

## New Flexible SMA Solution for off-grid System till 2MW

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## 1. Introduction

## SUNNY ISLAND INVERTERS



More than 20 years' experience developing grid-forming battery inverter…



## **Current SMA Off-Grid portfolio:** Need for more flexibility!

- System sizes 4 300 kW<sub>AC</sub> are covered by Sunny Island + Multicluster Box 6 / 12 / 36
- System sizes >1500 kW<sub>AC</sub> are covered by Sunny Central Storage



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## New Sunny Island X (SI X)





## New Sunny Island: How we **achieve** these targets?







## 2. Technical Data

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#### SMA Solar Technology

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## The new Sunny Island X: For On- and Off-Grid systems up MW-class





The new Sunny Island X can be used for **Off-Grid projects up to MW-class** and in **On-grid Systems with different batteries.** 



We will offer a list of compatible 3<sup>rd</sup> party batteries.

The Sunny Island X will be sold as single device.



For **Off-Grid** and **Backup systems** the **Sunny Island X Connection Box** with the integrated **Hybrid controller** is needed and sold as package





## **Discover the SMA Commercial Off-Grid solution** Technical data of Sunny Island X in a nutshell



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SUNNY ISLAND	

Input (Battery)	
Battery DC voltage range	200 V bis 980 V
Max. usable DC current	150 A
Battery communication	Modbus TCP or CAN Bus
Output (AC)	
Rated power (at 230 V, 50 Hz)	30kW / 50kW
Rated power (at 480 V, 60 Hz)	40 kW / 60kW
Rated power (at 208 V, 60 Hz)	27 kW
Rated output current / max. output current	75,5 A
Weight	approx. 104 kg (229,3 lb)
Operating temperature range	$-25\ ^\circ$ C to +60 $^\circ$ C ( $-13\ ^\circ$ F to +140 $^\circ$ F) with derating from 45 $^\circ$ C (still 90% of P <sub>rated</sub> at 60 $^\circ$ C)
Max. efficiency / European Efficiency	98,0 % / 97,6%
Protection class	IP65
Features	
Communication interfaces	Ethernet (2 ports, switched), WLAN (for commissioning), optional LED display
Data protocols	SMA Speedwire, SMA + Sunspec Modbus, SMA Hybrid Controller Modbus communication
EMC irradiation	Class B for AC Low-Voltage connection

## **Discover the SMA Commercial Off-Grid solution** The Sunny Island X as the core of the system



Scalable system design Nearly unlimited parallel operation of 27-60 kW inverter units in On- and Off-Grid mode

**Broad battery connectivity** BMS communication via Modbus TCP and CAN-Bus for integration of 3<sup>rd</sup> party batteries

#### **Inverter Modbus interface** Dedicated Modbus interface for monitoring and control purposes in On- and Off-Grid applications

#### Sunny Portal powered by ennexOS

System and inverter monitoring as well as remote parameterization on a singular platform

**Robust** IP65 – able to work in extreme conditions **10 years Warranty** 5 years standard warranty + 5 years after registration

**Sustainable inverter design** 20 years life-time design "Made in Germany"

**Integrated System Manager** Energy Management and Monitoring in On-Grid systems up to 10 devices without additional Data Manager M

**AC- and DC-powered inverter** Inverter commissioning and WebUI access without connecting the battery

**Easy inverter handling** Inverter package includes wall-mounting kit, screwable mounting handles and a single screw lid mounting concept

Flexible battery design Integrated DC-DC-converter allows a battery voltage from 200-980V with a strong current of up 150A

#### Reliable load supply

Supply of all single- and three-phase loads as well as unbalanced/asymmetric consumers in Off-Grid operation

#### Compact design and high efficiency

Transformerless 3-phase topology with 98% efficiency and a high power-density of 50 kW at 104 kg

#### Wide temperature range

No derating below  $45^{\circ}$  C and still more then 90% of nominal power at  $60^{\circ}$  C ambient temperature





#### SMA Solar Technology

## SMA Commercial Off-Grid Solution

Benefits at a glance

Flexible, scalable and robust

solution for larger Off-Grid

Systems > 300kW as well as

pure On-Grid Systems in all

power classes

Ease of installation and support along the project life cycle Revolutionary and futureproof Off-grid inverter technology with 20 years lifetime design







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## **The new Sunny Island X:** How to integrate it to a System?



\*or any connected device for monitoring- and control other Modbus purposes



## 3. Typical Systems

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#### **System Scenario 1a:** Sunny Island X On-Grid as System Manager w/o EDMM





#### **Components:**

- SUNNY ISLAND X
- Energy Meter
- Sunny Portal powered by ennexOS

- Up to 11 devices
  (SI X, PV inverters, Energy Meter, SMA EV Charger)
- Integrated Energy Management
- No additional Data Manager M needed

#### **System Scenario 1b:** Sunny Island X On-Grid + Data Manager M as System Manager





#### **Components:**

- Data Manager M
- SUNNY ISLAND X
- Energy Meter
- Sunny Portal powered by ennexOS

- Up to 50 devices
- Scalable up to the MW size

#### System Scenario 2: Sunny Island X On-Grid + BACKUP





#### **Components:**

- SUNNY ISLAND X
- SI X CONNECTION BOX
- HYBRID CONTROLLER
- Data Manager

- Backup
- Blackstart
- On- and Off-Grid energy and power management (V- and fcontrol and Peak Load Shaving).
- PV- active and reactive power control
- Automatic grid synchronization

#### **System Scenario 3:** Sunny Island X + Combustion Generator





#### **Components:**

- SUNNY ISLAND X
- SI X CONNECTION BOX
- HYBRID CONTROLLER
- Data Manager

#### Advantages

- Blackstart
- On- and Off-Grid energy and power management (V- and fcontrol and Peak Load Shaving).
- PV and combustion generator active and reactive power control.
- Automatic synchronization with the generator
- Diesel-Off-Mode

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#### **System Scenario 4:** Sunny Island X + Grid + Combustion Generator





#### **Components:**

- SUNNY ISLAND X
- SI X CONNECTION BOX
- HYBRID CONTROLLER
- Data Manager

- Backup
- Blackstart
- On- and Off-Grid energy and power management (V- and fcontrol and Peak Load Shaving).
- PV and combustion generator active and reactive power control.
- Automatic synchronization with the external sources
- Diesel-Off-Mode

#### **System Scenario 5:** Sunny Island X + Combustion Generators + Own Genset Controllers





#### **Components:**

- SUNNY ISLAND X
- SI X CONNECTION BOX
- HYBRID CONTROLLER
- Data Manager

- Blackstart.
- On- and Off-Grid energy and power management (V- and fcontrol and Peak Load Shaving).
- PV and combustion generator active and reactive power control
- Diesel-Off-Mode
- Compatible with several Genset Controllers (CRE, ComAp, DEIF, DSE, Woodward)



# System Components

# **New Sunny Island X** in a complete Off-Grid system offering





## New Data Manager M (EDMM-20)



#### **New Platform**

• 16 GB eMMC (because of pSLC Mode 8GB av

#### **Connectivity:**

- 2 x Ethernet switched (MAC-1)
- 1 x Ethernet (MAC-2)
- 2 x RS-485 (galvanically isolated)
- WLAN
- Optional LTE-Modem (launched later 2024)

#### On-Board I/O:

- 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



# Everything available at a glance: Sunny Portal powered by ennexOS





- Monitoring of the complete energy and power flow
- Overview of system-specific status information and device states
- Individual configuration of alarm thresholds
- Comprehensive analyses of battery and PV data

## Made for Off-Grid: Genset and fuel tank monitoring



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#### HYBRID CONTROLLER





#### SMA Hybrid Controller

#### Advanced plant control and Energy Management for Onand Off-Grid applications

- Robust and powerful industrial PLC
- Integrated high-precision power measurement modules assure ultra-fast control for all grid services\*
- Integrated I/O for flexible signal processing and control
- Secure network separation and remote access on demand with the new Data Manager M
- Compatible to several external Genset Controllers
- Optional: Integrated synchronization module for controllerless Diesel Gensets
- Optional: Supports telecontrol protocols IEC 60870
  and DNP3





## More flexibility for new opportunities: SMA Hybrid Controller

The Hybrid Controller intelligently controls energy flows and enables seamless integration of renewable energies into power grids

- Ultra-fast plant control for on- and offgrid applications
- Microgrid Management
- Fuel saving in PV-diesel applications
- Synchronization of external AC sources to microgrids
- On-Grid storage applications for grid ٠ services
- Grid resiliency and grid forming

- Feed-in management • Ramp rate control Grid services • Frequency control SOC Balancing **Energy Shifting** 贪 <u>Ľ</u>u Dispatch of PV according to  $\widetilde{|}$ load demand • Increase in selfconsumption
- Active & reactive • power control

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- F- and V-control
- Diesel off mode
- Optimized genset operation

- Peak Load Shaving
- **Energy Shifting** ٠
- Time of use
  - management



# Obelix A4 SI-X Connection Box

#### SI-X Distribution Box



Is a prewired system solution up to **500 or 800 kW** for direct connection of multiple **battery inverters** (up to 16), **communication**, **loads**, **energy sources**, **gensets and utility grid**.





# Connection possibilities

#### 2 Sizes

800kW – up to 16 Sunny Island X

- > 4 m long, 0,6 m deep and 2,2 m high
- > 1.100 1.200 kg heavy
- > IP 54 according to IEC 60529
- Operation temperature range within -10° C to +45/+50/+55° C
- Can be set up to an altitude of2000m above sea level

500kW – up to 10 Sunny Island X

- > 3 m long, 0,6 m deep and 2,2 m high
- > 800 kg heavy
- > IP 54 according to IEC 60529
- Operation temperature range within -10° C to +45/+50/+55° C
- Can be set up to an altitude of
  2000m above sea level



## Table with the SI X Connection Box models



Type Size	One protected input	Protected input and two entries (ATS)	One non protected input (no Sync module)
800kW			
500kW			

## **Overview of typical System Scenarios**



Use Case	Recommended range of system size	SI-X Box needed?	Data Manager M needed?	SMA Hybrid Controller needed?
<b>On-Grid w/o EDMM</b> without Backup	0 250 kW	No	No	No
<b>On-Grid w EDMM</b> without Backup	100 1000 kW	No	Yes	No
<b>On-Grid w HyCon</b> with Backup	300 500 (800) kW	Yes	Included in SI-X Box	Included in SI-X Box
<b>Off-Grid w HyCon</b> with 1x Diesel Genset	300 500 (800) kW	Yes	Included in SI-X Box	Included in SI-X Box
<b>On-Grid w HyCon</b> with Backup and 1x Diesel Genset	300 500 (800) kW	Yes	Included in SI-X Box	Included in SI-X Box
<b>Off-Grid w HyCon</b> with max. 16x Diesel Gensets	300 500 (800) kW	Yes	Included in SI-X Box	Included in SI-X Box

## CONNECTION BOX 16 – SINGLE AC SOURCE





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## CONNECTION BOX 16 – SINGLE AC SOURCE





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#### CONNECTION BOX 16 - DUAL AC SOURCE





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## CONNECTION BOX 16 – GENERATOR CLUSTER







# Mechanical Construction, functional architecture

## CONNECTION BOX 16 - DIMENSION





## CONNECTION BOX 16 - DIMENSION





Sunny Island "X" Connection Cabinet

- 16 x SI "X"
- scheme "1GenGrid"



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## Sunny Island X Connection Box





## Sunny Island X Connection Box





## CONNECTION BOX – PV & LOAD CABINET





## Sunny Island X Connection Box





## CONNECTION BOX – GENERATOR & GRID CABINET





## Sunny Island X Connection Box





## CONNECTION BOX – SI-X CABINET





## Sunny Island X Connection Box







TOP

CENTER

BUTTOM

# CONNECTION BOX – COMMUNICATION CABINET







# Thank you!

#### SMA Altenso GmbH

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