

# **AWILCO**

## **ENERGYSYSTEM ES-2000**

### **LITHIUM POWERPACK**

### **2000W-100AH**

ES-2000, EUROPE (230V)

ES-2000UK, UNITED KINGDOM (230V)

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## **OWNER'S MANUAL**



For safe and optimum performance, the Energysystem must be used properly. Carefully read and follow all instructions and guidelines in this manual and give special attention to the **CAUTION** and **WARNING** statements.

**PLEASE KEEP THIS MANUAL  
FOR FUTURE REFERENCE**

**DISCLAIMER**

While every precaution has been taken to ensure the accuracy of the contents of this guide, **AWILCO ApS** assumes no responsibility for errors or omissions. Note as well that specifications and product functionality may change without notice.

**IMPORTANT**

Please be sure to read and save the entire manual before using the Energysystem. Misuse may result in damage to the unit and/or cause harm or serious injury. Read manual in its entirety before using the unit and save manual for future reference.

**SERVICE CONTACT INFORMATION**

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**PRODUCT NUMBERS**

ES-2000	2000W / 100Ah - 230VAC (Schuko Socket - CEE 7/4)
ES-2000UK	2000W / 100Ah - 230VAC (British Socket - BS1363)
ES-2000AUS	2000W / 100Ah - 230VAC (Australia Socket – NS/NZS3112)
ES-2000US	2000W / 100Ah - 120VAC (NEMA 5-20)

**DOCUMENT PART NUMBER**

MUIC122055-100Ah Rev A

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# IMPORTANT SAFETY INFORMATION:

This section contains important safety information for the ES-2000 Powerpack. Each time, before using the unit, READ ALL instructions and cautionary markings on or provided with the unit, and all appropriate sections of this guide. The unit contains LiFePO<sub>4</sub> batteries are considered as hazardous goods due to the fact that they can overheat and ignite under certain conditions.

Lithium battery is classified as dangerous goods UN 3481, Class 9, Packing instruction 966 and 967 respectively. The Lithium Powerpack contains a power source with high energy density and hazardous materials mounted in metal cabinet. The unit contains no user-serviceable parts. See Warranty section for how to handle product issues.

Make sure to study the technical specification before use. The technical specification applies to the 12V LiFePO<sub>4</sub> battery and describes the type and size, performance, technical characteristics, warning and caution of the rechargeable cell.

## **DANGER: FIRE AND/OR CHEMICAL BURN HAZARD**

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- Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment.

## **DANGER: SHOCK HAZARD. KEEP AWAY FROM CHILDREN. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN DEATH OR SERIOUS INJURY**

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- When working with electrical equipment, have someone nearby in case of an emergency.
- Unit contains Lithium battery, study and follow all the battery manufacturer's specific precautions when using and servicing the battery.
- Avoid moisture. Never expose unit to snow, water etc.
- Unit provides high voltage AC, treat the AC output socket the same as regular wall AC sockets at home.
- Must not be used or stored in the environment of corrosively, explosives, high temperature (like in hot environments or direct sun exposure).
- Prolonged contact to high heat or freezing temperatures will decrease the working life of the battery.
- Do not short circuit terminals. Do not demolish or disassemble the battery.
- Guarantee is two years as of invoice date. Life time: 2000 cycles or 2 years\*. Any damage by incorrect use will void the guarantee. Free service will not be provided by the manufacturer.

- The system must be used in the assigned application. For further warranty information, see Warranty
- Disposal of the system must be at approved recycling centers and in accordance with national legislation.

## **STORAGE**

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The unit must be fully charged before it is placed into storage (please see the technical specification for information). Furthermore, please note that the battery must be recharged every 3-6 months.

## **FCC and EMC INFORMATION**

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules on 120V model and comply with the limits for CE EMC standard on 230V model. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

*\*) See warranty*

# 1. INTRODUCTION

## 2. PRODUCT DESCRIPTION:

### LIMITATIONS ON USE

Do not use in connection with life support systems or other medical equipment or devices.

### INTRODUCTION

Thank you for purchasing the AWILCO Energy-system. With our state of the art, easy to use design, this product will offer you reliable service by providing AC power, DC power and 5V USB power for your vehicle, home, cabin, boat, RV or Trailer and recharge the built-in Lithium battery by means of an engine alternator\* or by a utility AC grid connection. The Lithium Powerpack can run many AC-powered appliances when you need AC power anywhere. The 5V USB power can charge many USB-powered devices e.g a smartphone or tablet, which can be used to monitor the battery status via the built-in Bluetooth connection. The built-in transfer switch will automatically switch the load to the battery power when the utility power is interrupted.

This manual will explain how to use this unit safely and effectively. Please read and follow these instructions and precautions carefully

*\* Please contact authorized installer for proper connection to an engine alternator.*

### PRODUCT DESCRIPTION

ES-2000 includes the items list below.

- 1 pcs. Base unit
- 1 pcs. Owner's manual
- 3 pcs. Andersson connectors, black, red, blue.
- 2 pcs. RSTMini connectors 1 pcs. Male and 1 pcs. Female
- 4 pcs. Mounting brackets
- 1 pcs. power cable 1,5m with schuko plug

SERIES	MODEL NO.	RATING			AC OUTPUT TYPES
		INVERTER	CHARGER	TRANSFER SWITCH	
120V	ES-2000US	2000W	55A/12V	30A	US NEMA 5-15 (15A)
230V	ES-2000, ES-2000UK, ES-2000AUS	2000W	55A/12V	16A	-EU (16A) / -UK (13A) -AU (10A)

### 3. INSTALLATION:

#### ANDERSSON CONNECTORS

The **RED and BLACK Andersson connectors** are intended for use with DC applications which draw higher DC currents. Both terminals in the red connector are connected to battery positive (+), and both terminals in black connector are connected to battery negative (-). Please refer to tech spec table for max allowed DC currents

The **BLUE Andersson connector** is intended for easy/quick installation to vehicle alternator. Pin marked with (+) is connected to battery positive (+) and pin marked with (-) is connected to battery negative (-). Please refer to tech spec table for max allowed DC currents.

#### INSTALLATION

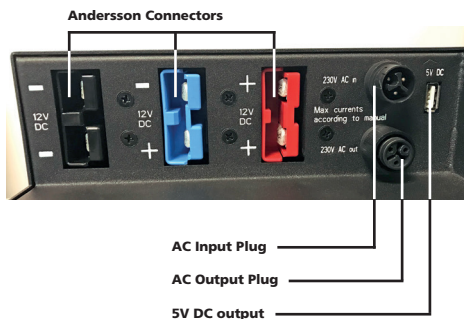
**WARNING:** It is recommended that all wiring be done by a certified technician or electrician to ensure adherence to the applicable electrical safety wiring regulations and installation codes. Failure to follow these instructions can damage the unit and could also result in personal injury or loss of life.

**CAUTION:** Before beginning unit installation, please consider the following:

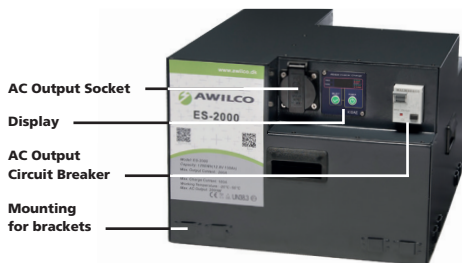
- The unit should be used or stored in an indoor area away from direct sunlight, heat, moisture or conductive contaminants.
- When placing the unit, allow a minimum of 8 cm. of space around the unit for optimal ventilation.

*(Continued on next page)*

#### REAR



#### FRONT



### 3. INSTALLATION:

*(Continued from page 9)*

- Secure that the unit can rest on a flat surface for optimal support
- Please choose a well-ventilated area for mounting the unit.
- The unit is to be mounted horizontally. Do NOT mount the unit upside down, or the unit can be damaged.
- Please use the supplied metalbrackets to mark for drillingholes in suitable positions, after inserting the brackets in to cabinet slots. Brackets can be inserted in 8 different positions around the cabinet. It is recommended to use all 4 brackets for secure installation of the ES-2000.
- Please use the according screws or bolt/nut, at correct size, min  $\varnothing 6$  / M6, recommended  $\varnothing 8$  / M8 for the material to which the system will be attached and mounted.
- Observe that your target area will allow proper support for the brackets, proper room for cables leading to/from the AC and DC connectors as well as the USB connector on the rear.

Connecting to an engine alternator via other 12V battery, using the Andersson connectors.

- When connecting to an engine alternator via other 12V battery, you are free to use any of the (+) positive terminals in the unit. Please observe that you do need to install a battery separator between engine battery and energysystem – for advice on correct battery separator, please contact authorized installer.
- For correct dimensioning of cable between ES-2000 and batteryseparator, please refer to batteryseparator manual
- Use suitable crimping tool for the cables for the 120A Andersson connectors.
- Make sure that it is firmly crimped for good connection.
- If your batteryseparator of choice allows for reverse connection (in order to transfer energy from ES-2000 to vehicle battery), please observe use of cables supporting the full current in reverse mode.



## 3. INSTALLATION:

### DISCHARGING WITH DC CURRENTS USING THE ANDERSSON CONNECTORS:

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ES-2000 allows for up to 200A continuous discharge\* Please use cables, red/black with max length of 1,5m and 50mm<sup>2</sup>. If you need longer cables, please refer to official cablestables in order to dimension the correct square of cable to the desired cablelength.

\* Please see section: *Andersson Connectors*

Should you choose to connect (-) negative on the energysystem to engine battery, please observe that the black negative cable should be of same square and length as the red (+) positive cable to the same battery.

### FUSES:

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When connecting ES-2000 to vehicle alternator or DC consumption, it must be observed to use proper size of fuse in serial connection.

For charging from alternator, 125A fuse is recommended.

For discharging to max DC currents, 200A fuse is recommended.

### CHASSIS GROUNDING CONNECTION:

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**DANGER:** The unit chassis has to be grounded properly. Never operate the unit without proper grounding. Failure to do so can result in death or serious injury.

- Connect the grounding cable's ring terminal to the unit ground screw.
- Connect the other side of the cable to the common grounding point.

### TEST THE UNIT:

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- Plug the unit to an AC source.
- The LED on display will turn on. If AC input source is available, 'Status' LED turns green. This indicates the unit is running in By-pass mode meaning AC output is running from the AC input source. On the app you will shortly see indication that battery is being charged \*see point 4 for additional information on Bluetooth connection.
- Disconnecting the AC input source will change the 'Status' LED on the Display to amber.
- Both AC output and 5V USB are now available and the unit is running on battery power.
- Plug in a small AC load like a 40W table lamp or small appliance to the AC socket to verify AC is available.
- The unit is successfully installed and functioning properly.

## 4. CONNECTING TO BLUETOOTH IN YOUR ENERGY SYSTEM:

Every ES-2000 can be connected and monitored by a smart phone/tablet via Bluetooth. However, the APP only supports Android and IOS.

**Attention:** Please note that only one user at a time can be connected to the Bluetooth feature.

1. Download the APP by scanning APP-store or Play store - AWILCO.



2. Open the APP
  - a. Scanning.
  - b. Found Bluetooth!

3. Under "Devices" – find and choose the according battery
  - a. Trying to create new connection
  - b. Connecting to GATT server
  - c. Connected!
4. When "status connected" is shown – press "start"
  - a. Under U.I.T.C. info you can follow the battery temperature and – cycles
  - b. Under System info "Events" includes a log status of the battery.
5. Choose the dots in the lower right corner and the box "Login dialog" will appear
6. Login dialog: Info about battery cell status – press 1234 + confirm
7. Login dialog: Rename device – press 5678 + confirm.



- Phone need Bluetooth 4.0 BLE (Bluetooth low energy)
- Require Android 4.3+
- Active Distance < 5.0 m



- Compatible with Iphone 4S or later
- Require IOS 6.0+
- Active Distance < 5.0 m

## 5. INVERTER/CHARGER OPERATION:

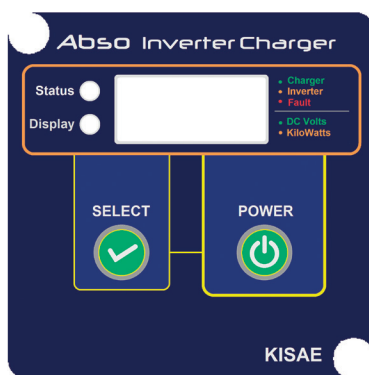
### **Auto Backup Mode (whatever “In” setting except “In0 and In3”):**

The inverter-unit is fully automatic. When utility power is available, the unit is running in AC By-Pass mode. AC output is supplied from the utility and the charger is active. When there is a power failure from the utility or an AC source is not available, the unit will run on battery power and the inverter will generate pure sinewave AC output to maintain and operate the load continuously (With ‘In2’ setting, there is a minimum of 10W AC-Load sense threshold for the inverter to fully turn on).

### **Non-Backup Mode (with “In0” setting)**

Same as Auto Backup Mode but when there is a power failure from the utility or the AC input source is not available; the inverter will not turn ON automatically. To turn on the inverter you are required to get into the setting mode to change the “In0” setting to “In1” or others. See more details on Inverter Setting.

### **UNDERSTANDING THE DISPLAY FUNCTION:**



#### **Note:**

**‘Status’** LED is used to indicate the status of the unit.

Green: By-Pass Mode

Amber: Battery (Inverter) Mode

**‘Display’** LED is used to indicate the digital display function.

Green: Display is showing Battery voltage in volts.

Amber: Display is showing Output power in KW.

*(Continued on next page)*

## 5. INVERTER/CHARGER OPERATION:

STATUS LED	DISPLAY LED	DISPLAY	FUNCTION/STATUS
Green (solid)	Green	'Ful'	By-Pass Mode / Charger Mode. Battery is fully charged
Green (flashing)	OFF	'bul'	By-Pass Mode / Charger Mode. Battery charging in progress and is in 'BULK' stage
	OFF	'abs'	By-Pass Mode / Charger Mode. Battery charging in progress and is in 'ABSORPTION' stage
Amber (solid)	Green	'12.5'	Battery / Inverter Mode, inverter is running, display shows battery voltage in DC volts
	Amber	'0.80'	Battery / Inverter Mode, inverter is running, display shows output power in kW (e.g. 0.8 kW = 800W as shown)
Amber (flashing)	Battery / Inverter Mode and AC Input is detected and AC output will switch to By-Pass / Charger Mode within 20 seconds		
Red (solid)	OFF	E01-E12	Unit has shutdown. Display shows error code (See error code reference chart below)

### UNDERSTANDING THE 'POWER' AND 'SELECT' PUSH BUTTON FUNCTION DURING NORMAL OPERATION:

A beep sound will occur every time when the **'Power'** or **'Select'** button is triggered.

**'Power'** button function:

- Turns the inverter On/Off during Battery Mode. Press and hold for 1 second to turn the unit either ON or OFF.

**Note:** The **'Power'** button can be used to turn AC Output OFF during AC By-Pass mode with 'In4' setting without the need to disconnect the AC-Input as per "In1" setting. See more on "Understanding the unit setting".

**'Select'** button function:

- Check unit setting: Press once to check or verify unit's present set functions

## 5. INVERTER/CHARGER OPERATION:

### UNDERSTANDING THE ERROR CODE:

CODE	CONDITION	CORRECTIVE ACTION
E01	Input battery voltage is too low and unit has shutdown	Recharge battery immediately and restart unit
E02	Input battery voltage is too high and unit has shutdown	Check battery voltage or determine if any external charger is connected to the battery bank
E03	AC output is overloaded or short circuited and unit has shutdown	Check load connected to the output. Reduce load and restart the unit
E04	Internal temperature is too high and unit has shutdown	Turn unit off and wait for 15 minutes before restarting. Check if any object has blocked the air flow of the unit
E05	'Input battery voltage is low and warning occurs	Recharge battery as unit will shutdown shortly
E06	At Battery Mode, AC output load connected has sensed high and is close to shutdown limit	Reduce load
E07	Internal temperature is high and is close to shutdown limit	Reduce load and check if any ventilation of the unit is blocked
E10	Battery Charging voltage too high	Check battery setting
E11	Battery is bad	Battery did not accept charge
E12	Internal transfer switch temperature is high and shutdown occurs	Reduce load and check if any ventilation of the unit is blocked

### AC LOAD ON INVERTER:

Although the Power Inverter can provide high surge power up to two times the rated output power, some high surge loads like sump-pumps, heavy duty motors etc. may still trigger

the inverter protection system even though the load falls within the power rating of the inverter. A higher power system with bigger inverter is required for these appliances.

## 6. FEATURE SETTING:

To understand more about the unit features, read the following section and follow the instructions to make changes to the desired setting.

### **Default Factory Setting:**

#### **In** (*Inverter*):

In1 - inverter enabled in standby mode with load sense off

#### **Cu** (*Charger*):

40A or 55A – charger enabled (40A for 1000W models and 2000W models)

#### **AL** (*Alarm*):

AL1 – alarm enabled

#### **Sd** (*UV shutdown*):

SdL – Under voltage shutdown set to low setting

#### **bAt** (*Battery type*):

LI – Lithium

#### **Cb** (*Maximum current*):

Cb3 – Maximum Shore Power Current draw is 30A for 120V models and 16A for 230V models.

#### **FAO** (*Fan Operation Setting*)

#### **Fd** (*Factory default*)

## 6. FEATURE SETTING:

### UNDERSTANDING THE UNIT SETTINGS:

	INVERTER SETTING
In0	<p>Inverter is disabled. AC Output is getting the power from utility (AC Input) only. But when utility power is not available, the unit will not provide AC backup function from the inverter, the display automatically turns off in about 10 seconds. When the Power button is pressed again, the display will turn on for another 10 seconds.</p> <p>To enable the inverter or turn on the backup function, this In0 setting has to be changed to other different setting.</p>
In1	<p>Inverter is set to standby condition with power save mode OFF. Unit will provide AC backup function when utility power is not available.</p>
In2	<p>Inverter is set to standby condition with power save mode ON. Unit will provide continuous AC backup function only when utility power is not available AND the load connected to the output is &gt;10W. Once it is ON, the unit will automatically return to power save (load sense) mode when the connected AC load drops to &lt; 3W.</p> <p>Note: During power save mode, the Inverter will turn ON every few seconds for a few AC cycle to check on the 10W power consumption.</p>
In3	<p>Use this setting when you decide to have all AC Output power coming from inverter only. Even when utility is available, the utility AC Power will only use to charge the battery only. The AC Input power will not By-pass to AC Output.</p> <p>Note: This mode is specially designed for the AC Output is always getting 'Pure Sinewave' Output from the inverter. This used to avoid getting 'Non-Pure Sinewave' Output from AC input when it is connected to a non-sinewave AC Generator. When this mode is used, in order to provide a constant AC Output, please be sure the AC Output power consumption is less than or equal to the AC Charger can provide to charge the battery.</p>
In4	<p>Same function as PS1 and the 'Power' button can be used to turn the AC Output ON and OFF, even with the AC Input power being present in By-pass mode. When the unit is turned off using the 'Power' button, the display remains ON showing the battery voltage and the 'Status' LED will turn off.</p>
5A-55A	<p>Bulk/Float current setting: 5A/1.5A, 15A/3A, 35A/4A, 55A/6A.</p>

## 6. FEATURE SETTING:

	<b>BATTERY TYPE AND VOLTAGE SETTING (BULK/ABSORPTION/FLOAT)</b>
LI	Lithium: 14.6V.
	<b>BATTERY UNDER VOLTAGE SETTING</b>
SdL	<p>Battery under voltage setting is set to LOW (setting used for normal operation)</p> <p>Under voltage alarm: 11.0 Vdc</p> <p>Under voltage alarm recovery: 11.3 Vdc</p> <p>Under voltage shutdown: 10.5 Vdc</p> <p>Under voltage recovery: 12.0 Vdc</p>
SdH	<p>Battery under voltage setting is set to HIGH (setting to avoid battery over discharge when connected to car start battery)</p> <p>Under voltage alarm: 12.1 Vdc</p> <p>Under voltage alarm recovery: 12.3 Vdc</p> <p>Under voltage shutdown: 11.8 Vdc</p> <p>Under voltage recovery: 12.6 Vdc</p>
	<b>ALARM SETTING</b>
AL0	Fault and warning audible alarm is disabled. Display panel only shows error code and audible alarm will not sound.
AL1	Audible alarm will sound when fault or warning occurs.



## 6. FEATURE SETTING:

<b>MAXIMUM SHORE POWER CURRENT DRAW SETTING</b>				
Cb1-3	<p>This setting limits the total AC current draw from the shore power during the By-Pass/Charger mode to avoid tripping the shore power Branch Breaker. Based on the table below, when there is a high demand on the AC Load Current, the unit will automatically reduce the Charger Current to the presets value. (E.g. with Cb1 setting, when the unit sense the AC load current is between 6 to 11Aac, it will reduce the charger current to 15A maximum).</p>			
	<b>ES-2000US IC122055 (120V MODEL)</b>		<b>ES-2000EU/UK/AUS IC122055I (230V MODEL)</b>	
	AC Load Current	AC Charger Current	AC Load Current	AC Charger Current
Cb1	Use this setting when the shore power circuit breaker rating is 15A or higher		Use this setting when the shore power circuit breaker rating is 8A or higher	
	>11Aac	5 Adc	>7Aac	5 Adc
	>6Aac and <11Aac	15 Adc	>5Aac and <7Aac	15 Adc
	>1Aac and <6Aac	35 Adc	>2Aac and <5Aac	35 Adc
	<1Aac	55 Adc	<2Aac	55 Adc
Cb2	Use this setting when the shore power circuit breaker rating is 20A or higher		Use this setting when the shore power circuit breaker rating is 10A or higher	
	>16Aac	5 Adc	>9Aac	5 Adc
	>11Aac and <16Aac	15 Adc	>7Aac and <9Aac	15 Adc
	>6Aac and <11Aac	35 Adc	>3Aac and <7Aac	35 Adc
	<6Aac	55 Adc	<3Aac	55 Adc

(Continued on next page)

## 6. FEATURE SETTING:

Cb3	Use this setting when the shore power circuit breaker rating is 30A or higher	Use this setting when the shore power circuit breaker rating is 16A or higher
	>26Aac                      5 Adc	>14Aac                      5 Adc
	>21Aac and <26Aac      15 Adc	>12Aac and <14Aac      15 Adc
	>16Aac and <21Aac      35 Adc	>8Aac and <12Aac      35 Adc
	<16Aac                      55 Adc	<8Aac                      55 Adc
FAN OPERATION SETTING		
FA0	<p>Allows the continuous activation of the fans at low (silent) speed (since the unit starts) and only in Bypass mode.</p> <p>If the maximum temperature threshold is reached, the over temperature shutdown is triggered. If so, once the temperature drops to a certain level, the unit can be manually turned on again by pushing the “Power” button.</p> <p>The charging current is de-rated to reduce the chance of getting a high-temperature shutdown.</p> <p>We suggest using this setting when a silent operation is required; for example when sleeping and having the unit in/close to the same room in Bypass (Charging) mode). This setting may represent more stress for the unit.</p> <p>In Inverter mode (with no shore power) the fans operate normally as per the “FA1” setting.</p>	
FA1	<p>In this setting, the fans are activated only when needed (as per the internal temperature sensed). There is no fans slow-speed (they run at full speed when activated). This is the factory default setting.</p>	
MANUFACTURING DEFAULT SETTING		
Fd	<p>Reset all settings to manufacturing default settings (In1, AL1, SdL, AGM, Cb3 and maximum current setting for the charger)</p>	

## 6. FEATURE SETTING:

### UNDERSTANDING THE UNIT SETTINGS:

The charger current will be de-rated when the environment temperature reaches 60 °C (140 °F) or the internal temperature reaches the pre-set values.

UNIT	DE-RATED VALUES	
Internal Temperature	>90°C (194°F)	Maximum charger will de-rated to half
	>95°C (203°F)	Charger current reduced to 5A
	<85°C (185°F)	Charger current recover back to set value
Environment Temperature	>60°C (140°F)	Charger current reduced to 5A
	>55°C (131°F)	Charger current recover back to set value

### ENTER FUNCTION MENU FOR UNIT SETTING:

To enter unit Function Menu, press and hold **"Power"** and **"Select"** button together for about 5 seconds until a beep sounds.

When you are in Function Menu:

- Press 'Power' button for 1 second to toggle between different Functions Menu like 'Cu', 'In', 'AL', 'Sd', 'bAt', 'Cb' and 'Fd' etc.
- Press 'Select' button for 1 second to enter Individual Function Set Menu and you can make change to the settings.
- The unit will EXIT the Main Menu automatically if 'Power' and 'Select' buttons are not triggered for more than 5 seconds.

When you are in Individual Function Set Menu:

- Press 'Select' button for 1 second to toggle between different setting values.
- Press 'Select' button for 5 seconds to set selected setting and exit to next Main Menu.

See more details on flow chart in Appendix I.

## 7. TROUBLESHOOTING:

To troubleshoot the unit, please note the error code displayed on the main unit and review "Understanding the Error Codes" in section 4.

PROBLEM	POSSIBLE CAUSE/CONDITION	SOLUTION
No AC Output. All the LEDs and the display are off	The unit is off.  No power coming into unit	Turn the unit ON by pressing the "Power" button (when the unit is in Battery/inverter mode, or in By-Pass mode if the In4 parameter is set) otherwise the unit should always turn on automatically at the moment the AC-Input power is connected.  Check the battery DC fuse, the Disconnect switch (if installed), the AC Input Source and the AC Input Branch Breaker is either tripped or turned OFF.
No AC output on AC Output Socket Status LED is Green or Amber (1)	230V Model: The AC Output Circuit Breaker is tripped.	Check loads and reset the breaker.
AC Output turns ON and OFF.	Power Safe mode ("In2") enabled and AC load <10W.	The load connected must be below the AC load sense threshold of 10W +/-25%.
No AC Output. Status LED is red	The unit has shutdown, check Error code shown on display.	Verify the error condition and make correction.
During AC Input Power Outage, there is no AC Output when battery power is available.	The unit is set to "Non-Backup" mode ("In0") and AC Input Power is not available.	Change the "In0" setting to different setting if you want to turn ON the inverter. With "In0" setting, the inverter is completely OFF. When the AC Input Power is not available and the "Power" button is pressed once, the display and LEDs stay working for about 10 sec only. With this setting, the unit will provide AC Output Power only when the AC Input Power is available.

# 8. SPECIFICATIONS:

Note: Specifications are subject to change without notices.

SPECIFICATION	ES-2000US IC122055 (120V MODEL)	ES-2000EU/UK/AUS IC122055I (230V MODEL)
INVERTER		
AC Output Power	2000W	2000W
AC Output Current	16.6A	8.7A
AC Surge Power (Peak)	4000W	4000W
AC Output Voltage/Frequency	120 VAC / 60 Hz	230 VAC / 50Hz
AC Output Waveform	Sinewave (<3% THD)	Sinewave (<3% THD)
Nominal DC Input Voltage	12.5 VDC	12.5 VDC
No Load battery draw (Inverter Mode)	< 1.5 ADC	< 1.5 ADC
DC Input Voltage operating range	10.5 – 15.5 VDC	10.5 – 15.5 VDC
Under Voltage Alarm	11.0/12.1 VDC	11.0/12.1 VDC
Under Voltage Alarm Recovery	11.3/12.3 VDC	11.3/12.3 VDC
Under Voltage Shutdown	10.5/11.8 VDC	10.5/11.8 VDC
Under Voltage Recovery	12.0/12.6 VDC	12.0/12.6 VDC
Over Voltage Shutdown	15.5 VDC	15.5 VDC
USB		
USB Port	5V, 2.1 A	5V, 2.1 A
ANDERSON INPUT/OUTPUT PORTS		
Anderson Connector 1	120A when using only one pin / 240A when using both pins	
Anderson Connector 2	120A	120A
Anderson Connector 3	120A when using only one pin / 240A when using both pins	

## 8. SPECIFICATIONS:

SPECIFICATION	ES-2000US IC122055 (120V MODEL)	ES-2000EU/UK/AUS IC122055I (230V MODEL)
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### AC TRANSFER SWITCH

Transfer Time	< 30 ms	< 30 ms
Transfer Relay Rating	30A	16A
AC Input Source Setting	15, 20, 30A	8, 10, 16A

### DISPLAY

Inverter Mode	Input Voltage, Output Power	Input Voltage, Output Power
Charger Mode	Status & Battery voltage	Status & Battery voltage

### CHARGER

Charging Voltage Range	14.6 VDC	14.6 VDC
Float Voltage Range	13.8 VDC $\pm$ 0.1	13.8 VDC $\pm$ 0.1
Charger Current (max)	55 ADC	55 ADC
Charger Current Setting (A)	5,15,35,55	5,15,35,55
Battery Type	Gel, Flooded, AGM, Fixed	Gel, Flooded, AGM, Fixed
Charge Control	Bulk/Absorption/Float	Bulk/Absorption/Float
Efficiency	>80%	>80%

### BATTERY

Type	LiFePO4	LiFePO4
Capacity	12V 100AH	12V 100AH

## 8. SPECIFICATIONS:

SPECIFICATION	ES-2000US IC122055 (120V MODEL)	ES-2000EU/UK/AUS IC122055I (230V MODEL)
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### SAFETY AND ENVIRONMENTAL

Conformance	UL 458, CSA C22.2 No. 107.2-01	LVD: EN/IEC 62040-1, IEC 61558-2-16
EMI/EMC	FCC Part 15 Class B	EMC: EN/IEC 62040-2, Category C1
Agency Markings	cETLus	CE
Operating Temperature	0°C to 40°C (32°F to 104°F)	0°C to 40°C (32°F to 104°F)
Storage Temperature	-20°C to 60°C (-4°F to 140°F)	-20°C to 60°C (-4°F to 140°F)
Relative Humidity	5-90% noncondensing	5-90% noncondensing
Operating Altitude	Up to 9,843ft (3000m) above sea level	

### WEIGHTS AND DIMENSIONS

Weights	29,4 Kg	29,4 Kg
Dimensions: h x w x d (front view)	241 mm x 397 mm x 339 mm	241 mm x 397 mm x 339 mm

### OPTIONAL ACCESSORIES

External Battery Bank	AWILCO article LFP12100BM	AWILCO article LFP12100BM
Anderson Connector		
Wire Assembly	Please refer to <a href="http://www.awilco.dk">www.awilco.dk</a> for options	

## 9. WARRANTY:

### **2 YEARS / 2000 CYCLES LIMITED WARRANTY:**

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**Refrain from using or installing the unit, until you have read and fully understood this manual entirely. Failing to comply, might cause severe damage and potentially hazardous.**

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of AWILCO ApS. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this unit is limited in duration to the duration of this warranty.

This unit is warranted, to the original purchaser only, to be free of defects in materials and workmanship for two years or max 2000 battery cycles, which ever comes first, from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users.

Manufacturer will not be responsible for any amount of damage in excess of the retail purchase price of the unit under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This unit is not intended for commercial use. This warranty does not apply to damage to units from misuse or incorrect installation/connection. Misuse includes improper wiring or connecting to improper polarity power sources.



## 9. WARRANTY:

### **RETURN/REPAIR POLICY:**

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If you are experiencing any problems with your unit, please contact your place of purchase. Proof of purchase and unit serial number is required to be presented. Any defective unit that is returned to manufacturer within 30 days of the date of purchase will be replaced free of charge.

If such a unit is returned more than 30 days but less than two years / with a max of 2000 battery cycles from the purchase date, manufacturer will repair the unit or, at its option, replace it, free of charge. If the unit is repaired, new or reconditioned replacement parts may be used, at manufacturer's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under these terms for the remainder of the warranty period. The customer is responsible for cost involved for dismounting defective unit and reinstallation of repaired/replacement unit, as well as the shipping charges on all returned items.

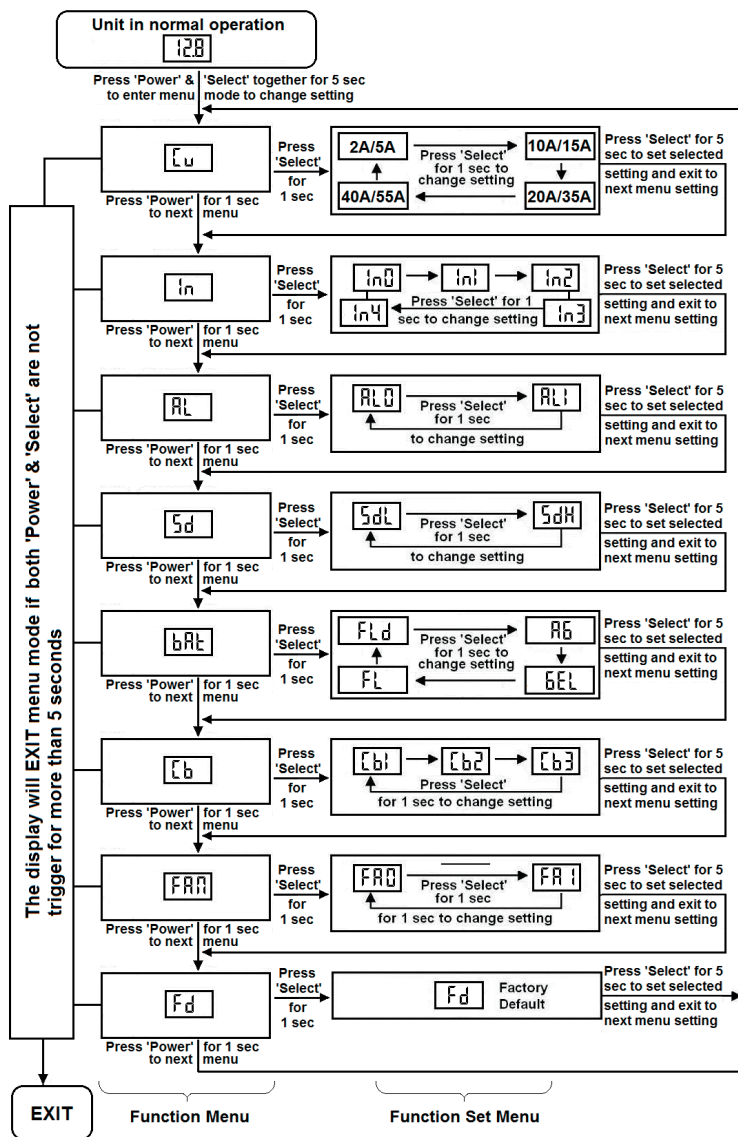
### **LIMITATIONS:**

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This warranty does not cover accessories, such as adapters and batteries, damage or defects resulting from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire and flood.

If your problem is not covered by this warranty, call our Customer Service Department at [mail@awilco.dk](mailto:mail@awilco.dk) or +45 56 56 54 00 for general information if applicable.

# APPENDIX I



# APPENDIX II

## EXTERNAL BATTERY BANKS (LFP12100BM) INFORMATION:

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### Dimensions

TBD by Awilco on External Battery bank details.

## ELECTRICAL FEATURES:

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### Standard Charge

Charging the cell initially with constant current at 0.2C and then with constant voltage at 14.6V (accuracy  $\pm 0.05V$ ) till charging current declines to 0.02C at 25°C.

### Standard discharge

Discharging the cell with constant current at 0.2C till cut-off voltage at 9.2V. Temperature: 25°C.

### Initial internal impedance

This means AC impedance of the pack measured at 1kHz after 50% charge. Initial Internal Impedance  $\leq 60m\Omega$ .

### Initial capacity

The capacity means the discharge capacity of the battery, which is measured with discharge current of 0.2C with 9.2V cut-off voltage after the standard charge. Initial Capacity  $\geq 95\%$  Nominal Capacity. Temperature: 25°C.

### Battery capacity as shipment

Capacity of battery pack shipment is more than 50%.

### Cycle life

Test condition: Temperature: 25 ~ 30°C Charge, 0.2C CC to 14.6V, and CV to 200mA cut off Discharge, 0.2C DC discharge to 9.2V, 80% or more of 1st cycle capacity at 0.2C discharge of operation, cycles quantity must not be less than 2000 cycles.

## INSTALLING THE UNIT WITH EXTERNAL BATTERIES (LFP12100BM) THROUGH ANDERSON CONNECTORS MOUNTING:

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**CAUTION:** Before beginning unit installation, please consider the following:

- The unit should be used or stored in an indoor area away from direct sunlight, heat, moisture or conductive contaminants.
- When placing the unit, allow a minimum of 8 cm of space around the unit for optimal ventilation.
- Secure that the unit can rest on a flat surface for optimal support
- Always use the supplied brackets (4 pcs) for secure installation, by fixing the brackets to the intended surface of installation by means sufficient screws/ nut + bolt, min M8.
- Observe that your target area will allow proper support for the brackets, proper room for cables leading to/from the AC and DC connectors as well as the USB connector on the rear.

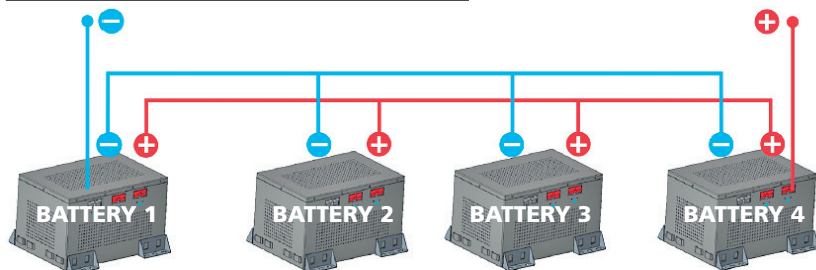
## APPENDIX II

### CABLES USE FOR EXTERNAL BATTERY BANKS:

- When mounting the external battery banks, it is essential that all batteries are connected correctly to the connection terminals.
- All cables connecting the system to the connection terminals must be of the same length and dimension.
- Use suitable crimping tool for the cables for the 120A Andersson connectors.
- Make sure that it is firmly crimped for good connection.
- To minimize the resistance, please note the longer cables, the higher mm2 for the 120A Andersson connectors. Use as minimum 25mm2 cables.

**WARNING:** Do not short circuit terminals; otherwise, the battery or appliance will be damaged or burned. Do NOT connect to the positive and negative terminals of the battery directly. Otherwise, the battery will be damaged or burned.

### EXAMPLE OF 4 EXTERNAL BATTERIES CONNECTED IN PARALLEL:



### ONLY Parallel Connection n external battery banks.

### GENEREL PRECAUTIONS:

- Do NOT connect the external batteries bank in serial. Otherwise the battery will be damaged, and the warranty immediately expires.

### DO NOT SERIAL CONNECT THE BATTERY!

- Make sure that all battery packs have the same voltage level (voltage difference  $<0.2V$ ) before connecting the batteries in parallel. Charge every battery pack to full and rest for 5 hours or more with same type of chargers.
- Connect the batteries according to the pictures below. Wires are connected to the poles of the battery as follows:
  1. Positive terminal + (Andersson RED connector) from battery 1 to battery 2
  2. Negative terminal - (Andersson BLACK connector) from battery 1 to battery 2.

## APPENDIX II

### CAUTION:

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- Avoid reverse polarity by connecting + to + (Positive terminal) and – to – (Negative terminal).

**Caution: The batteries are only to be connected in parallel!**

### **DANGER!**

- Cable dimensions must be able to handle > 100A. Please use min. 25mm<sup>2</sup> or higher.
- Please make sure that the environment of the battery is safe and protected from corrosion, vibrations and loose connections. Make sure the battery is fastened. Connection impedance < 0.1m .
- Do not use the batteries in series. This will cause sparks, short circuit and destruction at the battery.





