

ENERGY SYSTEM DATA SHEET

Read this data sheet carefully and ensure you have fully understood its contents before operating this device for the first time



PRODUCT	PRODUCT CODE	SPEC: SHORT
AC Energy System	ACLEVEL2	12 / 500 / 20-16-1280



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CONTENTS

1. GENERAL OVERVIEW OF THE LEVEL 2 ENERGY SYSTEM.....	3
2. INVERTER TECHNICAL SPECIFICATIONS.....	4-5
2.1 VICTRON ENERGY - MultiPlus Inverter/Charger 500VA	
2.2 Inverter	
2.3 Charger	
2.4 General	
2.5 Inverter enclosure	
2.6 Standards	
2.7. Energy system specifications	
3. DEFAULT CONFIGURATON SETTINGS.....	6-11
4. WIRING SCHEMATIC LEVEL 2 (12V).....	12
5. INTERNAL STORAGE.....	13
5.1 Battery specifications	
5. SOLAR PANEL INTEGRATION.....	13
5.1 Solar panel specifications for LEVEL 2 and 100 / 30 / 360 – 12 DC Attachment unit	
6. WIRING SCHEMATIC LEVEL 2 (12V).....	14
7. SAFETY INSTRUCTIONS.....	15
7.1 Transport and storage safety instructions:	
8. INSTALLATION.....	16
9. WARRANTY.....	17
10. QUALITY CONTROL.....	18-20

1. GENERAL OVERVIEW OF THE LEVEL 2 ENERGY SYSTEM

The primary use of this energy system is for an uninterrupted AC power (UPS) function. In the event of grid failure, the inverter within the Victron Energy MultiPlus Inverter/Charger 500VA is automatically activated and takes over the energy supply to the connected loads. This happens very quickly (20 milliseconds), enabling a computer and most sensitive electronic equipment to safely continue to operate efficiently from the unit's internal battery without any disruption .

This unit is not only a UPS. It has the capability to become an integral part of your electrical network, facilitating the input of solar energy into this network transferring up to 16A of 230 VAC through the system from mains supply.

With an intelligent battery charger, the system always maintains its modern LiFePO4 battery at the correct voltage values ensuring long-life and zero battery maintenance for many years.

Ask your service agent about any of the following system functions:

- Integration of solar panels.
- Transfer capacity and advantages.
- Parallel connection and growth of system.
- 1Ø - 3Ø phase connection capability.
- Remote monitoring and evaluation of the energy system.
- System setting and programming functions.



SPECIFICATIONS

2.1 VICTRON ENERGY - MultiPlus Inverter/Charger 500VA

12 VOLT 12/500/20

PowerControl	Yes
PowerAssist	No
Three Phase and parallel operation	Yes
Transfer switch	16A

2.2 INVERTER

Input voltage range	9,5 – 17V
Output Output voltage	230VAC \pm 2%
Output Frequency:	50Hz \pm 0,1% (1)
Cont. output power at 25°C (3)	500VA
Cont. output power at 25°C	430W
Cont. output power at 40°C	400W
Cont. output power at 65°C	300W
Peak power	900W
Maximum efficiency	90 %
Zero-load power	6 W
Zero-load power in search mode	2 W

2.3 CHARGER CONFIGURATION

AC Input Input voltage range:	187-265 VAC Input frequency: 45 – 65 Hz
Charge voltage 'absorption'	13,80 V
Charge voltage 'float'	13,50 V
Charge current house battery (4)	20 A

2.4 INVERTER ENCLOSURE

Common Characteristics	Material & Colour: Steel/ABS (blue RAL 5012)
	Protection category: IP 21
Battery-connection	16 mm ²
230V AC-connection	G-ST18i connector

SPECIFICATIONS

2.5 GENERAL

Programmable relay (5)	Yes
Protection (2)	a – g
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration
Remote on-off	On/off/charger only
DIP switches	Yes (6)
Internal DC fuse	125A
Common Characteristics	Operating temp. range: -40 to +65°C (fan assisted cooling)
	Humidity (non-condensing): max 95%

2.6 STANDARDS

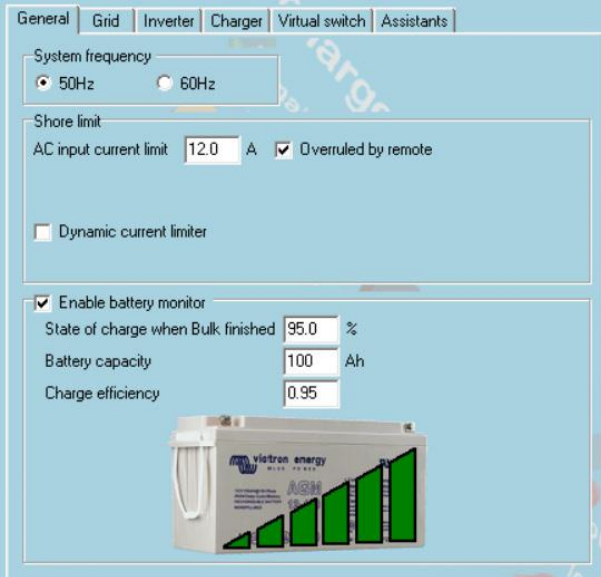
Safety	EN-IEC 60335-1, EN-IEC 60335-2-29, EN 62109-1
Emission / Immunity	EN 55014-1, EN 55014-2, EN-IEC 61000-3-2, EN-IEC 61000-3-3
	IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3
Road vehicles	ECE R10-5
1) Can be adjusted to 60Hz and to 240V 2) Protection: a. Output short circuit b. Overload c. Battery voltage too high d. Battery voltage too low e. Temperature too high f. 230VAC on inverter output g. Input voltage ripple too high 3) Non-linear load, crest factor 3:1	4) At 25°C ambient 5) Programmable relay which can be set for: General alarm, DC under voltage or generator start/stop signal function AC rating: 230V/4A DC rating: 4A up to 35VDC, 1A up to 60VDC 6) Remote / Battery charge voltage / Inverter frequency / search mode 7) Battery charge voltage / search mode

2.7 ENERGY SYSTEM SPECIFICATIONS

Enclosure material	Alluminium; 409 Stainless steel
Weight	28 Kg
Dimensions	550(H) X 620(W) X 155(D) mm
Ventilation distance	150mm clear on all sides with no obstructions
Installation	Indoors/inside only
Programming/settings	Optimally factory preprogrammed. Changing any settings will render warranty void.

3. DEFAULT CONFIGURATION SETTINGS

The EnergyDock Level 2 unit is supplied with the following default settings. Please note that these settings are primarily for the use of the UPS function. Should solar input or the power assist function will be used, please enquire at Specialized Solar Systems for the details of these settings.



The screenshot displays the configuration interface for the EnergyDock Level 2 unit, showing the following default settings:

- System frequency:** 50Hz (selected), 60Hz
- Shore limit:** AC input current limit: 12.0 A, Overruled by remote, Dynamic current limiter
- Battery monitor:** Enable battery monitor, State of charge when Bulk finished: 95.0 %, Battery capacity: 100 Ah, Charge efficiency: 0.95

An image of a Viatron Energy Plus Power AGM battery is shown at the bottom of the configuration window.

3. DEFAULT CONFIGURATION SETTINGS

The screenshot displays the 'Grid' configuration tab in the EnergyDock software. The 'Grid code selection' section includes a dropdown menu for 'Country / grid code standard' set to 'None: (feeding energy from DC to grid not allowed)' and a 'Show NS protection log' button. The 'Transfer switch' section contains several settings: 'Accept wide input frequency range (45-65 Hz)' is checked; 'AC low disconnect' is set to 180 V and 'AC high connect' is set to 265 V; 'AC low connect' is set to 187 V and 'AC high disconnect' is set to 270 V; and 'UPS function' is checked.

Setting	Value	Unit
AC low disconnect	180	V
AC high connect	265	V
AC low connect	187	V
AC high disconnect	270	V

In UPS mode, no feedback will be allowed.

3. DEFAULT CONFIGURATION SETTINGS

General | Grid | Inverter | **Charger** | Virtual switch | Assistants

Inverter output voltage: 230 V

Ground relay

DC input low shut-down: 11.80 V

DC input low restart: 13.20 V

DC input low pre-alarm: 12.70 V

Do not restart after short-circuit (VDE 2510-2 safety)

enable AES

Start AES when load lower than: 30 W

Stop AES when load: 30 W higher than start level.

AES type:

modified sine wave

search mode

Waveform diagram showing a pulse with a 1s period.

In UPS mode, the DC low shut down value has been set at 11.80V. This setting has been based on a low ampere draw and should be considered by the installer. At 11.80V the battery will be depleted between 0 – 5% state of charge (SOC). With a higher constant load, this should be increased to 12.2V.

3. DEFAULT CONFIGURATION SETTINGS

General | Grid | Inverter | **Charger** | Virtual switch | Assistants

Enable charger

Weak AC input

Stop after excessive bulk

Lithium batteries

Storage mode

Use equalization (tubular plate traction battery curve)

Charge curve: Adaptive

Absorption voltage: 13.80 V Repeated absorption time: 0.25 Hr

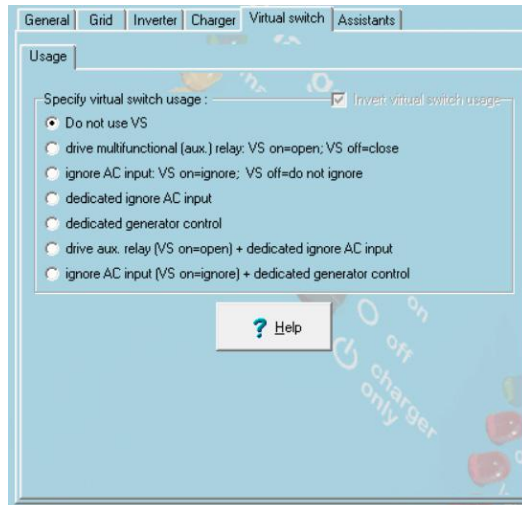
Float voltage: 13.50 V Repeated absorption interval: 0.50 Days

Charge current: 20 A Maximum absorption time: 1 Hr

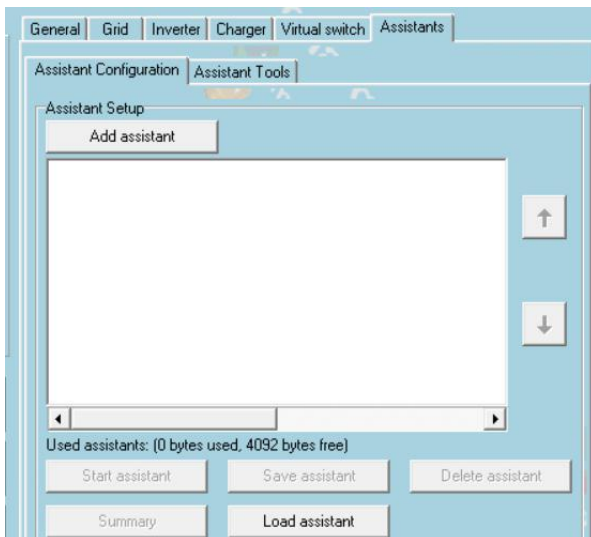
Battery type: No corresponding default

Please note that we have set the charger to 20A. Please maintain this setting. Please also take note of the “repeated times” -these have been set specifically for UPS mode.

3. DEFAULT CONFIGURATION SETTINGS



This is normally used when solar is applied.



3. DEFAULT CONFIGURATION SETTINGS

The level 2 unit has a smart BMS with the following values:

- Max Discharge 60A @ 12.8V
- Max Charge 30A @ 12.8V

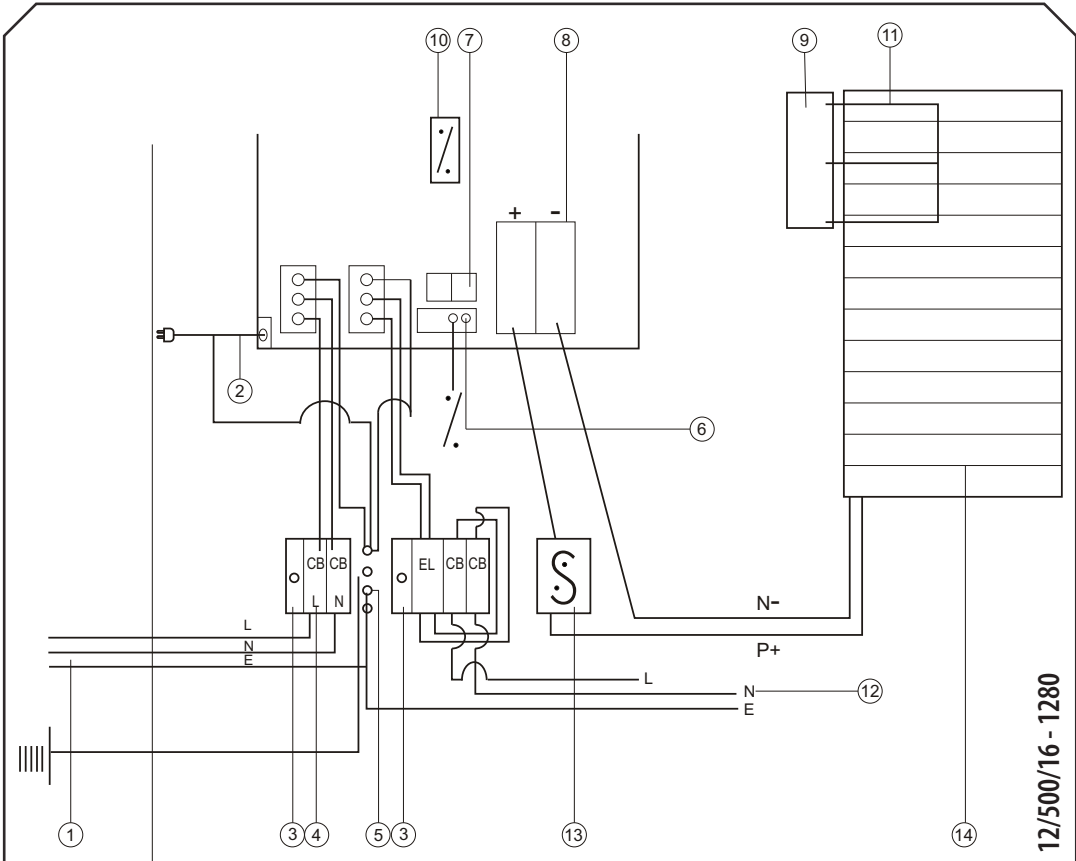
This BMS's settings are fixed, not programmable.

DC ATTACHMENT

Please confirm settings prior to connecting the DC Attachment unit.

EARTH LEAKAGE

Please note that the internal "Ground relay" in the inverter settings has been disconnected. This has been done with the assumption that the installed earth leakage will be used. If the installed earth leakage is bypassed, please inquire about the Ground Relay settings.



12/500/16 - 1280

1. AC input from grid.
2. Grounding connection.
3. Indicator lights.
4. Double pole circuit breaker.
5. Common earth bar.
6. Remote on/off switch.
7. Remote monitoring.

8. Battery connection.
9. Internal BMS.
10. Manual on/off switch.
11. Cell monitor cable.
12. AC output to load.
13. Main DC fuse.
14. LiFePO4 battery.

5.1 BATTERY SPECIFICATIONS

Battery type:	LiFePO ₄ (Lithium iron phosphate)
Nominal voltage:	12.80 VDC
Amp hours:	100
Wh capacity at 100%:	1280 Wh
Max charge (A):	30
Max discharge (A):	60
Battery voltage shutdown:	11.5 VDC
Battery voltage restart:	12.5 VDC
Expected cycle life:	Greater than 3000 @ 0.2C discharge & 90 % SOC
Max charge voltage:	13.95 VDC

5. SOLAR PANEL (PV) INTEGRATION

By purchasing the “DC- Attachment Unit” (100 / 30 / 360 – 12) , this energy system can become a full off-grid energy supply system for 1Ø or 3Ø phase energy supply. The following technical specifications would apply to this energy system:

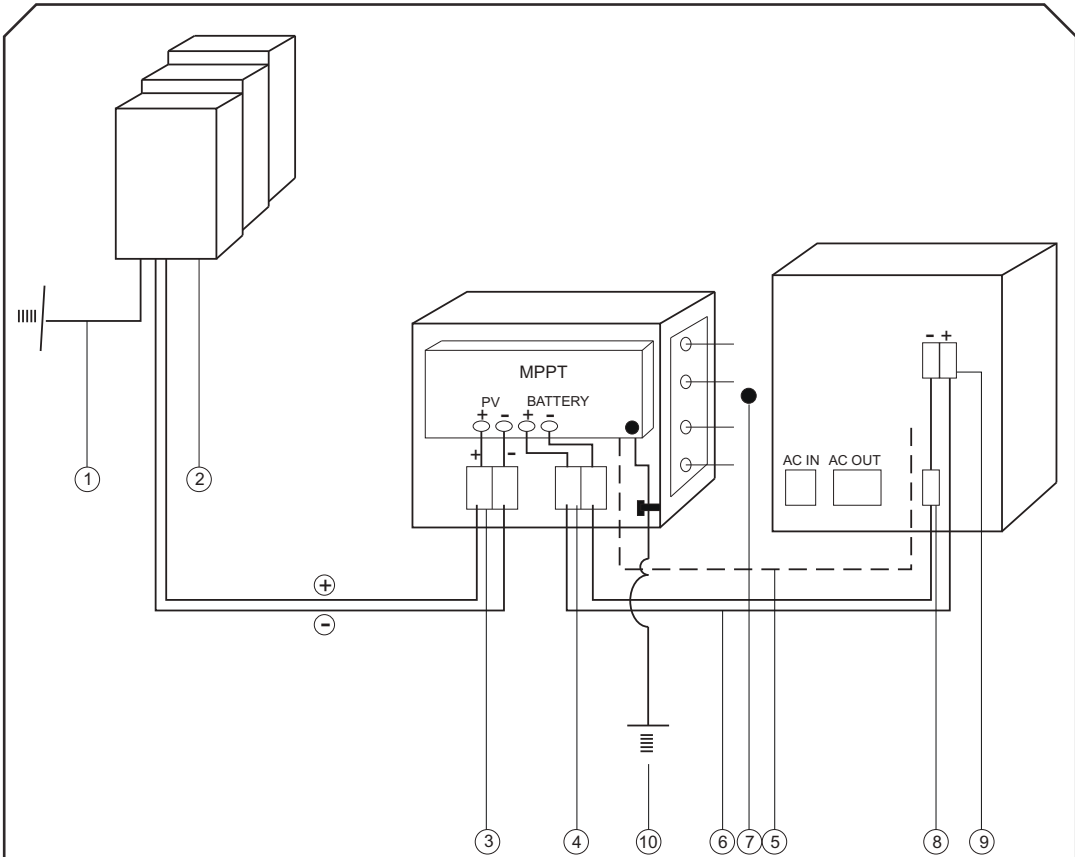
100 / 30 / 360 – 12 DC Attachment unit

5.1 PV SPECIFICATIONS LEVEL 2

Max Input Voltage from solar panels:	100 VDC
Max (A) supplied by solar and grid:	30A
Max WP of solar panels:	360 WP
Programming of MPPT for effective charge:	
Bulk and absorb voltage:	13.80VDC
Float voltage:	13.50 VDC
Max charge (AC/DC combo)	30A



6. WIRING SCHEMATIC LEVEL 2 (12V)



1. DC-PV earth not bonded to AC earth.
2. Configured solar panel installation.
3. Double pole DC breaker for PV.
4. Double pole DC breaker for battery.
5. Optional remote monitoring cable.
6. Battery cable connection MPPT with fuses.

7. Bolt on method between units.
8. Connect MPPT battery breaker to fuse.
9. Connect MPPT battery breaker directly to inverter input.
10. Bonded earth to AC.

7. SAFETY INSTRUCTIONS

General safety instructions:

Please read all documentation supplied with this product first so that you are familiar with the safety indicators and instructions before using this product. This equipment should be used for the designated application only.

WARNING: Danger and electrical shock

This product is used in combination with a permanent energy source (battery). Even if the equipment is switched off, a dangerous electrical voltage can occur at the input or output terminals. Always switch the AC power OFF and disconnect the battery before any maintenance is carried out.

Never use the product at sites where a gas or a dust explosion could occur. The product is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or with a lack of experience or knowledge.

An approved service agent must take responsibility of the installation of this product.

7.1 Transport and storage safety instructions:

When transporting or storing the product, ensure that the main supply and the battery leads are disconnected.

Transport the product in the original packaging only.

Store all products in a dry environment in a temperature range of 0 to 45°C.

WARNING: Do not lift heavy objects without assistance.

8. INSTALLATION

- For electrical work, follow the National Wiring Standards and Regulations of South Africa.
- This product is a Safety Class 1 device. The AC input and/or output terminals must be provided with an uninterrupted grounding for safety purposes. The additional grounding point located inside the unit should have a ground conduction of at least 4mm².
- Never replace a protective device with a component of a different kind.
- Before switching the energy system on, first check that the input voltage is correct.
- Ensure that the equipment is used in the correct operating conditions.
- Never operate in wet or dusty conditions.
- Ensure that there is sufficient free space for ventilation around the installed equipment.
- Install the product in a heat proof environment.
- Ensure that there are no chemicals, plastic pots or curtains in the immediate vicinity of the installation.
- Always ensure that you follow the correct installation video/manual procedures when attempting to install this unit.

9. WARRANTY

SPECIALIZED SOLAR SYSTEMS (PTY) LTD. (SSS) -- WARRANTY CONDITIONS

This Limited Warranty applies to the Products and Systems sold and/or installed by Specialized Solar Systems (SSS) or an affiliated company. SSS warrants the quality of such Systems and specifies the scope of such Warranty.

1. 1 (one) Year Limited Warranty
SSS warrants the equipment installed and workmanship to be free from defects and/or failures specified below for a period not exceeding 1 (one) year from the date of installation of such equipment:
 - i) Defects and/or failures due to manufactured items;
 - ii) Defects and/or failures due to materials;
 - iii) Defects and/or failures due to faulty workmanship.
 - iv) Batteries are subjected to a power usage factor of 0.2C over 3000 cycles or 5 years (whichever comes first), at a temperature that is less than 45°C.
 - v) Programming: Energy systems are optimally setup in factory production. Changing any of these settings will void the energy systems warranty.

In the event of any of the above defects and/or failures, SSS will arrange for the repair/replacement of such systems/components at its sole discretion. This may include the repair/replacement of the system/components with new/replacement components.

2. Warranty Exclusions
 - i) No claim based on this Limited Warranty may be brought after the applicable Warranty period;
 - ii) Any repair/replacement of systems/components shall not extend the original terms of this Warranty.
 - iii) The customer is responsible for ensuring a valid electrical Certificate of Compliance is obtained for a specific site/premises, prior to SSS conducting any installation of systems on that specific site/premises. Failure of the customer to comply with this requirement will invalidate this warranty.
3. This Limited Warranty shall not cover defects and/or failures of systems/components from the following causes, even though such defects and/or failures are discovered within the applicable Warranty period:
 - i) Defects and/or failures caused by devices and/or parts other than the systems/components supplied/installed by SSS;
 - ii) Defects and/or failures caused by defective wiring, installation, or handling by parties other than SSS;
 - iii) Defects and/or failures caused by installations not in conformance with SSS system/component specifications, installation manuals or operation manuals;

- iv) Defects and/or failures caused by unauthorized maintenance, operation or modification;
 - v) Defects and/or failures caused by removal from the original place of installation;
 - vi) Defects and/or failures caused by repairs not in accordance with SSS' instructions;
 - vii) Defects and/or failures caused by inappropriate handling during transportation and storage;
 - viii) Defects and/or failures caused by external accidents such as fire and explosion;
 - ix) Defects and/or failures caused by natural forces, acts of God, or *force majeure* events and other unforeseen circumstances or causes beyond SSS' reasonable control, including but not limited to, earthquakes, hurricanes, typhoons, tornadoes, floods, lightning, storm damage, snow damage, etc.;
 - x) Defects and/or failures caused by smoke and/or other pollution, salt damage, acid, rain, etc.;
 - xi) Unauthorized tampering with any part of the system/components.
4. This Limited Warranty does not cover the transportation cost for reshipment of any repaired or replaced system/components to the applicable location, and does not cover the transportation cost for the return of the system/components to SSS or SSS' authorized agents and costs associated with installation, removal or re-installation of the system/components, where such system/components are not installed by SSS or an authorized SSS agent.
 5. This Limited Warranty is transferrable to a new owner of a location where the system/components were originally installed provided that the system/components remain installed at the location where originally installed.
 6. Warranty Limitations
The Limited Warranty set forth herein is expressly in lieu of and excludes all other express or implied warranties including, but not limited to, warranties of merchantability and fitness for a particular purpose and all other obligations or liabilities on the part of SSS, unless such other warranties, obligations or liabilities are expressly agreed to in writing by SSS. SSS shall have no responsibility or liability whatsoever for damage or injury to persons or property, or for other loss or injury resulting from any cause whatsoever arising out of or relating to the system/components including, without limitation, any defects and/or failures in the systems/components or from use or installation.
Beyond this SSS shall not be liable under any circumstances for any incidental, indirect, consequential or special damages howsoever caused. In no event shall SSS' aggregate liability exceed the value of the system/component which is the subject of a claim or dispute.
This Limited Warranty shall be valid until a new revision is issued by Specialized Solar Systems.

ENERGYDOCK

LEVEL
02



SPECIALIZED SOLAR SYSTEMS® QUALITY CONTROL

COMPONENT NAME:		ASSEMBLER NAME:	
COMPONENT SERIAL NO:		QUALITY CONTROLLER NAME:	

10. QUALITY CONTROL

- CHECKLIST -

PASS	FIT & FINISH	QUALITY CONTROLLER INSPECTION	COMMENTS
	Main assembly (paint finish, structure, rivots)		
	Battery compartment lid		
	Inverter compartment lid		
	Multiplus Inverter fit		
	Circuit Breakers DIN Rail & SSS cover		
	LifePO ₄ battery mount		
	Alignments		

SIGN-OFF:

DATE:

PASS	COMPONENTS	QUALITY CONTROLLER INSPECTION	COMMENTS
	Multiplus Inverter 500 VA		
	Indicator lights		
	Double pole circuit breaker - 20A		
	Common earth bar		
	AC out in earth leakage - 25A		
	AC out breaker - 20A		
	LiFePO ₄ main fuse		
	Inverter on/off switch		
	Ground to earth		
	Battery BMS		
	BMS remote display		
	Battery cell monitor		
	Neutral / earth link		

SIGN-OFF:

DATE:

SPECIALIZED SOLAR SYSTEMS® QUALITY CONTROL

PASS	PROGRAMMING & COMMISSIONING Memory, setup & connectivity	QUALITY CONTROLLER INSPECTION	COMMENTS
	BMS on/off		
	Inverter on/off		
	VE Config upload		
SIGN-OFF:		DATE:	
PASS	PERFORMANCE - DISCHARGE & CHARGE	QUALITY CONTROLLER INSPECTION	COMMENTS
	UPS mode - AC disconnected		
	Resistive load 400w discharge to LVD		
	Discharge time		
	Discharge voltage LVD		
	Re-charge to 50% SOC		
SIGN-OFF:		DATE:	
PASS	SAFETY & LEGAL	QUALITY CONTROLLER INSPECTION	COMMENTS
	Earth leakage test		
	Breaker test		
	Labels - AC, PV DC (if applicable & align)		
	QR code		
	Earth relay test (inverter)		
SIGN-OFF:		DATE:	
PASS	SAFETY & LEGAL	QUALITY CONTROLLER INSPECTION	COMMENTS
	Packaging Material & mount		
	Shipping list :		
	Manual - Multiplus		
	Product Specification brochure		
	Hanger bracket kit		
	QC label		
	Spare fuse		
SIGN-OFF:		DATE:	

FINAL SIGN-OFF AND APPROVAL

NAME OF COMMISSIONER:	
DATE:	
SIGN-OFF:	



SPECIALIZED SOLAR SYSTEMS®

The National Alternative Energy Company

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