Hybrid Parity (Super) Inverter

USER MANUAL

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Index

1. Tuning the inverter ON/OFF / Buttons and LEDs

LED indicator		Meaning
DC	Green LED solid light	PV connection normal
AC	Green LED solid light	Grid connection normal
Normal	Green LED solid light	Inverter functioning normally
Alarm	Red LED solid light	Fault

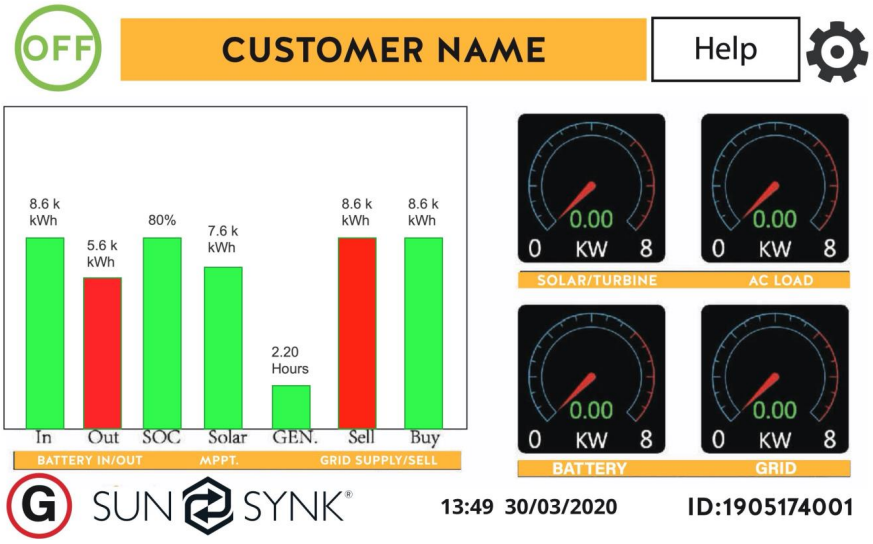
Function Key	Description
Esc	To exit the previous mode
Up	Increase the value of a setting
Down	Decrease the value of a setting
Enter	Confirm setting change (If not pressed each time the setting will not be saved)

1.1. Switching the Inverter ON/OFF

Once the inverter has been properly installed and the batteries are connected, press the on/off button (located on the left side of the case) to turn-on the system.

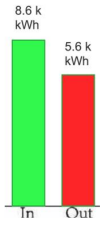
When the system is connected without a battery but connected with either PV or grid and the on/off button is switched off, the LCD will still light up (display will show off). In this condition, when switching on the on/off button and selecting no battery, the system can still work.

2. Home Page



The home screen is the essential page of the Sunsynk inverter. This page displays the real-time status of your system, as well as the daily production and power usage. Also, from the home screen, you can access a lot of information about the inverter.

2.1. Battery Energy IN/OUT

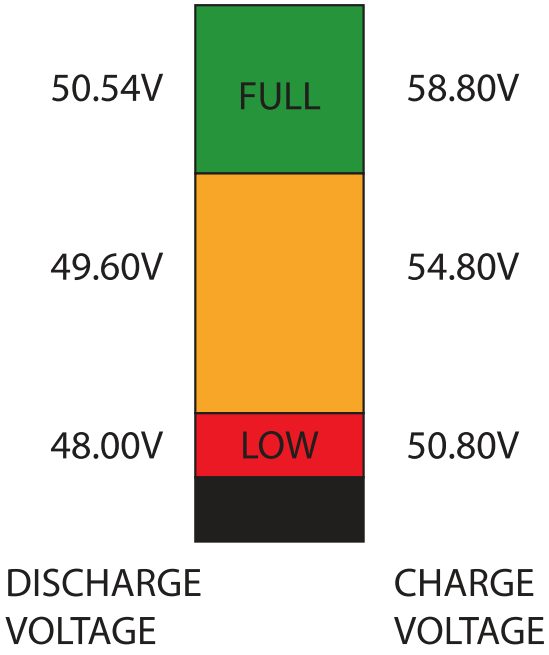


This part of the chart is the total energy into the battery during the day. It presents the total energy amount that charged the battery (IN) and all the energy provided by the battery (OUT). The IN value needs to be higher than the OUT, otherwise, the battery will go flat.

2.2. State of Charge (SOC)

Depending on how the installer has set the inverter, this value is shown on the display as in the chart on the right. SOC represents the battery charge as a percentage value. However, whether the inverter is not communicating to the battery via the BMS, the battery management system, or you are using gel type batteries this figure can be either inaccurate or expressed as a voltage.

SUNSYNK PARITY INVERTER CHARGE VOLTAGE



Since the batteries are 48V the figure on the left is x4:

- Fully Charged 50.54V (Discharge Mode)
- Fully Charged 58.50V (Charge Mode)
- 75% Charged 49.60V (Discharge Mode)
- 75% Charged 54.80V (Charge Mode)
- 25% Charged 48.00V (Discharge Mode)
- 25% Charged 50.80V (Charge Mode)
- Completely Discharged 47.50V

Setting the cut-off higher is better for the batteries.

The batteries normally used in the recommended Sunsynk systems are AGM lead acid or lithium battery bank. ('AGM' The Absorbed Glass Matt construction allows the electrolyte to be suspended near the plate's active material. In theory, this enhances both the discharge and recharge efficiency.)

State of Charge

Bulk: Involves about 80% of the recharge in which the charger current is held constant (in a constant current charger), and voltage increases. The properly sized charger will give the battery as much current as it will accept up to charger capacity (25% of battery capacity in Amp hours)

Absorption: Remaining charge equals 20%, approximately. It makes the charger to hold the voltage at the charger's absorption voltage (between 14.1 VDC and 14.8 VDC, depending on charger set points) and decreasing the current until the battery is fully charged.

Float: The charging voltage is reduced to between 13.0 VDC and 13.8 VDC and held constant, while the current is reduced to less than 1% of battery capacity. This mode can be used to maintain a fully charged battery indefinitely.

Equalisation: This is essentially a controlled overcharge (the peak voltage the charger) that attains at the end of the BULK mode (absorption voltage) an equalisation voltage, but technically it's not. Higher capacity wet (flooded) batteries sometimes benefit from this procedure, particularly the physically tall batteries. The electrolyte in a wet battery can stratify over time, if not cycled occasionally. In equalisation, the voltage is brought up above typical peak charging

voltage well into the gassing stage and maintained for a fixed (but limited) period. This stirs up the chemistry in the entire battery, “equalising” the strength of the electrolyte, and knocking off any loose sulfating that may be on the battery plates.

2.3. Solar

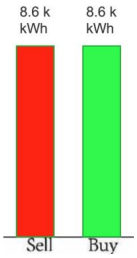
This column bar is the power produced by the photovoltaic system for 24 hours. This value resets automatically at midnight every day.

2.4. GEN

If you have a generator connected to your system this will show the total operating time of your generator for 24 Hours.

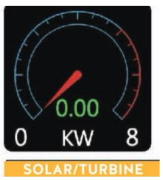
2.5. Sell / Buy

This chart shows the total power that you have bought or sold to the grid in the last 24 hours. This value resets automatically at midnight every day.



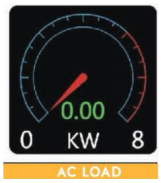
2.6. Solar / Turbine Dial

This dial presents the instantaneous power produced by the solar system / wind turbine.



2.6. AC Load Dial

This dial presents the instantaneous power consumed by the load.

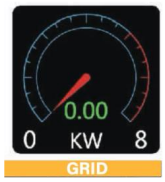


2.7. Battery Dial

This dial presents the instantaneous power consumed or supplied by the batteries.

2.8. Grid Dial

This dial presents the instantaneous power consumed or exported to the grid. If the dial shows a negative value it means that the inverter is injecting power into the grid.



2.9. Settings Icon

This gear icon accesses all the inverter settings (it may be locked). Unless you know what to do, it is suggested that only photovoltaic installers adjust these settings.

2.10. Status Icon

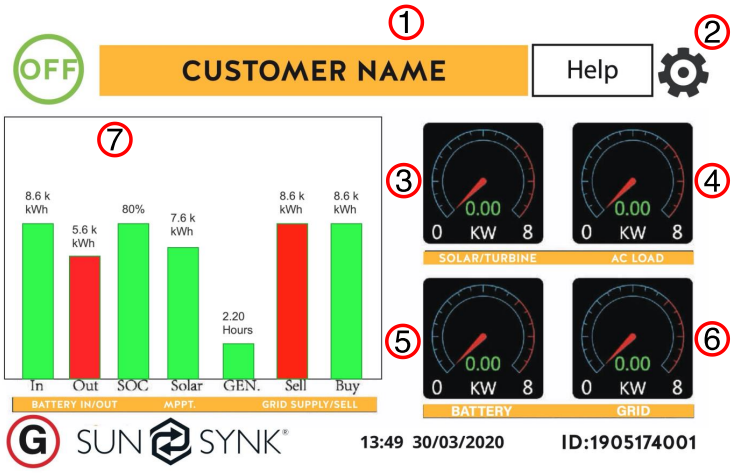
This will indicate whether the inverter is being remote controlled or updated. Also, it indicates fault codes.

2.11. Real Time and Serial Number

The home page also show the real time and the inverter serial number.

3. Accessing System Report Pages

From the home page, the user can access many report pages:



1. Customer name
2. Access settings menu page
3. Access solar history
4. Access system status page
5. Access system status page
6. Access grid history
7. Access system flow page

3.1. Accessing Status Page

To access the Status page, click on the “Battery” or “AC Load” dial on the Home page.

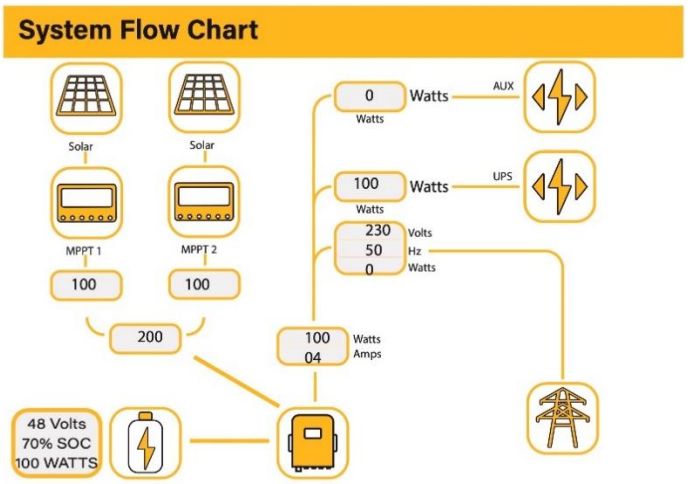
What this page displays:

- Total solar power produced
- MPPT 1 power/voltage/current
- MPPT 2 power/voltage/current
- Grid power
- Grid frequency
- Grid voltage
- Grid current
- Inverter power
- Inverter frequency
- Inverter voltage
- Inverter current
- Load power
- Load voltage
- Battery power charge/discharge
- Battery SOC
- Battery voltage
- Battery current
- Battery temperature

0 Watts 0.00 V 0.00 Amps 0.0 C	0 watts 0 Hz 0 Volts 0.0 Amps CT:0Watts LD: 0Watts	0 Watts 0.00 Volts 0.0 Amps
Battery	Grid Power	Solar Power 1
0 watts 0 Hz 0 Volts 0.0 Amps DC:100.0 C AC:100.0 C	0 Watts 0.00 Volts 0.0 Amps	0 Watts 0.00 Volts 0.0 Amps
Inverter Power	Load Power	Solar Power 2

3.2. Accessing System Flow Page

Access by clicking on the “Bar Chart ” on the home page.

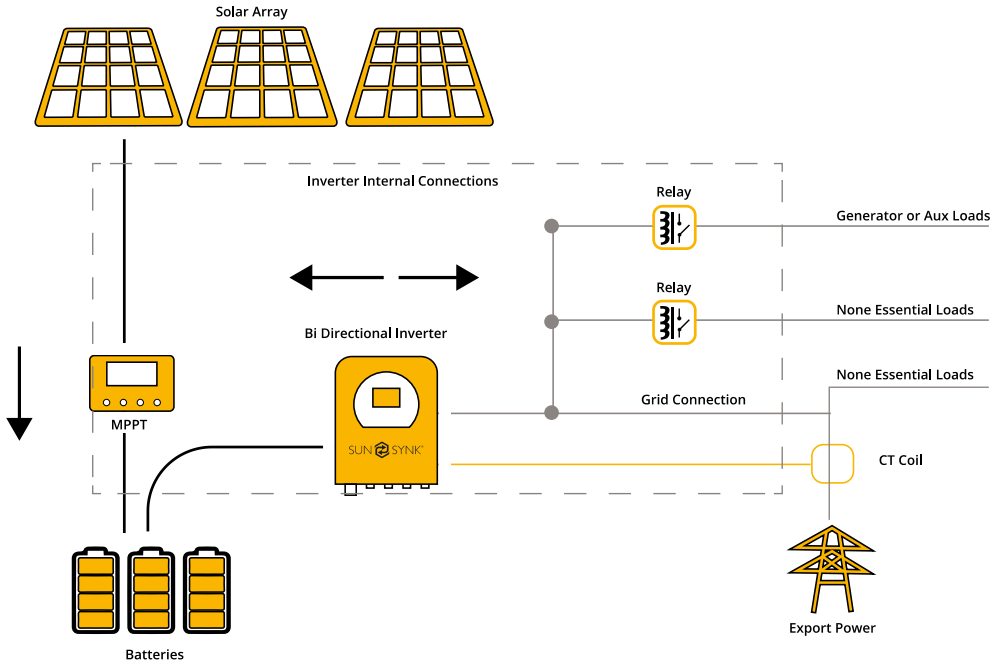


What this page displays:

- The system flow.
- MPPTs power.
- Battery status.
- Power distribution to load or grid.

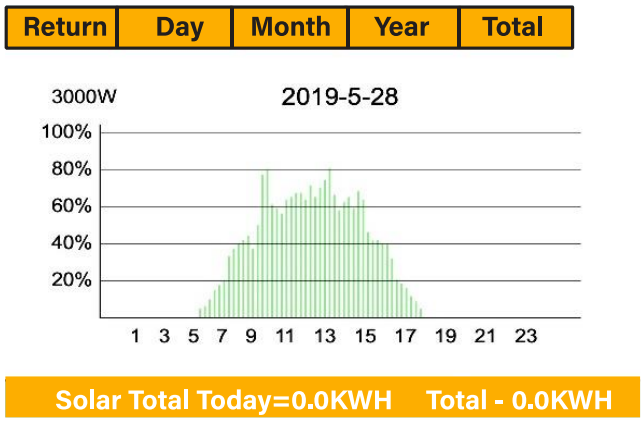
To understand better how the system works, take a look at the figure bellow:

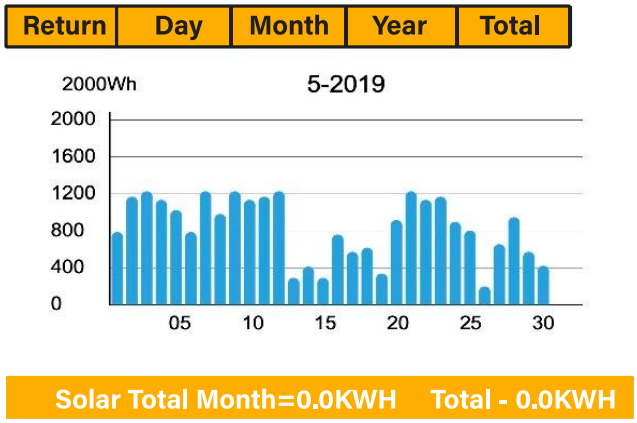
1. The PV modules charge the batteries.
2. When the batteries reach a specific level (programmable) the battery power is fed into the inverter.
3. The inverter can then supply power to the grid (export or no export), load, and auxiliary or smart load.
4. CT coil controls the export power.

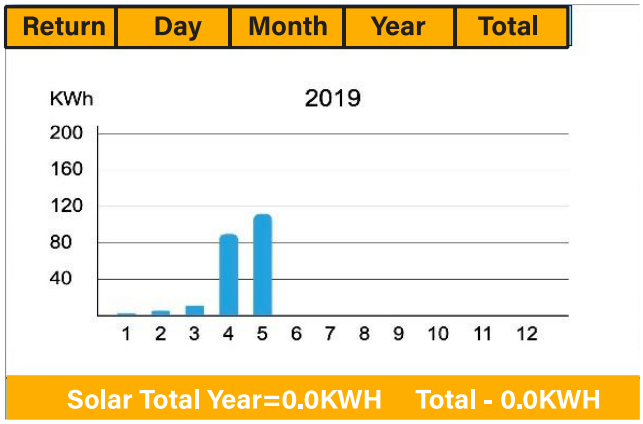


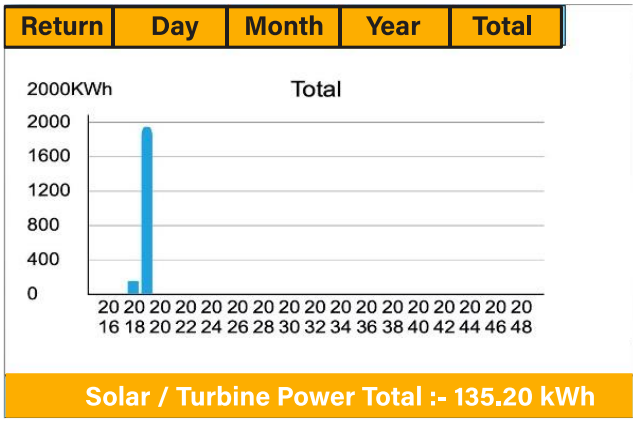
3.3. Accessing Generation and Usage History Files

To see power and energy data produced by the solar system click on the “Solar/Turbine” dial on the home page Then, you can click on “Day” to see daily data, “Month” to check monthly data, “Month” to see yearly data, and “Total” to check the total amount of energy produced.

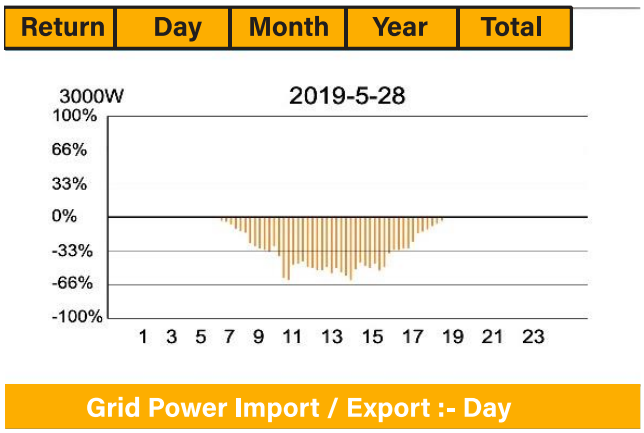


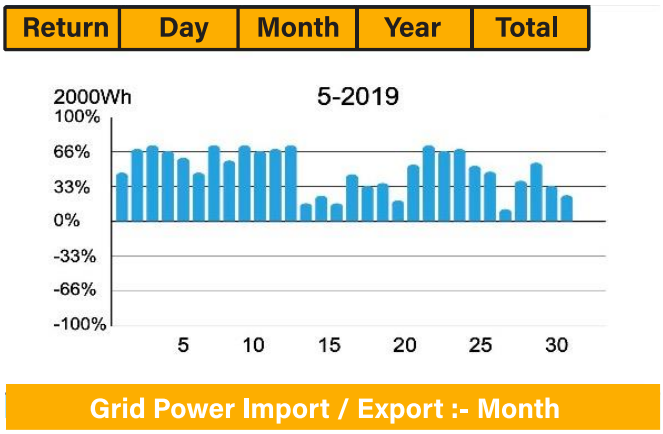


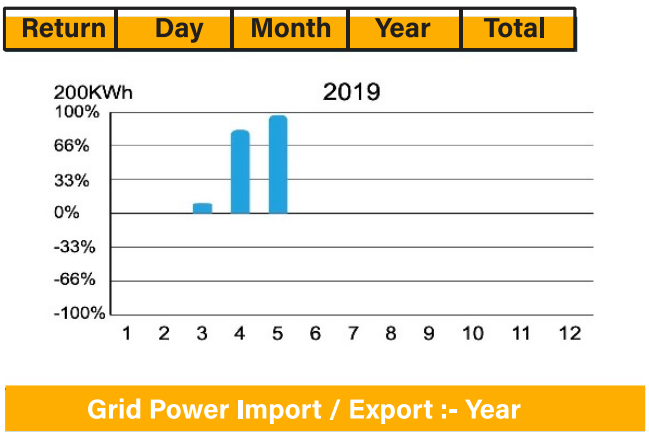


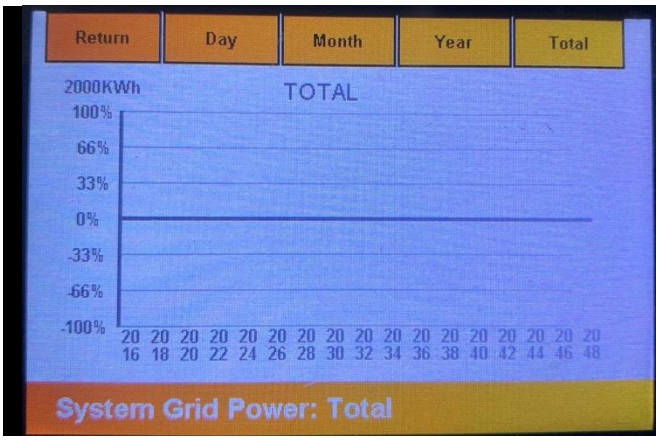


To see power and energy consumed or exported to the grid click on the “Grid” dial on the home page Then, you can click on “Day” to see daily data, “Month” to check monthly data, “Month” to see yearly data, and “Total” to check the total amount of energy consumed or exported.



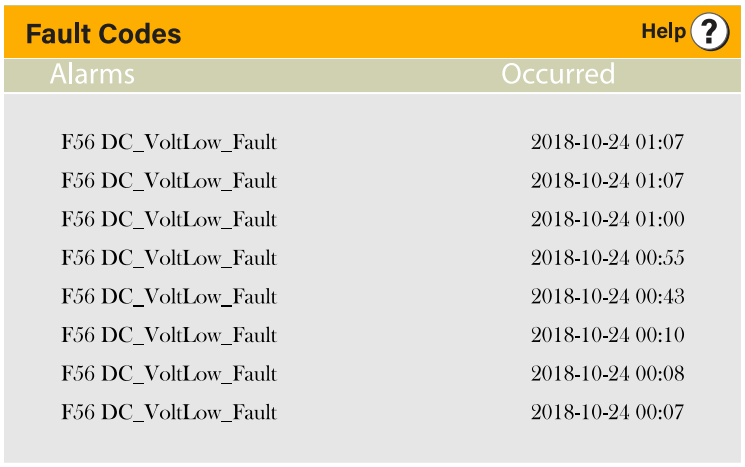






3.4. Accessing Fault Codes

To check fault codes click on the “Fault Codes” icon on the Settings menu.



If any of the fault messages listed in the following table appear on your inverter and the fault has not been removed after restarting, please contact your local vendor or service center. The following information is required:

1. Inverter serial number.
2. Distributor or service center of the inverter.
3. On-grid power generation date.
4. The problem description (including the fault code and indicator status displayed on the LCD) is as detailed as possible.
5. Your contact information.

Error Code	Description	Solutions
F13	Working Mode Change	Inverter work mode changed 1. Reset the inverter. 2. Seek help from Sunsynk.
F18	AC over current fault or hardware	AC Slide over current fault. 1. Check if the backup load power is within the range of the inverter. 2. Restart, and check if it is normal.
F20	DC over current fault of the hardware	DC Over current fault 1. Check if PV module and battery connections. 2. Reset the system.
F23	AC leakage current is trans over current	Leakage current fault 1. Check the PV module and inverter cables. 2. You may have a faulty PV panel (earth short) 3. Restart inverter
F24	DC insulation impedance failure	PV isolation resistance is too low 1. Check if the connection of PV panels and inverter are firmly connected. 2. Check if the earth bond cable on inverters is connected to the ground.
F26	The bus bar is unbalanced	1. Please wait 5 minutes to see if it returns to normal. 2. Fully reset the inverter.
F35	No at: grid	1. Check if the inverter's connected to the AC grid. 2. Check if the RSCD had not tripped. 3. Check if the switch and fuses between the inverter and grid are all switched on.
F42	AC line low voltage	Grid voltage fault 1. Check if the voltage is in the range of standard voltage in specification this can be adjusted via the grid set up page. 2. Check if grid cables are correctly connected.
F47	AT over frequency	Grid voltage fault 1. Check if the voltage is in the range of standard voltage in specification this can be adjusted via the grid set up page.

		2. Check if grid cables are correctly connected.
F48	AC lower frequency	Grid frequency out of range 1. Check if the frequency is in the range of specification 2. You may need to adjust the frequency on the grid set up page.
F56	DC bus bar voltage is too low	Battery low voltage 1. Check if the battery voltage is too low. 2. If the battery voltage is too low use the PV or grid to charge the battery. 3. Check the battery BMS
F64	Heat sink high-temperature failure	Heat Sink temp is too high 1. Check if the working environment temperature is too high. 2. Turn off the inverter for 30 minutes and restart.

Fault Information	Instruction	Fault Information	Structure
F01	DC_Inversed_Failure	F33	AC_OverCurr_Fault
F02	DC_Insulation_Failure	F34	AC_Overload_Fault
F03	GFDI_Failure	F35	AC_NoUtility_Fault
F04	GFDI_Ground_Failure	F36	AC_GridPhaseSeque_Fault
F05	EEPROM_Read_Failure	F37	AC_Volt_Unbalance_Fault
F06	EEPROM_Write_Failure	F38	AC_Curr_Unbalance_Fault
F07	GFDI_Fuse_Failure	F39	INT_AC_OverCurr_Fault
F08	GFDI_Relay_Failure	F40	INT_DC_OverCurr_Fault
F09	IGBT_Failure	F41	AC_WU_OverVolt_Fault
F10	AuxPowerBoard_Failure	F42	AC_WU_UnderVolt_Fault
F11	AC_MainContactor_Failure	F43	AC_VW_OverVolt_Fault
F12	AC_SlaveContactor_Failure	F44	AC_VW_UnderVolt_Fault
F13	Working_Mode_change	F45	AC_UV_OverVolt_Fault
F14	DC_OverCurr_Failure	F46	AC_UV_UnderVolt_Fault
F15	AC_OverCurr_Failure	F47	AC_OverFreq_Fault
F16	GFCI_Failure	F48	AC_UnderFreq_Fault
F17	Tz_COM_OC_Fault	F49	AC_U_GridCurr_DcHigh_Fault
F18	Tz_Ac_OverCurr_Fault	F50	AC_V_GridCurr_DcHigh_Fault
F19	Tz_Integ_Fault	F51	AC_W_GridCurr_DcHigh_Fault
F20	Tz_Dc_OverCurr_Fault	F52	AC_A_InductCurr_DcHigh_Fault
F21	Tz_GFDI_OC_Fault	F53	AC_B_InductCurr_DcHigh_Fault
F22	Tz_EmergStop_Fault	F54	AC_C_InductCurr_DcHigh_Fault

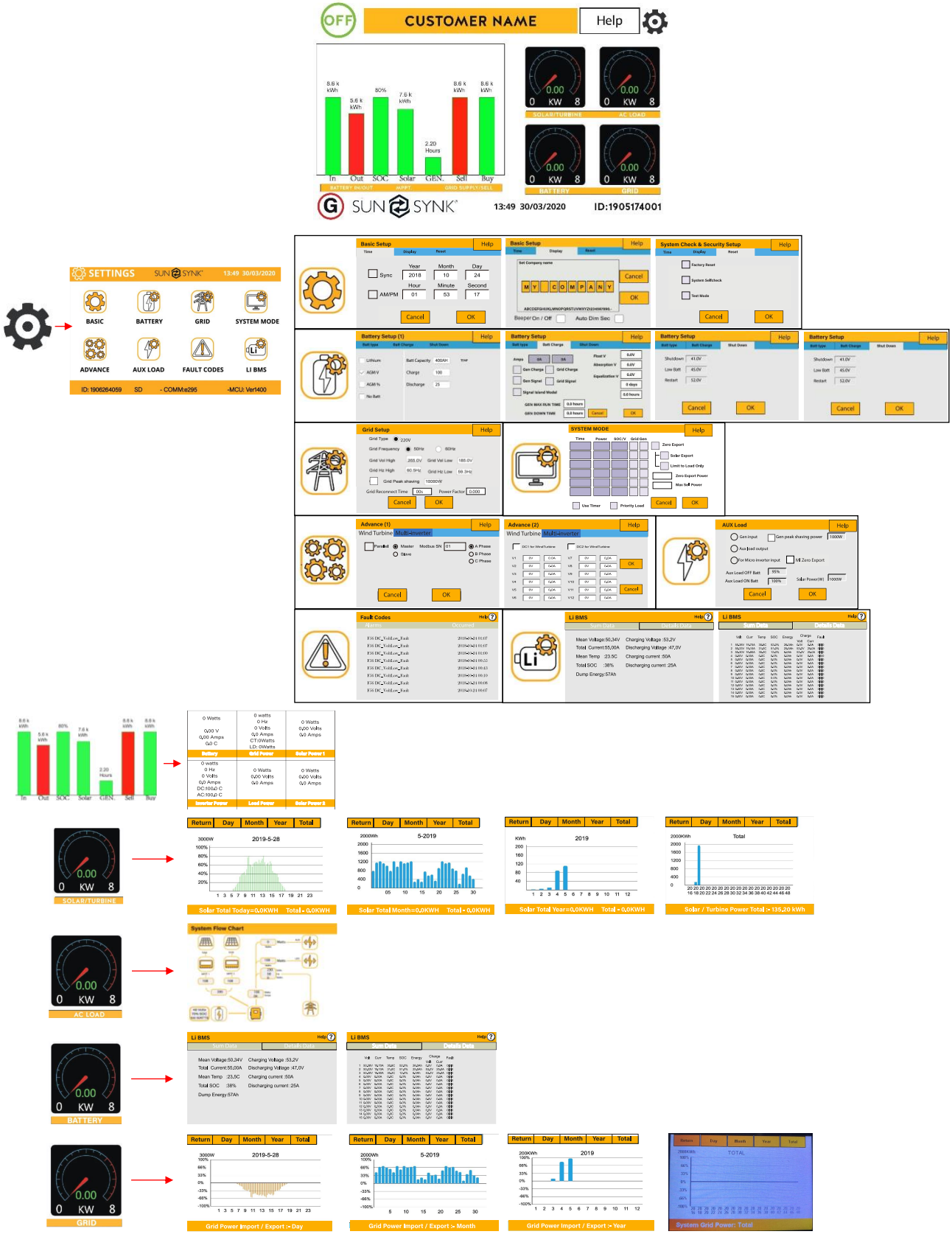
F23	Tz_GFCI_OC_Fault	F55	DC_VoltHigh_Fault
F24	DC_Insulation_Fault	F56	DC_VoltLow_Fault
F25	DC_Feedback_Fault	F57	AC_BackFeed_Fault
F26	BusUnbalance_Fault	F58	AC_U_GridCurr_High_Fault
F27	DC_Insulation_ISO_Fault	F59	AC_V_GridCurr_High_Fault
F28	DCIOver_M1_Fault	F60	AC_W_GridCurr_High_Fault
F29	AC_AirSwitch_Fault	F61	AC_A_InductCurr_High_Fault
F30	AC_MainContactor_Fault	F62	AC_B_InductCurr_High_Fault
F31	AC_SlaveContactor_Fault	F63	ARC_Fault
F32	DCIOver_M2_FaulT	F64	Heatsink_HighTemp_Fault

NOTE

- The energy storage inverter is designed according to the grid-connected operation.
- The inverters meets the safety and electromagnetic compatibility requirements as established in the main standards. Moreover, before leaving the factory, the inverter undergoes several rigorous tests to ensure that the inverter can operate reliably, as presented in Section 4 “Technical

If you need further help please refer to the Sunsynk website where you will find training videos and frequently asked questions www.sunsynk.com.

Appendix


OFF
CUSTOMER NAME
Help
SUN SYNK
13:49 30/03/2020
ID:1905174001
SETTINGS
BASIC
BATTERY
GRID
SYSTEM MODE
ADVANCE
AUX LOAD
FAULT CODES
LI BMS
Basic Setup
Battery Setup (1)
Grid Setup
SYSTEM MODE
Advance (1)
Advance (2)
AUX Load
Fault Codes
Li BMS
SOLAR/TURBINE
AC LOAD
BATTERY
GRID
System Flow Chart
Solar Total Today=0.0KWH Total=0.0KWH
Solar Total Month=0.0KWH Total=0.0KWH
Solar Total Year=0.0KWH Total=0.0KWH
Solar / Turbine Power Total :=135.20 kWh
Grid Power Import / Export :=Day
Grid Power Import / Export :=Month
Grid Power Import / Export :=Year
System Grid Powar: Total

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