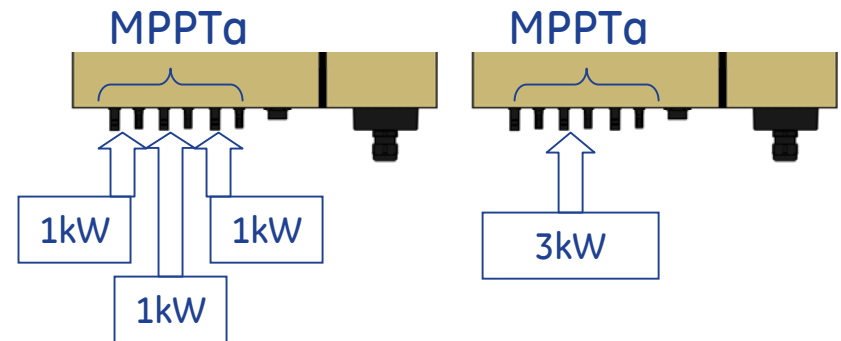
3 Strings in parallel
1 MPPT



PVIN02KS



PVIN03KS

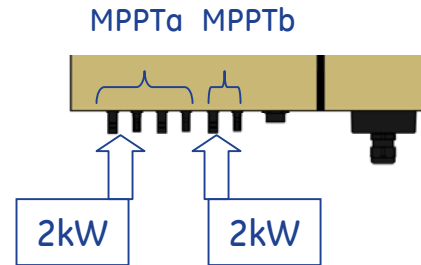


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SVT



PVIN04KS

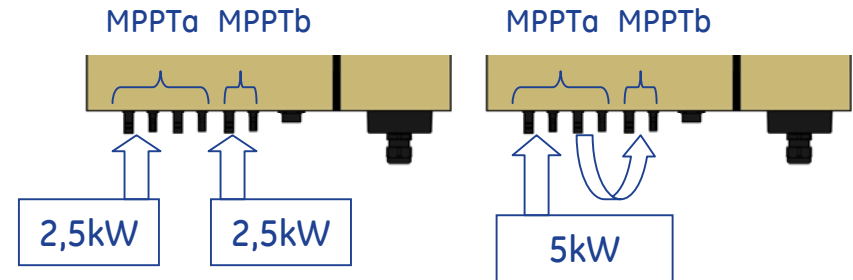


PVIN04KS-05KS

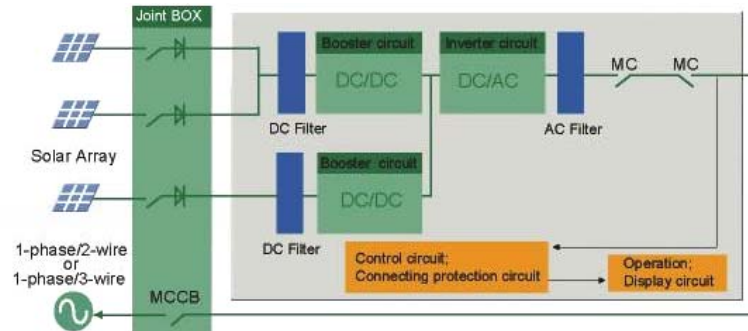
3 strings : 2 for MPPTa and 1 for MPPTb
2 MPPTs

Only for PVIN05KS, possibility to connect the 2 MPPTs between them to have full power in only 1 string

PVIN05KS



Configuration 05KP

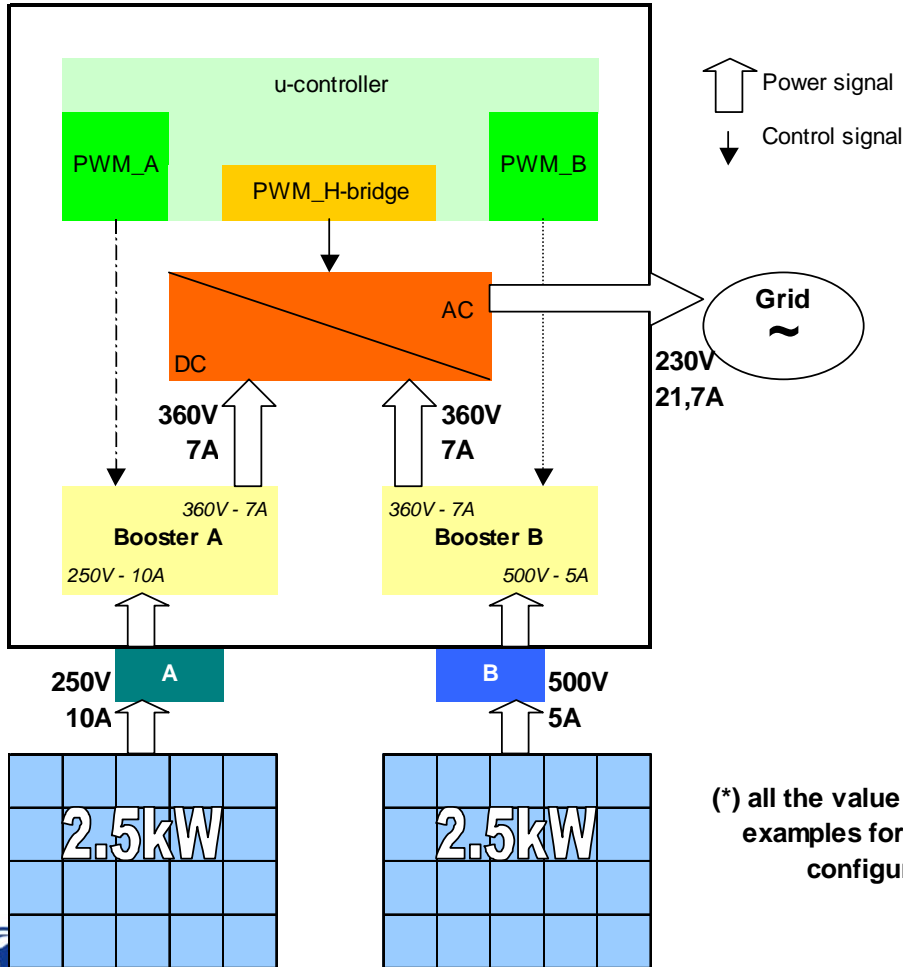


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Only for 5kW inverters

PVIN05KS

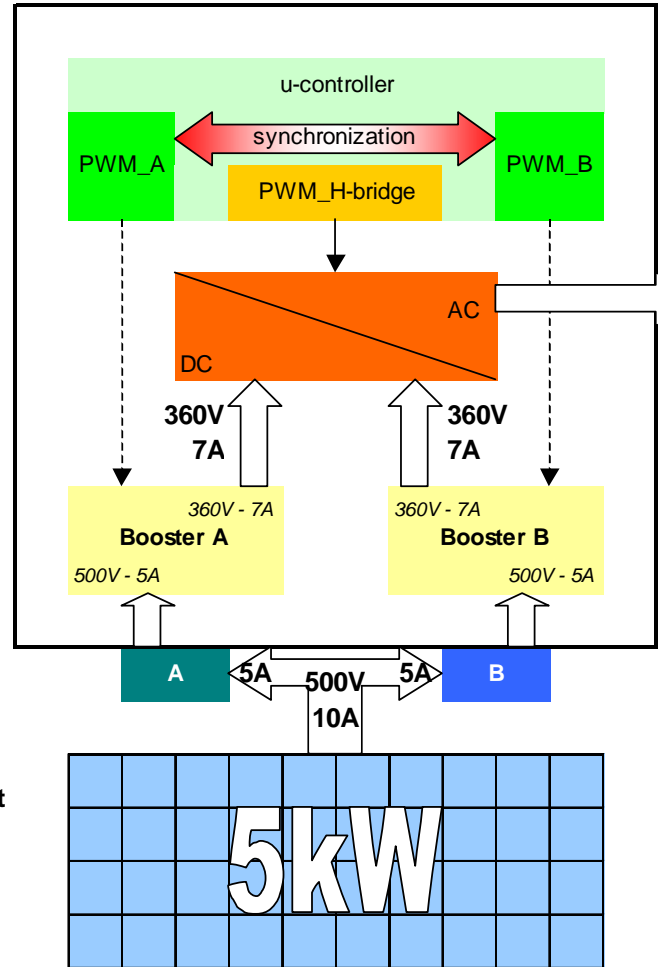
On this version, the u-controller generate **2 different control signals** in order to drive the boosters A and B, each one receiving power from 2 different solar panels (characteristic of voltage and current might be different, each booster works separately)



(* all the value here are just examples for one given configuration)

PVIN05KP

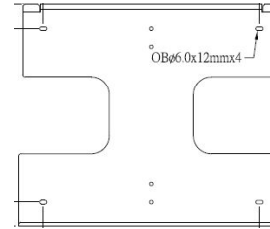
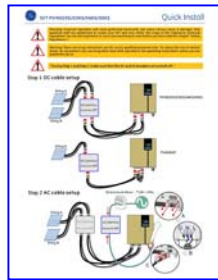
On this version, the u-controller generate **1 single synchronized control signal** for boosters A and B, both receiving power from 1 single solar panel (characteristic of voltage and current are equal in both sides, there is a perfect split between the current)



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Inside the packaging

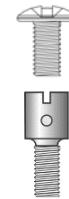
PVIN02KS-03KS-04KS



x 6



x 3



x 6

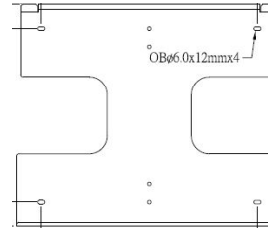
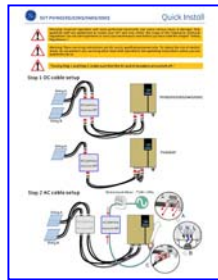
x 2



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Inside the packaging

PVIN05KS



x 4
x 2



x 3



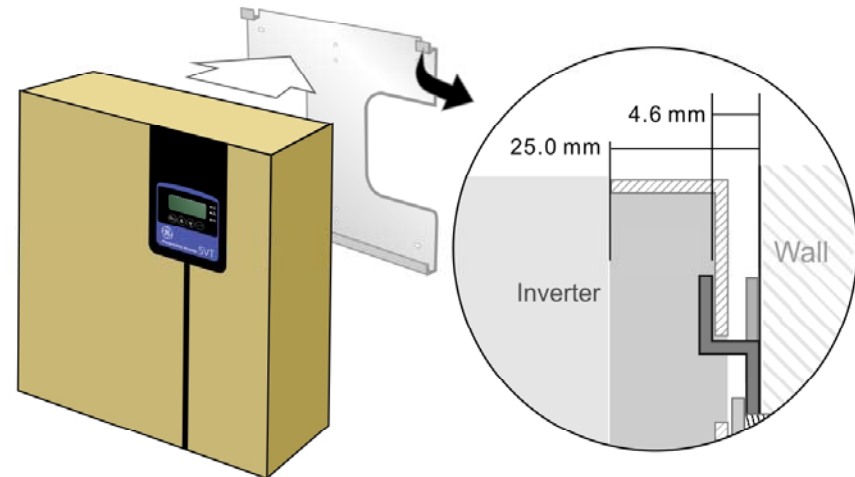
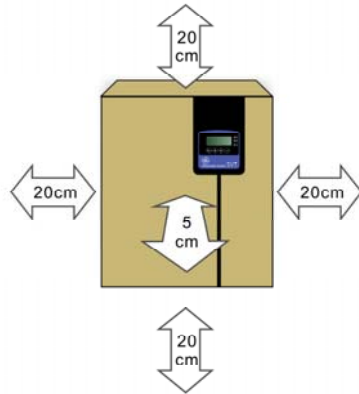
x 6
x 2



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Installation

	Minimum Clearance
Sides	20 cm
Top	20 cm
Underneath	20 cm
Front	5 cm



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Additional tools for the installers: Setting Tool

The Setting tool is able to limit the output rated power of the inverter

Configuration:

PVIN02KS : from 0 to 2kW max.

PVIN03KS : from 0 to 3kW max.

PVIN04KS : from 0 to 4kW max.

PVIN05KS : from 0 to 5kW max.

The screenshot shows the 'Setting Tool' software interface. The window title is 'Setting Tool'. The main menu includes 'CONNECTION', 'CONFIGURATION' (highlighted), 'IDENTIFIERS', 'ABOUT', 'LANGUAGE', and 'CALIBRATION'. The configuration section contains several input fields: 'InputA_V', 'InputB_V', 'DCBus', 'AC_V', 'AC_F', 'InputA_C', 'InputB_C', 'AC_C', and 'KWH'. Below these fields is a 'Stop' button with a red square icon. A green box titled 'Configurations Setting' contains the following options: 'If you want to write one of the value, please selecte the ', 'Sleep Power (0~20%)' with a value of '0', 'KW' with a value of '0,00', a dropdown menu set to 'Spain', and 'DC Input' with radio buttons for 'Standard' and 'Parallel' (selected). 'Write' and 'Read' buttons are also present.



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Additional tools for the installers: Selftest

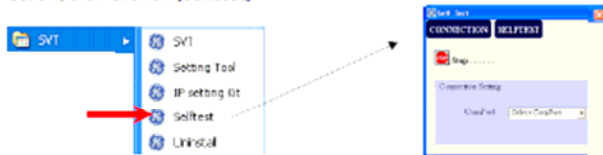
1. Selftest

1.1. Launch of the Selftest

Once the SVT monitoring Suite is installed (refer to the SVT monitoring Manual), connect the inverter to your computer through the RS232 cable.



On you computer, click on [Start] menu, then look for the SVT menu as shown below, then click on [Selftest]

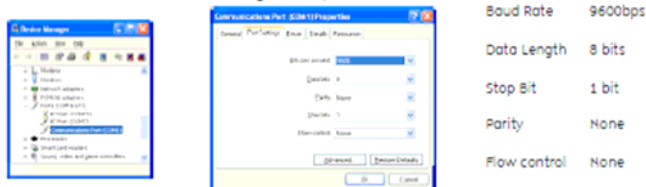


1.2. Connection

In order to configure the RS232 port interface, follow the instructions:

Step 1 Go to the "device manager" of windows (to do so, click on [Start] menu, then on [Run...], then enter "devmgmt.msc" then click [OK])

Step 2 Select the [Ports (COM & LPT)] object, select the [communication port] affected, then check the setting of the port.



Baud Rate 9600bps
Data Length 8 bits
Stop Bit 1 bit
Parity None
Flow control None

Step 3 On the Selftest program, select the port number on which you have connected the Inverter. When the communication is established, the Software will display: "It is monitoring....."



1.3. Execution of selftest

Step 1 - Click on the **SELFTEST** tab, and the following window will pop-up.



The inverter must be connected to the grid.

The inverter stops feeding in power (in order to have stable grid voltage), but keeps the AC relay closed (connected to the grid).

Step 2 - Click on **Self Test** to start the test.

Sequence

5501	100	At the beginning, LCD will display the fig.1 and fig2. First one is the current step the inverter is executing, second is a counter the inverter increments during the test.
fig. 1	fig. 2	
Step 3 - Click on Stop in order to launched the St01 (step 1) (under-voltage limit).		
Step 4 - At the end of the step, push again on Stop in order to launched the next steps. (over-voltage limit, under-frequency limit, over-frequency limit).		

5501	The selftest increases the stored under-voltage limit with a rate of +11,5V/s until it become higher than the actual voltage of the grid (each 0,1s the under-voltage limit increases of 1,15V and a counter is incremented). Then, the inverter will trip the AC relay because of the protection function. By knowing the grid voltage (measured by the inverter) and the final value of the counter, the selftest calculates & displays the initial stored under-voltage limit.
5502	
St02 is about the stored over-voltage limit. So the inverter will decrease the stored over-voltage limit with a rate of -11,5V/s. Same deduction to determine the initial stored over-voltage limit.	

5503	St03 is for the stored under-frequency limit. So the inverter will increase the stored under-frequency limit with a rate of 0.05Hz/s.
5504	St04 is for the stored over-frequency limit. So the inverter will decrease the stored over-frequency limit with a rate of 0.05Hz/s.



After the selftest, the result window will be updated with all protection function limits, calculated thanks to the process describe below. Inverter is in St05, final step.



Please restart the inverter to leave the selftest mode.



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Main Features

- Single phase transformerless inverters from 2 to 5kW
- Compact waterproof design, IP65
- 2 independent MPPT available for 4 and 5 kW
- Quiet operation, fanless
- Plug & Play connexions with MC4 connectors
- DC Cables included, Easy installation, Time and Money savings.
- Communication RS232 and Ethernet as standard.
- 5 years warranty with possibility for extension.
- Monitoring Software included, monitor status of installation and data about the generated energy.
- Setting Tool to adapt the inverter to the installation needs



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Technical data



Cat. no.		PVIN02KS	PVIN03KS	PVIN04KS	PVIN05KS
Ref. no.		817502	817503	817504	817505
Rated AC power	(W)	2000	3000	4000	5000
Maximum AC power output	(W)	2200	3300	4200	5300
Inverter technology		High frequency PWM without transformer			
DC input					
Maximum voltage		500VDC			
Nr. of input connection		1	1	2	2
Max. current for each connection	(A)	14.6	22	14	17.65
MPPT range	(VDC)	150 to 450			
AC output					
Phase/Wire		1-phase/2-wires (LN) or 1-phase/3-wires (LNG)			
Rated AC voltage	(VAC)	230VAC adjustable to 200/208/220/230/240			
Rated voltage	(VAC)	230VAC (184VAC to 253VAC)			
Rated frequency	(Hz)	50 or 60			
Rated AC current	(A)	8.7	13	17.4	21.7
Maximum AC current	(A)	10.2	15.3	20.4	25.5
Current distortion		Total harmonic current: less than 5% Single harmonic current: less than 3%			
Power factor		>0.99 with nominal AC current			



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Technical data



Efficiency data		
Euro efficiency	(%)	94 Euro efficiency = 0.03±5% + 0.06±10% + 0.13±20% + 0.1±30% + 0.48±50% + 0.2±100%
Max. convection efficiency	(%)	96
Environmental		
Operating temperature	(°C)	-25 to +50
Humidity	(%)	30 to 90% (without condensation)

Protection	
Utility	Over/Under voltage, Over/Under frequency, Ground fault, DC isolation fault
Islanding operation detection	Passive: Voltage phase jump detection Active: Reactive power control
Short-circuit	DC input: Input diode / Electronic circuit AC output: Output relay / Electronic circuit
EPO	Emergency Power Off: Inverter shuts down immediately



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Codes & References

SVT Series - Grid tie photovoltaic inverter



Rated AC power (W)	Max. AC power output (W)	DC Input		AC Output		Cat. no.	Ref. no.	Pack
		Nr. of input connections	Max. current for each connection (A)	Rated AC current (A)	Max. AC current (A)			
2000	2200	1	14.6	8.7	10.2	PVIN02KS	817502	1
3000	3300	1	22	13	15.3	PVIN03KS	817503	1
4000	4200	2	14	17.4	20.4	PVIN04KS	817504	1
5000	5300	2	17.65	21.7	25.5	PVIN05KS	817505	1



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References



Product Reference

PVI **N** **02K** **S**

Range

PVI = PV Inverter

Output Voltage

N = Monophasé

Output Power
kW

02K = 2.0kW

03K = 3.0kW

04K = 4.0kW

05K = 5.0kW

Options

Product code

81750 **2**

2 = 2.0kW

3 = 3.0kW

4 = 4.0kW

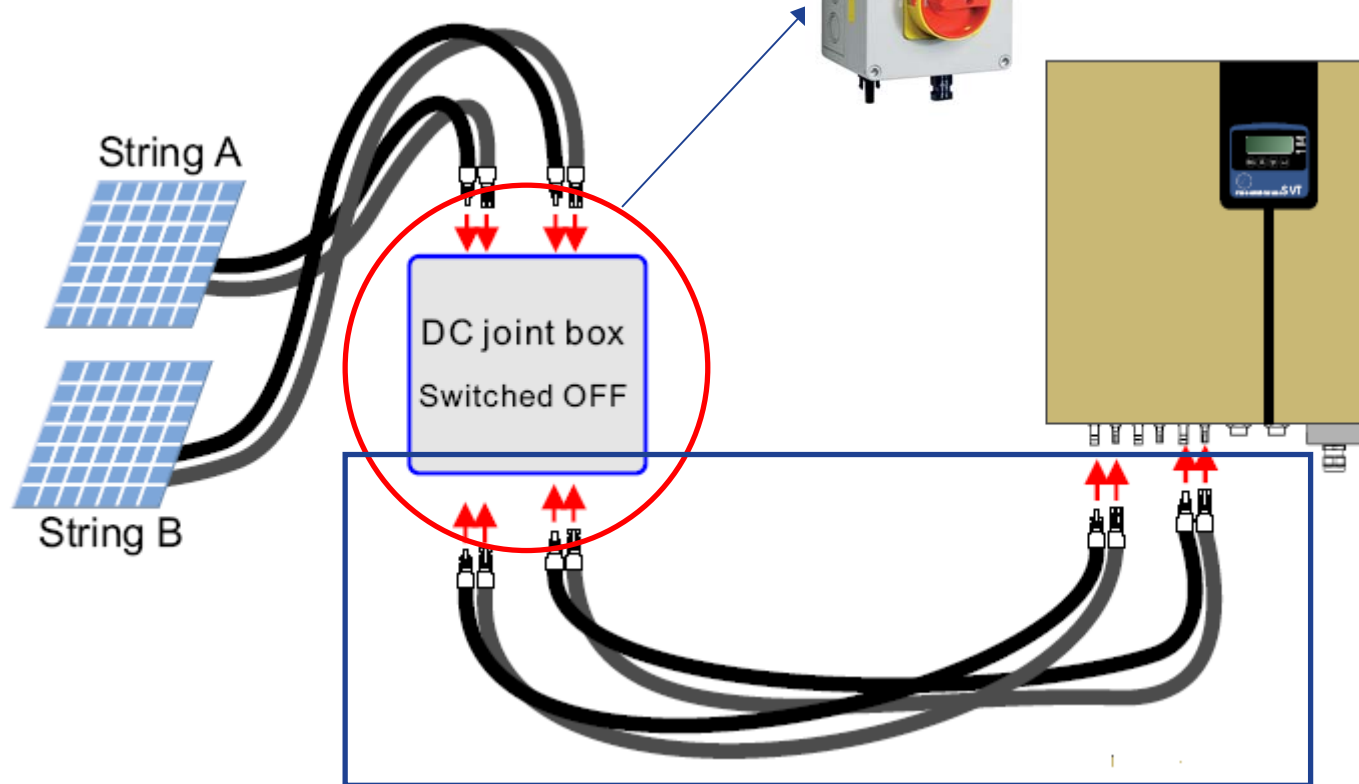
5 = 5.0kW



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DC Connexion

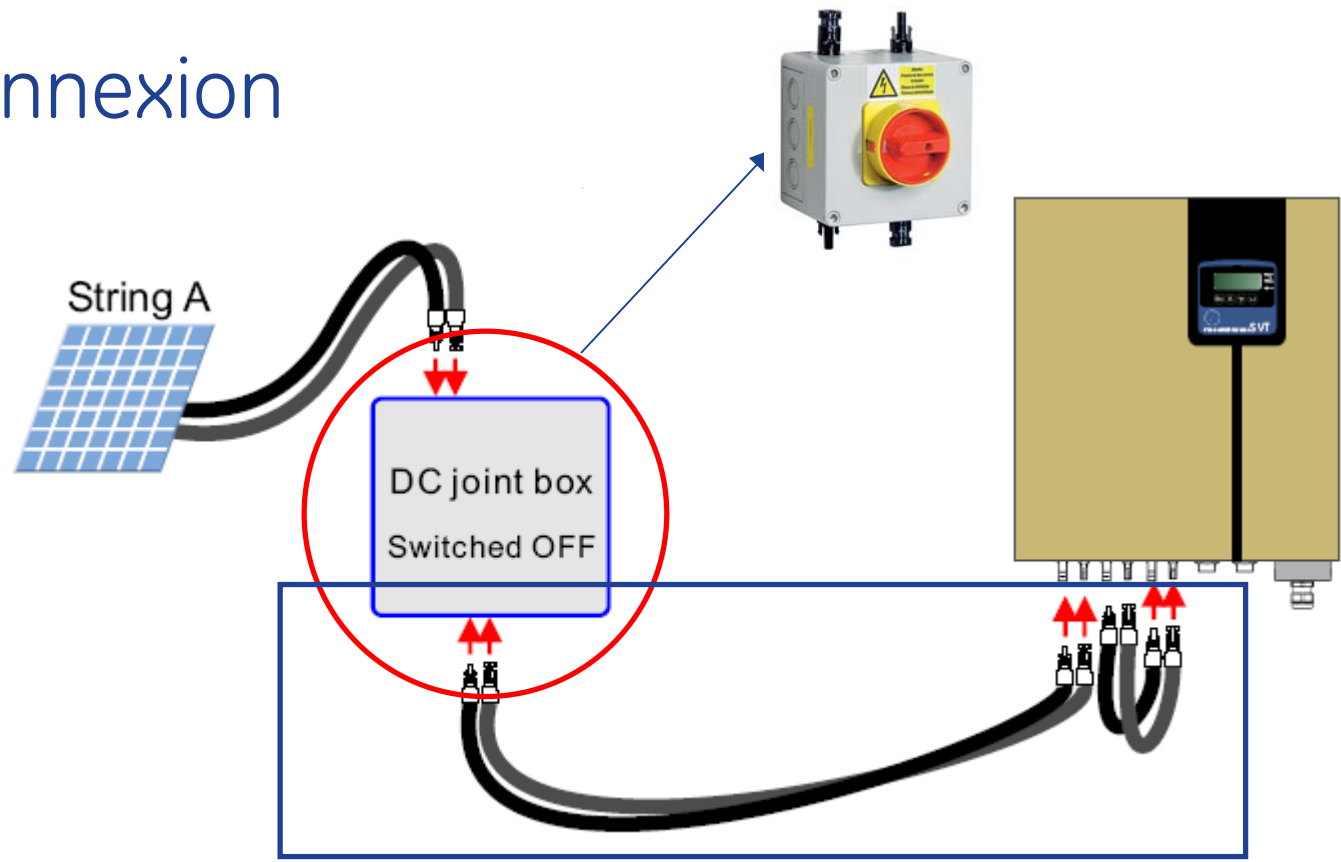


Example of DC protection box.
Usually, 1 box per inverter.
code **817590**
DC Main Switch of 40A @ 600Vdc
Differences from the picture :
Handle Black/Grey
No DC connectors as input

DC cables included with the inverter (3m)

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DC Connexion

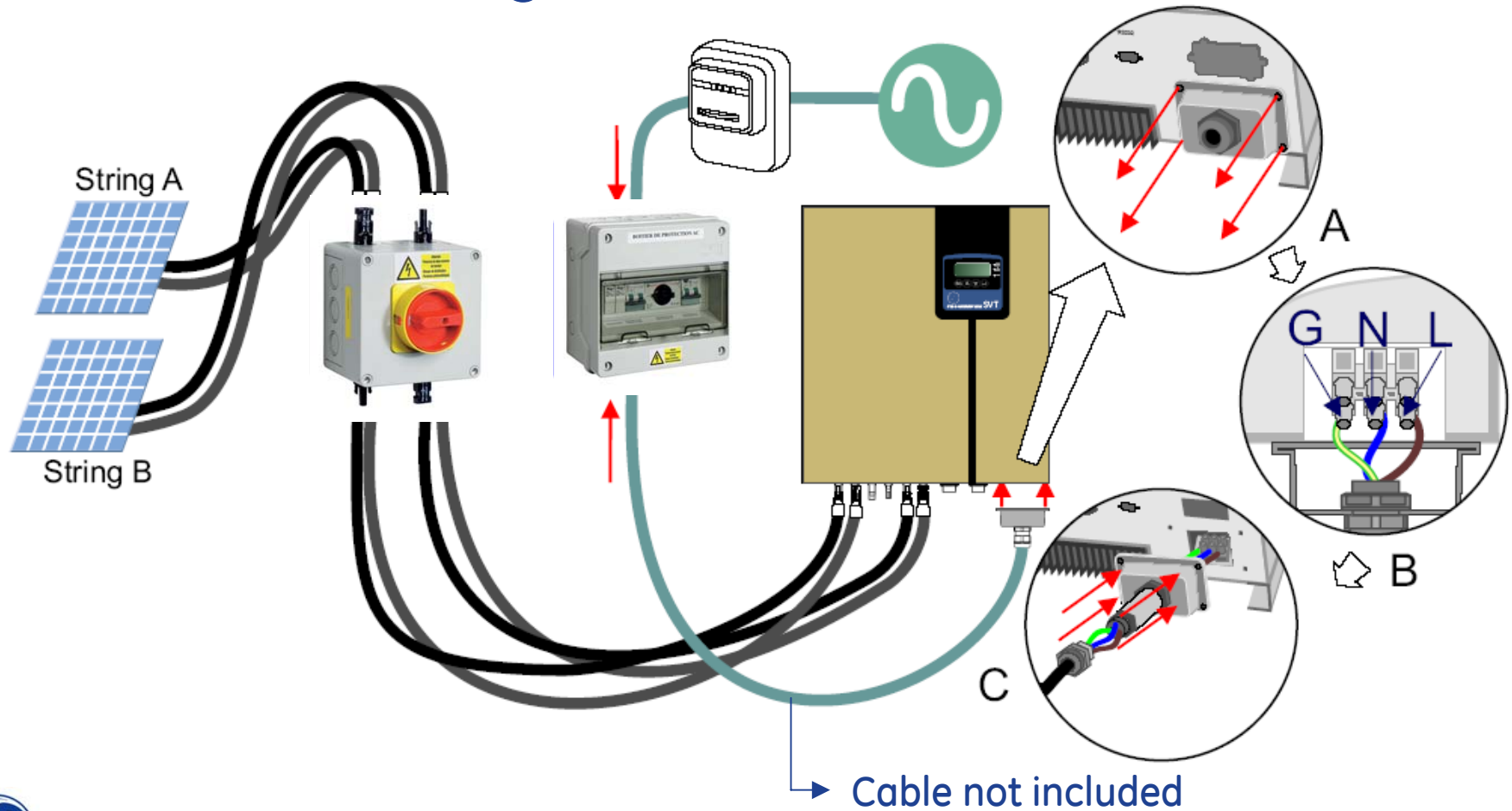


Only for 5kW

DC cables included with the inverter (3m)
+ 2 sets of 20cm to paralel the 2 MPPTs
like shown on the picture

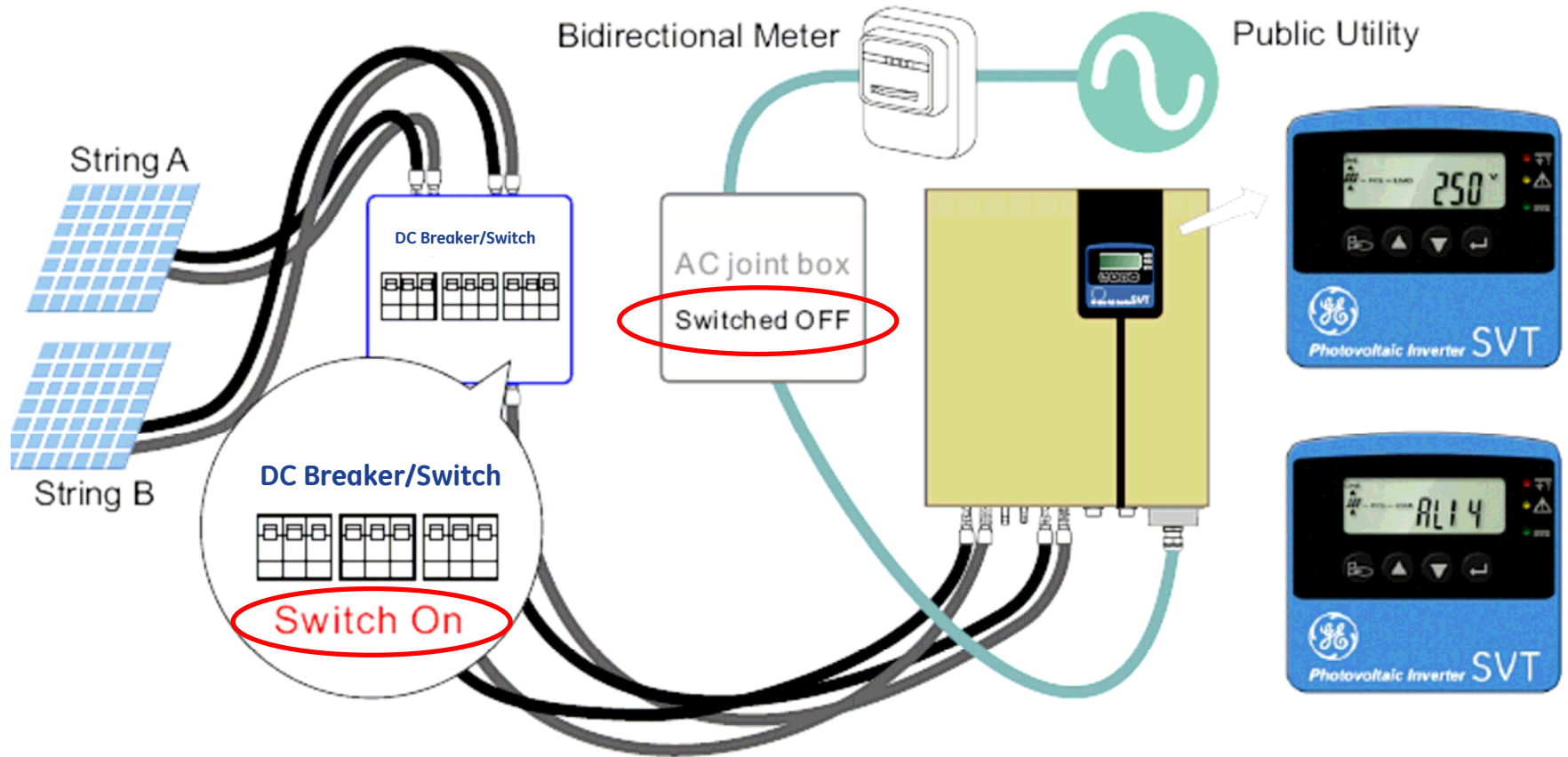
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Connexion to the grid



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Startup



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Only qualified and well-trained installers are authorized to enter in the Setting Mode and change the country setting of the inverter

Setting Mode





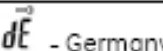
Step 3: Press and hold 5 seconds simultaneously the two buttons  and , LCD will illustrate as Fig. 5d and Fig. 5e.

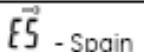

Fig. 5d



Fig. 5e

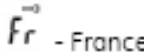
Country Selection

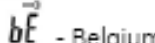
Step 4: Once in the Setting Mode, use  or  to choose the configuration setting in accordance to your country

 - Germany

 - Spain

 - Italy

 - France

 - Belgium



Step 5: Press  to validate and go to next step.


DC Input configuration


Step 6: After the country selection, you will have to choose the DC input configuration. LCD will illustrate as Fig. 5f and Fig. 5g.


Fig. 5f


Fig. 5g

Step 7: Use  or  to choose the DC input configuration

 Standard config. (PVIN05KS)

 Parallel config (PVIN05KP)

Step 8: Press  to validate and go to next step.

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Only qualified and well-trained installers are authorized to enter in the Setting Mode and change the country setting of the inverter

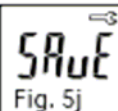
ID configuration

Step 9: After the DC input configuration, you will have to choose the ID of the inverter. LCD will illustrate as Fig. 5h and Fig. 5i.



Step 10: Use  or  to choose the increment the ID number from *Id 1* to *d200*.

Step 11: Press  to validate and exit the Setting Mode. LCD will illustrate as Fig. 5j.



Restart of the inverter

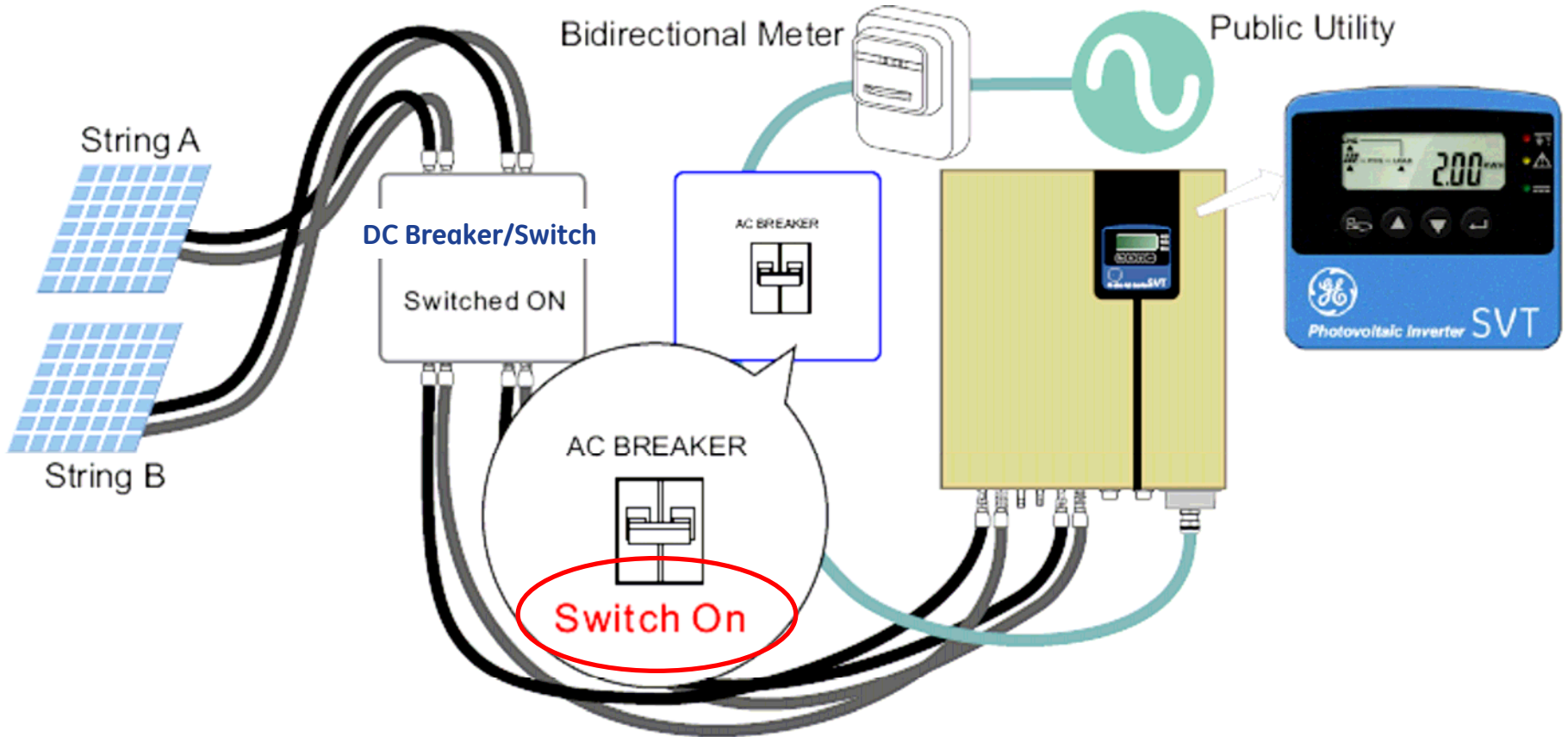


The new configuration is kept in the memory of the inverter and you need to restart the inverter to see effective changes on the parameters.

Step 12: So switch OFF the DC breaker, wait until the LCD and the LEDs are OFF, and then switch ON the DC breaker.

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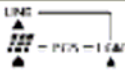
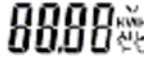
Startup

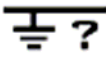








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Control Keypad



① LCD Display	
Symbol	Description
LINE	Utility Source
	Inverter Working in specified mode
	Solar Cell
	Inverter operation mode Flow Chart
	4 Digits Measurement Display

LED Indicators		
②		RED LED steadily lights up to indicate that the Ground fault or DC input isolation fault.
③		YELLOW LED steadily lights up to indicate that the utility (ex. Voltage, frequency etc.) is not matches with the input standard of the inverter.
④		Green LED steadily lights up to indicate that the Solar Cell power is greater than sleep power; the LED flashes flickeringly to indicate that the Solar Cell power is smaller than sleep power.

Control Keypads		
⑤		Special Function Log in /out
⑥		Go to previous page.
⑦		To re-confirm the change of Inverter Setting
⑧		Go to previous page.



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Control Keypad



Informations available on screen :

- DC Voltage and current for MPPT A & B
- Output Power
- Voltage, current, frequency and power (Grid).
- Energy kWh
- Internal temperature
- Heating dissipator temperature
- Error and Alarm codes



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Error Codes

Code	Designation	Description	Repair	
Er00	DC_BUS pre-Charge fail	The inverter is in soft start procedure, but the DC Bus can not reach and maintain anticipative charging voltage	<ol style="list-style-type: none"> 1. Disconnect ALL PV (+) or PV (-) 2. Wait for few seconds 3. After the LCD switches off, reconnect and check again 	
Er03	Inverter voltage abnormal	Output voltage is abnormal		
Er07	DC_BUS over-voltage	The DC BUS inside is lower or high than expected		
Er08	DC_BUS under-voltage			
Er17	EEPROM ERROR on the control board	EEPROM Data is wrong		
Er19	DC_BUS discharge fail	Capacitors of the DC Bus cannot be discharged		
Er22	Output Relay fail	Output Relay is abnormal		
Er24	Output Current sense fail	The inverter Output Current fails to detect.		
Er25	BOOSTER_A over-current	The current in the DC network is larger than specified.		
Er26	BOOSTER_B over-current			
Er30	Rating setting of Driver board is not match EEPROM of Control board	EEPROM Data is wrong		
Er06	EPO	Inverter enters into EPO mode (Emergency Power Off)		Remove the short circuit occurred at the EPO terminal.
Er09	Inverter Output over-current	The current in the AC network is larger than specified.		Turn off AC breaker, then check the peripheral AC system configuration and the grid conditions.
Er11	Inverter over-load	The load in the AC network is larger than specified.		
Er13	Inverter short-circuit	Short-circuit on the AC side.		
Er14	Inverter PLL fail	The phase of Inverter cannot synchronize with the utility.		
Er29	Inverter output DC current over spec.	The DC component of the electricity fed into the grid is longer than permissible range.		
Er10	Inverter Over temperature	Internal temperature is too high.		
Er18	Heat sink Over temperature	Heat sink temperature is too high.	Try to reduce the ambient temperature. Move the inverter to cooler place.	
Er01, Er02, Er04, Er05, Er12, Er15, Er16, Er20, Er21, Er23, Er27, Er28, Er31			Reserved	

If error code keeps recurring, contact your local distributor for help.



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Alarm codes

Code	Designation	Description	Repair
AL00	Utility Voltage Over-Voltage	Utility Voltage Greater or Smaller than the permissible value.	<ol style="list-style-type: none"> 1. Wait for 1 minute, if the grid returns to normal, the inverter automatically restarts. 2. Check grid connection, such as wires and connectors. 3. Make sure grid voltage and frequency meet the proper specifications.
AL01	Utility Voltage Under-Voltage		
AL02	Utility Voltage Over-Frequency	Utility Frequency Greater or Smaller than the permissible value.	
AL03	Utility Voltage Under-Frequency		
AL04	BOOSTER_A Input Over-Voltage	Over or Under voltage at DC input.	<ol style="list-style-type: none"> 1. Disconnect ALL PV (+) or PV (-). 2. Check the open PV voltage is outside the 120Vdc ~ 500Vdc. 3. If PV voltage is normal and the problem still occurs, contact your local distributor for help.
AL05	BOOSTER_A Input Under-Voltage		
AL06	BOOSTER_B Input Over-Voltage		
AL07	BOOSTER_B Input Under-Voltage		
AL08	Anti-Islanding	No Utility or Utility fail	<ol style="list-style-type: none"> 1. Disconnect ALL PV (+) or PV (-) 2. Check grid connection, such as wires and connectors. 3. Check grid usability.
AL 13	Phase of Utility is fail		
AL14	Waveform of Utility is fail		
AL09	Inverter Voltage unbalance	Inverter Voltage Waveform is in unbalance	<ol style="list-style-type: none"> 1. Shut down inverter (Unplug PV generator from the input). 2. Check grid usability and Restart inverter (plug PV generator from the input).
AL10	CFDI	Leakage current on ground conductor is too high.	<ol style="list-style-type: none"> 1. Unplug PV generator from the input, check AC peripheral system 2. After the problem is cleared, re-plug the PV. Check the PV-Inverter status.
AL11	Isolation Fault	The impedance is between PV (+) & PV(-) and Ground is smaller than 2M Ω .	<ol style="list-style-type: none"> 1. Disconnect ALL PV (+) or PV (-). 2. Check the impedance between PV (+) & PV (-) and Ground. The impedance must be larger than 2MΩ.
AL12, AL15 ~ AL 31			Reserved

If error code keeps recurring, contact your local distributor for help.



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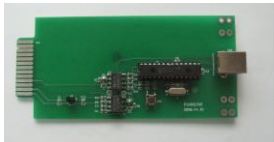
Other Features

- Communication RS232
- EPO : “Emergency Power OFF”
- Communication Ethernet

Optional communication cards



RS485



USB



Dry Contacts



imagination at work

Display different photovoltaic installations

The screenshot displays the monitoring software interface for two machines. Machine 2 is shown with the following data:

- Output power: 3.44kW
- Total Output power: 16229kWh
- Save Electrical: 3085 kWh
- Save CO2: 5116 kg
- Output power: 3.44kW
- Utility voltage: 110V
- Utility current: 30.3A
- Utility frequency: 60Hz
- String A voltage: 340V
- String B voltage: 330V
- String A current: 11.5A
- String B current: 11.5A

Machine 1 is shown with the following data:

- Output power: 4.22kW
- Total Output power: 12729kWh
- Save Electrical: 3616 kWh
- Save CO2: 5361 kg
- Output power: 4.22kW
- Utility voltage: 110V
- Utility current: 39.2A
- Utility frequency: 60Hz
- String A voltage: 330V
- String B voltage: 340V
- String A current: 15A
- String B current: 15A

Summary information for all machines:

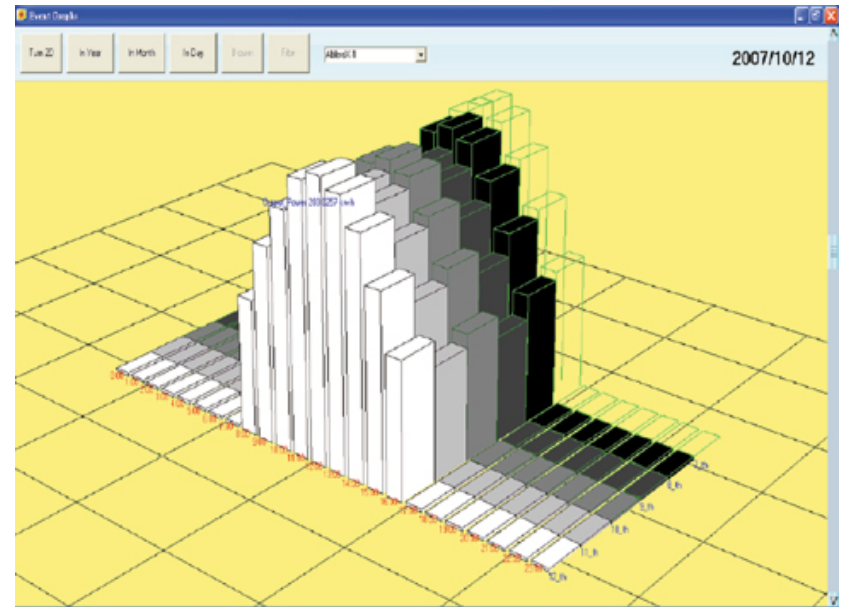
- All machine output power: 7.7600022889184kW
- All machine total output power: 22958kWh
- All machine save electrical: 6866 kWh
- All machine save CO2: 11178 kg

The interface also includes trend curves for String A current, String B current, String A voltage, and String B voltage. A detailed view of Machine 1 shows input and output parameters, a disconnect status, and a schematic diagram of the inverter and solar panels.

Wide choice of analysis (Trend curves daily, monthly and yearly, values of CO2 and €...).

PV inverter SVT

Real time analysis of data for each inverter with informations of status and measurements

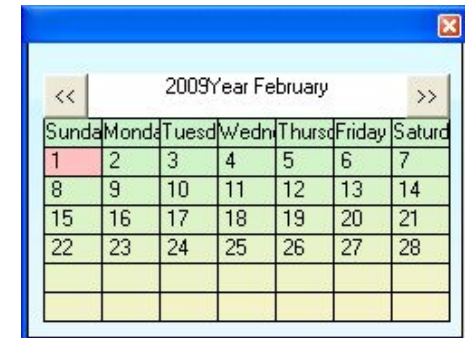


Export Data

Start Date: 01/02/2009

End Date: 09/02/2009

Export



PV inverter SVT

E-mail and SMS Servers

If any eventual event, notification by email and/or sms

E-mail Setting

Send Test

Mail

Mail Server Name: [text field]
User Name: [text field] User E-mail: [text field]
Receiver Name: [text field] Mail to: [text field]

Event	Whether transmits
Utility Voltage Over Rang	
Utility Voltage Under Rang	
Utility Frequency Over Rang	
Utility Frequency Under Rang	
Boost:1-Input Voltage Over Rang	
Boost:1-Input Voltage Under Rang	
Boost:2-Input Voltage Over Rang	
Boost:2-Input Voltage Under Rang	
Anti-islanding general alarm	
Input voltage balance general alarm	
Ground current fault general alarm	
Ground impedance fault general alarm	
System contact impedance fault general alarm	
Utility Voltage Phase Fault	
Utility Voltage Wave Fault	
Stand by	
Disconnect	
DC BUS Charge Fault	
Machine Fault	

SMS

Send Test

SMS

SMS Server: [dropdown menu]
ID: [text field] api_id: [text field]
Password: [text field]
Phone Number: [text field]

Event	Whether transmits
Utility Voltage Over Rang	
Utility Voltage Under Rang	
Utility Frequency Over Rang	
Utility Frequency Under Rang	
Boost:1-Input Voltage Over Rang	
Boost:1-Input Voltage Under Rang	
Boost:2-Input Voltage Over Rang	
Boost:2-Input Voltage Under Rang	
Anti-islanding general alarm	
Input voltage balance general alarm	
Ground current fault general alarm	
Ground impedance fault general alarm	

SAVE

Offers a Quick notice and diagnostic when your installation is offline