

SMA Solar Technology Portfolio Overview

IBC Solar Webinar, August 2024

SMA

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Who is Presenting?



Niël Lambrechts – Head of Sales

Southern and East African region Based in Cape Town, best way to reach me is via email: <u>Daniël.Lambrechts@sma-</u>solar.com

Ayanda Langa – Application & Sales Engineer

Responsible for all home, C&I segment portfolio. Primary function is in assisting customers during their initial project design phase. Based in Cape Town, best way to reach me is via email: <u>Ayanda.langa@sma-solar.com</u>

Jason Bruce-Brand – Key Account Manager- Project Sales

Responsible for project sales in respect of SMA's large-scale PV & BESS segment in SEA. For projects >1 MW reach out to me via email: <u>Jason.Bruce-Brand@sma-solar.com</u>

Please make sure to use the chat function for any questions during the webinar. SMA Solar Technology



Agenda



- About SMA **Portfolio, facts & figures**
- Sneak Peak
- New products for South African market
 - Home, C&I Solutions: The Sunny Tripower
- Sunny Boy, STP, CORE1 & CORE2, Sunny Islands
- Monitoring & Control
- Zero Export & Hybrid Control
- SMA Service
- OSC, Sunny Portal, Sunny Design Demo
- Medium Voltage/Large Scale application
- Peak 3 Inverter, MVPS/Storage & PPM





Pioneering renewable energy. Since 1981.







No.



Solution State S

PATENTS

INNOVATE

>4500

>1600

EMPLOYEES WORLDWIDE MOVE FORWARD THE GLOBAL ENERGY TRANSITION WITH OUR PARTNERS AND CUSTOMERS

ARE TESTAMENT TO OUR POWER TO

SMA

OCIS

> 50 ^D

DIFFERENT NATIONALITIES GET INVOLVED FOR DIVERSITY, INCLUSION AND EQUAL OPPORTINUTIY



SALES GUIDANCE GUIDANCE FOR 2024: 1,5 BIO. EUR H1 2024 SALES OF 759,3 MIO. EURO EBITDA H1 2024: 80,6 MIO. EURO

Pole-position in sustainability management – SMA is among the 10 most sustainable companies in the world!



Nominated for the German Sustainability Award 2024



GLOBAL100 **Excellent ESG Ratings** SUSTAINALYTICS +CDP Corporate ESG o Meminpher company Performance MSCI DISCLOSER ecovadis RATED 2021 Prime Climate Change: B-Bewertungsskala A bis D-Our business activities contribute to 9 of the 17 "UN Sustainable Development Goals"



We see strong growth in all markets addressed by SMA – hence, our strategy is aimed at this





8

With our innovations we connect **all** sectors of the energy market – and actively shape the energy transition





The future belongs to renewable energies, when we understand them as being interlinked and holistically – such as SMA does





With the SMA Strategy 2025 we have aligned our activities to shape the global energy transition. As a sustainable energy transition company and strong brand. With customer-centric solutions for each segment.



SMA Portfolio Overview

Our portfolio spans from 1.5kW to 4.6MW solutions





Curated for Southern Africa







Agenda



About SMA **Portfolio, facts & figures**

Sneak Peak

New products for South African market

Home, C&I Solutions: The Sunny Tripower Sunny Boy, STP, CORE1 & CORE2, Sunny Islands

Monitoring & Control Zero Export & Hybrid Control

- SMA Service
- OSC, Sunny Portal, Sunny Design Demo
- Medium Voltage/Large Scale application Peak 3 Inverter, MVPS/Storage & PPM



Sneak Peak

(into products reaching South African shores in 2024/5)

Sunny Boy Smart Energy







...

- Smart Energy: 1 phase Hybrid Inverter Platform with
 3.6, 4.0, 5.0, 6.0 kVA and integrated HV Battery Connection
- Connectivity: Reaching from LAN, WLAN via cellular to option slots (add-on piggy backs) for future connectivity needs or partner specific interfaces while keeping traditional standard I/Os available.
- Software: Frontend with dedicated User Interfaces / Apps for each customer group and deployment capability to serve as the hub for Software Products
- Accessories: Boxes for different Backup Options, cellular, Energy Meter(s), SPD's

Sunny Boy Smart Energy

Product models

- Power classes: 3.6, 4.0, 5.0, 6.0 kVA / 1-phase
- 3 independent MPP trackers with SMA ShadeFix
- Compatible to High voltage Batteries of leading Battery Manufacturers
- 10 years standard warranty, extendable to 15 and 20 years
- Made in Germany

Key features

- Hybrid PV and/or Battery inverter, light weight: 16,5kg
- New installation concept with only one screw for fastening
- Performance: ShadeFix optimization / intelligent string monitoring / I-V curve tracing
- Safety and compliance: ArcFix (AFCI)

New Accessories

 Secure Power Supply, Full Home Backup*, Monitored DC SPD, 1-phase Energy meter, IO-Module

Target applications

New, adding-on and repowering PV/Storage/Backup systems





Powered by ennexOS

Preview: SMA eCharger Successor of SMA EV Charger 7.4/22

- Extensive market access (MOW) 1.38kW to 22kW 1N & 3N connetion
- EVC stand-alone support
- Integrated display
- RFID authentication
- State-of-the-Art vehicle communication (IEC 61851, ISO 15118)
- LED ambient light for best illumination even at night
- New SMA design language
- Accessories: Charging cables (5,0 | 7,5 | 10,0 m), Cable holder, stele/pedestal, charging card





Preview: SMA eCharger The key to a cross-segment charging solution

- Billing of charging processes via OCPP interface ٠ including connection to the SMA eMobility Portal
- LTE/Cellular Modem as order option ٠
- Integrated System Manager ٠ interesting business cases in the field of retrofitting
- "Eichrechtskonformität" on PCBA level without cost-intensive additional energy meter
- AC-bidi ready Hardware ٠







Sneak Peak 2: SMA Commercial Storage New Sunny Island





Sunny Island

> Power class 4 – 250 kW_{AC} is covered with the Sunny Island + MC 6 / 12 / 36

> Power class >1500 kW_{AC} is covered with the Sunny Central Storage





Sneak Peak 2: SMA Commercial Storage Sunny Island



- Integrated System Manager: Energy Management and Monitoring in On-Grid systems up to 10 devices without additional SMA Data Manager M
- Transformerless grid connection at 400V/50Hz
- Wide temperature range: No derating below 45°C and still more then 90% of nominal power at 60°C ambient temperature
- Off-Grid systems up to 800kW: With a pre-wired SI X Connection Boxes. Bigger systems are possible, they will be project specific.
- **Broad battery connectivity:** BMS communication via Modbus TCP & CAN-Bus & integrated DC-DC-converter with wide voltage range for integration of approved 3rd party batteries
- Both Li Ion and Lead Acid batteries supported.
- **Reliable load supply:** Different single-phase and asymmetrical loads in grid-forming mode thanks to patented power electronics Flexible On- and Off-Grid-applications due to real 4 wire inverter for transformerless supply of single-phase loads
- **Compact design and high efficiency:** IP65 rated Transformerless 3-phase topology with 98% efficiency and a high power-density of 50 kW at 104 kg Complete system solution with connection and switchboxes for off-grid and backup applications (e.g. genset integration)



SMA

Next Generation Large Commercial Inverter 2024. Main facts.



- Successor of Sunny Tripower CORE2 (STP 110-60)
- **125kW** @ 400V AC, 1.100V DC
- 12 MPPTs with each 30A
- SMA "**Unity Design**" incl. attached AC connection box
- full integration into SMA Commercial System with integrated communication processor by SMA
 - SMA WebUI
 - SMA Speedwire communication
 - WiFi onboard
 - live interface to Sunny Portal powered by ennexOS
- ArcFix / AFCI conform to IEC 63027
- IV curve diagnosis



New Data Manager M (EDMM-20)

YODA-PRO Platform

• 16 GB eMMC (because of pSLC Mode 8GB available)

Connectivity:

- 2 x Ethernet geswitched (MAC-1)
- 1 x Ethernet (MAC-2)
- 2 x RS-485 (galv. getrennt)
- WLAN
- optional LTE Modem-Module (launched later Q2 2025)

<u>On-Board I/O:</u>

- 10 x Digital In
- 1 x Fast Stop In
- 5 x Multi Function Relay (MFR)
- 4 x Analogue In (4..20mA, 0..10V)
- 4 x Analogue Out (4..20mA, 0..10V)
- 2 x Temperature (PT100, later also PT1000)
- 1 x Reset Button



ardware comparison EDMM-20 and -10			
Function	EDMM-20	EDMM-10	
Prozessor/Kerne/Takt/RAM/eMMC	i.mx8/2/1.2GHz/1GB/16GB	CortexA8/1/1GHz/1GB/8GB	
Ethernet / RS-485 / USB 2.0	3 x RJ45, 2 MAC / 2 / 0	2 x RJ45 1 MAC / 1 / 1	
WLAN	Yes (only soft access point)	Since January 2020 not implemented anymore	
LTE Modem / SIM / eSIM	Optional / 1 / -	Not available	
Digital inputs	10 + Faststop	4 + Faststop	
Digital outputs	5 × MFR	(only via external I/O module)	
Analogue inputs	4 x 420mA oder 010V	(only via external I/O module)	
Analogue outputs	4 x 420mA oder 010V	(only via external I/O module)	
Temperature senor input	2 x PT100 oder später PT1000	(only via external I/O module)	
Button (reset)	1	1 (on the mainboard, reachable with pin)	
LED (bi-colour)	2	2	
Trusted Platform Module	TPM SLMTPM SLM96709670	Not available	
width/height/depth	216 x 90 x 68 mm	162 x 90 x 68 mm	

SMA Solar Lechnology



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Introduction SMA Energy System Home



Sunny Boy 3.0 / 3.6 / 4.0 / 5.0 / 6.0 SB x.x 1AV 41





Technical data	Sunny Boy 3.0	Sunny Boy 3.6	Sunny Boy 4.0	Sunny Boy 5.0	Sunny Boy 6.0
Input (DC)					
Max. generator power	5500 Wp	5500 Wp	7500 Wp	7500 Wp	9000 Wp
Max. input voltage			600 V		
MPP voltage range	110 V to 500 V	130 V to 500 V	140 V to 500 V	175 V to 500 V	210 V to 500 V
Rated input voltage			365 V		
Min. input voltage / initial input voltage			100 V / 125 V		
Max. input current input A / input B			15 A / 15 A		
Max. DC short-circuit current input A / input B			20 A / 20 A		
Number of independent MPP inputs / strings per MPP input			2 / A:2; B:2		
Output (AC)					
Rated power (at 230 V, 50 Hz)	3000 W	3680 W	4000 W	5000 W ¹⁾	W 0006
Max. apparent power AC	3000 VA	3680 VA	4000 VA	5000 VA ¹⁾	W 0006
Nominal AC voltage / range	220 V, 230 V, 240 V / 180 V to 280 V				
AC power frequency / range	50 Hz, 60 Hz / -5 Hz to +5 Hz				
Rated power frequency / rated grid voltage			50 Hz / 230 V		
Max. output current	16 A	16 A	22 A ²	22 A ²⁾	26.1 A
Power factor at rated power			1		
Adjustable displacement power factor		0.8 0	verexcited to 0.8 underex	kcited	
Feed-in phases / connection phases			1/1		
Efficiency					
Max. efficiency / European Efficiency	97.0% / 96.4%	97.0% / 96.5%	97.0% / 96.5%	97.0% / 96.5%	97.0 % / 96.6 %
Equipment					
DC connection / AC connection		5	SUNCLIX / AC connecto	r	
Display via smartphone, tablet, laptop			•		
Interfaces: WLAN / Ethernet / RS485			•/•/•		
Communication protocols	Modbus (SMA, Sunspec), Webconnect, SMA Data				
Shade management: integrated SMA ShadeFix			•		

Sunny Tripower 3.0 / 4.0 / 5.0 / 6.0 STP x.x 3AV 40





Technical data	Sunny Tripower 3.0	Sunny Tripower 4.0	Sunny Tripower 5.0	Sunny Tripower 6.0
Input (DC)				
Max. PV array power	6000 Wp	8000 Wp	9000 Wp	9000 Wp
Max. input voltage	850 V	850 V	850 V	850 V
MPP voltage range	140 V to 800 V	175 V to 800 V	215 V to 800 V	260 V to 800 V
Rated input voltage	580 V			
Min. input voltage / initial input voltage	125 V / 175 V			
Max. input current input A / input B	12 A / 12 A			
Max. DC short-circuit current input A/input B	18 A / 18 A			
Number of independent MPP inputs / strings per MPP input	2/A: 1; B: 1			
Output (AC)				
Rated power (at 230 V, 50 Hz)	3000 W	4000 W	5000 W	6000 W
Max. apparent power AC	3000 VA	4000 VA	5000 VA	6000 VA
Nominal AC voltage	3/N/PE; 220 V / 380 V 3/N/PE; 230 V / 400 V 3/N/PE; 240 V / 415 V			
AC voltage range	180 V to 280 V			
AC grid frequency / range	50 Hz / 45 Hz to 55 Hz 60 Hz / 55 Hz to 65 Hz			
Rated grid frequency / rated grid voltage	50 Hz / 230 V			
Max. output current	3 x 4.5 A	3 x 5.8 A	3 x 7.6 A	3 x 9.1 A
Power factor at rated power / Displacement power factor, adjustable	1 / 0.8 overexcited to 0.8 underexcited			
Feed-in phases / connection phases	3 / 3			
Efficiency				
Max. efficiency / European efficiency	98.2% / 96.5%	98.2% / 97.1%	98.2% / 97.4%	98.2% / 97.6%
Equipment				
DC connection / AC connection		SUNCLIX /	AC connector	
Display via smartphone, tablet, laptop			•	
Interfaces: WLAN / Ethernet / RS485	•/•/•			
Communication protocols	Modbus (SMA, Sunspec), Webconnect, SMA Data, TS4-R			

Sunny Tripower 8.0 / 10.0 STP x.x 3AV 40



Technical data	Sunny Tripower 8.0	Sunny Tripower 10.0	
Input (DC)			
Max. PV array power	15000 Wp	15000 Wp	
Max. input voltage	1000 V	1000 V	
MPP voltage range	260 V to 800 V	320 V to 800 V	
Rated input voltage	580 V		
Min. input voltage / initial input voltage	125 V / 150 V		
Max. input current input A / input B	20 A / 12 A		
Max. DC short-circuit current input A / input B	30 A / 18 A		
Number of independent MPP inputs / strings per MPP input	2 / A:2; B:1		
Output (AC)			
Rated power (at 230 V, 50 Hz)	8000 W	10000 W	
Max. apparent AC power	8000 VA	10000 VA	
Nominal AC voltage	3 / N / PE; 220 V / 380 V 3 / N / PE; 230 V / 400 V 3 / N / PE: 240 V / 415 V		
AC voltage range	180 V to 280 V		
AC grid frequency / range	50 Hz / 45 Hz to 55 Hz 60 Hz / 55 Hz to 65 Hz		
Rated grid frequency / rated grid voltage	50 Hz / 230 V		
Max. output current	3 x 12.1 A	3 x 14.5 A	
Power factor at rated power / displacement power factor adjustable	1 / 0.8 overexcited to 0.8 underexcited		
Feed-in phases / connection phases	3 / 3		
Efficiency			
Max. efficiency / European efficiency	98.3 % / 97.7 %	98.3 % / 98.0 %	
Features			
DC connection / AC connection	SUNCLIX / AC connector		
Display via smartphone, tablet, laptop	•		
Interfaces: WLAN / Ethernet / RS485	•/•/•		
Communication protocols	Modbus (SMA, Sunspec), Webconnect, SMA Data, TS4-R		
Shade management: SMA ShadeFix (integrated) / TS4-R	• / 0		



Parallel MPPT Connection







Figure 9: Connection overview for normal operation

Figure 10: Connection overview for parallel connection of the DC inputs A and B

Inverter	ΜΡΡΤ Α	MPPT B
SB 3.0 - 6.0 (1AV-41)	I _{op} : 15 A I _{sc} : 20 A	I _{op} : 15 A I _{sc} : 20 A
STP 3.0 - 5.0 (3AV-40)	I _{op} : 12 A I _{sc} : 18 A	I _{op} : 12 A I _{sc} : 18 A
STP 8.0 - 10.0 (3AV-40)	I _{op} : 20 A I _{sc} : 30 A	I _{op} : 12 A I _{sc} : 18 A

On-grid pv-systems with self-consumption Parts of the generated solar power will be directly consumed (Self-consumption)

Unused electricity is fed back into the utility grid

The utility energy meter has to be bidirectional





Increase of Self-sufficiency

Storage systems allows to use a greater proportion of your own solar power

The battery inverter controls the power flow at the point of common coupling

An SMA Energy Meter or Sunny Home Manager is required

The utility energy meter has to be bidirectional





Increase of Self-sufficiency

Storage systems allows to use a greater proportion of your own solar power

The battery inverter controls the power flow at the point of common coupling

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The utility energy meter has to be bidirectional







Increase of Self-sufficiency





Increase of Self-sufficiency


SMA Energy System Home

Increase of Self-sufficiency

For three phase systems the utility energy meter has to register the energy flow as the sum of all three phases







The SUNNY TRIPOWER X. Future solutions, pre-installed.

A legend has retired





Our famous "TL-30" family says "goodbye" ...

- STPxx000TL-30
- STPxx000TL-US-10
- STP25000TL-JP-30

... with globally > **400,000** installed units Thereof almost **70,000** US-inverters installed

New Platform for Small Commercial & Large Home Applications





Our new Sunny Tripower Platform as a successor of our famous "TL-30" family:

- Global product platform: STP12/15/20/25-50
- Potential for Repowering
- Core part of SMA Energy System Business and ennexOS, ready for future business

•	
hnical	data
	MMIM

	STP X 12	STP X 15	STP X 20	STP X 25
PV input	18,000 Wp, STC	22,500 Wp, STC	30,000 Wp, STC	37,500 Wp, STC
Max. V _{DC}		1,0	00 V	
Max. I _{DC} / Max. I _{DCsc}	24 A / 35 A per MPP tracker			
MPP tracker	3 MPP tracker / 2 strings per MPP tracker, 24 A			
AC output	12,000 VA	15,000 VA	20,000 VA	25,000 VA
AFCI / I-V diagnostics*	• / •			
DC surge protection (type 2, type 1/2)	0			
Dimensions (W/H/D)	728 mm / 762 mm / 266 mm (28.7 in / 30 in / 10.5 in)			
Weight	35 kg / 77 lbs			
Interface: Ethernet / Wi-Fi / RS485	● (2 ports) / ● / ○			
SMA Modbus / SunSpec Modbus / Speedwire		• / •	• / •	
Multifunction relay / expansion slot / digital inputs	● / ● (1 port) / 6 (e.g. for ripple control receiver)			

*) Supported from Q3 2022





• / • (1 port) / 6 (e.g. for ripple control receiver)

Intelligence Pre-Installed Integrated System Manager

• Integrated system manager

- Monitoring & control of up to five inverters (with up to 135 kVA) and 1 energy meter
- Direct access to SMA Sunny Portal powered by ennexOS
- Enables efficient monitoring in the portal through grouping of systems
- SMA Dynamic Power Control offering dynamic control of active and reactive power
- SMA ShadeFix
- SMA **ArcFix** integrated (AFCI) for enhanced plant safety
- Fast in-app commissioning via Wi-Fi and Ethernet





System Manager Configurations STP X as System Manager





System Manager Configurations STP X with SHM 2.0 as System Manager





System Manager Configurations STP X With Data Manager as System Manager





Maximum Flexibility All-in-one solution – can be adapted to any type of installation.

- **3 MPP trackers** to cover all possible scenarios
- Wide range of 4 power classes (12/15/20/25 kW)
- Up to **150% oversizing** of PV array
- Can be used flexibly in **home or business applications**
- Digital inputs and multifunction relay
- Simplified grid and system protection similar to CORE1
- Integrated I-V curve diagnostics for easily detecting yield loss







Usable Accessories



Overvoltage protection (SPD)

- Optional SPD type 2 or type 1/2
- Pre-assembled insert for quickly attaching onto the DIN rail with color-coded cables for safe wiring
- Advantage: replacable if required

RS485-interface (of CORE1)

- For expansion or repowering of existing PV systems in which RS485 communication is already used
- Offers e.g., the option to replace a Webbox with STP X

Sensor Module (of CORE1)

• Used to record environmental data such as solar irradiation and module temperature for analyzing system performance

DC Terminal Cover

- Mainly for usage in Australia and US
- Touch protection

The new Sunny Tripower X design. Long lifetime due to efficient cooling.

- Improved protection of electronic components due to generous product design
- Optimized ventilation ensuring longevity of the parts





SUNNY TRIPOWER CORE1

New Functions Available



Sunny TriPower 50-41 (CORE1)

50 kVA

82kg

150 V to 1000 V DC

230/400V 50 Hz

>98 % / >98%



Technical Data

- Power:
- DC Voltage range:
- AC Voltage:
- Efficiency Max/Euro:
- Weight:

Main Benefits:

- 6x MPPT: 12 direct string inputs to reduce installation time by 60%
- Option to integrate type II or type I/II SPD's
- Direct connection of sensors
- Integrated grid management functions
- Free-Standing inverter
- Board swap service concept
- Copper & Aluminum AC conductors (up to 120mm)

Monitoring / Interfaces

- Integrated Web UI with WLAN
- Integrated sensor connections & data-logging
- Simple integration into SCADA/ Building Management Systems (BMS)
- Modbus Sunspec compatible



Sunny TriPower 50-41 (CORE1)

Ideally suited for all commercial applications



CARPORT





GROUND MOUNT





Sunny TriPower 50-41 (CORE1)

Accessories

SMA



SMA Sensor Module MD.SEN-US-40



RS485 Module MD.RS485-US-40

SMA IO-Module

Antenna

MD.IO-40



Extension Kit EXTANT-US-40



AC Surge Protection Module Kit AC_SPD_Kit1-10 DC Surge Protection Module Kit DC_SPD_Kit4-10

Sensor Module

- 2x temperature: ambient and module (Pt100/Pt1000)
- Irradiation sensor (0...+/-10V; 0...20mA, 24V supply) ٠
- SO interface, e.g. for wind sensor ٠

All attachments available via third party. Approved sensors list available online

RS485 Module

- SMA Data 1 •
- compatible to Sunny WebBox (retrofit) and SMA ComGW
- I/O Module
- 6 relay inputs for ripple controller
- Only one module required per plant. Inverter can transmit grid specifications up to max 11 inverters in network





SUNNY TRIPOWER CORE2



Sunny Tripower 110 (Core-2) STP 110 - 60



	SMA
	Sunny Tripower CORE2
	165000 Wp STC
	1100 V
	500 V to 800 V
	585 V
	200 V / 250 V
cker	26 A / 40 A

Min. input voltage / Start input voltage	200 V / 250 V
Max. input current per MPP tracker / Max. short-circuit current per MPP tracker	26 A / 40 A
Number of independent MPP trackers / Strings per MPP tracker	12/2
Output (AC)	
Rated power at nominal voltage	110000 W
Max. apparent AC power	110000 VA
Nominal AC voltage	400 V
AC voltage range	320 V to 460 V
AC grid frequency / range	50 Hz / 45 Hz to 55 Hz 60 Hz / 55 Hz to 65 Hz
Rated grid frequency	50 Hz
Max. output current	159 A
Power factor at rated power / displacement power factor adjustable	1 / 0.8 overexcited to 0.8 underexcited
Harmonic (THD)	< 3%
Feed-in phases / AC connection	3 / 3-PE
Efficiency	
Max. efficiency / European efficiency	98.6% / 98.4%
Features / functions / accessories	
DC connection / AC connection	Sunclix / terminal lug (up to 240 mm²)
LED display (Status / Fault / Communication)	•
Ethernet interface	• (2 ports)
Data interface	Web Interface / Modbus SunSpec
Mounting type	Wall mounting / rack mounting

Technical data

Max. PV array power Max. input voltage MPP voltage range Rated input voltage

Input (DC)

Sunny TriPower 110-60 (CORE2)

110 kVA

94kg

200 V to 1100 V DC

230/400V 50 Hz

>98 % / >98%



Technical Data

- Power:
- DC Voltage range:
- AC Voltage:
- Efficiency Max/Euro:
- Weight:

Main Benefits:

- 12x MPPT: 24 direct string inputs to reduce installation time by 60%
- integrated type II AC and DC SPD
- fulfils IP66 and C5 corrosion class
- four DC switches (DC-PV1, manufacturer Santon) clearly assigned to string inputs
- MPP trackers with 28A operating current allow use of bi-facial modules; Isc max 40A
- MPP range 500 800 Vdc, Voc. 1100Vdc
- Fuseless design on DC side

Monitoring / Interfaces

- Integrated Web UI
- Data manager Mandatory (communicates via Sunspec)
- AC and DC SPD board is monitored
- Modbus Sunspec compatible



Sunny Tripower CORE2 Higher coverage within large commercial portfolio.





More performance. Highest power and maximum yields.



Out-of-the-box installation concept saves time and money

- No DC combiner required Package solution
- High-performance installations even in partly shaded constellations
- High environmental resistance with temperature derating starts after 50°C
- 4 DC disconnect switches
- Maximum system availability

Benefits for End-Customer

- Easy plant management
- Quicker ROI and lower maintenance cost
- Excellent data and IT security, servers based in Germany





SMA



SMA ShadeFix is a patented, integrated software solution that optimizes energy yield in PV plants.



SMA Smart Connected

Automated inverter monitoring optimizes services and delivers highest yields.

SMA Sunny Island



Battery Inverter Technology – Sunny Island

SMA Energy System Home



Sunny Island	6.0H/8.0H
Rated power	4.6 kW/6.0 kW
AC power at 25 °C	
for 30 min	6.0 kW/8.0 kW
AC power at 25 °C	
for 5 min	6.8 kW/9.1 kW
AC power at 25 °C	
for 3 sec	11.0 kW/11.0 kW
Inverter weight	63 kg









Compensation for Electricity produced

SMA

Self-consumption

- Useful if cost of electricity produced is less than cost of purchased electricity and feed-in tariff
- Cumulative meter required (registering the energy flows as the sum of all three phases)



Sunny Island in On-grid mode

for increased Self-consumption







SMA

Sunny Island in On-grid mode

Sunny Island on-grid mode for increased Self-consumption basic system

System Components

- > Sunny Island 6.0H/8.0H
- > SMA Energy Meter
- > SMA 1ph./3ph. PV-inverter with Webconnect

Functions

- Control of grid connection point via E-Meter
- > Dynamic limit of export to the grid between 0-100%
- Visualization in Sunny Portal / Sunny Places

> Modbus as an external interface

UTILITY GRID

 Battery-backup function (via additional retrofit kit)

SUNNY PORTAL





SMA

Sunny Island on-grid mode for increased Self-consumption

Advanced system

System Components

- > Sunny Island 6.0H/8.0H
- SMA Energy Meter >
- > SMA 1ph./3ph. PV-inverter with or without Webconnect
- > Sunny Home Manager 2.0

PV GENERATOR

Additional Functions

> Scheduled battery changing from grid

BATTERY

SUNNY PORTAL

INTERNET

ROUTER

(with SWITCH)

UTILITY GRID

TA A

UTILITY METER FOR BILLING

PURPOSES

SUNNY HOME

MANAGER 2.0

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- > Weather forecast based control
- > Automated Load Control



APPLIANCE

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Sunny Island with Off-Grid parameters



Stand-Alone Grid

- > Voltage and frequency controlled by Sunny Island
- > Power balancing by charging and discharging the batteries
- Power output of pv-inverters (offgrid mode) controlled by Sunny Island via frequency
- > Load control with multifunction relays:
 - > Load-shedding or/and by switching on additional loads



Sunny Island with Off-Grid parameters



Coupled with public grid or with the diesel generator

 Voltage and frequency controlled by public grid or diesel generator as the Sunny Island is synchronized with it



Sunny Island Off-Grid mode - backup function

Coupled with public grid

- > Public grid is the main system
- > Voltage and frequency controlled by public grid
- Power output of pv-inverters depends on country settings – often MPP-output.



Sunny Island Off-Grid mode - backup function

Coupled with public grid:

- Loads will be supplied by PV inverters, public grid and Sunny Island (batteries)
- Surplus of PV energy can <u>be</u> <u>feed-back</u> to the public grid if parameter is chosen (recommended)
- > If feed-back is not permited the SI disconnect the grid in case of reverse power, then starts the FSCP





Sunny Island Off-Grid mode – backup function



Coupled with public grid:

 Loads will be supplied by PV inverters, public grid and Sunny Island (batteries) – peak load shaving is possible



Sunny Island Off-Grid mode – backup function

SMA

Coupled with public grid

- > The batteries will be charged by the PV inverters and the public grid
- > During grid work the batteries are normally fully charge as the main goal of the system is to have full batteries for the case of grid black-out


Sunny Island Off-Grid mode – backup function



Grid and Generator



Sunny Island Off-Grid mode – backup function



Grid and Generator



Off-grid and On-Grid Backup Systems SMA Components | MC-Box



Technical Data	Multicluster-Box 6	Multicluster-Box 36	Multicluster-Box 12
Logd connection			
Rated voltage	230 V (L N) 400 V (L1 L2)	230 V (L N) 400 V (L1 L2)	230 V (L, N), 400 V (L1, L2)
AC voltage range	172.5 V to 250 V 300 V to 433 V	172.5 V to 250 V 300 V to 433 V	172.5 V to 265 V 300 V to 433 V
Rated frequency / frequency range	50 Hz / 40 Hz to 70 Hz	50 Hz / 40 Hz to 70 Hz	50 Hz, 60 Hz / 45 Hz to 65 Hz
Number of connections	1 x 3-phase	1 x 3-phase	1 x 3-phase
Rated power	55 kW	300 kW	138 kW
AC current at rated values	3 x 80 A (AC1)	3 x 435 A (AC1)	3 x 200 A (AC1)
Fuses	NH00	NH3	NH1
Sunny Island connections			
Maximum number of devices	6	36	12
AC rated power / AC current at rated values	36 kW / 3 x 52 A	216 kW / 3 x 313 A	72 kW / 12 x 26 A
AC power at 45°C / AC current at 45°C	32 kW / 3 x 46 A	195 kW / 3 x 283 A	65 kW / 3 x 94 A
AC power (25°C, 30 min)	48 kW	288 kW	96 kW
AC power (25°C, 5 min)	55 kW	328 kW	110 kW
Fuses	6 x circuit breaker C40 A	36 x circuit breaker C40 A	12 x circuit breaker C40A
Generator connection			
Number of connections	1 x 3-phase	1 x 3-phase	1 x 3-phase
Rated grid input power	55 kW	300 kW	138 kW
AC input current	3 x 80 A	3 x 435 A (AC1)	3 x 200 A
Fuses	NH00	NH3	NH1
PV system connection			
Number of connections	1 x 3-phase	1 x 3-phase	1 x 3-phase
PV rated power	55 kW	360 kW	138 kW
AC current at rated values	3 x 80 A	3 x 522 A (AC1)	3 x 200 A
Fuses	_	_	-

SMA Storage Solutions Commercial Segment | SI Multi-cluster System





SMA Storage Solutions Commercial Segment | SI Multi-cluster System







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- Medium Voltage/Large Scale application **Peak 3 Inverter, MVPS/Storage & PPM**



SMA Zero Export solutions for Residential and

Commercial systems

Requirement of Zero Export Systems



In the regions where FIT is not available, export control systems allows implementation of solar PV systems for self consumption.

Zero export control can allow for:

- larger PV systems to be installed
- simplified design where oversizing becomes more cost effective
- potentially avoid extensive grid studies and NVD
- standardized commercial PV system offering
- reduction in application processing time

> Installing active power control to restrict export to the grid by a commercial PV system will lower the risks to a project.

Main components of the Zero export PV system



On-Grid PV inverter	Controller	Feedback/ Smart Meter		
	SMA Sunny Home Manager up to 300kW	SMA Energy Meter (LV connection)		
SUNAY TROWR	SMA Data Manager up to 2.5MW	Janitza UMG604 (MV connection)		



SMA ENERGY METER

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Energy Meter



Home Manager





An example of intelligent energy management: PV generation with SMA storage solutions and various controlled appliances.



Home Manager







Monitoring and Control

- Data recording, monitoring and control of decentralized PV systems is even simpler, faster and more efficient.
- Specifically tailored to the needs of PV system operators, PV system managers and service technicians.
- Supports up to 50 devices or 2.5MW
- Master-Slave topology for systems more than 50 inverters
- Two powerful components perfectly in tune with each other
- Cutting-edge, uniform UI design
- Future-oriented functions for an automated grid management service (i.e. Zero Exports, Reactive Power Functions (Setpoints), etc.)
- Access to the quickly changing energy market of the future via ennexOS

Data Manager M and Sunny Portal powered by ennexOS







Zero Export Systems with Single Inverter in a PV Plant



SMA

System Components :

SMA

- PV Inverter : Single inverter in the system •
 - SB1.5/2.0/2.5-1VL-40
 - SB3.0/3.6/4.0/5.0/6.0-1AV-41
 - STP3.0/4.0/5.0/6.0-1AV-40
 - STP8.0/10.0-1AV-40
- Feedback: SMA Energy Meter ٠

Third Party

Ethernet router ٠

Single Phase Zero Export Systems with Multiple Inverter system





System Components :

- PV Inverter : 2 or more Single Phase Sunny Boy
 - SB1.5/2.0/2.5-1VL-40
 - SB3.0/3.6/4.0/5.0/6.0-1AV-41
- Feedback: SMA Sunny Home Manager 2.0

Three Phase Zero Export Systems (up to 300kW or 12 inverters)



SMA

- PV Inverter : Three Phase Sunny Tripower Inverters
 - STP3.0/4.0/5.0/6.0-1AV-40
 - STP8.0/10.0-1AV-40

System Components :

- STP15000/20000/25000TL-30
- STP50-40, STP50-41
- Feedback: SMA Sunny Home Manager 2.0

Third Party

SMA

- Ethernet router
- Ethernet cable



SMA

System Components :

SMA

- PV Inverter : Three Phase Sunny Tripower Inverters
 - STP15000/20000/25000TL-30
 - STP50-40, STP50-41
 - STP110-60 (20 devices per EDMM)
- Controller: SMA Data Manager-M
- Feedback: SMA Energy Meter

Third Party

- Ethernet router
- Ethernet Cables

Three Phase Zero Export Systems – MV or HV connection (up to 2.5MW or 50 inverters)





System Components :

SMA

- PV Inverter : Three Phase Sunny Tripower & Sunny Highpower Inverters
 - STP15000/20000/25000TL-30
 - STP50-40, STP50-41
 - STP110-60 (20 devices per EDMM)
 - SHP100/150-20
- Controller: SMA Data Manager-M
- Feedback: Janitza UMG 604

Third Party

- Ethernet router
- Ethernet Cables

Configuration in Data Manager M



SMA	DATA MANAGER							
`								
	CONFIGURATION	CONFIGURATION ENERGY	RGY METER					
>	IGULD Plant PV system	Electrical	Electrical					
F _	PV system properties	Position	Device	Channel				
6	Device administration	Purchased electricity	SMA Energy Meter 1900211903	Grid reference counter				
I	Meter configuration Grid management service	Grid feed-in	SMA Energy Meter 1900206773	Grid feed-in counter				
	Sensor assignment Parameters	PV generation	All PV inverters	PV generation				
	Device parameter adjustment							

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			Active power setpoint*							
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PV-Diesel & PV-Diesel-Battery Plants SMA Power Plant Manager & Hybrid Controller



HYBRID ENERGY SYSTEMS



> What does hybrid energy system mean?



HYBRID ENERGY SYSTEMS



> Hybrid energy systems are formed by combining two or more subsystems that produce the same or similar results



PV HYBRID SYSTEMS



- > Industrial hybrid energy solutions for consumers with weak or non-existing grid structure
- > Regular transport of the fuel is possible but expensive
- > The Diesel generator is the grid-forming device
- > Diesel always is needed
- > Up to 50 MW



Engine-Generator-Set¹



Diesel transport and storage

MOTIVATION (1/4)



- > Energy systems in some countries are typically supplied by conventional Diesel systems
- > High fuel and maintenance costs



Engine-generator-sets

MOTIVATION (2/4)



> Thanks to the SMA latest technology a large-scale PV plant can be integrated easily to the industrial energy systems based on fossil-fuelled energy generation units



MOTIVATION (3/4)



> The hybrid energy system produces electrical energy at lower cost than simple energy systems based on fossil-fuelled power generation units



MOTIVATION (4/4)



> The SMA controller offers reliable control and monitoring of all PV inverters, saving fuel and allowing a stable operation of the isolated grid







Why can the PV plant save fuel?



SMA Solar Technology AG





...because PV plant can provide active power!







Why does the PV plant need the SMA Hybrid Controller?



SMA Solar Technology AG





...to ensure the smooth operation of the gensets!







What does smooth operation of the gensets mean?



SMA Solar Technology AG

TECHNICAL REASONS











- Save on generator and diesel costs
- Lower maintenance costs
- Less number of diesel supply trips
- Lower carbon footprint
- Longer generator life genset controller



SMA Hybrid Controller offers attractive features :





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SMA Online Service Center my.sma-service.com



Plant Overview

All customer data at a glance: Localize the PV plants you oversee and assign appropriate devices. You can even add your own documents and notes to the structured overview.



Ticket Tracking

You can track your order status with ticket tracking. This lets you always keep track of all of your orders.



FAQ & Support

Not sure what a blink code or display message means? Then click through our practical guide. We also provide tips and tricks for your daily work along with answers to frequently asked questions.



Device Replacement

Ordering a replacement device is fast and easy. Would you like an SMA service technician to perform the replacement? Just select the appointment that works for you.



Extended Warranty

With just a few clicks, you can extend your manufacturer's warranty to 10, 15, 20 or 25 years. Another plus you see exactly when the warranty will expire, and you can act accordingly.



Contact

Do you have a question or need technical information? No problem - you can contact us from anywhere in the world through our Online Service Center.



SMA Online service center

OSC Home Page – SMA Video Training

Online Service Center – Video Training

- Training videos for EQ'd persons
- Able to track and reflect in SF when completed
- Available trainings:
 - STP Core-1 Board Exchange
 - SHP Peak 3 Board Exchange



SMA Video Training

Here, you will find our training videos for electrically qualified persons, which you can go through at your leisure.

Here's how to do it:

- 1. Choose the video training course you want to take.
- 2. Watch all the videos that form part of the training course you have chosen. The course description will include a recommended order in which to watch the videos.
- 3. You can watch the videos as many times as you like. There is no time limit, and you can study the videos over several days if you need to.
- 4. Once you have familiarized yourself with the content of all videos, complete the declaration to confirm that you have participated in the training.
- 5. Feel free to use the videos later on in your day-to-day work to refresh your memory on the relevant content if questions arise
- 6. If you have any queries about our training videos, please email us at Solaracademy@SMA.de.

We endeavor to make our training videos as engaging and entertaining as possible. Please use the videos to familiarize yourself with the issues so that you can carry out the relevant work safely and professionally.

Have fun!

Follow this link to the training videos:

- SMA Sunny Tripower CORE1 board exchange
- SMA Sunny Highpower PEAK3 board exchange

SMA



www.SunnyDesignWeb.com



Sunny Design

Functions after free registration

Easy project management

Own PV modules

Own locations

Own consumption profiles

Import of own PV modules and locations from Sunny Design 2



SUNNY DESIGN | Deutsch 🗸



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 Peak 3 Inverter, MVPS/Storage & PPM

Introducing Peak3

Simply Reliable.



SMA Solar Technology

Technical Data	Sunny Highpower 100-21	Sunny Highpower 150-21	Sunny Highpower 172-21	Sunny Highpower 180-21	
Input (DC)					
Max. PV array power	200 kWp	300 kWp	344 kWp	360 kWp	
Max. input voltage	1100 V	1500 V	1500 V	1500 V	
MPP voltage range / rated input voltage	590 V to 1000 V / 590 V	880 V to 1450 V / 880 V	968 V bis 1450 V / 968 V	1012 V bis 1450 V / 1012 V	
Min. DC voltage / start voltage	570 V / 625 V	855 V / 940 V	939 V / 1032 V	982 V / 1079 V	
Max. usable input current / max. short-circuit current	180 A ,	180 A / 325 A		180 A / 325 A	
Number of independent MPP trackers		1		1	
Number of inputs	1 or 2 (optional) for extern	1 or 2 (optional) for external PV array junction boxes		1 or 2 (optional) for external PV array junction boxes	
Output (AC)					
Rated power at nominal voltage	100 kW	150 kW	172 kW	180 kW	
Max. apparent power	100 kVA	150 kVA	172 kVA	180 kVA	
Nominal AC voltage / AC voltage range	400 V / 177 V to 477 V	600 V / 480 V to 690 V	660 V / 528 V to 759 V	690 V / 552 V to 793 V	
AC grid frequency / range	50 Hz / 44 60 Hz / 54	50 Hz / 44 Hz to 55 Hz 60 Hz / 54 Hz to 66 Hz		50 Hz / 44 Hz to 55 Hz 60 Hz / 54 Hz to 66 Hz	
Rated grid frequency	50	50 Hz		50 Hz	
Max. output current	15	151 A		151 A	
Power factor at rated power / displacement power factor adjustable	1 / 0 overexcited	1 / 0 overexcited to 0 underexcited		1 / 0 overexcited to 0 underexcited	
Harmonic (THD)	< 0	< 0.5%		< 0.5%	
Feed-in phases / AC connection	3 /	3 / 3-PE		3 / 3-PE	
Efficiency					
Max. efficiency / European efficiency	98.8% / 98.5%	99.1% / 98.8%	99.2% / 98.9%	99.2% / 98.9%	

Peak3 | Overview





Central vs Decentral Architecture Central Architecture Benefits.

Big Picture – At Plant Level Central vs. Decentral String





Central Architecture Benefits Reduces Transmission Loss

翩

transmission

transmission





Central Architecture Benefits Recaptures DC Loss









- 2. Loss is recaptured (100% Pout) at inverter output during clipping hours.
- 3. Moving the inverter close to the transformer increases the recapture.



Central Architecture Benefits Saves Cable



For the 'same power' over 'same distance' & 'loss limits', DC transmission requires lesser cable runs

Typical Decentral Architecture



Typical Central Architecture



Central Architecture Benefits Simplifies Trench



Sample trench for CENTRAL ARCHITECTURE - CLEAN



Sample trench for DE-CENTRAL ARCHITECTURE - CUMBERSOME



Decentral – big risk of EMC leakage, costly redesign of cable trenches (also with concrete), expensive labour

Central Architecture Benefits Responds Faster

With Central Topology – Ethernet

- Only 10-15m of Ethernet cabling between inverters
- Fast up to 100 Mbit/s & reliable
- Integration with plant SCADA is simple
- Additional PLC feature adds no value
 - Ethernet network required till transformer station
 - Extending the same is much simpler

With Decentral Topology – PLC

- Slow (115 kbit/s) & Error prone Due to interference
- Proprietary adapter for plant SCADA interface
- Not a holistic plant monitoring solution
 - Ethernet communication is still needed
 - Transformers station & AC side requires ethernet setup



Grid services are performed optimally & reliably with PEAK3 but extremely slowly & unreliably with competitor Inverters Storage today & in future is extremely simple, at a central location as plug & play. Extremely difficult with decentral topology

SMA

Central Architecture Benefits Plant Layout





Large Scale: Experience the intelligence for megawatt power plants with the unique SMA Power Plant Manager (PPM)





- Turn-key plant management solution
- Monitoring and control of large-scale power plants
- Enables and ensures grid code compliance
- Supports hybrid applications with pv, storage, diesel, wind
- Maximum availability through hot-standby redundancy
- IEC certified product



Large Scale: SMA Peak 3 (150kW) and Power Plant Manager



- Great fit for MV industrial applications with high heat tolerance and oversizing capabilities.
- Successfully implemented at more than 65MW of industrial and utility sites in Southern Africa (including wheeling and behind the meter applications)
- The PPM played an integral part to ensure the systems are grid code compliant.
- PPM can be configured according to plant requirements including hybrid control should future genset or battery inverter control functions be required
- Lead times for these products are, compared to other large-scale products, relatively short





SMA Sunny Central Storage & MVPS

With increasing decentralization, the electricity supply system will become more complex





- Renewable energies and **storage systems** form the backbone of future energy supply.
- In order to integrate them seamlessly and secure a reliable power supply, a comprehensive understanding of the system is essential.

> To provide a sustainable, secure and cost-effective electricity supply, all players will have to be seamlessly integrated and interconnected.



Large Scale: SMA MVPS Technical Information





- Voltage Levels: 10 kV 35 kV
- Frequency: 50 / 60 Hz
- Ambient Temperature: -40° to +55°C
- Dimensions (LxWxH):
 6.058m x 2.438m x 2.896m
 (20 foot high cube shipping container)
- Transformer Type: KNAN (biodegradable oil with natural air cooling)
- Switchgear: 1 Feeder / 3 Feeders

Reference case: Walvis Bay, Namibia









New: Stabilisation of Local MV Grids





GFM in parallel to the grid is a prerequisite for the stabilization functionality

Grid Services Opportunity

SMA

Frequency Management

A **fast-acting balancing system** is needed to provide a quick response to sudden frequency variations and increase or reduce the electricity demand within a few seconds (**fast frequency response** and primary reserves) or minutes (secondary reserve)

Inverter in Grid Forming Mode



Demand Management (Peak Shaving)

In times of low demand or high supply, energy is fed into storage, from which it is released at times of high demand or low supply. Alternatively, consumers adjust their energy consumption according to changes in electricity market price or management of different auxilliary power sources.





Thank you.

SMA Solar Technology South Africa (Pty) Ltd.

www.SMA-MEA.com

And our long-time partner in Africa:



