User’s Manual
3.6kWh All in One

SAMSUNG SDI

Table of Contents

1 Information in this Manual

1.1 About this Manual

This is the user's manual for the Samsung 3.6kWh All in One. Users of this device must refer to the user's manual, installation manual and the application note.

1.2 Target Group

This user's manual applies only to the 3.6kWh All in One.

1.3 Additional Information

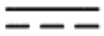
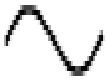
The user's manual and installation manual can be downloaded from the product download section at "https://myess.samsungsdi.com". Specification of the product can be change without any notice to customers for the system improvement.
And software can be update without any notice to customers via internet.

1.4 Symbols Used

Symbols	Meaning
	CAUTION!
	CAUTION represents hazardous situations which can cause light injuries if not avoided.
	NOTICE!
	NOTICE represents the situations which can cause damage to property if not avoided.
	Information
	"INFORMATION" provides tips that are valuable for optimum installation and operation of the product.

Symbol	Description
	Beware dangerous voltage. The inverter operates at high voltage. All works related to the inverter can only be performed by an electrical technician.

	Beware hot surface. The inverter can get hot during operation. Avoid contact in operation.
	Follow the guidelines of all relevant documents enclosed with the inverter.
	Do not dispose of the inverter with household wastes. For detailed disposal information, please refer to the installation manual provided.
	CE indication. The relevant equipment complies with the requirements in the EC guidelines.

Number	Symbol	Description
1		Direct current
2		Alternating current
3		Both direct and alternating current
4		Three-phase alternating current
5		Three-phase alternating current with neutral conductor
6		Earth terminal
7		Protective conductor terminal

Number	Symbol	Description
8		Frame or chassis terminal
9		Refer to the operating instructions

10		On (supply)
11		Off (supply)
12		Equipment protected throughout by double insulation or reinforced insulation
13		Caution, risk of electric shock
14		Caution hot surface

Number	Symbol	Description
15		Caution, risk of danger
16		In position of a bi-stable push control
17		Out position of a bi-stable push control
18		Input terminal or rating
19		Output terminal or rating
20		Bidirectional terminal rating
21		Caution, risk of electric shock, Energy storage timed discharge
22		Caution, risk of hearing damage. Wear hearing protection

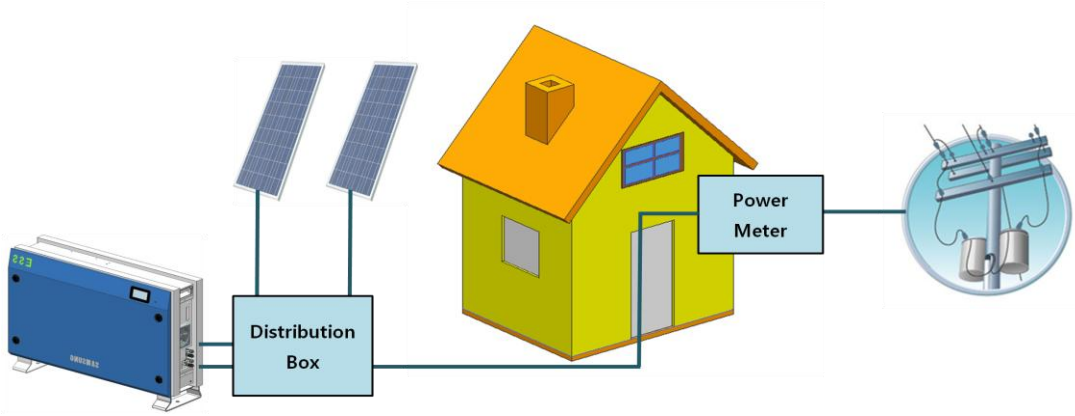
2 Safety

2.1 Intended Usage

The original usage purpose of this device is for household single-phase system link solar energy generation and Li-Ion Battery charge and discharge. The basic operations are as follows.

Samsung 3.6kWh All in One uses solar energy power connected to the input/output terminal installed on the side of the device to charge the Li-Ion Battery installed inside, and converts the direct current electricity of the battery to alternating current to discharge as household single-phase load or electric system, or uses the electric system of electric energy to charge the battery.

It is recommended not to use this device for other than the purpose described in this manual. The substitute use of this device, random change, and use of components other than sold or recommended by Samsung SDI will nullify the product guarantee. For inquiries about the proper use of this device, please contact the Samsung SDI Service line (Refer to the contact).



3.6kWh All in One

2.1.1 Identifying the Product

On the enclosure of this device, Type Label is attached. In the Type Label, the identity of this product is described. The contents below are indicated on the Type Label. For safe usage, the user must be well-informed of the contents in the Type Label. The Type Label includes:

Product Name
Device Type (Model)
Serial Number (Serial No.)
Device-specific characteristics
Certification Lists
Warnings and Notification

The model No. of 3.6kWh All in One system is defined as below.

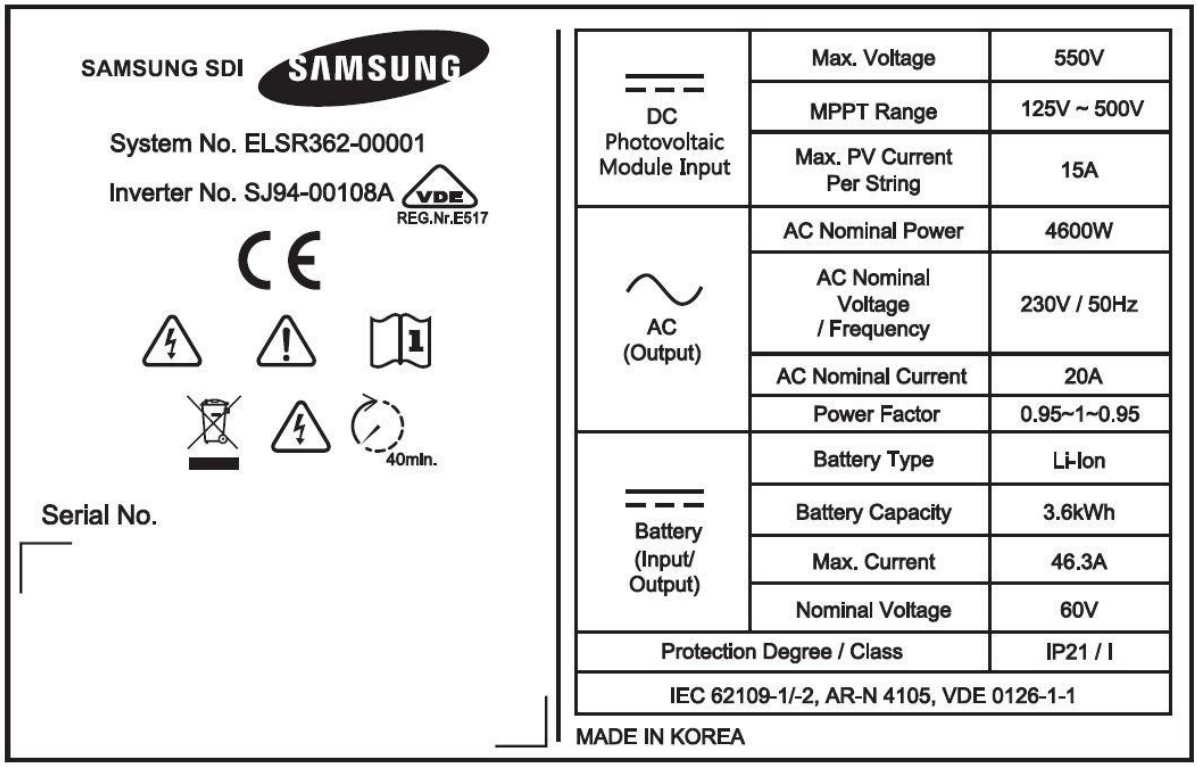
ESLR362-00001

ESLR: Residential application
36: Battery capacity (x0.1kWh)
2: Battery capacity group (Less than 10kW)
0001: product line number

The model No. of PCS (power conditioning system) is defined as below.

SJ94-00108A
SJ: battery for ESS
94: Ass'y
00108: product number
A: version type

The Table below is the Type Label.

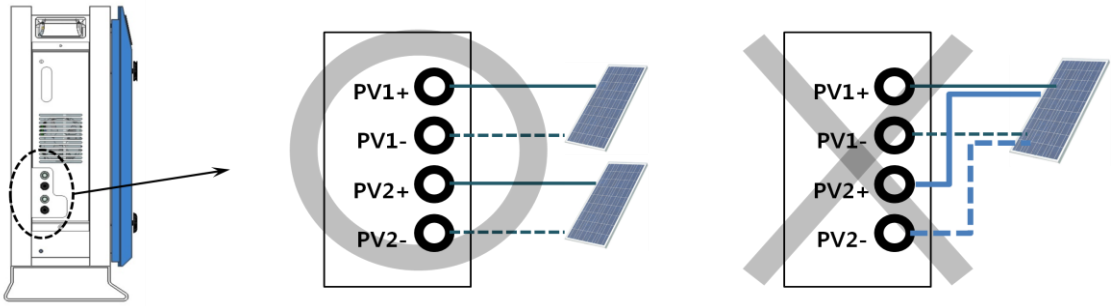


DC Photovoltaic Module Input	Max. Voltage	550V
	MPPT Range	125V ~ 500V
	Max. PV Current Per String	15A
AC (Output)	AC Nominal Power	4600W
	AC Nominal Voltage / Frequency	230V / 50Hz
	AC Nominal Current	20A
	Power Factor	0.95~1~0.95
Battery (Input/ Output)	Battery Type	Li-Ion
	Battery Capacity	3.6kWh
	Max. Current	46.3A
	Nominal Voltage	60V
Protection Degree / Class		IP21 / I
IEC 62109-1/-2, AR-N 4105, VDE 0126-1-1		

MADE IN KOREA

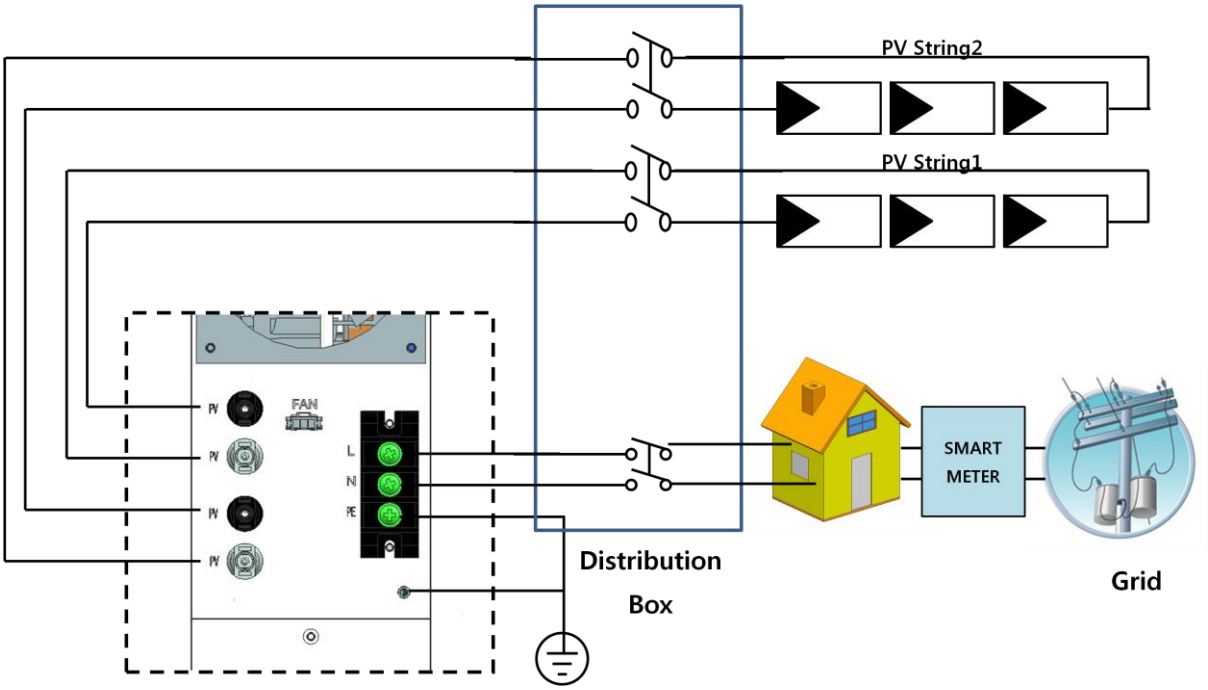
2.1.2 Installation Application Suitable for Safety

This device, Samsung RES 3.6kWh All in One is designed to be suitable for household purposes. The PV Input terminal is composed of two Strings, and one PV String input must install 3.3kW or less PV panel capacity. Also, the maximum input voltage of the PV String must be limited to 550V or less.
Two independent channels of the PV Input exist in the 3.6kWh All in One as shown in the figure below, ({PV1+, PV1-}, {PV2+, PV2-}). They are used independently for running the maximum power from the sources, PV1 and PV2. For the two PV Inputs, independent use of two channels is recommended. The parallel connection of one PV string into two independent PV inputs (PV1, PV2) should be avoided (Refer to 3.6kWh All in One Solar energy input connection in the Figure below). PV common mode is not allowed.



3.6kWh All in One Solar energy input connection

For 3.6kWh All in One and Public Grid connection, the watt-hour meter (refer to the installation manual) recommended by Samsung SDI must be installed first, and between the Grid watt-hour meter and the 3.6kWh All in One, distribution box must be installed. For the distribution box, the equipment recommended by the installation company must be used. For installation, it must be installed in a location complying with the IP21. Installation in a location that does not comply with the IP21 may cause failure and the product will not be guaranteed for any related accident or damage. For details, refer to the Installation Guide. The Figure below is the complete connection.

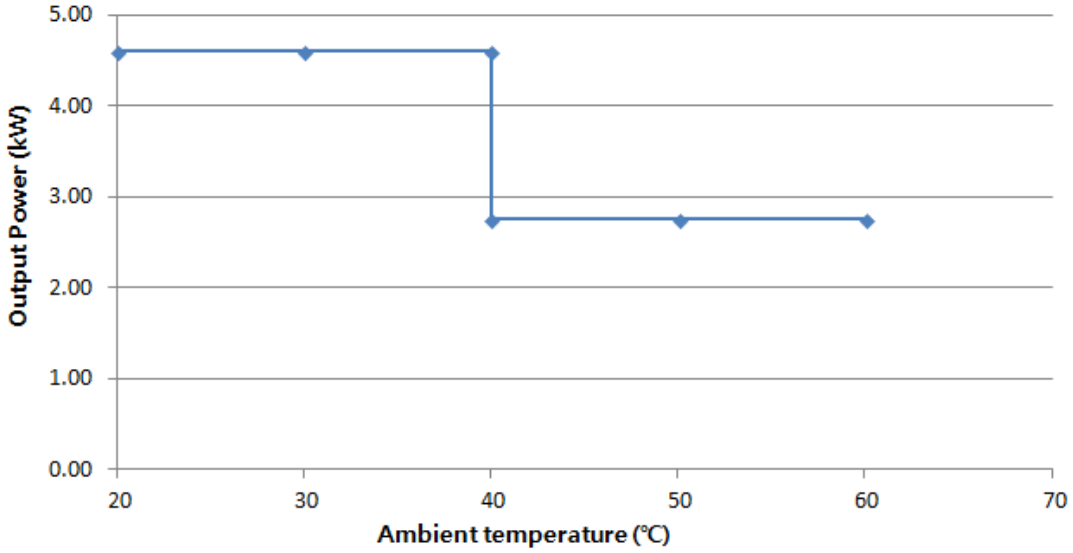


2.1.3 Technical Specifications

Rating	Units
PV input quantities:	
Vmax PV(absolute maximum)	DC 550V
PV input operating voltage range	DC 125~500V
Maximum operating PV input current per string	DC 15A
Isc PV (absolute maximum)	DC 20A

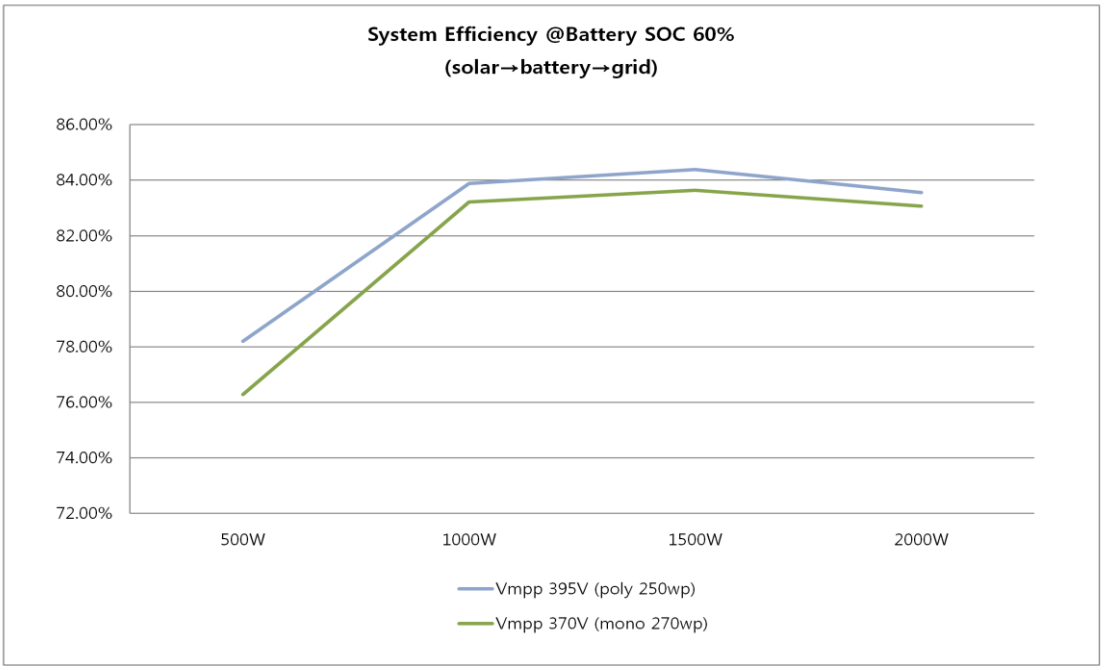
Max. inverter backfeed current to the array	0A
AC output quantities:	
Voltage (nominal or range)	AC 230V (184V ~ 264.5V)
Current (maximum continuous)	AC 25A
Current (inrush)	68.6A peak, 100us
Frequency (nominal or range)	50 Hz (47.5Hz~51.5Hz)
Power (maximum continuous)	4600W or VA
Power factor ranger	0.95 ~ 1 ~ 0.95
Maximum output fault current	AC Current (peak/duration) : 420A/4ms
Maximum output over current protection	AC 30A RMS
Harmonic distortion of output current (at THD<2%, P_{AC}> 0.5 P_{ACnom})	5%
AC input quantities:	
Voltage (nominal or range)	AC 230V (184V ~ 264.5V)
Current (maximum continuous)	AC 20A :
Current (inrush)	AC 68.6A peak, 100us
Frequency (nominal or range)	50 Hz (47.5Hz~51.5Hz)
DC input (other than PV) quantities:	
Battery Voltage (nominal or range)	DC 60V(nominal) : Range : 43~67V
Battery Current (nominal continuous)	DC 33.3A
Battery Current (max. continuous)	DC 46.5A
Average discharge depth	90% DOD (6000cycles)
DC output (other than PV) quantities:	
Battery Voltage (nominal or range)	DC 60V(nominal) : Range : 43~67V
Battery Current (nominal continuous)	DC 33.3A
Battery Current (max. continuous)	DC 46.5A
Other quantities:	
Protective class(I, II, III)	Class I
Ingress protection (IP) rating per part 1	IP21
AC connection	1 phase
Operating temperature	-10~40° C
Storage temperature	-20~60° C
Over voltage category	III

Battery data	**Value**	**Unit**
Battery Capacity	3.6	kWh
Battery voltage range/nominal voltage	43.2 ~ 67.2 /60	Vdc
Battery Max. current	47	A
Battery DC/DC data	**Value**	**Unit**
Nominal Power	2.0	kW
Technology	Isolated	-
PV inverter connection data	**Value**	**Unit**
Max. input total power	6.6	kWp
Max. input power per string	3.3	kWp
Max. input voltage	550	Vdc
Min. input voltage/Initial input voltage	125/150	Vdc
MPPT voltage	125~500	Vdc
Max. input current per string	15	A
Number of MPP trackers	2	EA
Max. number strings	2	EA
Grid connection data	**Value**	**Unit**
Nominal output power	4.6	kW
Max. nominal output power	5	kVA
Max. output current	25	A
Max. allowed fuse protection	32	A
Harmonic distortion of output current (at THD<2%, P_{AC}> 0.5 P_{ACnom})	5	%
Nominal AC voltage/range	230/184~264	V
AC grid frequency	50	Hz
Over voltage category	III	-
AC connection	1	phase
Operating temperature	-10~40	° C
Storage temperature	-20~60	° C



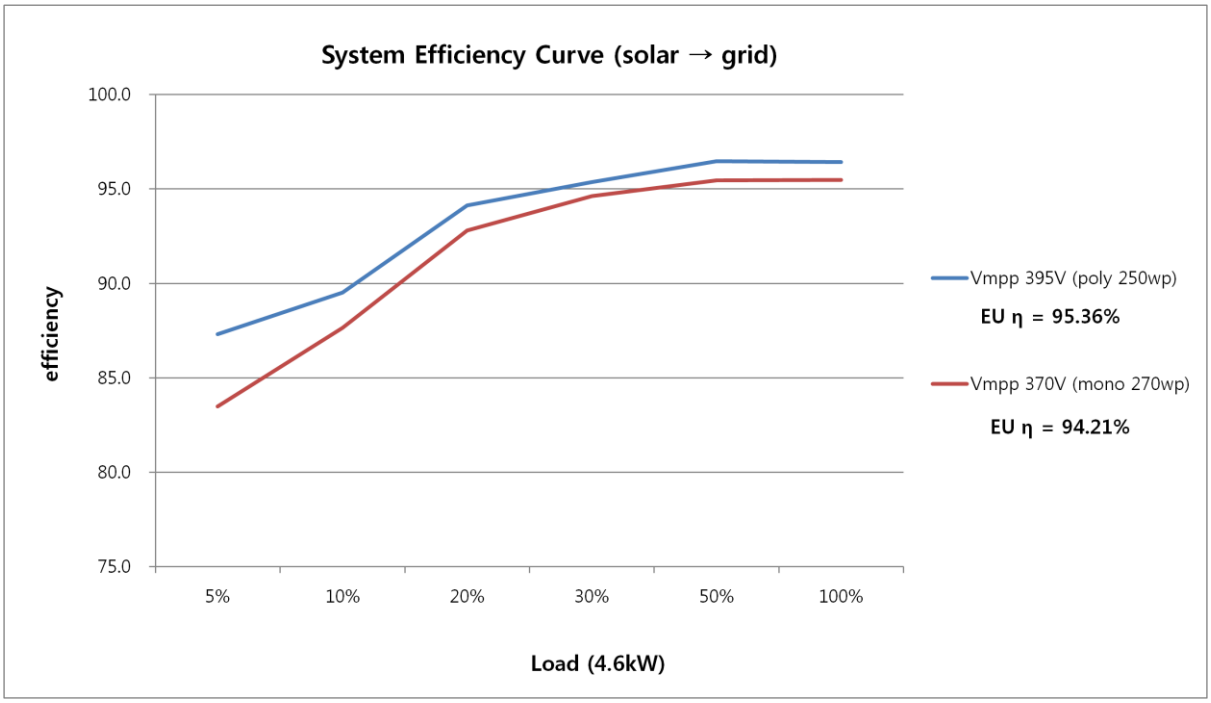
Derating Curve

System Efficiency Curve (poly 250wp, mono 270wp)



Power efficiency curve

Efficiency Curve of PV module (poly 250wp, mono 270wp)



Power efficiency curve

2.2 Safety Guidelines

	DANGER High voltages in power conditioning circuits. Lethal hazards resulting in electric shock and burns The following work on the inverter must be carried out by qualified personnel only. Electrical insulation Repairs Modification

	Except when under supervision by qualified personnel, children or people lacking physical, mental or intelligence capability should not work on this system. The system should be installed out of the reach of children. Even when no external voltage is applied to the system, it may have internal high voltage in the device. High voltage can cause lethal damage to the human body.

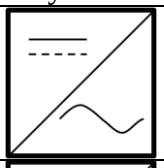
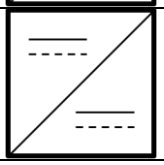
	CAUTION Photovoltaic array supplies DC voltage to the 3.6kWh All in One system. Do not touch PV cable when PV cable is connected to PV arrays.

	CAUTION! Li-Ion battery ESS (energy storage system) inside. When assembling the system, do not intentionally make a short condition between the positive (+) and negative (-) terminals of the ESS with a metallic object. All work on the ESS and electrical connections must be carried out by qualified personnel only. ESS inside 3.6kWh All in One provides a safe source of electrical energy when operated as intended and as designed. Potentially hazardous circumstances such as excessive heat or electrolyte mist may occur under improper operating conditions, damage, misuse and/or abuse. The following safety precautions and the warning messages described in this section must be observed. If any of the following precautions are not fully understood, or if you have any questions, contact Customer Support for guidance. The Safety Section may not include all regulations for your locale; personnel working with 3.6kWh All in One must review applicable federal, state and local regulations as well as the industry standards regarding this product.
	CAUTION When transporting the All in One system with packaged type, remove the battery tray from the All in One system and transport it separately.

	NOTICE 1. Over voltages in the power conditioning circuits. Destruction of the All in One system means voiding of warranty claims. 2. Danger to life from electric shock due to damaged 3.6kWh All in One. Operating a damaged 3.6kWh All in One can lead to hazardous situations that may result in death or serious injuries due to electrical shock. Only operate the 3.6kWh All in One when it is technically faultless and in an operationally safe stat. Regularly check the All in One system for visible damage. Make sure that all safety equipment is freely accessible at all times. If the 3.6kWh All in One is damaged, do not touch. Please, immediately contact the installer or Samsung SDI. 3. Please contact SDI or installer if an LCD screen shows significant event messages. Please contact installer whenever the All in One system reports an event. Refer to the event message table for different significant/general events.

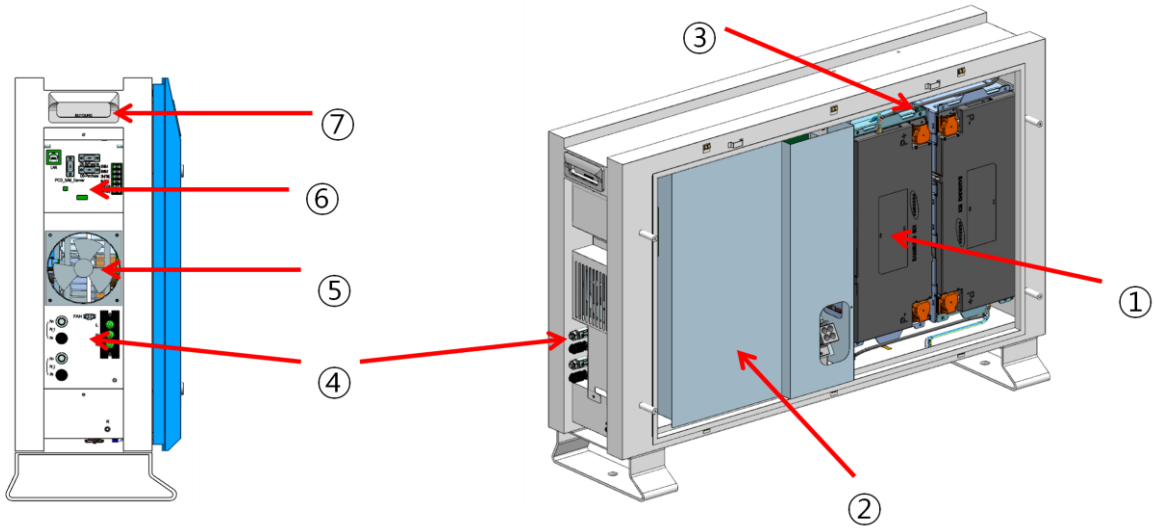
2.3 Symbol description

2.3.1 PCS Symbols

Symbol	Description
	Inverter
	dc/dc converter

3 Product Overview

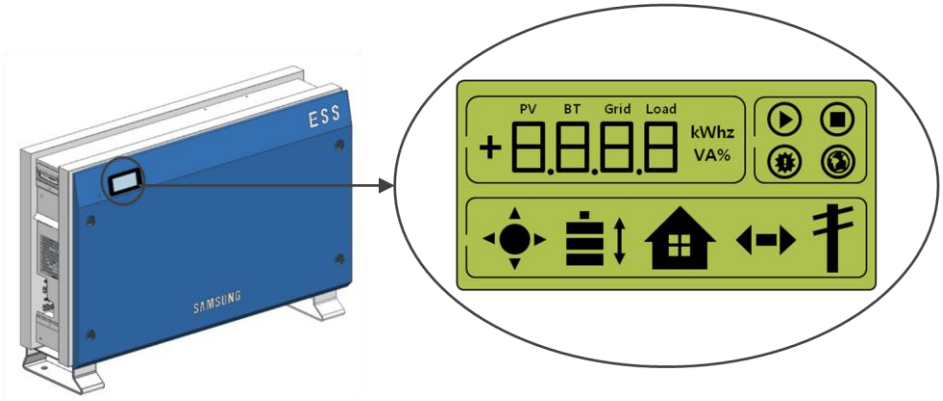
This device is an 3.6kWh All in One System including the PV inverter, battery charger / discharger, Lithium Ion battery, and EMS, and compared to existing products, installation is simple, and is an optimized solution to increase self-consumption rate at low cost.
The basic operation modes consist of PV generation mode, PV generation + charge / discharge mode, and battery discharge mode, and the type of operation mode is determined by the EMS command.



-	Description
1	Lithium Ion battery
2	PCS (PV inverter, battery charger / discharger)
3	Tray BMS
4	Input / Output terminal (MC4-2set, Grid connection terminal -L/N/PE)
5	Cooling Fan
6	Communication terminal block
7	Carrying handle

4 Operating Modes

The status of this system can be identified in real-time through the indication screen (LCD screen) shown in the Figure below. The status indication screen can indicate numbers up to 4-digits, and the icons are defined for each state. Details are described in subsections.



<Front status indication screen>

4.1 Operation Mode Description

This system is composed of 6 modes - PV Auto, PV Only, Battery discharge, Standby, A/S(forced charge), and Stand-alone mode. Otherwise, there exists event check status, which is not categorized as a mode.

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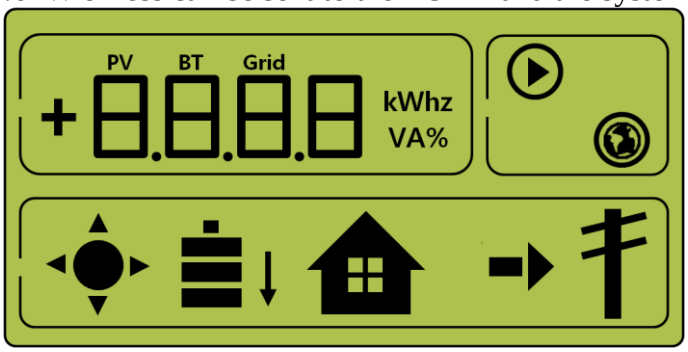
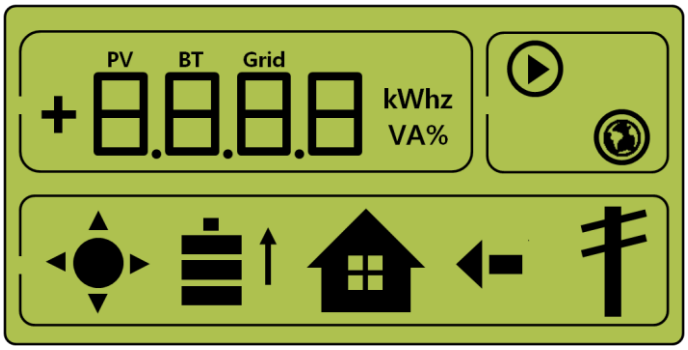
4.1.1 PV Auto Mode

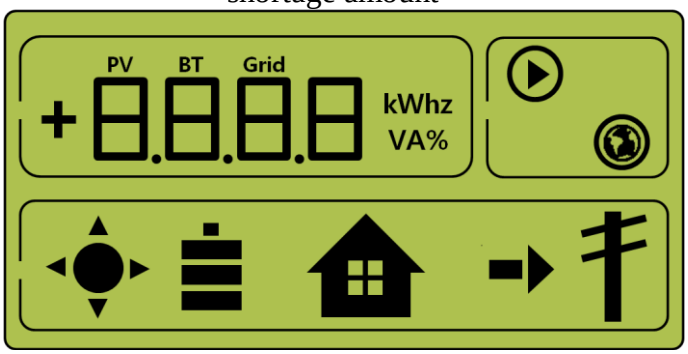
(1) Solar energy generation is possible and battery charge-discharge is possible.
(2) The solar energy generation power is charged or discharged to the battery through the EMS decision.
(3) Maximum 4.6kW or less can be sent to the LOAD and the system.



<Indication screen_1: Solar energy generation (Large), battery charge, home use, sell remaining amount>



<Indication screen_2: Solar energy generation (small), battery discharge, Home use, buy shortage amount>

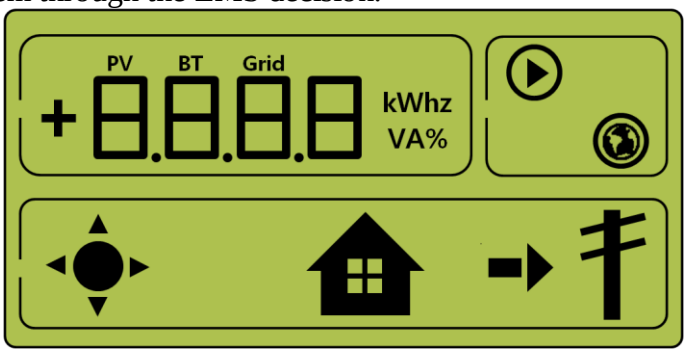


<Indication screen_3: Solar energy generation, Battery standby, Home use, sell remaining amount>

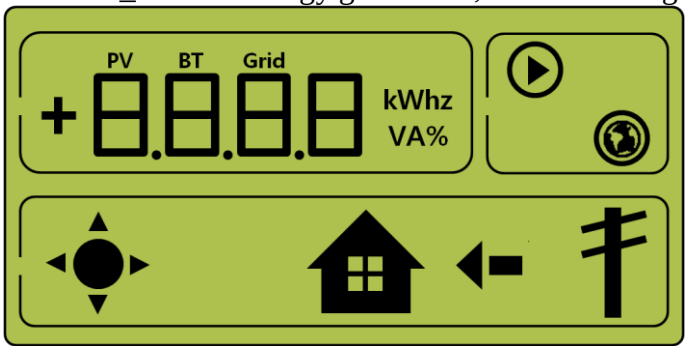
4.1.2 PV Only Mode

(1) This is the state enabled for solar energy generation. However, the battery charge-discharge does not operate.

(2) Maximum 4.6kW or less of solar energy generation power can be sent to the LOAD and the system through the EMS decision.



<Indication screen_1: Solar energy generation, Sell remaining amount>

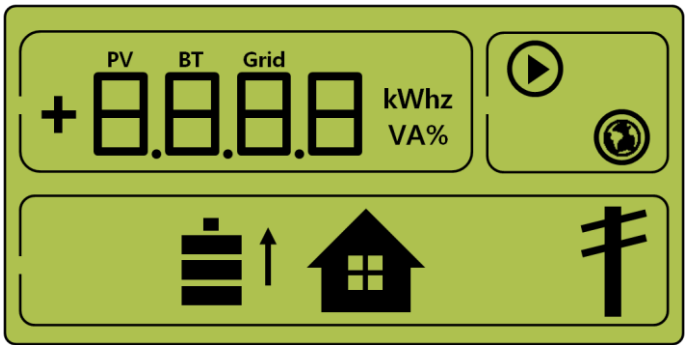


<Indication screen_2: Solar energy generation, Buy shortage amount>

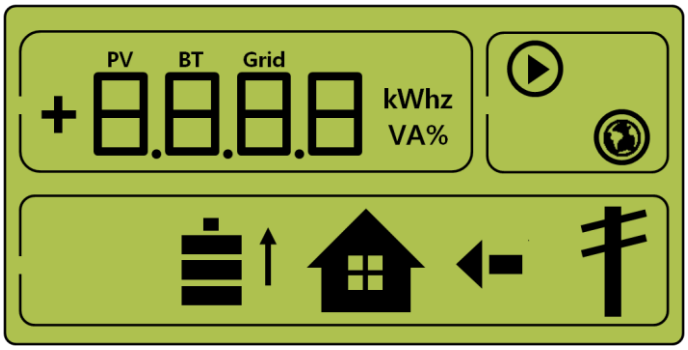
4.1.3 Battery Discharge Mode

(1) This is the state of having no solar energy generation. Only battery discharge is possible.

(2) By the EMS decision, the battery discharge power can be sent a maximum of 2kW or less only to the LOAD.



<Indication screen_1: Battery discharge, Home use>

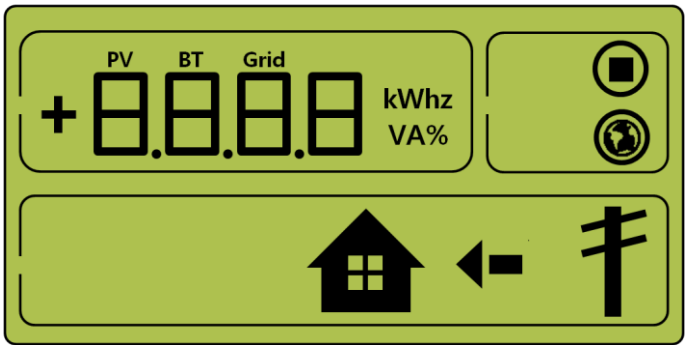


<Indication screen_2 : Battery discharge, Home use, Buy shortage amount>

4.1.4 Standby Mode

(1) This is the standby state before converting to the operation mode (PV Auto, PV Only, Battery discharge mode).

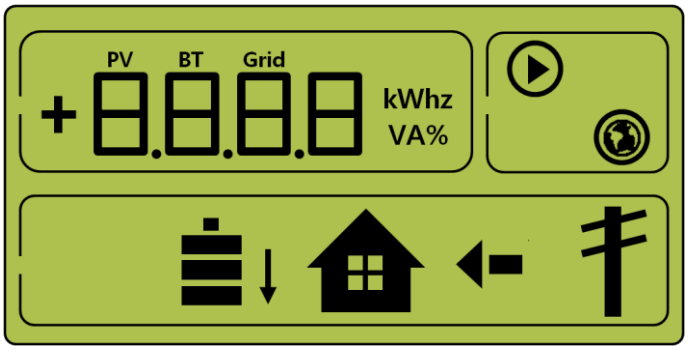
(2) Conversion to the operation mode (PV Auto, PV Only, Battery discharge mode) is made by the EMS decision.



<Indication screen on Standby Mode>

4.1.5 Forced Charged Mode (A/S mode)

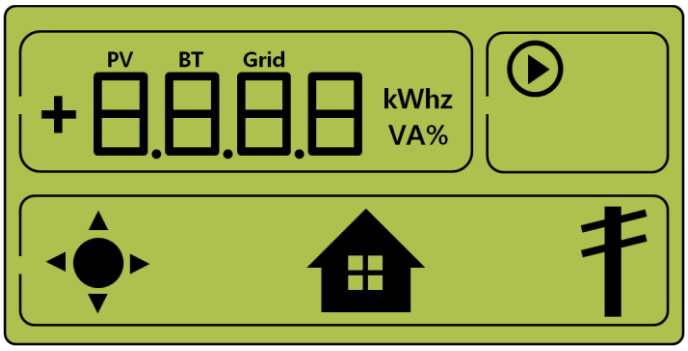
(1) This is the forced charge mode of the battery in system check. (Solar energy generation is not used.) This is the state where the power continuously flows from the electric power system to the battery.



<Indication screen on Forced charged Mode>

4.1.6 Stand-Alone Mode

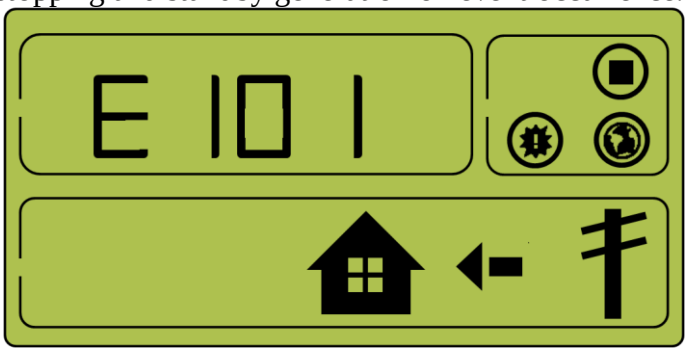
When the All in One is disconnected from the smart meter or the power conversion system is disconnected from the EMS(energy management system), the All in One system enters into the Stand-Alone Mode. The system operates in a PV- only mode.



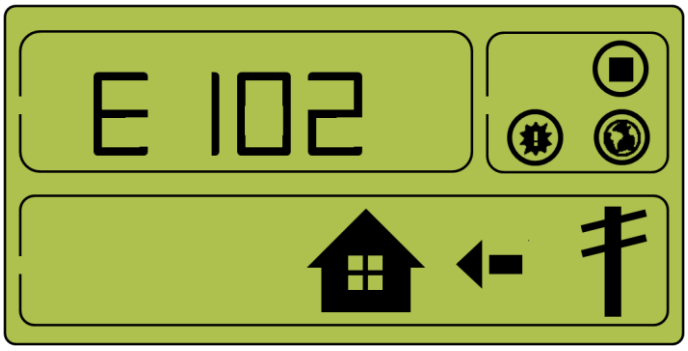
< Indication screen on stand-alone mode >

4.1.7 Event Checking Status

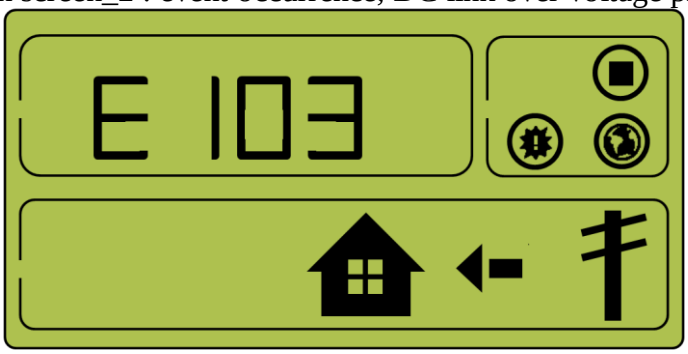
This is the mode of stopping and standby generation on event occurrence.



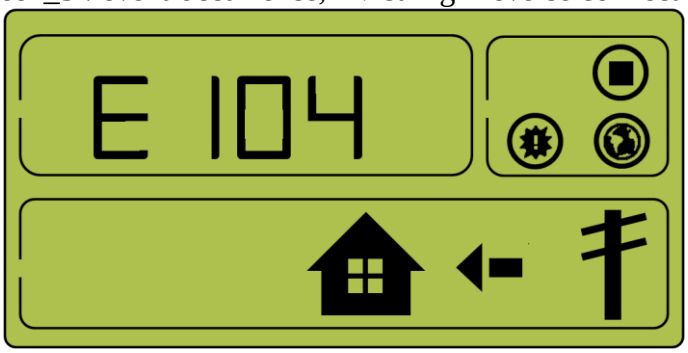
<Indication screen_1 : event occurrence, Grid RMS over current protection>



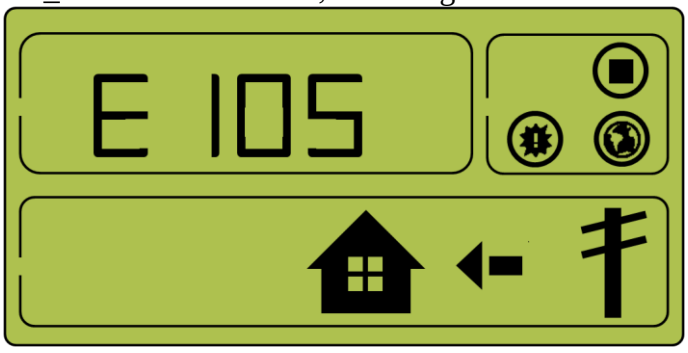
<Indication screen_2 : event occurrence, DC link over voltage protection>



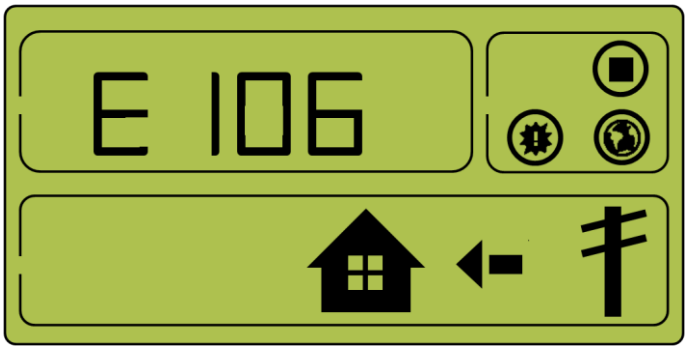
<Indication screen_3 : event occurrence, PV string1 reverse connection protection>



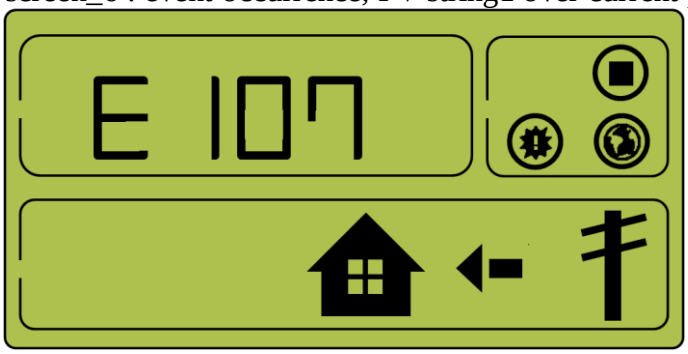
<Indication screen_4 : event occurrence, PV string2 reverse connection protection>



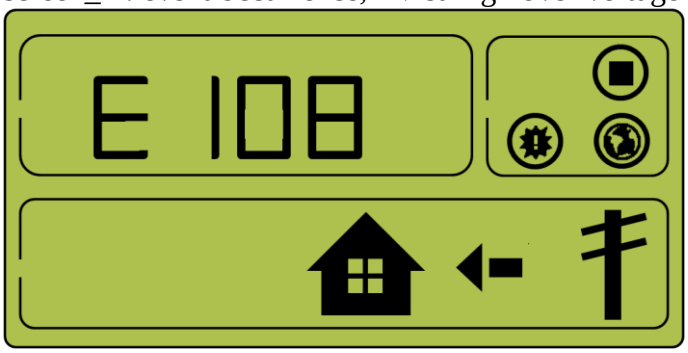
<Indication screen_5 : event occurrence, PV string1 over voltage protection>



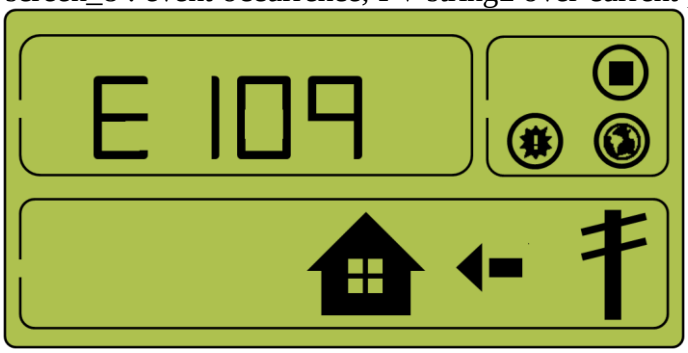
<Indication screen_6 : event occurrence, PV string1 over current protection>



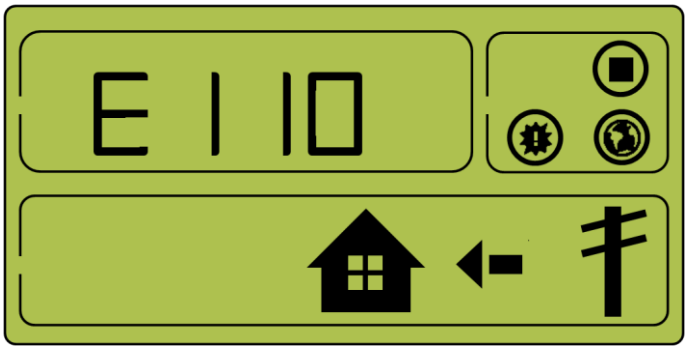
<Indication screen_7 : event occurrence, PV string2 over voltage protection>



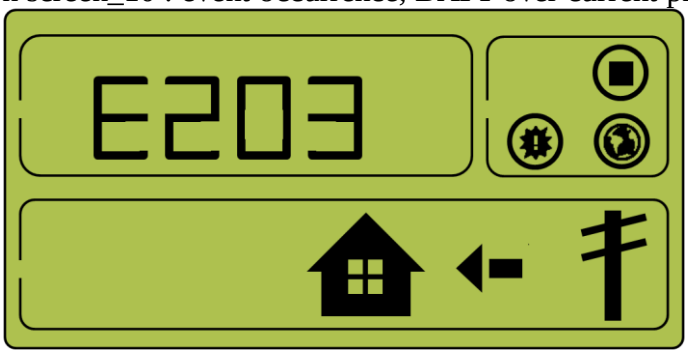
<Indication screen_8 : event occurrence, PV string2 over current protection>



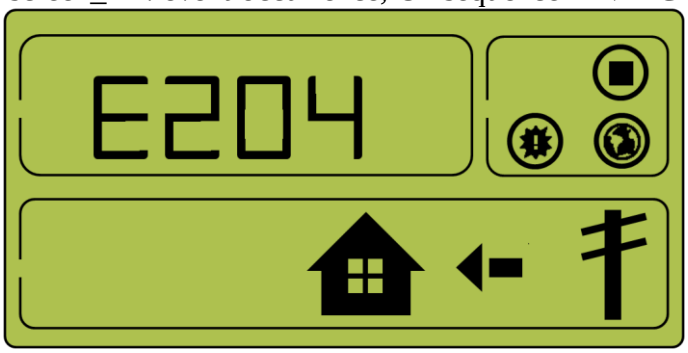
<Indication screen_9 : event occurrence, BATT over voltage protection>



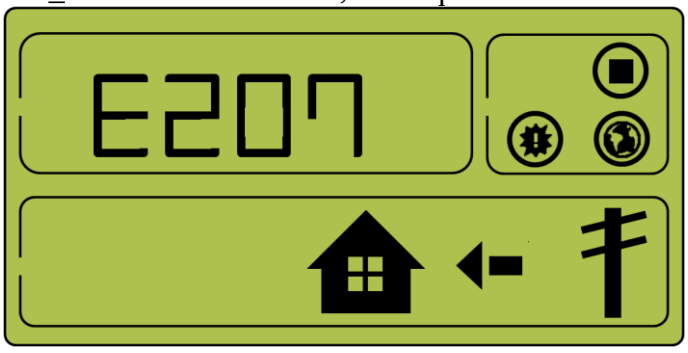
<Indication screen_10 : event occurrence, BATT over current protection>



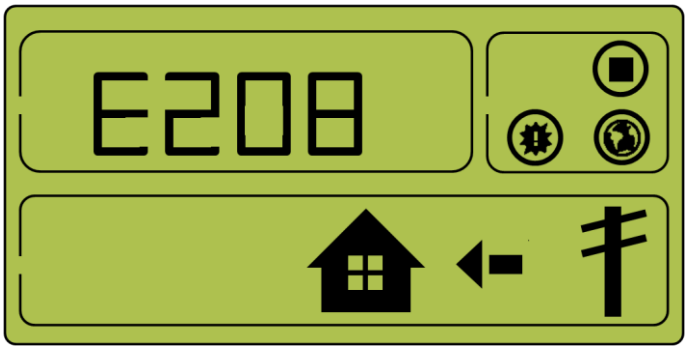
<Indication screen_11 : event occurrence, On sequence INV DC link event>



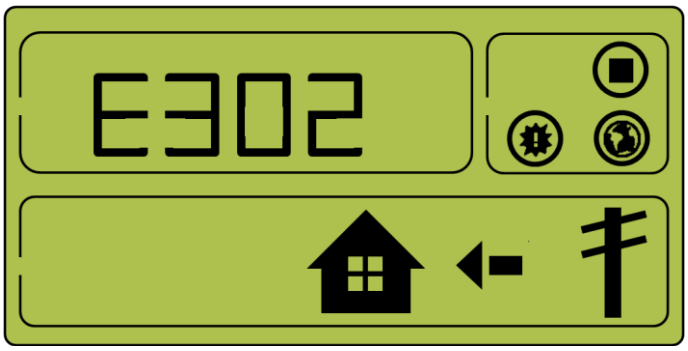
<Indication screen_12 : event occurrence, On sequence BATT V & BATT I event>



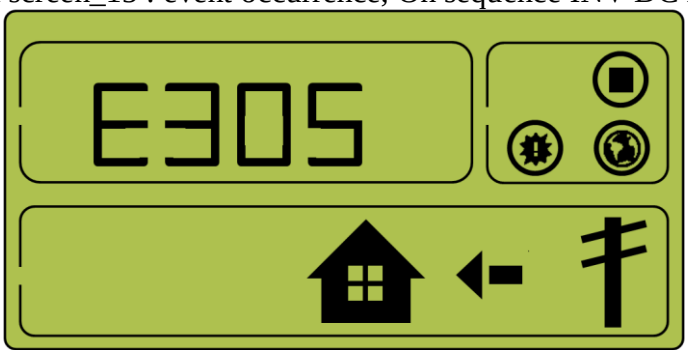
<Indication screen_13 : event occurrence, Normal INV DC link event>



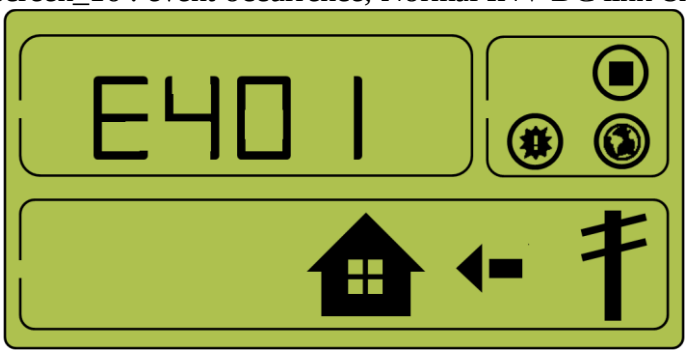
<Indication screen_14 : event occurrence, Normal BATT V & BATT I & BDC DC link event>



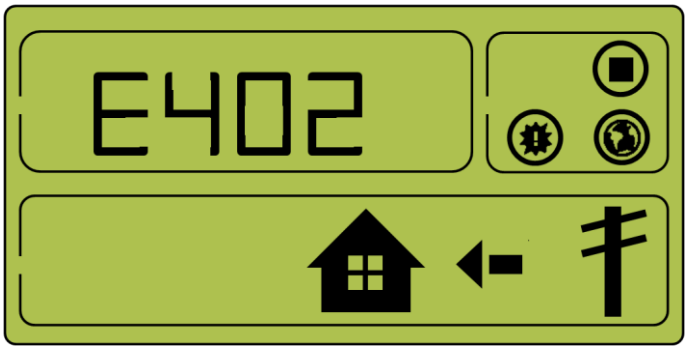
<Indication screen_15 : event occurrence, On sequence INV DC link event>



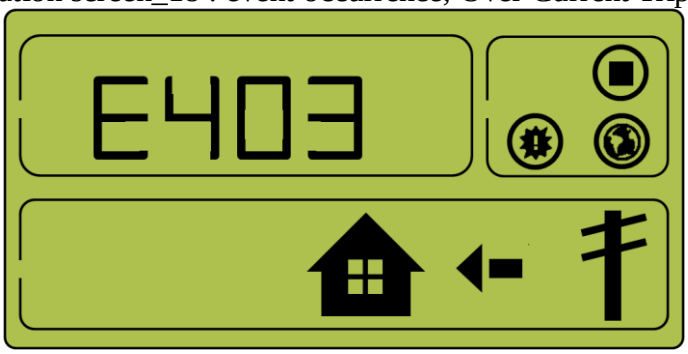
<Indication screen_16 : event occurrence, Normal INV DC link & PV I event>



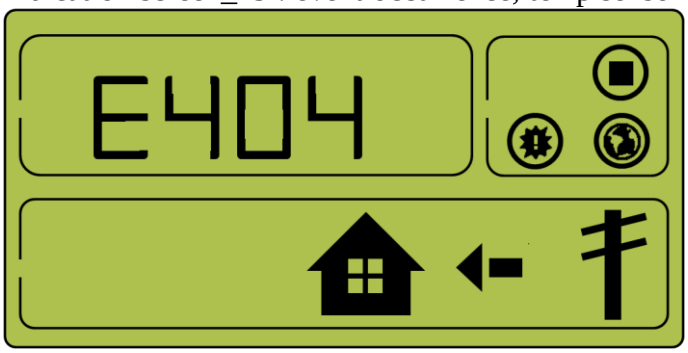
<Indication screen_17 : event occurrence, Temp protection>



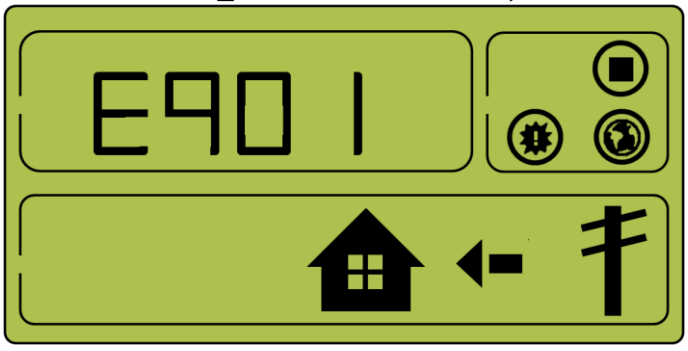
<Indication screen_18 : event occurrence, Over Current Tripzone>



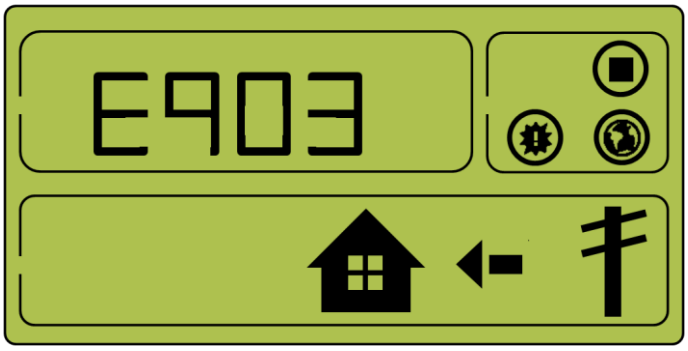
<Indication screen_19 : event occurrence, temp sensor>



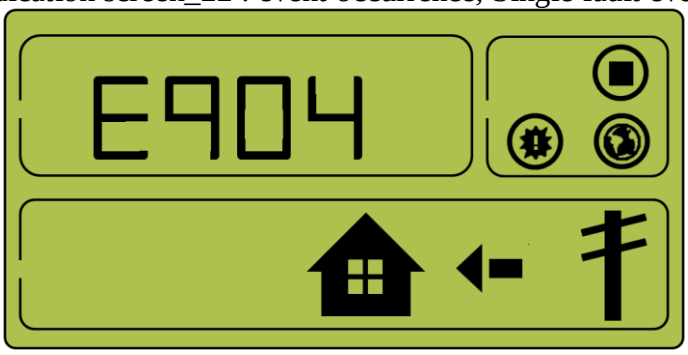
<Indication screen_20 : event occurrence, PV common>



<Indication screen_21 : event occurrence, SPI communication event>

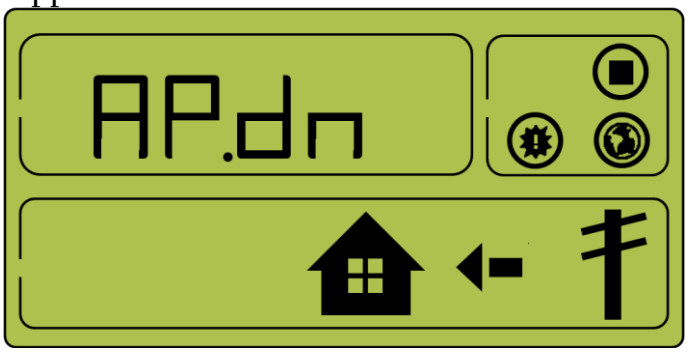


<Indication screen_22 : event occurrence, Single fault event>



<Indication screen_23 : event occurrence, Continuously 3 times PCS fault>

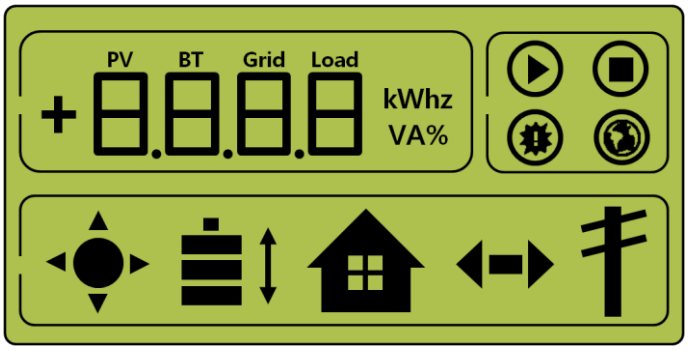
4.1.8 Application Download Mode



<Indication screen on Application Download Mode >

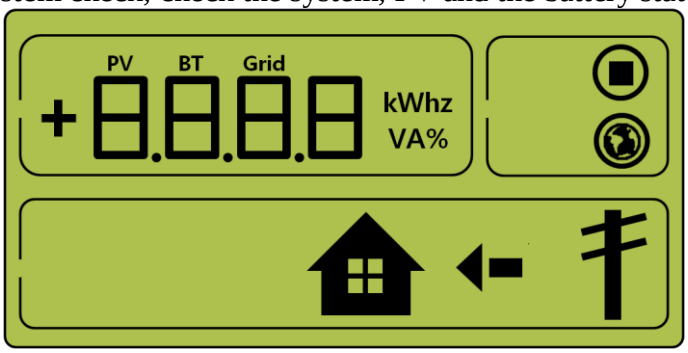
4.2 Starting the System

(1) After completing the installation, turn on the AC circuit breaker and DC disconnect switch installed in the distribution box (distribution board). (see the section 5.7 in the installation guide)
(2) Check the system check message on the front LCD screen.



<Initial indication screen on power on>

(3) After the system check, check the system, PV and the battery state.



<Standby state indication screen before the EMS command>

(4) Receive the command from the EMS to convert to operation mode. For each operation mode screen, refer to 4.1.1~4.1.6.
(5) On the occurrence of event message, refer to 4.1.7 and 7.2.

4.3 System Turn-off Method

To turn-off the system, push down the manual AC circuit breaker and DC disconnect switch in the distribution board(panel board).

5 Communication

5.1 Overview

This is a description of the Internet connection for system monitoring.
When the Internet connection is properly completed, the system operation status can be monitored through the computer.

5.2 Components and LAN Connection

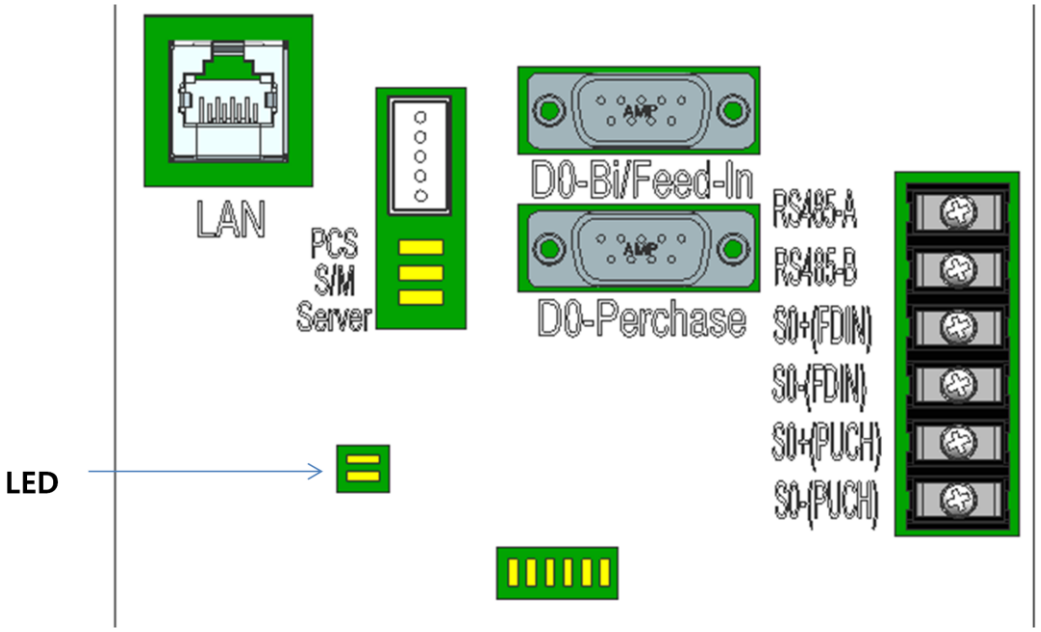
This is a description of the components for connecting the system to the Internet.

5.2.1 Essential Components

5.2.1.1 Internet service line
5.2.1.2 Wired router
5.2.1.3 RJ45 LAN connection cable

5.2.2 LAN Connection

5.2.2.1 LAN terminal



5.2.2.2 Check Internet connection status
Check by looking at the LED lighting status.
5.2.2.2.1 Function per LED
Upper LED: Turns on automatically on connecting the Internet line (Connection)
Lower LED: Blinks when there is data. (Rx, Tx)
5.2.2.2.2 LED status on normal connection
Upper LED is On, lower LED is blinking
5.2.2.2.3 LED status on abnormal connection
Upper and lower LED all maintaining Off state
5.2.2.3 On abnormal connection
5.2.2.3.1 Connect the LAN cable again, and check the LED status.

5.2.2.3.2 Check whether the router is Off.
5.2.2.3.3 Contact the installation company for maintenance.

5.3 Homepage

The customer purchasing this device can use the web browser (https://myess.samsungsdi.com) or the smart phone to check operation status and various operation statistical information in the house or remotely.

5.3.1 Service Terms

This service is provided only when the device is connected to the Internet, and specific services can collect additional information only through approval from the customer.

5.3.2 Membership

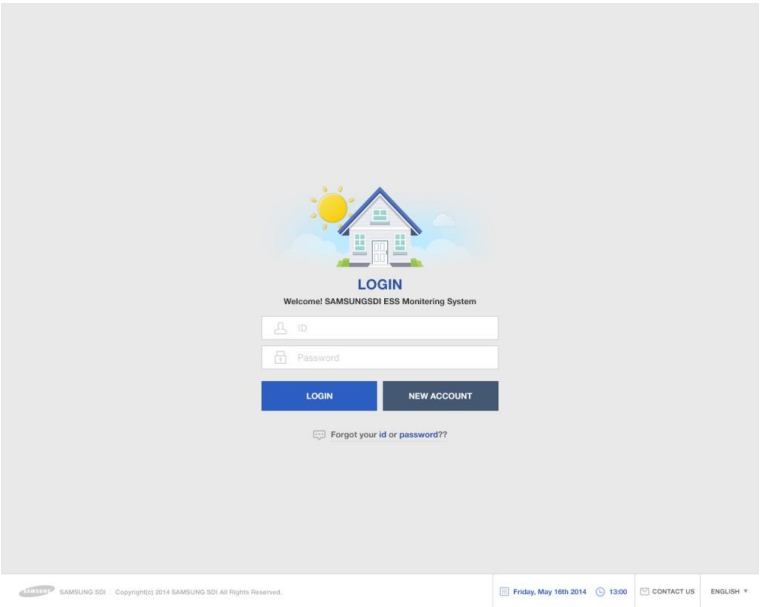
To use the service, you must register the membership through the homepage. During membership registration, the member's information such as ID, password, name and the address are collected and additional data can also collected for providing various statistical analysis information with the customer's approval.
(User new account is refer to Appendix 'Signing up for a membership')

5.3.3 Membership Withdrawal

For a customer who does not want to use the service, membership withdrawal is possible through the personal information modification menu on the homepage.

5.3.4 Log-in

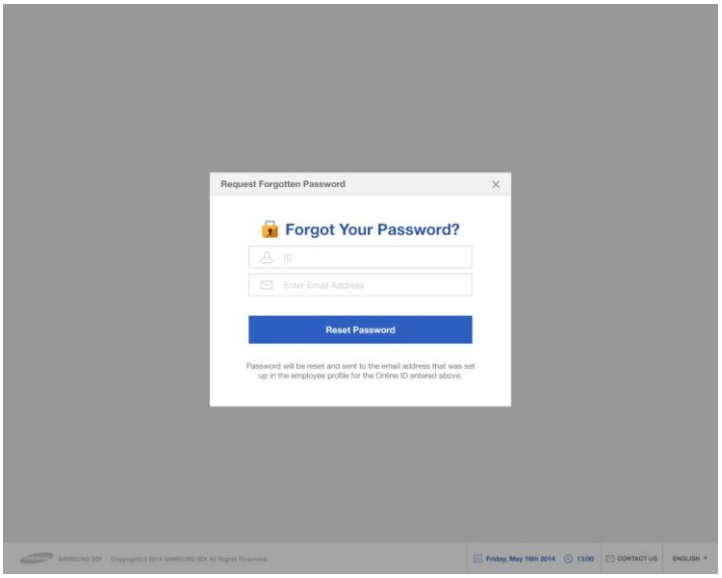
Log-in to the homepage through the ID and the password generated through membership registration. If you are not logged in, normal service use is not possible.
Also, if the log-in ID error or the password error occurs 5 consecutive times, the access is blocked for 10 minutes for security, and permitted of access afterwards, therefore, please take caution.



Log-in page

5.3.5 Password Initialization

For the customer who forgets their password during use, the password initialization menu can be used in the homepage to initialize the password. In the log-in page, select the “Forgot your id or password?” menu, and when the customer confirm the ID and the e-mail address filled in during the membership registration, the initialized password is sent to the registered e-mail address.



Password initialization

5.3.6 How to Use the Service

After completing log-in, normal service use is possible. This service currently provides menus of monitoring, consumption report, ESS report, ESS forecast, and notice. (Enabled to modify after further update)

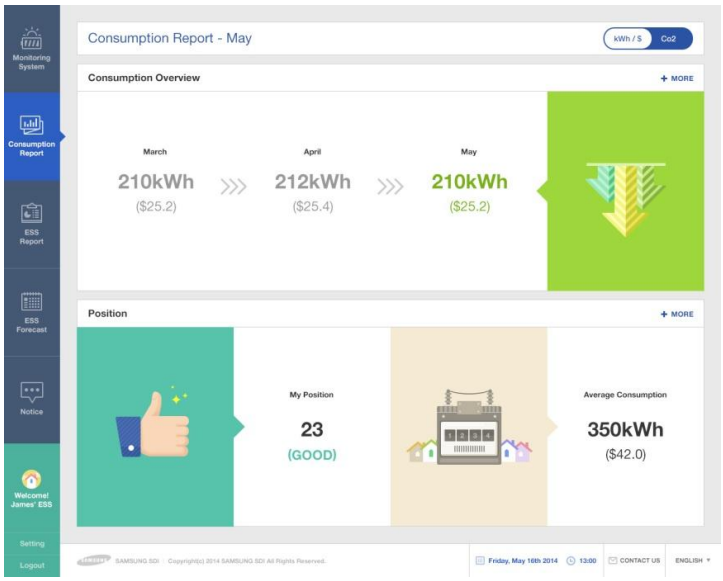
5.3.6.1 Monitoring

The operation status of the current product is indicated. The operation status of the product or the customer power usage information, generation amount information can be checked in real-time. Furthermore, event codes which occurred during operation can be checked on the monitoring page. Details of the event codes can be checked by clicking the exclamation marks which are popped up on the ESS icon. If internet is not available, customers cannot check the event codes.

Monitoring page

5.3.6.2 Consumption Report

The household power usage information collected during smart meter linkage is provided. Especially, information such as household type, size, and inhabiting manpower collected according to the customer approval are used to provide various types of statistics and comparative analysis data.



Consumption report page

5.3.6.3 ESS Report

In the ESS Report page, various types of data generated through ESS operation can be checked. The amount of energy charged or discharged can be checked through the ESS, and other data comparison with solar energy production amount or the power sales amount is possible.

ESS Report page

5.3.6.4 ESS forecast

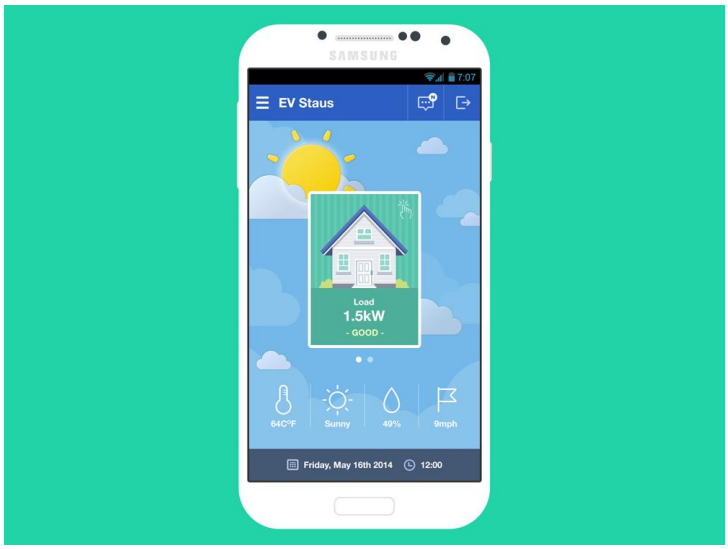
In the ESS Forecast menu, the generation amount forecast information and the guide for optimized operation can be checked through the algorithm mounted on the product.

5.3.6.5 Notice

When there is an update or other changes in the service, the notice message can be checked.

5.3.7 Mobile Service

For the customers using Android or I Phone, the product status can be easily checked on the move through the smart phone. To use the mobile service, the customer must first register the membership through the webpage and use the ID and the password to log-in and use the service.



Mobile service

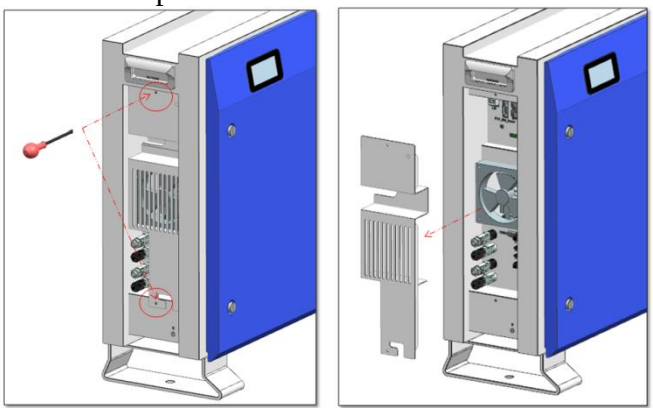
6 Maintenance and Cleaning

	Warning Do not disassemble during operation for cleaning. High voltage can cause lethal damage to the human body. Please make sure the AC and DC switch relay in the distribution box is disconnected before disassembling the system.

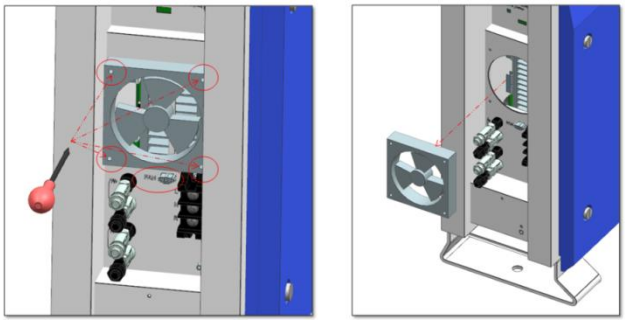
6.1 Fan Exchange

Change the fan according to the following procedures.

1) Turn off the AC circuit breaker and the DC disconnect switch.
2) Separate the side cover. Do not separate the front cover.



3) Separate the fan connector.
4) Separate the fan.



5) Change the fan.
6) After changing the fan, follow stages 1 to 4 in reverse order to install the new fan. Use 1.3~1.6N·m torque to tighten and fix the screw.
7) Check the fan state.
8) After changing the fan, perform a test operation to check whether there is a fan event message.

6.2 Cleaning

Cleaning should be done periodically. The 3.6kWh All in One system is recommended to be cleaned every four months. If the enclosure is in a dirty condition, please use a soft brush or a vacuum to remove the dirt.

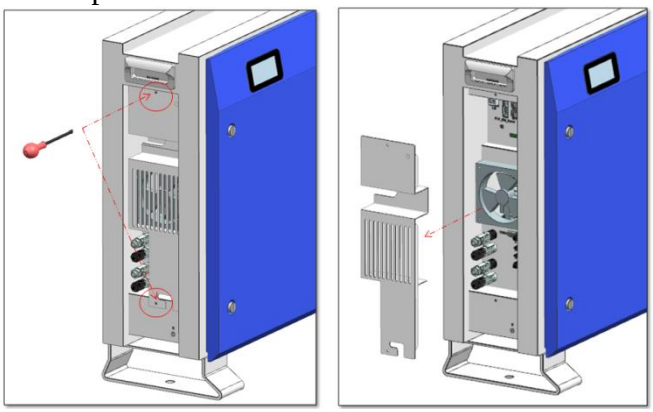
Do not use liquids such as solvents, abrasives or corrosive liquids in the enclosures.

6.2.1 Side Cover Cleaning

Clean the side cover according to the follow procedures.

1) Turn off the DC disconnect switch and AC circuit breaker on the panel board and separate the MC connector.

Separate the side cover. Do not separate the front cover.



Clean the side cover with a vacuum cleaner.

	Notice! Use of compressed air may damage the fan. In cleaning the fan, do not use compressed air, because it may damage the fan.

After cleaning insert the side cover.
Insert the side cover and use 1.3~1.6Nm torque to tighten and fix the screw.

6.3 Checking the Event Logs

Checking the event messages on the website (https://myess.samsungsdi.com), check the cause of the event message described in the following chapter to perform the correct measure (refer to Chapter 7). Among the event messages, for the significant messages, contact the designated installer or the maintenance company for A/S.

6.4 Checking the Terminals

1) Warning

High voltages during operation can cause lethal damage to the human body if the terminals are touched. Please disconnect the product from the voltage sources (PV, AC grids).
Ensure PV connection cables on the PV1+, PV1- and PV2+, PV2- are fastened.
Check for corrosion on the terminals. If corrosion is seen, please contact the installer.

Ensure AC cables in AC1 and AC2 are fastened.

7 Message Description

7.1 Messages in Normal Operation

Status message	Description	Remark
	Operation mode under progress	
	NOP State	
	Warning and fault state	When this icon is marked, check the event list.
	Normal communication state	
kW	Indicating PV, BATT, GRID value	
kWh	Indicating the integrating power value of each mode	
Hz	Indicating the frequency under operation	
V	Indicating PV, BATT, GRID voltage	
A	Indicating PV, BATT, GRID current	
%	Indicating BATT SOC	

7.2 General Events

The general event is composed of warning and protection. The warning level event does not affect the change in the product mode, and is automatically restored when solving the problem. In this case, problem solving is enabled according to the change in the time and operation status / condition.

On protection level event occurrence, the system stops, and is automatically restored when solving the problem. In this case, problem solving is enabled according to the change in the time and operation status / condition.

Checking event codes are available in the website (https://myess.samsungsdi.com). If internet is not available, customers can check the only fatal event codes.

7.2.1 PCS General Events (Warnings)

Type	Code	Description	Measures
WARNING	E001	GRID UNDER VOLTAGE	Occurs below the standard level of system voltage. This is the overall voltage-current warning message, with no special change in the sequence.

			The warning message disappears when converted to the normal state.
	E002	GRID OVER VOLTAGE	Occurs above the standard level of system voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E003	BATT UNDER VOLTAGE	Occurs below the standard level of battery energy voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E004	BATT OVER VOLTAGE	Occurs above the standard level of battery energy voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E005	FAN WARNING	Occurs when the Fan operation is abnormal. This is the overall Fan warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E006	BATT CONNECTION WARNING	Occurs when the battery connection is abnormal. This is the connection warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.

7.2.2 PCS General Events (Protection)

Type	Code	Description	Measures
PROTECTION	E101	GRID RMS OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E102	DC LINK OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal.

			If it is not removed until the time limit, it is converted to significant event.
	E103	PV STRING1 REVERSE CONNECTION PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E104	PV STRING2 REVERSE CONNECTION PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E105	PV STRING1 OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E106	PV STRING1 OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E107	PV STRING2 OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E108	PV STRING2 OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E109	BATT OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is

			automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E110	BATT OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

7.2.3 Battery Discharge General Events

Type	Code	Description	Measures
PROTECTION	E201	ON SEQUENCE GRID OFF	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E202	ON SEQUENCE BATT STATUS EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E203	ON SEQUENCE INV DC LINK EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E204	ON SEQUENCE BATT V & BATT I EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E0205	NORMAL GRID OFF	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function.

			Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E206	NORMAL BATT STATUS EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E207	NORMAL INV DC LINK EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E208	NORMAL BATT V & BATT I & BDC DC LINK EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

7.2.4 PV General Events (Protection)

Type	Code	Description	Measures
PROTECTION	E301	ON SEQUENCE GRID OFF	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E302	ON SEQUENCE INV DC LINK EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

PROTECTION	E303	ON SEQUENCE PV V EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E304	NORMAL GRID OFF	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E305	NORMAL INV DC LINK & PV I EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E306	NORMAL PV V EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

7.2.5 ETC General Events (Protection)

Type	Code	Description	Measures
PROTECTION	E401	TEMP Protection	Occurs when the switch temperature is high. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E402	OVER CURRENT TRIPZONE	Occurs on PCS hardware protection. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

PROTECTION	E403	TEMP SENSOR	Occurs when the Temp sensor connection is abnormal. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal.
PROTECTION	E404	PV COMMON	Occurs when the PV common states is abnormal. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal.

7.2.6 BMS General Events

Type	Code	Description	Measures
WARNING	E501	OVER VOLTAGE PROTECTION-CELL	Occurs when the Max. cell voltage is above Warning level Automatically restored to normal state when the Max. cell voltage comes below the limit value
PROTECTION	E502	OVER VOLTAGE PROTECTION-CELL	System stops when the Max. Cell voltage is above Protection level. Automatically restored to normal state when the Max. Cell voltage comes below the limit value
WARNING	E503	UNDER VOLTAGE PROTECTION-CELL	Occurs when the Min. cell voltage is below Protection level. Automatically restored to normal state when the Min. Cell voltage goes above the limit value
PROTECTION	E504	UNDER VOLTAGE PROTECTION-CELL	System stops when the Min. cell voltage is below Protection level. Automatically restored to normal state when the Min. Cell voltage goes above the limit value
WARNING	E505	OVER TEMP. PROTECTION-CELL	Occurs when the Max. Cell temperature is above Protection level. Automatically restored to normal state when the Max. Cell temperature comes below the limit value
PROTECTION	E506	OVER TEMP. PROTECTION-CELL	System stops when the Max. Cell temperature is above Protection level. Automatically restored to normal state when the Max. Cell temperature comes below the limit value
WARNING	E507	UNDER TEMP. PROTECTION-CELL	Occurs when the Min. cell temperature is below Protection level. Automatically restored to normal state when the Min. Cell temperature goes above the limit value

PROTECTION	E508	UNDER TEMP. PROTECTION-CELL	System stops when the Min. cell temperature is below Protection level. Automatically restored to normal state when the Min. Cell temperature goes above the limit value
WARNING	E509	CELL VOLTAGE IMBALANCE PROTECTION	Occurs when the imbalance of the Cell voltage is above limit value Restored to normal state when the imbalance of the Cell voltage is below limit value
PROTECTION	E510	CELL VOLTAGE IMBALANCE PROTECTION	Occurs when the imbalance of the Cell voltage is above limit value Restored to normal state when the imbalance of the Cell voltage is below limit value
WARNING	E511	AFE INITIALIZATION	AFE initialization failure Restored to normal mode on AFE initialization success
PROTECTION	E512	AFE INITIALIZATION	AFE communication failure
WARNING	E513	CELL TEMP SENSOR 1EA	Occurs above the standard level of Battery cell temp.
PROTECTION	E514	CELL TEMP SENSOR 2EA	Occurs above the standard level of Battery cell temp.

7.2.7 EMS/Communication Events

Type	Code	Description	Measures
WARNING	E601	PCS CAN EVENT	• Turn off and restart the system • Reconnect the communication line between the EMS board and the DSP board.
WARNING	E602	ETHERNET EVENT	• Disconnect and reconnect the LAN. • Turn off and restart the router • Make sure that the DHCP server function of router is activated. • Turn off and restart the system
WARNING	E603	SMART METER EVENT	• Make sure that the Meter device is properly selected. • Disconnect and reconnect the D0 cable. • Turn off and restart the system

7.2.8 Single Fault Events

Type	Code	Description	Measures
WARNING	E701	GRID UNDER VOLTAGE FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event

			settled.
	E702	GRID OVER VOLTAGE FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E703	GRID UNDER FREQUENCY FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E704	GRID OVER FREQUENCY FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E705	GRID TEN MINUTE AVERAGE FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E706	RCMU FAULT	• Turn off system power when the level of leakage current is over standard level. • Check leakage current level then restart or turn off for the level below standard and problem respectively.
	E708	PV INSULATION FAULT	• OFF Turn off system power if PV INSULATION RESISTANCE is of standard level. • Restart after 3 minutes
	E709	ANTI ISLANDING FAULT	• In case of electric power system black out, it automatically detects the state and turns off All in One. • Restart after 3 minutes
	E710	FUNCTIONAL SAFETY FAULT	• Occur in case of mismatching between the two MCU measuring values • Restart after 3 minutes if no problem found

7.3 Significant Events

In Significant events, the system is basically turned off, installer must be contacted, and the problem must be solved by the installer's measures to restore the system to normal operation. Checking event codes are available in the website (https://myess.samsungsdi.com). If internet is not available, customers can check the only fatal event codes.

Type	Code	Description	Measures
Significant	E901	SPI COMMUNICATION EVENT	Occurs on internal non-communication between the PCS. Contact the installer immediately.
	E902	CAN COMMUNICATION EVENT	Occurs on non-communication with the EMS. All in One System is operation converted to Stand Alone mode. Contact the installer immediately.
	E903	SINGLE FAULT EVENT	Occurs on system connection standard single fault over. Contact the installer immediately.
	E904	CONTINUOUSLY 3 TIMES PCS FAULT	When PCS FAULT is occurred three consecutive times, PCS HARD FAIL is judged to be occurred to stop the operation. Contact the installer immediately.
	E905	PV CROSS CONNECTION Permanent Fail	Occurs when the PV GND is cross-connected. Contact the installer immediately.
	E906	Cell Over Voltage Permanent Fail	Exceeding Cell Max voltage Contact the installer immediately.
	E907	Cell Under Voltage Permanent Fail	Abnormal decrease in Cell Min voltage Contact the installer immediately.

8 Arrangement of Terms

Chapter 1

RES	Residential Energy Storage

Chapter 2

Li-Ion Battery	Lithium Ion Battery
SDI	Abbreviation of Samsung Display and Interface
PV	Photo voltaic
Single phase	A type of phase in electricity
Distribution Box	A box containing AC, DC ON-OFF switches for electricity distribution
AC	Alternating Current
DC	Direct Current
LCD	Liquid Crystal Display
Inverter	An electric circuit that converts DC to AC and vice versa.
Converter	An electric circuit that converts DC to DC

Chapter 3

PCS	Power conversion system which contains inverters and converters
Tray BMS	Tray battery management system
EMS	Energy management system

Chapter 4

Load	Power load
Power grid	Electricity grid which connects to power system

Chapter 7

SOC	State of Charge (battery charging state)
PV String	Describes series connected photovoltaic modules
SPI	Serial port interface
CAN	Controller Area Network
CELL	Battery individual cell

9 Contact

For technical problems or inquiries for usage, please contact the installation company.
To receive customer support, the following information is required.

- Product type
- Serial Number
- Connected PV module type and number
- Option equipment

Address : 85737 Oskar-Messter-Str. 29 Ismaning (Muenchen) Germany
E-Mail : esseuservice@samsung.com

10 Appendix

Samsung SDI Limited Warranty

Product Name: 3.6kwh All in One

I. Product Warranty

1. Samsung SDI warrants that the Product[1] will be free from defects in material and workmanship under normal use in accordance with the applicable Technical Specifications for the Product.

2. The warranty period of the Product ("Product Warranty Period") is specified as follows:
   A. PCS : The warranty period shall be five (5) years from the Date of Installation[2]
   B. Battery & Enclosure : The warranty period shall be two (2) years from the Date of Installation

3. In the event that the Product should fail to conform to the Technical Specifications during the Product Warranty Period, Samsung SDI shall, at Samsung SDI's option: (i) repair the non-conforming or defective Product; or (ii) provide Buyer[3] with a replacement for the Product. Samsung SDI shall be responsible for all reasonable costs of repair or replacement in connection with such non-conforming or defective Product; provided that Buyer shall bear the costs of removing the defective Product(s) and (re) installation of the repaired or replaced Product.

II. Performance Guarantee

1. In addition to the Product Warranty, Samsung SDI guarantees performance of the Product to be maintained at least sixty five percent (65%) of initial battery's capacity, provided that the usage of the Product shall have complied with the Operating Conditions under specification for a period of ten (10) years after the Installation Date , whichever occurs earlier ("Performance Guarantee Period"). Also, Samsung SDI guarantees cycle life of 6,000cycles at room temperature 25℃.

2. About Self Discharging Degradation, Samsung SDI guarantees 180days after

[1] "Product" means the battery pack of Samsung SDI that consists of Battery, PCS, and the Enclosure.

[2] "Date of Installation" To claim any warranty hereunder, Buyer must provide the date of installation. If Buyer is unable to submit any proof of the Date of Installation, Samsung SDI will calculate the Product Warranty Period from the manufacturing date which is written on the Product's label.

[3] "Buyer" means any individual or entity that directly purchases the Product from Samsung SDI.

ex-work.

III. Limitation of Warranty

1. The warranties set forth hereunder shall not apply to Products which, in Samsung SDI's absolute judgment have been subjected to: misuse, abuse, neglect or accident; alteration, improper installation, application or removal (including but not limited to any installation, application, repair, service or removal by any party not authorized in writing by Samsung SDI); non-observance of Samsung SDI's installation, users and/or maintenance instructions; repair or modifications by someone other than an approved service technician of Samsung SDI; power failure surges, lightning, flood, fire, accidental breakage or other events outside Samsung SDI's control. Further, no warranty shall apply to any damage caused by goods to which Samsung SDI's Products are incorporated or installed into, or used together with, including any parts thereof.

2. Buyer shall promptly (but in any event within five (5) days after obtaining notice or knowledge thereof) notify Samsung SDI of any defect or other nonconformity with any of equipment warranties identified by Buyer by delivering written notice to Samsung SDI of a warranty claim. Samsung SDI shall promptly notify Buyer of any defect or other nonconformity with any of the equipment warranties identified by Samsung SDI.

3. EXCEPT AS SPECIFIED ABOVE, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, NON-INTERFERENCE, ACCURACY OF INFORMATIONAL CONTENT, OR ARISING FROM A COURSE OF DEALING, LAW, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY SAMSUNG SDI. TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED, SUCH WARRANTY IS LIMITED IN DURATION TO THE EXPRESS WARRANTY PERIOD. THIS DISCLAIMER AND EXCLUSION SHALL APPLY EVEN IF THE EXPRESS WARRANTY SET FORTH ABOVE FAILS OF ITS ESSENTIAL PURPOSE.

4. IN NO EVENT WILL SAMSUNG SDI BE LIABLE FOR ANY COSTS OR PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES OR FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, INDIRECT, OR PUNITIVE DAMAGES, INCLUDING WITHOUT LIMITATION LOST PROFITS, WHETHER THE CLAIM IS BASED ON CONTRACT, TORT, STRICT LIABILITY, OR ANY OTHER THEORY OF LAW OR EQUITY, EVEN IF

ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SAMSUNG SDI'S LIABILITY FROM ANY CAUSE WHATSOEVER SHALL IN NO EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY BUYER TO SAMSUNG SDI FOR SUCH PRODUCT GIVING RISE TO THE LIABILITY.

IV. Obtaining of Warranty Service

A) The warranty provided hereunder is only applicable to the Buyer who has purchased Products directly from Samsung SDI or from the subsidiaries of Samsung SDI.

B) The return of any Products will not be accepted unless prior written authorization has been given by Samsung SDI. The written authorization should contain the Product's model name, a description of the defect and/or failure, and the serial number located on the Products label attached to the backside of the Products, and the Date of Installation.

C) In the event Samsung SDI has discontinued the manufacture of the Product in issue at the time the related warranty claim is accepted by Samsung SDI. Samsung SDI may, at its sole option, replace it with a different type of Product (of mutually agreed size, color, shape and/or power) or refund the purchase price prorated by the days of the relevant Warranty Period remaining.

V. Contact

Address : 85737 Oskar-Messter-Str. 29 Ismaning (Muenchen) Germany
E-Mail : esseuservice@samsung.com

11 Appendix

Signing up for a membership

Product Name: 3.6kwh All in One

A. Open the browser on an internet-connected device such as PC, notebook or smartphone

B. Enter “**https://myess.samsungsdi.com”** in the address field of the browser.

C. When you connect to the website successfully, the screen shown in Figure A will appear.

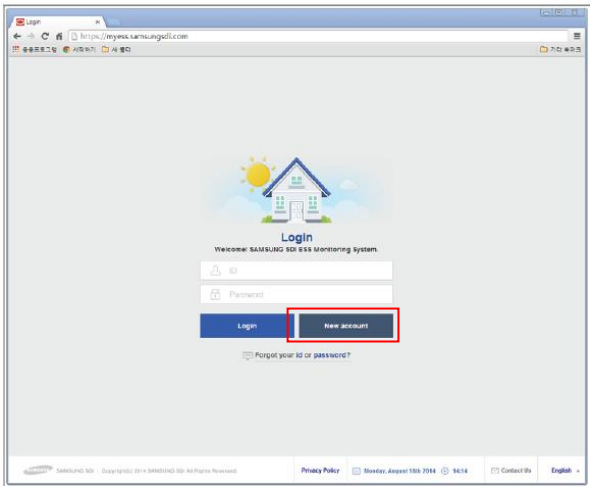


Figure A. Connecting to the website

D. Press the "New Account" button to register as a new member.

E. First time users of the service must sign up for membership.

F. Enter the required information and additional information to sign up for membership.

G. Lastly, agree to the service subscription terms and conditions, and then press the "Submit" button.

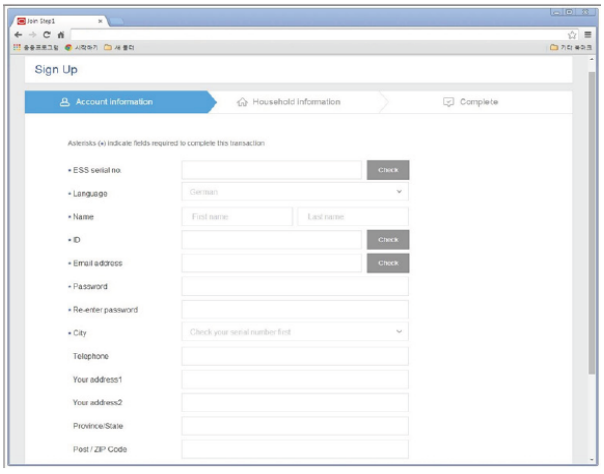


Figure B. Entering the information to sign up for a membership

⚠ Caution

- Items marked with (*) are required.
- Family information is optional. If you agree to provide this additional information, you can receive a variety of analysis information.
- If you do not wish to provide additional information later, you can cancel it from the setting page.