

INGECON SUN STORAGE 1PLAY

Use and Settings of the Battery-Backup Function for Single
Phase Installations

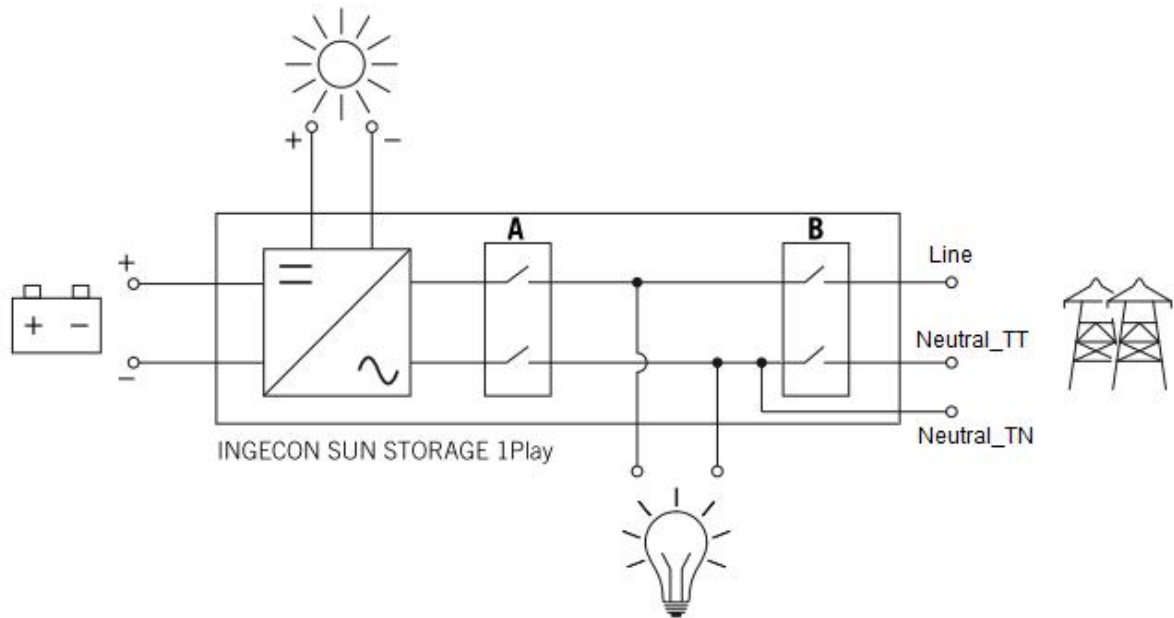
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1 Introduction

The INGECON SUN STORAGE 1Play (hereinafter, ISS 1Play) with battery-backup function enabled takes care of the uninterrupted supply of the loads with electricity during a grid failure.

For that, the ISS 1Play has a dedicated “AC Load Port” where the critical loads have to be connected.



A. Consumption grid relay.

B. Grid relay.

Figure 1. ISS 1Play schema with the dedicated “AC Loads Port”

When the grid is not able to feed the loads, the inverter will feed the loads connected in that port from its battery or PV energy sources, operating in a similar manner to a UPS.

The “Grid relays” (B) disconnects the utility grid, keeping the “Loads relays” (A) connected to feed the loads in backup mode.

This functionality is compatible with TT and TN grounding systems. For that, the neutral of the grid is connected in a different terminal of the inverter. For more information, see the “Installation and Operation Manual”.

2 Battery-Backup Functionality

The ISS 1Play changes its working mode depending on the status of the Battery-Backup function parameter:

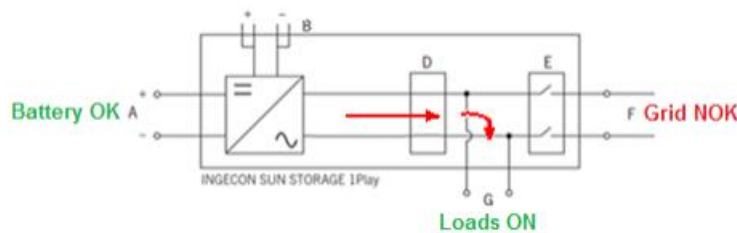
Battery-Backup Function → Disabled:

When the Battery-Backup function is disabled, all the loads must be connected in the “AC Grid Port”. This is, they must not be connected in the “AC Loads Port”, because this port is not feed during a grid failure.

The ISS 1Play will keep the “AC Loads Port” disconnected until the Network requirements are fulfilled.

Battery-Backup Function → Enabled:

With the Battery-Backup function enabled (default setting), the Loads to be fed during a grid failure must be connected in the “AC Loads Port” as long as the energy available in battery is enough to supply the loads consumption power.



Depending on the blackout period, the battery could get fully discharged or not.

Note: The battery is considered “fully discharged” either when:

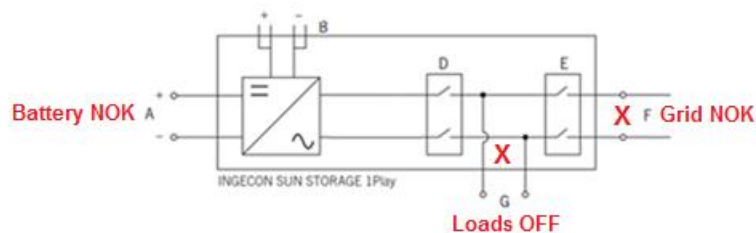
- The state of charge value (SOC) is lower than the SOCdescx parameter.
- The battery voltage is lower than the minimum battery voltage parameter.

Both conditions are timed with “Time for SOCdescx” configuration parameter (80 seconds by default).

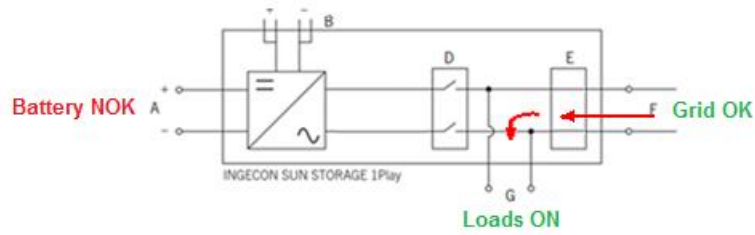
This will open two scenarios for reconnecting the inverter to the grid when it is available again:

Scenario A: The battery is NOK when the grid is back again

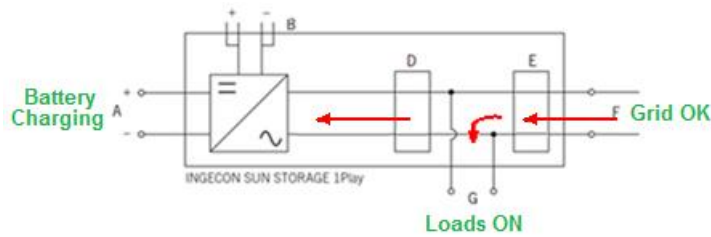
If the blackout lasts too long, the battery will get fully discharged and the ISS 1Play will disconnect the Loads port to prevent damaging the battery.



This state will be maintained until the grid is back again. Once the grid is available, the ISS 1Play will connect the Loads Port to the utility grid automatically. All the network requirements, including the grid reconnection waiting time, will be checked in this status.

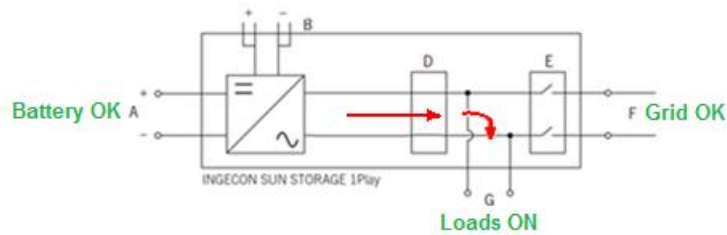


Finally, when the Network requirements are fulfilled, the inverter links the battery to the utility grid to be able to charge the battery from the grid.

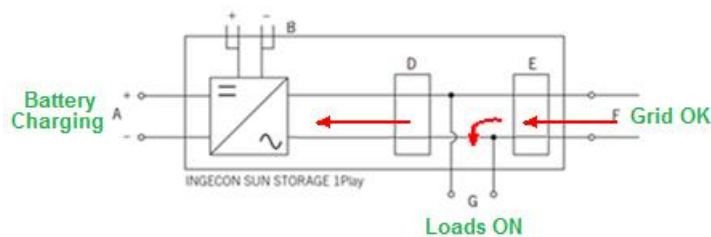


Scenario B: The battery is OK when the grid is back again

If during the blackout the battery is not fully discharged and the grid is back again, the inverter will start to check the Network Requirements, including the grid reconnection waiting time. The ISS 1Play will keep feeding the loads from the battery.



Finally, when the Network requirements are fulfilled, the inverter connects to the utility grid to be able to charge the battery from the grid.



3 Grounding of the TT system

For TN grounding system, this point is not applied.

For TT grounding system, the Battery-Backup function disconnects both Line and Neutral_TT conductors from the utility grid in the event of a grid failure.

To keep the neutral of the loads connected to ground as is required in the TT networks, it is mandatory to install an external contactor. This contactor will be managed by a digital output of ISS 1Play. The configuration of this output is explained in the “Setting the Inverter” chapter of this guide.

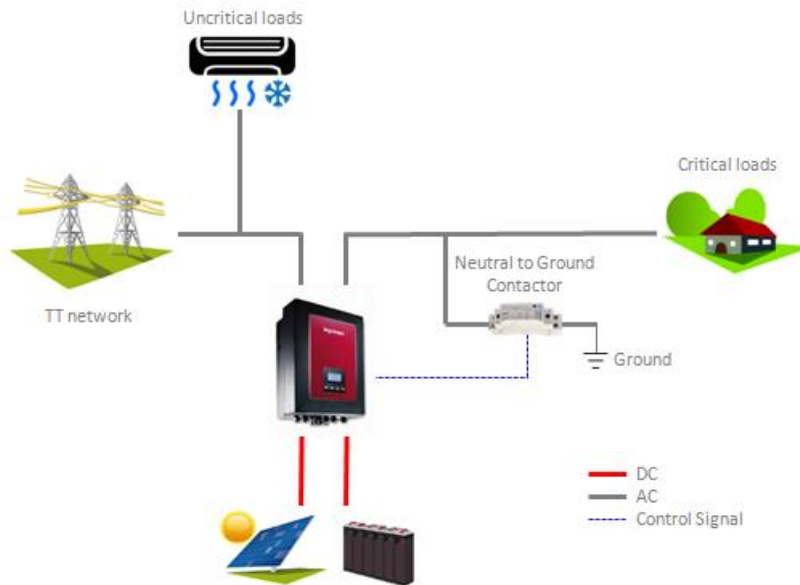


Figure 2. External contactor to ground the neutral in TT networks

The following figures include the behavior of the digital output depending on its state. The neutral to ground external contactor is handled by the digital output. The digital output is a voltage-free contact (6A, 250Vac).

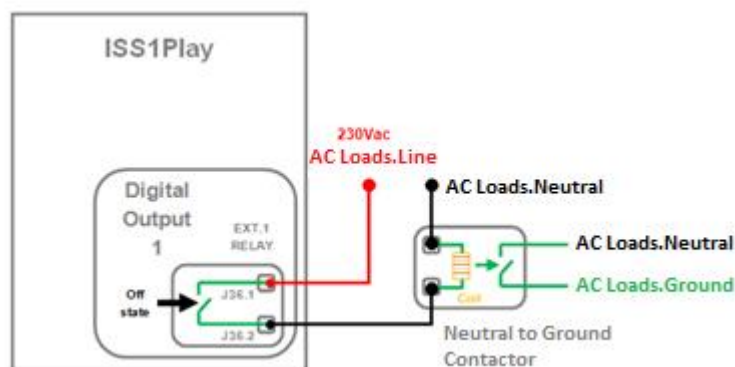


Figure 3: ISS 1Play digital output configuration

4 Switching Times for Loads

In the case of grid failure, the ISS 1Play with battery-backup function enabled internally disconnects the critical loads from the utility grid and provides the necessary power for that loads in a response time of 12 milliseconds.

This time is imperceptible for the most types of the loads, such as computers, fridges....

5 Setting the inverter

This chapter describes how to configure the battery-backup functionality.

To do so, the inverter must be switched on with DC power.

Minimum Firmware Version:

The minimum FW versions to use this functionality are the following:

- Inverter: ABH1002_V
- Display: ABH1003_M

The FW versions can be found at the display or via the “Ingecon Sun Manager” software:

Using Ingecon Sun Manager:

The firmware version is indicated underneath the inverter node.

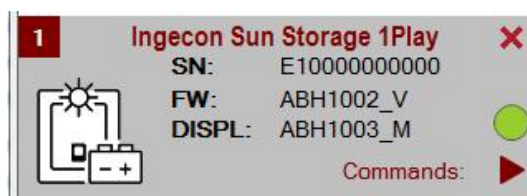


Figure 1: Inverter and Display FW versions of Node 1 shown on Ingecon Sun Manager.

Using Display:

MAIN MENU > MONITORING > FIRMWARE MONIT

In order to know the firmware version from the inverter or the display, the user should check the last two characters from the given firmware code. This two characters are arranged in alphabetical order.

For example, the firmware code ABH1002_V represents a V version, and the ABH1002AC code represents an AC version. In this particular case, the AC version is more updated than the T version.

The inverter and the display should be updated to the latest available firmware version that can be found at www.ingeteam.com.

5.1 Battery-Backup Function

The ISS 1Play brings the Battery-Backup Function enabled by default.

It is required to keep it enabled to use this functionality, but it can be disabled with the “Battery-Backup Function” parameter.

This can be done using the “Ingecon Sun Manager” software package (downloadable on www.ingeteam.com) or through the display:

Using Ingecon Sun Manager:

Settings → 6-.OPERATION MODE: Battery-Backup Function: Mode.

Click on the “Send” button. A screen informing that the configuration was successfully saved must appear when the settings are correctly applied to the inverter.

Using Display:

To perform any configuration change through the display, the required installer password must be entered on:

MAIN MENU > CONFIGURATION > ENTER PASSWORD

The password is indicated on the “Installation and Operation Manual”, on the chapter dedicated to configuration.

When the permission is given, go to:

MAIN MENU > CONFIGURATION > OPERATION MODE > BATTERY-BACKUP FUNCTION

Confirm the desired selection by pressing the “OK” button. A message to confirm the modification will pop up. A final screen that shows that the process has been completed will be shown on the display.

5.2 Management of the Loads Neutral to Ground contactor

As explained above in this guide, for TT grounding system, it is mandatory installing an external contactor to connect to Ground the neutral of the AC Loads Port in the event of a grid failure, where this port is no longer connected to the utility grid’s Ground. In case of TN grounding system this point is not applied.

For that, you can configure one of the available digital outputs to close the external contactor in the event of grid disconnection, and open it when the grid is connected back again.

This can be done using the “Ingecon Sun Manager” software package (downloadable on www.ingeteam.com) or through the display:

Using Ingecon Sun Manager:

Settings → 7-.DIGITAL OUTPUT/INPUT: Digital Output “X”: Mode: Neutral to Ground

“X” means the digital output wired to rule the contactor.

Click on the “Send” button. A screen informing that the configuration was successfully saved must appear when the settings are correctly applied to the inverter.

Using Display:

To perform any configuration change through the display, the required installer password must be entered on:

MAIN MENU > CONFIGURATION > ENTER PASSWORD

The password is indicated on the “Installation and Operation Manual”, on the chapter dedicated to configuration.

When the permission is given, go to:

MAIN MENU > CONFIGURATION > DIGITAL I/O > DIGITAL OUTPUT "X"> NEUTRAL GROUND

"X" means the digital output wired to rule the contactor.

Confirm the desired selection by pressing the "OK" button. A message to confirm the modification will pop up. A final screen that shows that the process has been completed will be shown on the display.

5.3 Other parameters to consider

The following configuration parameters are important in this functionality to consider that the battery is fully discharged.

5.3.1 Minimum SOC to disconnect the battery (SOCdescx)

The SOCdescx parameter is used to disconnect the "AC Loads Port" when the battery is feeding the Loads in off-grid mode. When the state of charge is lower than this parameter ($SOC \leq SOCdescx$) during the "Time for SOCdescx" configuration parameter, the inverter will show the Low Battery Alarm (Alarm = 0x1 + Code2 = 0x80).

This parameter can be set using the "Ingecon Sun Manager" software package or through the display:

Using Ingecon Sun Manager:

Settings → 6-.OPERATION MODE: SOCdescx.

Click on the "Send" button. A screen informing that the configuration was successfully saved must appear when the settings are correctly applied to the inverter.

Using Display:

To perform any configuration change through the display, the required installer password must be entered on:

MAIN MENU > CONFIGURATION > ENTER PASSWORD

The password is indicated on the "Installation and Operation Manual", on the chapter dedicated to configuration.

When the permission is given, go to:

MAIN MENU > CONFIGURATION > OPERATION MODE > MODE > "Your desired Strategy" > SOCDESCX

Confirm the desired selection by pressing the "OK" button. A message to confirm the modification will pop up. A final screen that shows that the process has been completed will be shown on the display.

5.3.2 Minimum Battery Voltage to disconnect the battery

The Minimum Battery Voltage parameter is used, in off-grid mode, to disconnect the "AC Loads Port" when the battery is feeding the Loads. When the battery voltage is lower than this parameter during the "Time for SOCdescx" configuration parameter, the inverter will show the Low Battery Alarm (Alarm = 0x1 + Code2 = 0x80).

This parameter can be set using the "Ingecon Sun Manager" software package or through the display:

Using Ingecon Sun Manager:

Settings → 1.1-.Lead-Acid Battery Settings: Minimum Voltage.

Click on the "Send" button. A screen informing that the configuration was successfully saved must appear when the settings are correctly applied to the inverter.

Using Display:

To perform any configuration change through the display, the required installer password must be entered on:

MAIN MENU > CONFIGURATION > ENTER PASSWORD

The password is indicated on the “Installation and Operation Manual”, on the chapter dedicated to configuration.

When the permission is given, go to:

MAIN MENU > CONFIGURATION > BATTERY > LEAD-ACID > V MINIMUM

Confirm the desired selection by pressing the “OK” button. A message to confirm the modification will pop up. A final screen that shows that the process has been completed will be shown on the display.

Important Note: The minimum battery voltage is only configurable for Lead-Acid batteries. For Lithium batteries, this parameter is defined by the battery manufacturer in the BMS.

5.3.3 Delay Time to disconnect the battery in a low battery event

This parameter is used to delay the disconnection of the “AC Loads Port” in a Low Battery event. The temporization is used to avoid that transients during connection/disconnection of big loads can state undesired Low Battery situations.

This parameter can be set using the “Ingecon Sun Manager”:

Using Ingecon Sun Manager:

Settings → 6-.OPERATION MODE: Time for SOCdescx.

Click on the “Send” button. A screen informing that the configuration was successfully saved must appear when the settings are correctly applied to the inverter.

6 Attachment I. References

Commercial codes for the products indicated:

- Ingecon Sun Manager Software ISS Manager