



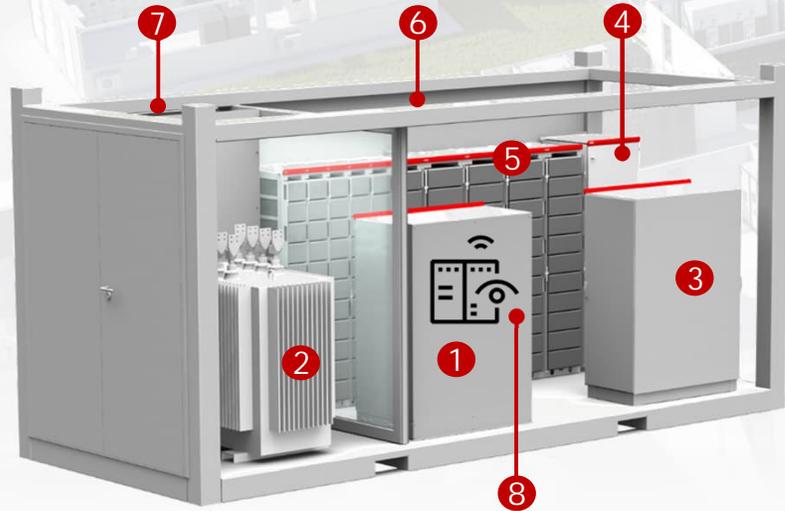
- 90 Very good
- 6 Good
- 4 Fair
- 30 Poor
- 10 Very poor
- 30 Offline

ABB Ability Energy Manager
BESS & Solar Widgets

Battery Energy Storage Systems (BESS)

What is BESS?

BESS sample picture



- ① AC Switchgear
- ② Transformer
- ③ Power conversion
- ④ DC Switchgear
- ⑤ Battery Racks
- ⑥ Fire Suppression
- ⑦ HVAC
- ⑧ Operating system

What are Battery Energy Storage Systems (BESS)?

A Battery Energy Storage System (BESS), is the industry's generic reference name for a collection of equipment that comprise a system to store energy in batteries and use the energy later when it is advantageous.

A typical system is comprised of batteries, a battery management system, an inverter, switchgear, transformer, protection and a control system.

Often renewable energy sources are combined with a BESS to store the renewable energy during peak production time and then the energy is used when it is needed.

Market trends

What are the expectations for the BESS market?

As electricity consumption is on the rise, we need to find different and more sustainable ways to produce, use and consume our primary source of power.

151 bn \$

MARKET VALUE

In 2019, Global Advanced Battery Energy Storage System Market was worth approximately 151.96 billion U.S. dollars.

9.5%

GROW RATE

The market is predicted to grow with a healthy growth rate of more than 4.8% over the forecast period 2020-2027.

221 bn \$

EXPECTED GROWTH

By 2027, the market is forecast to be worth over 221 U.S. dollars.

+ 19%

RENEWABLE ENERGY PRODUCTION INCREASE

Renewable electricity generation in 2022 is set to expand by more than 19%.

E-kit: Typical architecture with 3° party devices

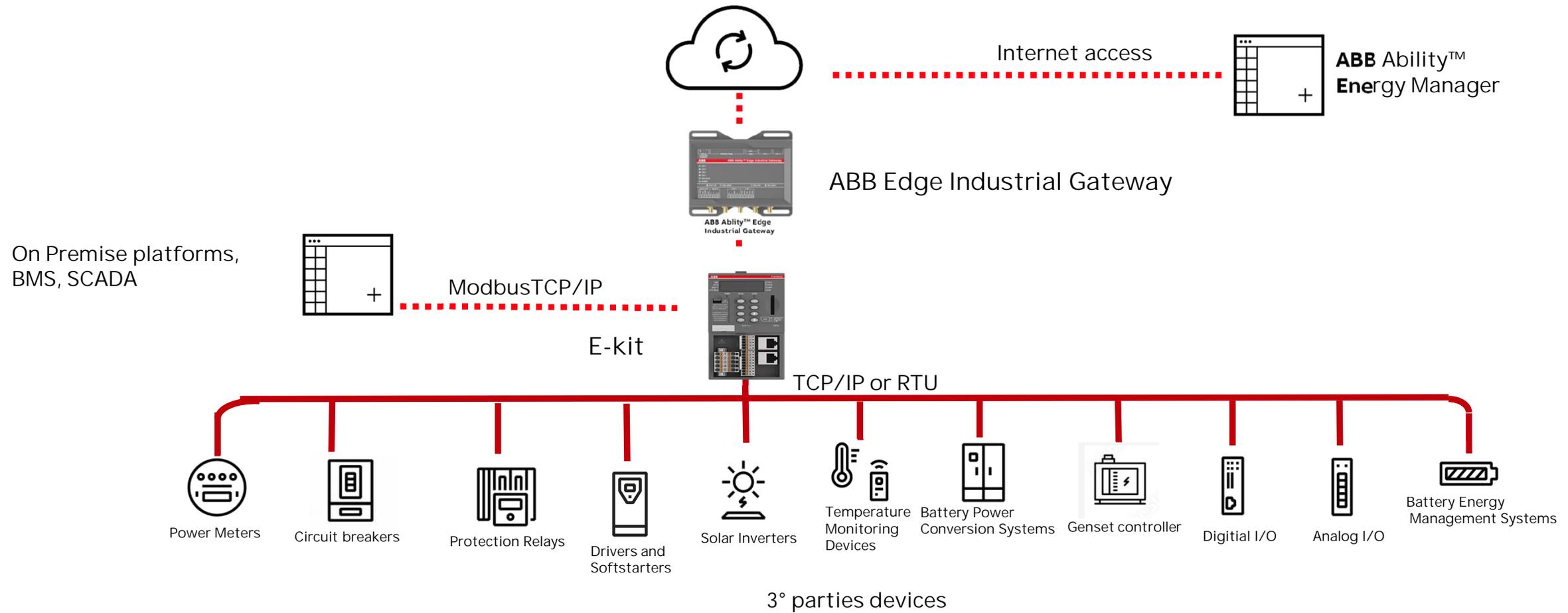
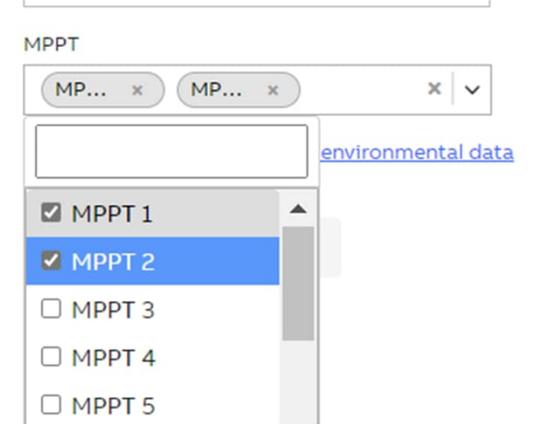
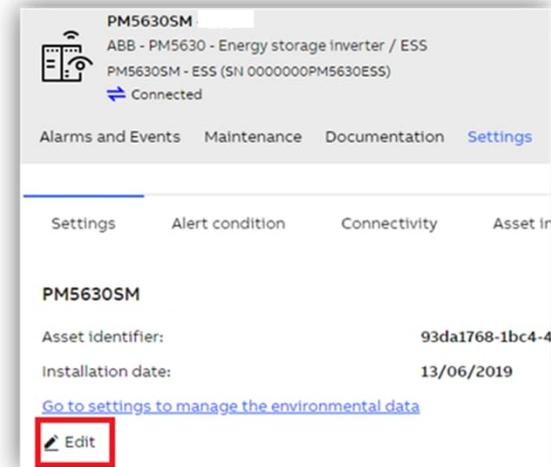
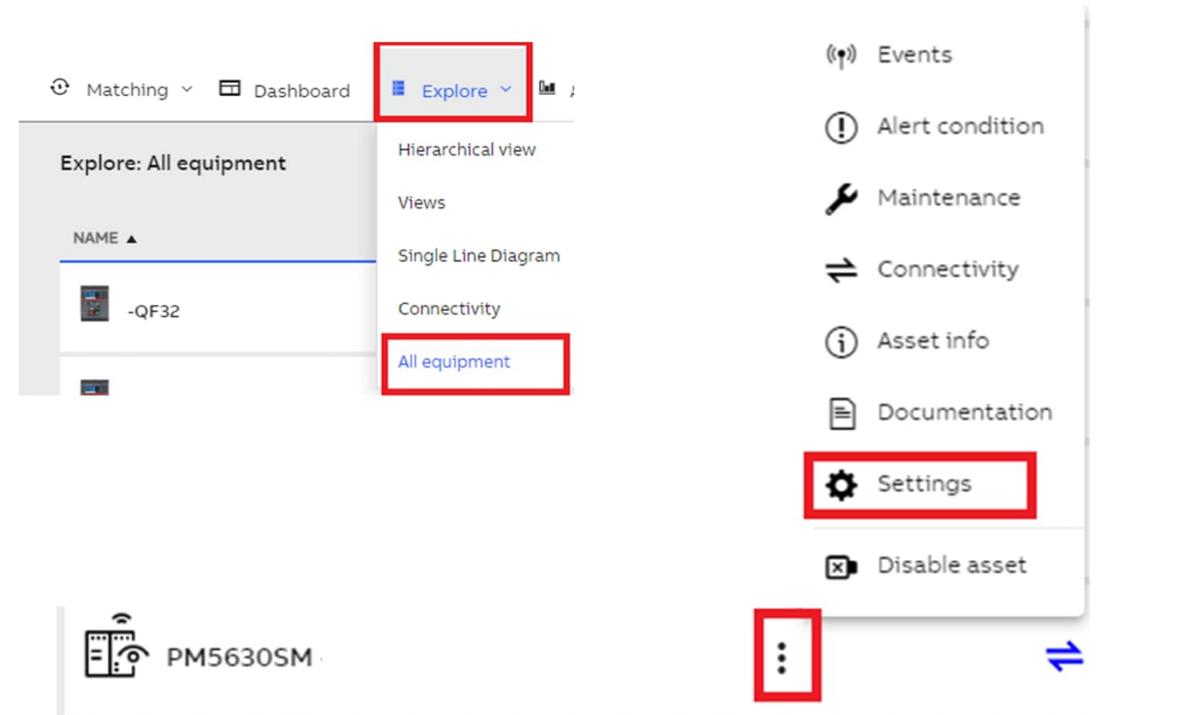


ABB Ability™ Energy Manager Widgets

Inverter Settings

To visualize Solar Inverter-enabled widgets, please select the number of MPPTs (Maximum Power Points Tracking).

- 1.) Click on "Explore tab" – "All equipment" button find the Solar Inverter from the list.
- 2.) Click on 3 dots, and "settings".
- 3.) Click on "Edit".
- 4.) Select the MPPTs and save them.



Real-Time PV - MPPT

Real-time PV- MPPT widget shows the real-time measurements of MPPTS (Up to 12) of a PV inverter.

Shows real-time measurements (30 seconds) of DC current, DC voltage, DC power, DC energy .

Real-Time PV - MPPT

Asset

TRIO

DC Current: 33.54 A DC Voltage: 386 V DC Power: 22.39 kW DC Energy: 0 kWh Operating State:  ON

MPPT		OPERATING STATE	DC CURRENT	DC VOLTAGE	DC POWER	DC ENERGY
MPPT01		 Off	16.77 A	386 V	22.4 kW	0 kWh
MPPT02		 Off	16.78 A	384 V	22.39 kW	0 kWh

PV- MPPT Trend

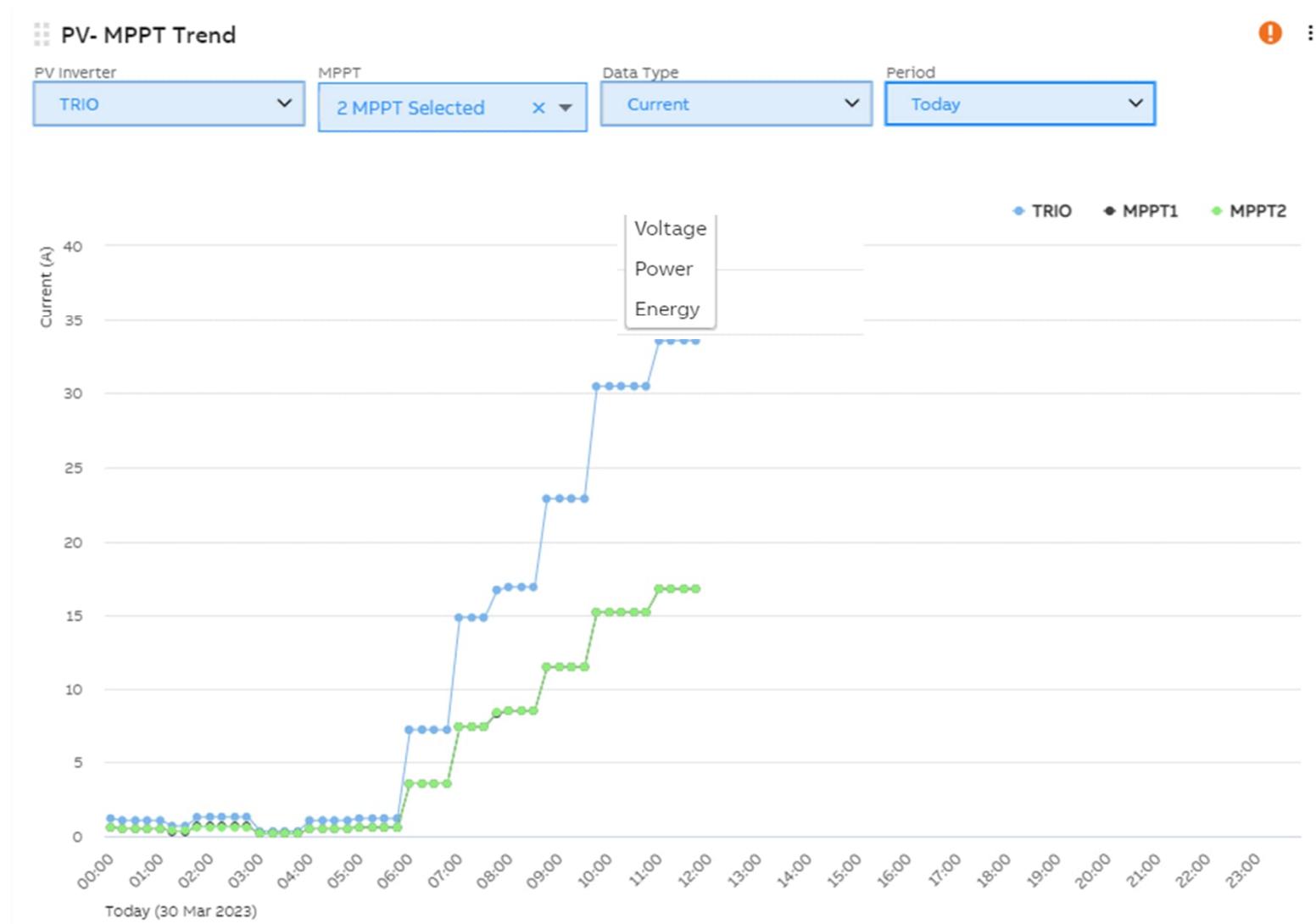
PV- MPPT Trend widget displays the measurements of MPPT data related to PV inverters in the plant.

The widget is organized as:

- Drop-down menu with the name of the PV inverters present in the plant
- Drop-down menu with all the MMPTs referred to the PV inverter selected (up to 9)
- Data type: DC current, DC voltage, DC power, DC energy
- Period

Aggregation process over 15 minutes time:

- current --> average
- voltage --> average
- power --> average
- energy --> cumulated



Battery manager system (BMS) Settings

Number of racks

To visualize BMS-enabled widgets, please select the number of racks.

- 1.) Click on "Explore tab" – "All equipment" button find the BMS from the list
- 2.) Click on 3 dots, and "settings".
- 3.) Click on "Edit".
- 4.) Select the racks and save them.

The screenshot illustrates the process of configuring the number of racks for a BMS-enabled widget. It is divided into four numbered steps:

- Step 1:** The user navigates to the "Explore" tab in the top navigation bar. In the "Explore: All equipment" list, the "All equipment" button is highlighted. The equipment list shows "PM5630SM - ESS".
- Step 2:** The user clicks on the three-dot menu icon next to the "PM5630SM - ESS" entry. The "Settings" option in the dropdown menu is highlighted.
- Step 3:** The user is taken to the "Settings" page for "PM5630SM - ESS". The "Edit" button at the bottom left is highlighted. The page shows details for the equipment, including its asset identifier and installation date.
- Step 4:** The "Battery Rack" configuration dialog is shown, where the user can select the number of racks (e.g., Rack 1, Rac...). The "Save settings" button is highlighted.

Additional details from the screenshot include a sidebar menu with options like "Events", "Alert condition", "Maintenance", "Connectivity", "Asset info", "Documentation", "Settings", and "Disable asset". The "Settings" option is highlighted in red. The "Battery Rack" dialog has a "Go to settings to manage the environmental data" link and "Save settings" and "Cancel" buttons.

BMS Battery Status

BMS Battery Status Widget visualizes the temperature and the battery charge level of BMS.

The number of racks has to be set in the device settings .

(explore ->all equipment -> click on the device -> settings ->edit)

 **PM5630SM - BMS**
ABB - PM5630 - Battery Rack / BMS
PM5630SM - BMS (SN 0000000PM5630BMS)
⇌ Disconnected

Alarms and Events Maintenance Documentation **Settings**

Settings Alert condition Connectivity Asset info

Asset information

* Name
PM5630SM - BMS

* Asset identifier
ca88292e-b9ff-44bb-909b-85037be9030c 

Function:
None

* Installation date Primary voltage
13/6/2019  440V  Fill Manually

Note
Note

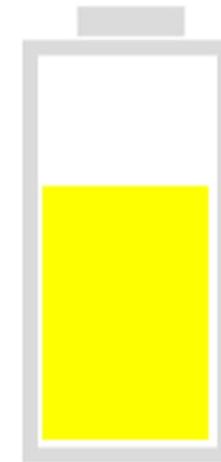
* Environmental preset
Industrial

Battery Rack
Select...

[Go to settings to manage the environmental data](#)

BMS Battery Status

ASSET RACK
PM5630SM ... Rack 1



Battery level

67%

Temperature

73°C

Real-Time Energy Storage System (ESS)

Shows real-time data of each Energy Storage System connected to the plant.

Maximum number of racks can be visualized : 5

Parameters:

Voltage
Current
SOC
SOH
Max Cell Voltage
Minimu Cell Voltage
Max Cell Temp
Min Cell Temp

Real-Time Energy Storage System

Asset

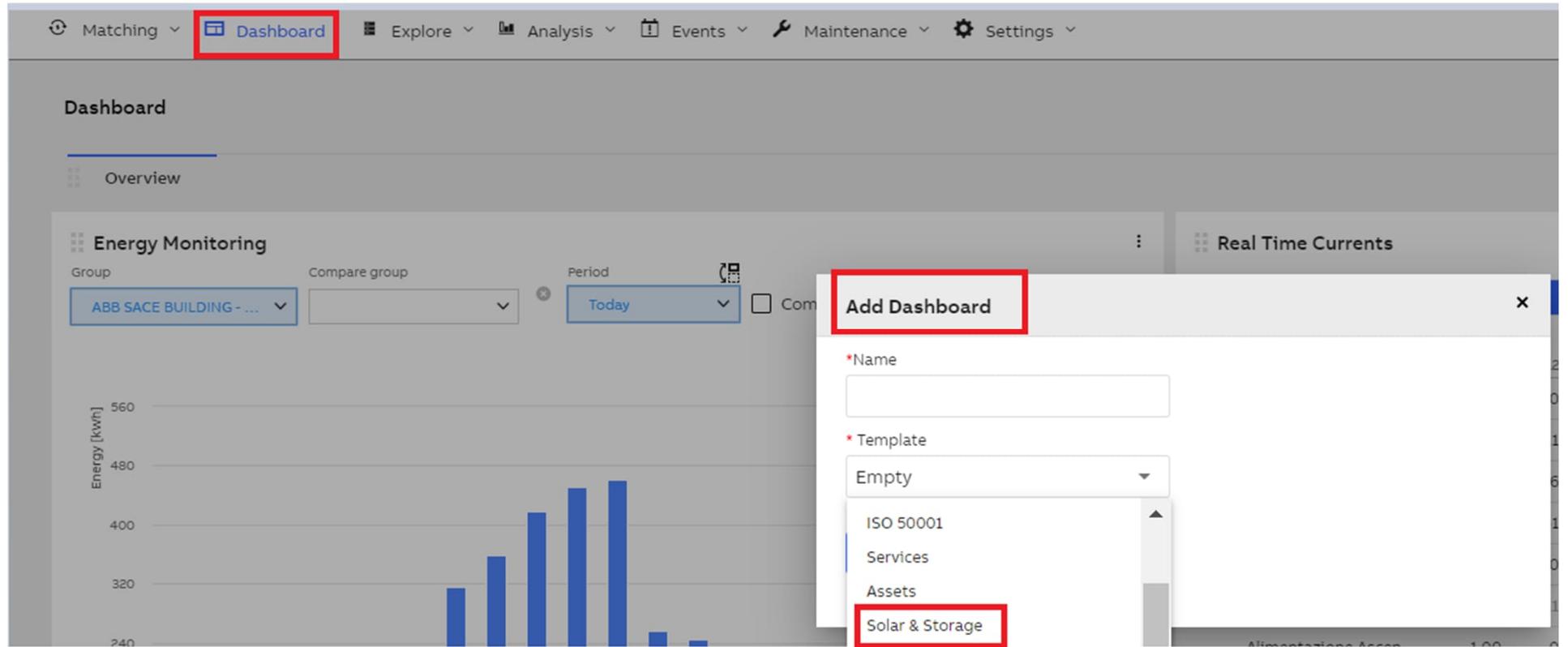
PM5630SM - BMS

VALUE	TOTAL	RACK 1	RACK 2	RACK 3
System Voltage	18 V	65 V	75 V	85 V
System Current	19 A	66 A	74 A	86 A
System SOC	20 %	67 %	77 %	87 %
System SOH	21 %	68 %	78 %	88 %
Max cell voltage of system	22 V	71 V	81 V	91 V
Min cell voltage of system	23 V	69 V	79 V	89 V
Max cell temperature of system	25 °C	72 °C	84 °C	94 °C
Min cell temperature of system	24 °C	76 °C	82 °C	92 °C

Solar & Storage Dashboard

Widgets

- Predefined template available
- Asset Current, Energy, Power, p.f Trend
- Real-Time Energy Storage System
- Asset frequency trend
- Asset Voltage Trend
- Frequency
- Power Factor
- BMS Battery Status
- Real Time Currents , Voltage, power



Synchronization to Utility

Shows synchronization data of ESS inverters.

Utility f: Utility frequency

Actual f: Actual frequency

Utility V: Utility Voltage

System availability: availability of the system to start

The other voltages shown in the speedometer are the following:

Sync voltage L1-2

Sync voltage L2-3

Sync voltage L3-1

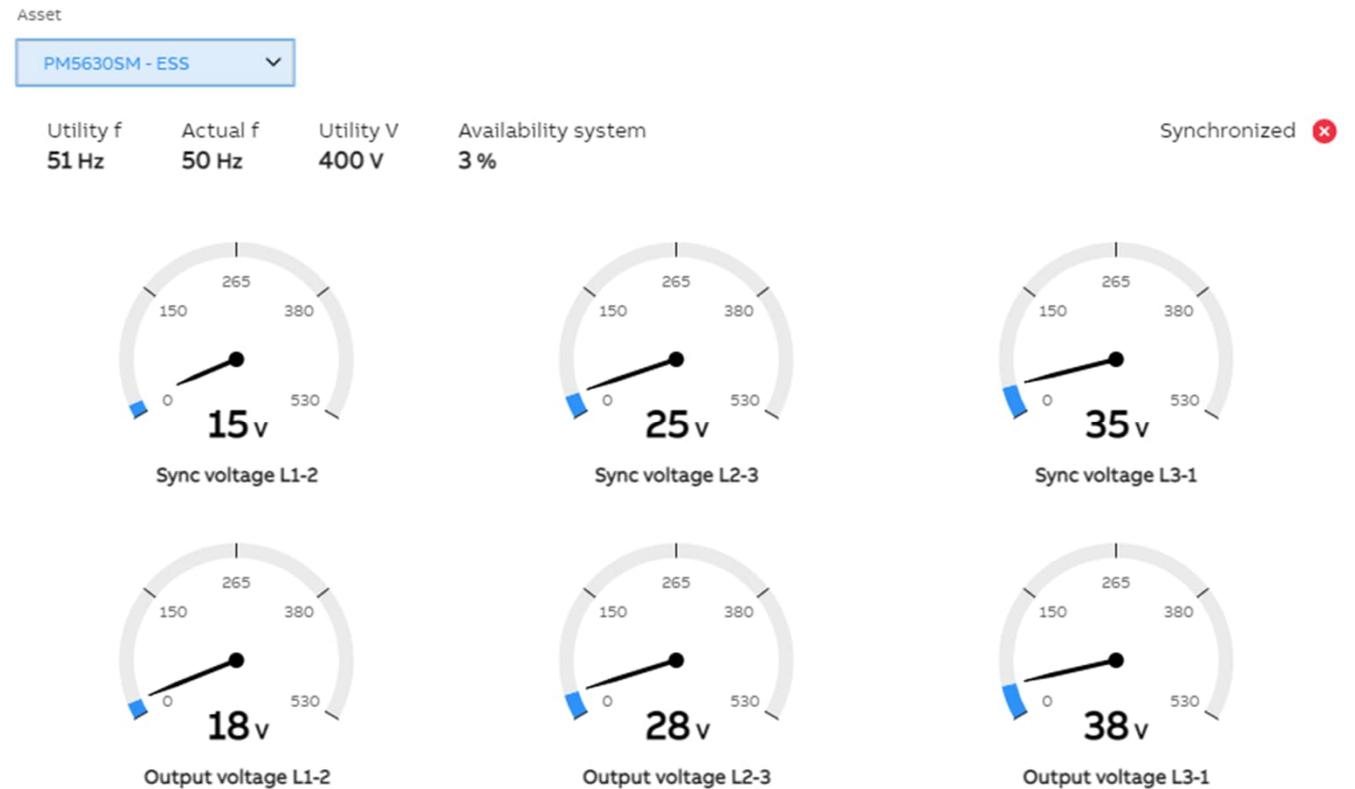
Output voltage L1-2

Output voltage L2-3

Output voltage L3-1

Max voltage value to be shown default 530 V

Min voltage: 0



Status and Alarms

PV Inverter

From a drop-down menu, the user can select a PV inverter .
Alarms that are shown for the PV inverter are:

- | | |
|--------------------|------------------------|
| Off | Over temperature |
| Sleeping | Under Temperature |
| Starting | DC over voltage |
| Shutting Down | Frequency above limit |
| Generic Fault | Frequency under limit |
| Standby | AC Voltage above limit |
| Ground fault | AC Voltage under limit |
| AC disconnect open | internal error |
| DC disconnect open | Arc Detection |
| Grid shutdown | |
| Manual shutdown | |

Status and Alarms	
Asset	
Simulated ...	
Alarms	STATUS
AC Disconnect Open	✓
AC Voltage Above Limit	✓
AC Voltage Under Limit	✓
Arc Detection	✓
DC Disconnect Open	✓
DC Over Voltage	✓
Frequency Above Limit	✓
Frequency Under Limit	✓
Generic Fault	✓
Grid Shutdown	✓
Ground Fault	✓
Internal Error	✓
Manual Shutdown	✓
Off	✓

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Status and Alarms ESS

Triggered alarms/statuses are shown at first.

All of the triggered alerts are shown in alphabetic order.

The list of alarms is in alphabetic ordered (all the remaining alerts (not triggered) are shown in alphabetic order).

Status and Alarms

Asset
Simulated ... ▾

Alarms	STATUS
Alert	✓
converter ready confirmation	✓
Equalize Mode	✓
External island forced	✓
Fault	✓
Fixed power mode (Pset/Qset)	✓
Grid islanded (forced or grid loss)	✓
Grid loss detected	✓
in Standby	✓
Inhibit	✓
Inhibit Indication	✓
Islanded V or F limited detected	✓
Isochronous mode (Fset/Vset)	✓
load ramping	✓

Status and Alarms

Asset
Simulated ... ▾

Alarms	STATUS
Local mode	✓
Local Trip	✓
Module Hot	✓
Overload	✓
Ready	✓
Rectifiers online	✓
Run	✓
Starting	✓
Stop	✓
Stopping	✓
Sync mode (Fsync/Usync)	✓
Synchronize	✓
System loadable	✓
System Mode	✓

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Status and Alarms

BMS

- Charge Over Current Protection level2
- Discharge Over Current Protection level2
- Discharge Over Current Protection level3
- Discharge Over Current Protection level4
- Under Temperature Protection
- Over Temperature Protection
- Under Voltage Protection - Cell
- Over Voltage Protection - Cell
- Voltage Imbalance
- Temperature imbalance
- Communication Failure (Module ↔ Rack)
- Communication Failure (Rack ↔ System)
- Over Current Protection (Charge Level1)
- Over Current Protection (Discharge Level1)
- Under Voltage Protection - Rack
- Over Voltage Protection - Rack
- Voltage Sensing Error
- Current Sensing Error
- Fuse Failure
- Emergency Stop (Dry Contact input)

Status and Alarms

Asset

PM5630S... 

Alarms	STATUS
Charge Over Current Protection level2	
Communication Failure (Module ↔ Rack)	
Discharge Over Current Protection level2	
Fuse Failure	
Over Current Protection (Charge Level1)	
Over Current Protection (Discharge Level1)	
Over Temperature Protection	
Temperature Imbalance	
Under Voltage Protection - Cell	
Under Voltage Protection - Rack	
Voltage Sensing Error	
Communication Failure (Rack ↔ System)	
Current Sensing Error	
Discharge Over Current Protection level3	

Asset Power Trend

ESS

When the user selects an ESS in the "asset power trend widget", they can select positive and negative limits for reactive and active power using checkboxes and visualize them on the graph.

When an ESS is selected, two check-boxes should appear:

Reactive thresholds: this will activate in the graph the visualization of Negative & positive reactive power limit

Active thresholds: that will activate visualization of Negative & Positive real power limit

ESS

Asset power trend

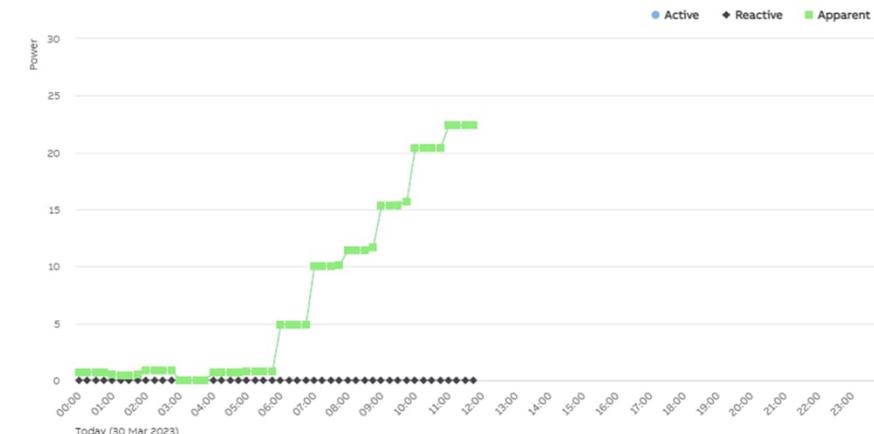
Asset: **ESS 2** | Period: **Today**

Reactive threshold Active threshold

Solar

Asset Power Trend

Asset: **TRIO** | Period: **Today**



	Active 7,36 kW (Average)	Reactive 0,00 kVAR (Average)	Apparent 7,36 kVA (Average)
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ABB