REGIONE BASILICATA
PROVINCIA DI POTENZA
COMUNE DI MONTEMILONE

Progetto di due impianti agrivoltaici avanzati per la produzione di energia elettrica, denominati Montemilone 1 CP: 202300145 della potenza nominale di 61.920 kW e Montemilone 2 CP: 202300146 della potenza nominale di 51.660 kW, ubicati in Località Perillo Soprano, La Sterpara, Santa Maria nel Comune di Montemilone (PZ) per una potenza nominale complessiva di 113.580 kW comprensivo delle opere di rete per la connessione a 36kV alla RTN di Terna Spa

PROGETTO DEFINITIVO DELL'IMPIANTO DI PRODUZIONE COMPRENSIVO DELLE OPERE DI RETE PER LA CONNESSIONE

ELABORATO	DISCIPLINARE DESCRITTIVO

DATA: Dicembre 2023	Scala: -	Nome file: *NPB1_MTM_J1 - Disciplinare descrittivo*

PROPONENTE

NP Basilicata 1

NP Basilicata 1 S.r.l.
Galleria Passarella n. 2, 20122 Milano (MI)
Partita IVA 13004260967
PEC: npbasilicata1@legalmail.it

NP Basilicata 1 S.r.l.
Galleria Passarella, 2
20122 MILANO
P.IVA - C.F. 13004260967

ELABORATO DA:

Entrope Srl
Dott. Sc. Amb. Enrico Forcucci
Via per Vittorito Zona PIP
65026 Popoli (PE)
Tel/Fax 085986763
PIVA 01819520683

Arch. Pasqualino Grifone
Piazza Sirena, 8
66023 - Francavilla al Mare

ORDINE DEGLI ARCHITETTI, PIANIFICATORI, PAESAGGISTI E CONSERVATORI PROVINCIA di PESCARA
ARCHITETTO
Pasqualino
GRIFONE
Albo A
1293

Agronomo Nicola Pierfranco Venti
Via A. Volta, 1
65026 Popoli (PE)

COLLEGIO DEI DOTTORI AGRONOMI E DEI DOTTORI FORESTALI
DOTT. NICOLA VENTI
Sez. A n. 175

revisione	descrizione	data	Elab. n.
A			J1
B			
C			

www.jinkosolar.com

Solar
JinKO
Building Your Trust in Solar

Tiger Neo N-type
78HL4-BDV
605-625 Watt

BIFACIAL MODULE WITH DUAL GLASS

N-Type

Positive power tolerance of 0~+3%

IEC61215(2016), IEC61730(2016)

ISO9001:2015: Quality Management System

ISO14001:2015: Environment Management System

ISO45001:2018
Occupational health and safety management systems

Key Features

SMBB Technology
Better light trapping and current collection to improve module power output and reliability.

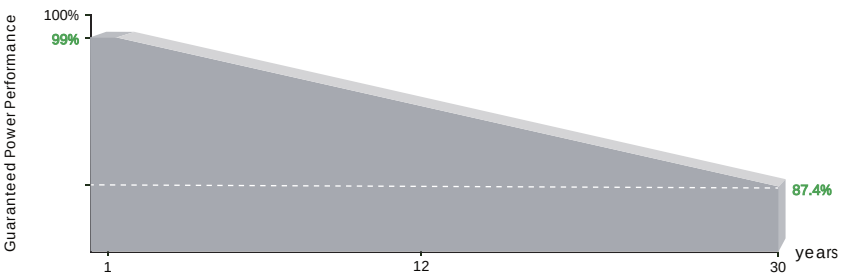
Hot 2.0 Technology
The N-type module with Hot 2.0 technology has better reliability and lower LID/LETID.

PID Resistance
Excellent Anti-PID performance guarantee via optimized mass-production process and materials control.

Enhanced Mechanical Load
Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).

Higher Power Output
Module power increases 5-25% generally, bringing significantly lower LCOE and higher IRR.

LINEAR PERFORMANCE WARRANTY

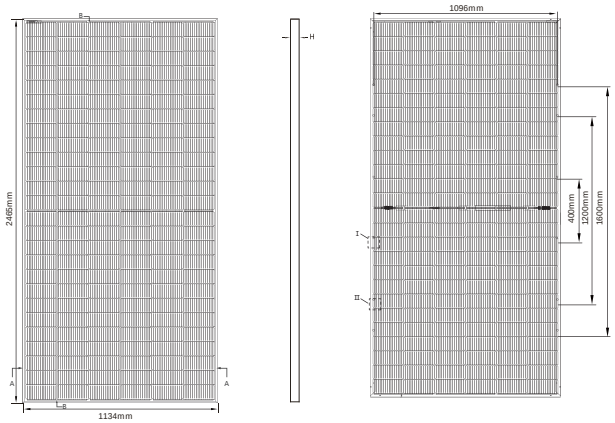


12 Year Product Warranty

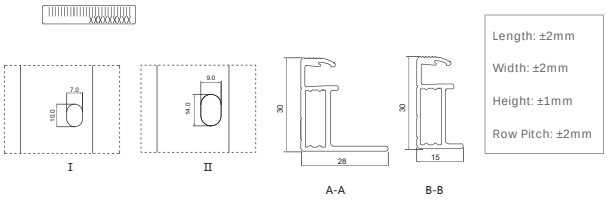
30 Year Linear Power Warranty

0.40% Annual Degradation Over 30 years

Engineering Drawings



Front Side Back



*This tolerance range applies only to the four-angle distance of the module as indicated above.

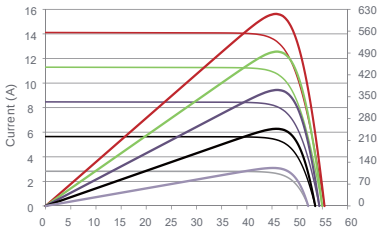
Packaging Configuration

(Two pallets = One stack)

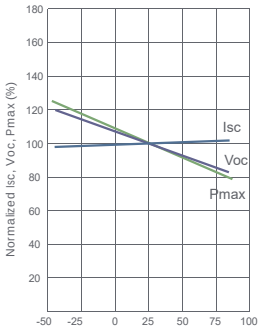
36pcs/pallets, 72pcs/stack, 576pcs/ 40'HQ Container

Electrical Performance & Temperature Dependence

Current-Voltage & Power-Voltage Curves (615W)



Temperature Dependence of Isc,Voc,Pmax



Mechanical Characteristics

Cell Type	N type Mono-crystalline
No. of cells	156 (2×78)
Dimensions	2465×1134×30mm (97.05×44.65×1.18 inch)
Weight	34.6kg (76.38 lbs)
Front Glass	2.0mm, Anti-Reflection Coating
Back Glass	2.0mm, Heat Strengthened Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68 Rated
Output Cables	TUV 1×4.0mm² (+): 400mm , (-): 200mm or Customized Length

SPECIFICATIONS

Module Type	JKM605N-78HL4-BDV		JKM610N-78HL4-BDV		JKM615N-78HL4-BDV		JKM620N-78HL4-BDV		JKM625N-78HL4-BDV	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	605Wp	455Wp	610Wp	459Wp	615Wp	462Wp	620Wp	466Wp	625Wp	470Wp
Maximum Power Voltage (Vmp)	45.42V	42.23V	45.60V	42.35V	45.77V	42.46V	45.93V	42.57V	46.10V	42.68V
Maximum Power Current (Imp)	13.32A	10.77A	13.38A	10.83A	13.44A	10.89A	13.50A	10.95A	13.56A	11.01A
Open-circuit Voltage (Voc)	55.17V	52.41V	55.31V	52.54V	55.44V	52.66V	55.58V	52.79V	55.72V	52.93V
Short-circuit Current (Isc)	13.95A	11.26A	14.03A	11.33A	14.11A	11.39A	14.19A	11.46A	14.27A	11.52A
Module Efficiency STC (%)	21.64%		21.82%		22.00%		22.18%		22.36%	
Operating Temperature(℃)	-40℃~+85℃									
Maximum system voltage	1500VDC (IEC)									
Maximum series fuse rating	30A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.30%/℃									
Temperature coefficients of Voc	-0.25%/℃									
Temperature coefficients of Isc	0.046%/℃									
Nominal operating cell temperature (NOCT)	45±2℃									
Refer. Bifacial Factor	80±5%									

BIFACIAL OUTPUT-REARSIDE POWER GAIN

5%	Maximum Power (Pmax)	635Wp	641Wp	646Wp	651Wp	656Wp
	Module Efficiency STC (%)	22.73%	22.91%	23.10%	23.29%	23.48%
15%	Maximum Power (Pmax)	696Wp	702Wp	707Wp	713Wp	719Wp
	Module Efficiency STC (%)	24.89%	25.10%	25.30%	25.51%	25.71%
25%	Maximum Power (Pmax)	756Wp	763Wp	769Wp	775Wp	781Wp
	Module Efficiency STC (%)	27.05%	27.28%	27.50%	27.73%	27.95%

*STC: Irradiance 1000W/m² Cell Temperature 25°C AM=1.5

NOCT: Irradiance 800W/m² Ambient Temperature 20°C AM=1.5 Wind Speed 1m/s

SUNNY CENTRAL
2200 / 2475 / 2500-EV / 2750-EV / 3000-EV

SC-2200-10 / SC-2475-10 / SC-2500-EV-10 / SC-2750-EV-10 / SC-3000-EV-10

Efficient

- Up to 4 inverters can be transported in one standard shipping container
- Overdimensioning up to 225% is possible
- Full power at ambient temperatures of up to 35 °C

Robust

- Intelligent air cooling system OptiCool for efficient cooling
- Suitable for outdoor use in all climatic ambient conditions worldwide

Flexible

- Conforms to all known grid requirements worldwide
- Q on demand
- Available as a single device or turnkey solution, including medium-voltage block

Easy to Use

- Improved DC connection area
- Connection area for customer equipment
- Integrated voltage support for internal and external loads

SUNNY CENTRAL 2200 / 2475 / 2500-EV / 2750-EV / 3000-EV

The new Sunny Central: more power per cubic meter

With an output of up to 3000 kVA and system voltages of 1100 V DC or 1500 V DC, the SMA central inverter allows for more efficient system design and a reduction in specific costs for PV power plants. A separate voltage supply and additional space are available for the installation of customer equipment. True 1500 V technology and the intelligent cooling system OptiCool ensure smooth operation even in extreme ambient temperature as well as a long service life of 25 years.

SUNNY CENTRAL 1000 V

Technical Data	Sunny Central 2200	Sunny Central 2475*
Input (DC)		
MPP voltage range V_{DC} (at 25 °C / at 35 °C / at 50 °C)	570 to 950 V / 800 V / 800 V	638 V to 950 V / 800 V / 800 V
Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	545 V / 645 V	614 V / 714 V
Max. input voltage $V_{DC, max}$	1100 V	1100 V
Max. input current $I_{DC, max}$ (at 25°C / at 50°C)	3960 A / 3600 A	3960 A / 3600 A
Max. short-circuit current $I_{DC, sc}$	6400 A	6400 A
Number of DC inputs	24 double pole fused (32 single pole fused)	
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²	
Integrated zone monitoring	○	
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Output (AC)		
Nominal AC power at cos φ =1 (at 35°C / at 50°C)	2200 kVA / 2000 kVA	2475 kVA / 2250 kVA
Nominal AC power at cos φ =0.8 (at 35°C / at 50°C)	1760 kW / 1600 kW	1980 kW / 1800 kW
Nominal AC current $I_{AC, nom}$ = Max. output current $I_{AC, max}$	3300 A	3300 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range[1) 8)]	385 V / 308 V to 462 V	434 V / 347 V bis 521 V
AC power frequency / range	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz	
Min. short-circuit ratio at the AC terminals[9)]	> 2	
Power factor at rated power / displacement power factor adjustable[8) 10)]	● 1 / 0.8 overexcited to 0.8 underexcited ○ 1 / 0.0 overexcited to 0.0 underexcited	
Efficiency		
Max. efficiency[2)] / European efficiency[2)] / CEC efficiency[3)]	98.6% / 98.4% / 98.0%	98.6% / 98.4% / 98.0%
Protective Devices		
Input-side disconnection point	DC load break switch	
Output-side disconnection point	AC circuit breaker	
DC overvoltage protection	Surge arrester, type I	
AC overvoltage protection (optional)	Surge arrester, class I	
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III	
Ground-fault monitoring / remote ground-fault monitoring	○ / ○	
Insulation monitoring	○	
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP65 / IP34 / IP34	
General Data		
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (109.4 / 91.3 / 62.5 inch)	
Weight	< 3400 kg / < 7496 lb	
Self-consumption (max.[4)] / partial load[5)] / average[6)])	< 8100 W / < 1800 W / < 2000 W	
Self-consumption (standby)	< 300 W	
Internal auxiliary power supply	Integrated 8.4 kVA transformer	
Operating temperature range[8)]	−25°C to 60°C / −13°F to 140°F	
Noise emission[7)]	67.0 dB(A)	
Temperature range (standby)	−40°C to 60°C / −40°F to 140°F	
Temperature range (storage)	−40°C to 70°C / −40°F to 158°F	
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%	
Maximum operating altitude above MSL[8)] 1000 m / 2000 m / 3000 m / 4000 m	● / ○ / ○ / ○ (earlier temperature-dependent derating)	
Fresh air consumption	6500 m³/h	
Features		
DC connection	Terminal lug on each input (without fuse)	
AC connection	With busbar system (three busbars, one per line conductor)	
Communication	Ethernet, Modbus Master, Modbus Slave	
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ethernet (FO MM, Cat-5)	
Enclosure / roof color	RAL 9016 / RAL 7004	
Supply transformer for external loads	○ (2.5 kVA)	
Standards and directives complied with	CE, IEC / EN 62109-1, IEC / EN 62109-2, BDEW-MSRL, IEEE1547, UL 840 Cat. IV, Arrêté du 23/04/08	
EMC standards	IEC / EN 61000-6-4, IEC / EN 61000-6-2, EN 55022, IEC 62920, FCC Part 15 Class A, Cispr 11, DIN EN55011:2017	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001	
● Standard features ○ Optional * preliminary		
Type designation	SC-2200-10	SC-2475-10

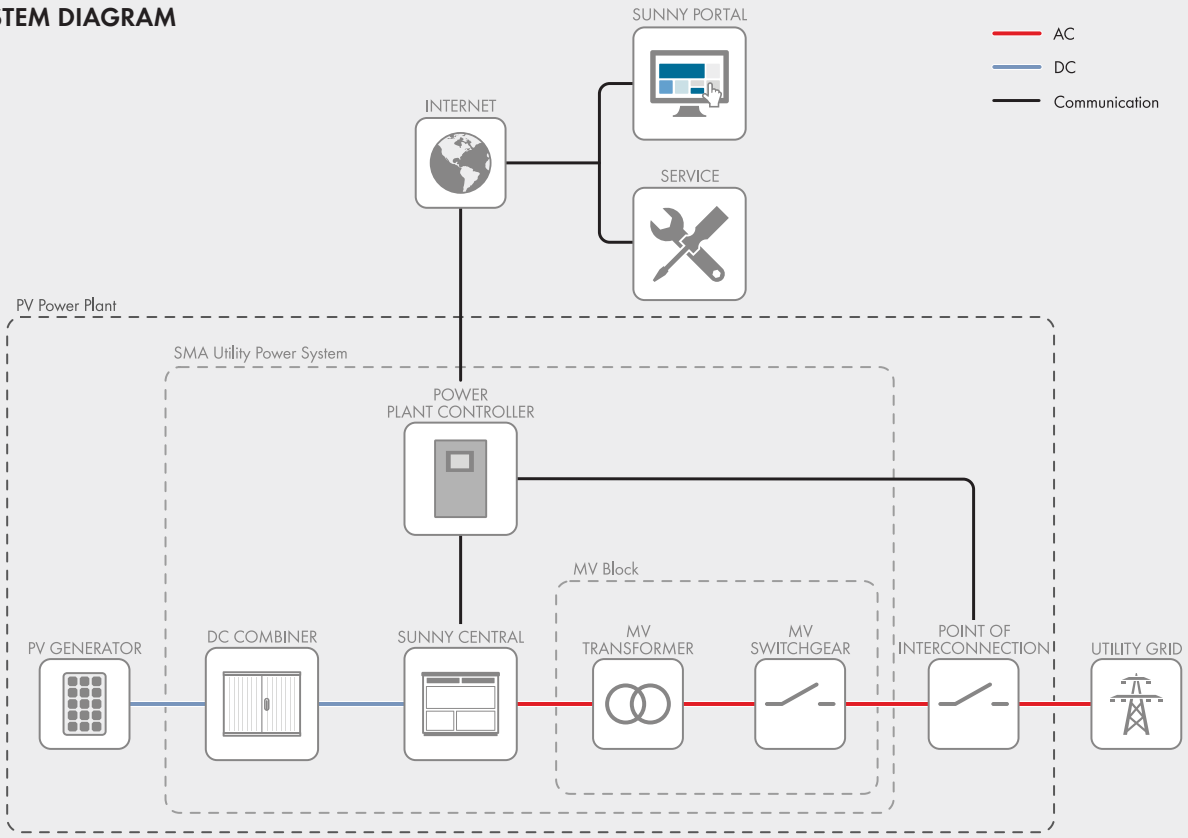
1) At nominal AC voltage, nominal AC power decreases in the same proportion
2) Efficiency measured without internal power supply
3) Efficiency measured with internal power supply
4) Self-consumption at rated operation
5) Self-consumption at < 75% Pn at 25°C
6) Self-consumption averaged out from 5% to 100% Pn at 25°C
7) Sound pressure level at a distance of 10 m
8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.
9) A short-circuit ratio of < 2 requires a special approval from SMA
10) Depending on the DC voltage

SUNNY CENTRAL 1500 V

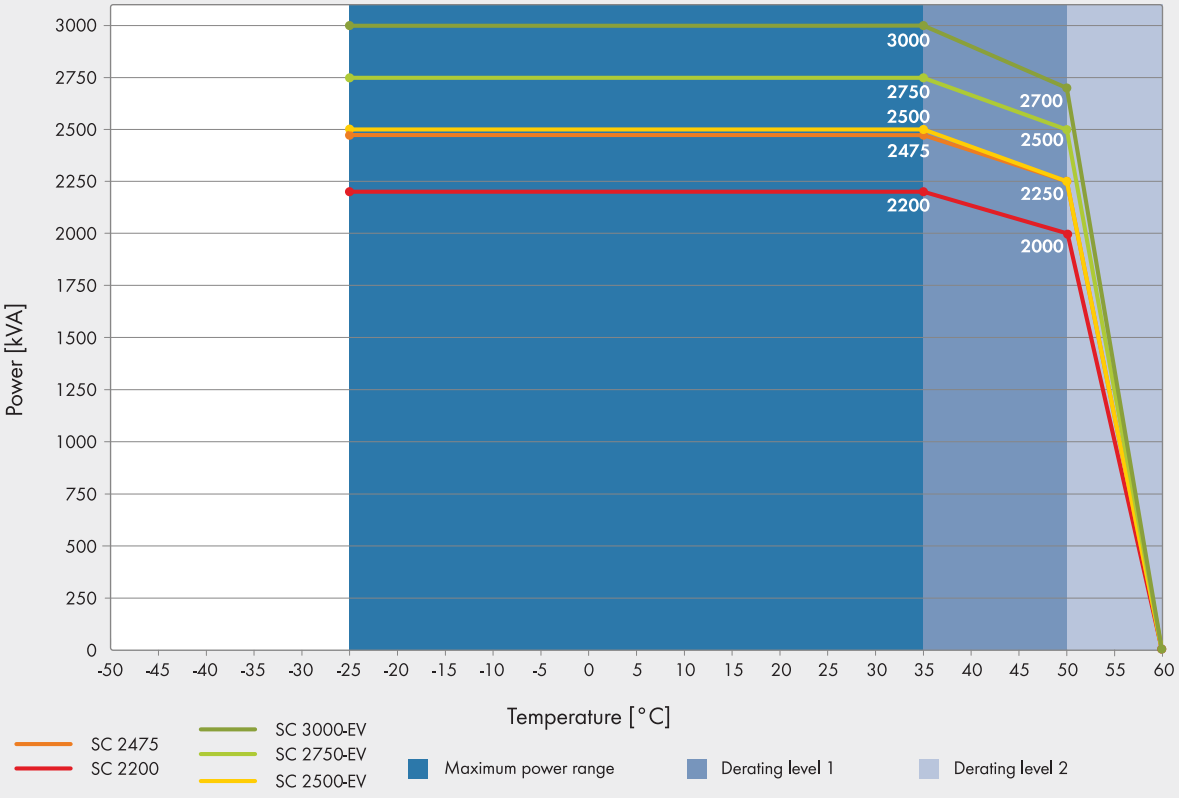
Technical Data	Sunny Central 2500-EV	Sunny Central 2750-EV	Sunny Central 3000-EV*
Input (DC)			
MPP voltage range V_{DC} (at 25°C / at 35°C / at 50°C)	850 V to 1425 V / 1200 V / 1200 V	875 V to 1425 V / 1200 V / 1200 V	956 V to 1425 V / 1200 V / 1200 V
Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	778 V / 928 V	849 V / 999 V	927 V / 1077 V
Max. input voltage $V_{DC, max}$	1500 V	1500 V	1500 V
Max. input current $I_{DC, max}$ (at 25°C / at 50°C)	3200 A / 2956 A	3200 A / 2956 A	3200 A / 2970 A
Max. short-circuit current rating	6400 A	6400 A	6400 A
Number of DC inputs	32	32	32
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²	2 x 800 kcmil, 2 x 400 mm²	2 x 800 kcmil, 2 x 400 mm²
Integrated zone monitoring	○	○	○
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A		
Output (AC)			
Nominal AC power at cos φ =1 (at 35°C / at 50°C)	2500 kVA / 2250 kVA	2750 kVA / 2500 kVA	3000 kVA / 2700 kVA
Nominal AC power at cos φ =0.8 (at 35°C / at 50°C)	2000 kW / 1800 kW	2200 kW / 2000 kW	2400 kW / 2160 kW
Nominal AC current $I_{AC, nom}$ = Max. output current $I_{AC, max}$	2624 A	2646 A	2624 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range[1) 8)]	550 V / 440 V to 660 V	600 V / 480 V to 690 V	655 V / 524 V to 721 V[9)]
AC power frequency	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz		
Min. short-circuit ratio at the AC terminals[10)]	> 2		
Power factor at rated power / displacement power factor adjustable[8) 11)]	● 1 / 0.8 overexcited to 0.8 underexcited ○ 1 / 0.0 overexcited to 0.0 underexcited		
Efficiency			
Max. efficiency[2)] / European efficiency[2)] / CEC efficiency[3)]	98.6% / 98.3% / 98.0%	98.7% / 98.5% / 98.5%	98.7% / 98.6% / 98.5%
Protective Devices			
Input-side disconnection point	DC load-break switch		
Output-side disconnection point	AC circuit breaker		
DC overvoltage protection	Surge arrester, type I		
AC overvoltage protection (optional)	Surge arrester, class I		
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III		
Ground-fault monitoring / remote ground-fault monitoring	○ / ○		
Insulation monitoring	○		
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP65 / IP34 / IP34		
General Data			
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (109.4 / 91.3 / 62.5 inch)		
Weight	< 3400 kg / < 7496 lb		
Self-consumption (max.[4)] / partial load[5)] / average[6)])	< 8100 W / < 1800 W / < 2000 W		
Self-consumption (standby)	< 370 W		
Internal auxiliary power supply	Integrated 8.4 kVA transformer		
Operating temperature range[8)]	–25 to 60°C / –13 to 140°F		
Noise emission[7)]	67.8 dB(A)		
Temperature range (standby)	–40 to 60°C / –40 to 140°F		
Temperature range (storage)	–40 to 70°C / –40 to 158°F		
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month / year) / 0 % to 95%		
Maximum operating altitude above MSL[8)] 1000 m / 2000 m / 3000 m	● / ○ / ○ (earlier temperature-dependent derating)		
Fresh air consumption	6500 m³/h		
Features			
DC connection	Terminal lug on each input (without fuse)		
AC connection	With busbar system (three busbars, one per line conductor)		
Communication	Ethernet, Modbus Master, Modbus Slave		
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ethernet (FO MM, Cat-5)		
Enclosure / roof color	RAL 9016 / RAL 7004		
Supply transformer for external loads	○ (2.5 kVA)		
Standards and directives complied with	CE, IEC / EN 62109-1, IEC / EN 62109-2, BDEW-MSRL, IEEE1547, Arrêté du 23/04/08		
EMC standards	CISPR 11, CISPR 22, EN55011:2017, EN 55022, IEC/EN 61000-6-4, IEC/EN 61000-6-2, IEC 62920, FCC Part 15 Class A	CISPR 11, CISPR 22, EN55011:2017, EN 55022, IEC 62920, FCC Part 15 Class A	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001		
● Standard features ○ Optional * preliminary			
Type designation	SC-2500-EV-10	SC-2750-EV-10	SC-3000-EV-10

1) At nominal AC voltage, nominal AC power decreases in the same proportion
2) Efficiency measured without internal power supply
3) Efficiency measured with internal power supply
4) Self-consumption at rated operation
5) Self-consumption at < 75% Pn at 25°C
6) Self-consumption averaged out from 5% to 100% Pn at 35°C
7) Sound pressure level at a distance of 10 m
8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.
9) AC voltage range can be extended to 753V for 50Hz grids only (option „Aux power supply: external" must be selected, option "housekeeping" not combinable).
10) A short-circuit ratio of < 2 requires a special approval from SMA
11) Depending on the DC voltage

SYSTEM DIAGRAM



TEMPERATURE BEHAVIOR (at 1000 m)



Robust
- Station and all individual components type-tested
- Optimally suited to extreme ambient conditions

Easy to Use
- Plug and play concept
- Walk-in control rooms
- Completely pre-assembled for easy set-up and commissioning

Cost-Effective
- Easy planning and installation
- Low transport costs due to 20-foot container

Flexible
- Global solution for international markets
- Numerous options
- Compatible with MVPS 4400 – MVPS 6000

MV POWER STATION 2200 / 2475 / 2500 / 2750 / 3000

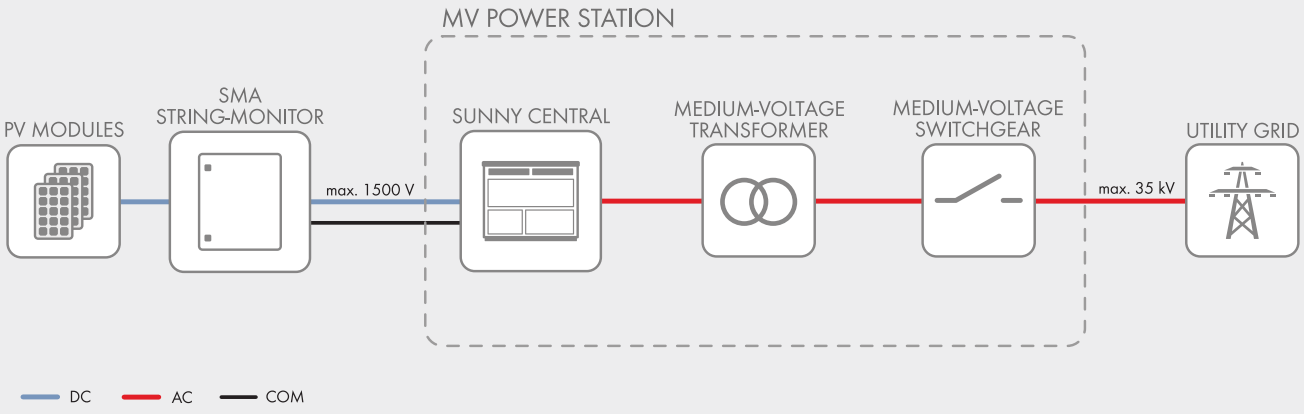
Turnkey Solution for PV Power Plants

With the power of the new robust central inverters, the Sunny Central or Sunny Central Storage, and with perfectly adapted medium-voltage components, the new MV Power Station offers even more power density and is a turnkey solution available worldwide. The solution is the ideal choice for new generation PV power plants operating at 1500 V_{DC}. Delivered pre-configured in a 20-foot container, the solution is easy to transport and quick to assemble and commission. The MVPS and all components are type-tested. The MV Power Station combines rigorous plant safety with maximum energy yield and minimized deployment and operating risk.

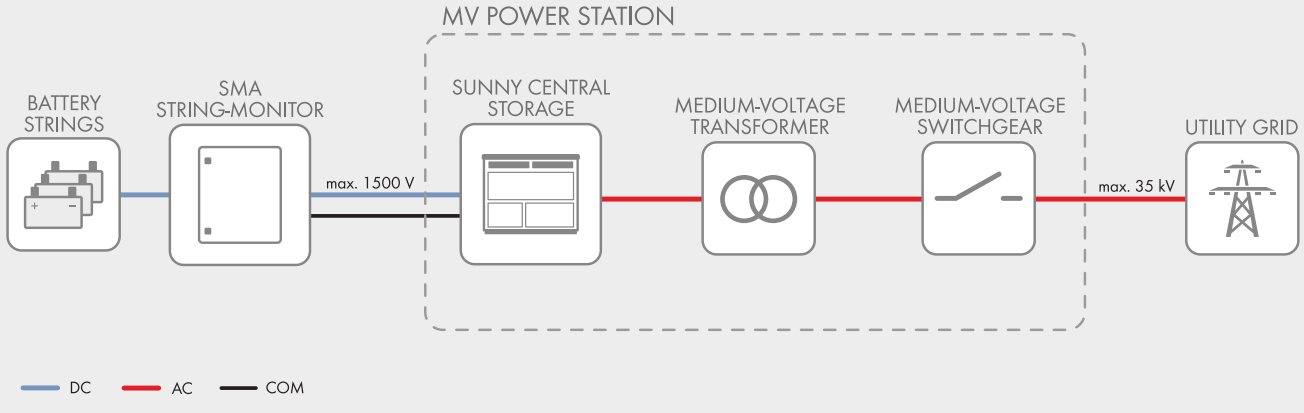
MV POWER STATION
2200 / 2475 / 2500 / 2750 / 3000

Technical Data	MV Power Station 2200
Input (DC)	
Available inverters	1 x SC 2200 or 1 x SCS 2200
Max. input voltage	1100 V
Max. input current	3960 A
Number of DC inputs	24 double pole fused (32 single pole fused)
Integrated zone monitoring	○
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A
Output (AC) on the medium-voltage side	
Standard power at 1000 m and cos φ = 1 (at 35 °C / at 40 °C / at 45 °C)[1]	2200 kVA / 2000 kVA / 0 kVA
Optionale power at 1000 m and cos φ = 1 (at 35 °C / at 50 °C / at 55 °C)[1]	2200 kVA / 2000 kVA / 0 kVA
Typical nominal AC voltages	6.6 kV to 35 kV
AC power frequency	50 Hz / 60 Hz
Transformer vector group Dy11 / YNd11	● / ○
Transformer cooling methods ONAN[2] / KNAN[2]	● / ○
Max. output current at 33 kV	39 A
Transformer no-load losses Standard / Ecodesign[3]	● / ○
Transformer short-circuit losses Standard / Ecodesign[3]	● / ○
Max. total harmonic distortion	< 3%
Reactive power feed-in	○ up to 60% of AC power
Power factor at rated power / displacement power factor adjustable	1 / 0.8 overexcited to 0.8 underexcited
Inverter efficiency	
Max. efficiency	98.6%
European efficiency	98.4%
CEC weighted efficiency[4]	98.0%
Protective devices	
Input-side disconnection point	DC load-break switch
Output-side disconnection point	Medium-voltage vacuum circuit breaker
DC overvoltage protection	Surge arrester type I
Galvanic isolation	●
Internal arc classification medium-voltage control room (according to IEC 62271-202)	IAC A 20 kA 1 s
General Data	
Dimensions of the 20-foot ISO container (W / H / D)[5]	6.058 m / 2.591 m / 2.438 m
Weight	< 16 t
Self-consumption (max. / partial load / average)[1]	< 8.1 kW / < 1.8 kW / < 2.0 kW
Self-consumption (stand-by)[1]	< 300 W
Degree of protection according to IEC 60529	Control rooms IP23D, inverter electronics IP65
Environment: standard / chemically active / dusty	● / ○ / ○
Degree of protection according to IEC 60721-3-4 (4C1, 4S2 / 4C2, 4S2 / 4C2, 4S4)	● / ○ / ○
Maximum permissible value for relative humidity	15% to 95%
Max. operating altitude above mean sea level 1000 m / 2000 m / 3000 m / 4000	● / ○ / ○ / ○ (earlier temperature-dependent de-rating)
Fresh air consumption of inverter and transformer	6500 m³/h
Features	
DC terminal	Terminal lug
AC connection	Outer-cone angle plug
Tap changer for MV-transformer: without / with	● / ○
Shield winding for MV-Transformer: without / with	● / ○
Communication package	○
Station enclosure color	RAL 7004
Transformer for external loads: without / 20 kVA / 30 kVA	● / ○ / ○
Medium-voltage switchgear: without / 2 feeders / 3 feeders 1 or 2 cable feeders with load-break switch, 1 transformer feeder with circuit breaker, internal arc classification IAC A FL 20 kA 1 s according to IEC 62271-200	● / ○ / ○
Accessories for medium-voltage switchgear: without / auxiliary contacts / motor for transformer feeder / cascade control / monitoring	● / ○ / ○ / ○ / ○
Oil containment	○
Industry standards (for other standards see the inverter datasheet)	IEC 62271-202, IEC 62271-200, IEC 60076 , CSC certificate, EN 50588-1
● Standard features ○ Optional features – Not available	
Type designation	MVPS-2200-20

System diagram with Sunny Central



System diagram with Sunny Central Storage



Technical Datasheet Medium Voltage Switchgear

1.	TYPE	:	Medium Voltage Switchgear **SD-SD-CB 40.5 kV**
2.	DESIGN	:	ORMAZABAL CGM.3 2lv 40.5 kV 2 cable feeders with **switch disconnector** and earthing switch 1 transformer feeder with vacuum **circuit breaker** including protection device, disconnector and earthing switch
3.	RATED VOLTAGE (Ur)	kV :	40.5
4.	GRID VOLTAGE (U_N)	kV :	34.5 or 35 or 36
5.	RATED POWER FREQUENCY WITHSTAND VOLTAGE (Ud)	kV :	70 or 95
6.	RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE (Up)	kV :	170 or 185
7.	RATED PEAK WITHSTAND CURRENT (Ip)	kA :	50 for Ik = 20 kA (standard) and 63 for Ik = 25 kA (option)
8.	RATED SHORT CIRCUIT MAKING CURRENT (Ima)	kA :	50 for Ik = 20 kA (standard) and 63 for Ik = 25 kA (option)
9.	RATED SHORT CIRCUIT BREAKING CURRENT (Isc)	kA :	20 for Ik = 20 kA (standard) and 25 for Ik = 25 kA (option) for CB
10.	RATED SHORT TIME WITHSTAND CURRENT (I_k)	kA :	20 for switchgears with t_k = 1 s (standard)
11.	RATED SHORT TIME WITHSTAND CURRENT (I_k)	kA :	20 with tk = 3 s or 25 with tk = 1 s (options)
12.	RATED CURRENT OF THE CABLE FEEDERS @ 40°C * (Ir)	A :	630
13.	RATED CURRENT OF THE CABLE FEEDERS @ 50°C * (Ir)	A :	540
14.	RATED CURRENT OF THE CABLE FEEDERS @ 55°C * (Ir)	A :	480
15.	RATED CURRENT OF THE CABLE FEEDERS @ 60°C * (Ir)	A :	430
16.	RATED FREQUENCY (fr)	Hz :	50 / 60
17.	INTERNAL ARC CLASSIFICATION	:	IAC A FL 20 kA 1 s according to IEC 62271-200
18.	INSULATING GAS	:	SF6
19.	DEGREE OF PROTECTION FOR GAS FILLED VESSEL	:	IP65 according to IEC 60529
20.	DEGREE OF PROTECTION FOR ENCLOSURE	:	IP2X according to IEC 60529
21.	MECHANICAL LIFETIME	:	M1 according to IEC 62271-100
22.	ELECTRICAL LIFETIME	:	E1 according to IEC 62271-100
23.	TRANSPORT CONDITIONS	:	Class 2M4 according to IEC 60721-3-2
24.	PROTECTION DEVICE FOR CIRCUIT BREAKER	:	Over current protection (ANSI 51 / 51N) Short circuit potection (ANSI 50 / 50N) Self powered relay via current transformers
25.	CERTIFICATES	:	Type tested according to IEC 62271-200
26.	CONNECTION INTERFACE OF THE CABLE FEEDERS	:	Outer cone bushings type C
27.	STANDARD ACCESSORIES	:	Gas pressure gauge / indicator Capacitive voltage detective system for every feeder Switch levers 3 cable clamps per cable feeder, diameter 36 - 52 mm
31.	OPTION 1: AUXILIARY CONTACTS	:	Auxiliary contacts for the switches in the cable feeders and in the transformer feeder Circuit breaker 2 normally open / 2 normally closed contacts Switch disconnectors 2 normally open / 2 normally closed contacts Earthing switches 1 normally open / 1 normally closed contact
32.	OPTION 2: REMOTE CONTROL	:	Motor drive for the circuit breaker, DC 24 V including auxiliary contacts for the switches

All technical data are subjected to change at any time without notice. SMA assumes no liability for typographical or other errors.

* Maximum ambient temperature of the MV switchgear. The 24 hour mean value is max. 35°C according to IEC 62271-1.
Please note the temperature rise of +10°C inside the MV Power Station in comparison to the outside ambient temperature.

DC-CMB-U10-16 / DC-CMB-U10-24 / DC-CMB-U10-32 /
DC-CMB-U15-16 / DC-CMB-U15-24 / DC-CMB-U15-32

Robust

- Stable housing made of glass-fiber-reinforced polyester
- Indoor and outdoor installation possible thanks to IP54 degree of protection

- Can be operated at ambient temperatures of –25°C to 60°C and at altitudes of up to 4000 m above MSL

Easy to Use

- Easy to install thanks to its compact structure and low weight
- Integrated DC load-break switch for ultra-high safety

Versatile

- For PV array voltages of 1000 V and 1500 V
- Collection and safeguarding of 16, 24 or 32 strings for flexibility during the system design phase

SMA STRING-COMBINER

For safe collection of all strings in the PV field

The boxes can be installed quickly, safely and easily both indoors and outdoors thanks to their compact dimensions, while their robust enclosure guarantees durability and reliable safety in the PV field. The SMA String-Combiners with 24 and 32 string inlets are fitted with two cable outlets per pole as standard and cover – just like the Combiner with 16 string inlets – a sealing range of 17 to 38.5 millimeters. Cables with cross-sections of 70 to 400 mm² can be inserted.

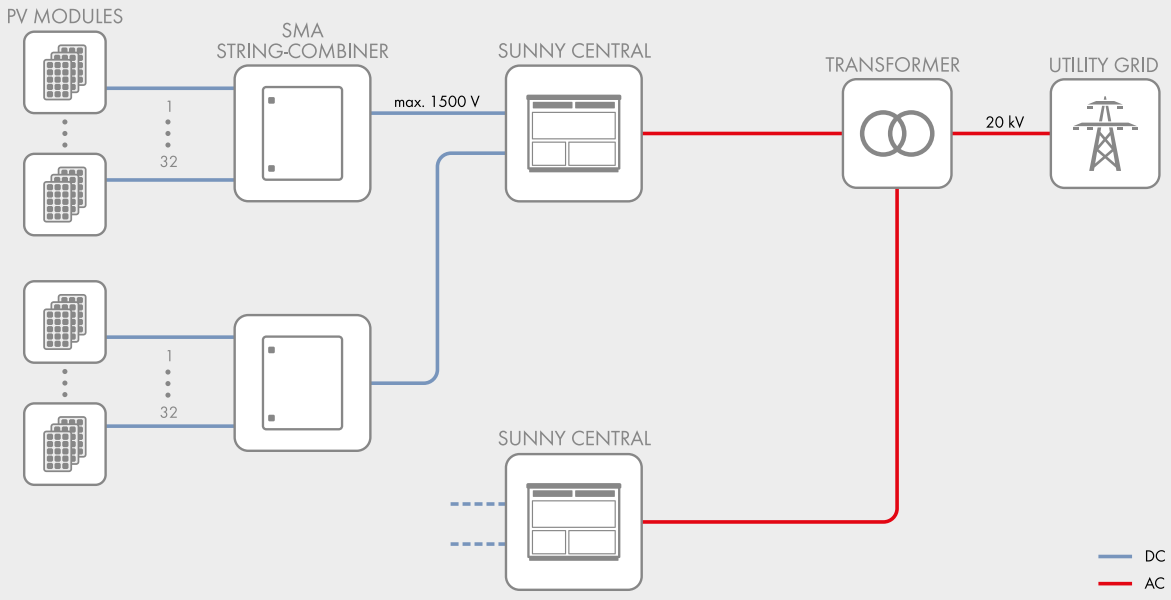
SMA STRING-COMBINER for 1000 V_{DC} systems

Technical Data	DC-CMB-U10-16	DC-CMB-U10-24	DC-CMB-U10-32
Input (DC)			
Rated voltage	1000 V	1000 V	1000 V
Altitude derating (rated voltage)	2001 m to 3000 m above MSL = reduction by 1.0% per 100 m 3001 m to 4000 m above MSL = reduction by 1.2% per 100 m		
Number of string inputs / fuse holders per pole	16	24	32
Rated current	13.75 A	12.5 A	12.5 A
Fuse type*	10.3 x 38 - 1000 VDC - gPV		
String connection	Connection to the fuse holder		
Sealing range of cable gland	5 mm to 8 mm		
Output (DC)			
Rated current	220 A	300 A	360 A
Temperature derating (rated current)	>50°C operating temperature = reduction by 1% per K		
DC switch (load-break switch)	250 A / 1000 V	400 A / 1000 V	400 A / 1000 V
Surge arrester	Type 2, In = 15 kA; Imax = 40 kA		
DC output	Busbar (ring terminal lug M12)		
Number of DC outputs	1	1 / 2	1 / 2
Conductor cross-section	Busbar 70 mm² to 400 mm²		
Sealing range of cable glands	17 mm to 38.5 mm	17 mm to 38.5 mm	17 mm to 38.5 mm
Enclosure / Ambient Parameters			
IP degree of protection according to IEC 60529	IP 54 / self-ventilated	IP 54 / self-ventilated	IP 54 / self-ventilated
Enclosure material	Glass-fiber reinforced plastic / UV-resistant		
Dimensions (W / H / D), wall mounting bracket and string cable harness included	550 / 650 / 260 mm (21.65 / 25.59 / 10.24 inch)		590 / 790 / 285 mm (23.23 / 31.10 / 11.22 inch)
Max. weight	24.2 kg (53.5 lb)	27.4 kg (60.5 lb)	34 kg (75 lb)
Protection class (according to IEC 61140)	II	II	II
Mounting type	Wall mounting		
Ambient temperature in operation / during storage	–25°C to +60°C / –40°C to +70°C		
Relative humidity	0% to 95%, non-condensing		
Max. altitude above MSL	4000 m	4000 m	4000 m
Standards			
Compliance	CE, IEC 61439-1, IEC 61439-2		
* accessory required			

SMA STRING-COMBINER for 1500 V_{DC} systems

Technical Data	DC-CMB-U15-16	DC-CMB-U15-24	DC-CMB-U15-32
Input (DC)			
Rated voltage	1500 V	1500 V	1500 V
Altitude derating (rated voltage)	2001 m to 3000 m above MSL = reduction by 1.0% per 100 m 3001 m to 4000 m above MSL = reduction by 1.2% per 100 m		
Number of string inputs / fuse holders per pole	16	24	32
Rated current	17.2 A	13.75 A	10.31 A
Fuse type*	10.3 x 85 - 1500 VDC - gPV		
String connection	Connection to the fuse holder		
Sealing range of cable gland	5 mm to 8 mm		
Output (DC)			
Rated current	275 A	330 A	330 A
Temperature derating (rated current)	>50°C operating temperature = reduction by 1% per K		
DC switch (load-break switch)	400 A / 1500 V	400 A / 1500 V	400 A / 1500 V
Surge arrester	Type 2, In = 15 kA; Imax = 40 kA		
DC output	Busbar (ring terminal lug M12)		
Number of DC outputs	1	1 / 2	1 / 2
Conductor cross-section	Busbar 70 mm² to 400 mm²		
Sealing range of cable glands	17 mm to 38.5 mm	17 mm to 38.5 mm	17 mm to 38.5 mm
Enclosure / Ambient Parameters			
IP degree of protection according to IEC 60529	IP 54 / self-ventilated	IP 54 / self-ventilated	IP 54 / self-ventilated
Enclosure material	Glass-fiber reinforced plastic / UV-resistant		
Dimensions (W / H / D), wall mounting bracket and string cable harness included	550 / 650 / 260 mm (21.65 / 25.59 / 10.24 inch)		590 / 790 / 285 mm (23.23 / 31.10 / 11.22 inch)
Max. weight	25 kg (55 lb)	28 kg (62 lb)	40 kg (88 lb)
Protection class (according to IEC 61140)	II	II	II
Mounting type	Wall mounting		
Ambient temperature in operation / during storage	-25°C to +60°C / -40°C to +70°C		
Relative humidity	0% to 95%, non-condensing		
Max. altitude above MSL	4000 m	4000 m	4000 m
Standards			
Compliance	CE, IEC 61439-1, IEC 61439-2		
* accessory required			

SYSTEM EXAMPLE



iTracker XL: engineered for safety

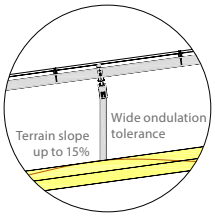
iTracker XL can host up to 120 large PV modules, protecting them from aeroelastic instabilities thanks to its innovative multi-drive system

soltigua™
solar tracking since 2007

iTracker XL
Larger Tracker - Better Solutions

Leading-edge tracking algorithm

- Three-dimensional backtracking for each individual tracker
- Maximised collection of diffused radiation during cloudy periods



Terrain adaptability

- Maximum flexibility for complex borders and ondulated terrains
- North South slopes up to 15%

Facilitated O&M

- Proprietary NFC app to support fast commissioning and seamless O&M
- Large corridors facilitate cleaning operations

Optimised for bifacial and agrivoltaics

- Gap between modules minimises shadow from torque tube
- Flexible height to meet the most demanding agrivoltaic needs

Sub-1GHz

Unique wireless system

- Low power consumption and long life batteries (up to 5+ days of autonomy)
- Long range communication

Ease of installation

- Fewer foundation piles per MW minimise ramming time
- Facilitated installation of PV modules to avoid height risks

Wind resilience

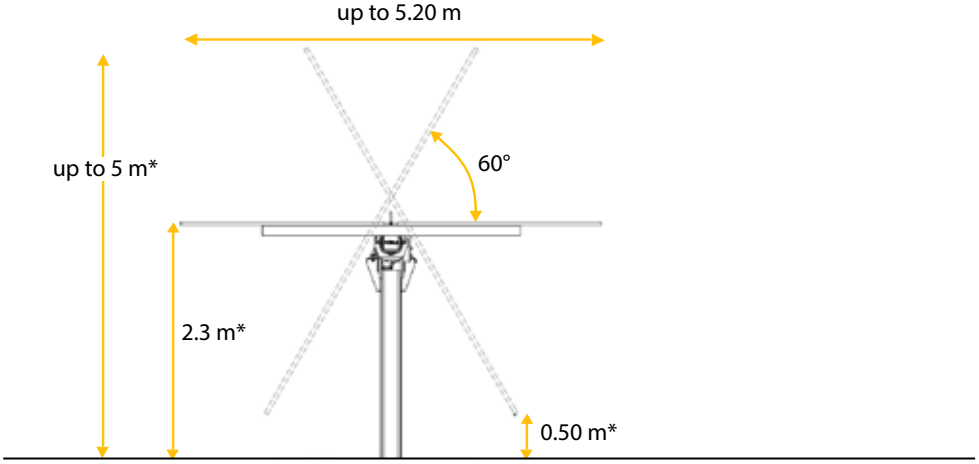
- Multi-drive blocks protect against dynamic instability
- Locked-in horizontal stowing minimises stress on foundations

Certified quality

- Certified according to ISO 9001/14001/45001
- CE marked according to the Machinery Directive 2006/42/UE

Technical features

Tracking type	Independent single axis horizontal tracker Any tracker alignment possible (ideally along North-South direction)
Tracking algorithm	Accurate astronomical formulas; tracking precision = 1.0°. Individually customized 3D backtracking to follow terrain undulations
Rotation range	±60°
Ground cover ratio	Freely configurable by customer (between 34% and 50%)
PV Module compatibility	Framed modules; all major brands
Module mount	2 modules portrait
Drive system	independent motor serving a multidrive system for each tracker
Peak power per tracker	Up to 71 kWp per tracker (with 550Wp modules)
N° of Module per tracker	Up to 120 modules (1500 V)
PV array voltage	1000 V or 1500 V
Power supply	Self powered with dedicated small PV module and Li-$FePO_4$ battery
Communication	Soltigua wireless radio network
Monitoring	Local control via SCADA; remote control available
Foundation type	Standard: driven piles
Wind resistance (Eurocodes)	In operation: up to 70 km/h in any position Stow position: up to 160 km/h in stow position
Snow resistance	Up to 1'500 N/m^2; depending on tracker version
Tracker stowing time	≤ 6 min; 3.5 min on average
Installation tolerances	North South: ±40 mm East-West: ±25 mm standard pile; ±25 mm drive pile Height tolerance: ±40 mm Pile tilt: ±1° Twist: ±7,5°
Ground slope	Max 15% slope in longitudinal direction (North- South) Any slope in transversal direction (East-West) [max 70% local slope for rotation clearance] Local deviation from theoretical ground profile is ±150 mm
Installation method	Engineered for fast and easy assembly; no welding nor drilling required on site
Materials	HDG, Z and ZM construction steel; maintenance free bearings; triennial maintenance for slew drive
Certifications/Compliance	CE 2006/42/UE; Eurocodes EN1991-1-1/3/4; LV 2014/35/UE; EMC 2014/30/UE ; ISO 9001-2015; ISO 14001-2015 and ISO 45001-2018
Warranty	Structure: 10 years Drive batteries and electronics: 5 years Corrosion: 30 years in C2 atmospheric environment Warranty extension available
Earthing	The rotating structure is connected to the ground through its drive pile; PV module frames are connected to the rotating structure with n.1 star washer for each module



*= reference dimensions - can change based on PV module dimensions and on project specs

soltigua™
solar tracking since 2007

Via Roma, 54 - 47035 Gambettola (FC) - Italy
Tel. +39 0547 52600 - Fax +39 0547 52756
sales@soltigua.com - www.soltigua.com

RG16H1R12-1,8/3 kV ÷ 26/45 kV
RG16H1OR12-1,8/3 kV ÷ 26/45 kV

Costruzione, requisiti elettrici, fisici e meccanici:	CEI 20-13
	CEI 20-66
	IEC 60502
Misura delle scariche parziali:	CEI 20-16
	IEC 60885-3

REAZIONE AL FUOCO

CONFORME CPR
REGOLAMENTO 305/2011/UE

Norma:	EN 50575:2014+A1:2016
Classe:	E_{ca}
Classificazione:	EN 13501-6
Propagazione della fiamma:	EN 60332-1-2
Organismo Notificato:	0051 - IMQ
CE	2021

RG16H1R12 / Descrizione

- Cavi unipolari isolati in gomma HEPR di qualità G16, sotto guaina di PVC.
- Conduttore: rame rosso, formazione rigida compatta, classe 2
- Strato semiconduttore: estruso (solo cavi Uo/U ≥ 6/10 kV)
- Isolamento: gomma HEPR, qualità G16 senza piombo
- Strato semiconduttore: estruso, pelabile a freddo (solo cavi Uo/U ≥ 6/10 kV)
- Schermo: fili di rame rosso con nastro di rame in controspirale
- Guaina: mescola a base di PVC, qualità R12
- Colore: rosso

N.B. Il cavo può essere fornito nella versione tripolare riunito ad elica visibile. In tal caso la sigla di designazione diventa RG16H1R12X seguita dalla tensione nominale di esercizio.

RG16H1OR12 / Descrizione

- Cavi tripolari isolati in gomma HEPR di qualità G16, sotto guaina di PVC.
- Conduttore: rame rosso, formazione rigida compatta, classe 2
- Strato semiconduttore: estruso (solo cavi Uo/U ≥ 6/10 kV)
- Isolamento: gomma HEPR, qualità G16 senza piombo
- Strato semiconduttore: estruso, pelabile a freddo (solo cavi Uo/U ≥ 6/10 kV)
- Schermo: fili di rame rosso con nastro di rame in controspirale
- Identificazione fasi: fili o nastrini colorati
- Riempitivo: estruso penetrante tra le anime
- Guaina: mescola a base di PVC, qualità R12
- Colore: rosso

Caratteristiche particolari

Buona resistenza ai raggi UV.
(ISO 4892-2:2013 / IEC 60811-501:2012 / 1000h)

Caratteristiche funzionali

- Tensione nominale di esercizio Uo/U: 1,8/3 ÷ 26/45 kV
- Temperatura massima di esercizio: 90°C
- Temperatura minima di esercizio: -15°C (in assenza di sollecitazioni meccaniche)
- Temperatura massima di corto circuito: 250°C

Condizioni di posa

- Temperatura minima di posa: 0°C
- Raggio minimo di curvatura consigliato: 14 volte il diametro del cavo
- Massimo sforzo di trazione consigliato: 60 N/mm^2 di sezione del rame

Impiego e tipo di posa

Adatto per il trasporto di energia tra le cabine di trasformazione e le grandi utenze. Per posa in aria libera, in tubo o canale.
Ammessa la posa interrata anche non protetta, in conformità all'art. 4.3.11 della norma CEI 11-17.

Riferimento Regolamento Prodotti da Costruzione 305/2011/UE e Norma EN 50575:
Il cavo è adatto per l'alimentazione di energia elettrica nelle costruzioni ed altre opere di ingegneria civile.

Marcatura

Pb free [Ditta] RG16H1(O)R12 [tens. nominale] [form.] Eca [anno] [ordine] (logo CE) [metrica]

RG16H1R12 - 26/45 kV
Uo/U: 26/45 kV
U max: 52 kV

Caratteristiche tecniche

Formazione	Ø indicativo conduttore	Spessore medio isolante	Ø esterno indicativo	Peso indicativo cavo	Portata di corrente A			
					in aria		interrato*	
n° x mm^2	mm	mm	mm	kg/km	a trifoglio	in piano	a trifoglio	in piano
1 x 50	8,1	10,3	37,7	1910	225	250	205	212
1 x 70	9,7	10,3	39,3	2190	280	315	255	260
1 x 95	11,4	10,3	41,2	2540	340	380	300	310
1 x 120	12,9	10,0	42,2	2805	395	440	355	365
1 x 150	14,3	9,5	42,8	3080	445	495	385	395
1 x 185	16,0	9,3	44,3	3465	510	570	440	450
1 x 240	18,3	9,3	46,9	4160	600	665	510	520
1 x 300	21,0	9,0	49,2	4875	695	760	570	580
1 x 400	23,2	9,0	51,8	5782	800	875	650	655
1 x 500	26,1	9,0	55,3	7000	930	1010	735	740
1 x 630	30,3	9,0	59,3	8355	1070	1180	835	845

(*) I valori di portata si riferiscono alle seguenti condizioni:
- Resistività termica del terreno: 1 K·m/W
- Temperatura ambiente 20°C
- profindità di posa: 0,8 m

Caratteristiche elettriche

Formazione	Resistenza elettrica a 20°C	Resistenza apparente a 90°C e 50Hz Ω/km		Reattanza di fase Ω/Km		Capacità a 50Hz
n° x mm^2	Ω/Km	a trifoglio	in piano	a trifoglio	in piano	µF/km
1 x 50	0,387	0,494	0,494	0,15	0,20	0,15
1 x 70	0,268	0,342	0,342	0,15	0,21	0,15
1 x 95	0,193	0,246	0,246	0,14	0,20	0,16
1 x 120	0,153	0,196	0,196	0,14	0,20	0,18
1 x 150	0,124	0,159	0,158	0,13	0,19	0,20
1 x 185	0,0991	0,128	0,127	0,13	0,19	0,21
1 x 240	0,0754	0,0985	0,0972	0,12	0,18	0,23
1 x 300	0,0601	0,0797	0,0779	0,12	0,18	0,26
1 x 400	0,0470	0,0638	0,0616	0,11	0,17	0,28
1 x 500	0,0366	0,0517	0,0489	0,11	0,17	0,31
1 x 630	0,0283	0,0425	0,0389	0,10	0,16	0,34

RG7H1RFR EPRO-SETTE™

Unipolare da 1,8/3 kV a 26/45 kV
Single core from 1,8/3 kV to 26/45 kV

Norma di riferimento
CEI 20-13 (IEC 60840 per 26/45 kV)

Descrizione del cavo
Anima
Conduttore a corda a fili di rame in accordo alla norma CEI 20-29, classe 2
Semiconduttivo interno
Elastomerico estruso
(solo per cavi con tensione ≥ 3,6/6 kV)
Isolante
Mescola di gomma ad alto modulo G7
Semiconduttivo esterno
Elastomerico estruso (solo per cavi con tensione ≥ 3,6/6 kV) pelabile a freddo
Schermo metallico
Fili di rame e nastro equalizzatore di rame
Guaina di separazione
Mescola PVC
Armatura
Fili di alluminio
Guaina esterna
Mescola PVC, colore rosso
Marcatura
PRYSMIAN (*) RG7H1RFR <tensione> <sezione> <anno>

(*) Sito produttivo

Marcatura in rilievo ogni metro
Marcatura metrica progressiva ad inchiostro

Applicazioni
I cavi possono essere forniti con caratteristiche di:
- non propagazione dell'incendio e ridotta emissione di sostanze corrosive
- ridottissima emissione di fumi opachi e gas tossici e assenza di gas corrosivi (AFUMEX).

Standard
CEI 20-13 (IEC 60840 for 26/45 kV)

Cable design
Core
Conductor: annealed stranded copper wires, according to IEC 60228, class 2
Inner semi-conducting layer
Extruded elastomeric compound (only for rated voltage ≥ 3,6/6 kV)
Insulation
High module rubber compound, G7 type
Outer semi-conducting layer
Extruded cold strippable elastomeric compound (only for rated voltage ≥ 3,6/6 kV)
Metallic screen
Copper tapes
Separation sheath
PVC compound
Armour
Aluminium wires
Over sheath
PVC compound, red colour
Marking
PRYSMIAN (*) RG7H1RFR <rated voltage> <cross-section> <year>

(*) Plant of production

Embossed marking each meter
Meter marking by ink

Applications
Cables can be supplied with the following characteristics:
- *fire retardant and with low emission of corrosive substances*
- *low emission of opaque smoke and toxic gases and without corrosive gases (AFUMEX).*

TEMPERATURA FUNZIONAMENTO / *OPERATING TEMPERATURE*: 90°C
TEMPERATURA CORTOCIRCUITO / *SHORT-CIRCUIT TEMPERATURE*: 250°C
CEI 20-35 EN 60332
RIGIDO / *RIGID*

Condizioni di posa / *Laying conditions*

TEMPERATURA MIN. DI POSA 0 °C / *MINIMUM INSTALLATION TEMPERATURE 0 °C*
CANALE INTERRATO / *BURIED TROUGH*
TUBO INTERRATO / *BURIED DUCT*
ARIA LIBERA / *OPEN AIR*
DIRETTAMENTE INTERRATO / *DIRECTLY BURIED*

RG7H1RFR EPRO-SETTE™

Unipolare da 1,8/3 kV a 26/45 kV
Single core from 1,8/3 kV to 26/45 kV

Unipolare - conduttore di rame / *Single core - copper conductor* - RG7H1RFR

sezione nominale	diametro indicativo conduttore	spessore isolante	diametro esterno massimo	peso indicativo del cavo	raggio minimo di curvatura
conductor cross-section	*approximate conductor diameter*	*insulation thickness*	*maximum outer diameter*	*approximate weight*	*minimum bending radius*
(mm²)	(mm)	(mm)	(mm)	(kg/km)	(mm)

sezione nominale	posa in aria a trifoglio	posa interrata a trifoglio p= 1° C m/w
conductor cross-section	*open air installation trefoil*	*underground installation trefoil p= 1° C m/w*
(mm²)	(A)	(A)

Dati costruttivi / *Construction charact.* - 18/30 kV

50	8,1	8,0	41,2	2060	550
70	9,8	8,0	43,0	2350	580
95	11,4	8,0	44,8	2710	610
120	12,9	8,0	46,6	3040	620
150	14,2	8,0	49,6	3570	660
185	15,8	8,0	51,2	4110	690
240	18,2	8,0	54,4	4760	730
300	20,5	8,0	57,3	5530	770
400	22,9	8,0	60,3	6500	800
500	26,2	8,0	63,9	7750	860
630	30,0	8,0	68,9	9500	940

Caratt. elettriche / *Electrical charact.* - 18/30 kV

50	235	212
70	292	259
95	352	380
120	402	348
150	451	383
185	510	427
240	590	484
300	663	534
400	745	589
500	836	646
630	930	701

Dati costruttivi / *Construction charact.* - 26/45 kV

70	9,8	10,0	48,5	2860	650
95	11,4	10,0	50,3	3240	680
120	12,9	10,0	51,9	3580	690
150	14,2	9,0	51,3	3720	690
185	15,8	9,0	53,2	4190	720
240	18,2	9,0	56,1	4910	750
300	20,5	9,0	59,0	5680	790
400	22,9	9,0	61,9	6670	830
500	26,2	9,0	65,5	7940	870
630	30,0	9,0	70,1	9630	940

Caratt. elettriche / *Electrical charact.* - 26/45 kV

70	291	256
95	351	304
120	401	343
150	451	382
185	510	426
240	591	484
300	665	535
400	747	590
500	839	647
630	934	702