



Power Station PS500-3320

Technical specification

Soleil Power Station

Power station for photovoltaic applications

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During the whole life time of the equipment

TECHNICAL SPECIFICATION

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1 MAIN FEATURES

All "PS", from PS500, to PS3320 are power stations for photovoltaic systems with direct connections to Medium Voltage Feeder, ideal for large installations and solar farms/parks, suitable for connection to mono/polycrystalline, amorphous and thin film modules (with or without grounding lines).



PSxxx system is based on metal frame marine shipping container with following features:

- Base frame in UNP240 beams with welded corners; corner blocks in accordance with ISO1161.
- External walls and roof made of corrugated steel sheet.
- Liner in "sandwich" panels constructed from two sheets of galvanized steel Sendzimir that includes the insulating rigid polyurethane foam (60mm thickness).
- Raised floor room formed by slats in galvanized steel

The interior is divided into two main sections:

- **MV transformer room, equipped with:**
 - oil or dry resin insulated step-up transformer, with a single, double or triple secondary winding (according to version of PSxxx) and suitable transform ratio for connections to 6kV,10kV, 15kV, 20kV,30kV, 33kV, 34.5kV or 36kV systems (others on request), equipped with temperature control probes and CPU for fans control and management.
 - air exhaust system based on wall axial fans, with suitable capacity depending on the model of PSxxx, operated through CPU for control .
 - double grate door for direct room access and ventilation air intake.
 - transformer oil collection tank (for oil-based models).
 - rails for easy installation and removal of the transformer.
- **Technical room and entry line, equipped with:**
 - Medium Voltage switchboard for incoming line, load disconnecting switch with 63A fuse for transformer protection. Optionally, the version with motorized automatic circuit breaker, maximum current protection (ANSI protection codes 50,51,51N) and interface protection (ANSI protection codes 27, 59, 59N, 81O, 81U) is also available. In & Out daisy chain arrangement connection between PSxxx are available optionally.

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- Differential grounding relay (shelter in TN working regime) or insulation monitors (for shelter in IT working regime).
- Soleil DSPX TLH series inverter (power units according to the container version, from 500kW up to 833kW).
- DC fuse-based combiner box, with different number of input from DC field (optional)
- Low Voltage cabinet for auxiliary services, integrating remote supervision TGS2 (described below), energy metering system (with current and voltage transducers in the MV transformer room).
- Low-voltage transformer feeding auxiliary service (optional), available in different power ratings (from 15 to 50kVA), protected by automatic circuit breaker.
- Forced air system, based on axial fans, wall mounted.
- UPS for continuous power supply of supervision system, available in different power ratings (from 3kVA to 6kVA) and backup time.
- double grill doors providing direct access to the space and ventilation.
- Lighting system and power supply.
- Safety Accessories for cabins and warning signs.

The system is classified according to two different categories of temperature tolerance range:

- **'Standard' temperature range, suited for installation with ambient temperature between -10°C and +45°C.**
- **'Extended' temperature range, suited for installation with ambient temperature between -50°C and +45°C.**

'Standard' version of PSxxx features a ventilation scheme with a **Forced air Open architecture**, for both the inverter room and the MV transformer room. In these models, the 'cold' air is sucked-in from the outside through 'intake' grills (with anti-dust filters) and it is expelled through 'output' grid. The MV transformer room is equipped with axial fans, temperature-driven, to help the air evacuation when needed. The transformer itself, can be optionally added with an extra ventilation bar, for heavy duty of transformer, if needed (110% of rated power)

'Extended' temperature version of PSxxx, is particularly suited for very low temperature environments and its ventilation scheme is a 'controlled' open architecture . This basically means that the container has air intake openings from the outside to inside and air exhaust openings. Both of them are controlled through a PLC and motorized roll-up blinds.

Depending on the internal and external temperature, the logic opens and closes the roll-up blinds.

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If the internal temperature is low but in the operating range of the equipments, the windows are closed and the equipments (inverters and MV transformer) work in a 'closed' architecture fashion (no air flow exchange with the exterior).

This happens until the internal temperature gets high enough to need some fresh air to be brought in. In this case, the control, lets the windows to open-up (proportionally to the temperature difference between the internal ambient and the external), in order to appropriately refresh the internal ambient. In this case, the ventilation architecture gets fully 'open'. In order to handle long no-run periods, at a very low external temperature, a warm-up phase of the container will take place. Every container will be supplied with a appropriate heating resistor bank, in order to raise the ambient temperature when it is too low (e.g. when it is less than -20°C), for instance because the container has not been operated for a long time on winter.

Model	L (mm) (feet)	W (mm)	H (mm)	Weight (kg)
PS3320	12.192mm (40')	2.438	2.896	23.000
PS2500	12.192mm (40')	2.438	2.896	20.000
PS1980	12.192mm (40')	2.438	2.896	17.000
PS1670	12.192mm (40')	2.438	2.896	15.500
PS1320	12.192mm (40')	2.438	2.896	14.500
PS1250	12.192mm (40')	2.438	2.896	13.800
PS990	12.192mm (40')	2.438	2.896	11.000
PS833	6.057mm (20')	2.438	2.896	10.000
PS660	6.057mm (20')	2.438	2.896	9.500
PS500	6.057mm (20')	2.438	2.896	9.000

2 BASIC WIRING DIAGRAM

The diagrams below illustrate some of the available configurations, classified on the basis of:

- Disconnection device for MV (load disconnecting switch with transformer protection or motorized automatic circuit breaker).
- Grounded Neutral (TN) or Floating Neutral (IT) versions: in 'TN' version, ground current leakage is monitored through toroidal differential relays for safety (MV release). In the 'IT' version, insulation monitoring devices are present for first line-to-ground failure monitoring.

The inverters are grouped in cabinets (one or two cabinets). The number of inverters present in the shelter can vary from a minimum of 1 (PS500, PS660, PS833) to a maximum of 4 (PS3320).

The number of secondary windings on the low-voltage side of the MV transformer, can vary from a minimum of 1 to a maximum of 4 (for modules with a grounding line).

All versions are available in two versions, with grounded DC pole ('M'-type) or insulated DC bus, discriminated by the 'M' suffix of the name. 'M'-type power stations, usually embed an MV transformer with a higher number of secondary windings, respect to the relevant 'non-M' version.

Example:

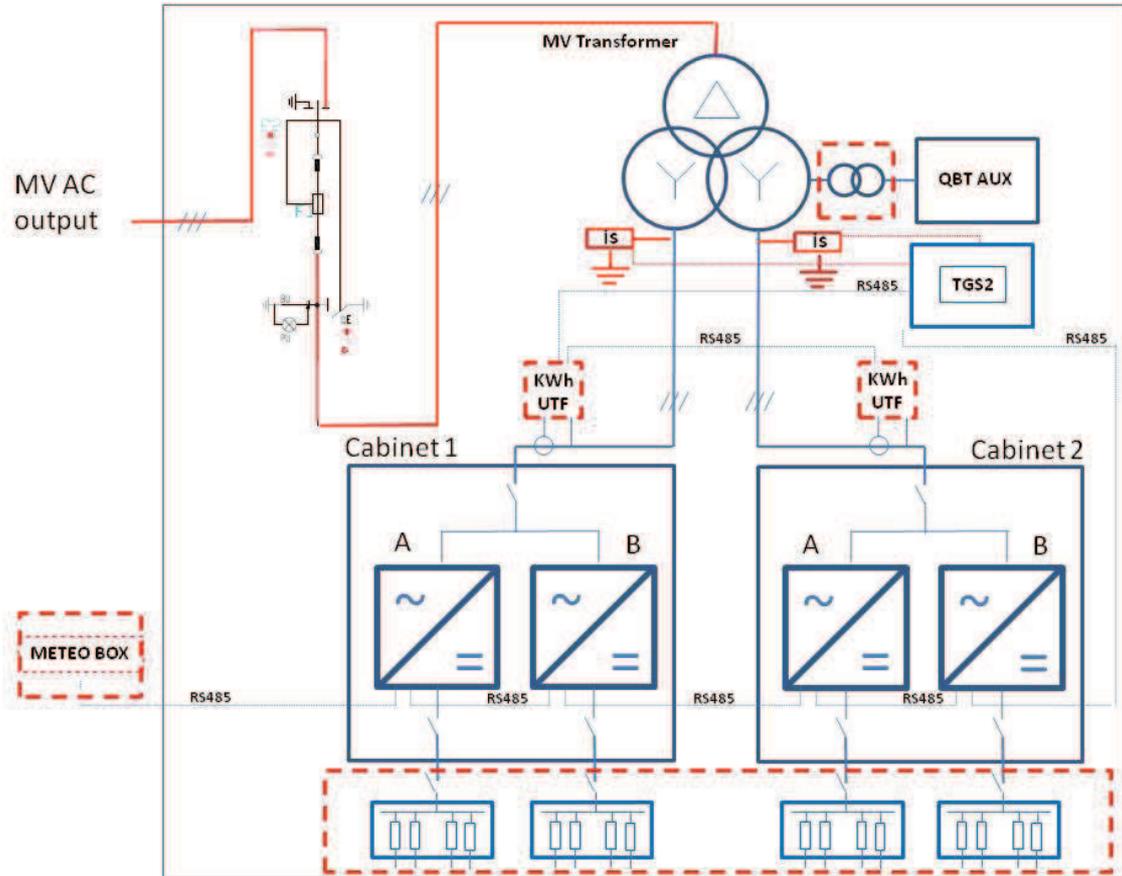
- **PS1980M** (DC negative grounded pole)
 - MV transformer with **3 secondary windings** on the low-voltage side.
 - 3 x DSPX 660M TLH inverter with single output (each connected to a single winding).
 - Insulation monitoring system is disabled when the inverters are ON, it is enabled when inverters are OFF (for continuous AC line insulation monitoring).
- **PS1980** with floating DC
 - MV transformer with **2 secondary windings** on the low-voltage side.
 - 2 x DSPX 660 TLH inverter with single output (each connected to a single winding).
 - 1 x DSPX 660 TLH inverter with dual output, one output (330kW) being connected to winding n. 1 and the other output 8330kW) connected to winding n.2.

Energy Metering system is composed by as many energy counters as it is the number of secondary windings of the transformer.

Given the multiple available variations and combinations, the following illustrations depict the basic layouts of some system versions

Dotted lines denote components that are considered '**optional**'.

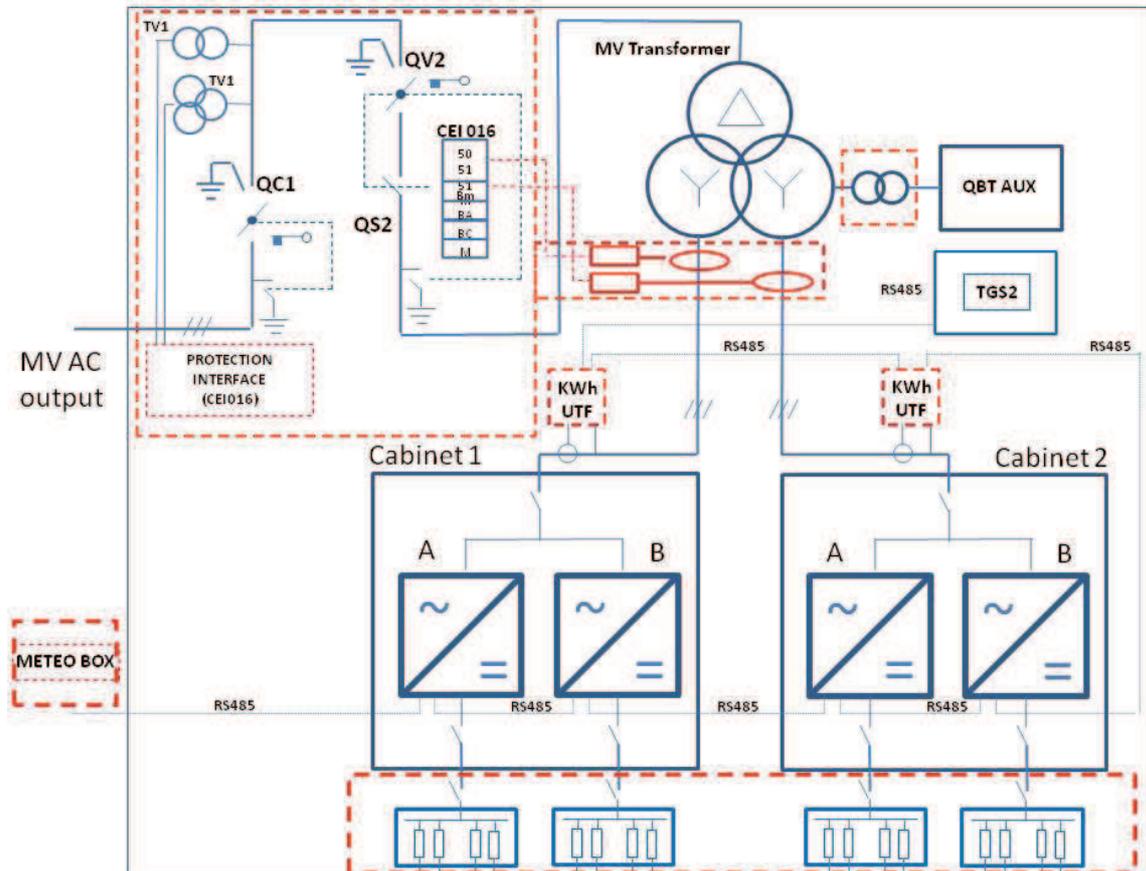
2.1 Version with MV load disconnecting switch, IT mode, double-cabinet (2 inverters), insulated DC bus [PS1250, PS1670]



The same arrangement is available with the following variations:

- Transformer with single secondary winding(PS990, PS500, PS660, PS833).
- Smaller container for PS500, PS660, PS833.
- TN regime with grounded neutral transformer.

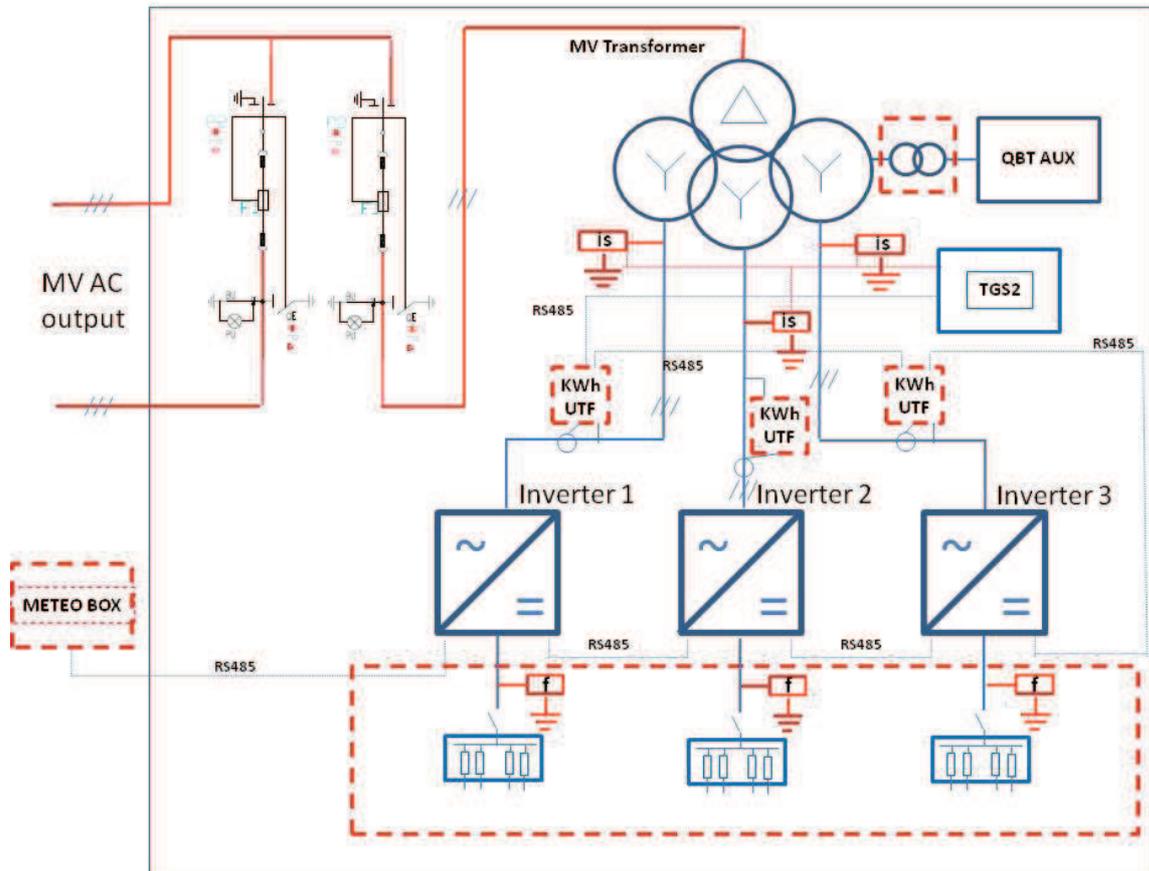
2.2 Version with motorized MV Switch, TN use, rotary switch disconnecter and CEI016 interface (optional)



The same arrangement is available with the following variations:

- Transformer with single secondary winding(PS990, PS500, PS660, PS833).
- Smaller container for PS500, PS660, PS833.
- TN regime with grounded neutral transformer.

2.3 Version with MV breaker (in-out configuration), IT use, 3 inverters, one DC grounding pole [PS1980M, PS2500M]



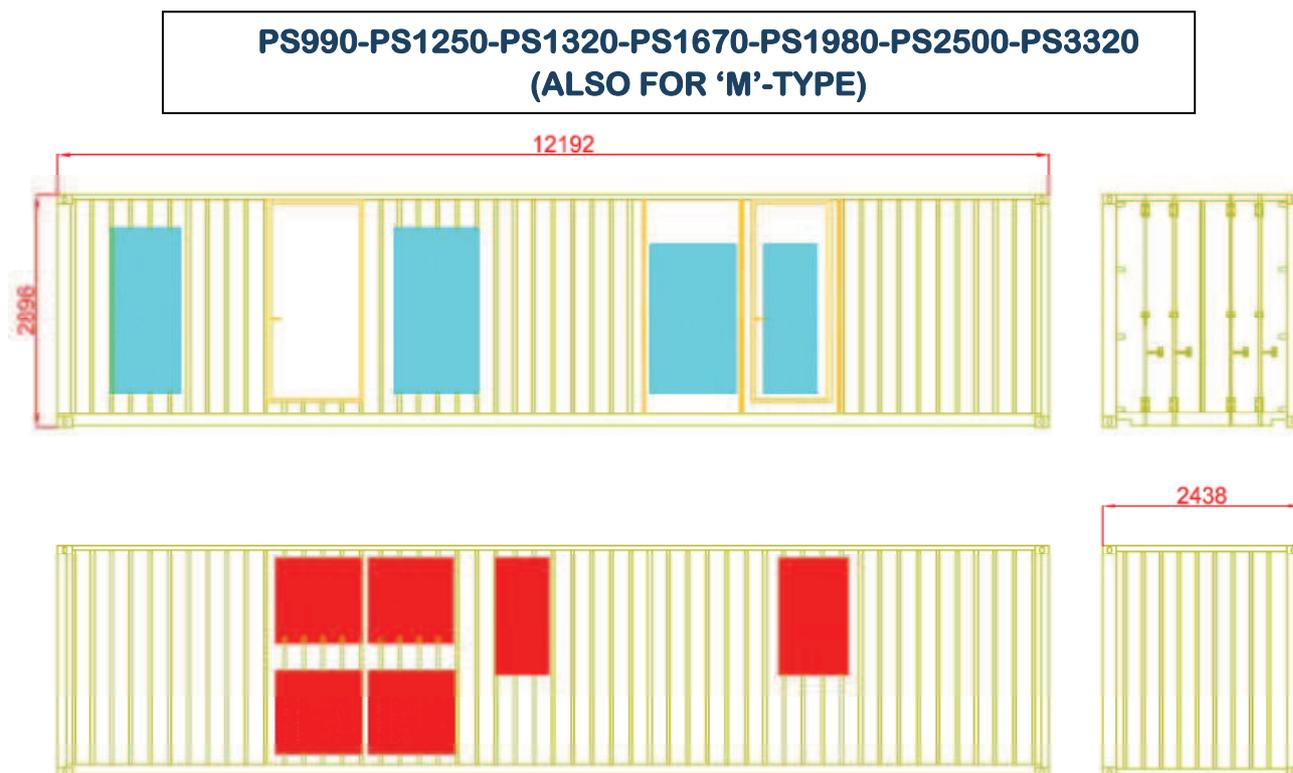
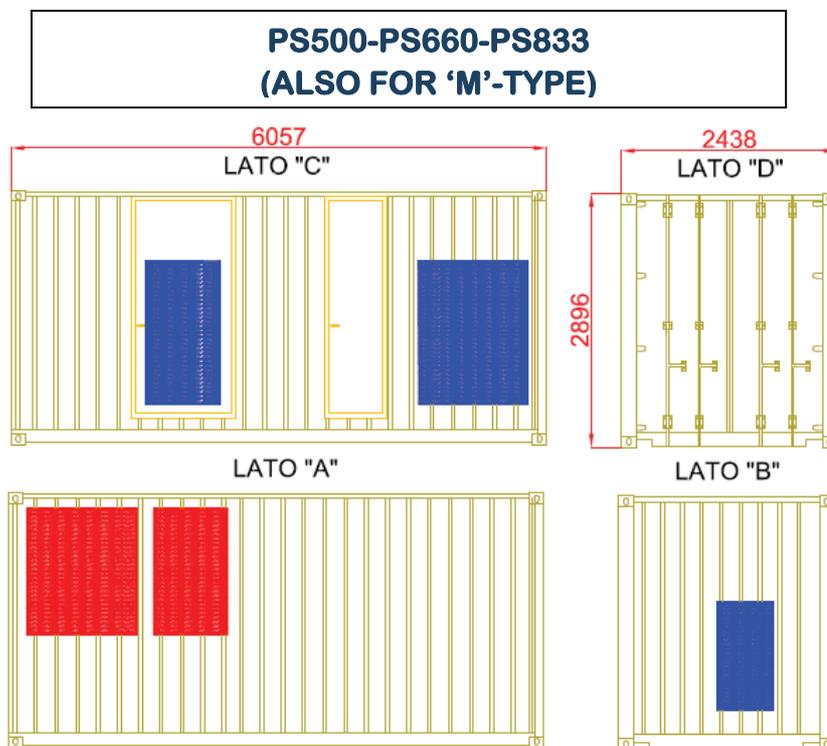
In this application, the transformer has three distinct windings, each connected to 'M'-type inverter (with grounded pole).

The same arrangement is available with the following variations:

- Transformer with single or dual secondary winding (with insulated DC bus)

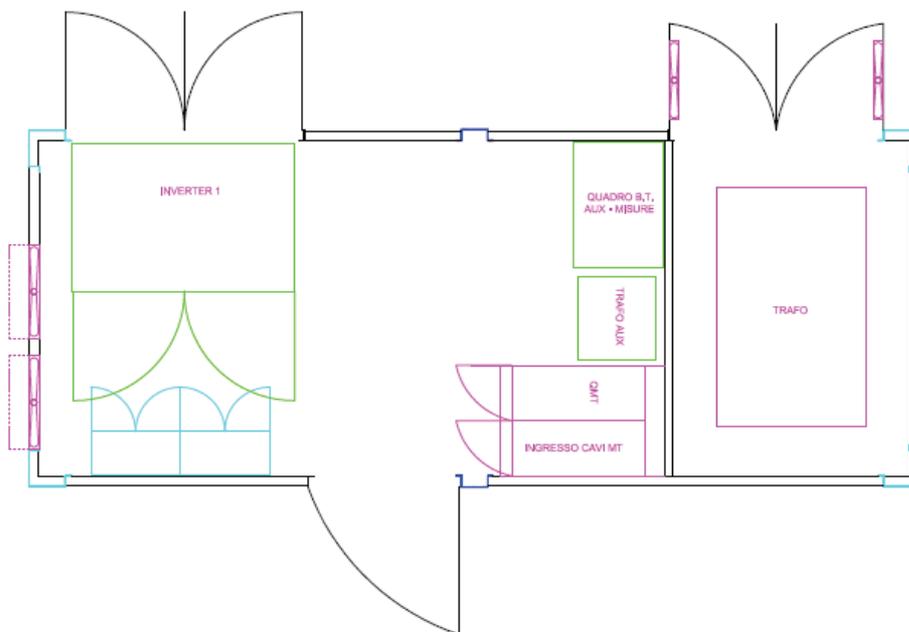
3 POWER STATION MECHANICAL DRAWINGS

3.1 Exterior view and dimensions



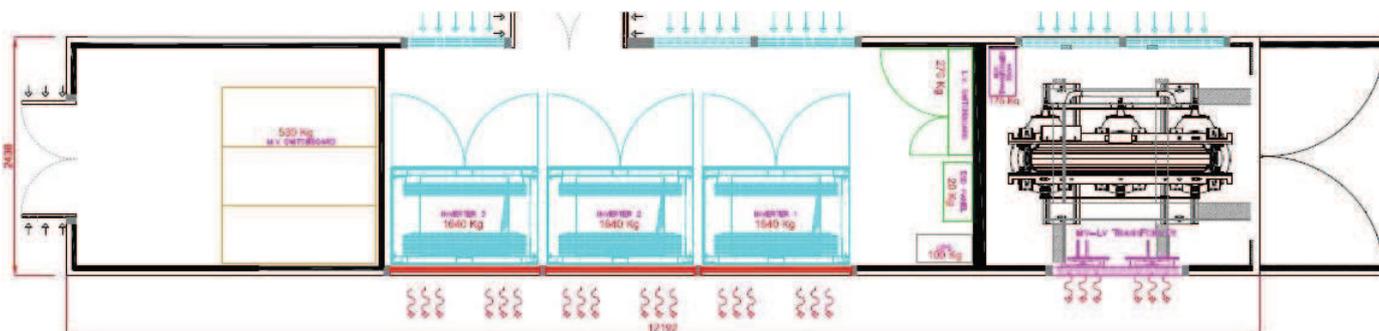
3.2 Layout and internal top view

**PS500-PS660-PS833 - 20' CONTAINER
(ALSO FOR 'M'-TYPE)**

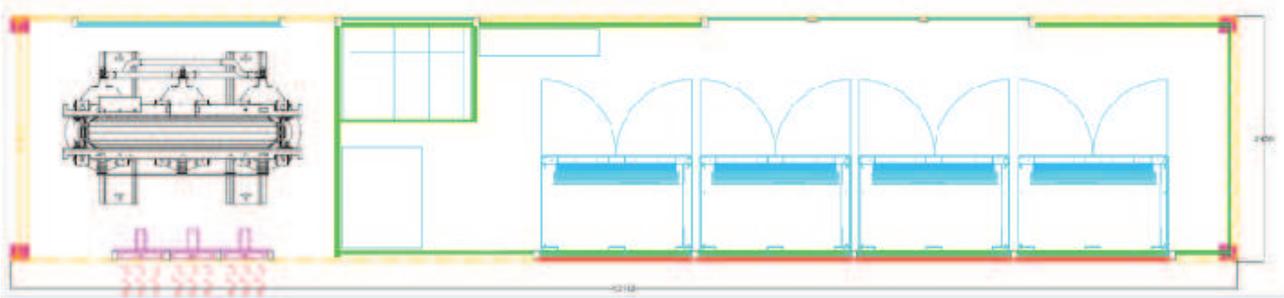


Some appropriate clearance must be kept around the container to guarantee correct ventilation and access for maintenance.

**PS1980-PS2500 – 40' CONTAINER
(ALSO FOR 'M'-TYPE)**



**PS3320 – 40' CONTAINER
(ALSO FOR 'M'-TYPE)**



4 COMPONENTS

4.1 MV switchboard: composition of compartments

The MV switchgear is manufactured with normalized pre-fabricated compartments.

Each compartment is internally divided into a number of cells which are separated by metal barriers described below.

4.1.1 Features of the MV switchgear

Insulation voltage	18kV standard, 28kV, 36kV upon request
Rated Voltage	20kV standard (10kV, 15kV, 33kV, 34.5kV upon request)
Number of phases	3
Rated Frequency	50Hz
Rated current of bus-bar	630 (higher ratings available on request)
Withstand current capability for short duration (1s)	16kA IACFLR (25kA, 31.5kA available on request)
Rated lighting impulse current	170kA

Please consider that, a custom design of the container may be possible for high rating systems (rated voltage above 20kV and /or withstand current higher than 25kA), because of the increasing dimensions of the MV switchboard and related components.

The MV cabins are equipped with all accessories outlined for DL 81-2008 and with up-dated accident prevention features, in particular:

- rubber insulating mat (test voltage, at least two times the operating voltage of the cabin) placed along the area in front of the cells;
- insulating gloves, complete with their own pouch;
- warnings and signs "How to assist in the case of electric shock, No entrance, Danger of death, No access unless voltage is removed, Do not use water to extinguish fire";
- Wiring diagram located on the cells.
- User Manual.

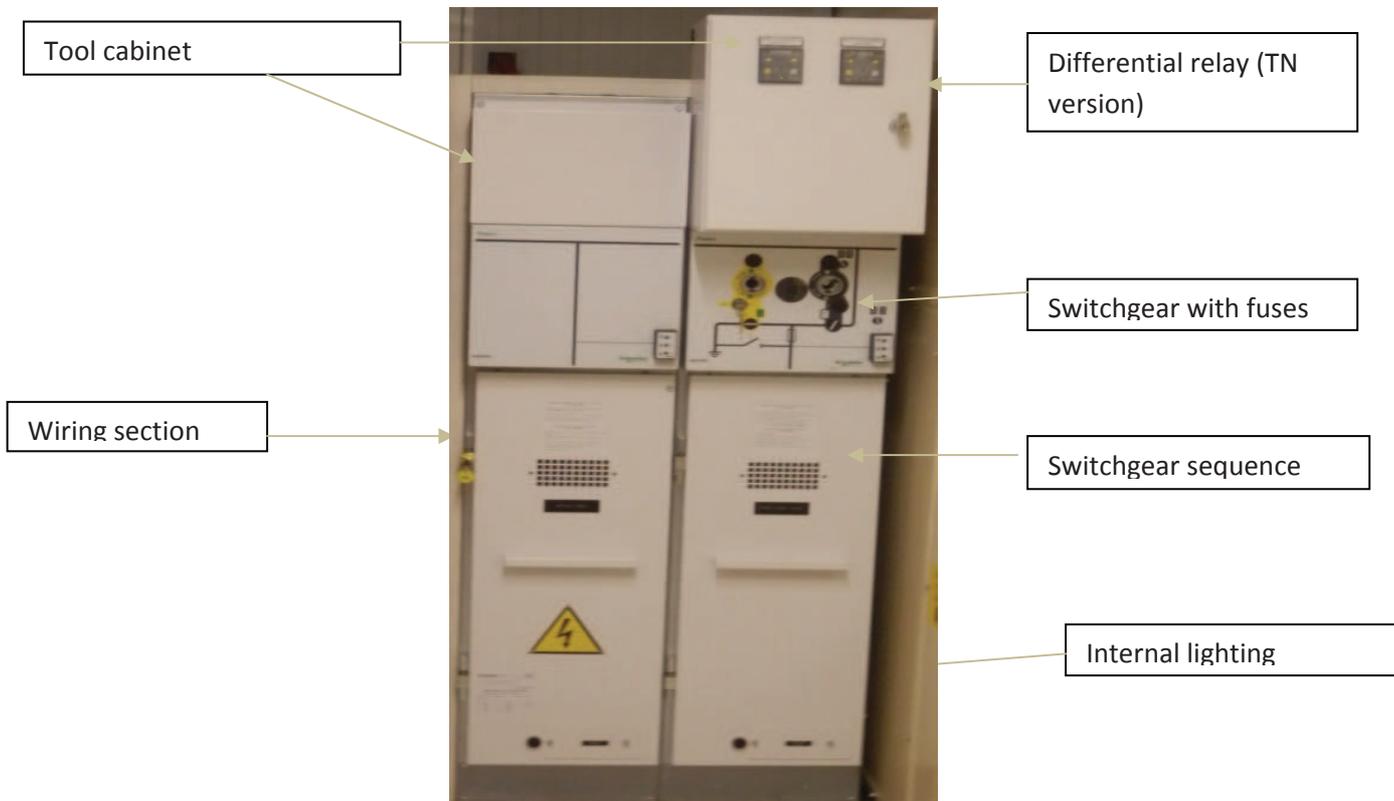
4.1.2 Versions of the switchgear

Switchboard is available according to two different classifications:

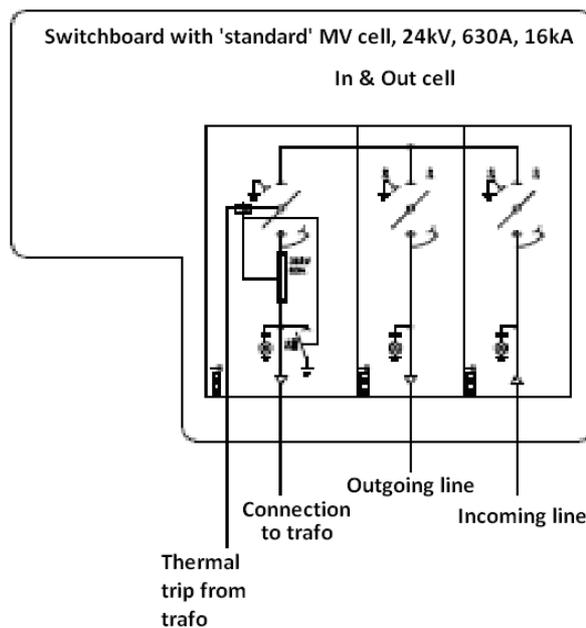
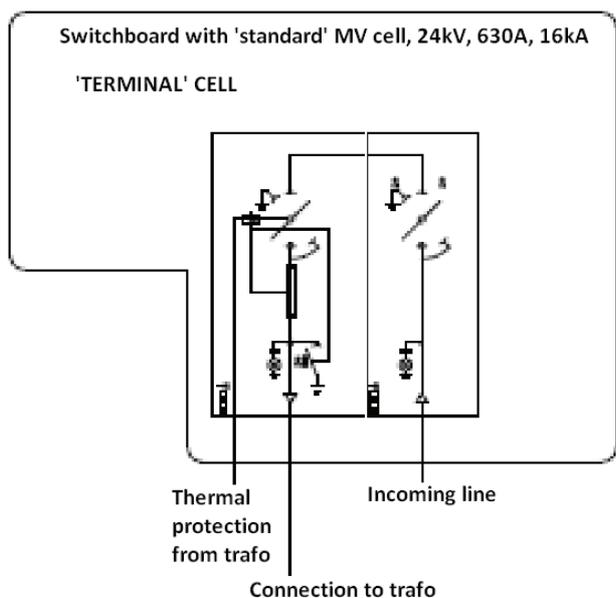
- Type of disconnecting device:
 - switchgear with fuse-based transformer protection
 - circuit breaker with maximum current protection CPU (motorized version optional)
- Type of connection topology:
 - In & Out
 - 'Terminal' version

Usually, for large installation where the total power is greater than the power of the top rated PS3320, many PSxxx can be combined and connected together in a daisy chain (or ring) topology. The PSxxx which are part of the chain, are equipped with a MV switchgear 'In & Out' type, whereas the last PSxxx of the chain is named 'terminal' and is equipped with a 'standard' MV cell.

4.1.2.1 'Standard' version (with fusible isolator switch)



Wiring diagram of the cell



The cell for the bars is accessible from the bottom of the compartment, or from the front.

The incoming line compartment fits:

- Support insulators for the bars.
- Aluminium bars
- Three capacitor dividers with signal light system;
- Tool box with auxiliary circuits;
- Accessories to complete the compartment.

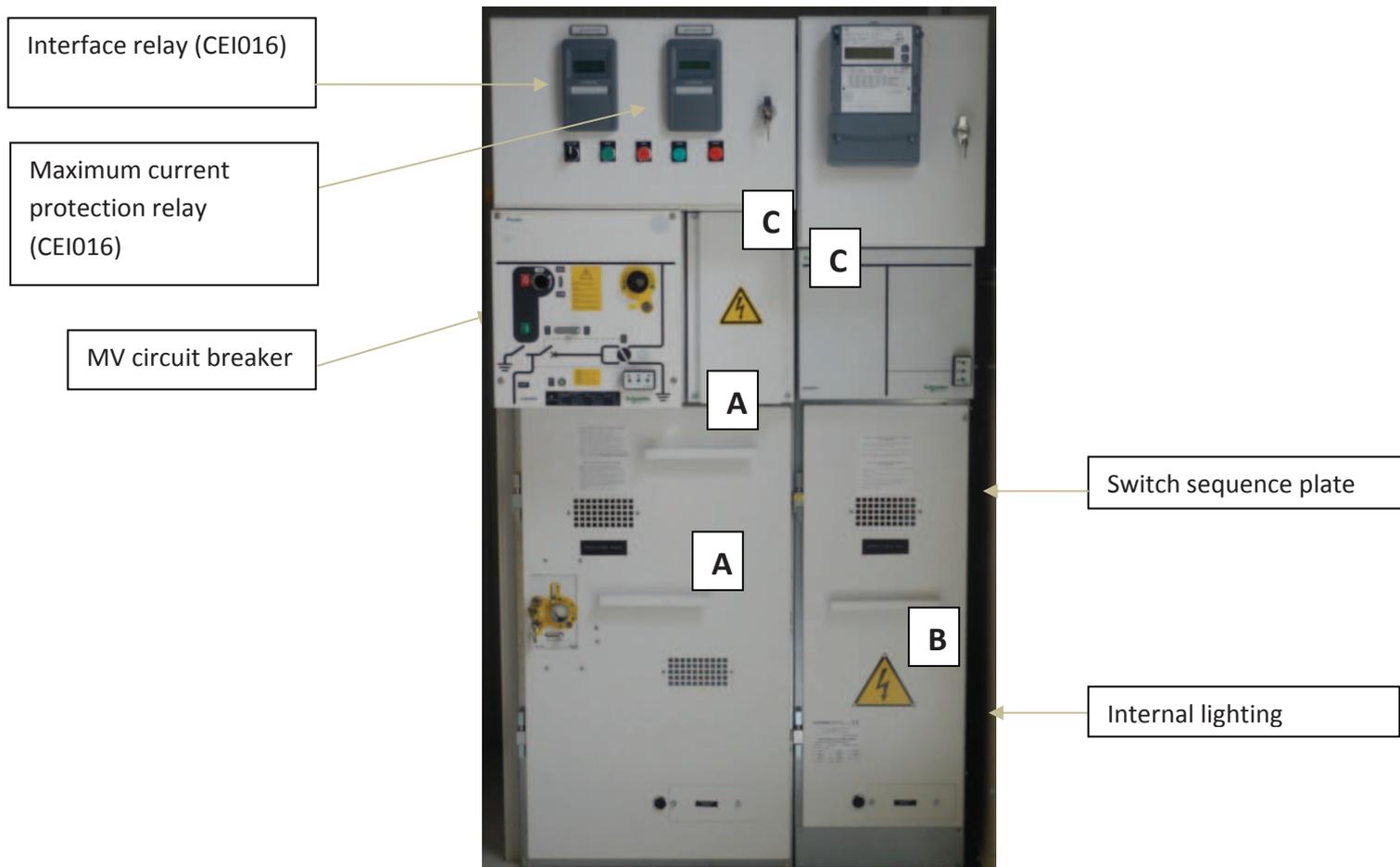
Switchgear:

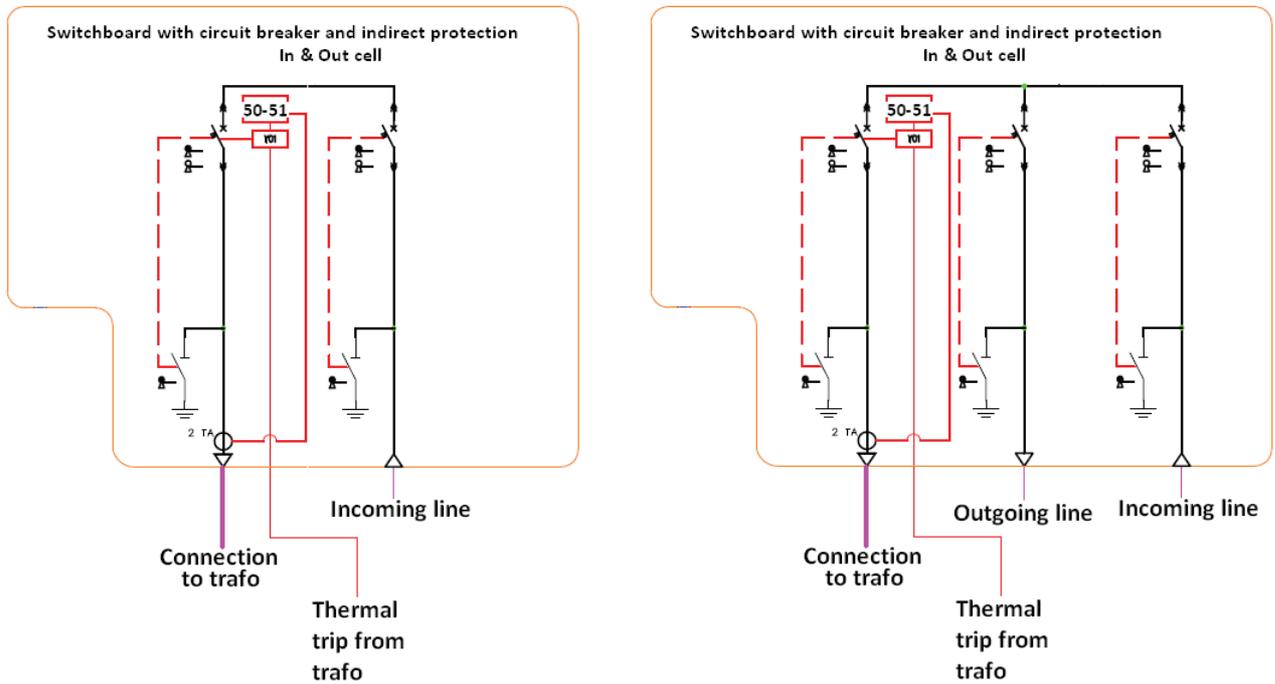
- 16kA disconnecter with 24kV or 36kV fuses(see table par. 4.4.1);
- Earth disconnecter switch
- Three capacitor dividers with signal light system;
- Tool box with auxiliary circuits;
- Accessories to complete the compartment.

4.1.2.2 Version with circuit breaker and indirect protection

- A. Circuit Breaker Cell
- B. Incoming line cell
- C. Cell for instruments and auxiliaries for L.V.
- D. Motorized circuit breaker optional

The following image shows the front view of the of Medium Voltage switchgear for the version with the motorized switch.





All of the operations for normal use are controlled from the front of the closed doors.
The maintenance and replacement operations require the opening of the panels on the front.

Incoming line compartment and incoming wiring bars



The bars cell is accessible from the front.

This compartment fits:

- Support insulation for the bars;
- Aluminum bars.
- Fixing bar cables with capacitive isolators

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Front panel for instruments



This panel is located right above the circuit breaker cell and it is locked by key.

The instruments are:

- Protection Controller interface Thytronic NV10P or equivalent (optional) to monitoring voltage and frequency;
- Relay controller for indirect protection ANSI code 50 and 51 (such as Thytronic NA16 or equivalent) ; more complex protection controller are available.
- Monitor differential Relay DER2/D2B (only for the version in TN).

4.2 Connections in Medium Voltage

The three-phase connection in MV between MV switchgear and transformer is performed employing type RG7H1R 12/20VA kV 1x50 mm²conductors. The conductors are applied with special pre-formed terminals, suitable for the maximum operating voltage and are complete with pressure terminals

4.3 Medium Voltage Transformers

The Medium Voltage transformer with which the PS series is equipped, is manufactured either in dry resin or oil and installed in the appropriate compartment, fitted with a grill door and extractor fan. Following tables summarize the transformer main characteristics for PSxxx and PSxxx 'M'-type stations.

Model	PS3320	PS2500	PS1980	PS1670	PS1320	PS1250	PS990	PS833	PS660	PS500
Rated power (kVA) (*)	3320	2500	1980	1670	1320	1250	1000	800	660	500
Secondary windings	2	2	2	2	1	1	1	1	1	1
Line-to-line voltage of primary windings (kV)	20 (**)									
Line-to-line voltage of secondary windings (V)	380	380	280 or 380	380	280 or 380	380	280 or 380	380	280 or 380	280 or 380
Insulation Class (kV)	24 (***)									
Frequency (Hz)	50	50	50	50	50	50	50	50	50	50
Vector group	Dy11n- y11n	Dy11n- -y11n	Dy11n- y11n	Dy11n- y11n	Dy11	Dy11	Dy11	Dy11	Dy11	Dy11
Induction (T)	<1.6									
Short circuit voltage (Vcc%)	6									

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The following table shows the technical characteristics of the transformer in sizes from 1320kVA to 3320kVA.

Model	PS3320M	PS2500M	PS1980M	PS1670M	PS1320M
Rated power (kVA) (*)	3320	2500	1980	1670	1320
Secondary windings	4	3	3	2	2
Line-to-line voltage of primary windings (kV)	20 (**)				
Line-to-line voltage of secondary windings (V)	380	380	280 or 380	380	280 or 380
Insulation Class (kV)	24 (***)				
Frequency (Hz)	50	50	50	50	50
Vector group	Dy11n- y11n-y11n- y11n	Dy11n- y11n-y11n	Dy11n- y11n-y11n	Dy11n- y11n	Dy11n- y11n
Induction (T)	<1.6				
Short circuit voltage (Vcc%)	6				

NOTES:

(*) : Power can be increased to a 110% of its rated value by installation of dedicated additional ventilation bar (for dry resin transformer only).

() other voltages available (10kV, 15kV, 33kV, 34.5kV and other)**

(*) : insulation class is related to rated voltage at the primary winding (MV): 24kV is default, 18kV, 36kV insulation models available**

The transformer is supplied complete with the following standard accessories:

- Number plate denoting characteristics;
- Lifting eyebolts;
- Earth Clamps, caster wheels;
- Temperature control unit DGPT2
- Electrostatic screen;

4.4 Inverter Soleil DSPX



Soleil DSPX 500 TLH 'M' - 833TLH 'M'



Soleil DSPX 500TLH-833TLH

4.4.1 System composition

PSxxxx model	Inverter type and quantity
PS3320	4 x Soleil DSPX 833 TLH
PS3320M	4 x Soleil DSPX 833 TLH 'M'
PS2500	3 x Soleil DSPX 833 TLH
PS2500M	3 x Soleil DSPX 833 TLH 'M'
PS1980	3 x Soleil DSPX 660 TLH
PS1980M	3 x Soleil DSPX 660 TLH 'M'
PS1670	2 x Soleil DSPX 833 TLH
PS1670M	2 x Soleil DSPX 833 TLH 'M'
PS1320M	2 x Soleil DSPX 660 TLH 'M'
PS1320	2 x Soleil DSPX 660 TLH
PS1250	1 x Soleil DSPX 833 TLH 1 x Soleil DSPX 416 TLH
PS990	1 x Soleil DSPX 660 TLH 1 x Soleil DSPX 330 TLH
PS833	1 x Soleil DSPX 833 TLH
PS660	1 x Soleil DSPX 660 TLH
PS500	1 x Soleil DSPX 500 TLH

All Soleil inverters are three-phase without neutral.

Soleil DSPX from 500TLH to DSPX 833TLH are composed of an IGBT double power module, dual control, with two independent MPPT, PWM (Pulse Width Modulation) technology.

Soleil DSPX from DSPX 660TLHM to DSPX 833TLHM are composed of an IGBT double power module with single control, single MPPT, PWM (Pulse Width Modulation) technology.

The system transfers a current to the mains with an identical waveform to that of the voltage, power factor is adjustable from 0.9 (leading or lagging) to 1. Default is 1.

Soleil inverters feature all the state-of-the art requirements in terms of grid support functions, such as:

- Reactive power generation (depending on a setpoint communicated through 'RS485 Modbus RTU protocol').
- Active power limitation (depending on a setpoint communicated through 'RS485 Modbus RTU protocol').
- Voltage regulation support through automatic reactive power injection (as a function of actual voltage).
- Frequency regulation support through automatic active power derating (as a function of frequency).
- Low Voltage Failure Ride Through.
- High Voltage Failure Ride Through.

The commands and instructions for the Soleil DSPX 500TLH - Soleil DSPX 833 TLH are entered using two 'touch screen' panels (one per controlled unit), enabling visual access to all the operating parameters of the system (electrical measurements, states and alarms).

'M'-type inverters, only require one 'touch screen' panel.

Please refer to the documents IV346 "Instruction Manual Soleil DSPX" and IV347 "Soleil DSPX Installation Guide" for further and more detailed information on the subject.

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The following information relates to the technical characteristics of the 380V output inverters:

SOLEIL DSPX TLH 380V	330	416	500	660	833	660M	833M
DC input side– Recommended power of the modules							
Rated [kWp]	330	416	500	660	833	660	833
Maximum [kWp]	400	503	608	800	1006	800	1006
DC input side– Electrical specifications							
Operating voltage range [V] ⁷	560 - 930						
MPPT voltage [V] ⁷	560 - 780						
Max. voltage [V]@-10°C	1000						
Min. voltage [V] @+70°C ⁷	560						
Modules max. Isc [A]	598	752	910	1197	1506	1197	1506
N. DC inputs	12		12X2			24	
N. MPPT inputs	1		2			1	
AC output side							
Pmax rated power [kW] ¹	330	416	500	660	833	660	833
Maximum power Smax [kVA] ¹	330	416	500	660	833	660	833
Connection	3Ph						
Nominal voltage [V]	380						
Rated current [A] ²	501	632	760	1003	1266	1003	1266
Maximum current [A] ³	557	702	844	1114	1406	1114	1406
Min Smax operating voltage [V] ⁴	90% Vn						
Minimum operating voltage [V] ⁴	85% Vn						
Maximum operating voltage [V] ⁴	115% Vn						
Nominal frequency [Hz]	50						
Frequency interval [Hz] ⁵	47,5 - 51,5						
Max. efficiency [%] ⁶	98,5	98,8	98,1	98,5	98,8	98,5	98,8
Euro efficiency [%] ⁶	98,1	98,35	97,3	98,1	98,35	98,1	98,35
THD% I @Pnom	3						
Power factor ¹	0.9 ... 1.0 adjustable						
Short circuit current contribution [A]	752	948	1140	1504	1899	1504	1899
Other data							
Ventilation system	Forced air						
Dissipated power without load [W]	64	64	128	128	128	128	128
Control	Digital DSP						
Output wave form	Sinusoidal						
Operating temperature (full power)[°C]	-20°C / +50°C						
Operating temperature range [°C]	-20°C / +50°C						
Storage temperature range [°C]	-25°C / +70°C						
Operating humidity range	5% / 95% without condensing						
Maximum altitude	1000m (s.l.m.)						
Environment category	Indoor not conditioned						
Pollution Degree	PD3						
Overvoltage class (input DC)	Class II						
Overvoltage class (output AC)	Class III						
Mechanical characteristics							
dBA	68	68	68	68	68	68	68
Class of protection	IP20						
Dimensions LxDxH [mm]	1500x1000x2000						
Weight [kg]	850	850	1520	1600	1600	1600	1600

(*)Note: the maximum efficiency is measured at the input voltage of 600V dc.

For full details of all inverters (example for 330VAC output) see the document "IV346E"

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The following information relates to the technical characteristics of the 280V output inverters:

SOLEIL DSPX TLH 280V	330	500M	660	660M
DC input side– Recommended power of the modules				
Rated [kWp]	330	500	660	660
Maximum [kWp]	401	608	803	803
DC input side– Electrical specifications				
Operating voltage range [V] ⁷	460 - 930			
MPPT voltage [V] ⁷	460 - 780			
Max. voltage [V]@-10°C	1000			
Min. voltage [V] @+70°C ⁷	460			
Modules max.[A]	731	1108	1463	1463
N. DC inputs	8	16	8 x 2	16
N. MPPT inputs	1	1	2	1
AC output side				
Pmax rated power [kW] ¹	330	500	660	660
Maximum power Smax [kVA] ¹	330	500	660	660
Connection	Three-phase			
Nominal voltage [V]	280			
Rated current [A] ²	680	1031	1361	1361
Maximum current [A] ³	756	1146	1512	1512
Min Smax operating voltage [V] ⁴	90% Vn			
Minimum operating voltage [V] ⁴	85% Vn			
Maximum operating voltage [V] ⁴	115% Vn			
Nominal frequency [Hz]	50			
Frequency interval [Hz] ⁵	47,5 - 51,5			
Max. efficiency[%] ⁶	98,1	98,1	98,1	98,1
Euro efficiency [%] ⁶	97,3	97,3	97,3	97,3
THD% I @Pnom	3			
Power factor ¹	0.9 ... 1.0 inductive-capacitive			
Short circuit current contribution [A]	1021	1547	2041	2041
Other data				
Ventilation system	Aria forzata			
Dissipated power without load [W]	64	128	128	128
Control	Digital with DSP			
Output wave form	Sinusoidal			
Operating temperature (full power)[°C]	-5°C / +45°C			
Operating temperature range [°C]	-5°C / +50°C			
Storage temperature range [°C]	-20°C / +50°C			
Operating humidity range	5%/95% with no condensing			
Maximum altitude	1,000 m a.s.l.			
Environment category	Indoor unconditioned			
Pollution Degree	PD3			
Overvoltage class (input DC)	Class II			
Overvoltage class (output AC)	Class III			
Mechanical characteristics				
dBA	68	68	68	68
Class of protection	IP20			
Dimensions LxDxH [mm]	1500x1000x2000			
Weight [kg]	850	1520	1600	1600

(*)Note: the maximum efficiency is measured at the input voltage of 520V dc.

For full details of all inverters (example for 330VAC output) see the document "IV346E"

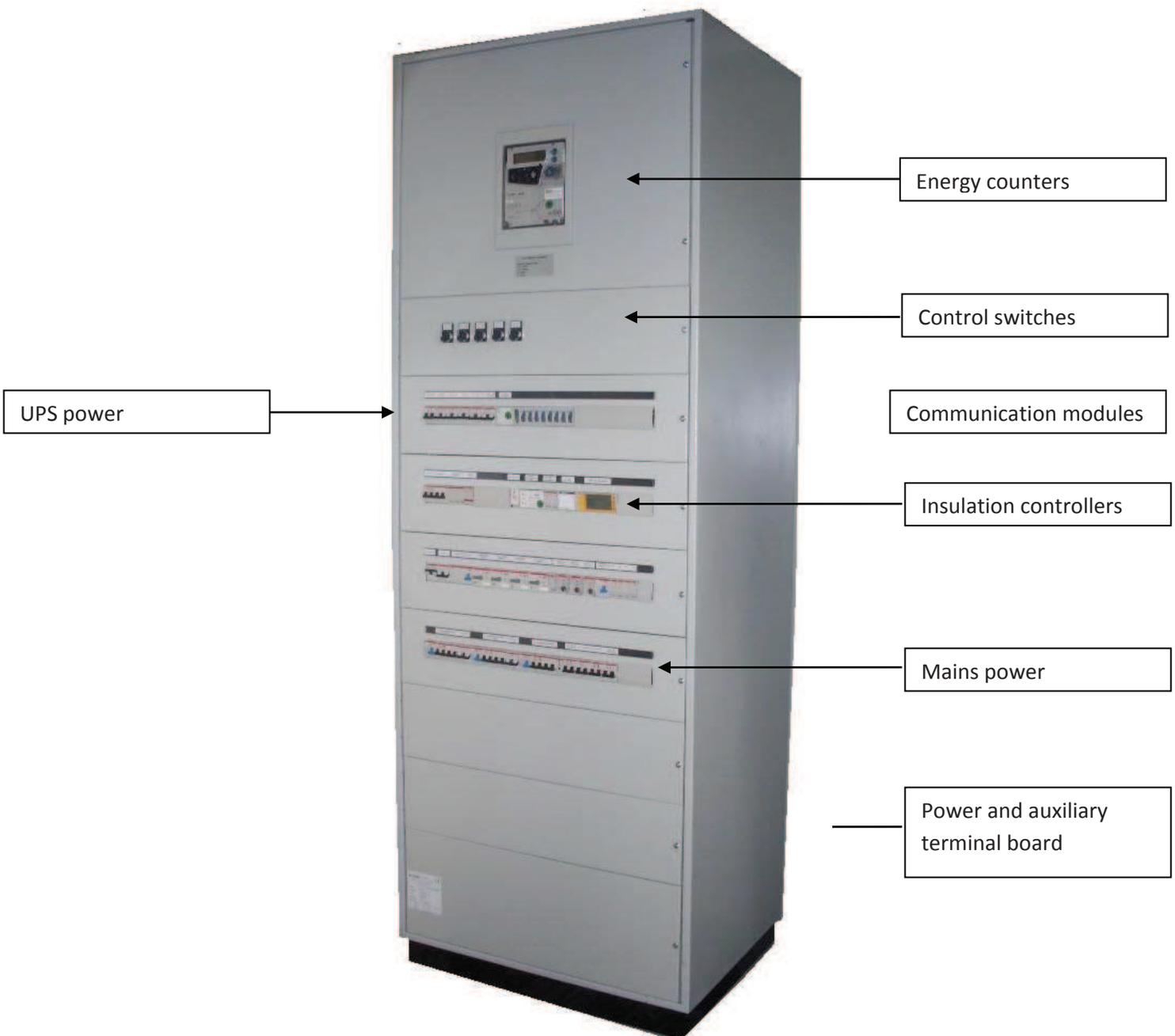
Power Station PS500-PS3320
Technical specification

Low Voltage Distribution Switchgear and auxiliary protection

The switchgear contains all the relevant switches for the protection and distribution of the ancillary circuits of the system and, as standard, it is powered by an external electricity line provided by the client.

The electric switchgear is enclosed in a metal cabinet, with the following characteristics:

- Protection grade: IP30
- Operating voltage: 400V
- Rated current: 50A
- Short circuit current: 6 kA



The switchgear also includes the isolation meters for operating the plant in IT (recommended)
The switchgear also houses the communication devices with acquisition modules (I/O and GPRS modem), as described in Chapter 5.

4.4.2 Options

Optionally, the switchgear can be powered by a dedicated transformer from 15 kVA 280 (380)/400V connected directly from the secondary of the MV transformer, housed in the switchgear itself and complete with switch protection on the primary side and of the necessary power connections, performed with FG7/ conductors or 0.6 / 1kV calculated section . Other ratings are available for this transformer.

4.5 DC combiner (optional)

The PSxxx station can be equipped with a DC combiner switchboard with fuses, for DC cables protection. Main characteristics are:

- Short circuit current withstand capability: 2kA, 1s
- Rated current: depending on PSxxx model.
- gPV fuses, with appropriate dly rated, depending on PSxxx model.
-

4.6 UTF Counters in LV (optional)

On request, 1, 2,3 or 4 counters for UTF use can be supplied: type ITRON SL761B071-2012 (or similar).

The counters are complete with appropriate measurement TA, in addition to output signals for the measurement of energy, plus predisposed terminals for connection to a supervision system.

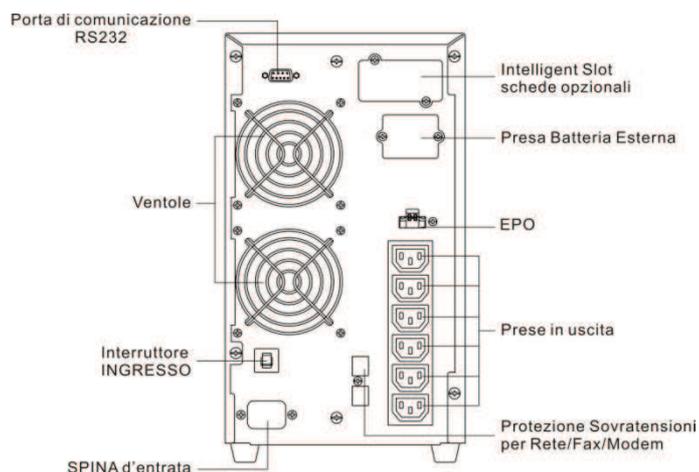
4.7 Air conditioning system (optional)

The Power Station is equipped with a forced ventilation system in the “open” architecture version.

The “closed” architecture version includes a precision air conditioning unit, based on Stulz CVS-A2 (or equivalent unit), double (Master-Slave optional operations) for PS990, PS1320, PS1650 , PS1980, PS2500 or PS3320, single for PS500, PS660 and PS833, also operating in “free-cooling” mode.

4.8 UPS

All of the Power Stations are equipped with 3KVA (as a standard, high rating models available) continuity groups for the power supply of the supervision platform (chapter 5).



The following information refers to the characteristics of the UPS:

INPUT	
Phases	Single-phase
Voltage(Vac)	175-285
Frequency (Hz)	(45~55)/(54~66)
Current (A)	26
OUTPUT	
Power	3KVA/2.4KW
Voltage(Vac)	208/220/230/240 (±2%)
Frequency (Hz)	50/60 ±0.2Hz (battery Mode)
Waveform	Sinusoidal
Typical autonomy (internal batteries 8x12V, 7.2Ah)	100% Charge: 5 min 50% Charge: 15 min.

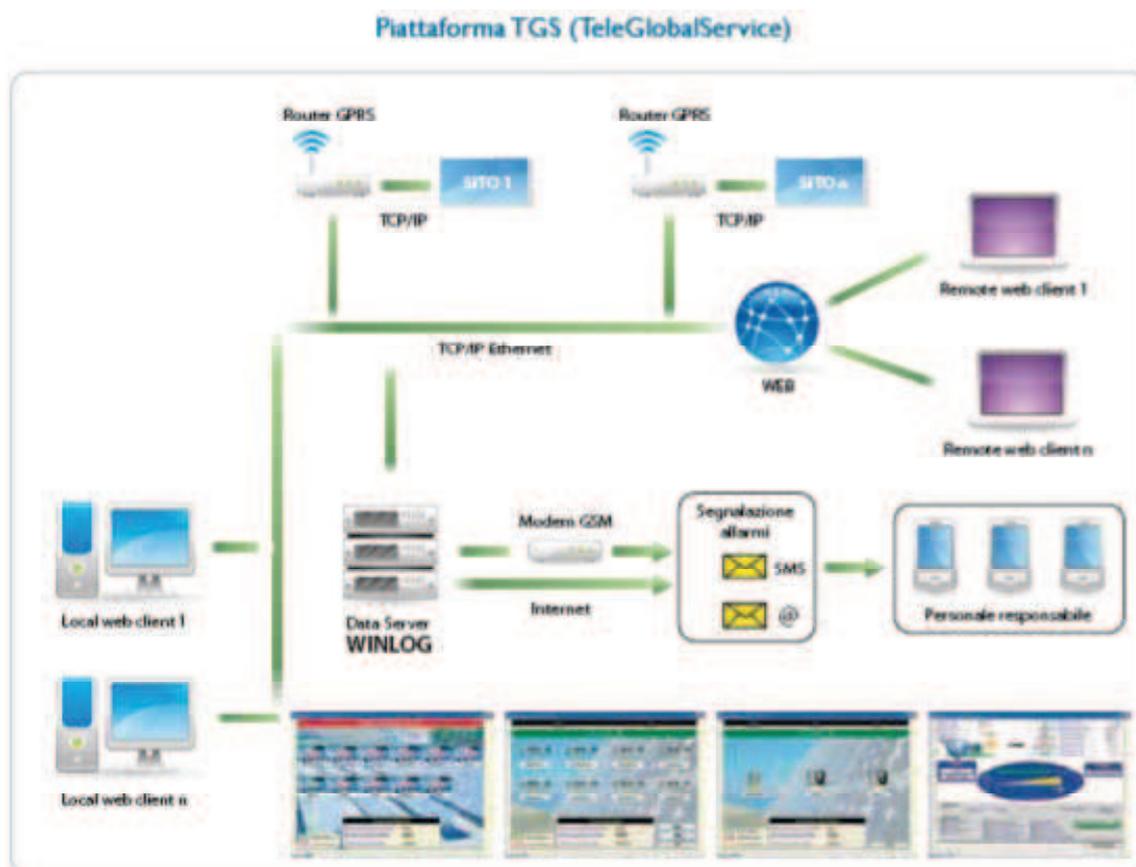
5 COMMUNICATION PLATFORM TGS2

Power Station is equipped with a supervision system that allows the monitoring of the main operating parameters of the inverters, the groups of parallel connected strings and the system.

An application located on a SIEL (TGS2) server, performs a monitoring interrogation of all the HW present in the system and records and archives all of the information acquired and accumulated over time.

Moreover, in the case of any fault or anomaly, the TGS2 system is able to communicate via e-mail and/or sms to a configurable set of recipients, the instant of the beginning of that anomaly, and the type of fault, thus enabling the user to intervene in the problem without delay.

When the fault disappears, a further alert is sent (e-mail and/or SMS) to notify users of the conclusion of the problem.



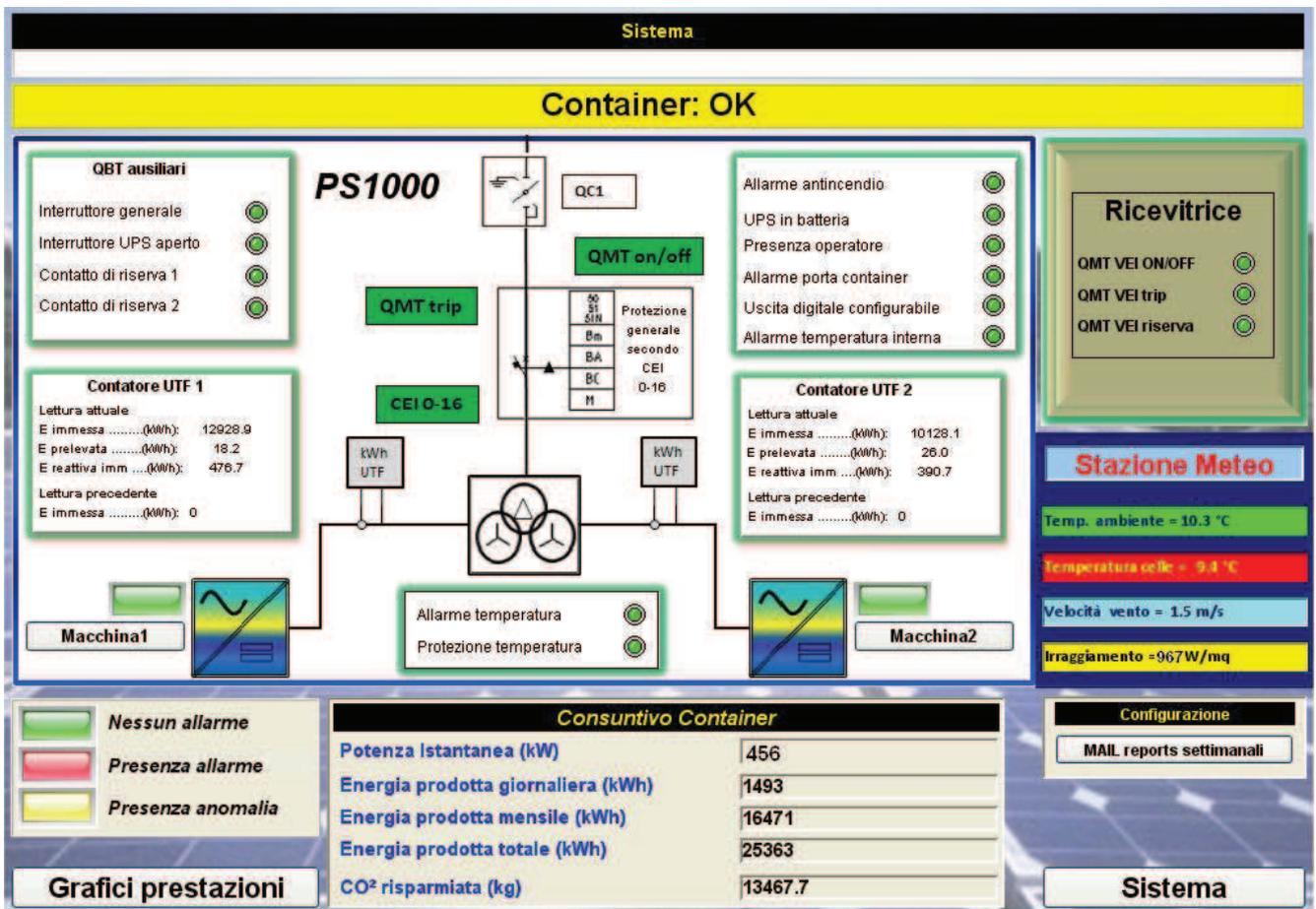
The user is provided with an IP address corresponding to the Power Station and, using any Internet browser (e.g., MS Explorer), it is possible to access a set of screens that provide the state, graphics and measurements for the entire system, the single inverter and every single group of parallel CSP12 strings .

5.1 Monitoring the state of the system

Through supervision equipment, the following signals (contacts) relating to the system (container) are monitored:

- State of the fusible disconnecter switch MV (open/closed), where present;
- State of the motorized switch MV (open/closed), if present;
- State of protection of CEI016 interface, where present;
- State of protection of maximum current 50, 51, 51N;
- Maximum temperature alarm MV transformer ;
- Maximum temperature protection MV transformer;
- Fire alarm;
- Internal temperature alarm.
- QBT open switch alarm;
- UPS battery operation;
- UPS switch open;
- Container door opening alarm.

The status, alarms and the measurements of the main variables of the inverter are also monitored. Please refer to the documents IV346 "Instruction Manual Soleil DSPX-TLH" and IV347 "Installation Guide" for further and more detailed information on the subject.



External Weather Station (optional)

On request, a control unit with weather related sensors for the acquisition of the following data:

- Ambient temperature
- Cell temperature
- Wind Speed
- Radiation

5.2 Monitoring kit receiver (optional)

On request, a kit is available that enables the client to receive data relating to the status of the following points:

- State of the general switch (open/closed) MV;
- State of protection of maximum current 50, 51, 51N;
- State of user contact.

6 TECHNICAL SPECIFICATIONS

MODEL	SOLEIL PS500	SOLEIL PS660	SOLEIL PS833	SOLEIL PS990	SOLEIL PS1250	SOLEIL PS1320	SOLEIL PS1670	SOLEIL PS1980	SOLEIL PS2500	SOLEIL PS3320
INPUT PARAMETERS										
Maximum power modules [KWp]	608	800	1006	1200	1500	1606	1836	2400	3018	4024
Max/min voltage MPPT (V)	460(560)/780	460(560)/780	560/750	460(560)/780	560/750	460(560)/780	560/750	460(560)/780	560/780	560/750
Maximum voltage at entry at -10°C (V)	1000									
MPPT Number	1 or 2	1 or 2	1 or 2	2 or 3	2 or 3	2 or 4	2 or 4	3 or 6	3 or 6	4 or 8
Number of inverters	1 x DSPX 500TLH	1 x DSPX 660TLH	1 x DSPX 833TLH	1 x DSPX 660TLH + 1 x DSPX 330TLH	1 x DSPX 833TLH + 1 x DSPX 416TLH	2 x DSPX 660TLH	2 x DSPX 833TLH	3 x DSPX 660TLH	3 x DSPX 833TLH	4 x DSPX 833TLH
OUTPUT PARAMETERS										
Nominal Power Pn (kW)	500	660	833	990	1250	1320	1670	1980	2500	3320
Maximum Power Smax [kVA]	500	660	833	990	1250	1320	1670	1980	2500	3320
Number of phases	3F									
Nominal linked voltage (kV)	6kV,10kV, 15kV, 20kV,30kV or 36kV (others on request)									
Harmonic Distortion of current to nominal power (%)	<3									
Maximum inverter efficiency (%)	up to 98.8									
Euro inverter efficiency (%)	up to 98.35									
Power Factor (cos phi)	0.9 ... 1.0 inductive-capacitive									
GENERAL CHARACTERISTICS										
Operating temperature (°C)	-5°C/+50°C (Note 1)									
Installation	Suitable for outdoor installation									
Communication system	MODBUS / LAN / ADSL / GPRS									
MV Switchboard	Inside for all models									
LV/MV Transformer	Inside for all models									

Note 1: Also available in the "closed " architecture version with operating temperature -40°C/+60°C

7 REFERENCE REGULATIONS

7.1 MV Interface (if present)

- A70, A68 - CEI 016 complaint

7.2 MV Switchboard

- IEC 62271-200
- IEC-EN 62271-200

7.3 Switches:

- IEC 62271-100
- IEC-EN 62271-100

7.4 MV Transformers

- CEI EN 60300
- CEI EN 60076

7.5 Inverter

- EMC Directive 2004 /108/EC
- Directive 2006 /95/EC

- EN 61000-6-1 (immunity)
- EN 61000-6-3 (emissions)
- EN 50178, EN62109-1, IEC 62109-2 (safety)
- EN 61000-3-12 (harmonics)
- EN 61000-3-11 (voltage flicker)
- Guide to connection to the network of Enel Distribution.
- CEI 0-16, CEI 0-21, Annexes A70 (MV connection) and A68 (HV connection) of Terna