

# SUNSYS

P33TR - P66TL/TR - P100TL/TR

Installations- und bedienungsanleitung (DE)

Manuel d'installation et d'utilisation (FR)

Installation and operating manual (GB)

Manuale di installazione e uso (IT)





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# 1. SAFETY INSTRUCTIONS

## 1.1. PERSONAL SAFETY PRECAUTIONS

To prevent personal injury and damage to property please read the following warnings before activating the device for the first time:

### Read the operating instructions beforehand!

- Observe the safety warnings!
- Observe the user information!

### Risk of electric shocks from live device parts!

In the event of system maintenance, carry out the following steps beforehand:

- Disconnect the photovoltaic system and the AC power supplies.
- Make sure the system cannot be restarted.
- Make sure the electricity supply has been disconnected.
- Earth the equipment sub-assemblies and short-circuit them.
- Cover or separate nearby live device units.
- Before working on circuits upstream make sure the inverter is disconnected by opening the DC disconnection switches.
- If there are field panels upstream of the inverter attach label to them displaying the following information:

WARNING!

DEVICE WITH SEVERAL HAZARDOUS VOLTAGE POWER SUPPLY SOURCES INSIDE EVEN AFTER DISCONNECTION DEVICES HAVE BEEN OPENED.

ADOPT ALL SAFETY MEASURES REQUIRED FOR PROCEDURES ON LIVE PARTS.

### The following measures are required:

- To prevent personal injury and damage to property, the device should only be used by qualified personnel with electrical and technical training.
- The qualified technician must have read the operating instructions.
- National accident prevention standards must be observed.
- Maintenance and repair procedures must only be carried out by trained personnel authorised by Socomec. The user is strictly prohibited from carrying out procedures which could involve compromise the integrity of the inverter (for example, removing inverter modules).

### During installation, observe the following:

- Observe the connection conditions and technical data.
- Observe standards regarding electrical installation, e.g. cable cross-section, contactor connection and earthing.
- Do not touch any components and electronic contacts (electrostatic charge could destroy the components).



#### DANGER!

Risk of electric shock from live device parts!

SUNSYS P inverters can be connected to a maximum of three separately protected power supplies:

- 1 DC cable - Photovoltaic generator power supply (separate for the three modules or shared)
- 2 AC cable - Power from the mains network, supplied by the electricity company
- 3 AC cable - Auxiliary power supply

- Before carrying out any work make sure the electricity supply has been disconnected.
- All DC power supplies should be considered as part of the same circuit, even in the configuration with centralised multi-string inverter. Before carrying out any work make sure all electricity supplies have been disconnected.



#### DANGER!

Risk of electric shock from live device parts!

The intermediate inverter circuit may be live even after it has been deactivated.

- Wait 5 minutes for the power to disperse and make sure that there is none remaining.



#### DANGER!

Risk of electric shock from live device parts!

The photovoltaic modules are live as soon as they are exposed to sunlight.

- Take suitable measures and make sure there is no power remaining.

## 1.2. COMPLIANT USE

SUNSYS P are photovoltaic inverters for the conversion of direct current into alternating current in compliance with the mains network. Any use other than the specified purpose will therefore be considered as improper. The manufacturer/supplier shall not be held responsible for damage resulting from this. The risk and responsibility lies with the system manager.

SUNSYS P are constructed in accordance with current technical regulations and official safety standards. Before shipment all devices undergo technical safety testing. Nevertheless, incorrect or improper use may endanger the life or health of the operator and third parties, or damage equipment or other materials.

Compliant use also includes observing operating instructions. SUNSYS P must be installed by specialist personnel deemed responsible for complying with existing standards. Repair work may only be carried out by authorised centres. Arbitrary and unauthorised work may have fatal consequences, cause injury or damage property. In the event of damage, SOCOMEC shall assume no responsibility and the warranty shall be void.

## 1.3. STANDARDS AND GUIDELINES

When carrying out electrical installation, all standards specified by the IEC and the electricity supplier must be observed. All national standards apply to photovoltaic systems must be respected during insatallation and configuration.

## 1.4. IDENTIFICATION DATA PLATE



**WARNING!**

Before connecting the modules, check that they are fully compatible with the model of system in use.

1.4-1 900 V identification plates

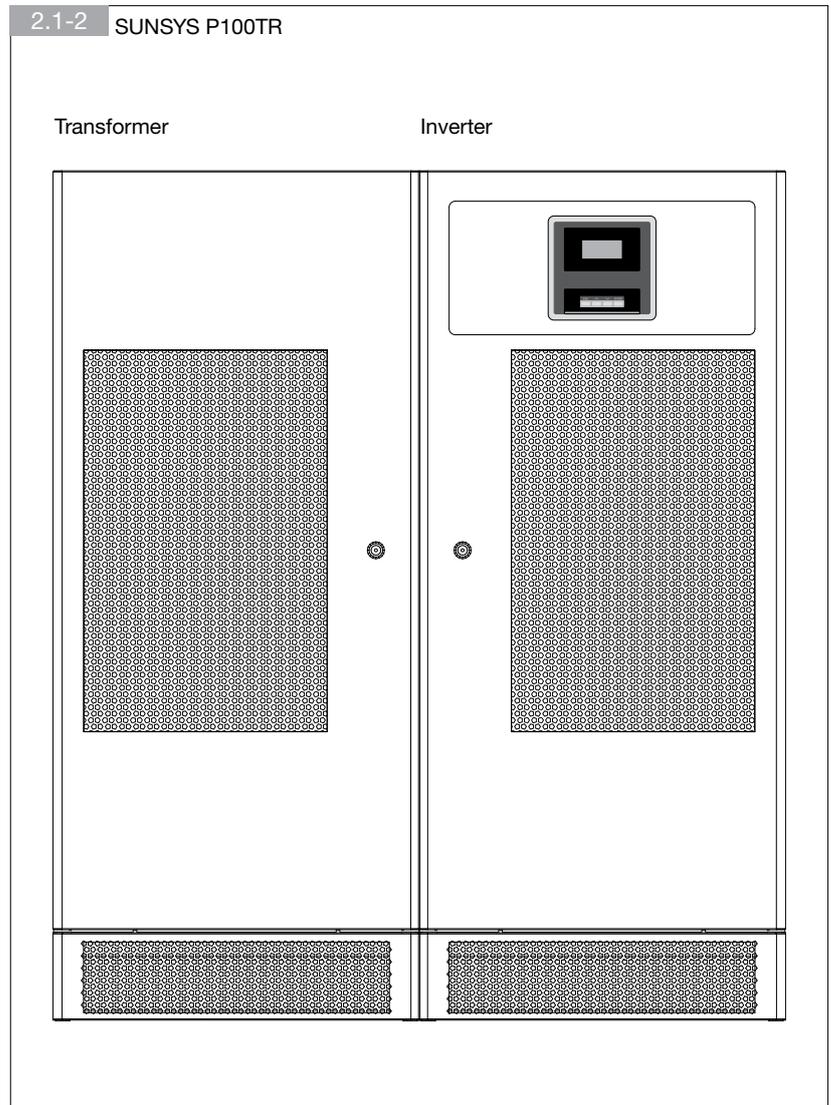
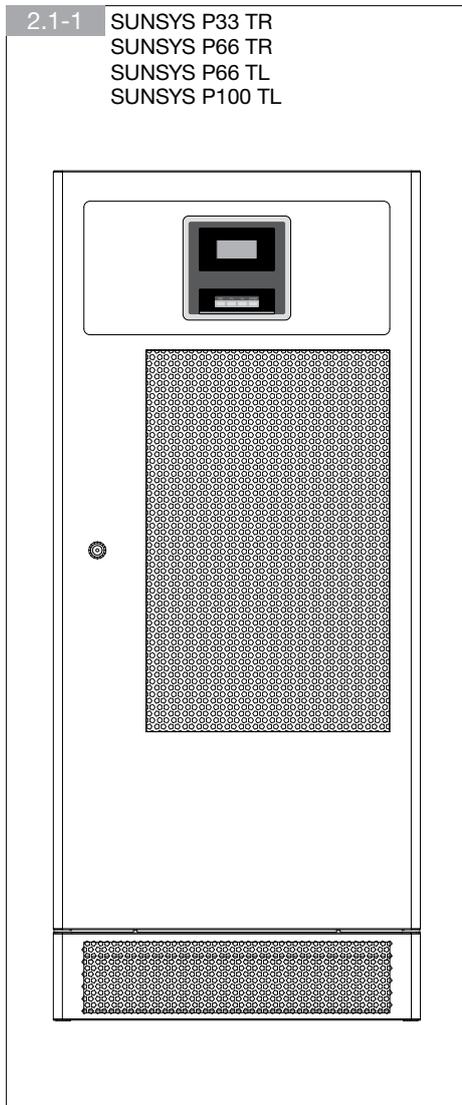
<b>socomec</b> Via Sila 1/3 - Zona Industriale Scovizzo 36033 Isola Vicentina (VI) Italy Innovative Power Solutions Tel. +39 0444 598611 - FAX +39 0444 598622		CE
MODEL No:		
SERIAL No:		
DC:	INPUT MPP VOLTAGE :	
OVC 2	MAX DC INPUT VOLTAGE : <b>900 VDC</b>	
	CURRENT :	
AC:	OUTPUT VOLTAGE :	
OVC 2	CURRENT :	
	OUTPUT NOM. POWER :	
IP CLASSIFICATION :		SAFETY CLASS :
STANDARDS :		
XXX - XX - MOD33+T2 XXXXXXXXXX XXX XX		

1.4-2 1000 V identification plates

<b>socomec</b> Via Sila 1/3 - Zona Industriale Scovizzo 36033 Isola Vicentina (VI) Italy Innovative Power Solutions Tel. +39 0444 598611 - FAX +39 0444 598622		CE
MODEL No:		
SERIAL No:		
DC:	INPUT MPP VOLTAGE :	
OVC 2	MAX DC INPUT VOLTAGE : <b>1000 VDC</b>	
	CURRENT :	
AC:	OUTPUT VOLTAGE :	
OVC 2	CURRENT :	
	OUTPUT NOM. POWER :	
IP CLASSIFICATION :		SAFETY CLASS :
STANDARDS :		
XXX - XX - MOD33+1K XXXXXXXXXX XXX XX		

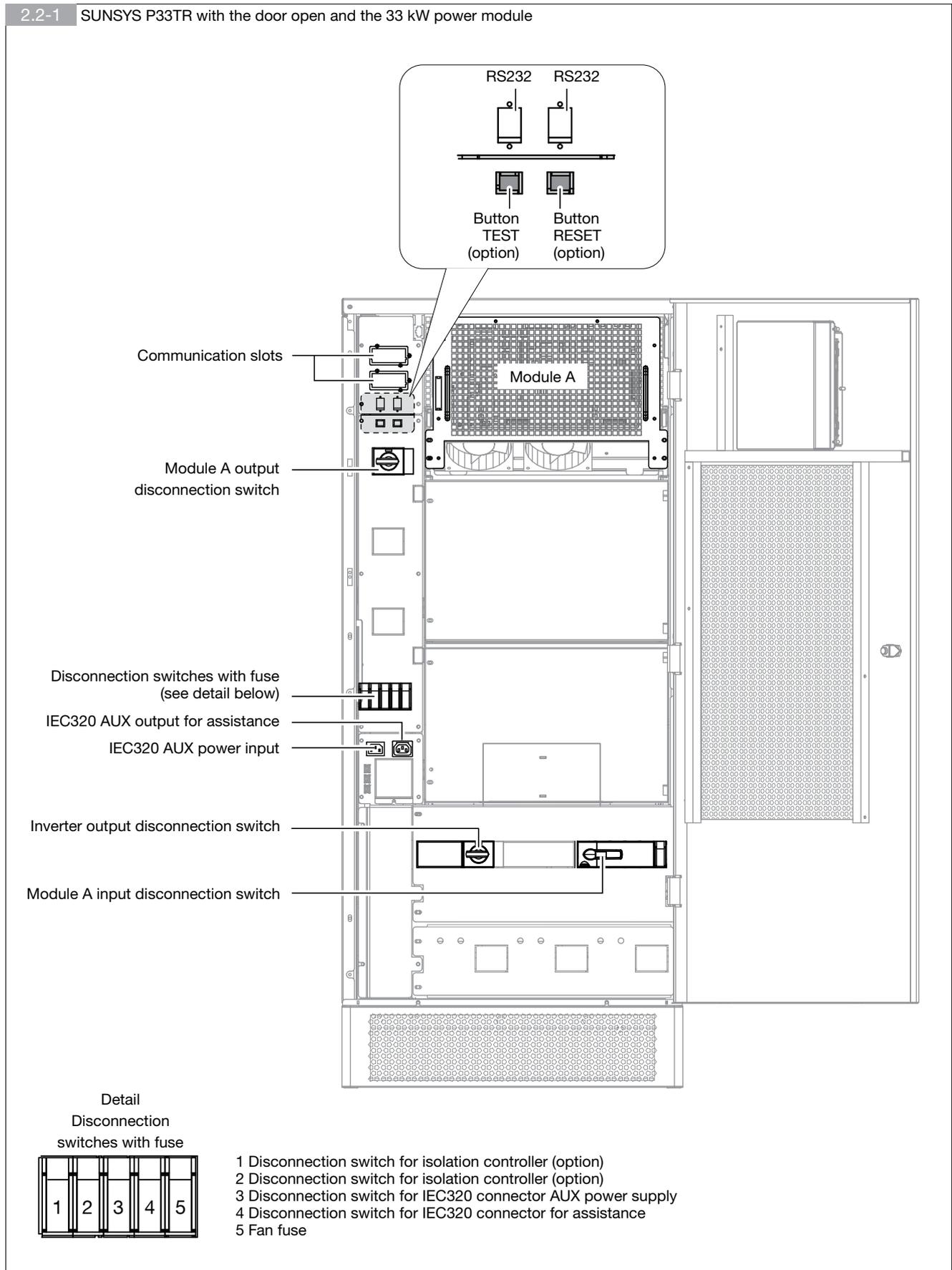
## 2. DESCRIPTION OF THE SYSTEM

### 2.1. OVERVIEW



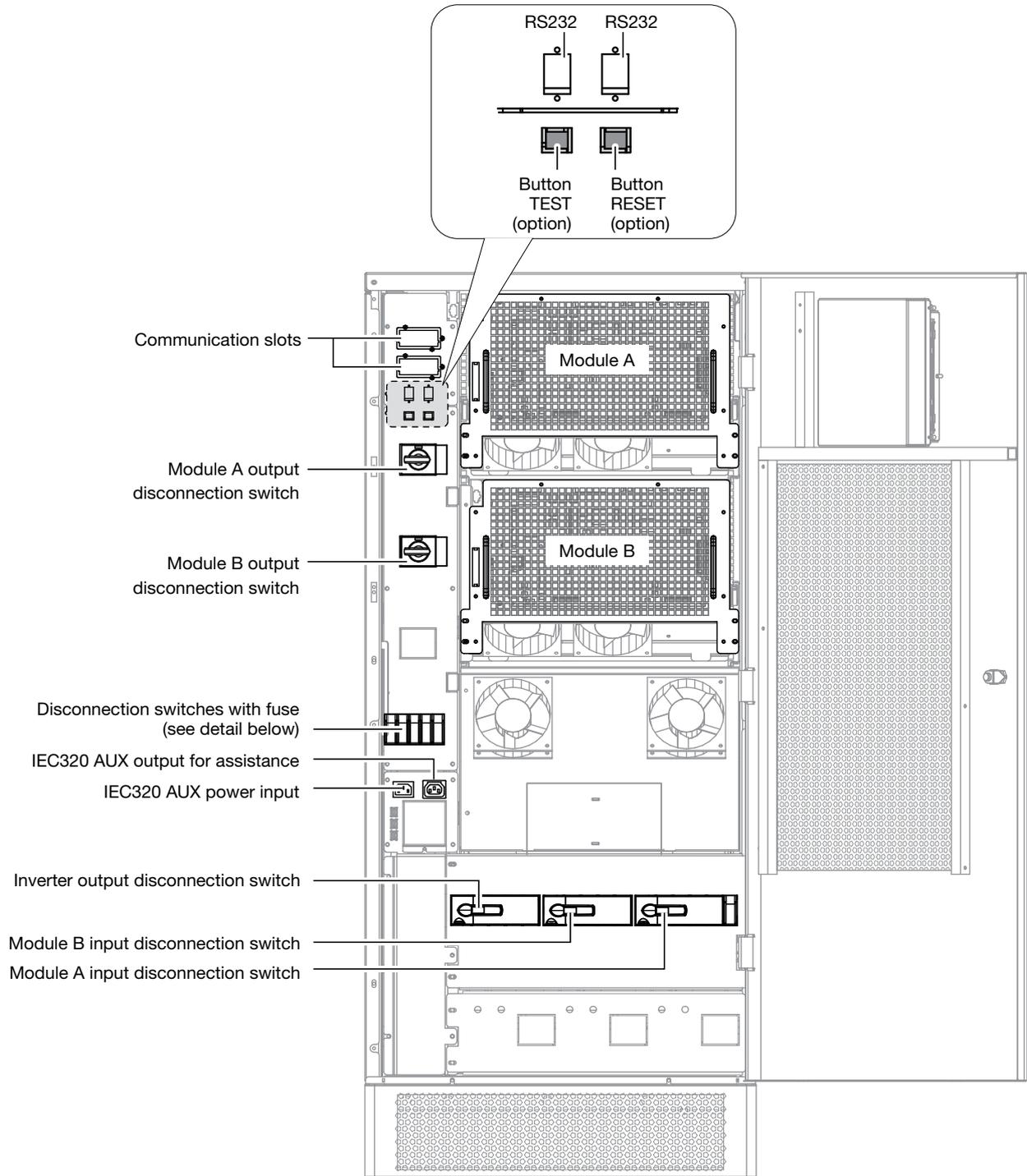
2.2. DESCRIPTION

2.2-1 SUNSYS P33TR with the door open and the 33 kW power module

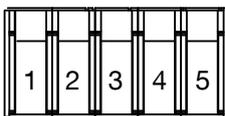


ENGLISH

2.2-2 SUNSYS P66TR with the door open and the two 33 kW power modules

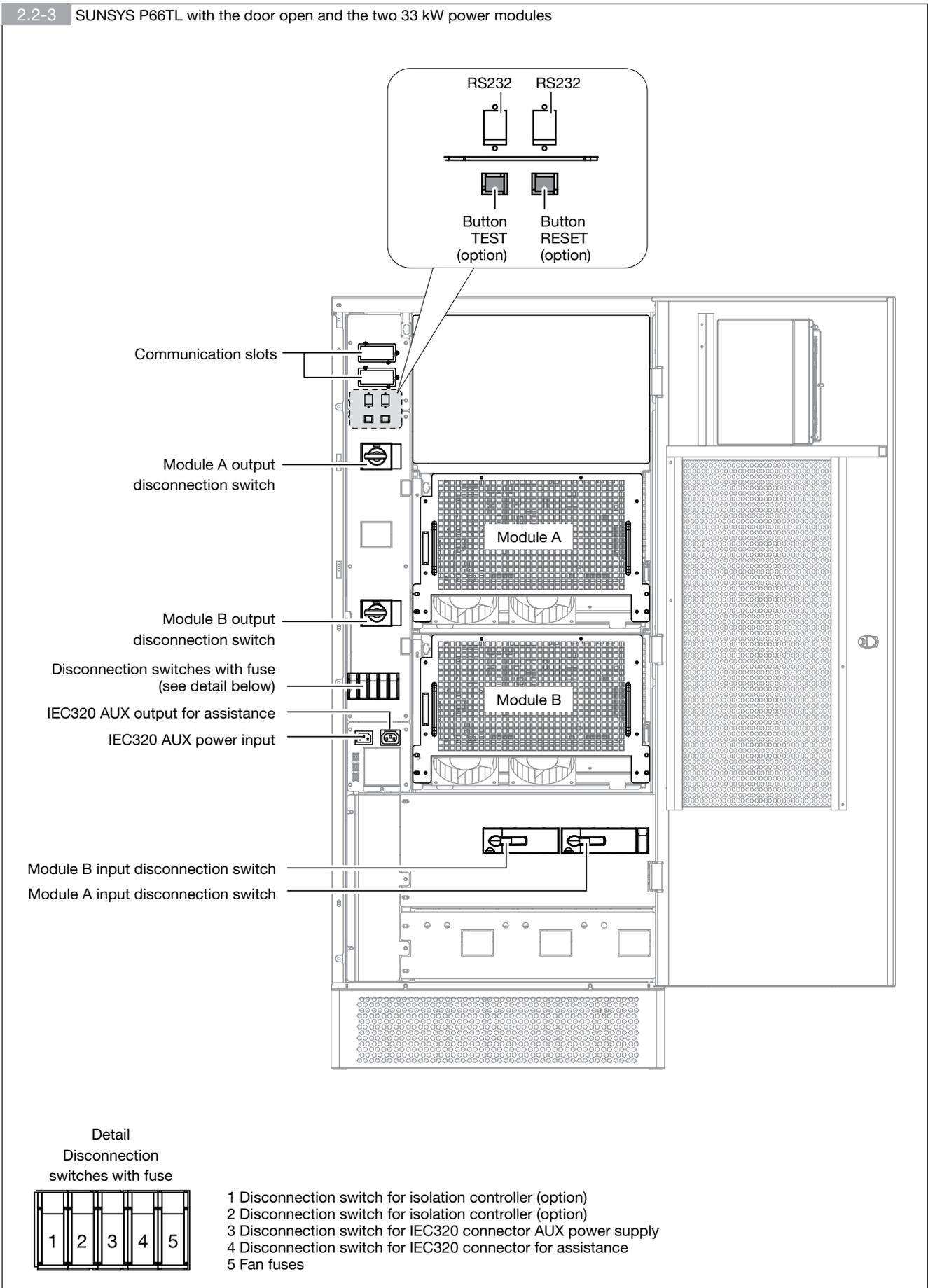


Detail  
Disconnection  
switches with fuse

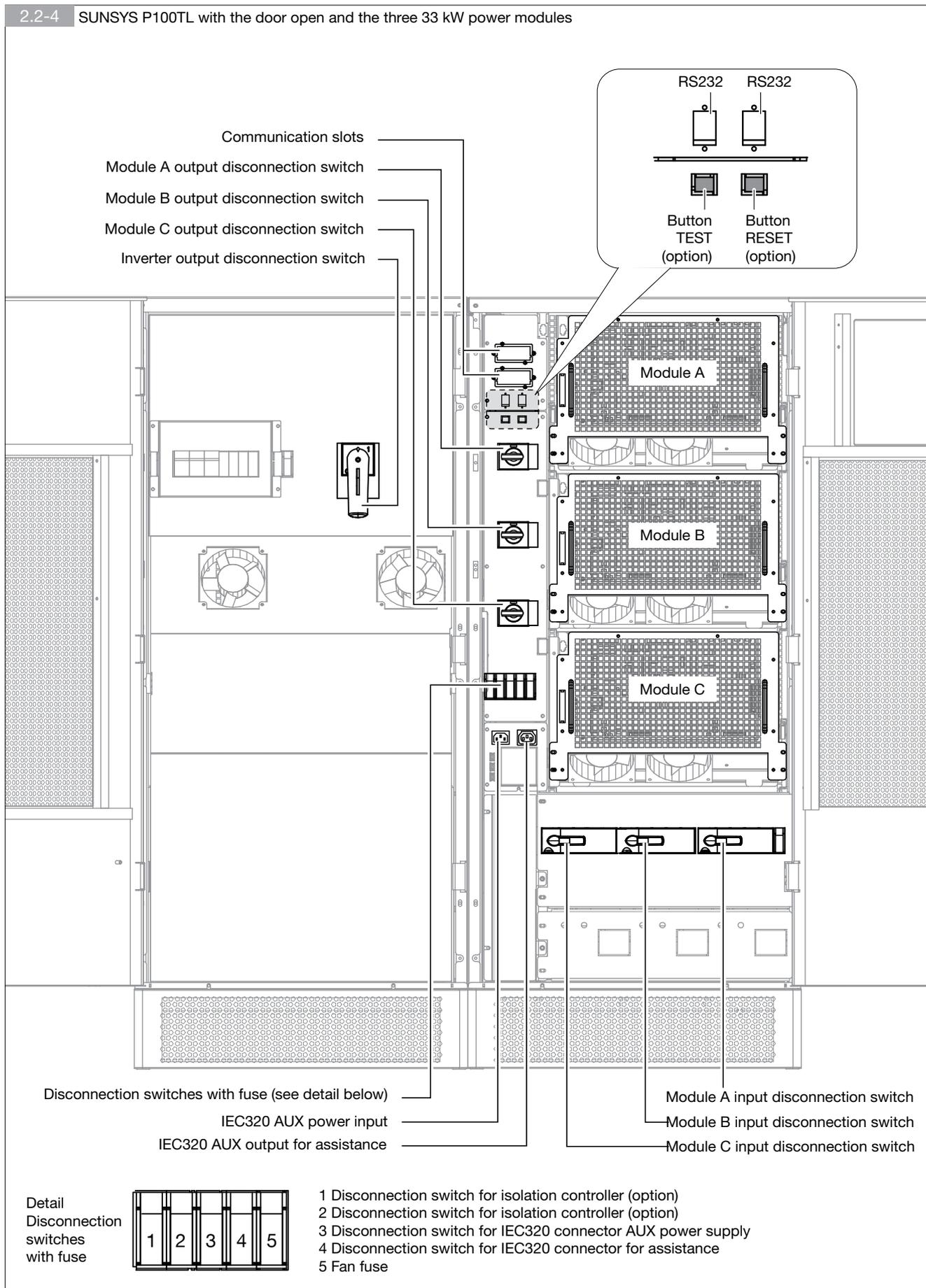


- 1 Disconnection switch for isolation controller (option)
- 2 Disconnection switch for isolation controller (option)
- 3 Disconnection switch for IEC320 connector AUX power supply
- 4 Disconnection switch for IEC320 connector for assistance
- 5 Fan fuses

2.2-3 SUNSYS P66TL with the door open and the two 33 kW power modules



2.2-4 SUNSYS P100TL with the door open and the three 33 kW power modules



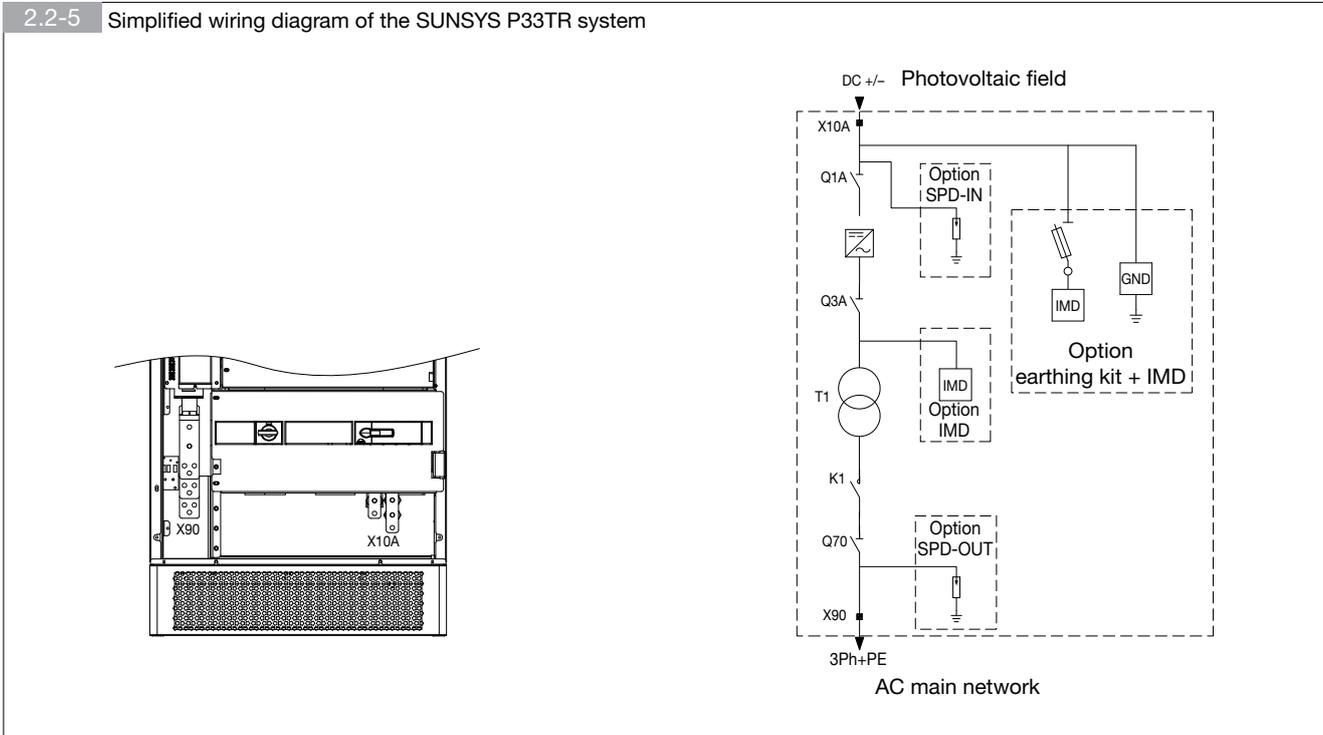
## 2. DESCRIPTION OF THE SYSTEM

The SUNSYS P series covers a range of power from 33.3 to 100 kW and consists of 1, 2 or 3 modules of 33.3 kW each.

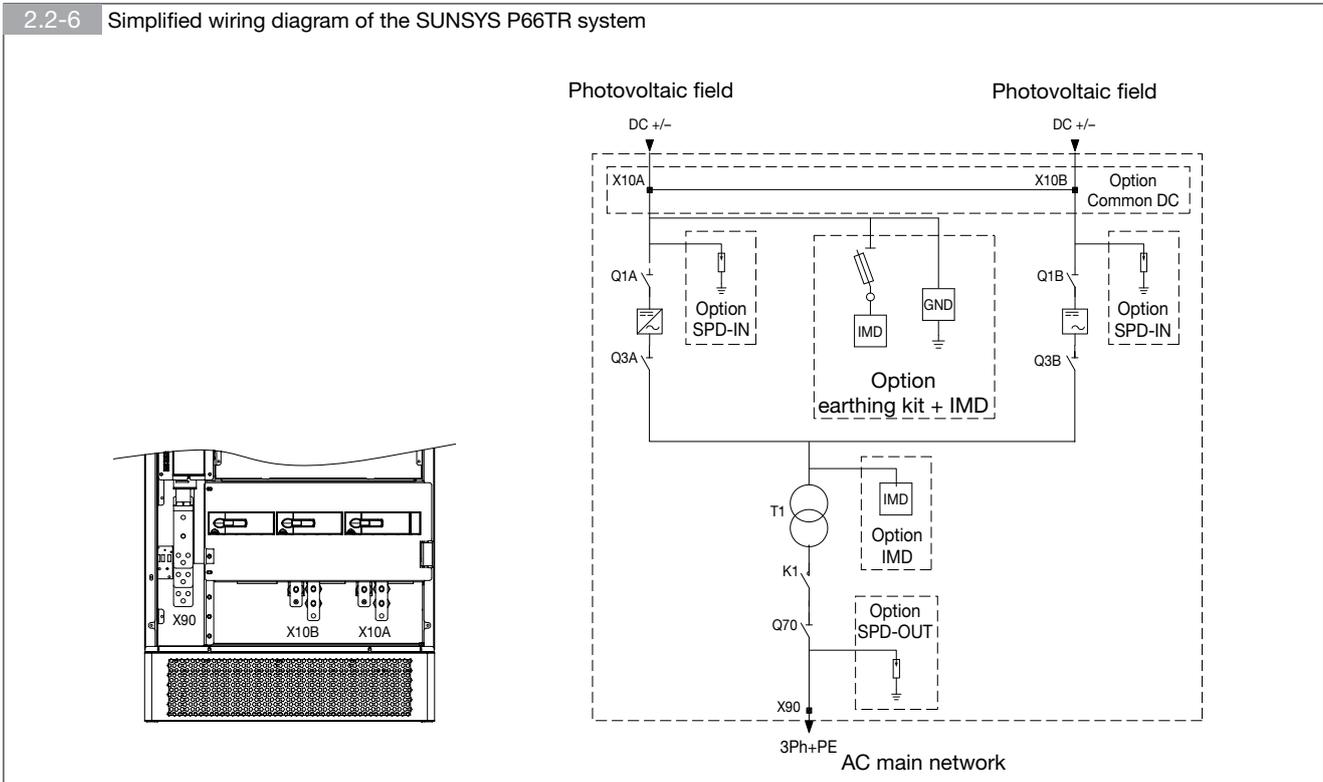
Each module converts the energy provided by the solar panels, using a Maximum Power Point Tracking (MPPT) algorithm to fully exploit the features of the photovoltaic cells.

The DC terminals of all modules can be connected to the same photovoltaic field (centralised modular inverter with single MPPT), or can have different photovoltaic fields (centralised multi-string inverter with separate MPPTs).

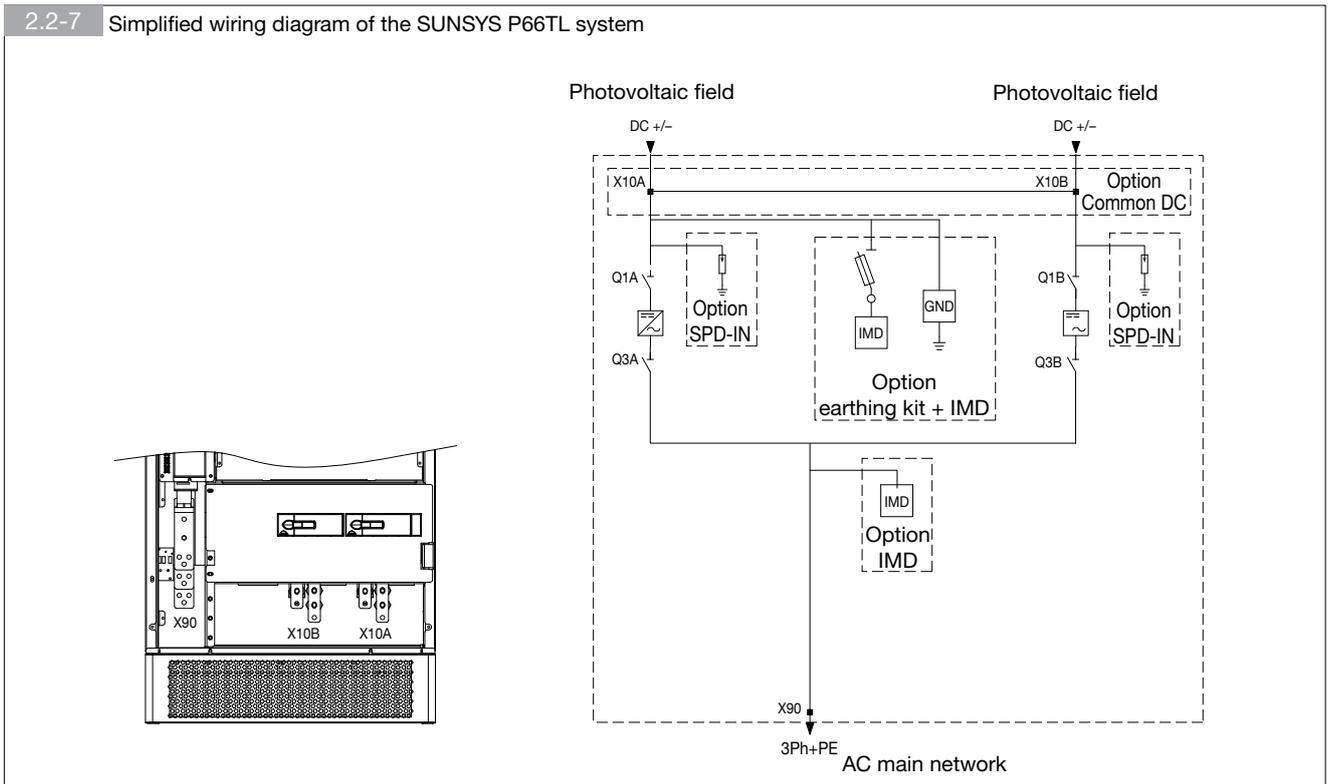
2.2-5 Simplified wiring diagram of the SUNSYS P33TR system



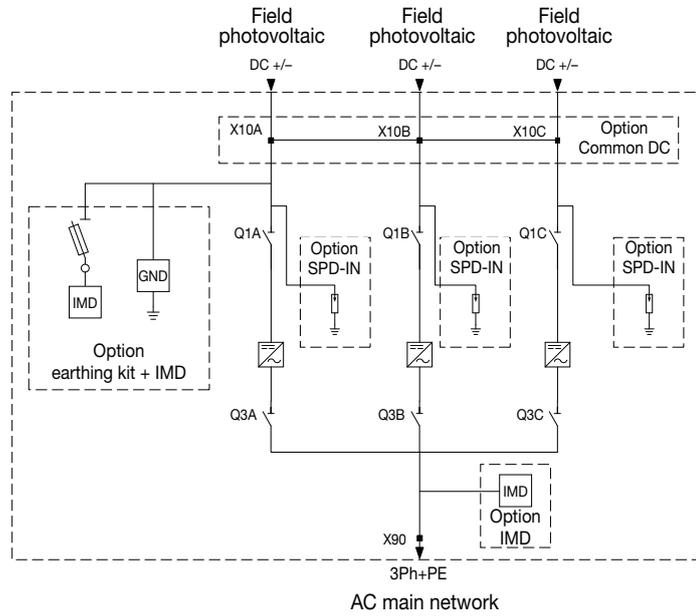
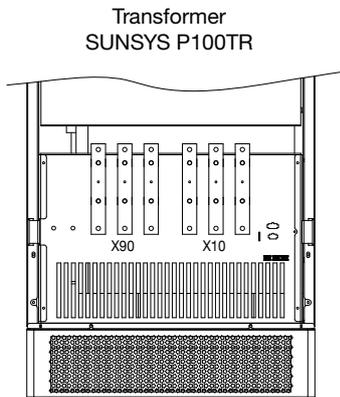
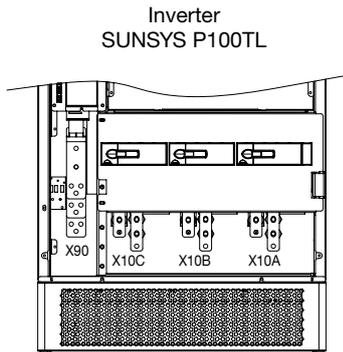
2.2-6 Simplified wiring diagram of the SUNSYS P66TR system



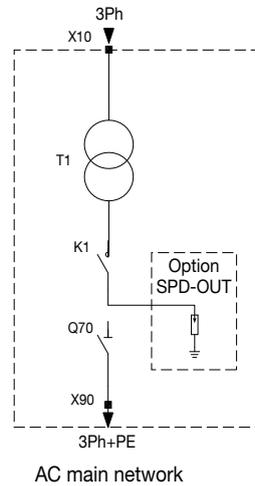
2.2-7 Simplified wiring diagram of the SUNSYS P66TL system



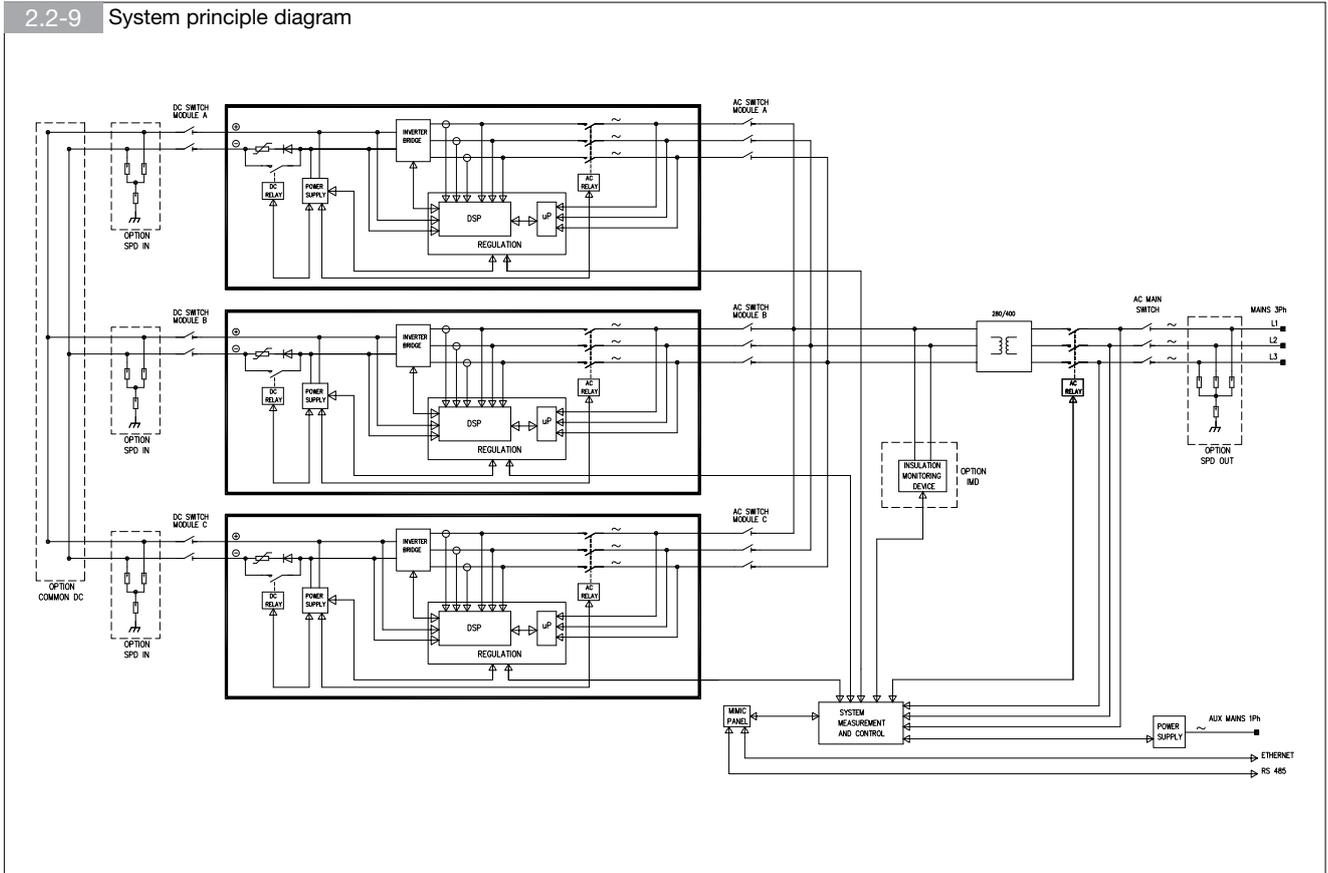
2.2-8 Simplified wiring diagram of the SUNSYS P100TL system (with Sunsys P100TR)



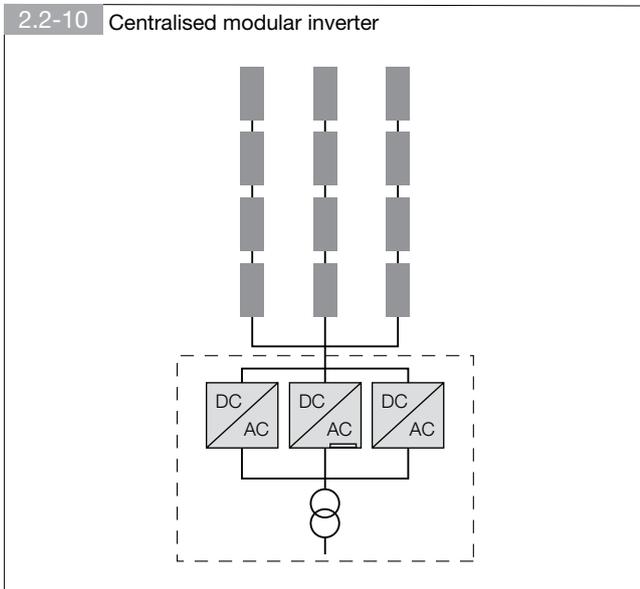
Power supply network



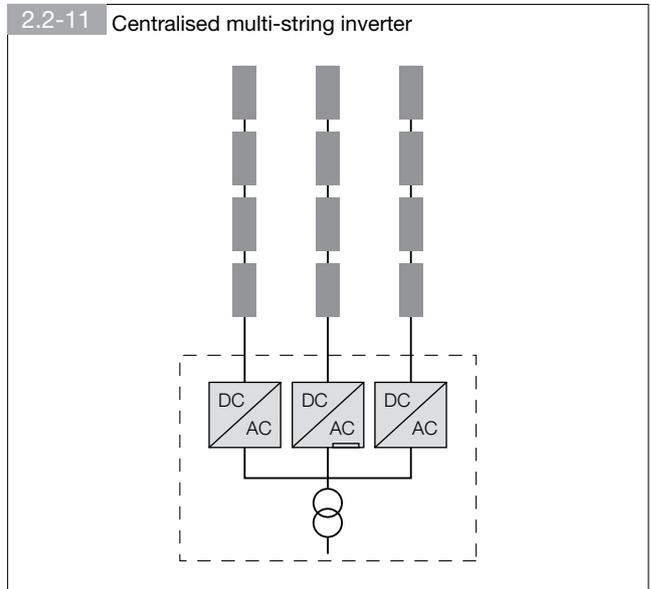
2.2-9 System principle diagram

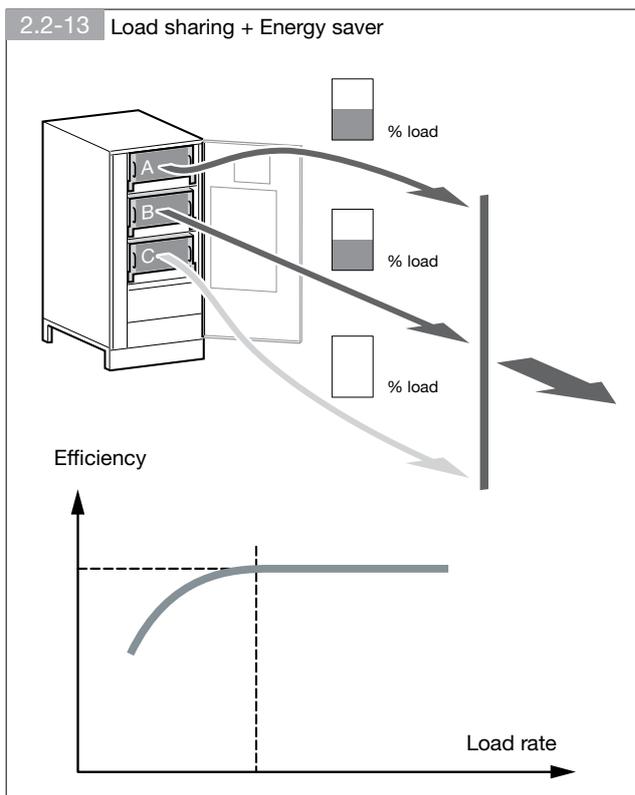
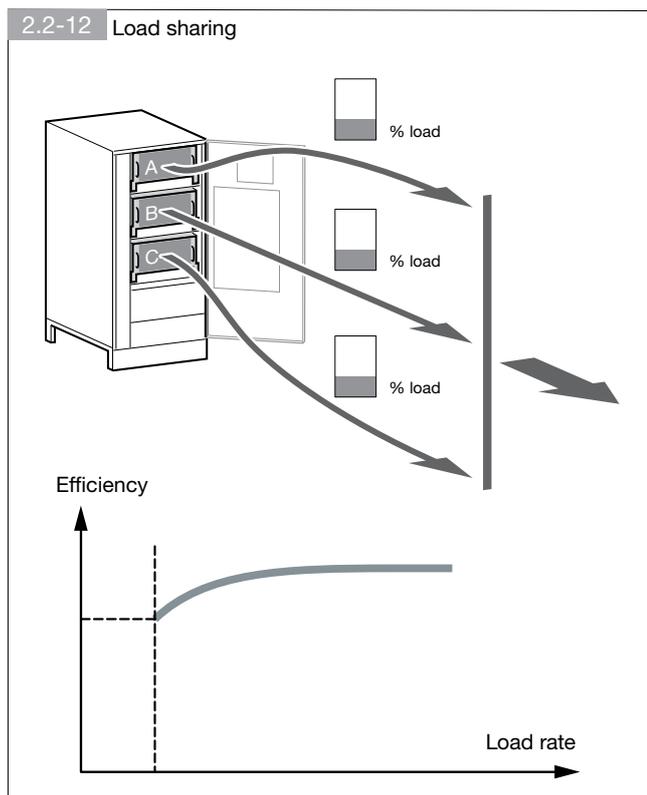


2.2-10 Centralised modular inverter



2.2-11 Centralised multi-string inverter





In the case of the centralised modular inverter, the 33.3 kW modules run on Energy Saver mode.

This type of operation has two advantages:

- Longer equipment lifetime, as the individual modules are switched on and off at random and run for less time on average, instead of all being switched on and off at the same time.
- Increased efficiency, as only the equipment actually required is activated and operates under optimal efficiency conditions (30-60% of rated power).

In the case of centralised multi-string inverters, the MPPT algorithm of each module runs independently to maximise the power supplied by the photovoltaic panels.

The inverter is equipped with an isolation transformer as standard, and can therefore be used with all photovoltaic panel technology (crystalline, thin film, back contact etc.). For technology which requires one of the photovoltaic generator poles to be earthed, the special optional kit (GND) must be used.

### 2.2.1. Options

SUNSYS P can be ordered together with the following options:

- Earthing: PV generator + or – pole earthed (GND)
- Permanent isolation controller (IMD)
- AC over-voltage dischargers (SPDO)
- DC over-voltage dischargers (SPDI)
- Cable fastening brackets



For detailed information regarding the options refer to the relevant documentation.

## 2.3. TECHNICAL DATA

	SUNSYS P33TR	SUNSYS P66TL	SUNSYS P66TL 1K	SUNSYS P66TR	SUNSYS P100TL	SUNSYS P100TL 1K	SUNSYS P100TR
<b>DC input</b>							
DC rated current	80 A	160 A		240 A			
Max. DC voltage	900 V	900 V	1000 V	900 V	900 V	1000 V	900 V
Stop voltage	350 V	350 V	400 V	350 V	350 V	400 V	350 V
MPP field *	450 to 800 V	450 to 800 V	485 to 850 V	450 to 800 V	450 to 800 V	485 to 850 V	450 to 800 V
MPPT no.	1	1-2		1-3			
<b>AC output</b>							
Rated power	33.3 kW/kVA	66.7 kW/kVA		100 kW/kVA			
Maximum power (30 min.)	36.6 kW/kVA	73.4 kW/kVA		110 kW/kVA			
<b>AC voltage</b>							
Output voltage	400 V 3ph	280 V 3ph	320 V 3ph	400 V 3ph	280 V 3ph	320 V 3ph	400 V 3ph
Protection	63 A curve D	200 A curve C	160 A curve C	125 A curve D	250 A curve C	250 A curve C	200 A curve D
Power factor **	≥0.99						
Distortion factor	<3%						
<b>Efficiency</b>							
η % (rat.)	96.1	97.6	98.0	96.3	97.6	98.0	96.4
η %(euro)	95.2	97.3	97.8	95.6	97.3	97.8	95.8
<b>Auxiliary power supp.</b>							
In operation	<30 W						
On Standby	<10 W						
<b>Environmental conditions</b>							
Cooling air requirements	480 m³/h	960 m³/h		1280 m³/h	1440 m³/h		1760 m³/h
Dissipated power	1750 W	2400 W		3500 W	3650 W		5250 W
Dissipated power	5980 BTU/h	8184 BTU/h		11950 BTU/h	12450 BTU/h		17900 BTU/h
<b>Temperature range</b>							
During operation	-5°C to 40°C (from 40°C to 55°C with downgrading)						
During transportation	-5°C to 55°C						
Relative humidity	5% to 95% without condensation						
Environmental category in accordance with EN 62109-1	Non-air-conditioned indoor space						
Altitude	≤1000 m without derating						
Protection class in accordance with EN 60529	IP20						
Pollution class in accordance with EN60664-1	3						
Pulse resistance voltage in accordance with EN 60060-1 AC terminals	2.5 kV						
Pulse resistance voltage in accordance with EN 60060-1 DC terminals	4 kV						
<b>Mechanical characteristics</b>							
Dimensions (LxHxD)	600x1400x795 mm	600x1400x795 mm		600x1400x795 mm	600x1400x795 mm		1200x1400x795 mm
Weight	330 kg	125 kg		525 kg	190 kg		190 + 580 kg
Noise (front, 1 m)	60 dB	64 dB					
<b>Communication ports</b>							
Serial	RS232/485 JBUS						

\* The full power MPPT voltage range is valid at nominal mains condition

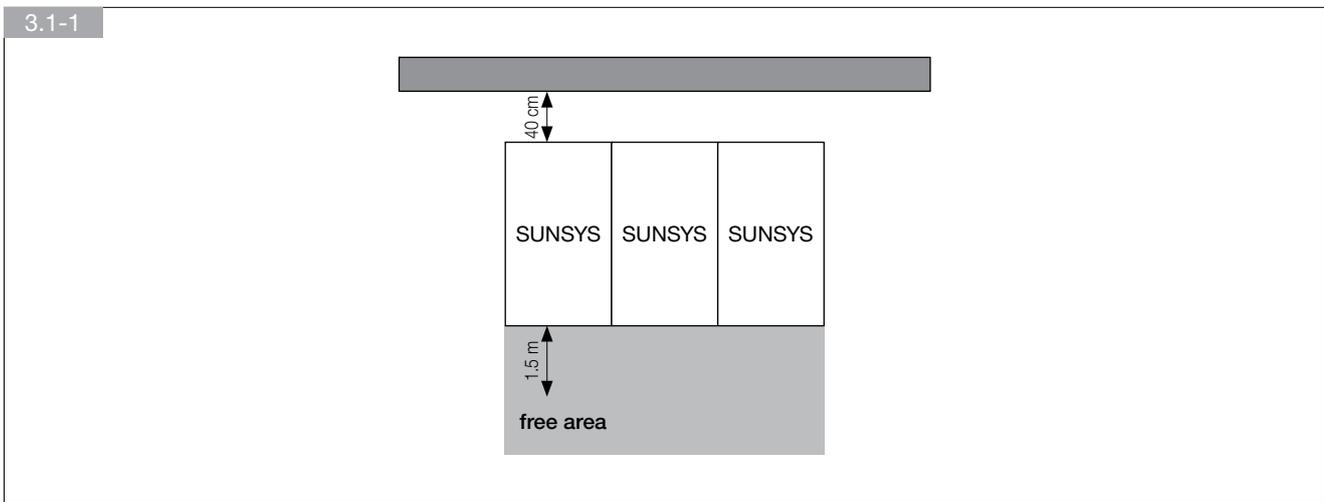
\*\* Adjustable according main supplier condition

# 3. PREREQUISITES

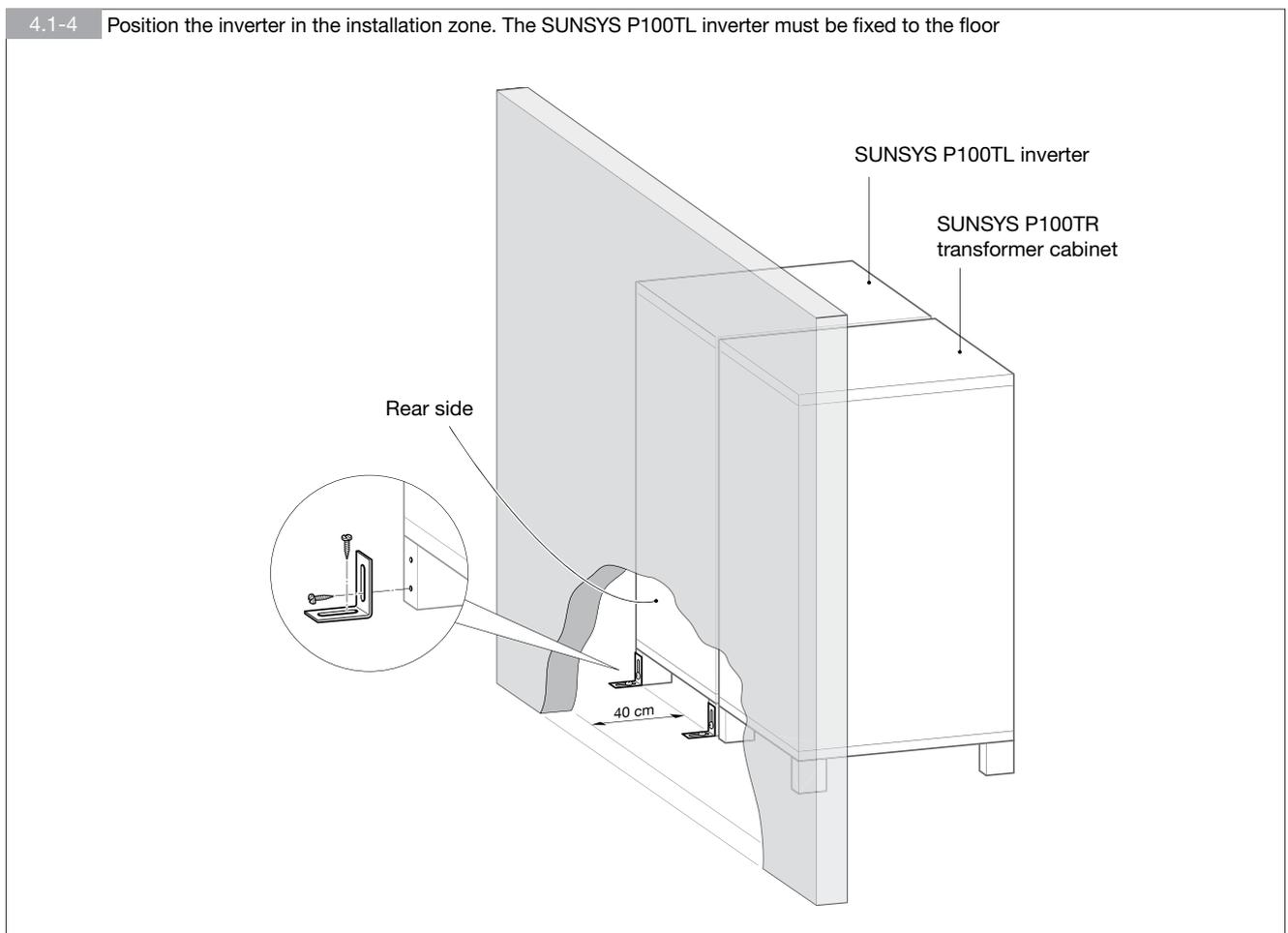
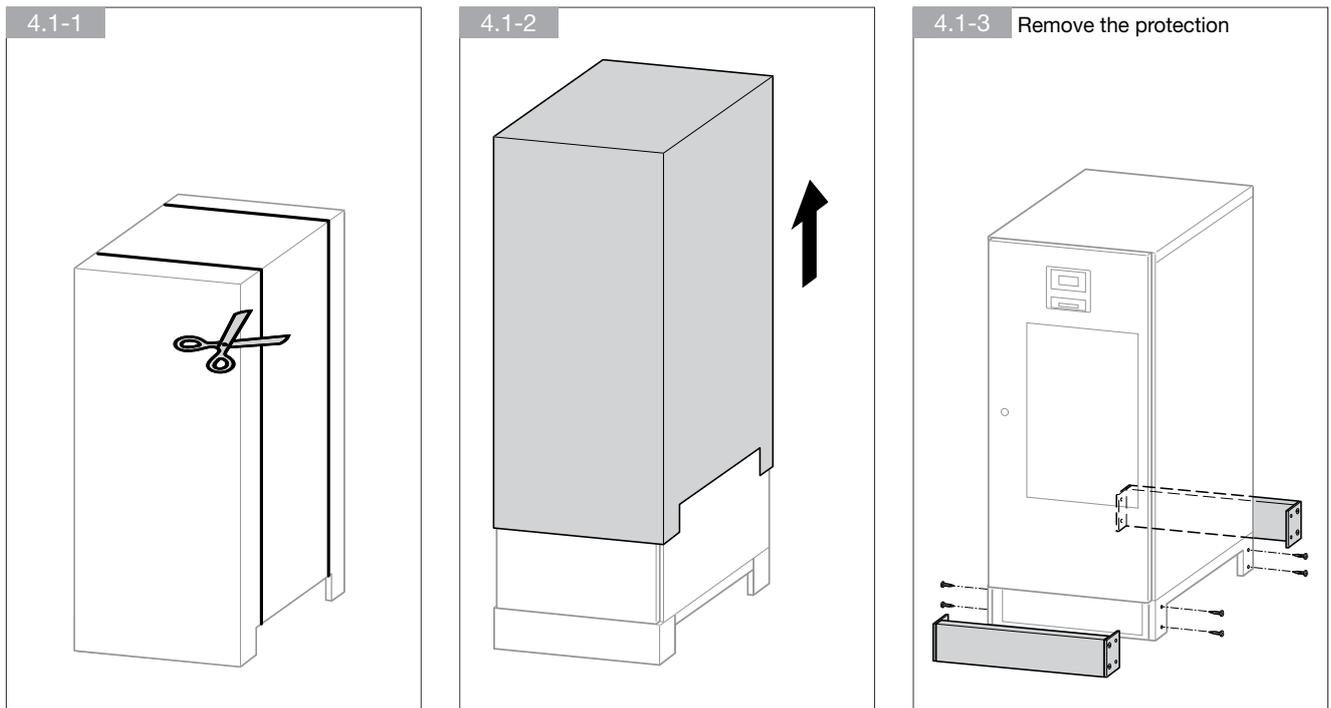
## 3.1. INSTALLATION SITE CONDITIONS

The installation site must meet the following requirements:

- The inverter is designed for use within non-air-conditioned rooms in accordance with standard IEC 62109-1. The inverter is not designed for outdoor use.
- The foundations must be able to withstand the relevant weight (inverter, transportation device) and suited to the base. Stability must also be guaranteed.
- The ambient temperatures, relative humidity and altitude of the installation site are indicated in the technical data table.
- Avoid environments which are dusty or which contain dust from conductive or corrosive materials (e.g. dust from metal or chemical solutions).
- The inverter has front access for handling devices; nevertheless, a space of at least 1.5 metres should be left free at the front of the inverter for any maintenance work required.
- The rear of the inverter must be at least 40 cm away from the wall or other obstacles to guarantee sufficient ventilation (see figure).



## 4. TRANSPORT AND UNWRAPPING



**WARNING!**  
After completing all the procedures, fit the protective skirting

# 5. INSTALLATION



**DANGER!**  
Risk of electric shock from live device parts!

In the event of system maintenance, carry out the following steps beforehand:

- Disconnect the photovoltaic system.
- Make sure the photovoltaic system cannot be restarted.
- Make sure the mains electricity supply has been disconnected.
- Earth the device units and short-circuit them.
- Cover or separate the nearby live device units.
- Before working on the circuits upstream make sure the inverter is disconnected by opening the DC disconnection switches.



**DANGER!**  
Risk of electric shock from live device parts!

SUNSYS P can be connected to a maximum of three power supplies:

- 1 DC cable - Photovoltaic generator power supply (separated for the three modules or shared)
- 2 AC cable - Power from the mains network, supplied by the electricity company
- 3 AC cable - Auxiliary power supply

- Before carrying out any work, make sure the electricity supply has been disconnected.
- All DC power supplies should be considered as part of the same circuit, even in the configuration with centralised multi-string inverter. Before carrying out any work, make sure all electricity supplies have been disconnected.



**DANGER!**  
Risk of electric shock from live device parts!

The intermediate inverter circuit may be live even after it has been deactivated.

- Wait 5 minutes for the power to disperse and make sure that there is none remaining.



**DANGER!**  
Risk of electric shock from live device parts!

The photovoltaic modules are live as soon as they are exposed to sunlight.

- Take suitable measures and make sure there is no power remaining.

SUNSYS P are designed for instant application. Only the AC and DC cables coming from outside must be installed and the inverter configured.

## 5.1. ELECTRICAL INSTALLATION REQUIREMENTS

The installation and system must comply with existing national legislation.

The fixed power distribution unit must include protection and disconnection for the main AC network for the auxiliary network.

The following table indicates the sizing of AC protection devices that will ensure correct installation.

Model	Network cable cross-section Main AC (mm <sup>2</sup> ) <sup>1</sup>	Magneto-thermal switch protecting the main AC network	Differential AC protection (optional)
SUNSYS P33TR	min. 16 / max. 120	63 A type D <sup>2</sup>	0.3 A type AC or A
SUNSYS P66TR	min. 35 / max. 120	125 A type D <sup>2</sup>	0.3 A type AC or A
SUNSYS P66TL	min. 70 / max. 120	200 A type C	0.3 A type AC or A
SUNSYS P66TL 1K	min. 70 / max. 120	160 A type C	0.3 A type AC or A
SUNSYS P100TL	120	250 A type C	0.3 A type AC or A
SUNSYS P100TL 1K	120	250 A type C	0.3 A type AC or A
SUNSYS P100TR	min. 70 / max. 120	200 A type D <sup>2</sup>	0.3 A type AC or A

1. Determined by the size of the terminals

2. Recommended magneto-thermal switch: three poles with intervention threshold  $\geq 10$  In

The auxiliary power supply socket must be protected with a 16 A magneto-thermal switch, curve C, and from category 2 over-voltages or greater.

The following table indicates the sizing of the wires originating from the photovoltaic generator for correct installation.

Inverter size	PV generator cable cross-section in case of shared DC inputs (mm <sup>2</sup> ) <sup>1</sup>	PV generator cable cross-section in case of separate DC inputs (mm <sup>2</sup> ) <sup>2</sup>
33 kW	min. 25 / max. 120 (M8)	N.A.
66 kW	min. 50 / max. 120 (M8)	min. 25 / max. 120 (M8)
100 kW	min. 95 / max. 120 (M8)	min. 25 / max. 120 (M8)

1. Determined by the size of the terminals

2. Up to 2 cables can also be connected at the same point, max. 2x50 mm<sup>2</sup>



### WARNING!

The inverter is designed for transient over-voltages in category II installations for AC terminals. If the inverter may be subjected to transient over-voltages in category III installations, protective SPDs must be provided for the AC power supply network. The SPDO option, designed to protect against category III over-voltages, can be fitted directly to the inverter. If it is used, the distance between the inverter and type I centralised SPD protection must be ≥15 m.



### WARNING!

The inverter is designed for transient over-voltages in category II installations for DC terminals. If the inverter may be subject to transient over-voltages in category III installations, or if the distance from the SPDs in the photovoltaic field is excessive, protective SPDs must be fitted near the inverter. The SPDI option, designed to protect against over-voltages in photovoltaic applications, can be fitted directly to the inverter.



### NOTE

DC inputs do not require protection against over-voltages, if fewer than three inverter modules are connected to the same photovoltaic generator.



### NOTE

Functional panel earthing (optional): for correct operation, some types of photovoltaic panel require one of the two poles to be earthed. The special optional kit (GND) can be used to earth the positive or negative pole of the photovoltaic generator. For further details and instructions, please refer to the kit (GND) installation and operating manual.



### IT SYSTEM

With the photovoltaic panels isolated from earth, the circuit consisting of the panels and the inverter is configured like an IT system. We therefore recommend a permanent isolation controller is used in the system or built into the inverter (IMD option).

## 5.2. CONNECTING THE PHOTOVOLTAIC GENERATOR AND MAIN AC NETWORK TO THE POWER TERMINALS OF THE SUNSYS P33TR INVERTER

The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Apply the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L1, L2, L3) to the connection terminals.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



**DANGER!**  
Risk of electric shock from live device parts!

The inverter can be connected to a maximum of three power supplies:

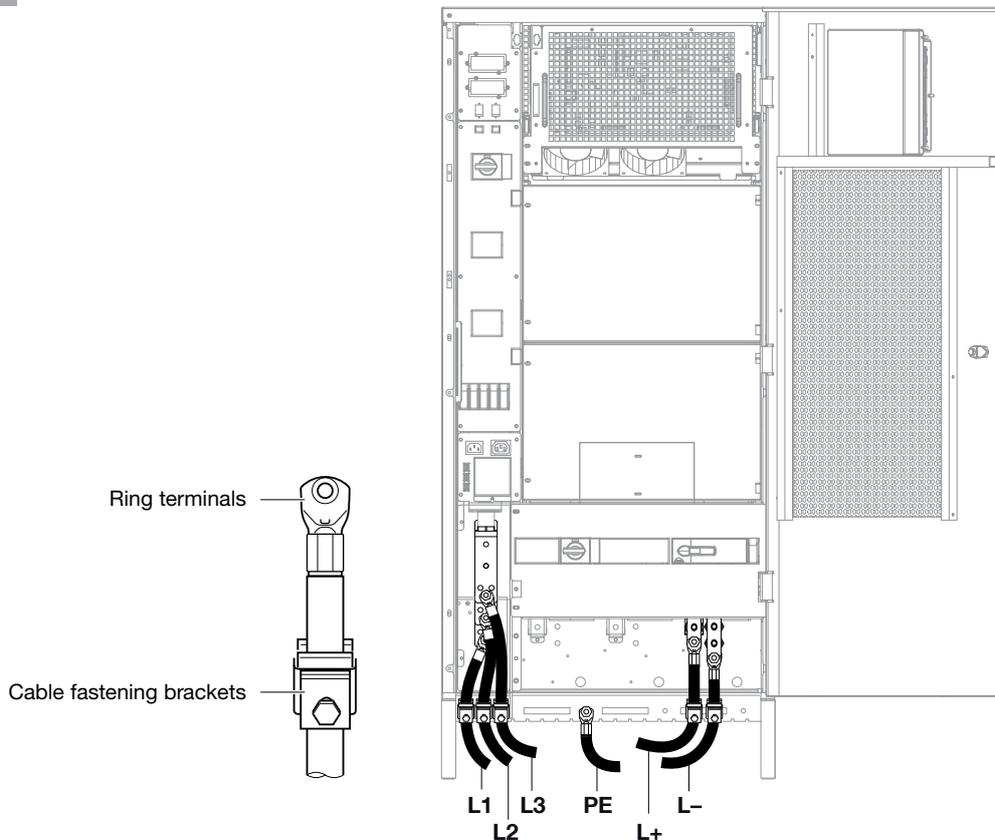
- 1 DC cable - Photovoltaic generator power supply (separated for the three modules or shared)
- 2 AC cable - Power from the mains network, supplied by the electricity company
- 3 AC cable - Auxiliary power supply

- Before carrying out any work, make sure the electricity supply has been disconnected.
- All DC power supplies should be considered as part of the same circuit, even in the configuration with centralised multi-string inverter. Before carrying out any work, make sure all electricity supplies have been disconnected.



**NOTE**  
Torque for the DC and AC power terminals: 20 Nm

5.2-1



Key

PE: Connection terminal for the protective earth wire (PE)

L1, L2, L3: Connection terminals for the main AC network  $3N\sim$

L+, L-: DC connection terminals for the photovoltaic generator

### 5.3. CONNECTING THE PHOTOVOLTAIC GENERATOR AND MAIN AC NETWORK TO THE POWER TERMINALS OF THE SUNSYS P66TR INVERTER

The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Attach the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L1, L2, L3) to the connection terminals.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



#### DANGER!

Risk of electric shock from live device parts!

The inverter can be connected to a maximum of three power supplies:

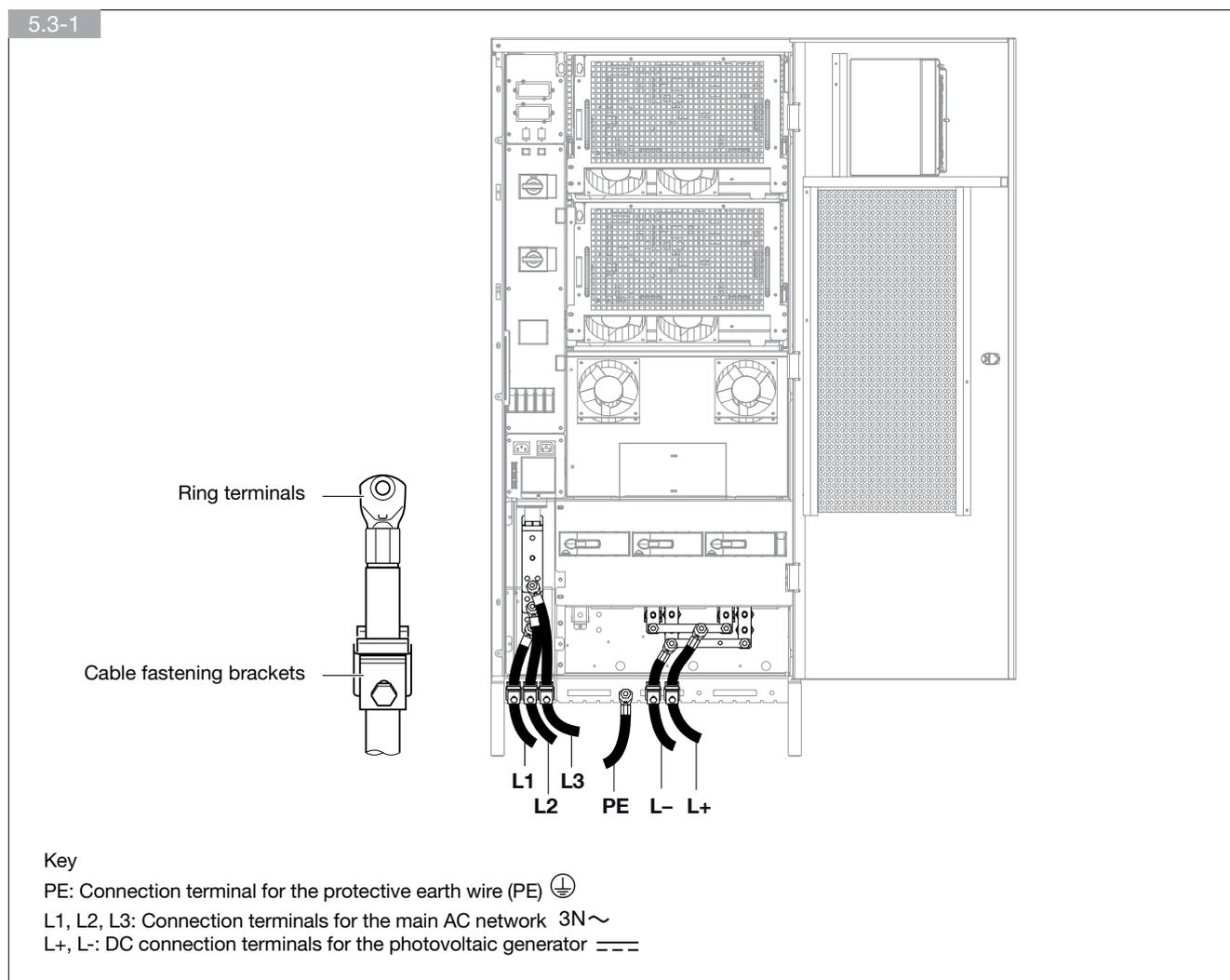
- 1 DC cable - Photovoltaic generator power supply (separated for the three modules or shared)
- 2 AC cable - Power from the mains network, supplied by the electricity company
- 3 AC cable - Auxiliary power supply

- Before carrying out any work, make sure the electricity supply has been disconnected.
- All DC power supplies should be considered as part of the same circuit, even in the configuration with centralised multi-string inverter. Before carrying out any work, make sure all electricity supplies have been disconnected.



#### NOTE

Torque for the DC and AC power terminals: 20 Nm



The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Apply the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Remove the sharing bar for the DC terminals if using a centralised multi-string inverter.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L1, L2, L3) to the connection terminals.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



**DANGER!**  
Risk of electric shock from live device parts!

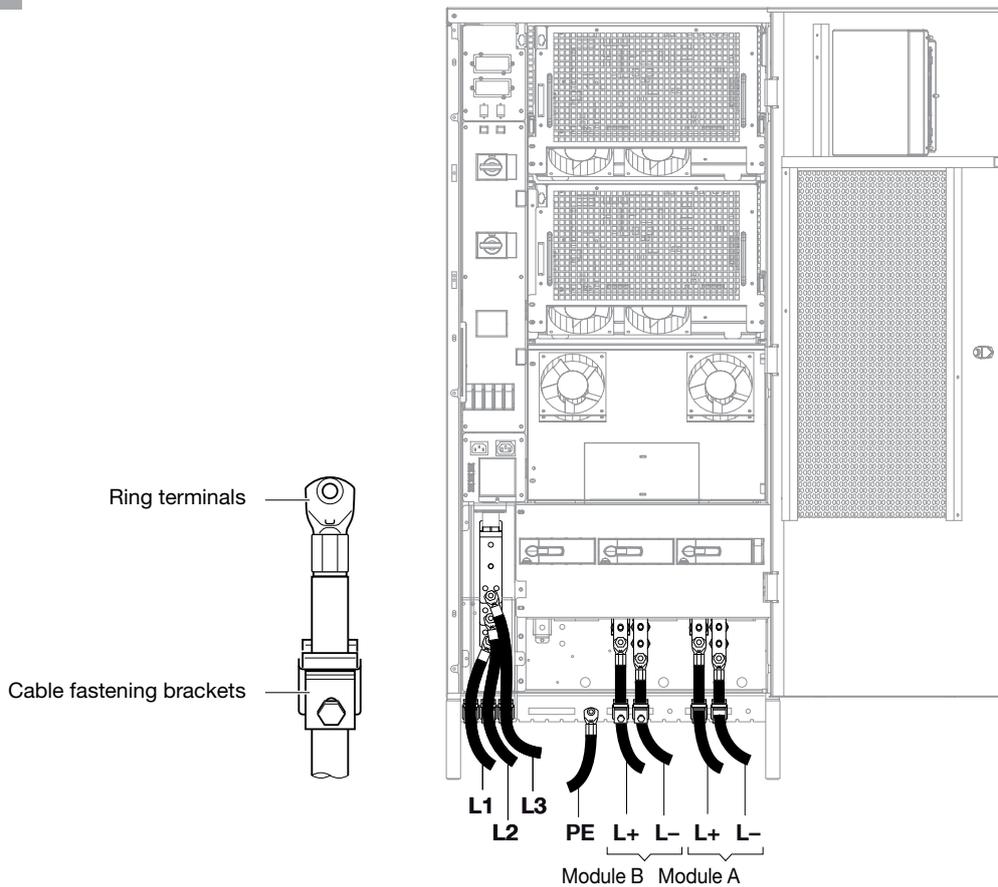
The inverter can be connected to a maximum of three power supplies:

- Before carrying out any work, make sure the electricity supply has been disconnected.



**NOTE**  
Torque for the DC and AC power terminals: 20 Nm

5.3-2



Key

PE: Connection terminal for the protective earth wire (PE)

L1, L2, L3: Connection terminals for the main AC network 3N~

L+, L-: DC terminals connecting the photovoltaic generator to module B

L+, L-: DC terminals connecting the photovoltaic generator to module A

## 5.4. CONNECTING THE PHOTOVOLTAIC GENERATOR AND MAIN AC NETWORK TO THE POWER TERMINALS OF THE SUNSYS P66TL INVERTER

The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Attach the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L1, L2, L3) to the connection terminals.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



### DANGER!

Risk of electric shock from live device parts!

The inverter can be connected to a maximum of three power supplies:

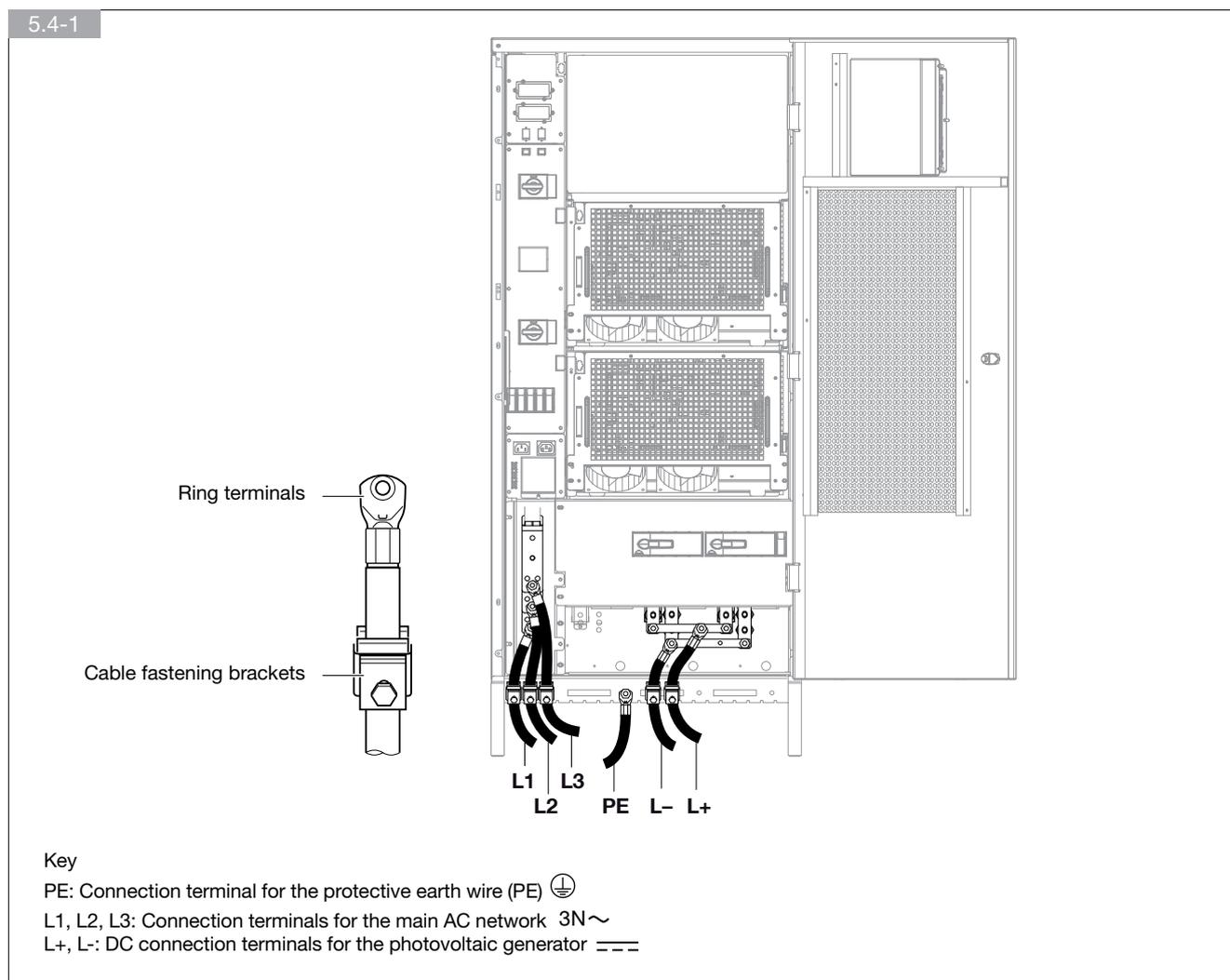
- 1 DC cable - Photovoltaic generator power supply (separated for the three modules or shared)
- 2 AC cable - Power from the mains network, supplied by the electricity company
- 3 AC cable - Auxiliary power supply

- Before carrying out any work, make sure the electricity supply has been disconnected.
- All DC power supplies should be considered as part of the same circuit, even in the configuration with centralised multi-string inverter. Before carrying out any work, make sure all electricity supplies have been disconnected.



### NOTE

Torque for the DC and AC power terminals: 20 Nm



The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Apply the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Remove the sharing bar for the DC terminals if using a centralised multi-string inverter.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L1, L2, L3) to the connection terminals.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



**DANGER!**  
Risk of electric shock from live device parts!

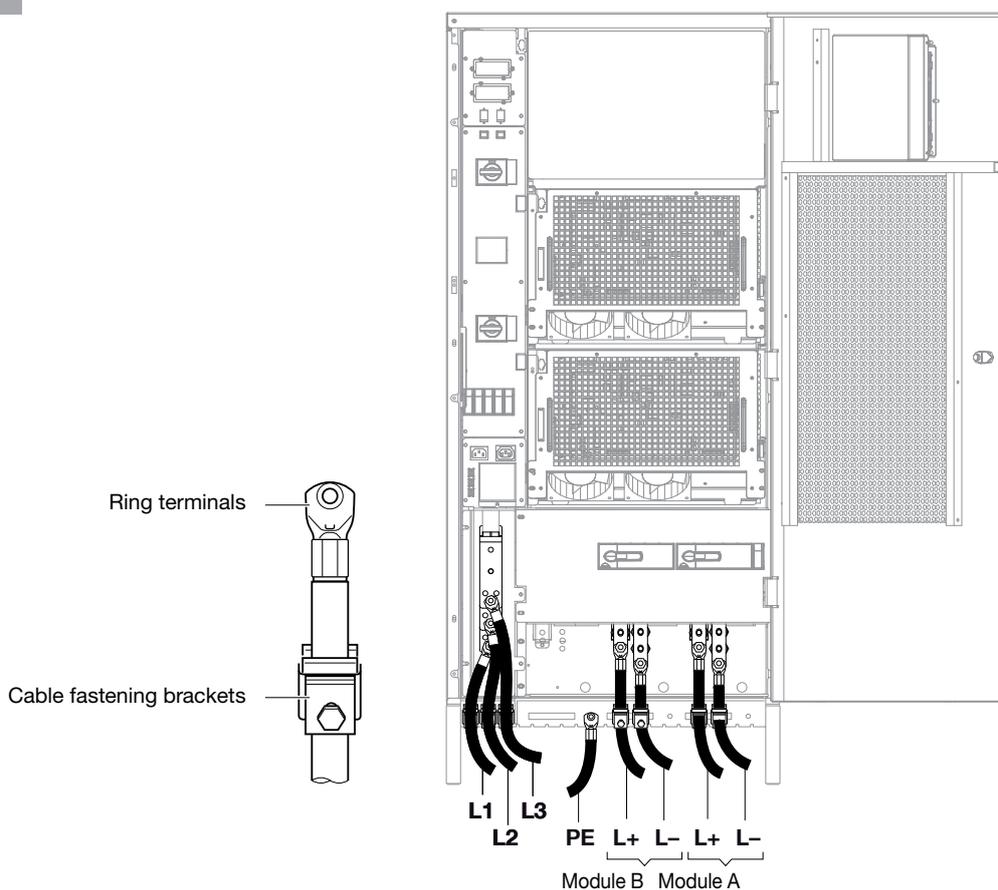
The inverter can be connected to a maximum of three power supplies:

- Before carrying out any work, make sure the electricity supply has been disconnected.



**NOTE**  
Torque for the DC and AC power terminals: 20 Nm

5.4-2



Key

PE: Connection terminal for the protective earth wire (PE)

L1, L2, L3: Connection terminals for the main AC network 3N~

L+, L-: DC terminals connecting the photovoltaic generator to module B

L+, L-: DC terminals connecting the photovoltaic generator to module A

## 5.5. CONNECTING THE PHOTOVOLTAIC GENERATOR AND MAIN AC NETWORK TO THE POWER TERMINALS OF THE SUNSYS P100TL INVERTER

The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Attach the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the power cables supplied between the transformer cabinet and the inverter.
- Fix the signal cables supplied between the transformer cabinet and the inverter.
- Fix the wires (L1, L2, L3) to the connection terminals on the transformer cabinet.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



### DANGER!

Risk of electric shock from live device parts!

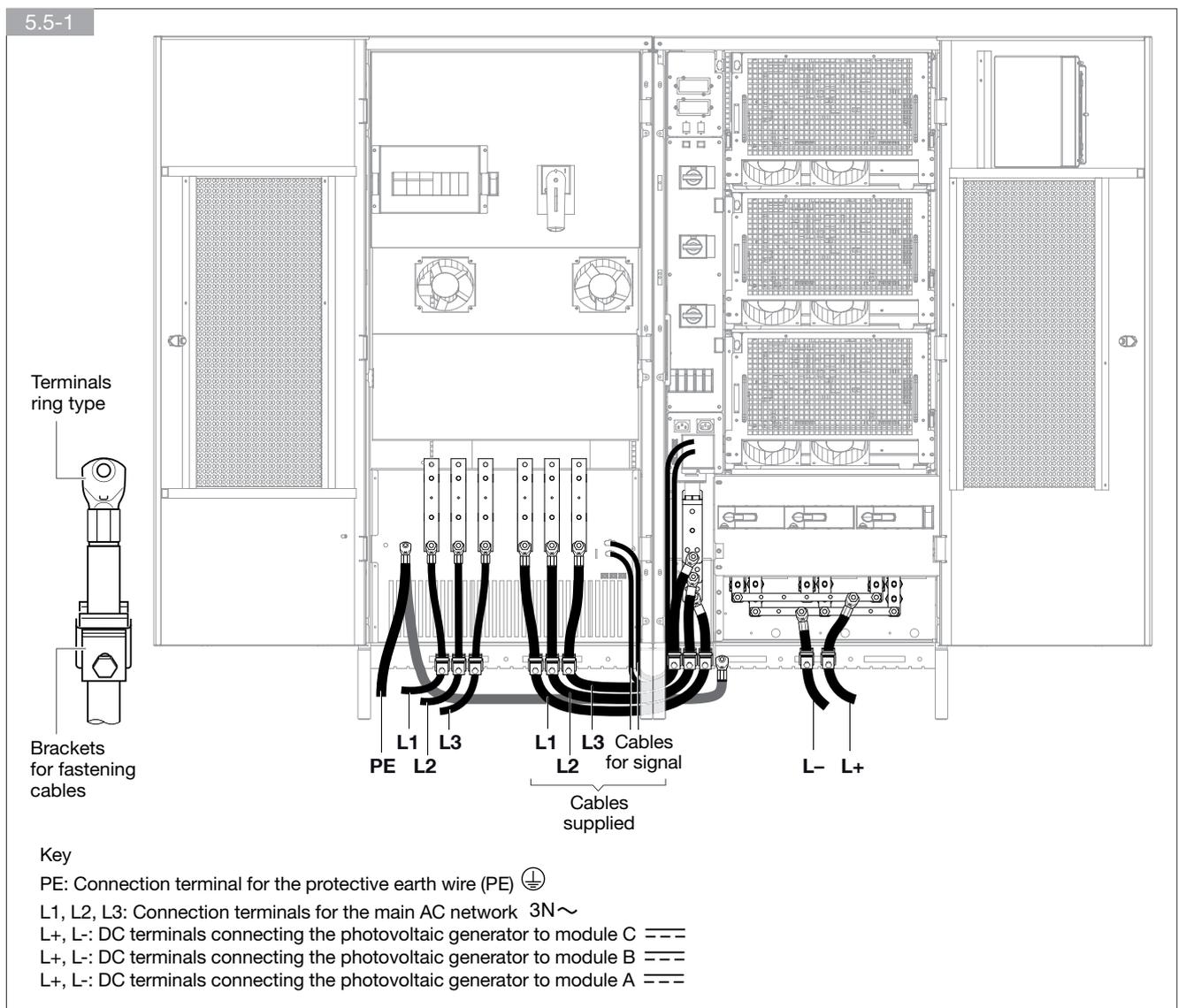
The inverter can be connected to a maximum of three power supplies:

- Before carrying out any work, make sure the electricity supply has been disconnected.



### NOTE

Torque for the DC and AC power terminals: 20 Nm



The inverter is connected to the photovoltaic generator via the DC terminals, and to the main AC network via the AC power terminals.

- Attach the ring terminals to the cables.
- Remove the panels protecting the connection zone in front of the terminals.
- Remove the sharing bar for the DC terminals if using a centralised multi-string inverter.
- Fix the protection wire (PE) to the connection terminal.
- Fix the wires (L+,L-) to the connection terminals.
- Fix the power cables supplied between the transformer cabinet and the inverter.
- Fix the signal cables supplied between the transformer cabinet and the inverter.
- Fix the wires (L1, L2, L3) to the connection terminals on the transformer cabinet.
- Fix the cables to the cable support guide using cable fastening brackets.
- Reposition the panels protecting the connection zone in front of the terminals.



**DANGER!**  
Risk of electric shocks from live device parts!

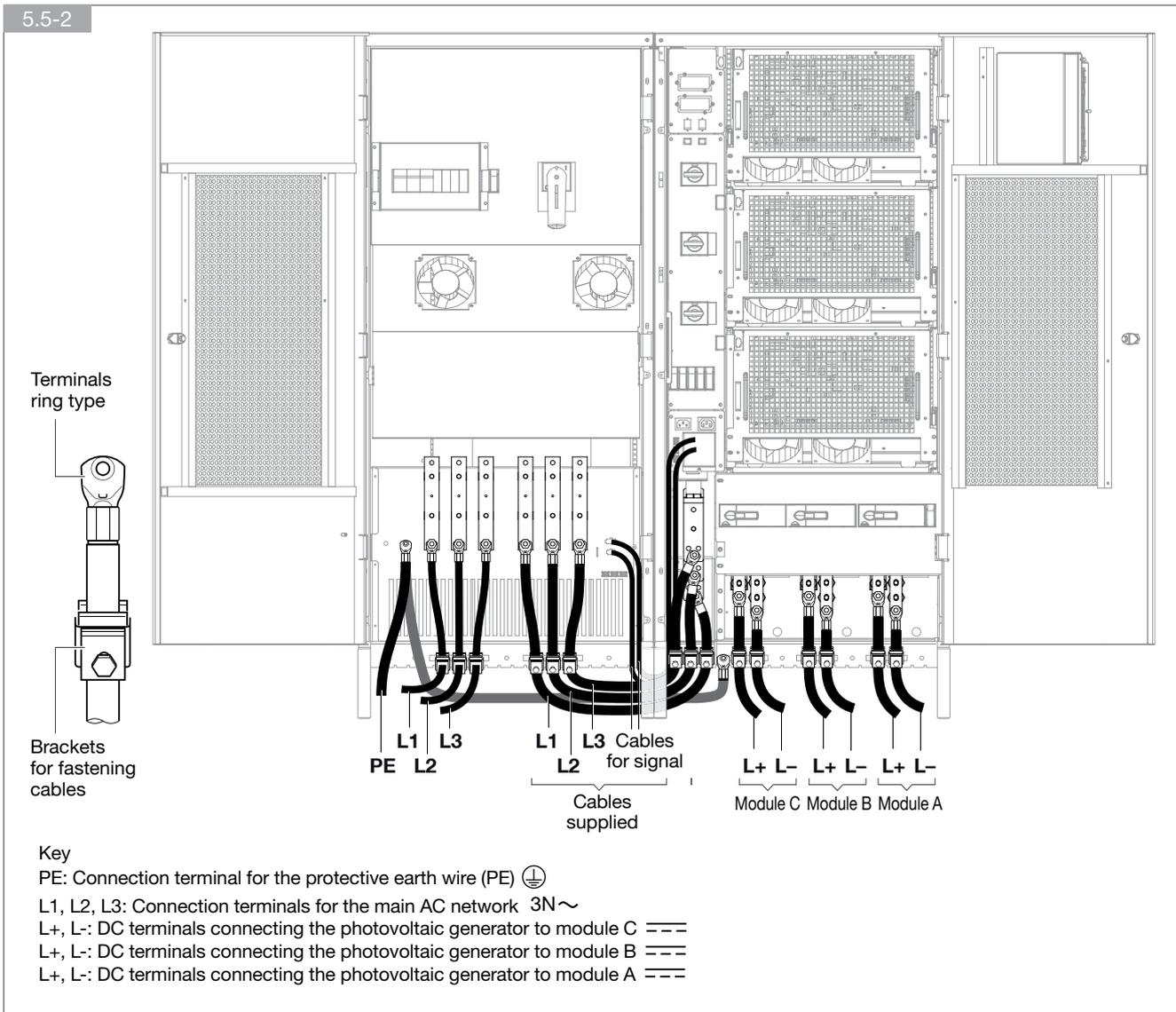
The inverter can be connected to a maximum of three power supplies:

- Before carrying out any work, make sure the electricity supply has been disconnected.

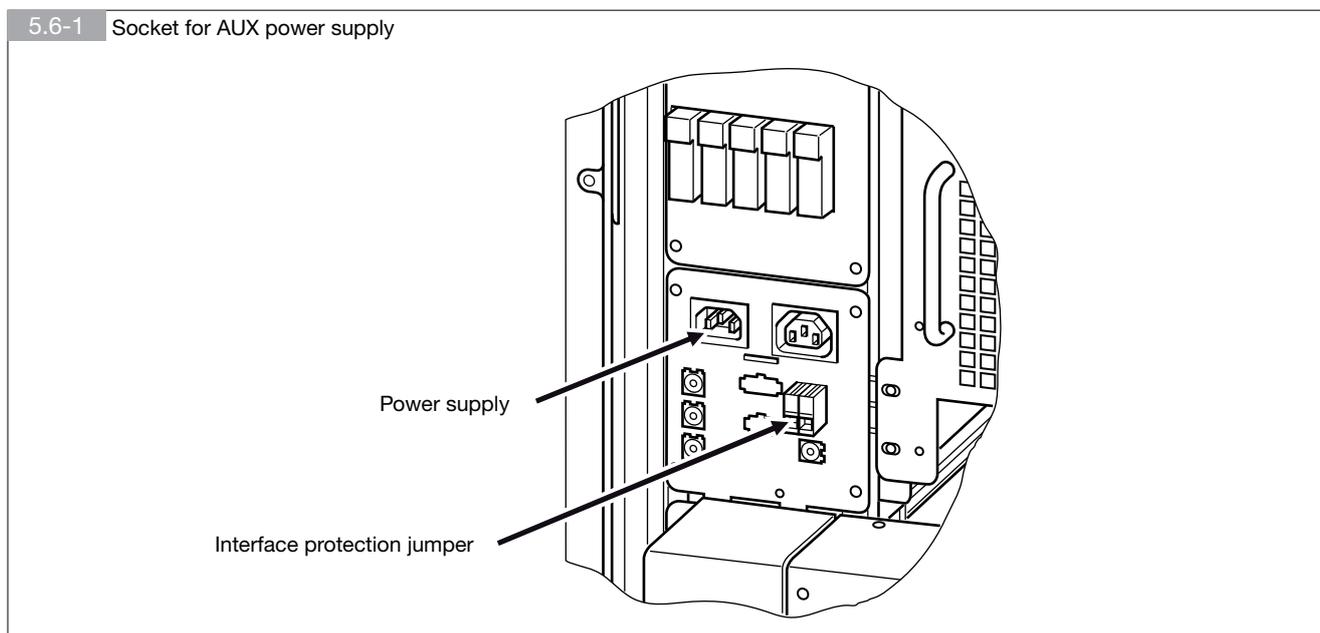


**NOTE**  
Torque for the DC and AC power terminals: 20 Nm

5.5-2



## 5.6. AUXILIARY POWER SUPPLY



The inverter equipment is powered by a special 230 V single-phase line. The auxiliary voltage must be connected to the relevant socket (see figure).



**DANGER!**  
Risk of electric shock from live device parts!

The inverter can be connected to a maximum of three power supplies:

- Before carrying out any work, make sure the electricity supply has been disconnected.



**WARNING!**  
Risk of damage to the system if not observed!

The auxiliary power supply cable must be fitted with a 16 A max. protection device.

## 5.7. OPTIONAL INPUT FOR EXTERNAL INTERFACE PROTECTION

If local electricity supply company connection rules specify that external interface protection must be used, the external protection output signal (dry contact) can be used to control the internal contactor for the Sunsys Modular inverter, removing the jumper in figure 5.5-1.

# 6. OPERATING MODES

## 6.1. ACTIVATING THE INVERTER FOR THE FIRST TIME

The first time the equipment is switched on the system displays the **COMMISSIONING WIZARD** page and a guided procedure follows on screen. In particular, when scrolling the menu options it is possible to choose the user interface language and set the system configuration of the country in which the equipment is installed. The most important steps are described here.

### 6.1.1. Language setting

It is possible select the language from those the installed.



### 6.1.2. Activation Code

During the initial startup procedure the four-digit activation code must be entered.

The activation code is supplied directly by the relevant Service Centre after the equipment serial number is entered using the on screen keyboard.



*Note: If the code is not entered the 'initial startup' procedure cannot be completed and the equipment will be prevented from operating. When contacting the Service Centre for the activation code detailed information relating to the services available for the equipment in question can be obtained, in addition to regular preventive maintenance schedules.*

6.1.2-2



The 'initial startup' procedure may only be completed using the confirmation menu option that appears if the activation code has been entered by pressing **ENTER** after selecting the ✓ symbol which appears on the on screen keyboard.

At this point the inverter is activated and ready. If the IMD permanent isolation controller (optional) is installed check its configuration via the **SERVICES** menu. For setting details please refer to the sheet supplied with the IMD.

### 6.1.3. Date & Time

Insert Date & Time and confirm by selecting **APPLY**.

6.1.3-1



### 6.1.4. System Setup

The number of modules installed in the cabinet ranges from 1 to 3 depending on the size of the machine (33 kW, 66 kW or 100 kW).



#### WARNING!

All modules inside the cabinet must be powered to successfully complete the configuration procedure.

When following the guided procedure if more than one module is fitted the type of connection on the DC side is required for each.

6.1.4-1



This could be:

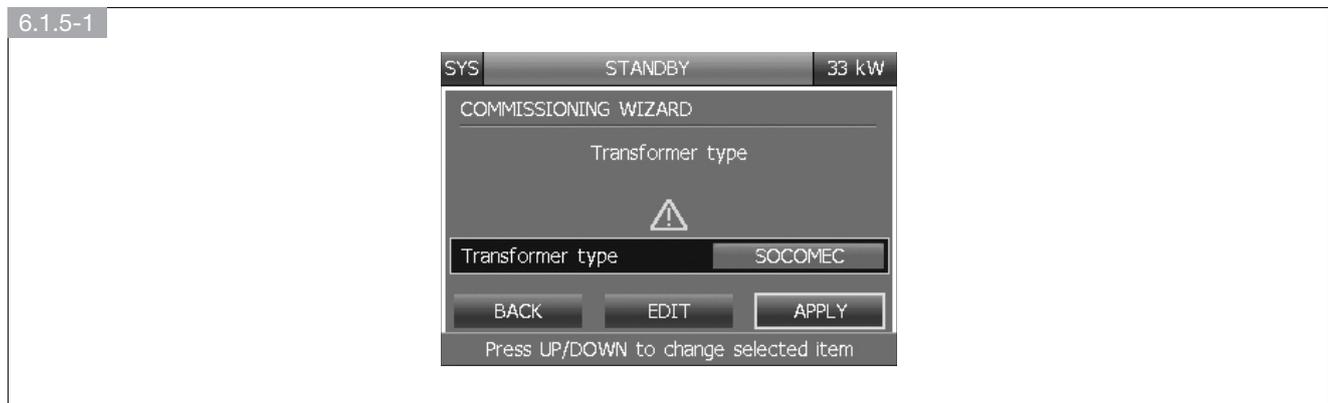
- **Stand-Alone** if the module in question is connected individually to an array of photovoltaic panels (see figure 2.2-9 Centralised Multi-String Inverter)
- **Modular** if the module in question is connected in parallel with other modules to the same array of photovoltaic panels (see figure 2.2-8 Centralised Modular Inverter).

Confirm the settings for each module.



### 6.1.5. Transformer Configuration

When installing make sure the type of transformer selected in the Transformer Type menu corresponds to the installed device. The default transformer type is 'SOCOMECEC'; only select 'External' if the machine is not fitted with a SOCOMECEC transformer.



### 6.1.6. Country setting

Choosing the country is particularly important as it leads to the automatic configuration of the inverter in compliance with the standards in force in that country.

All other parameters appearing in the 'initial startup' guided procedure menu will then be configured correctly and will not usually need to be changed, unless the local electricity supply company has specific requirements which need to be met.



#### WARNING!

The country of installation cannot be changed after the first machine activation. If this becomes necessary contact an authorised SOCOMEC service centre.

The installer is responsible for carrying out the procedure in accordance with national standards.



Note: some other options depend on the country selected, other items could be included on the commissioning wizard procedure.

## 6.2. SWITCHING ON THE INVERTER

Switch on the inverter as follows (Figures 6.3-1, 6.3-2, 6.3-3):

- Set all the DC input Q1 disconnection switches for the modules to position 1.
- Set the inverter AC output Q70 disconnection switch to position 1.
- Set all the AC output Q3 disconnection switches for the modules to position 1.

This procedure is also described in the menu **COMMANDS > Start Procedure**.

## 6.3. SWITCHING OFF THE INVERTER

Switch off the inverter as follows (Figures 6.3-1, 6.3-2, 6.3-3):

- Set all the AC output Q3 disconnection switches for the modules to position 0.
- Set the inverter AC output Q70 disconnection switch to position 0.
- Set all the DC input Q1 disconnection switches for the modules to position 0.

The inverter is now switched off. This procedure is also described in the menu **COMMANDS > Stop Procedure**.

If the auxiliary power supply also needs to be cut off, disconnect the cable from the Auxiliary Power Supply Input socket or break the fuse connection. This procedure will switch off all the auxiliary inverter equipment, including the system controller and the mimic panel. The general AC power contactor for the machine will also be opened.



#### DANGER!

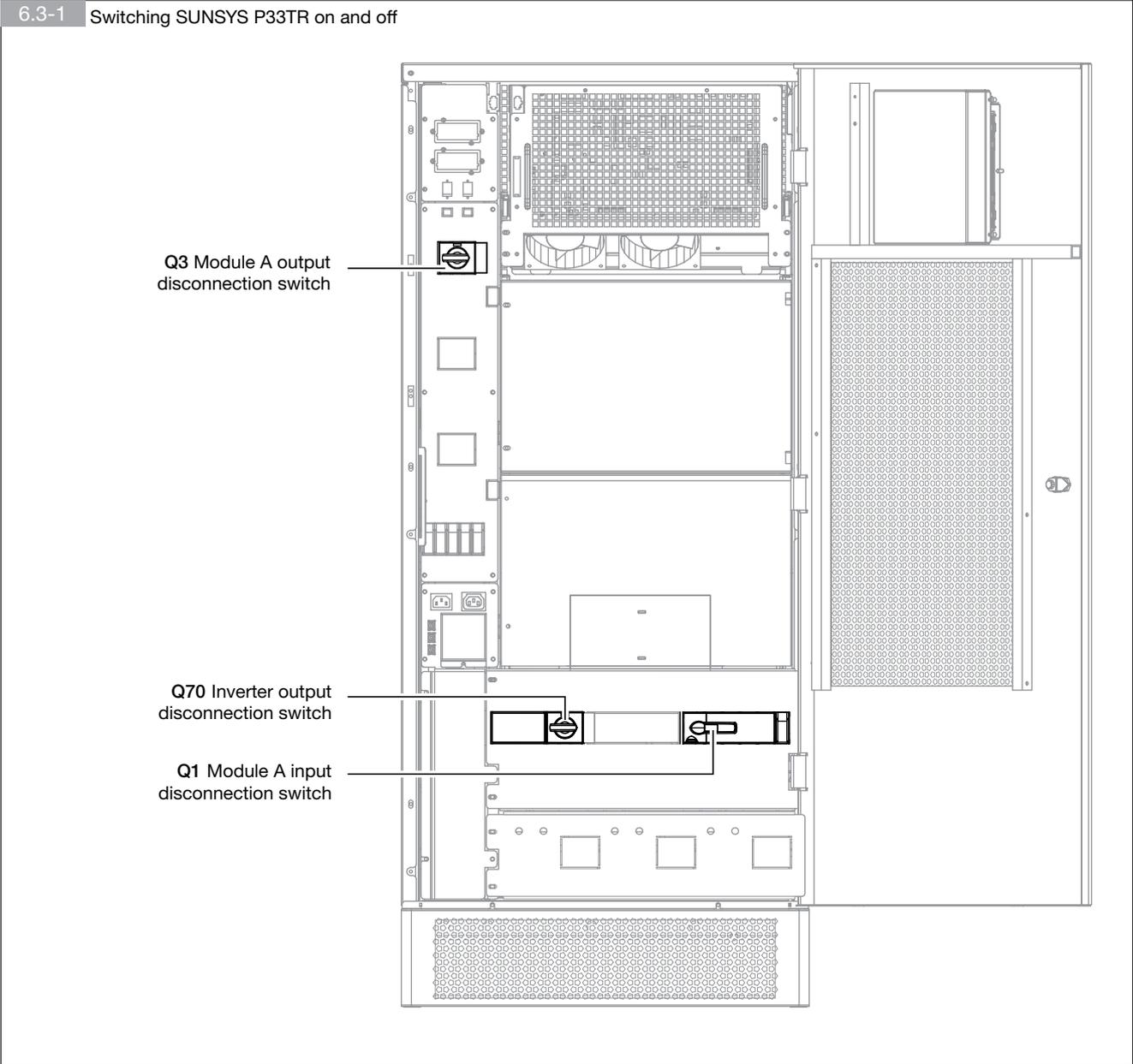
Risk of electric shock from live device parts!

The inverter can be connected to a maximum of three power supplies:

- 1) DC cable - Power from the photovoltaic generator
- 2) AC cable - Power from the mains network, supplied by the electricity company
- 3) AC cable - Auxiliary power supply

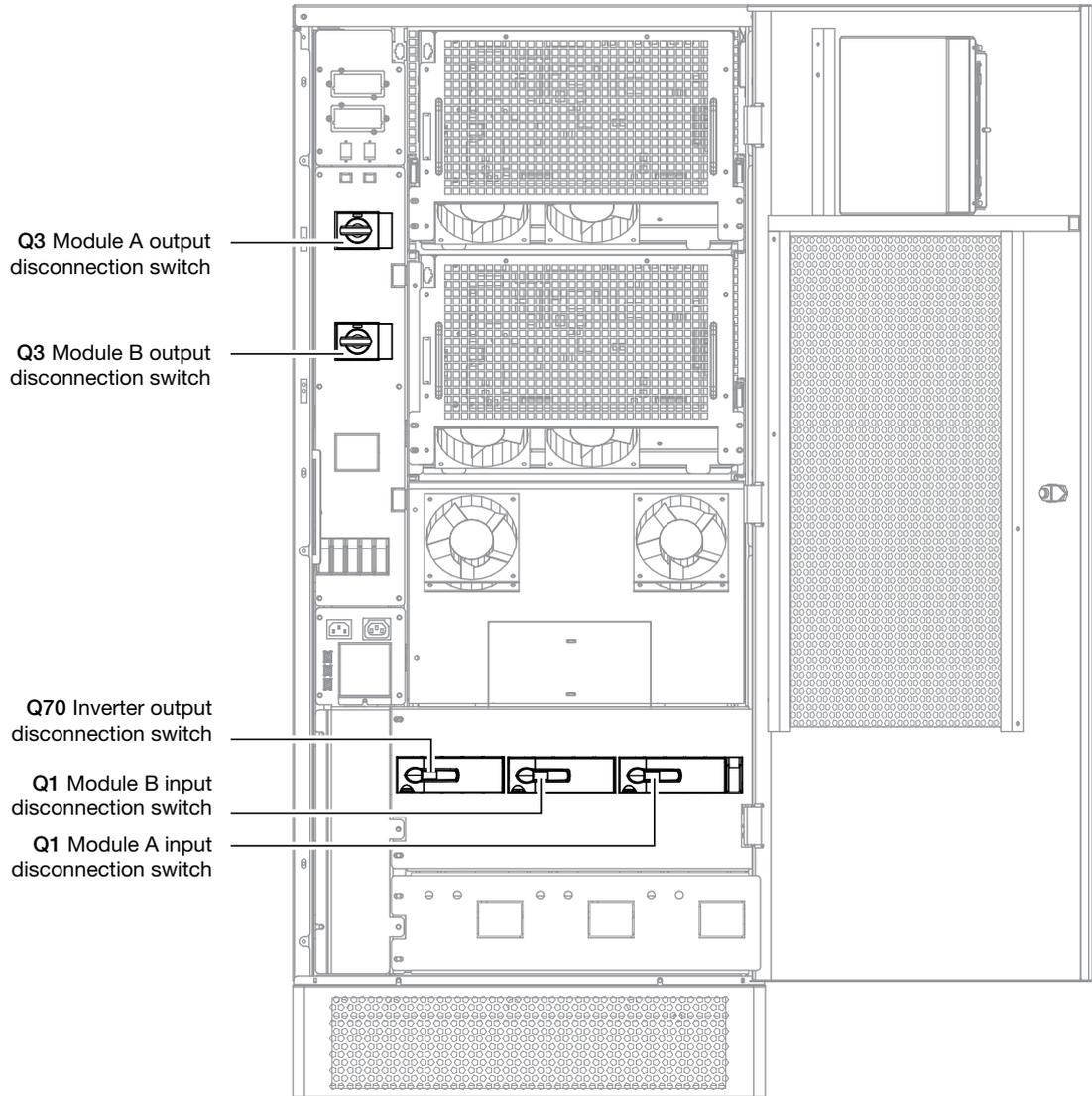
Before carrying out any work make sure the electricity supply has been disconnected.

6.3-1 Switching SUNSYS P33TR on and off

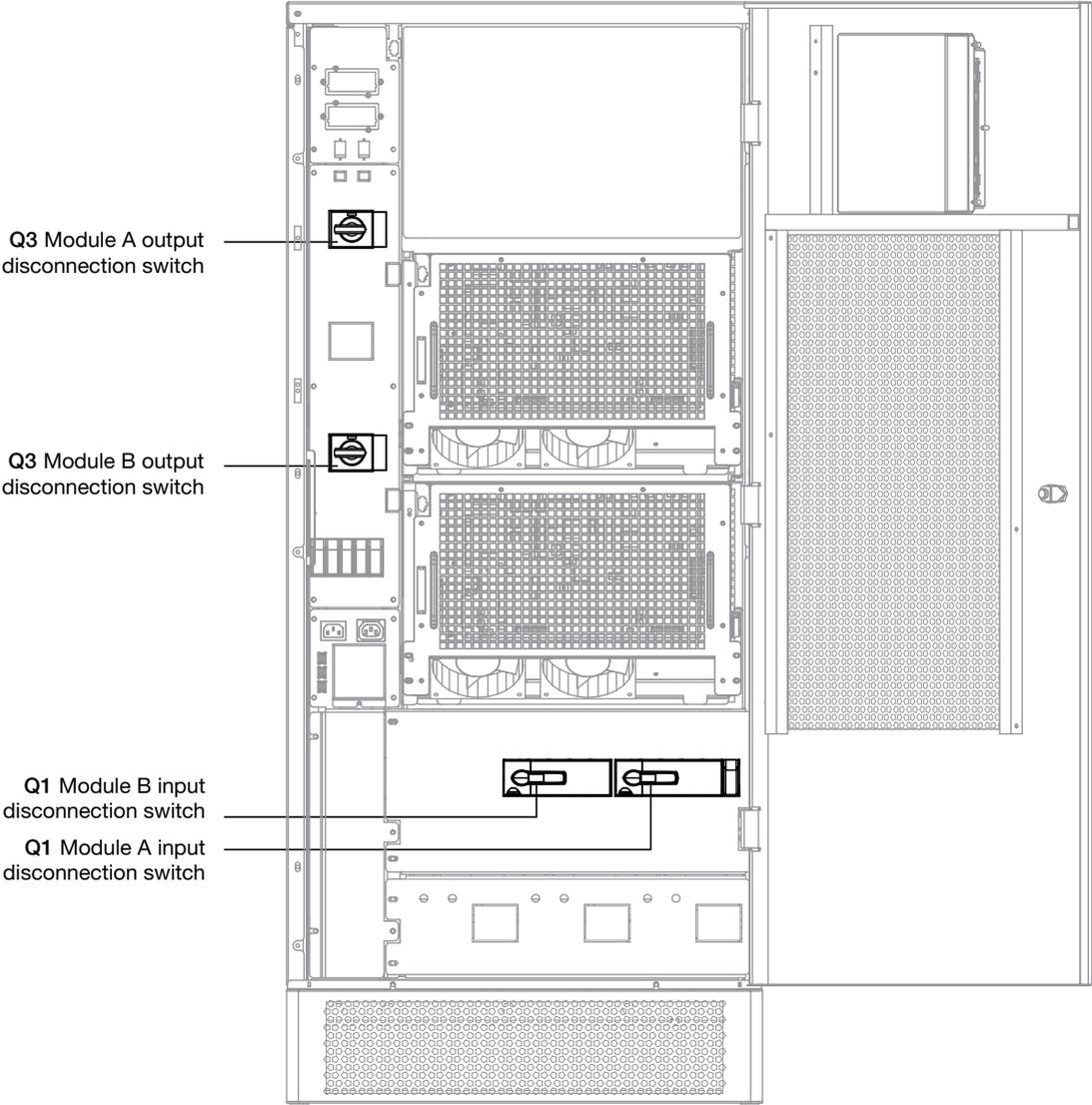


ENGLISH

6.3-2 Switching SUNSYS P66TR on and off



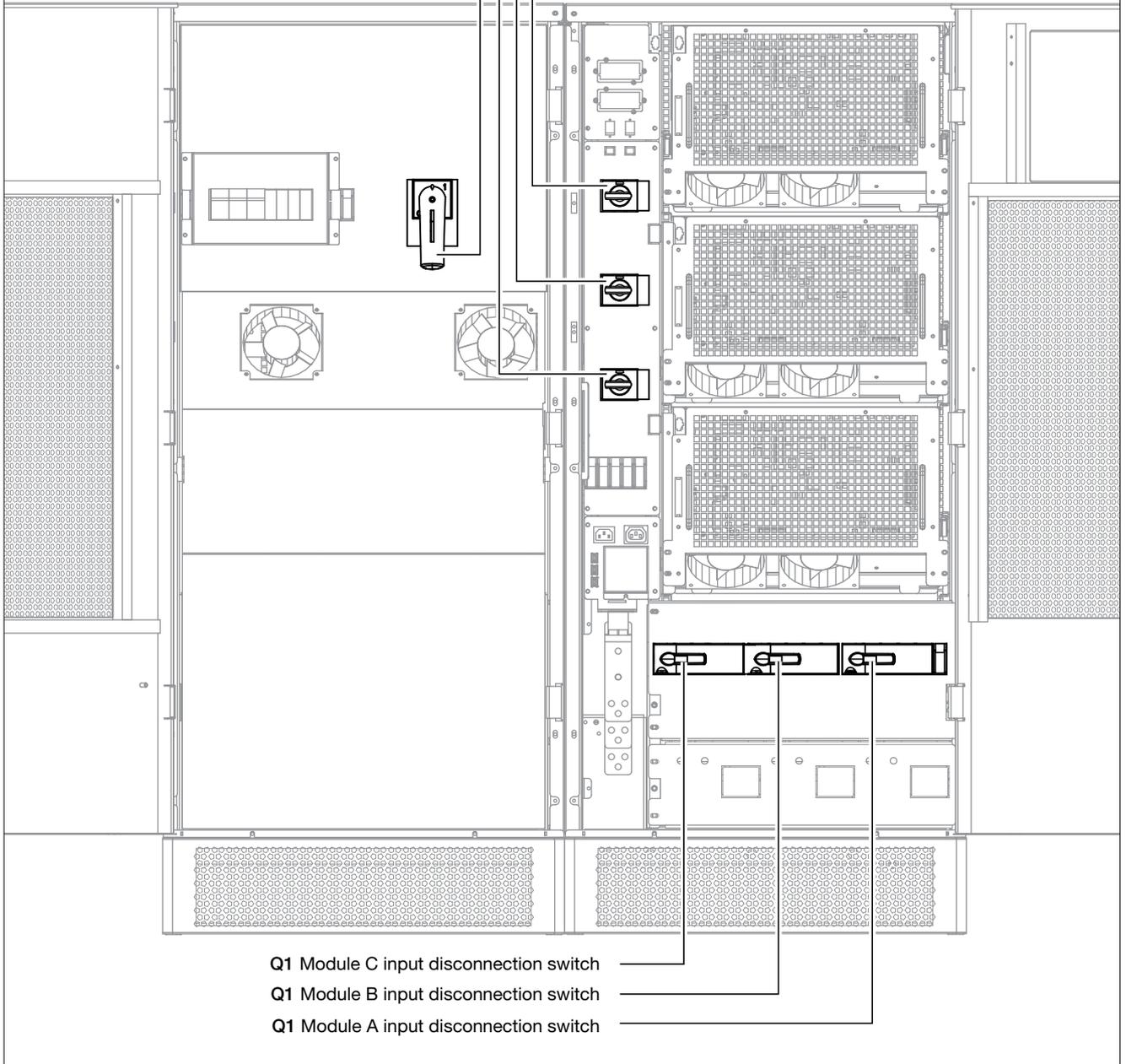
6.3-3 Switching SUNSYS P66TL on and off



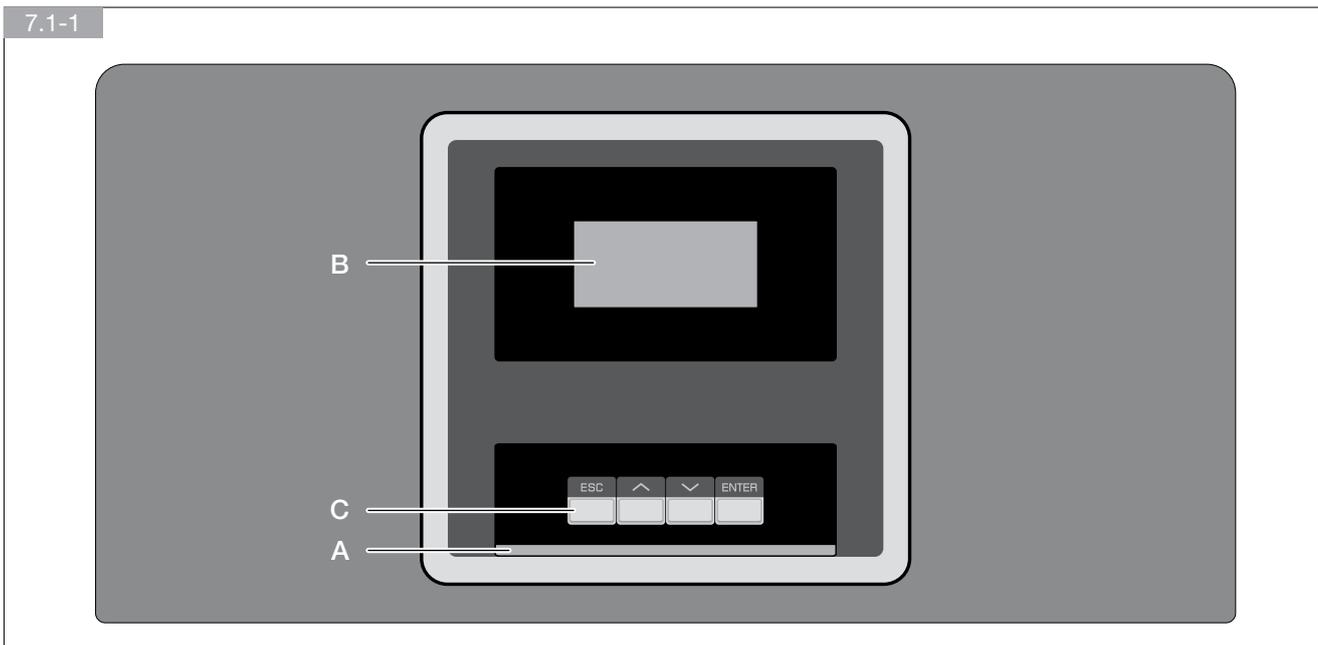
ENGLISH

6.3-4 Switching SUNSYS P100TL on and off

- Q3 Module A output disconnection switch
- Q3 Module B output disconnection switch
- Q3 Module C output disconnection switch
- Q70 Inverter output disconnection switch



# 7. MIMIC PANEL



The LCD mimic panel (figure 7.1) on the door provides all the information relating to operating status, electrical measurements, access to controls and configuration parameters.

The information is divided into three parts:

A. multicoloured luminous bar identifying the inverter status

B. alphanumerical information which, via a menu layout, provides details of any alerts, recorded values, commands and parameters

C. button usage:

- ESC: exit the menu/parameter/current action;
- UP: scroll upwards through the menu/available values; while a parameter is being modified it increases the value every time it is pressed;
- DOWN: scroll downwards through the menu/available values; while a parameter is being modified it decreases the value every time it is pressed;
- ENTER: enter the menu suggested on the display or confirm the choices/changes made

## 7.1. MEANING OF THE LUMINOUS STATUS BAR

The luminous bar (figure 7.1-1) instantly signals inverter status by means of its colour:

- Red: Alert conditions present
- Yellow: Warning conditions present
- Green: Inverter working properly

Colour	Conditions displayed
RED flashing	At least one alert is present
RED	Inverter off due to alert
YELLOW flashing	At least one warning is present and one inverter is switched on
YELLOW	First maintenance period has elapsed or inverter off due to warning
GREEN flashing	Inverter in startup procedure phase
GREEN	Inverter switched on

## 7.2. DISPLAY MENU

Display options are organised in menus with various levels:

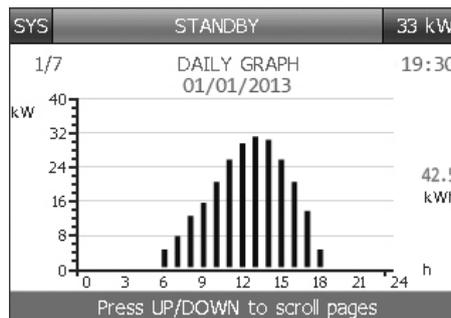
- to access a lower-level menu press the **ENTER** key
- to return to the higher level press **ESC**
- to scroll through the information available at a certain level use the **UP** and **DOWN** keys.

In the case of Sunsys P66TR and Sunsys P100TL models the mimic panel displays system information as a single photovoltaic inverter. It is possible to view information corresponding to individual inverters on the mimic panel by selecting the inverter serial number.

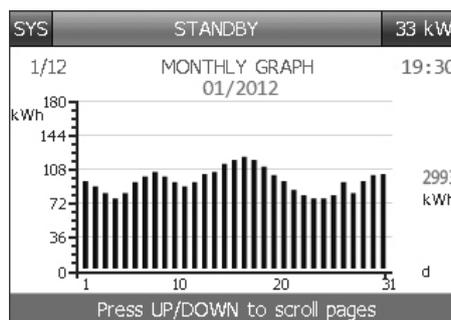
7.2-1 System statistics

SYS	STANDBY	33 kW
SYSTEM		
Today run-time	125	min
Total run-time	453	hrs
Today energy	45	kWh
Total energy	60	MWh
Today max power	27	kW
Absolute max power	32	kW

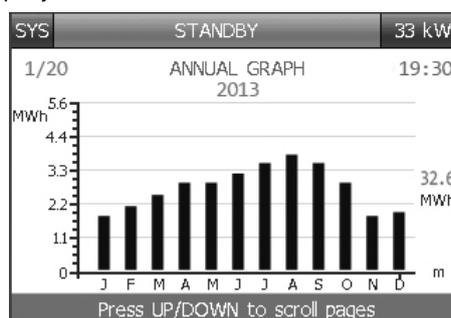
7.2-2 Daily graph of energy produced per day



7.2-3 Monthly graph of energy produced per month



7.2-4 Annual graph of energy produced per year



## 7.3. MENU TREE

FIRST LEVEL	SECOND LEVEL	THIRD LEVEL
PRODUCTION DATA	STATISTICS	SYSTEM
		MODULE
	PRODUCTION GRAPHS	DAILY
		MONTHLY
ANNUAL		
MEASUREMENTS	INVERTER POWER	
	AC MEASURES	
	DC MEASURES	
	SENSORS	
ALARMS AND WARNINGS	ALARMS	
	WARNINGS	
HISTORY LOG		
COMMANDS	START PROCEDURE	
	STOP PROCEDURE	
	ALARM RESET	
	TEST PROCEDURES	
	SYSTEM CONFIG. PROCEDURE	
	RESET STATISTICS	
	RESTART DISPLAY	
SETTINGS	PREFERENCES	LANGUAGE
		DATE & TIME
		BUZZER
		DISPLAY
		PASSWORDS
	SYSTEM CONFIGURATION	
	INVERTER SETTINGS	COUNTRY/NETWORK CODE
		CONNECTION PARAMETERS
		AC INTERFACE PROTECTION
		ACTIVE POWER <sup>1</sup>
		REACTIVE POWER <sup>1</sup>
		...OTHER SETTINGS <sup>2</sup>
	OPTIONAL DEVICES	
	PERIPHERALS	NETWORK PARAMETERS
		NETWORK TCP PORTS
		RS232/485 PORT
		RS232/MODEM PORT
		RS232 SLOT OPTION
	SERVICES	NETWORK
	SERVICE	FIRMWARE VERSION
SERIAL NUMBER		
COMMISSIONING CODE		
UPGRADE FIRMWARE		

1. Present depending on the country code

2. Depends on the country code

## 7.4. KEYPAD LOCKING

The keypad can be locked by pressing the buttons in the following sequence:

**ESC → UP → DOWN → ENTER**

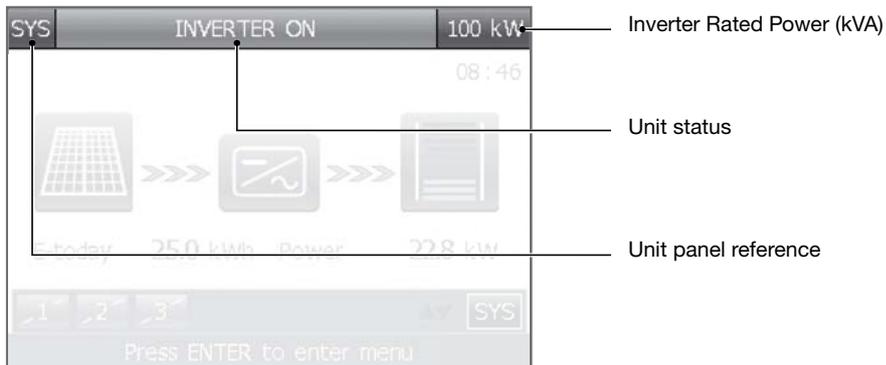
To unlock the keypad the buttons must be pressed in the reverse sequence:

**ENTER → DOWN → UP → ESC**

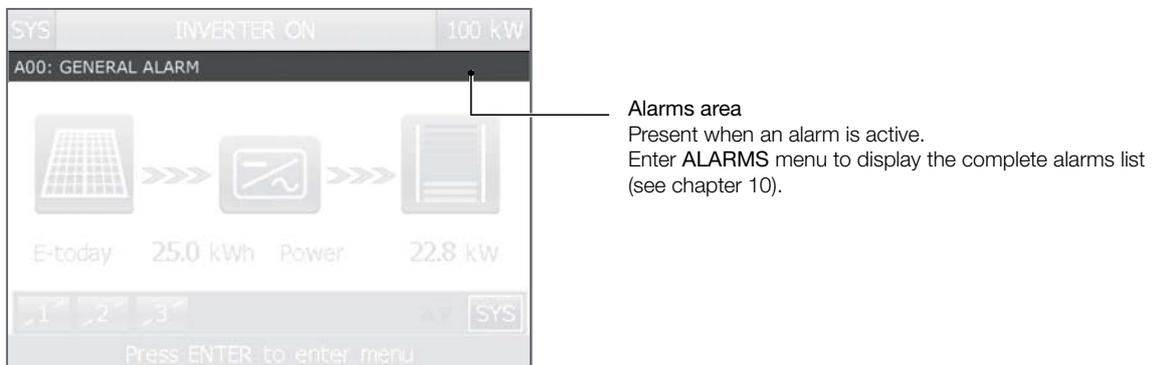
These sequences only work only on the Mimic Panel page.

## 7.5. MIMIC PANEL OVERVIEW

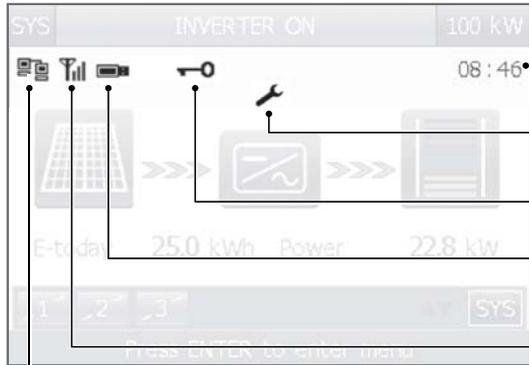
7.5-1 Status bar



7.5-2 Alarms area



7.5-3 Status icons



Time: Inverter current time (hours and minutes, with ':' flashing).

Commissioning Code not inserted or Scheduled Inspection warning: machine inspection required. Call SOCOMEC support service

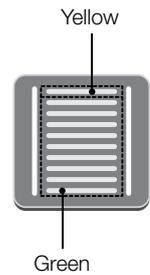
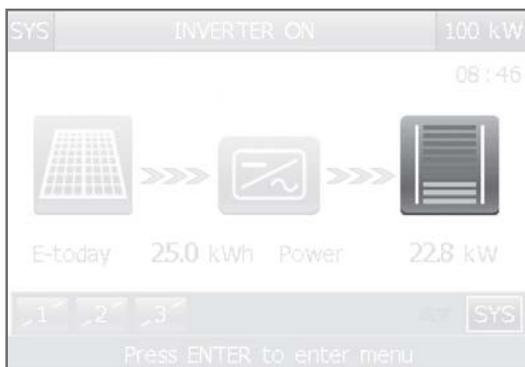
Key icon: Displayed if the keypad has been locked.

USB icon: Displayed if a USB memory stick is inserted. It must be formatted with a FAT32 file system.

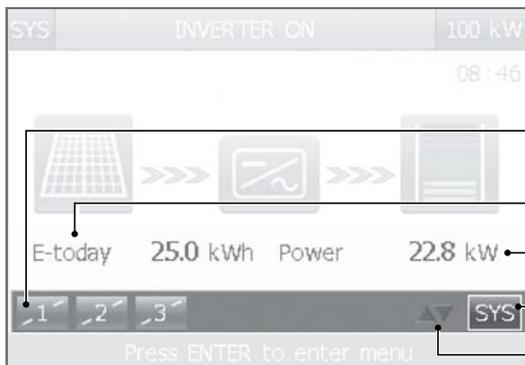
Modem icon: reserved for technical support.

Network icon: Displayed if a valid link has been established on the ethernet. Flashes when a remote host is communicating with the inverter.

7.5-4 Instant power level



7.5-5 Data and status area



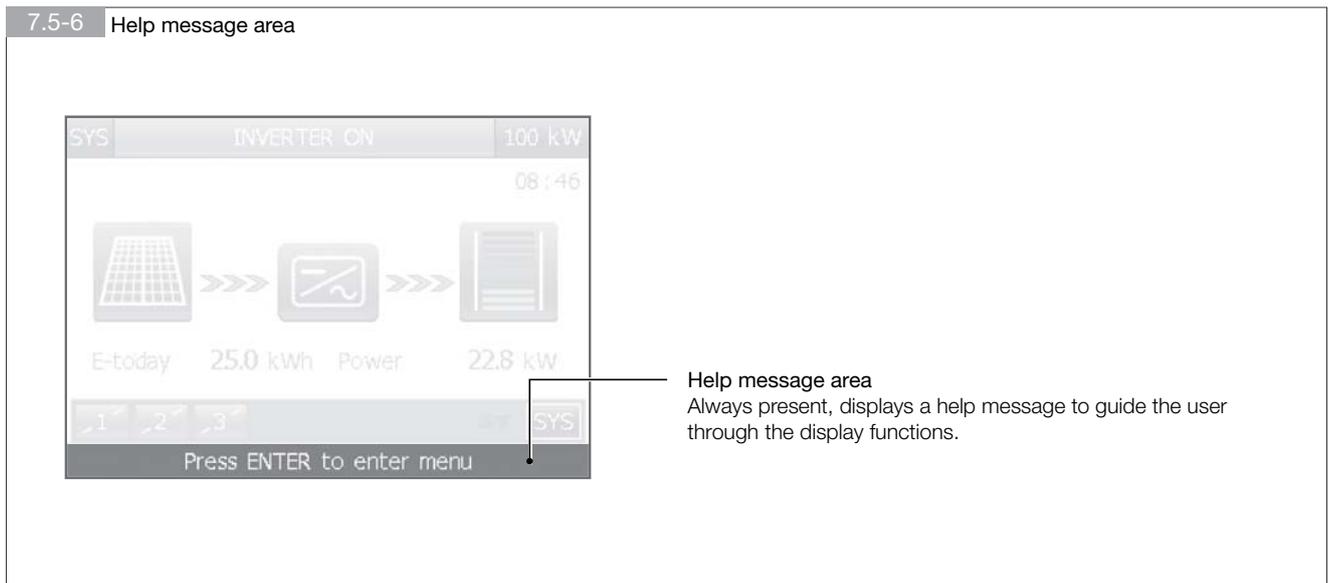
Inverter Unit (UNIT MENU).  
The icon colours are the same as the top bar colours.

Daily energy produced

Instant power

SYSTEM view (MAIN MENU)

Use the UP/DOWN keys to select different unit or system mimic panels



## 7.6. SERVICE MENU

This menu is reserved for support service personnel and holds the INVERTER identification data and utilities for the SW upgrade.

### 7.6.1. Language upgrade

Text translations in several languages are held in files with the \*.lng extension which are provided by SOCOMEC. Language upgrades must be performed through the USB port, using a standard USB memory stick. The USB device must be formatted with FAT16 or FAT32.

#### Step 1

The language file to be installed must be copied onto a USB stick and placed in the standard folder:

{USB stick}\sunsys\uwghi

#### Step 2

Insert the USB stick into the USB port on the back of the INVERTER door.

#### Step 3

Enter the menu: **SERVICE > UPGRADE FIRMWARE > UPGRADE LANGUAGES**. The SYS unit has to be selected beforehand on the main page.

#### Step 4

The list of files in the \sunsys\uwghi folder in the USB memory stick is shown.

Select the file you want to install and follow the instructions displayed.

#### Step 5

At the end of the process select Yes to restart the display.

#### Step 6

Remove the USB stick when requested.

#### Step 7

The new language is available after restarting.

To change the language go to the SYSTEM menu: **SETTINGS > PREFERENCES > LANGUAGE**

*Note: To restore English as the default language press the ESC button for at least 4 seconds on the main page (mimic panel page).*

# 8. COMMUNICATION

## 8.1. MULTILEVEL COMMUNICATION

The photovoltaic inverter comes with the serial communication channel RS232/485 which can be used to connect to a BMS (Building Management System).

8.1-1

RS232/485 C1 pin key	RS232/MODEM pin key
1 Not connected	1 Reserved
2 RX for RS232	2 RX for RS232
3 TX for RS232	3 TX for RS232
4 Date +	4 Reserved
5 GND for RS232	5 GND for RS232
6 Date -	6 Not connected
7 Reserved	7 RTS
8 Not connected	8 CTS
9 +12V	9 +12V

ENGLISH

## 8.2. MODBUS/TCP INTERFACE

The inverter can be monitored from remote stations using MODBUS/TCP network protocol for functionality. See menu **SETTINGS > CONNECTIVITY > PERIPHERALS > NETWORK PARAMETERS** to **Enabled/Disabled DHCP** setting. Restart the HMI after modifying the parameters. IP Addresses can be changed only if DHCP is disabled. Refer to JBUS/MODBUS documentation for data mapping.

8.2-1

**Key**

- A USB connector
- B LAN RJ45 connector for ethernet

## 9. PREVENTIVE MAINTENANCE



### WARNING!

Inspection may only be carried out by the system manager, or by an authorised person.



### WARNING!

In the event of a fault, the system must not be restarted. Inverter maintenance or repairs must be performed by SOCOMEC personnel, or by personnel from a SOCOMEC authorised support centre.



### DANGER!

Risk of electric shock from live device parts!

In the event of system maintenance, carry out the following steps beforehand:

- Disconnect the photovoltaic system.
- Make sure the photovoltaic system cannot be restarted.
- Make sure the mains electricity supply has been disconnected.
- Earth the device units and short-circuit them.
- Cover or separate nearby live device units.
- Before working on the circuits upstream make sure the inverter is disconnected by opening the DC disconnection switches.



### DANGER!

Risk of electric shock from live device parts!

The inverter can be connected to a maximum of three power supplies:

- 1 DC cable - Photovoltaic generator power supply (separated for the three modules or shared)
- 2 AC cable - Power from the mains network, supplied by the electricity company
- 3 AC cable - Auxiliary power supply

- Before carrying out any work, make sure the electricity supply has been disconnected.
- All DC power supplies should be considered as part of the same circuit, even in the configuration with centralised multi-string inverter. Before carrying out any work, make sure all electricity supplies have been disconnected.



### DANGER!

Risk of electric shock from live device parts!

5 min

The intermediate inverter circuit may be live even after it has been deactivated.

- Wait for the power to disperse and make sure that there is none remaining.



### DANGER!

Risk of electric shock from live device parts!

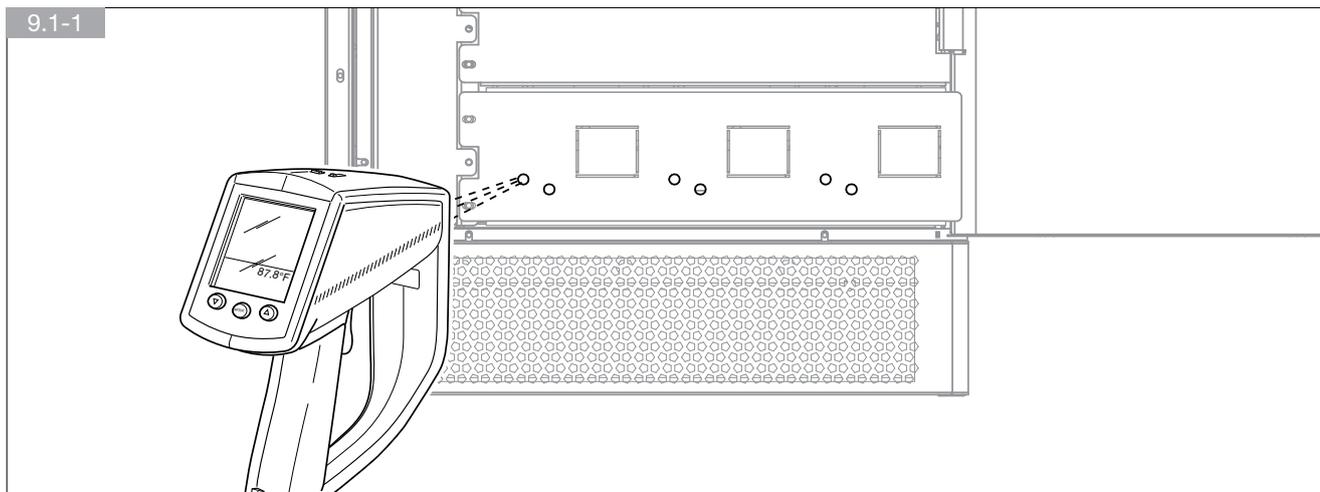
The photovoltaic modules are live as soon as they are exposed to sunlight.

- Take suitable measures and make sure there is no power remaining.

## 9.1. REGULAR INSPECTION OF THE INVERTER

Carry out a visual and mechanical check every month, to guarantee continuous reliable operation:

- Check the transformer fans by activating them manually using the mimic panel command.
- Make sure the cables are well secured. Thermal stress means that the screws may loosen over time. Tighten the screws if necessary.
- Switch off the inverter (ch. 6).
- Check the connections, components and fuses, looking for any discolouration or damage. Discoloured components indicate damage caused by heat or corrosion and must be replaced.
- Check for excessive dust on the cards. If necessary, contact an authorised SOCOMEC service centre to request machine cleaning.
- Use the designated holes to inspect the connections using an infrared thermal camera.



## 9.2. PREVENTIVE INVERTER MAINTENANCE

We must specify that the inverter should undergo regular specialist maintenance (on an annual basis), in order to maintain optimum equipment efficiency while preventing system downtime and all associated damage and risks.

We recommend any preventive maintenance requirements which may be displayed automatically by the equipment via an alert/warning message are observed at all times. All procedures carried out on the equipment must be only carried out by SOCOMEC personnel or by authorised support personnel.

Maintenance involves thorough operational checks of the various electronic and mechanical parts and, if necessary, the replacement of parts subject to wear and tear. These parts typically include fans and capacitors.

### Fans

The lifetime of the fans used to cool powered parts depends on the environmental and operating conditions (temperature, dust). The average life of these components is 10 years.



#### WARNING!

Fan replacement can only be carried out by qualified personnel. If the fans need to be changed, they should be replaced with a product which meets SOCOMEC specifications.

### Capacitors

Electrolytic capacitors and filter capacitors are fitted inside the appliance; the life of these components depends on the environmental and operating conditions, which is why we recommend they are replaced by authorised personnel as a preventive measure. The average life of these components is 10 years.

The effective condition of the components is verified during the preventive maintenance visit.

# 10. TROUBLESHOOTING

The alert messages which can appear on the display offer immediate diagnosis of any faults, malfunctions or breakdowns in the photovoltaic system. The following events are indicated:

- **Warning:** non-serious alert conditions which cause the inverter to stop but can be reset automatically
- **Alerts:** serious alert conditions which cause the inverter to stop and require a manual reset command from the operator to be reset.

Alerts and warnings are divided into two categories:

- **System Alerts/Warnings:** these affect the parts external to the Inverter, such as the mains power network, the output line and the ambient temperature. Corrective actions can usually be activated by the user (system installer or operator)
- **Inverter Alerts/Warnings:** relate to the parts of the inverter. Corrective actions are generally activated by the Support Service.

## 10.1. SYSTEM WARNINGS

- **W01: AMBIENT OVER-TEMPERATURE**

The ambient temperature recorded by the inverter is over 45° (see values on mimic panel). Check the ventilation or air-conditioning system in the inverter room.

- **W02: AMBIENT TEMPERATURE UNDER THE MINIMUM THRESHOLD**

The ambient temperature recorded by the inverter is under 15° (see value on mimic panel). Check the ventilation or air-conditioning system in the inverter room.

- **W03: SYSTEM EFFICIENCY NOT ALIGNED**

The power obtained from the inverter is too low in relation to the rated system power. Make sure the photovoltaic panels are connected properly.

- **W04: INTERNAL OVER-TEMPERATURE; W66: INTERNAL OVER-TEMPERATURE**

The temperature of the inverter power structure is over 110° (see value on mimic panel). Check the ventilation or air-conditioning system in the inverter room.

- **W05: LOW RADIATION; W67: LOW RADIATION**

The inverter is waiting for the incoming energy level to increase before attempting activation.

- **W06: CONTINUOUS INPUT VOLTAGE TOO LOW**

The inverter is waiting for the incoming energy level to increase before attempting activation.

- **W19: NO INVERTER PRESENT**

There has been no radiation for over 24 hours: this condition may be normal but is highlighted so that the necessary checks can be carried out.

- **W20: HIGH IMPEDANCE TO EARTH**

If the isolation controller and resistance to earth recorded is too high this warning is generated: check the protective fuses and if the problem persists contact the support service.

- **W69: AC INPUT NETWORK OUTSIDE TOLERATED RANGE; W70: AC INPUT NETWORK OUTSIDE FREQUENCY RANGE**

The input network is missing or insufficient (voltage and/or frequency values incorrect in reference to the information provided in the technical data table); if this is not due to a general network absence, check for any disconnection of protective devices upstream of the inverter. Check the applied voltage and frequency comply with the values set on the mimic panel.

## 10.2. INVERTER WARNINGS

- **W13: HIGH IMPEDANCE TO EARTH**

Make sure the photovoltaic panel earth connection is intact

- **W65: INVERTER IN DERATING**

The inverter is reducing the power dispensed to the network. Check the other alerts and/or visual warnings.

- **W76: FAN FAULT**

Ventilation system is not working properly; make sure the air inlets and outlets on the front and rear of the inverter are free from obstruction.

### 10.3. SYSTEM ALERTS

- **A01: SWITCH-OFF DUE TO EXTERNAL COMMAND; A59: SWITCH-OFF DUE TO EXTERNAL COMMAND**

The inverter is switched off due to an external instant switch-off command. Check the external contact

- **A04: LOW IMPEDANCE TO EARTH**

Check the photovoltaic system isolation to earth

- **A05: AC DISCHARGERS TRIGGERED**

Check and replace if necessary

- **A06: DC DISCHARGERS TRIGGERED**

Check and replace if necessary

- **A07: OUTPUT CONTACTOR ALERTS**

The output contactor status is not consistent; contact the support service

- **A08: TRANSFORMER OVER-TEMPERATURE**

Check the ventilation or air-conditioning system in the inverter room.

- **A09: AC INPUT NETWORK RMS VALUE OUTSIDE TOLERATED RANGE;  
A10: AC INPUT NETWORK FREQUENCY OUTSIDE FREQUENCY RANGE**

The input network is missing or insufficient (incorrect voltage and/or frequency values); if this is not due to a general network absence, check for any disconnection of protective devices upstream of the inverter.

Check the applied voltage and frequency comply with the values set on the mimic panel.

- **A15: INCORRECT SYSTEM CONFIGURATION**

Error in configuration parameters; contact the support service.

### 10.4. INVERTER ALERTS

- **A47 : MODULES WITH DIFFERENT CONFIGURATION**

Check the modules are identified by the same model code for Hardware compatibility.

- **A68: INVERTER OFF DUE TO OVER-TEMPERATURE**

Check the ventilation or air-conditioning system in the inverter room.

- **A69: FAN FAULT**

Ventilation system breakdown; make sure the air inlets and outlets on the front and rear of the inverter are free from obstruction.

- **A70: SCHEDULED CHECKS**

To guarantee product performance and efficiency remain at an optimum level, the equipment must be checked regularly by the support service. The message Scheduled Check appearing on the mimic panel indicates that it would be wise to have the equipment inspected by a specialised technician.

- **A72: INVERTER LOCKED**

Contact the Support Service.

- **A73: INPUT OVER-VOLTAGE**

The DC input voltage has exceeded 900 V. Check the connections.









HEAD OFFICE

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