



## Copernico TT

Photovoltaic inverter  
20 to 100 kVA  
with transformer

## Copernico TL

Photovoltaic inverter  
20 to 500 kVA  
transformer less

## Copernico Green Shelter Power Station

1 MVA - 2 MVA  
Solar energy power conversion station



# Copernico TT

Photovoltaic inverter  
20 to 100 kVA  
with transformer



## Applications

- Photovoltaic systems connected to low voltage (LV) grids
- Photovoltaic systems connected to medium (MV) grids
- Stand alone photovoltaic plants with storage systems
- Hybrid energy production systems
- Battery discharge systems delivering constant power or current to grid

## Benefits

- High European efficiency value, starting from low power levels, to maximise the return on investment.
- Compatibility with all major European and non-European network standards, including BDEW, guaranteeing certification according to local standards.
- Excellent MPPT adjustment efficiency, optimising the energy production in all environmental conditions and at all times.
- Hot parallel function on a single MV or HV transformer, with isolation control before connection, avoiding production losses in the event of problems on part of the plant.
- Ability to deliver reactive power on request, supporting the mains electricity network during transients and overloads.

## Main options

- String diode box
- Array monitor
- Green Power Guardian monitoring system
- KNX accessories
- Sensors: radiation, ambient temperature, module temperature, anemometers, etc.

### Copernico TT technical data

Rating (kVA)	20	30	50	100
Nominal power (kW)	20	30	50	100
Max PV power (kWp)	24	35	60	120
Dimensions WxDxH (mm)	690x895x1345			800x800x1900
Weight (kg)	475	486	540	905

Input				
Maximum voltage	1000 V			
MPPT range voltage	450 ÷ 820 V			
Maximum current (A)	46	69	115	230
Input protection	Isolator PV switch + fuses			Isolator PV switch

Output					
Nominal voltage	400 V 3-phase with integrated transformer				
Frequency	50 ÷ 60 Hz				
Power factor	0.99 Cos Ø depending on grid regulation				
Current harmonics (THD)	< 2 % @ nominal power and sinusoidal voltage				
Output protection	Electronic short-circuit protection - fuses - contactor				
Maximum efficiency (%)	>94.12	>95.51	>95.79	>96.28	
European maximum efficiency (%)	>93.20	>94.08	>95.04	>95.79	
Losses under normal operation at rated power	Wh	1150	1350	2100	3720
	BTU	3900	4600	7200	12700

Connectivity and function extensions	
Front panel	LCD display, mimic LED panel and keyboard
Remote communication	Modbus RS485

System	
Protection degree	IP 20
Colour	RAL 7035
Accessibility	Front access

# Copernico TL

Photovoltaic inverter  
20 to 500 kVA  
transformerless



Copernico TL da 500 kVA

## Copernico TL technical data

Rating (kVA)	20	30	50	100	150	200	250	350	500
Nominal power (kW)	20	30	50	100	150	200	250	350	500
Max PV power (kWp)	24	35	60	120	180	240	295	410	580
Dimensions WxDxH (mm)	690x895x1345			800x800x1900		1000x800x2100		1600x1000x2100	
Weight (kg)	260	271	320	415	500	635	686	1150	1372

Input									
Maximum voltage	1000 V								
MPPT range voltage	450 ÷ 820 V								
Maximum current (A)	46	69	115	230	345	460	570	795	1140
Input protection	Isolator PV switch + fuses				Isolator PV switch				

Output										
Nominal voltage	300 V 3-phase									
Frequency	50 ÷ 60 Hz									
Power factor	0.99 Cos $\phi$ depending on grid regulation									
Current harmonics (THD)	< 2 % @ nominal power and sinusoidal voltage									
Output protection	Electronic short-circuit protection - fuses - contactor									
Maximum efficiency (%)	>96.76	>97.21	>96.97	>97.37	>97.67	>97.73	>97.79	>97.95	>98.08	
European maximum efficiency (%)	>94.77	>95.86	>96.01	>96.60	>97.03	>97.18	>97.17	>97.45	>97.69	
Losses under normal operation at rated power	Wh	650	850	1500	2600	3500	4500	5500	8200	12000
	BTU	2200	2900	5100	8800	12000	15300	18700	27900	40900
Max PV power recommended (kWp)	24	35	60	120	180	240	295	410	580	

Connectivity and function extensions									
Front panel	LCD display, mimic LED panel and keyboard								
Remote communication	Modbus RS485								

System									
Protection degree	IP 20								
Colour	RAL 7035								
Accessibility	Front access								

## Copernico TT e TL technical data

Environmental	
Operating temperature range	-10 °C ÷ +50 °C
Storage temperature range	-10 °C ÷ +70 °C
Non-condensing relative humidity	<95%
Altitude	< 2000 m above sea level
Audible noise at 1 m (dBA)	<68

Standards and certifications	
Quality assurance, environment, health and safety	ISO 9001:2008, ISO 14001:2004, BS OHSAS 18001:2007
Safety	IEC 62103 - EN 50178 - IEC 62109-1
EMC	IEC EN 61000-6-2, IEC EN 61000-6-4
Protection degree	IEC EN 60529
Marking	CE

# Copernico Green Shelter Power Station 1 MVA - 2 MVA

Solar energy power conversion station



Copernico Green Shelter Power Station is a complete turnkey system for the generation of renewable energy from photovoltaic fields, with connection to medium and high voltage networks. All in a single compact container, this is the most efficient solution for converting the DC energy of photovoltaic modules directly into medium voltage with all the facilities for:

- DC wiring to photovoltaic field side
- AC wiring to medium voltage side
- electrical protection of photovoltaic panels
- electrical protection of mains power network
- production control
- plant management

All the equipment is installed in a block, divided into three main rooms:

- MV line arriving from the electrical station (client)
- Transformer room
- Inverter room

## Applications

- Medium Voltage (MV) plants
- High Voltage (HV) plants

## Benefits

- High European efficiency value, starting from low power levels, to maximise the return on investment.
- Compatibility with all major European and non-European network standards, including BDEW, guaranteeing certification according to local standards.
- Excellent MPPT adjustment efficiency, optimising the energy production in all environmental conditions and at all times.
- Hot parallel function on a single MV or HV transformer, with isolation control before connection, avoiding production losses in the event of problems on part of the plant.
- Ability to deliver reactive power on request, supporting the mains electricity network during transient effects and overloads.

## Main options

- Metal cabinet
- Vibrated reinforced concrete cabinet
- Air conditioning system
- Solution with MV panel with input/output
- Solution with MV panel with automatic circuit

# Copernico Green Shelter Power Station 1 MVA - 2 MVA

## Copernico Green Shelter Power Station technical data

Rating (MVA)	1	2
Nominal power (kW)	1000	2000
Max PV power (kWp)	1160	2320
Dimensions WxDxH (mm)	10000x2700x2500	
Weight (kg)	35000 approx	
<b>Input</b>		
Maximum voltage	1000 V	
MPPT range voltage	450 ÷ 820 V	
Maximum current	2 x 1140 A	4 x 1140 A
Nominal voltage	550 V	
MPPT channels	2	4
DC inputs with fuses	2 x 10	4 x 10
Input protection	gPV fuses, overvoltage suppressors type 2 for each MPPT channel, PV input disconnecter with release coil, electronic protection for internal circuitry	
<b>Output</b>		
Nominal apparent power (kVA)	1000	2000
Nominal voltage	20 kV *	
Range voltage	+/- 15% **	
Nominal current	28.9 A	57.7 A
Frequency	50 ÷ 60 Hz	
Frequency range	+/- 5% configurable **	
Power factor	> 0.99 Cos Ø (adjustable to +/- 0.90, locally or remotely)	
Current harmonics (THD)	< 2% @ rated power	
Maximum efficiency (%)	> 98.08 %	
European efficiency (%)	> 97.69 %	
Output protection	Inverter protection for short circuit, type 1 overvoltage suppressors (MV side), SF6 gas insulated isolator switch + fuses (MV side)	
Earthing scheme	IT (PV field and AC LV side)	
<b>Transformer BT / MT</b>		
Execution	Epoxy resin insulated transformer, class E2 C2 F1	
Nominal power	1000 kVA in continuous service	2000 kVA in continuous service
Vector group	Dd0	
<b>Standard equipment</b>		
LV parallel switchgear	LV parallel switchgear, AC side of inverters, automatic circuit breaker	
MV parallel switchgear	SF6 gas insulated isolator switch + fuse 63 A, disconnecter with transformer side earthing, internal connections with cable RG7H1R	
Auxiliary services switchgear	Internal power supply from second LV/LV transformer, 30 kVA, 400 V; on-line UPS 3 kVA autonomy 10 min, 1Ph and 3Ph distribution switchgear, 1Ph distribution switchgear supplied by UPS	
Electrical system	light each room, 1 socket 220V 16A for room, emergency light, external emergency button	
Safety equipment	Fire control unit, transformer temperature control unit, system emergency AC and DC disconnection unit, ventilation control unit, accident prevention accessories, powder extinguisher, warning signboards	
Supervision system	Green Power Guardian integrated solution	

\* other values on request

\*\* these figures indicate the maximum range of acceptability

## Copernico Green Shelter Power Station technical data

### System

Protection degree	IP 54
Colour	RAL on request
Accessibility	On the front side, doors with grating to access to internal areas
Cooling system	Forced air with helical extractors
Material	Monolithic in vibrated reinforced concrete, rck class > 450Kg/cm <sup>2</sup>
Structure	Reinforcing electrical welded mesh
Walls	8 cm thickness, plastic wall plaster
Roof	Single body with the structure, waterproofed with sheath
Lighting system	Fluorescent lamps (minimum 200 lux) + emergency light

### Environmental

Operating temperature range	-10 °C ÷ +45 °C
Storage temperature range	-10 °C ÷ +70 °C
Non-condensing relative humidity	< 95 %
Altitude	< 2000 m above sea level

### Standards and certifications

Quality assurance, environment health and safety	ISO 9001:2008, ISO 14001:2004, BS OHSAS 18001:2007
Safety	IEC 62109-1, IEC 62271-202
EMC	IEC EN 61000-6-2, IEC EN 61000-6-4
Protection degree	IEC EN 60529
Marking	CE
Standard	CEI-016, DIN VDE V 0126-1-1, EN 50438 Royal Decree 1663/2000., BDEW, Annex A68 CdR Terna

### Options

LV parallel switchgear	The switchgear can be equipped with: - Approved energy meter for counting the energy incentives - Motorized circuit breaker - Interface protection (DI)
MV parallel switchgear	The following solutions can be provided in place of the switchgear with isolator switch: • <b>Solution IN/OUT:</b> - Isolator switch + Fuses - Incoming line cell with earthing + line switch - Outgoing line cell with earthing + line switch • <b>Solution DG:</b> - Vacuum circuit breaker - General protection (DG)
Auxiliary services switchgear	UPS with more than 10 min autonomy
Power factor correction switchgear	Fixed 50 kVA PFC switchgear
Monitoring	Solar Power Manager (active and reactive power)
Cabin	Metallic shelter, air conditioners

## Who we are

Borri is specialized in the custom design, manufacturing and servicing of power protection systems in major sectors such as oil & gas, energy, utilities, industrial, ICT and static conversion for renewable energy sources.

The Borri research and development department is among the most complete regarding the coverage of the various disciplines involved in power conversion. With over 80 years of experience in semiconductor and magnetic components design, our development of one of the most advanced digital control algorithms and extensive microchip programming compounded with our strength of proven expertise in product customization and our continuous quest for excellence has made Borri into one of the leading Power Conversion companies around the world. The most recent development is the UPSaver® three-phase UPS solution, using Green Conversion patent technology, able to guarantee unparalleled energy savings and the best PUE for data centres and mission critical applications with very low environmental impact.

Under the Astrid brand, Borri offers a wide range of renewable energy solutions, reflecting its commitment to our pursuit of innovation and sustainable development. Headquartered in Italy, with 15,000 m<sup>2</sup> of production area and a fully equipped inspection and testing area, the company is able to count on more than 80 years of experience, multi-disciplinary R&D and a highly application specialized custom engineering capability.

Borri is present on all 5 continents with thousands of installations worldwide, professional staff and a network of partners able to provide you value added technical support and services.

