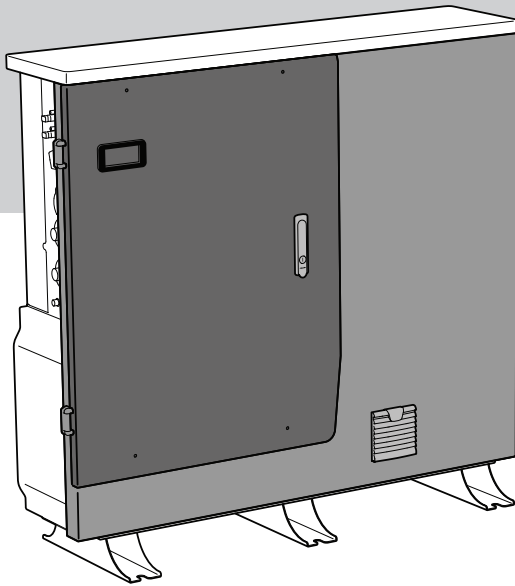




# ELSR722-00004 / ELSR103-00001

## Scalable All In One

### User Manual

ELSR722-00004: Battery Tray (ELPT362-00004) x 2  
ELSR103-00001: Battery Tray (ELPT362-00004) x 3

|                                                                                     | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>■ Use this product only at home.</li> <li>■ Do not operate with other components not approved by the ESS systems. (Connecting other products in parallel to Hansol Technics's products may result in abnormal operation.)</li> <li>■ The internet connection is required to use all functions of the ESS system.</li> <li>■ If you have a problem, please contact the installer.</li> <li>■ The Specifications of the product may be modified without prior notice to improve product quality.</li> </ul> |

|                                                                                     | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ol style="list-style-type: none"> <li>1. Read the manual and all other available information.</li> <li>2. Attend Hansol installation training course/s. This course/s is recommended before the distributor Provides an ESS.</li> <li>3. Register as a Hansol installer.</li> <li>4. Be compliant with CEC accreditation requirements for grid connect systems with batteries, which currently requires off-grid installation accreditation.</li> <li>5. Visit the installation site prior to quoting.</li> <li>6. Check that the switchboard has room, or is suitable for, additional connection/s (e.g. external meter for ESS 3.6 model).</li> <li>7. Be aware of Dangerous Goods Class 9 regulations for transport, storage and handling of lithium batteries.</li> <li>8. Be aware of Building Code regulations for battery installations.</li> <li>9. Read the manual again.</li> <li>10. Ensure you have the latest version of the installation manual, which can be downloaded from your distributor's website.</li> </ol> |



---

# Table of Contents

|                                                              |            |
|--------------------------------------------------------------|------------|
| <b>Table of Contents .....</b>                               | <b>i</b>   |
| <b>Table of Tables.....</b>                                  | <b>iii</b> |
| <b>Table of Figures .....</b>                                | <b>iv</b>  |
| <b>1. Information in this Manual .....</b>                   | <b>1</b>   |
| 1.1 About this Manual .....                                  | 1          |
| 1.2 Target Group.....                                        | 1          |
| 1.3 Manual Storage .....                                     | 1          |
| 1.4 Symbols Used.....                                        | 1          |
| <b>2. Safety .....</b>                                       | <b>4</b>   |
| 2.1 Intended Use .....                                       | 4          |
| 2.1.1 Identifying Hansol Scalable All in One .....           | 6          |
| 2.1.2 Installation Application Suitable for Safety.....      | 9          |
| 2.1.3 Technical Specifications .....                         | 11         |
| 2.2 Safety Guidelines .....                                  | 16         |
| 2.3 Symbol Indication.....                                   | 18         |
| <b>3. Product Overview .....</b>                             | <b>19</b>  |
| 3.1 Grounding the PV Inverter .....                          | 20         |
| 3.2 Fail-safe actions upon power failure .....               | 20         |
| 3.3 Grid Switch Box Connection between Grid and System ..... | 21         |
| 3.4 Selection of Installation Location .....                 | 25         |
| 3.4.1 Possible locations for installation .....              | 26         |
| 3.4.2 Storing the ESS system .....                           | 26         |
| 3.5 Dimensions and Weight .....                              | 27         |
| 3.5.1 Ambient Conditions and Temperatures.....               | 27         |
| 3.5.2 Minimum Clearance .....                                | 27         |
| 3.5.3 Position (Location Selection).....                     | 28         |
| 3.6 Scalable (From 7.2 kWh to 10.8 kWh) .....                | 29         |
| <b>4. Operation Test .....</b>                               | <b>31</b>  |
| 4.1 Starting the System.....                                 | 31         |
| 4.2 Turning off the System.....                              | 32         |
| 4.3 Descriptions of Operation Mode.....                      | 32         |
| 4.3.1 PV-Auto Mode.....                                      | 33         |
| 4.3.2 PV-Only Mode.....                                      | 33         |
| 4.3.3 Battery-Discharge Mode.....                            | 34         |
| 4.3.4 Standby Mode .....                                     | 35         |
| 4.3.5 Grid-Charge Mode .....                                 | 35         |

|           |                                                                                        |           |
|-----------|----------------------------------------------------------------------------------------|-----------|
| 4.3.6     | Stand-Alone Mode .....                                                                 | 35        |
| 4.3.7     | Self-Reliance Mode .....                                                               | 36        |
| <b>5.</b> | <b>Communication Connection .....</b>                                                  | <b>37</b> |
| 5.1       | Internet Connection .....                                                              | 37        |
| 5.1.1     | Components.....                                                                        | 37        |
| 5.1.2     | Connection Block Diagram .....                                                         | 37        |
| 5.1.3     | Connection Method .....                                                                | 37        |
| 5.2       | Homepage.....                                                                          | 38        |
| 5.2.1     | Service Terms .....                                                                    | 38        |
| 5.2.2     | Membership .....                                                                       | 38        |
| 5.2.3     | Membership Withdrawal .....                                                            | 38        |
| 5.2.4     | Log-In .....                                                                           | 38        |
| 5.2.5     | Password Initialization .....                                                          | 39        |
| 5.2.6     | Types of Service Offered .....                                                         | 39        |
| 5.2.7     | Mobile Service .....                                                                   | 42        |
| <b>6.</b> | <b>Maintenance .....</b>                                                               | <b>43</b> |
| 6.1       | Cleaning the Fan and the Cover .....                                                   | 43        |
| 6.2       | Checking the Event Logs.....                                                           | 45        |
| 6.3       | Checking the Terminals .....                                                           | 45        |
| <b>7.</b> | <b>Problem Confirmation .....</b>                                                      | <b>46</b> |
| 7.1       | General Events .....                                                                   | 46        |
| 7.1.1     | INVERTER General Events (Warnings) .....                                               | 46        |
| 7.1.2     | System General Events (Protection).....                                                | 49        |
| 7.1.3     | BMS General Events .....                                                               | 51        |
| 7.1.4     | EMS/Communication Events.....                                                          | 52        |
| 7.1.5     | Single Fault Events .....                                                              | 53        |
| 7.2       | Significant Events.....                                                                | 54        |
| <b>8.</b> | <b>Contact .....</b>                                                                   | <b>56</b> |
|           | <b>Safety Precautions .....</b>                                                        | <b>57</b> |
|           | <b>Additional Guidelines for Fire Fighting Safety Cautions for the Transporter ...</b> | <b>60</b> |
|           | <b>Hansol Technics Warranty Policy .....</b>                                           | <b>63</b> |

# Table of Tables

|                                                                                    |    |
|------------------------------------------------------------------------------------|----|
| [Table 1-1: Symbol Description] .....                                              | 3  |
| [Table 2-1: Technical specifications] .....                                        | 14 |
| [Table 2-2: Inverter symbols].....                                                 | 18 |
| [Table 2-3: RCD Leakage circuit breaker description] .....                         | 18 |
| [Table 3-1: Part Description].....                                                 | 19 |
| [Table 3-2: Maximum Outage Response Times for each System with Battery Full] ..... | 20 |
| [Table 3-3: Weight of All in One].....                                             | 27 |
| [Table 4-1: Description of Icons on indication screen] .....                       | 32 |
| [Table 7-1: Inverter general events warning list] .....                            | 49 |
| [Table 7-2: System general events protection list].....                            | 50 |
| [Table 7-3: BMS general events list].....                                          | 52 |
| [Table 7-4: EMS/communication events list].....                                    | 52 |
| [Table 7-5: Single fault events list] .....                                        | 53 |
| [Table 7-6: Significant events list] .....                                         | 55 |

# Table of Figures

|                                                                                              |    |
|----------------------------------------------------------------------------------------------|----|
| [Figure 2-1: Connection Diagram] .....                                                       | 5  |
| [Figure 2-2: Name Plate] .....                                                               | 7  |
| [Figure 2-3: Battery Tray Label] .....                                                       | 8  |
| [Figure 2-4: PV connections] .....                                                           | 9  |
| [Figure 2-5: Distribution box connection diagram] .....                                      | 10 |
| [Figure 2-6: Derating Curve] .....                                                           | 14 |
| [Figure 2-7: Power efficiency curve of System] .....                                         | 15 |
| [Figure 2-8: Power efficiency curve of PV Generation] .....                                  | 15 |
| [Figure 3-1: Part View of Hansol All in One] .....                                           | 19 |
| [Figure 3-2: Back up mode (LCD)] .....                                                       | 20 |
| [Figure 3-3: Wiring Schematic of Single Phase System for Australia] .....                    | 23 |
| [Figure 3-4: Wiring Diagram] .....                                                           | 23 |
| [Figure 3-5: Final Assembly] .....                                                           | 24 |
| [Figure 3-6: Dimension of All in One] .....                                                  | 27 |
| [Figure 3-7: Minimum Clearance for All in One] .....                                         | 28 |
| [Figure 3-8: Restriction for the surface gradient] .....                                     | 28 |
| [Figure 3-9: Unfastening screws] .....                                                       | 29 |
| [Figure 3-10: Removal of the side cover] .....                                               | 29 |
| [Figure 3-11: Removal of the battery cover grade] .....                                      | 30 |
| [Figure 3-12: Battery tray mounting] .....                                                   | 30 |
| [Figure 4-1: Initial indication screen on power on] .....                                    | 31 |
| [Figure 4-2: Standby state indication screen before the EMS command] .....                   | 32 |
| [Figure 4-3: PV generation, Battery charge, Load use, sell remaining amount] .....           | 33 |
| [Figure 4-4: PV generation, Battery discharge, Load use, buy shortage amount] .....          | 33 |
| [Figure 4-5: PV generation, Battery standby, Load use, sell remaining amount] .....          | 33 |
| [Figure 4-6: PV generation, Sell remaining amount] .....                                     | 34 |
| [Figure 4-7: PV generation, Buy shortage amount] .....                                       | 34 |
| [Figure 4-8: Battery discharge, Load use] .....                                              | 34 |
| [Figure 4-9: Battery discharge, Load use, Buy shortage amount] .....                         | 34 |
| [Figure 4-10: Indication screen on Standby Mode, Buy shortage amount] .....                  | 35 |
| [Figure 4-11: Indication screen on Grid charge Mode] .....                                   | 35 |
| [Figure 4-12: Indication screen on stand-alone mode] .....                                   | 35 |
| [Figure 4-13: Indication screen on Self-Reliance mode, Battery to LOAD discharge] .....      | 36 |
| [Figure 4-14: Indication screen on Self-Reliance mode, PV to BATTERY charge (LOW SOC)] ..... | 36 |
| [Figure 5-1: Internet Connection] .....                                                      | 37 |
| [Figure 5-2: Log-in page] .....                                                              | 38 |
| [Figure 5-3: Password initialization page] .....                                             | 39 |
| [Figure 5-4: Monitoring page] .....                                                          | 40 |
| [Figure 5-5: Consumption report page] .....                                                  | 40 |
| [Figure 5-6: Forecast page] .....                                                            | 41 |
| [Figure 5-7: Setting page] .....                                                             | 42 |
| [Figure 5-8: Mobile service page] .....                                                      | 42 |
| [Figure 6-1: PV MC4 connector] .....                                                         | 43 |
| [Figure 6-2: Upper cover removal] .....                                                      | 44 |
| [Figure 6-3: Fan removal] .....                                                              | 44 |

# 1. Information in this Manual

## 1.1 About this Manual

This is the user manual for the Scalable (7.2 kWh/10.8 kWh) All in One system. This user manual is specially designed to detail the device's functions and features. Please read this manual before using the device to ensure safe and proper use.

## 1.2 Target Group

This user manual applies only to the Hansol Scalable All in One.

## 1.3 Manual Storage

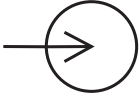
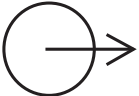
The user manual and installation manual can be downloaded from the product download section at "<https://myess.hansoltechnics.com>". The specifications of the product can be changed for improvement without notice.

Also, the software can be updated automatically without notice over the Internet.

## 1.4 Symbols Used

| Symbols                                                                             | Meaning                                                                                                                        |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|  | <b>CAUTION</b><br><br>This symbol indicates a hazardous situation which could result in a light injury, if not avoided.        |
|  | <b>NOTICE</b><br><br>This symbol indicates a hazardous situation which could result in damage to the property, if not avoided. |
|  | <b>Information</b><br><br>This symbol indicates valuable tips for optimum installation and operation of the product.           |

| 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                                                |
| 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 and Energy Storage Timed Discharge                                                                       |
| 22     |  | Caution: Risk of Hearing Damage and Wear Hearing Protection Wear hearing protection                                                      |
| 23     |  | Do not dispose of the inverter with household wastes.<br>For further information on disposal, refer to the installation manual provided. |
| 24     |  | The CE Indication:<br>The relevant equipment complies with the requirements in the EC guidelines.                                        |
| 25     |  | Caution: Risk of Electric Shock and wait at least 5 min after power turn off when opening the product.                                   |

[Table 1-1: Symbol Description]

## 2. Safety

### 2.1 Intended Use

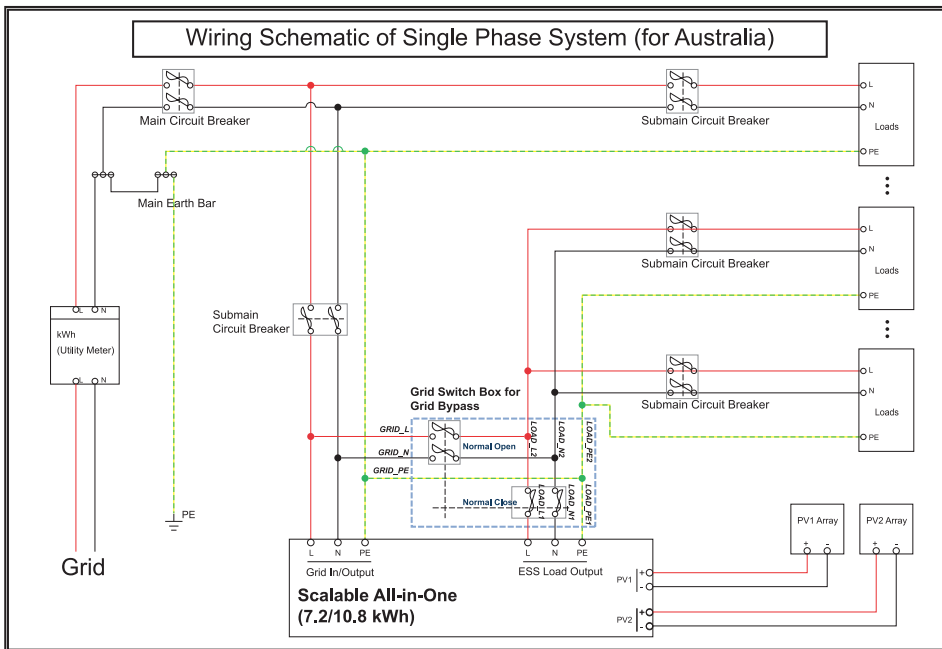
|                                                                                   |                                                                                                                                                                            |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>NOTICE</b><br><b>The Scalable All in One system is intended for residential use only. The Scalable All in One system should not be used for commercial or building.</b> |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The Scalable All in One system is designed for residential use. It is a single-phase, grid-connected system of solar energy sources and Li-Ion Battery energy storage.

The Scalable All in One system uses solar energy power connected to the input/output terminal installed on the side of the device in order to:

- 1) charge the Li-Ion battery energy storage,
- 2) provide a supply to the household load, and
- 3) convert direct current (DC) electricity of the battery to alternating current (AC) to discharge as household single-phase load or electric system.

This device should not be used for any purpose other than the purpose described in this installation manual. Any substitute use of this device, random change in any of its parts, and use of components other than sold or recommended by Hansol Technics will nullify the product's guarantee. For example, Hansol Li-Ion battery energy storage should not be replaced by other manufacturer's battery storages. For further information on proper use of this device, contact the Hansol Technics Service line or visit at "[www.hansoltechnics.com](http://www.hansoltechnics.com)".



[Figure 2-1: Connection Diagram]

### 2.1.1 Identifying Hansol Scalable All in One

Attached on the enclosure of this product is the Type Label where the identity of this product is described. For safe usage, make sure that the following product information is indicated on the Type Label.

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

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

- ELSR722-00004
  - ELSR: Residential application
  - 72: Battery capacity (x0.1 kWh, Less than 10 kWh)
  - 2: Battery capacity group
  - 00004: product line number
- ELSR103-00001
  - ELSR: Residential application
  - 10: Battery capacity (x1 kWh, More than 10 kWh)
  - 3: Battery capacity group
  - 00001: product line number

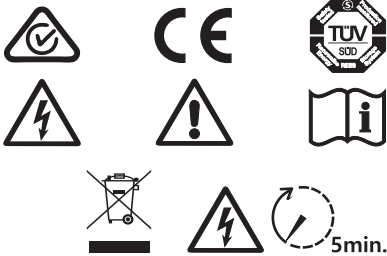
The model No. of INVERTER (power conditioning system) is defined as below.

- SJ94-00146A
  - SJ: battery for ESS
  - 94: Ass'y
  - 00146: product number
  - A: National Code (Australia)

The Type Label is shown in the [Figure 2-2].

Hansol Technics **Hansol**

Model Name : Scalable All-in-One  
Inverter No. : SJ94-00146A



Serial No. \_\_\_\_\_

|                                                                                                                         |                                                                |                   |      |
|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------|------|
| <br>DC<br>Photovoltaic<br>Module Input | Max. Voltage                                                   | 550V              |      |
|                                                                                                                         | MPPT Range                                                     | 125V ~ 500V       |      |
|                                                                                                                         | Max. PV Current<br>Per String/ $I_{SC\ PV}$                    | 15A / 20A         |      |
| <br>AC<br>(Input)                     | Normal Voltage (Vac)                                           | 230               |      |
|                                                                                                                         | Nominal Frequency (Hz)                                         | 50                |      |
|                                                                                                                         | Max. Continuous Current (A)                                    | 35                |      |
| <br>Load                             | Normal Voltage (Vac)                                           | 230               |      |
|                                                                                                                         | Nominal Frequency (Hz)                                         | 50                |      |
|                                                                                                                         | Normal Active Power $P_n$ (kW)<br>(AC Input + Inverter rating) | 8                 |      |
| <br>AC<br>(Output)                   | Normal Voltage (Vac)                                           | 230               |      |
|                                                                                                                         | Normal Frequency (Hz)                                          | 50                |      |
|                                                                                                                         | Max. Continuous Current (A)                                    | 22                |      |
|                                                                                                                         | Normal Active Power (kW)                                       | 4.98              |      |
|                                                                                                                         | Power Factor                                                   | 0.8un ~ 1 ~ 0.8ov |      |
| <br>Battery<br>(Input/<br>Output)    | Battery Type                                                   | Li-Ion            |      |
|                                                                                                                         | Battery Capacity (kWh)                                         | 7.2               | 10.8 |
|                                                                                                                         | Max. Continuous Current (A)                                    | 46                | 38   |
|                                                                                                                         | Nominal Voltage (V)                                            | 120               | 180  |
| Protection Degree / Class                                                                                               |                                                                | IP54 / I          |      |
| IEC62109-1/-2, AS62040.1.1, AS4777.2:2015, IEC62619,<br>IEC60730-1 Annex H, IEC61000-6-2/-3, IEC61727, IEC62116         |                                                                |                   |      |

[Figure 2-2: Name Plate]

The product serial number is defined as below

■ AR00500108Z11510300001C

- AR: Residential Type
- 0050: Output power of inverter (x0.1 kW) \*
- 0108: Capacity of battery (x0.1 kWh)
- Z1: Factory Line
- 151030: Production date (YY-year, M-month, DD-day)
- 0001: Production order per day (001 ~ 999)
- C: National Code (Australia)

(\* It was rounded off. (e.g. 4.98 → 5.0))

The Battery Tray Label is shown in the [Figure 2-3].

The number of Battery Tray is normally not matched inverter's one.  
It is finally coupled when installing

|                                                                                                                                                                                                                              |                                                                                  |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------|
| <b>SAMSUNG SDI</b> <br><br><b>Serial No.</b><br><div style="border: 1px solid black; width: 100px; height: 100px; margin-top: 10px;"></div> | <b>IXP46/175/127/[16S]M/-20+60/90</b><br><b>Rechargeable Li-ion Battery Tray</b> |               |
|                                                                                                                                                                                                                              | Model Name                                                                       | ELPT362-00004 |
|                                                                                                                                                                                                                              | Nominal Voltage                                                                  | == 60Vdc      |
|                                                                                                                                                                                                                              | Rated Capacity                                                                   | 60Ah          |
|                                                                                                                                                                                                                              | Recommended CC                                                                   | 21A           |
|                                                                                                                                                                                                                              | Recommended CV                                                                   | == 65.92V     |
|                                                                                                                                                                                                                              | End Charge Current                                                               | 3.15A         |

[Figure 2-3: Battery Tray Label]

The battery tray serial number is defined as below

■ ET361A14709000X

- ET: Tray type
- 36: Capacity of tray (under x0.1 kWh)
- 1A: Factory Line
- 14709: Production date (YY-year, M-month, DD-day)
- 0001: Production order per day (0001 ~ 9999)
- X: Grade of Cell

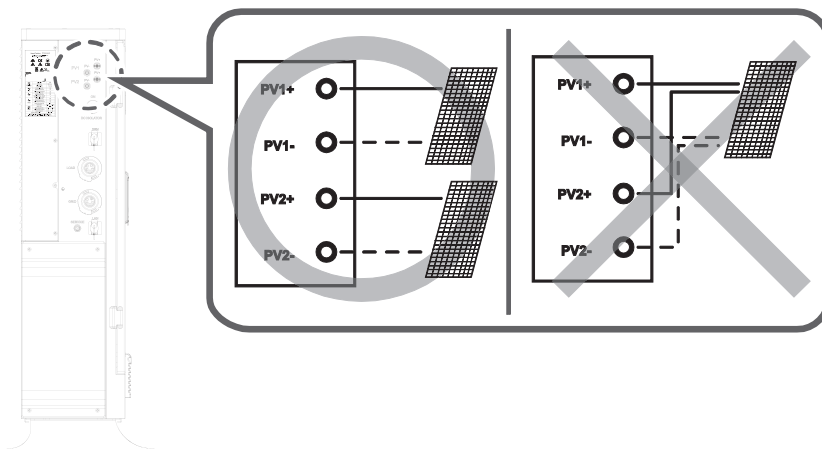
### 2.1.2 Installation Application Suitable for Safety

As shown in the [Figure 2-4], the Scalable All in One uses the two independent channels of the PV Input ({PV1+, PV1-}, {PV2+, PV2-}). They are used independently for running the maximum power from the sources of PV1 and PV2. Two channels are recommended for independent use for the two PV Inputs. Make sure not to connect one PV string in parallel with the two independent PV inputs (PV1, PV2). (Refer to Scalable All in One Solar energy input connection in the [Figure 2-4]).

A PV string must not be commonly connected to the two input terminals of the All in One system. That is, make sure not to connect the split wiring from one PV string output with the two independent PV inputs (PV1+, PV1- and PV2+, PV2-). (Refer to the PV String connection method in the [Figure 2-4]).

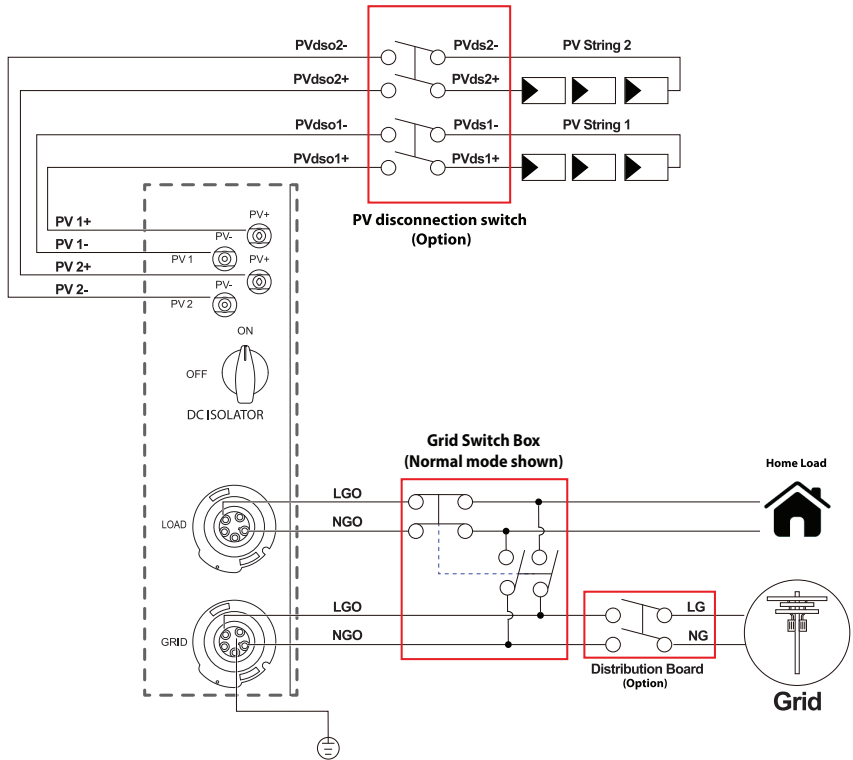
When want connect the two PV input with one PV Module, should be carried out by qualified personnel only.

✘ ***PV modules shall have an IEC61730 Application Class A rating or equivalent.***



[Figure 2-4: PV connections]

The [Figure 2-5] shows the connection diagram on the distribution board. The distribution box receives the DC input (the PV string 1 and the PV string 2) from the solar energy module. The power grid and the house load are connected to the Grid (L, N) and Load (L, N).



[Figure 2-5: Distribution box connection diagram]



**CAUTION**

The PV string 1 and the PV string 2 must be each connected to the distribution box terminals, as shown in the distribution board connection diagram. Make sure that the string numbers match correctly.  
For example do not connect a PV string 1 to a PV string 2.

### 2.1.3 Technical Specifications

| PV Data (DC)                                    |                             |                 |
|-------------------------------------------------|-----------------------------|-----------------|
| Max. input total power                          | 6.6 kWp                     |                 |
| Max. input power per string                     | 3.3 kWp                     |                 |
| Max. input voltage                              | 550 V                       |                 |
| Min. input voltage/Initial input voltage        | 125 V/150 V                 |                 |
| MPPT voltage range                              | 125 V~500 V                 |                 |
| Max. input current per string                   | 15 A                        |                 |
| Max. input short circuit current for each MPPT  | 20 A                        |                 |
| Max. inverter back feed current to the array    | Negligible                  |                 |
| Number of independent MPP trackers              | 2                           |                 |
| Number of DC inputs pairs for each MPPT         | 2                           |                 |
| Connection type                                 | MC4                         |                 |
| Battery Data (DC)                               |                             |                 |
| System Model No.                                | ELSR722-00004               | ELSR103-00001   |
| Battery rated capacity                          | 7.2 kWh                     | 10.8 kWh        |
| Battery usable capacity                         | 6.48 kWh                    | 9.72 kWh        |
| Discharge of depth (DOD)                        | 90 % (6000 cycles, 5 ~ 95%) |                 |
| Battery technology                              | Li-Ion                      |                 |
| Battery voltage range/nominal voltage           | 96~132 V/ 120V              | 145~198 V/ 180V |
| Battery Max. current                            | 46 A                        | 38 A            |
| Battery nominal current                         | 33.3 A                      | 27.8A           |
| Nominal DC/DC power                             | 4.0 kW                      | 4.98 kW         |
| Grid Data (AC)                                  |                             |                 |
| Rated voltage/range                             | 230 V/200 V~270 V           |                 |
| Rated power frequency/range                     | 50 Hz/47.5 Hz ~51.5 Hz      |                 |
| Rated output power                              | 4.98 kW                     |                 |
| Rated output current                            | 22 A                        |                 |
| Max. input Power                                | 8 kW                        |                 |
| Max. input current                              | 35 A                        |                 |
| Max. output over-current protection             | 35.3 A                      |                 |
| Max. allowed output current for fuse protection | 32 A                        |                 |
| Adjustable power factor range                   | 0.8un~1~0.8ov               |                 |
| Feed-in phases/connection phases                | 1/1                         |                 |

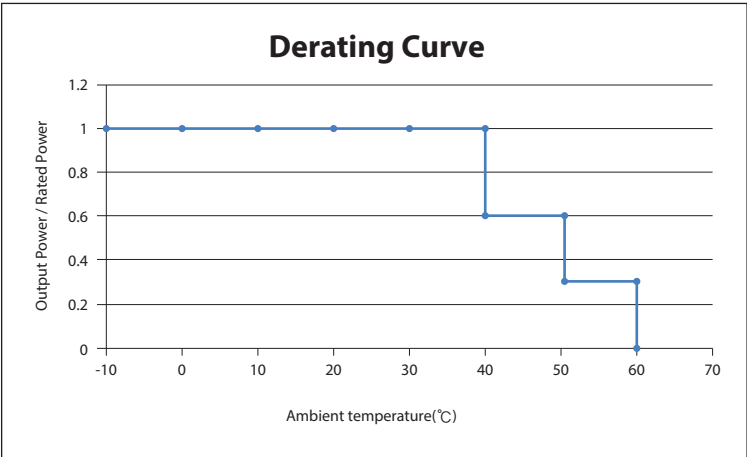
|                                                                                                                                                                         |                                                |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------|
| Total Harmonic Distortion.<br>(Total harmonic factor of the output current with total harmonic factor of the AC voltage < 2%,<br>and AC power > 50% of the rated power) | <5 %                                           |        |
| Emergency Power Supply (LOAD)                                                                                                                                           |                                                |        |
| Rated voltage                                                                                                                                                           | 230 Vac                                        |        |
| Rated Frequency                                                                                                                                                         | 50 Hz                                          |        |
| Rated current                                                                                                                                                           | 17.4 A                                         | 22 A   |
| Rated power                                                                                                                                                             | 4 kW                                           | 4.98kW |
| Feed in type                                                                                                                                                            | Single-phase                                   |        |
| Efficiency (PV to Grid)                                                                                                                                                 |                                                |        |
| European efficiency                                                                                                                                                     | 96 %                                           |        |
| Max. efficiency                                                                                                                                                         | 97 %                                           |        |
| Protective Device                                                                                                                                                       | Yes                                            |        |
| DC disconnection device for PV                                                                                                                                          | Yes                                            |        |
| Ground-fault monitoring(RCMU)/grid monitoring                                                                                                                           | Yes/Yes                                        |        |
| General Data                                                                                                                                                            |                                                |        |
| Dimensions (W/H/D)                                                                                                                                                      | 1200/1140/280 mm                               |        |
| Weight                                                                                                                                                                  | 104 / 44.9 kg                                  |        |
| Protective class (I, II, III)                                                                                                                                           | Class I                                        |        |
| Degree of protection                                                                                                                                                    | IP54                                           |        |
| Max. permissible value for relative humidity                                                                                                                            | 95 % (non-condensing)                          |        |
| Operating temperature                                                                                                                                                   | -10~40° C                                      |        |
| Storage temperature                                                                                                                                                     | -20~60° C                                      |        |
| Noise emission                                                                                                                                                          | ≤50dB(A) @ 1m                                  |        |
| Over voltage category                                                                                                                                                   | III                                            |        |
| Features                                                                                                                                                                |                                                |        |
| Display                                                                                                                                                                 | Custom LCD                                     |        |
| Communication                                                                                                                                                           | LAN, RS485                                     |        |
| Energy management system                                                                                                                                                | Integrated                                     |        |
| Certificates and approvals                                                                                                                                              | IEC62109-1/2<br>AS/NZS 3100, AS4777.2:2015, CE |        |

| Item                                               | Specification                                                                                                                            |                                                                                                                                   |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|                                                    | Battery Cell                                                                                                                             | Battery Tray                                                                                                                      |
| Product name                                       | Battery Cell                                                                                                                             | Battery Tray                                                                                                                      |
| Type/model                                         | CM0630B0002G                                                                                                                             | ELPT362-00004                                                                                                                     |
| Nominal voltage                                    | 3.75V                                                                                                                                    | 60V                                                                                                                               |
| Rated capacity                                     | 63Ah                                                                                                                                     | 60Ah                                                                                                                              |
| Recommended charging voltage by manufacturer       | 4.12V                                                                                                                                    | 65.92V                                                                                                                            |
| Upper limit charging voltage                       | 4.12V                                                                                                                                    | -                                                                                                                                 |
| Recommended charging current by manufacturer       | 21A                                                                                                                                      | 21A                                                                                                                               |
| Maximum charging current                           | 150A                                                                                                                                     | 38A<br>(model no. ELSR103-00001)<br>46A<br>(model no. ELSR722-00004)                                                              |
| Charging temp. upper limit                         | 65°C                                                                                                                                     | 65°C                                                                                                                              |
| Charging temp. lower limit                         | -40°C                                                                                                                                    | -20°C                                                                                                                             |
| Standard charging method by manufacturer           | Charge at constant current 21A until voltage reaches 4.12V, then charge at constant voltage 4.12V till charge current is 1.2A.           | Charge at constant current 21A until voltage reaches 65.92V, then charge at constant voltage 65.92V till charge current is 3.15A. |
| Charging procedure for internal short-circuit test | Charge at constant current 150A until voltage reaches 4.12V, then charge at constant voltage 4.12V till charge current is 0.05C (3.15A). | -                                                                                                                                 |
| Maximum discharge Current                          | 120 A                                                                                                                                    | 38 A<br>(model no. ELSR103-00001)<br>46 A<br>(model no. ELSR722-00004)                                                            |
| Final discharge voltage                            | 2.7 V                                                                                                                                    | 43.2 V                                                                                                                            |
| Dimension                                          | (45.6±0.4) mm ×<br>(173.9±0.3) mm ×<br>(125.7±0.4) mm                                                                                    | (160.3±2) mm ×<br>(408.3±2) mm ×<br>(513.8±2) mm                                                                                  |
| Weight                                             | (1900±100) g                                                                                                                             | (44.9±0.5) kg                                                                                                                     |

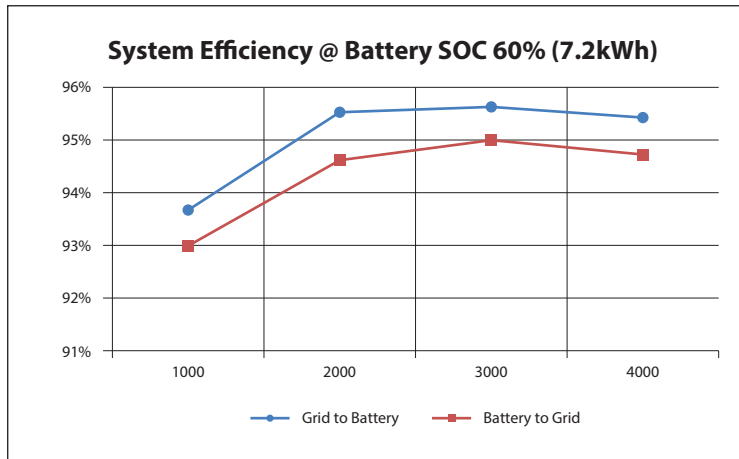
Remark:

1. The sample is battery tray used in energy storage applications. It consists of 2S modules, each module includes 8S cells. There is no BMS protection function in the battery tray and the BMS protection is integrated into the specified end system, so the battery tray has to be used together with the specified end system (model no. ELSR722-00004 or model no. ELSR103-00001).
2. The final evaluation of the battery tray must be conducted in the end product for which the battery tray will be used.

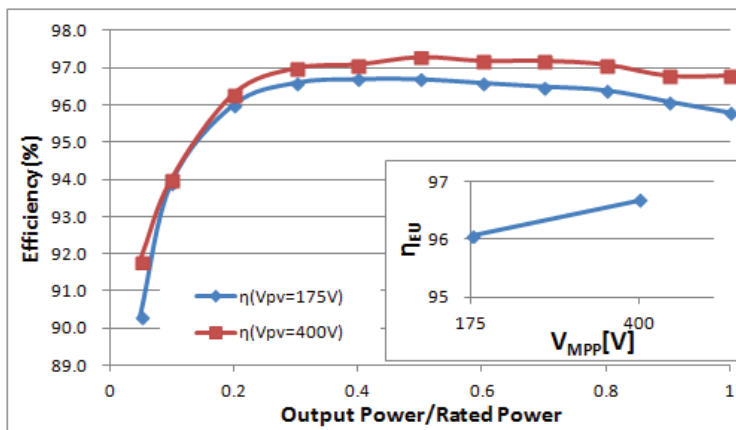
[Table 2-1: Technical specifications]



[Figure 2-6: Derating Curve]



[Figure 2-7: Power efficiency curve of System]



[Figure 2-8: Power efficiency curve of PV Generation]

## 2.2 Safety Guidelines

|    | DANGER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     | <p>High voltages in power conditioning circuits. Lethal hazard of electric shock or serious burns.</p> <p>The following work on the inverter must be carried out by qualified personnel only.</p> <ul style="list-style-type: none"><li>▪ Electrical insulation</li><li>▪ Repairs</li><li>▪ Modification</li></ul> <p>Except when under supervision by qualified personnel, children or people lacking physical, mental, or intellectual capabilities should not work on this system.</p> <p>The system should be installed out of the reach of children.</p> <p>Even when no external voltage is applied to the system, it may have internal high voltage in the device, which can cause lethal damage to the human body. High voltage can cause lethal damage to the human body.</p>                                                                                                                                                                                                                                                                                |
|    | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                     | <p>Photovoltaic array supplies DC voltage to the Scalable All in One system. Do not touch the PV cable when it PV cable is connected to the PV arrays.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|  | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                     | <p>Li-Ion battery energy storage system (ESS) inside. When assembling the system, do not intentionally short the positive (+) and negative (-) terminals with metallic object.</p> <p>All work on the ESS and electrical connections must be carried out by qualified personnel only. The ESS within Scalable All in One provides a safe source of electrical energy when operated as intended and as designed.</p> <p>A potentially hazardous circumstance such as excessive heat or electrolyte mist may occur due to 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 Scalable All in One must review applicable federal, state and local regulations as well as the industry standards regarding this product.</p> |
|  | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                     | <p>When transporting the All in One system with packaged type units, remove the battery tray from the All in One system and transport them separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| NOTICE                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ol style="list-style-type: none"><li>1. Over voltages in the power conditioning circuits.<br/>Any damage to the All in One system will result in voiding of warranty claims.<br/>Danger to life from electric shock due to damaged Scalable All in One.<br/>Inadvertent operation of damaged Scalable All in One can lead to a hazardous situation that may result in death or serious injury due to electrical shock. Only operate Scalable All in One when it is technically faultless and in an operationally safe state.<br/>Regularly check the All in One system for visible damage. Make sure that all safety equipment is freely accessible at all times. If the Scalable All in One is damaged, do not touch it. Please immediately contact your installer or Hansol Technics for arrange for a repair.</li><li>2. Please contact your installer or Hansol Technics if a significant event message is shown on the LCD screen or if the All in One system reports an event. Refer to the table of event messages for different significant/general events.</li></ol> |

## 2.3 Symbol Indication

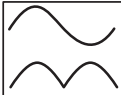
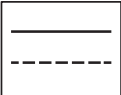
### INVERTER Symbols

| Symbol                                                                            | Description     |
|-----------------------------------------------------------------------------------|-----------------|
|  | Inverter        |
|  | dc/dc converter |

[Table 2-2: Inverter symbols]

### RCD (residual current device) Leakage Circuit Breaker

This product can cause a DC current in the external protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, either an RCD or RCM of Type B is only available on the supply side of this product.

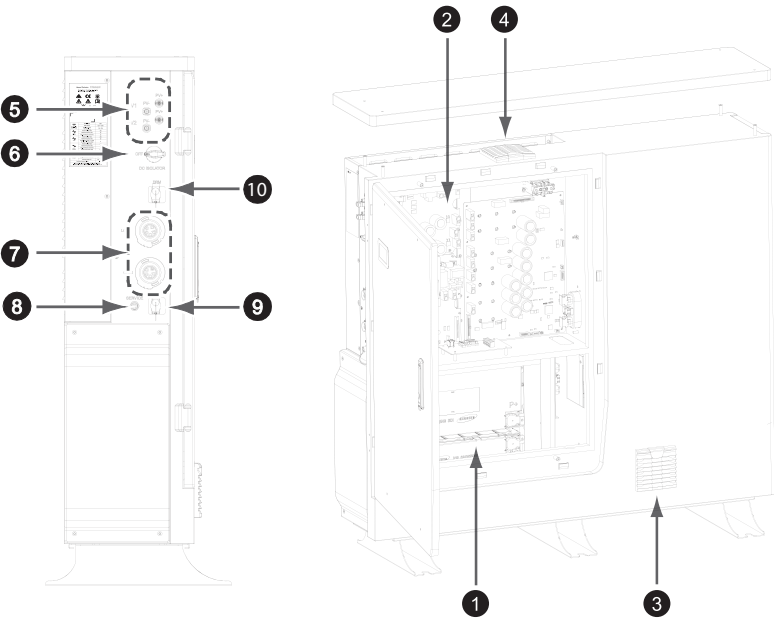
| ITEM                                                                              |                                                                                   |        | Description                                                                                    |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------------------------|
|  |  | Type B | Type B devices, which detect residual currents comprising of pure AC, rectified AC and pure DC |

[Table 2-3: RCD Leakage circuit breaker description]

### 3. Product Overview

The All in One system includes the PV inverter, battery charger/discharger, Li-Ion battery, and EMS.

The basic operating modes consist of PV generation mode, PV generation + charge/discharge mode. The operation mode of this product is automatically determined by the EMS algorithm.



[Figure 3-1: Part View of Hansol All in One]

| No. | Description                                                         |
|-----|---------------------------------------------------------------------|
| 1   | Lithium Ion battery                                                 |
| 2   | INVERTER & Converter (PV inverter and battery charger / discharger) |
| 3   | Air Filter1 (Bottom)                                                |
| 4   | Air Filter2 and FAN (Top)                                           |
| 5   | Input terminal (MC4-2set)                                           |
| 6   | DC isolator                                                         |
| 7   | Grid and Load connector (RST50i5S connector)                        |
| 8   | Service Connector for Installation                                  |
| 9   | Communication (LAN)                                                 |
| 10  | DRM Connection (LAN)                                                |

[Table 3-1: Part Description]

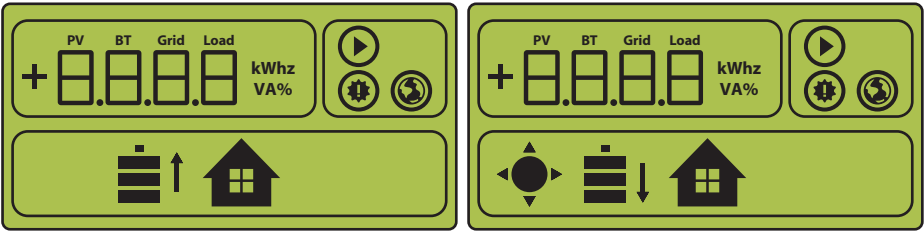
### 3.1 Grounding the PV Inverter

The PV inverter complies with the local requirements for grounding the PV inverter. Hansol Technics recommends connecting and grounding the PV inverter’s frame and other electricity conducting surfaces in such a way that there is continuous conduction in order to achieve maximum protection for systems and persons. And the PV inverter’s DC (+) pole and DC (-) pole are not permitted to be grounded.

### 3.2 Fail-safe actions upon power failure

When a system outage occurs, the utility pole in the following figure disappears and it switches to the backup mode after 20 seconds to supply power. With 7.2 kWh, the supplied power is a maximum of 4 kW and with 10.8 kWh, a maximum of 4.98 kW. The back mode is canceled in 5 minutes after return to normal operation.

The utility pole appears when power is supplied to the system. Upon system outage, it disappears. Upon PV generation, the sun mark appears.



[Figure 3-2: Back up mode (LCD)]

Under DOD 90% and 95% of battery to loads, the 7.2 kWh system can operate for approx. 92 minutes and the 10.8 kWh system for approx. 110 minutes.

| System   | Battery capacity | Battery energy | Load    | Hour | Min   |
|----------|------------------|----------------|---------|------|-------|
| 7.2 kWh  | 7.2 kWh          | 6.48 kWh       | 4 kW    | 1.8  | 110.8 |
| 10.8 kWh | 10.8 kWh         | 9.72 kWh       | 4.98 kW | 1.5  | 92.3  |

[Table 3-2: Maximum Outage Response Times for each System with Battery Full]

**NOTICE**

The outage response time may vary depending on the battery capacity and loads.

### 3.3 Grid Switch Box Connection between Grid and System

|                                                                                   |                                                                                                                                           |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>CAUTION</b></p> <p>When it is required to check the ESS system and its connected load, make sure that the Grid is disconnected.</p> |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

Power is supplied to the Grid Switch Box from Grid upon any failure in the ESS system. Normal indicates that the power for the load is supplied via the ESS system.

During

1. ordinary times,
  2. power outage (when the ESS system is in normal status),
  3. and normal status after finishing the quality inspection of the product,
- set it to Normal to supply power to the load via the ESS system.

In case of failure in the ESS system, power must be supplied from Grid by Bypass.

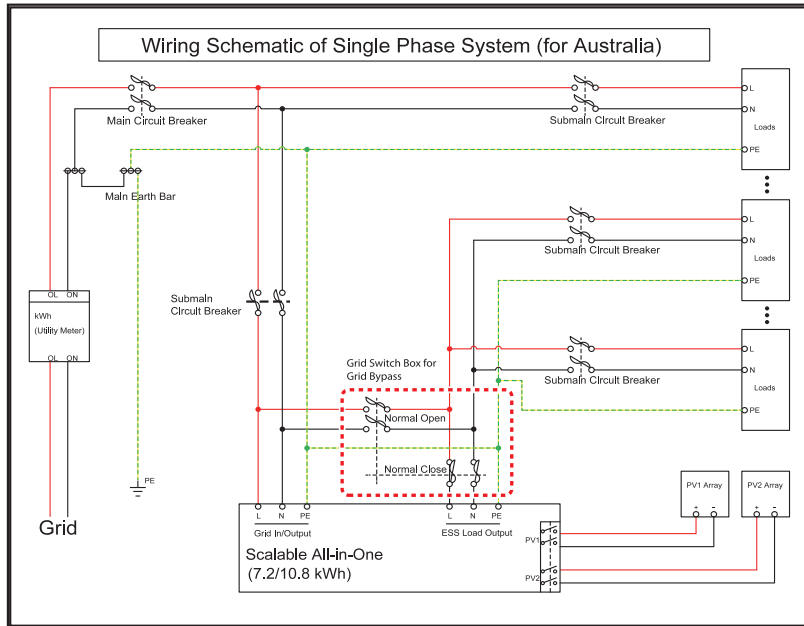
When power outage happens, it is changed to the stand-alone mode within 30 seconds to supply power to the load.

When the elapsed time is over 30 seconds after power outage but power is not supplied to the load, it is caused by the ESS system failure.

1. Upon no PV power generation,
  2. full battery discharge,
  3. and ESS system failure,
- it must be changed to Bypass to supply power to the load upon restoration from power outage.

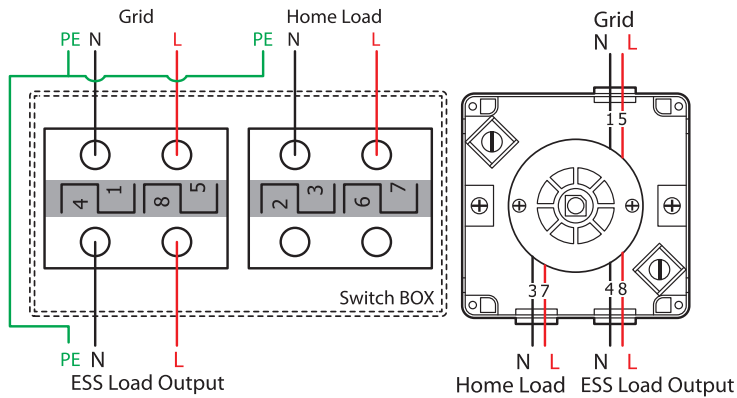
|  | NOTICE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <ul style="list-style-type: none"><li>▪ At this time, the power to the load is switched from the ESS system to the main system.</li><li>▪ If the switching occurs when the ESS system is in normal status, the following actions are sequentially taken. At this time, the system encounters no problem but the power outage happens for the switching time of the load switch from OFF to Bypass.<ul style="list-style-type: none"><li>Ⓐ While the ESS system supplies power: The switch is switched from OFF to Bypass. The load encounters power outage for the switching time and then power is supplied from the main system to the load by Bypass. When the power that is being supplied from the ESS system to the load, is instantly supplied to the system, the power level can exceed the zero feed-in limit but it will be stabilized within several seconds.<ul style="list-style-type: none"><li>▶ System encounters no problem except from load power outage during the switching time.</li></ul></li><li>Ⓑ While the ESS system supplies no power: The switch is switched from OFF to Bypass. The load encounters power outage for the switching time and then power is supplied from the main system to the load by Bypass.<ul style="list-style-type: none"><li>▶ System encounters no problem except from load power outage during the switching time.</li></ul></li></ul></li></ul> |

## 1. Grid Switch Box Wiring Schematic of Single Phase System for Australia



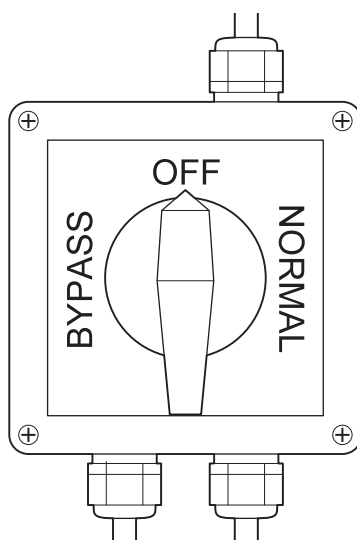
[Figure 3-3: Wiring Schematic of Single Phase System for Australia]

## a. Check the wiring diagram of the Grid Switch Box.



[Figure 3-4: Wiring Diagram]

- b. The final assembly of the Grid Switch Box is as follows.



[Figure 3-5: Final Assembly]

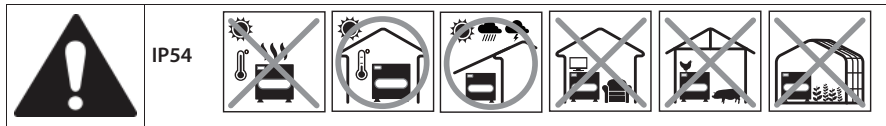
### 3.4 Selection of Installation Location

|  | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <p>Danger to life due to fire or explosion!</p> <p>Danger to life due to high voltages!</p> <p>Despite careful construction, a fire can occur with electrical devices.</p> <p>Do not install the Scalable All in One on the following locations:</p> <p>On flammable construction materials;</p> <p>In potentially explosive areas; and</p> <p>In areas where highly flammable materials are stored!</p> |

|  | CAUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <p>Li-Ion battery energy storage is equipped within Scalable All in One.</p> <p>The ESS within Scalable All in One provides a safe source of electrical energy when operated as intended and as designed.</p> <p>A potentially hazardous circumstance such as excessive heat or electrolyte mist may occur due to improper operating conditions, damage, misuse and/or abuse. The following safety precautions and the warning messages described in this section must be observed.</p> <p>If any of the following precautions are not fully understood, or if you have any questions, contact Customer Support for guidance.</p> <p>The Safety Section may not include all regulations for your locale; Personnel working with 7.2/10.8 kWh All in One must review applicable federal, state and local regulations as well as the industry standards regarding this product.</p> |

|  | CAUTION                                                                                                |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                                                                                     | <p>All work on the ESS and electrical connections must be carried out by qualified personnel only.</p> |

#### 3.4.1 Possible locations for installation



Selecting an optimal installation location for the ESS is required for operation safety, efficiency and life of the product.

1. This IP54 product is recommended to be installed indoor. If it is required to be installed outdoor, the place must have a roof to avoid direct sunlight, rain and snow.
2. Install the product in a well ventilated and clean area with no dust or insects. (e.g. stockyards and carpets are not allowed).
3. Do not install the product in an area prone to floods or a high humidity area.
4. Do not install the product where a fire or explosion might occur.
5. Install the product in a place that is not exposed to corrosive gases (e.g. ammonia, acid, salinity content, etc.).
6. Install the product in a place where children cannot reach.
7. Install the product considering the noise level because noise is generated during operation, which may cause discomfort. (e.g. near a bedroom)
8. The floor must be hard so that it can withstand the weight and vibration of the product. (e.g. concrete structure)
9. The floor must not be sloped or recessed where a pool of water may form. If this is an issue, adjust the height of the floor to be at a higher point.
10. The floor surface must be fixed with anchors.
11. Do not install the product on flammable material. Flammable materials must not be placed within a specific distance.
12. Objects must not be stacked on top of the product.
13. After connecting all the cables, make sure that they are firmly inserted.

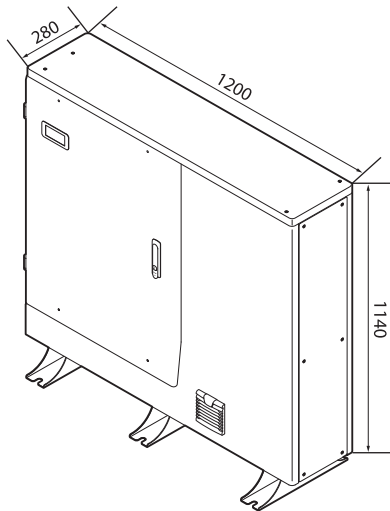
#### 3.4.2 Storing the ESS system

1. The product must not be tilted when being moved. It must be lifted vertically.
2. The product must not fall from a height of 10 cm or more.
3. Make sure the product does not get wet in the rain or snow.
4. Do not stack the products on top of each other.

## 3.5 Dimensions and Weight

Once the 7.2/10.8 kWh All in One system has been assembled, its dimension is 1140 x 1200 x 280 mm, and its weight is approximately from 194 kg (7.2 kWh) to 239kg (10.8 kWh).

The [Figure 3-6] and [Table 3-3] show the outer dimensions and the weight of the device after assembly, respectively.



[Figure 3-6: Dimension of All in One]

| System   | Battery | Inverter ( Include case) | Total  |
|----------|---------|--------------------------|--------|
| 7.2 kWh  | 90 kg   | 104 kg                   | 194 kg |
| 10.8 kWh | 135 kg  | 104 kg                   | 239 kg |

[Table 3-3: Weight of All in One]

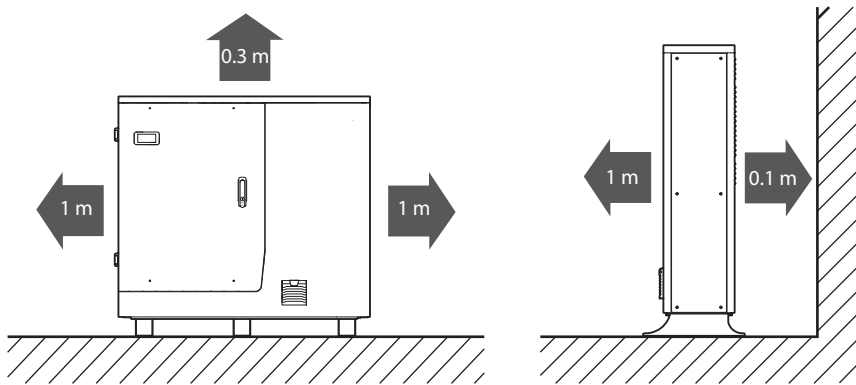
### 3.5.1 Ambient Conditions and Temperatures

Identify a proper installation location to install and remove the device easily at any time. This device must be located within reach distance.

The ambient temperature of the installation location will range from -10°C to +40°C.

### 3.5.2 Minimum Clearance

This device is required to maintain a minimum clearance distance for the safe installation of the product. Refer to the [Figure 3-7] to secure enough space and keep a distance of 0.1 m from the wall, 1 m in the front of the device, 1 m on both sides, and 0.3 m on top.

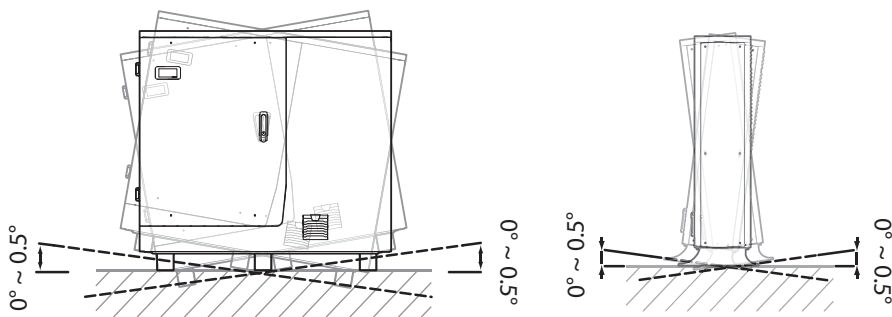


[Figure 3-7: Minimum Clearance for All in One]

#### 3.5.3 Position (Location Selection)

As shown in the [Figure 3-8], install the device on a flat surface. (Front, back, left, right gradient within  $\pm 0.5^\circ$ )

To allow for natural ventilation, the side of the system must be kept away from the wall about 0.3m at least. Make sure not to have foreign substances and objects stuck in the blowing fan, ventilation entrance and exit sides.



[Figure 3-8: Restriction for the surface gradient]

## 3.6 Scalable (From 7.2 kWh to 10.8 kWh)

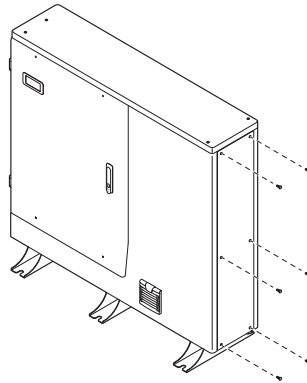
**CAUTION**

When it is scalable from 7.2 kWh to 10.8 kWh, the system is maintained with the battery life (SOH, EOL) for 7.2 kWh. It means that the system guarantees the battery life for 7.2 kWh. When it is scalable to 10.8 kWh, the battery life is guaranteed for 7.2 kWh.

**NOTE**

When it is scalable from 7.2 kWh to 10.8 kWh, contact the installer.

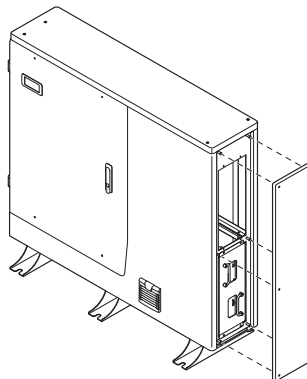
1. Unfasten 6 side cover bolts.



Screwing Torque = 1.4 Nm

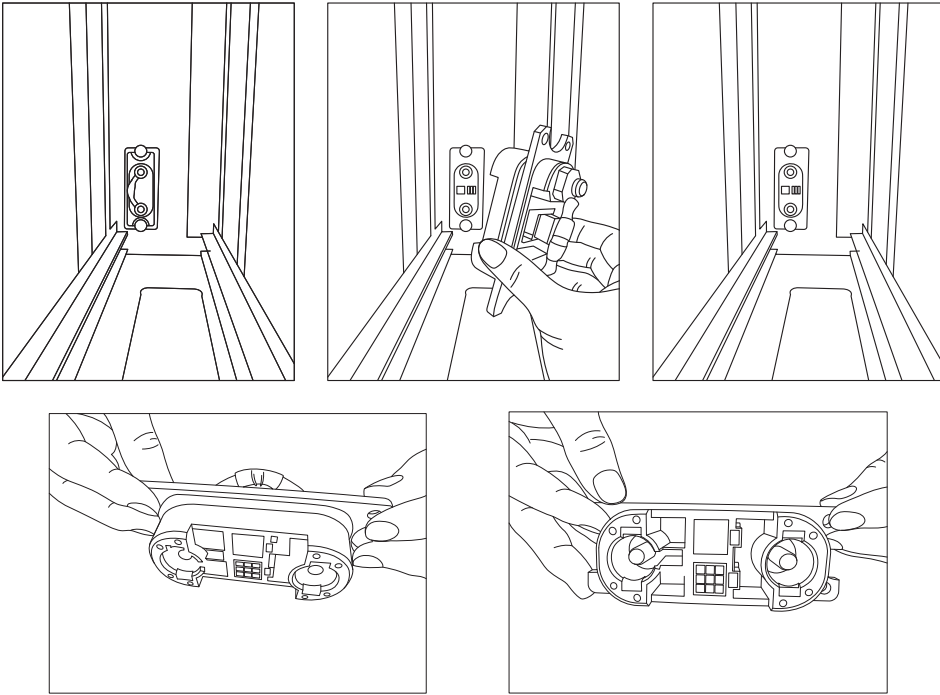
[Figure 3-9: Unfastening screws]

2. Side cover open



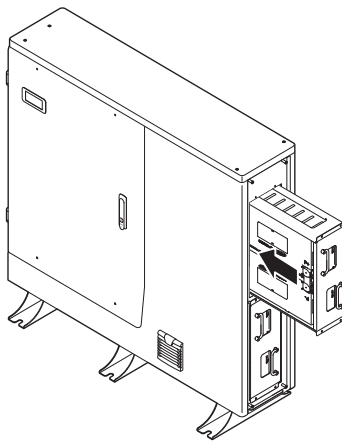
[Figure 3-10: Removal of the side cover]

3. Unfasten 6 screws for the battery cover grade and remove the battery cover grade.



[Figure 3-11: Removal of the battery cover grade]

4. Mount the battery tray.



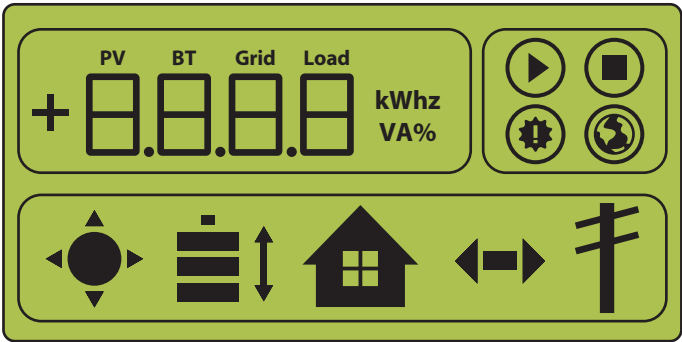
[Figure 3-12: Battery tray mounting]

# 4. Operation Test

## 4.1 Starting the System

After completing the installation, turn on the AC circuit breaker and the DC Isolator installed in the distribution box. (see the Section 5.6 in the installation guide)

Check the system check message on the front LCD screen.



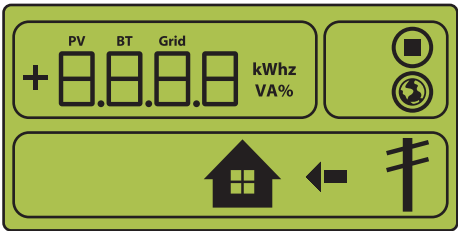
[Figure 4-1: Initial indication screen on power on]

| Icon | Displayed                                                                                 | Not Displayed                                                                                       |
|------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|      | System running                                                                            | System not running                                                                                  |
|      | System stopped/in standby                                                                 | System not stopped                                                                                  |
|      | Fault occurred                                                                            | No fault                                                                                            |
|      | EMS running                                                                               | EMS stopped or not accessible                                                                       |
|      | PV generating                                                                             | PV not generating                                                                                   |
|      | 1. BATTERY: Normal BMS communication<br>2. Up arrow: Discharged<br>3. Down arrow: Charged | 1. BATTERY: Abnormal BMS communication<br>2. Up arrow: Not discharged<br>3. Down arrow: Not charged |

|                                                                                   |                                                              |                                                                         |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------|
|  | Always turned on                                             |                                                                         |
|  | 1. Left arrow: Buy from GRID<br>2. Right arrow: Sell to GRID | 1. Left arrow: No purchase from GRID<br>2. Right arrow: No sale to GRID |
|  | GRID in normal status                                        | GRID in abnormal status (Running standalone)                            |

[Table 4-1: Description of Icons on indication screen]

After finishing the system check, check the system, the PV, and the battery status.



[Figure 4-2: Standby state indication screen before the EMS command]

You will receive the command from the EMS to convert to operation mode.  
For individual operation mode screen, refer to 8.3.

## 4.2 Turning off the System

It is recommended to turn off the DC isolator first and then the manual AC circuit breaker. (If AC is turned off first, the standalone mode starts.)

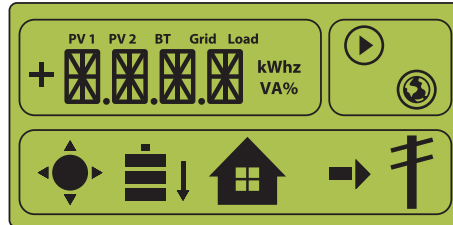
## 4.3 Descriptions of Operation Mode

This system is composed of six modes: PV Auto, PV Only, Battery discharge, Standby, Maintenance (forced charge), and Stand-alone. The event check status should not be considered as any specific mode.

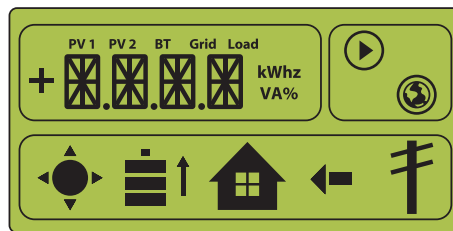
This system is composed of eight modes: PV Auto, PV Only, Battery discharge, Standby, GRID charge, Maintenance (forced charge same as GRID charge), Stand-alone and Self-reliance (PV to battery charge or Battery to LOAD). The event check status should not be considered as any specific mode.

### 4.3.1 PV-Auto Mode

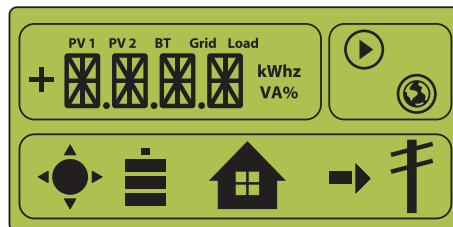
Both solar energy generation and battery charge-discharge are available. The solar-generated power is charged or discharged to the battery based on the EMS decision. A maximum of 4.98 kW or less can be sent to the LOAD and the electric power system.



[Figure 4-3: PV generation, Battery charge, Load use, sell remaining amount]



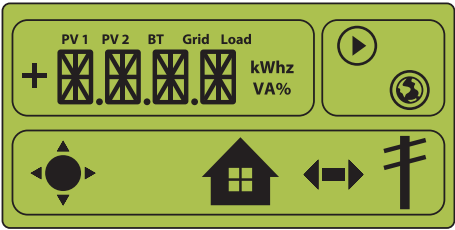
[Figure 4-4: PV generation, Battery discharge, Load use, buy shortage amount]



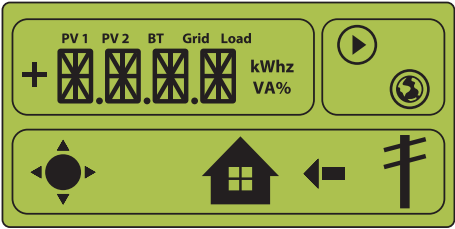
[Figure 4-5: PV generation, Battery standby, Load use, sell remaining amount]

### 4.3.2 PV-Only Mode

This mode enables the solar energy to be generated. However, the battery charge-discharge does not operate. A maximum of 4.98 kW or less of solar energy generation power can be sent to the LOAD and the system based on the EMS decision.



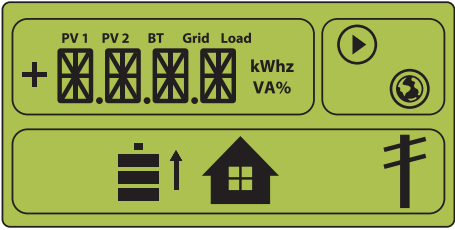
[Figure 4-6: PV generation, Sell remaining amount]



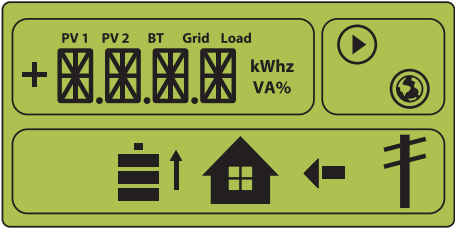
[Figure 4-7: PV generation, Buy shortage amount]

### 4.3.3 Battery-Discharge Mode

This mode permits of no solar energy generation. Battery discharge is only available on this mode. Based on the EMS decision, the battery discharge power can be sent maximum 4~5 kW or less only to the LOAD.



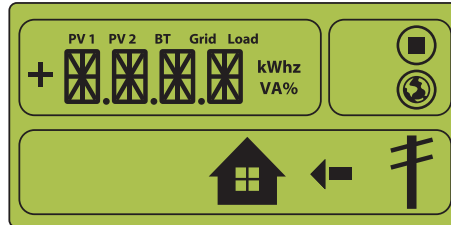
[Figure 4-8: Battery discharge, Load use]



[Figure 4-9: Battery discharge, Load use, Buy shortage amount]

#### 4.3.4 Standby Mode

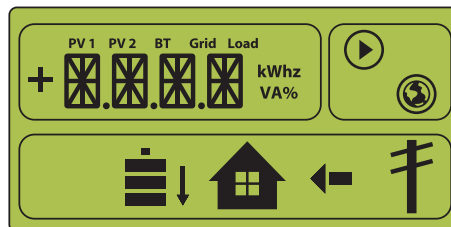
This is the standby mode before converting to operation mode (PV Auto, PV Only, Battery discharge mode). Conversion to the operation mode (PV Auto, PV Only, Battery discharge mode) is made by the EMS decision.



[Figure 4-10: Indication screen on Standby Mode, Buy shortage amount]

#### 4.3.5 Grid-Charge Mode

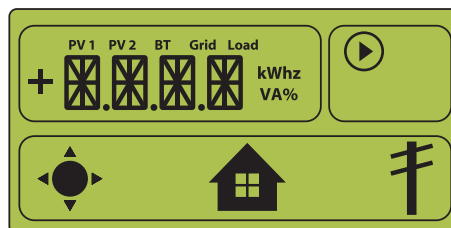
In this mode, solar energy generation is not used, but the power continuously flows from the electric power system to the battery.



[Figure 4-11: Indication screen on Grid charge Mode]

#### 4.3.6 Stand-Alone Mode

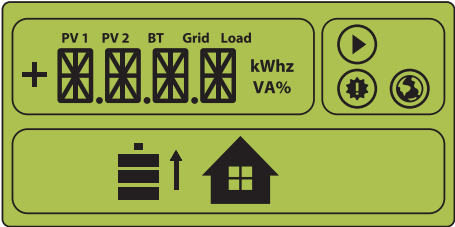
When the All in One is disconnected from the energy meter, or the power conversion system is disconnected from the energy management system (EMS), the All in One system enters into the Stand-Alone Mode. The system operates in a PV- only mode.



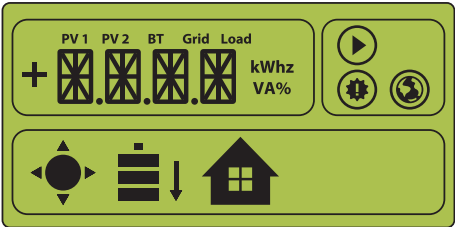
[Figure 4-12: Indication screen on stand-alone mode]

### 4.3.7 Self-Reliance Mode

When the All in One is disconnected from the grid, the All in One system enters into the Self-Reliance Mode. The system operates in a battery charge or discharge mode.



[Figure 4-13: Indication screen on Self-Reliance mode, Battery to LOAD discharge]



[Figure 4-14: Indication screen on Self-Reliance mode, PV to BATTERY charge (LOW SOC)]

## 5. Communication Connection

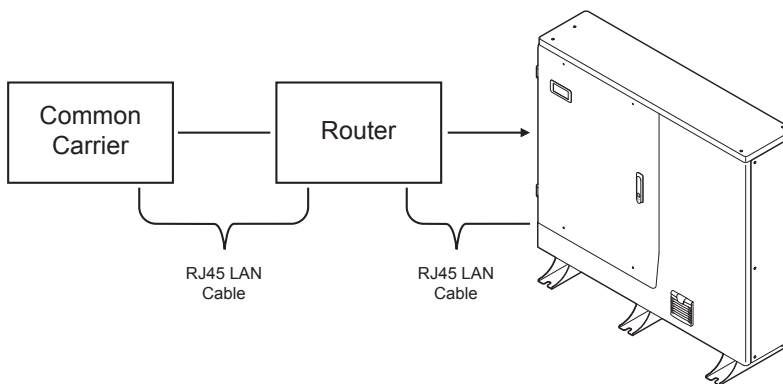
### 5.1 Internet Connection

#### 5.1.1 Components

- Wired Router (not provided in the product package)
- RJ45 general LAN Cable (not provided in the product package)

#### 5.1.2 Connection Block Diagram

LAN (Common carrier → Router) → ESS



[Figure 5-1: Internet Connection]

#### 5.1.3 Connection Method

Plug the RJ45 LAN Cable between the LAN terminal and the Router.

# 5.2 Homepage

Any customer who has purchased this device can use a web browser (<https://myess.hansoltechnics.com>) or a smart phone to check its current operation status and receive various statistical information on operation in the house or remotely.

## 5.2.1 Service Terms

This service is provided only when the device is connected to the Internet, and specific services may require additional information only after approval from the customer.

## 5.2.2 Membership

To use this service, you must register for membership through our homepage. During membership registration, the member's information such as ID, password, name and the address are collected, and additional data may also be collected to provide statistical information upon customer's approval.

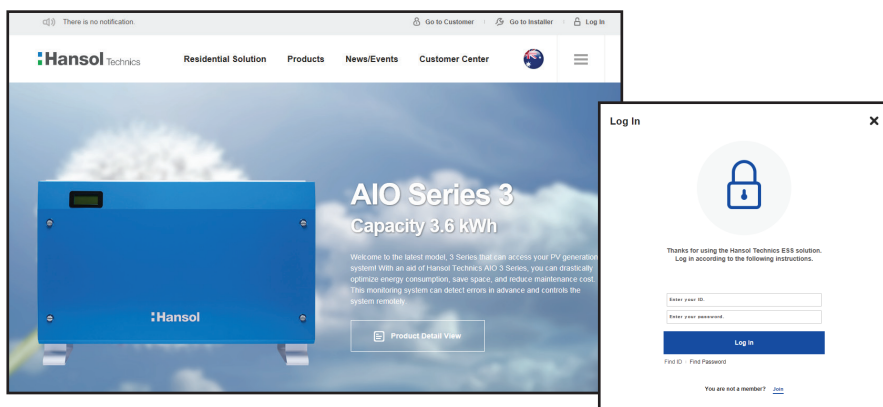
## 5.2.3 Membership Withdrawal

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

## 5.2.4 Log-In

Log in to the homepage through the ID and the password generated through membership registration. You can monitor the product online only when you are logged in.

Also, if a log-in ID error or a password error occurs five consecutive times, access is blocked for 10 minutes for security reasons, and access is permitted after this waiting period of time.



[Figure 5-2: Log-in page]

### 5.2.5 Password Initialization

A customer who forgets the password during use can initialize the password by using the password initialization menu on the homepage. On the log-in page, select the "Forgot your id or password?" menu, and when the customer confirms the ID and the e-mail address created during membership registration, the initialized password is sent to the registered e-mail address.

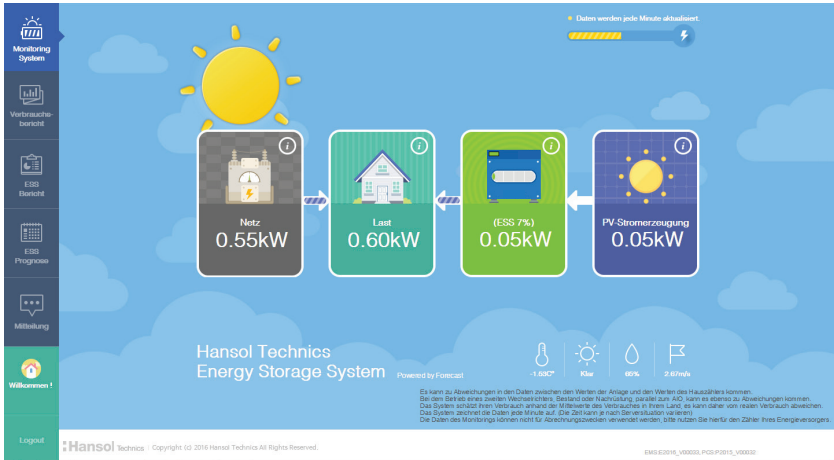
[Figure 5-3: Password initialization page]

### 5.2.6 Types of Service Offered

After completing log-in, normal service is available. This service currently provides such menu items as monitoring, consumption reports, ESS reports, ESS forecasts, and notices.

#### 5.2.6.1 Monitoring

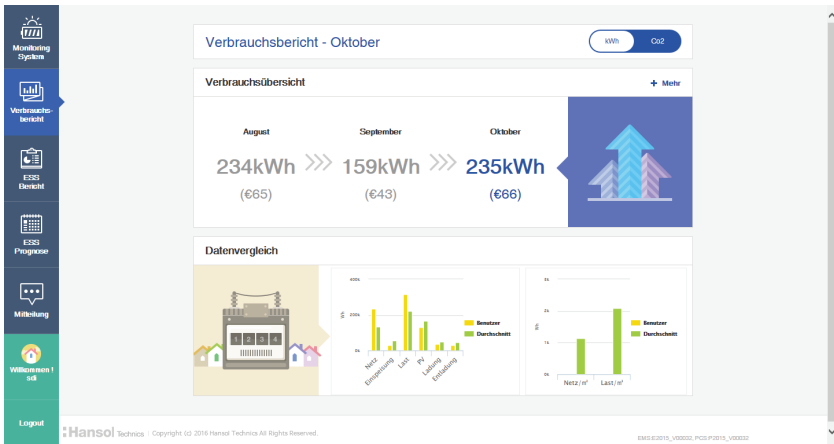
The operational status of the product is indicated. You can check the current status of operation, the customer's power consumption information, and power generation amount information in real-time. You can also check event codes generated during run time on the monitoring page. You can check the details of the event codes by clicking the exclamation marks which appear on the ESS icon. If the Internet is not available, the event codes cannot be checked.



[Figure 5-4: Monitoring page]

5.2.6.2 Consumption Report

The household power consumption information collected during energy meter linkage is provided. In particular, such information on as the household type, the size, and the number of family residents is collected according to the customer's approval. You can use these data to identify various types of statistics and comparative analysis data.



[Figure 5-5: Consumption report page]

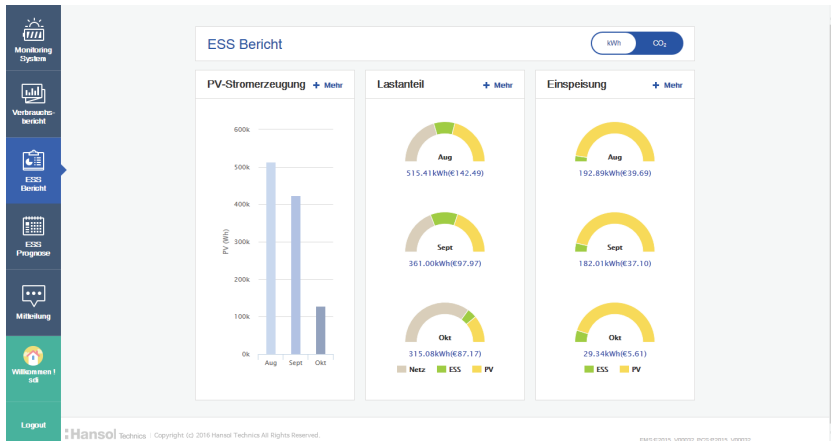
5.2.6.3 ESS Report

On the ESS Report page, you can check various types of data generated through ESS operation. You can also use the ESS Report to check the amount of energy charged or

discharged and other data comparisons with the solar energy production amount or the power sales amount.

#### 5.2.6.4 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.



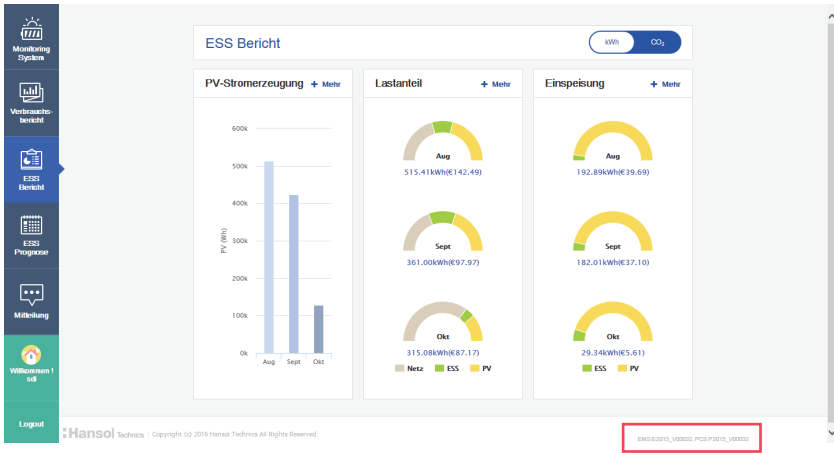
[Figure 5-6: Forecast page]

#### 5.2.6.5 Notices

You can check the notice message whenever there is an update or any other change in the service.

#### 5.2.6.6 Software Versions

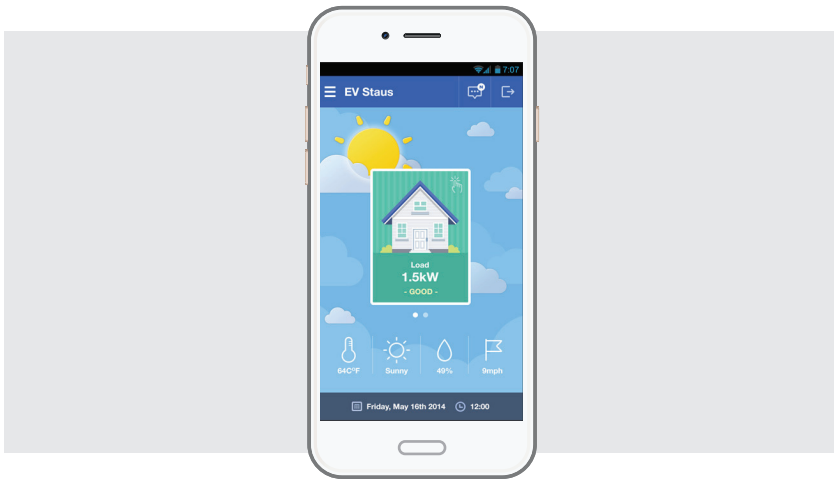
You can check the software version of the product on the monitoring page.



[Figure 5-7: Setting page]

### 5.2.7 Mobile Service

Customers who use Android or I-Phone can use a smart phone to easily check the product status anytime, anywhere. 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.



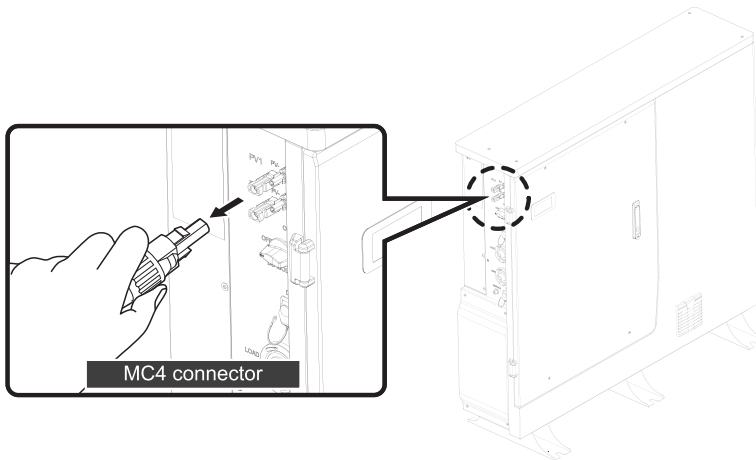
[Figure 5-8: Mobile service page]

## 6. Maintenance

### 6.1 Cleaning the Fan and the Cover

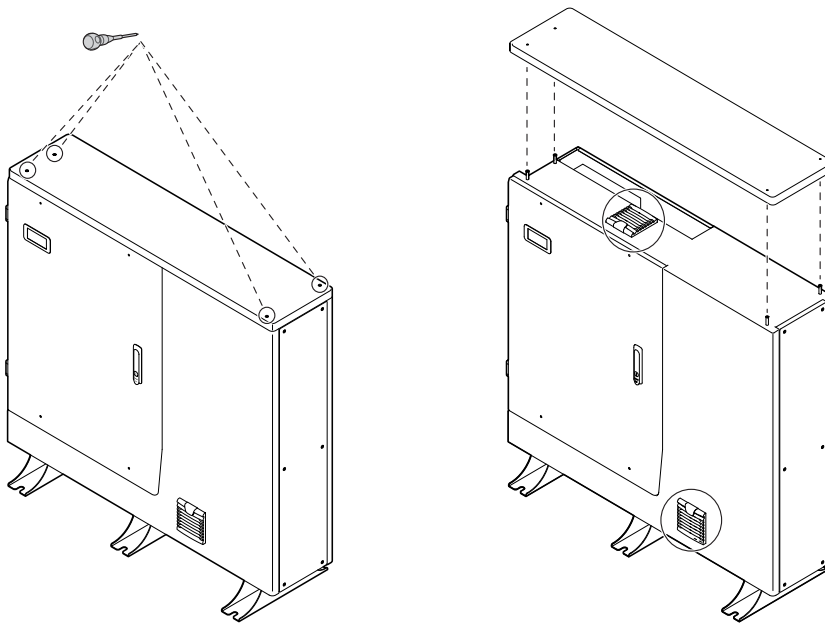
|                                                                                   |                        |
|-----------------------------------------------------------------------------------|------------------------|
|  | <b>NOTICE</b>          |
|                                                                                   | Qualified Person Only! |

Refer to the following procedures and check the fan when error code E005 is shown. If the fan is covered with dirty particles, clean the fan as guided in this chapter. Turn off the AC circuit breaker and the DC Isolator in the distribution box, then separate the Photovoltaic MC4 connector from the connector located on the side of the Scalable All in One.



[Figure 6-1: PV MC4 connector]

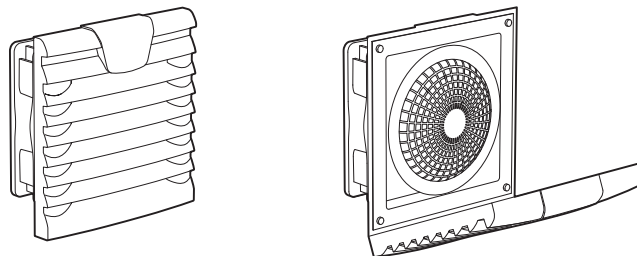
DC Isolator off and Removal of the Photovoltaic MC4 Connector



[Figure 6-2: Upper cover removal]

When the top cover is removed, clean 2 pint the filter and fan by using a smooth brush, paint brush, or wet cloth. Show figure

Remove the fan connector.



[Figure 6-3: Fan removal]

Clean the filter and fan with a smooth brush or a wet cloth.



**NOTICE**

Using compressed air may damage the fan.  
When cleaning the fan, do not use compressed air.  
It may damage the fan.

When the fan is cleaned, assemble all the components in the in reverse order.

## 6.2 Checking the Event Logs

You can check the event messages on the website (<https://myess.hansoltechnics.com>) and identify various causes of the event message described in the following chapter (Chapter 7) to perform a correct measure. Regarding a significant message, contact the designated installer or the maintenance company for customer service.

## 6.3 Checking the Terminals

|  | WARNING                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <p>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).</p> <p>Ensure that PV connection cables on the PV1+, PV1- and PV2+, PV2- are fastened.</p> <p>Check for corrosion on the terminals. If corrosion is seen, please contact the installer.</p> <p>Ensure that AC cables in AC1 and AC2 are fastened.</p> |

## 7. Problem Confirmation

Checking event codes is available on the website (<https://myess.hansoltechnics.com>). If the Internet is not available, the event codes cannot be checked.

### 7.1 General Events

The general events contain warnings and protection.

The warning level events does not stop the generating process. A displayed warning message automatically disappears as soon as the issue is resolved.

When protection level events occur, the product stop the generating process. The process may automatically resume as long as the issue is resolved.

#### 7.1.1 INVERTER General Events (Warnings)

| Type    | Code | Code Name              | Description                                                                                                                                                                                                   |
|---------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WARNING | E101 | Inverter Over Current  | An over current has occurred on the DC/AC energy conversion output. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.) |
|         | E102 | DCL Over Voltage       | An over voltage has occurred on the DC-LINK capacitor. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.)              |
|         | E103 | PV #1 Connection Error | Reverse polarity has been detected in the PV #1 connection. Please check the connector.                                                                                                                       |
|         | E104 | PV #2 Connection Error | Reverse polarity has been detected in the PV #2 connection. Please check the connector.                                                                                                                       |
|         | E105 | PV #1 Over Voltage     | An over voltage has been detected in the PV #1 input. Please check the PV Array input (< 660 V).                                                                                                              |
|         | E106 | PV #1 Over Current     | Over current has been detected in the PV #1 input. Please contact the after-sales service center for circuit inspection on PV.<br>(goes back to normal status once the error has been cleared.)               |

| Type | Code | Code Name             | Description                                                                                                                                                                                                                   |
|------|------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | E107 | PV #2 Over Voltage    | An over voltage has been detected in the PV #2 input. Please check the PV Array input (< 660 V).                                                                                                                              |
|      | E108 | PV #2 Over Current    | An over current has been detected in the PV #2 input. Please contact the after-sales service center for circuit inspection on PV.<br>(goes back to normal status once the error has been cleared.)                            |
|      | E109 | BDC Over Voltage      | A battery over voltage has been detected. Please contact the after-sales service center for battery inspection.                                                                                                               |
|      | E110 | BDC Over Current      | An over current has been detected in the BDC circuit. Please contact the after-sales service center for circuit inspection on BDC.<br>(goes back to normal status once the error has been cleared.)                           |
|      | E111 | Inverter Over Voltage | An over voltage has been detected in the DC/AC output during stand-alone operation. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.) |
|      | E114 | BDC Under Voltage     | A battery low voltage error has been detected. Please contact the after-sales service center for battery inspection.                                                                                                          |
|      | E115 | DCL Under Voltage     | A low voltage error has occurred in the DC-LINK capacitor. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.)                          |
|      | E116 | PV Over Temperature   | An over temperature has been detected in the PV converter switch. Please check the PV converter circuit and contact the after-sales service center.                                                                           |
|      | E117 | BDC Over Temperature  | An over temperature has been detected in the BDC converter switch. Please check the BDC converter circuit and contact the after-sales service                                                                                 |

| Type | Code | Code Name                 | Description                                                                                                                                                                                                                   |
|------|------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |      |                           | center.                                                                                                                                                                                                                       |
|      | E118 | Inverter Over Temperature | An over temperature has been detected in the INVERTER switch. Please check the INVERTER circuit and contact the after-sales service center.                                                                                   |
|      | E119 | D12V Over Voltage         | An over voltage has been detected in the DC 12V input of the controller. Please contact the after-sales service center for circuit inspection in the auxiliary power unit of the regulator.                                   |
|      | E120 | D12V Under Voltage        | A low voltage error has been detected in the DC 12V input of the controller. Please contact the after-sales service center for circuit inspection in the auxiliary power unit of the regulator.                               |
|      | E122 | Inverter Under Voltage    | An over voltage has been detected in the DC/AC output during stand-alone operation. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.) |
|      | E123 | LOAD Over Current         | An over current has been detected in the LOAD output terminal. Please decrease the value of the load (< 43 A) connected to the LOAD terminal.                                                                                 |
|      | E125 | PV #1 Voltage sensor open | OPEN has been detected in the PV STRING #1 input voltage sensor. Please contact the after-sales service center for sensor circuit inspection.                                                                                 |
|      | E126 | PV #2 Voltage sensor open | OPEN has been detected in the PV STRING #2 input voltage sensor. Please contact the after-sales service center for sensor circuit inspection.                                                                                 |
|      | E127 | PV #1 Current sensor open | OPEN has been detected in the PV STRING #1 current sensor. Please contact the after-sales service center for sensor circuit inspection.                                                                                       |
|      | E128 | PV #2 Current sensor open | OPEN has been detected in the PV STRING #2 current sensor. Please contact the after-sales service center for sensor circuit inspection.                                                                                       |
|      | E129 | Inverter Over Power       | Power Over has been detected in the inverter output. It may be caused by temporary or rapid LOAD (< 5500 W)                                                                                                                   |

| Type | Code | Code Name            | Description                                                                                                                                        |
|------|------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|      |      |                      | changes. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.) |
|      | E130 | LOAD Reverse Current | A reverse current has been detected in the LOAD output terminal. Please check if the electric power generator is connected to the LOAD terminal.   |
|      | E131 | LOAD OVER (WARNING)  | An over current has been detected in the LOAD output terminal. (Warning) Please decrease the value of the load connected to the LOAD terminal.     |

[Table 7-1: Inverter general events warning list]

### 7.1.2 System General Events (Protection)

| Type | Code | Code Name                            | Description                                                                                                                                                                                   |
|------|------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | E410 | DIC Communication Error              | An error has occurred while in internal communication of the controller. Please contact the after-sales service center.                                                                       |
|      | E411 | uEMS Communication Error             | An error has occurred during communication between the EMS board and the controller. Please contact the after-sales service center for inspection on the communication circuit or connection. |
|      | E448 | AC Relay Check Error                 | A fusion has been detected in the AC relay (INVERTER or GRID side). Please contact the after-sales service center for relay inspection.                                                       |
|      | E455 | PV_INVERTER part initialization fail | The internal initialization for the PV_INVERTER controller failed. Please contact the after-sales service center.                                                                             |
|      | E456 | BDC to DC-LINK Voltage charge fail   | The DC-LINK voltage charging has malfunctioned in the BDC (using BATTERY). Please contact the after-sales service center.                                                                     |
|      | E458 | PV_INVNT Logic fail                  | The inner sequence (LOGIC) process of the PV_INVNT DSP failed. Please contact the after-sales service center.                                                                                 |
|      | E459 | BATTERY Short                        | A battery shortage has been detected. Please check the battery connection. If                                                                                                                 |

| Type    | Code | Code Name                          | Description                                                                                                                                                                                                   |
|---------|------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |      |                                    | the problem continues after inspection, please contact the after-sales service center.                                                                                                                        |
|         | E460 | DC-Breaker switch OFF              | OFF has been detected while in operation in the DC-Breaker switch. Please check the switch.                                                                                                                   |
|         | E461 | BDC Logic fail                     | The inner sequence (LOGIC) process of the BDC DSP failed. Please contact the after-sales service center.                                                                                                      |
|         | E462 | BDC part initialization fail       | The internal initialization in the BDC controller failed. Please contact the after-sales service center.                                                                                                      |
|         | E463 | BATTERY Reverse connection         | A reverse battery connection has been detected. Please check the battery connection. If the problem continues after inspection, please contact the after-sales service center.                                |
|         | E464 | BATTERY & AFE Differential Voltage | A deviation has been detected between the BATTERY input terminal and BMS voltage measurement. Please contact the after-sales service center after checking the actual voltage and measurement of the battery. |
|         | E465 | BATTERY Voltage sensor open        | OPEN has been detected in the BATTERY voltage sensor. Please contact the after-sales service center.                                                                                                          |
|         | E466 | BDC #1 Current sensor open         | OPEN has been detected in the BDC STRING #1 current sensor. Please contact the after-sales service center.                                                                                                    |
|         | E467 | BDC #2 Current sensor open         | OPEN has been detected in the BDC STRING #2 current sensor. Please contact the after-sales service center.                                                                                                    |
| Warning | E468 | DIC Communication Error (Warning)  | An error has occurred while in internal communication of the controller. Please contact the after-sales service center.                                                                                       |

[Table 7-2: System general events protection list]

### 7.1.3 BMS General Events

| Type    | Code | Code Name                         | Description                                                                                                                                                                   |
|---------|------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Warning | E501 | Cell Over Voltage                 | An over voltage has been detected in the BATTERY Cell. Please check the battery.                                                                                              |
| Fault   | E502 | Cell Over Voltage                 | An over voltage has been detected in the BATTERY Cell. Please contact the after-sales service center for battery inspection.                                                  |
| Warning | E503 | Cell Under Voltage                | A low voltage error has been detected in the BATTERY Cell. Please check the battery.                                                                                          |
| Fault   | E504 | Cell Under Voltage                | A low voltage error has been detected in the BATTERY Cell. Please contact the after-sales service center for battery inspection.                                              |
| Warning | E505 | Cell Over Temperature             | An over temperature has been detected in the BATTERY Tray. Please check the battery.                                                                                          |
| Fault   | E506 | Cell Over Temperature             | An over temperature has been detected in the BATTERY Tray. Please contact the after-sales service center for battery inspection.                                              |
| Warning | E507 | Cell Under Temperature            | A low temperature error has been detected in the BATTERY Tray. Please check the battery.                                                                                      |
| Warning | E509 | Cell Voltage Imbalancing          | A voltage deviation has been detected in the BATTERY Cell. Please contact the after-sales service center for battery inspection.                                              |
|         | E511 | AFE Communication Error           | A communication error has occurred between the BDC's DSP and the BMS board. Please contact the after-sales service center for inspection on the connection wire or BMS board. |
|         | E520 | TOTAL Voltage Over (@ BMS (AFE))  | An over voltage has been detected in the battery measured in BMS. Please contact the after-sales service center for inspection on the battery and BMS.                        |
|         | E521 | TOTAL Voltage Under (@ BMS (AFE)) | A low voltage error has been detected in the battery measured in BMS. Please contact the after-sales service center for inspection on the battery and BMS.                    |
|         | E524 | Cell Temperature                  | Errors in 2 or more temperature                                                                                                                                               |

| Type    | Code | Code Name                  | Description                                                                                                                                                                   |
|---------|------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |      | sensor broken              | sensors in the BATTERY Tray have been detected. Please check the battery. Please contact the after-sales service center.                                                      |
| Warning | E525 | AFE Communication Error    | A communication error has occurred between the BDC's DSP and the BMS board. Please contact the after-sales service center for inspection on the connection wire or BMS board. |
| Warning | E526 | Cell Imbalance Temperature | A temperature measurement deviation has occurred in the BATTERY tray. Please contact the after-sales service center for battery inspection.                                   |

[Table 7-3: BMS general events list]

#### 7.1.4 EMS/Communication Events

| Type | Code | Code Name                        | Description                                                                                                                                                                                   |
|------|------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | E601 | PCS Communication Error          | An error has occurred during communication between the EMS board and the controller. Please contact the after-sales service center for inspection on the communication circuit or connection. |
|      | E602 | Ethernet Communication Error     | A communication error has occurred on the external Ethernet of the EMS board. Please contact the after-sales service center for inspection on the communication circuit or connection.        |
|      | E603 | Energy Meter Communication Error | A communication error has occurred in the EMS board and the embedded energy meter. Please contact the after-sales service center for inspection on the communication circuit or connection.   |

[Table 7-4: EMS/communication events list]

### 7.1.5 Single Fault Events

| Type    | Code | Code Name             | Description                                                                                                                                                                                                  |
|---------|------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WARNING | E701 | Grid Under Voltage    | A low voltage error has been detected in the GRID. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.)                 |
|         | E702 | Grid Over Voltage     | An over voltage has been detected in the GRID. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.)                     |
|         | E703 | Grid Under Frequency  | A low frequency error has been detected in the GRID. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.)               |
|         | E704 | Grid Over Frequency   | An over frequency has been detected in the GRID. If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.)                   |
|         | E706 | RCMU Over Current     | A leakage has been detected in the internal inverter output of the system. Please contact the after-sales service center                                                                                     |
|         | E708 | PV Insulation Error   | An error has been detected in the insulation resistance of the PV input. Please contact the after-sales service center for inspection on the PV Array and connection.                                        |
|         | E709 | Grid Anti-islanding   | An error has been detected in the GRID (Anti-Islanding situation). If the problem continues, please contact the after-sales service center.<br>(goes back to normal status once the error has been cleared.) |
|         | E710 | Function Safety Error | A deviation has been detected in the PV_INV and BDC. Please contact the after-sales service center.                                                                                                          |

[Table 7-5: Single fault events list]

## 7.2 Significant Events

If a significant event is notified, the system is set to stop operation. If that is the case, contact your installer to restore the system to normal operation.

| Type        | Code | Description                                 | Measures                                                                                                                                                                                                                                            |
|-------------|------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Significant | E912 | PCS Permanent Error                         | Consecutive errors have been detected in the PV_INVERTER. Please contact the after-sales service center.                                                                                                                                            |
|             | E913 | BDC Permanent Error                         | Consecutive errors have been detected in the BDC. Please contact the after-sales service center.                                                                                                                                                    |
|             | E914 | INVERTER Current Over (Trip-zone, @INVT)    | An over current surge has been detected in the DC/AC energy conversion output of the PV_INVERTER controller. If the problem continues, please contact the after-sales service center. (goes back to normal status once the error has been cleared.) |
|             | E915 | DC-LINK Voltage Over (Trip-zone, @INVT)     | An over current surge has been detected in the DC-LINK capacitor of the PV_INVERTER controller. If the problem continues, please contact the after-sales service center. (goes back to normal status once the error has been cleared.)              |
|             | E916 | INVERTER Current Over (Trip-zone, @BDC)     | An over current surge has been detected in the DC/AC energy conversion output of the BDC controller. If the problem continues, please contact the after-sales service center. (goes back to normal status once the error has been cleared.)         |
|             | E917 | DC-LINK Voltage Over (Trip-zone, @BDC)      | An over voltage surge has been detected in the DC-LINK capacitor of the BDC controller. If the problem continues, please contact the after-sales service center. (goes back to normal status once the error has been cleared.)                      |
|             | E918 | BDC STRING #1 CurrentOver (Trip-zone, @BDC) | An over current surge has been detected in the BDC converter #1 of the BDC controller. If the problem continues, please contact the after-sales service center. (goes back to                                                                       |

| Type | Code | Description                                        | Measures                                                                                                                                                                                                                      |
|------|------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |      |                                                    | normal status once the error has been cleared.)                                                                                                                                                                               |
|      | E919 | BDC STRING #2<br>CurrentOver (Trip-<br>zone, @BDC) | An over current surge has been detected in the BDC converter #2 of the BDC controller. If the problem continues, please contact the after-sales service center. (goes back to normal status once the error has been cleared.) |

[Table 7-6: Significant events list]

## 8. Contact

■ Address: 5 FL. B-FINE AVENUE Bldg.,  
100, Eulji-ro, Jung-gu, Seoul  
Republic of Korea

■ E-Mail: [ess.service@hansol.com](mailto:ess.service@hansol.com)

For technical problems or inquiries for use, please contact the installation company.

To receive customer support, the following information is required.

1. Product type: ELSR722-00004 or ELSR103-00001
2. Serial Number:
3. PV module type and configuration
4. Option equipment: Energy Meter Part Name

# Safety Precautions

The following precautions are intended to ensure your safety and prevent property damage. Before use of the product, be sure to read the following for proper use.

|                                                                                   |                                                                                                                                              |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|  | <div><b>WARNING</b></div> <div>Failure to observe this may result in personal injury or death.</div>                                         |
|  | <div><b>CAUTION</b></div> <div>Failure to observe this may result in personal injury.</div>                                                  |
|  | <div><b>NOTICE</b></div> <div>This ESS (Energy Storage System) product is for domestic use only.<br/>Do not use it for other purposes.</div> |

## Installation

|  | WARNING                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>For product installation, contact professional personnel.</b><br/>If non-qualified personnel install the product, it may cause electric shock, fire, failure, explosion, or injury.</li></ul> |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Never install the product near a heat source or flammable substance.</b><br/>It may cause fire.</li></ul>                                                                                     |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Do not install the product in a humid or water-prone area.</b><br/>It may cause electric shock, short-circuiting, or fire.</li></ul>                                                          |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Do not install the product in a dusty place with many insects.</b><br/>It may cause fire.</li></ul>                                                                                           |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Do not install the product in a place where there is a risk of falling (e.g. on a high wall or outside of the Veranda).</b><br/>It may cause personal injury or property damage</li></ul>     |

|  | CAUTION                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                    | <ul style="list-style-type: none"><li>▪ <b>Do not install the product in a place which requires less exposure to noise such as bedroom and study room.</b><br/>The product generates noise less than the regulated level.</li></ul> |
|                                                                                    | <ul style="list-style-type: none"><li>▪ <b>Fix the product on the floor.</b><br/>Otherwise, it may cause the product failure or accident caused by abnormal vibration or tipping over.</li></ul>                                    |

## Wiring

|  | WARNING                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     | <ul style="list-style-type: none"><li>▪ <b>Do not forcibly bend, pull, twist, or tie the power cable or connector.</b><br/>It may cause electric shock or fire.</li></ul> |
|                                                                                     | <ul style="list-style-type: none"><li>▪ <b>Do not place a heavy object on the power cable.</b><br/>It may cause electric shock or fire.</li></ul>                         |

## Operation

|  | WARNING                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>If the product has been inundated, stop operation immediately and contact the service center.</b><br/>It may cause electric shock or fire.</li></ul>                                      |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>If the product suddenly stops operation or any abnormal symptom occurs, stop operation immediately and contact the service center.</b><br/>It may cause electric shock or fire.</li></ul> |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Do not arbitrarily disassemble or modify the product.</b><br/>It may cause the product failure or accident.</li></ul>                                                                     |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Be sure to keep the product away from children.</b><br/>It may cause the product failure or accident.</li></ul>                                                                           |
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Do not touch the product with wet hands.</b><br/>It may cause electric shock.</li></ul>                                                                                                   |

|  | CAUTION                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   | <ul style="list-style-type: none"><li>▪ <b>Do not climb or sit on the product.</b><br/>It may cause electric shock, fire, failure, or personal injury.</li><li>▪ <b>Do not place a heavy or dangerous object.</b><br/>It may cause fire, failure, or personal injury.</li></ul> |

## Cleaning

|  | WARNING                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     | <ul style="list-style-type: none"><li>▪ <b>Do not directly spray water on the product, nor wipe the product with benzene, thinner or alcohol.</b><br/>It may cause discoloration, deformation, electric shock, or fire.</li></ul> |

# **Additional Guidelines for Fire Fighting Safety Cautions for the Transporter**

## **Quarantine**

The packages that can be easily crushed, punctured, or torn open to reveal contents shall not be transported. Such packages should be isolated until the shipper has been consulted, provided instructions and, if appropriate, arranged to have the product inspected and repacked.

### **Spilled Product**

In the event that damage to packaging results in release of cells, the spilled products shall be promptly collected and segregated and the shipper should contact us for instructions.

## **Environmental misuseage**

Never place the battery near the fire or a heat source. Never throw the battery into the fire.

Never immerse, throw, or dip the battery in water or seawater.

## **Others**

Keep the battery away from babies and children to avoid accidents such as swallowing.

If children are to use the battery, their guardians should explain proper use and precautions. Before use of the battery, be sure to read the user's manual and precautions for proper handling. Before use of the charger, be sure to read the user's manual for the charger.

Be sure to read the user's manual for installation or removal of the battery.

Replace the battery when the battery life seems much shorter than usual. Cover the terminals with insulating tape before disposal.

If the battery needs to be stored for a long time, it shall be removed from the application site and be stored in a place where humidity and temperature are comparatively low.

While the battery is being charged, used, or stored, keep it away from the objects with static electric charges.

## Fire Fighting

The respirator is not required during normal operation.

Use the SCBA (self-contained breathing apparatus) in the event of fire. Use an FM-200® or CO<sub>2</sub> extinguisher upon battery fire.

Use an ABC fire extinguisher when the fire is not from the battery and does not spread to it yet.

During overhaul, do not contact any high voltage component. Always use the insulated tools while in overhaul.

Take appropriate measures upon fire before entering the “hot zone.”

Shut off any connected power systems or electronic appliances such as PV (photovoltaic) system, charger, and circuit breaker. Remove batteries in the fireplace. Note that the batteries heated over 160°C have a risk of burst.

If a high voltage battery gets involved in a fire or is bent, twisted, damaged, breached, or if you suspect that the battery is heating up, use large amounts of water to cool the battery, DO NOT extinguish fire with a small amount of water. Always request an additional water supply.

Battery fires can take up to 24 hours to fully extinguish. Consider allowing the system to burn while preventing exposures.

Use a thermal imaging camera to make sure that the high voltage battery is completely cooled before leaving the place. If a thermal imaging camera is not available, monitor the battery for re-ignition. Smoke indicates that the battery is still heating. Do not deliver the vehicle to second responders until there has been no sign of smoke from the battery for at least one hour.

Always advise second responders (law enforcement agent, tow personnel) that there is a risk of battery re-ignition. After a System (Product) has been involved in a submersion, fire, or collision that can cause damage to the high voltage battery, always store it in an open area with no exposures within 50 feet.

## Fire Fighting Equipment

Use a Personal Protective Equipment Directive (89/686/EEC) complied full-face SCBA with a full protective gear. Hazardous fumes including carbon monoxide, carbon dioxide, and/or various hydrocarbons can be generated during a fire.

## Effective Ways to Deal with Accidents

- On land: Segregate damaged batteries into a place and call the local fire department or service agency.
- In water: If a battery is flooded, first cut off power supply to the battery system. (For example, switch off the AC circuit breaker connected to the battery inverter and PV system.) Wait until flood water subsides and does not approach near the battery. If, inevitably, someone has to go into the flooded water, wear insulated full length rubber boots and gloves. Never use the flooded batteries again and contact with the service agency.

## High Voltage Battery – Fire Damage

Responders shall wear full PPE (personal protective equipment) including SCBA and take appropriate measures to protect civilians downwind from the incident. Use the fog streams or PPV (positive pressure ventilation) fans to direct the vapors.

The high voltage battery is made of lithium-ion cells. These are considered dry cell batteries, if damaged, only a small amount of battery fluid may leak.

The Li-Ion battery fluid is clear in color.

The high voltage battery, drive unit, charge controllers, and DC-DC converter are liquid cooled with typical glycol-based coolant.

A damaged high voltage battery can cause rapid heating of the battery cells. If you notice smoke coming from the battery area, assume that the battery is heating and take appropriate actions as specified on this page.

## If user is exposed to internal materials of the battery cell due to damage on the outer casing, the following actions are recommended.

- Inhalation: Leave the contaminated area immediately and seek medical attention.
- Eye contact: Rinse eyes with water for 15 minutes and seek medical attention.
- Contact with skin: Wash the contacted area with soap thoroughly and seek medical attention.
- Ingestion: Induce vomiting and seek medical attention.

Wipe out the contacted area with a sponge or cloth that is soaked in water until you obtain medical aid. These materials can cause damage to your skin and eyes, even making you go blind.

# Hansol Technics Warranty Policy

(Product Name: Scalable All-in-One)

## I. Product Warranty

---

1. Hansol Technics and Hansol Technics Europe GmbH (in the following referred to as “Hansol Technics”) warrant that the Product<sup>1</sup> will (i) be free from defects in material and workmanship under normal use and (ii) conform to the applicable Technical Specifications for the Product.
2. The warranty period of the Product (“Product Warranty Period”) is specified as follows  
: The warranty period shall be five (5) years from the Date of Installation<sup>2</sup>
3. In the event that the Product fail to conform to the above warranty during the Product Warranty Period, Hansol Technics shall, at Hansol Technics’s option: (i) repair the non-conforming or defective Product; or (ii) provide End-User with a replacement for the Product without undue delay, within 7 working days in Germany, for the other countries within 7 working days plus delivery dates.. Hansol Technics shall be responsible for all reasonable costs of repair or replacement in connection with such non-conforming or defective Product;

---

<sup>1</sup> “Product” means the battery pack of Hansol Technics that consists of Battery, Inverter, and the Enclosure.

<sup>2</sup> “Date of Installation” To claim any warranty hereunder, End-User must provide the date of installation. If End-User is unable to submit any proof of the Date of Installation, Hansol Technics will calculate the Product Warranty Period from the manufacturing date which is written on the Product’s label.

whereas the End-User shall bear the costs of removing the non-conforming or defective Product(s) and (re)installation of the repaired or the Product is attributable only to the End-User.

Any defects in products arising from End-User's misuse, natural disaster, unauthorized change or repair, or abnormal installation environment shall be repaired or replaced at End- User's cost (Refer Article 4).

## II. Performance Guarantee

1. In addition to the Product Warranty, Hansol Technics guarantees performance of the Product to be maintained at least sixty five percent (65%) of initial battery's capacity for a period of ten (10) years after the Installation Date or until the end of 6,000 cycles of the Products, whichever occurs earlier "(Performance Guarantee Period)", provided that the usage of the Product shall have complied with the Operating Conditions under specification.
2. About Self Discharging Degradation, Hansol Technics guarantees 180days after ex-work for the Performance Guarantee Period.

## III. Limitation of Warranty

1. The warranties set forth hereunder shall not apply to Products which, in Hansol Technics'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 or text form by Hansol Technics) ; non-observance of Hansol Technics's installation, users and/or

maintenance instructions; repair or modifications by someone other than a service technician approved by Hansol Technics ; power failure surges, lightning, flood, fire, accidental breakage or other events outside Hansol Technics's control. Further, no warranty shall apply to any damage caused by unauthorized goods to which Hansol Technics's Products are incorporated or installed into, or used together with, including any parts thereof. Customers of Hansol Technics's Products shall be fully aware that the Products are intended for individual operation. Connecting other product or products in parallel with Hansol Technics's Products may result in abnormal operation. For the avoidance of doubt, it shall be clarified that this shall not restrict the End-User from incorporating or installing the Products in combination with products or in systems offered by The End-User.

2. End-User shall promptly (but in any event within fifteen (15) days after obtaining notice or knowledge there of) notify Hansol Technics of any defect or other nonconformity with any of the Product Warranty identified by End-User by delivering written notice (whereas telefax or email shall be sufficient) to Hansol Technics of a warranty claim. Hansol Technics shall promptly notify End-User of any defect or other nonconformity with any of the Product Warranties identified by Hansol Technics. Any installation defects, however, shall be identified by the Installers who installed the Products in the first place. Hansol Technics can send its engineers to the installation site upon request, however, to identify the purported defect upon request, provided that any cost incurred is to be paid by Installers.
3. This warranty does not apply to batteries that
  - are not operated in accordance with the operating manuals for their intended purpose;
  - have been incorrectly installed or commissioned;

- have been modified, altered or operated with other components not approved by Hansol Technics;
- have been physically damaged (e.g. damage from falls, from transportation);
- have been damaged by force majeure (e.g. flash of lightning, overvoltage, storm, fire);
- have been treated improperly, negligently in any other inappropriate way  
(including use outside of the recommended ambient conditions).

4. 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, 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 HANSOL TECHNICS. 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.

5. IN NO EVENT WILL HANSOL TECHNICS BE LIABLE 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. HANSOL TECHNICS'S LIABILITY FROM ANY CAUSE WHATSOEVER SHALL IN NO EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY END-USER TO HANSOL TECHNICS FOR SUCH PRODUCT GIVING RISE TO THE LIABILITY.

6. Since Hansol Technics's Products are intended to be operated with Internet connection, web registration of the Products is required. (Ask to Installer) Remote control of the Products is achieved only when the Products are connected to the Internet, including but not limited to, monitoring of the Product operation and updating of firmware. The Products are able to be operated without Internet connection (i.e. Stand-Alone mode), however, Warranty herein may not fully cover the Products that are not registered on the web and operated without Internet connection.

#### IV. Obtaining of Warranty Service

1. The warranty provided hereunder is only applicable to the End-User who has purchased Products. The End-User shall not assign the warranty without prior written consent by Hansol Technics. Notwithstanding the foregoing, the warranty provided hereunder is transferable to a subsequent owner of the Products, provided that Hansol Technics is informed in writing within a reasonable time

of the sale of the subsequent owner's name and contact details. The notice should identify the name of the previous owner of the Products, place and date of the purchase, model, make and serial number of the Products. The effective transfer of the warranty does not otherwise alter the terms of the warranty provided hereunder.

2. The return of any Products will not be accepted unless prior written authorization (whereas telefax or email shall be sufficient) has been given by Hansol Technics. 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.
  
3. In the event Hansol Technics has discontinued the manufacture of the Product in issue at the time the related warranty claim is accepted by Hansol Technics. Hansol Technics may, at its sole option, replace it with a different type of Product (of mutually agreed size, color, shape power, performance or other technical specification) or refund the purchase price prorated by the days of the relevant Warranty Period remaining.

## **VI. SDI Service Center Information**

1<sup>st</sup> Contact Point : AWP GROUP (Call Center/On-Site Service)

1) Company Name : AWR GROUP

2) Address : Unit 2/8 Moorlands Road, INGLEBURN, NSW 2565  
AUSTRALIA

3) Tel : 1300-377726 (1300-ESS Hansol)

4) E-mail : [ess.service@hansol.com](mailto:ess.service@hansol.com)

[www.hansoltechnics.com](http://www.hansoltechnics.com)

