



## **POWER STATION**

FOR V-LOCK AND 3-STUD LITHIUM ION BATTERIES ONLY

Models

**PWS-RUGGED**

**PWS-RUGGED 3S**

## **OPERATING INSTRUCTIONS**

Revision 1.0

## **Please read these instructions concerning your safety**

BLUESHAPE POWER STATIONS have been designed to provide a superior performance by efficiently managing a high power output during their operation without overheating or becoming unstable.

With the high output power capability of the PWS-RUGGED, it is expected and very normal that the internal electronics generate some heat and the internal temperature rises to a controlled extent. The unit is designed to withstand operation with the lid closed during power delivery (discharge) but needs to be kept with the lid open during charging. It is important not to obstruct the fan intakes and ventilation openings of the enclosure.

Moreover, please follow the safety instructions below.

- The equipment is designed to IP65 standards. It is advisable to protect the equipment from rain and extreme humid environments. Preferably, avoid excess contact with water or other fluids as much as possible. . Refrain to use if any liquid has been accidentally spilled inside the equipment. Contact qualified service personnel for inspection or repair
- Clean only by using a dry cloth
- Remove on-board batteries when not in use
- Read the supplied instructions thoroughly and keep handy
- Avoid setting up near heat sources such as fire places, radiators, stoves or other heat generating equipment
- If the equipment develops a fault, have it repaired by qualified service personnel only
- NEVER attempt to close the lid, block the ventilation openings or obstruct cooling fan air flow during charging
- Use only as instructed by the manufacturer
- Do not dismantle the apparatus. No user-serviceable parts inside



### **IT IS STRONGLY RECOMMENDED TO USE BLUESHAPE BATTERIES TO OPERATE THIS UNIT**

Although this unit can also run on 3<sup>rd</sup> party batteries, it is not advisable to use any of these since:

only BLUESHAPE batteries are able to communicate and dialogue with the unit. The unit was designed for the BLUESHAPE battery protocol

BLUESHAPE batteries are renowned for their high discharge capabilities and can guarantee:

- Up to 9A for the standard series
- Up to 12A or more for the HD/HDplus series

### Package contents

- PWS RUGGED Power Station
- Power cable (according to region)
- Operating manual

## CAUTION

The unit IS resistant to IP 65\*<sup>1</sup> standard but IS NOT being declared as waterproof and not intended for usage in submerged in water conditions or heavy direct rainfall

\*1

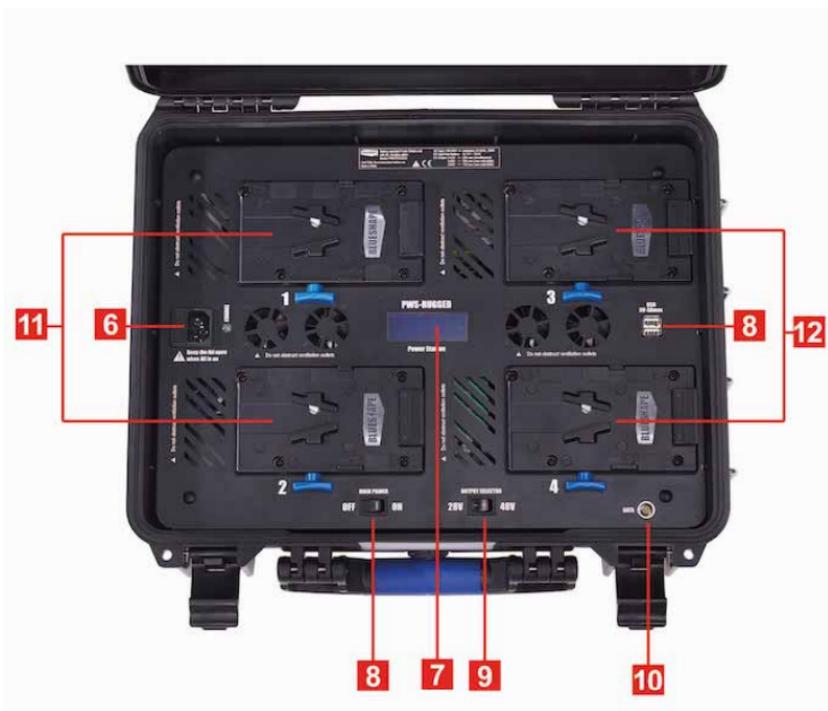
Explanation of IP65 (Ingress protection rating)		
IP	6	5
Ingress Protection	First digit Solids protection	Second digit Liquids protection
RATED EXTENT	No ingress of dust; complete protection against contact.	Water projected by a nozzle (6.3mm) against enclosure from any direction shall have no harmful effects.

## PWS-RUGGED graphic description – exterior



1. Watertight 2-step latches
2. Swivelling and ergonomic handle
3. 14V outlet (max 340W) over two paired 4 pin XLR sockets, protected with rubber caps
4. 28V outlet (max 560W) over two paired 3 pin XLR socket, protected with rubber caps
5. 48V outlet (max 560W) over two paired 3 pin XLR socket, protected with rubber caps

## PWS-RUGGED graphic description – interior



6. AC socket used in battery charging
7. LCD Display showing the state of charge and the actual current delivered by each battery, the voltage of each battery and the total power delivered by PWS-RUGGED
8. Illuminated power On/Off switch
9. Dual USB output socket, 5V 3A - 15W max/each
10. 28V - 48V output selector. When the 28V output is selected, the 48V outlets are totally disconnected. Conversely, when the 48V output is selected, the 28V outlets are totally disconnected
11. Data socket for computer testing, debugging and calibration
12. Battery bay #1 and bay #2\*
13. Battery bay #3 and bay #4\*

\*Note:

V-Lock adapter plates are installed on PWS-RUGGED  
3-Stud adapter plates are installed on PWS-RUGGED 3S

## Introduction

The BLUESHAPE Power Station concept is a convenient system to integrate the power of multiple V-lock batteries into a unique source that can be tapped anywhere, anytime as a simultaneous dual DC voltage output. Moreover, the PWS-RUGGED doubles up as a powerful battery charger capable of charging 4 batteries simultaneously at 4A each (65W). A user can carry the unit on the field during the day and power up his equipment indefinitely if an adequate supply of batteries is available. Later on or at night time, he can re-charge his batteries, 4 at a time in the comfort of his hotel, office or studio.

Depending on which batteries are installed, the quad PWS-RUGGED system can supply power as follows:

- Up to 560W out with 4x HD or HDplus models
- Up to 490W out with 4x standard models

The internal electronics are highly efficient operating at not less than 90% especially when delivering full loads. Such efficiency permits the PWS-RUGGED to remain cool even after hours of continuous operation. This feature ensures a safe and prolonged system reliability and lifetime.

The batteries on channels 1-4 are hot-swappable and enable the unit to provide uninterrupted power even when a battery becomes empty. The user will just need to monitor the capacity decrease of the batteries through the LCD display provided and replace as necessary without needing to switch off the unit.

Power is available from the 6 side XLRs as follows:

Selectable: 28V

- 2 x 3 pin female XLRs for 28V/ 560W max output (20A)

Selectable: 48V

- 2 x 3 pin female XLRs for 48V/ 560W max output (10A)

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Always present

- 2 x 4 pin XLRs for 14V 340W max output (24A)

Inside (lid open) there is also a twin USB charger for mobile phone top-up.

The display on the PWS-RUGGED will show each battery's individual state of charge and the total real time power being generated by the unit. This display makes it therefore, very easy to monitor the unit during operation and understand what output, it is delivering.

## Details on PWS-RUGGED operation

The unit must be operated with lid open when it is being used as a charger but can be operated with the lid closed when it is only supplying output from the on-board batteries.

AC connection is not necessary to have a DC output at 14V and 28V or 48V. The unit needs to be plugged to AC when it is to be used in charger mode.

If AC is connected, the unit starts to charge any on-board batteries immediately even if the main power switch is OFF.

If AC is connected but no battery is installed, then no DC output will be available. At least one battery needs to be present to obtain a DC output.

If batteries are installed and the device is turned ON, the DC outputs become available even if AC is not connected. No harm is done to the unit if loads are being powered by the various outputs while at the same time, AC is being supplied. The unit will manage the DC power distribution by itself and can also augment the output power by up to 60W per battery channel, making use of the additional power being derived from the mains.

For example:

If a battery (1 station) needs to release 100W in total, 60W will be provided by AC, whereas the remainder is provided by the battery.

The unit can operate with even just 1 battery on board. It all depends on the amount of power required by the user. Ideally however, all 4 should be installed. Each battery is individually stepped up to 28V-48V, so the total output is the combination of the outputs of all the batteries installed. It would be desirable to have the load, evenly distributed on all 4 batteries for these never to become overstressed.

Every station is hot swappable and can be monitored from the display. It is easy to determine how the power is being supplied and balance the requirement accordingly.

If a battery becomes empty or goes in an overload state, that battery is excluded from the total output (the user is notified on the display)

We strongly suggest the usage of BLUESHAPE HD and HDplus batteries because of their high current draw capabilities.

## Explanation of the DC outputs

1. Two outputs are available at all times - a regulated 14V (always available) and a regulated 28V or 48V (user selectable)
2. A total of 6 x XLR outputs are installed on the PWS-RUGGED side panel. These are divided as 2 sockets for each voltage (ie: in parallel)
3. The 28V and 48V are each splitted on 2 x 3-pin female XLRs
4. The 14V is always available on 2 x 4-pin female XLRs
5. The 28V or 48V are alternative and user selectable through a switch. When 28V is selected, the 48V output is disabled. If 48V is selected, the 28V output is disabled
6. If there is an overload on any of the 3 different outputs, all the outputs are automatically disconnected and the yellow RESET button is lit. To reactivate the device, the user needs to remove the overload condition and then press the RESET button
7. The instant power released from the 14V and 28V~48V output is always shown on the display

## Properties of the PWS-RUGGED

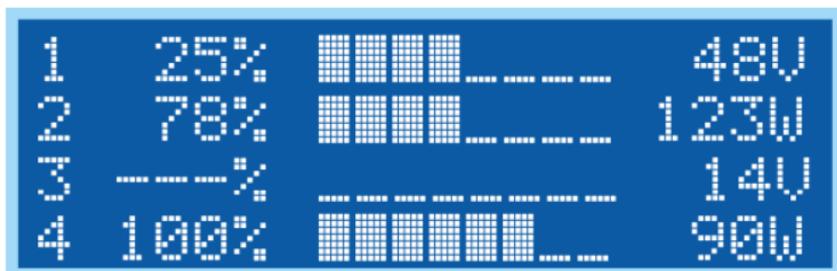
- Powerful 28V/48V selectable @ 20A/10A and 14V/24A continuous output capability
- High speed charging of 4 batteries simultaneously at 4A (65W)
- Heavy duty, water resistant, rugged design. Ideal for harsh outdoor environments
- 5V twin USB output for charging mobile devices
- Sophisticated internal electronics with highly efficient DC-DC converters and the acclaimed BLUESHAPE 'QUICKCHANGER' technology featuring on all 4 channels for hot swapping of batteries.
- Can operate with as little as one battery on board (though not recommended since the unit will not be able to reach its full performance capabilities)
- Accurate data display obtained by the direct dialogue between unit and the batteries (BLUESHAPE batteries only)
- Data communication outlet (useful for firmware upgrades/testing and calibration purposes at factory or even for future user software applications)

## Interpretation of the Display

Upon switch on (at least one battery on any channel must be present), the display lights up, showing the installed Firmware versions.

From then onwards, the screen will interchange between 2 different data displays. The interval between screen interchanges is approximately 3 seconds.

The first screen will display as follows:



**1**

**2**

**3**

**4**

Column #1	Battery no. (1 through 4) An asterisk is shown when batteries are not communicating with the unit
Column #2	Battery remaining capacity in percentage (100%=full, 0%=empty)
Column #3	8 bar current contribution meter The bars represent the PERCENTAGE contribution of the channel versus a maximum possible of 10A for that channel
Column #4	Actual power mode selected, 28V/48V and power outputs for 24V/48V and 14V supplies simultaneously

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The state of charge of each installed battery is shown in percentage. When BLUESHAPE batteries are powering the unit, this value is very accurate and is read and updated in real time through the dialogue between the battery and the unit since they are using the same protocol. It therefore represents a true value of the remaining capacity.

When 3rd party batteries are in use, the capacity value may not be as accurate since this is an estimation that unit makes based on the battery voltage

The second screen will display as follows:

1	15.45V	2.65A	48V
2	15.80V	2.50A	123W
3	-----	----	14V
4	16.50V	0.88A	90W

**1**
**2**
**3**
**4**

Column #1	Battery no. (1 through 4) An asterisk is shown when batteries are not communicating with the unit
Column #2	Battery Voltage
Column #3	Current demand per battery
Column #4	Actual power mode selected, 28V/48V and power outputs for 24V/48V and 14V supplies simultaneously

**Notes:**

1. If an on-board battery is:  
 < 10% state-of-charge (for battery types that are communicative)  
 or

Its voltage is less than 13 Volts (for batteries that do not communicate

then,

column 2 flashes in the appropriate row of the battery in caption

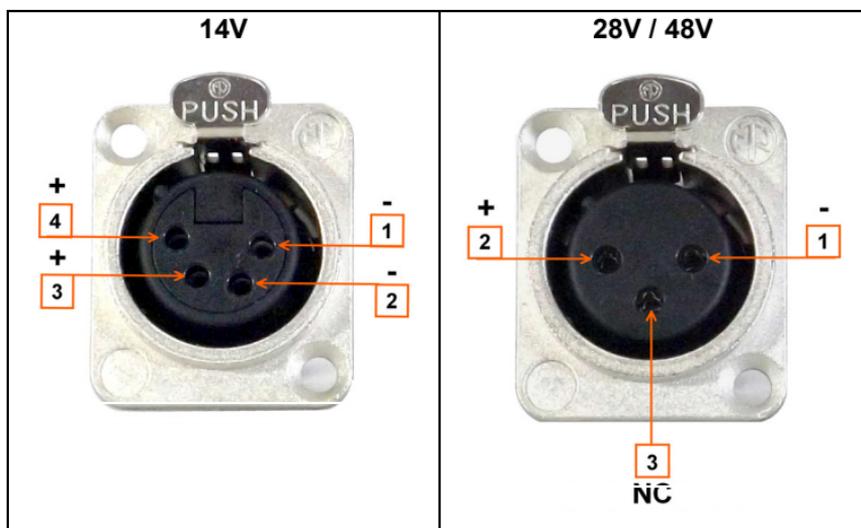
2. If a battery on any station is missing (not installed), the appropriate row will show blanks.

The above is applicable for both screen 1 and screen 2.

## Usage with BLUESHAPE batteries

PWS-RUGGED Recommendations							
BATTERY MODEL	Capacity (Wh)	Max. Discharge (A)	Recommended 1 = least 5 = most				
			1	2	3	4	5
<b>BV095 Mini</b>	65Wh	7A	<input checked="" type="checkbox"/>				
<b>BV090</b>	90Wh	7A		<input checked="" type="checkbox"/>			
<b>BV100HDplus</b>	100Wh	20A				<input checked="" type="checkbox"/>	
<b>BV140 Mini</b>	140Wh	12A				<input checked="" type="checkbox"/>	
<b>BV150</b>	150Wh	9A			<input checked="" type="checkbox"/>		
<b>BV180</b>	180Wh	9A			<input checked="" type="checkbox"/>		
<b>BV190HDplus</b>	190Wh	20A					<input checked="" type="checkbox"/>
<b>BV270HD</b>	270Wh	12A					<input checked="" type="checkbox"/>
<b>BV290HDplus</b>	290Wh	20A					<input checked="" type="checkbox"/>

## XLR Polarity



### Accessories

A number of cable accessories are available for connecting the PWS-RUGGED with the most popular cameras on the market.

Examples:

PWC33: XLR 3 pole to XLR 3 pole

PWC34: XLR 3 pole to XLR 4 pole

PWC44: XLR 4 pole to XLR 4 pole

PWCAL: XLR 3 pole to Fisher 2 pole for ARRI® ALEXA

Please visit the BLUESHAPE website for more details:

[www.blueshape.net](http://www.blueshape.net)



**PLEASE NOTE THAT THE MAXIMUM OUTPUT POSSIBILITY IS SHARED BETWEEN THE TWIN XLRs FOR EACH OUTPUT VOLTAGE**

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- The maximum power output for the 48V supply is 560W total
- The maximum power output for the 28V supply is 560W total
- The maximum power output for the 14V supply is 340W total

CE certification is pending.

## Technical specifications:

Parameter	Value
Charging section	4 x 16.7V/65W charging units
Charging type	simultaneous
AC	110V to 240V , 50/60Hz
Power Source	Uninterruptable by battery hot swapping
Output Voltage #1	48V (selectable) +/- 3% on no load
Outlet [external]	2 x 3pin female XLR
Maximum output #1	560W (outputs from both 48V XLRs combined)
Output Voltage #2	28V (selectable) +/- 5% on no load
Outlet [external]	2 x 3pin female XLR
Maximum output #2	560W (outputs from both 28V XLRs combined)
Output Voltage #3	14V (always available) +/- 5% on no load
Outlet [external]	2 x 4pin female XLR
Maximum output #3	340W (outputs from both 14V XLRs combined)
Output Voltage #4	5V (always available)
Outlet [internal]	Twin USB socket
Maximum output #4	15W (3A) total output
Over current protection of outputs	Available on all outlets
Short circuit protection of outputs	Available on all outlets
Over temperature protection	Available
Display	20 column x 4 rows backlit white characters/ blue background
Number of battery positions (channels)	4 (1 to 4)
Position type	Hot-swappable on all 4 channels
Conversion efficiency of DC-DC converters	>= 90%
Operating temperature range	0°C - 50°C (32°F - 122°F)
Storage temperature range	-20°C - 65°C (-4°F - 149°F)
Operating/Storage humidity	5% to 90% RH
Dimensions	434 x 371 x 193 mm (17.09" x 14.61" x 7.60")
Weight	5.5 Kg (12.13 lbs) excluding batteries

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## Warranty

BLUESHAPE Power Stations are warranted to be free from defects in materials, workmanship and functionality for a period of 18 months commencing from the date of purchase.

This warranty shall not apply to any products or parts of, that have been subjected to misuse, negligence, accidental or abnormal conditions of operation.

The buyer should always contact the place of purchase for any return of defective product. It is important that the buyer provides us with as much information as possible about the failure being claimed.

In the event of product failure for which warranty applies, we will repair or replace the product free of charge. In these cases, all expenses including transport charges will be borne by us.

In the case where the failure has been caused by one of the causes explained above, repairs should be billed at a nominal cost. Prior to the carrying out of any repairs, we will inform the customer of the estimated costs of these repairs.

These warranty conditions are the only ones applicable to our products and overrule any other expressed or implied warranties. We shall not be held liable for any damages resulting from warranty statements other than those contained in this declaration.

In all warranty claims, the buyer must reproduce the original purchase invoice.



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VIA LIGURIA 4-6,  
42124 REGGIO EMILIA, ITALY  
TEL. +39 0522 518556  
FAX. +39 0522 277084  
WEB: [www.blueshape.net](http://www.blueshape.net)  
EMAIL: [info@blueshape.net](mailto:info@blueshape.net)