



## TECHNICAL WHITE PAPER

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# HP VR BACKPACK BATTERY & LED WHITEPAPER

Drive through the most demanding immersive workflows with the ultimate machine for VR creation and consumption in the HP VR Backpack. This powerful and wearable PC delivers the full resolution and framerates of the HP Reverb VR Headset with the latest NVIDIA® GeForce® graphics to fully immerse the user in the experience. Plus, with upgraded ergonomics users can enjoy full range of motion in comfort with no distractions. This highly versatile backpack when docked or VESA mounted also acts as a powerful super slim desktop that is ready for intensive design work making it a one stop shop for VR creators to design and experience VR.



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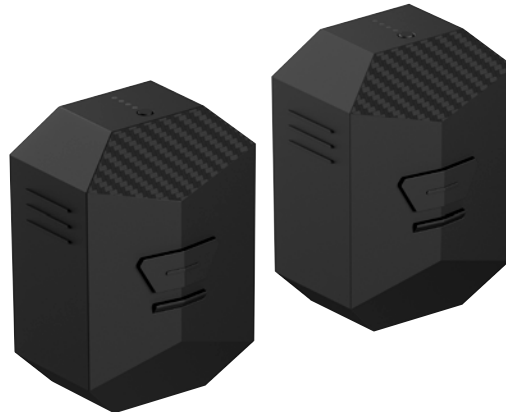
## BATTERY/LED BEHAVIOR



The HP VR Backpack brings mobility to VR experiences thanks to its innovative power and battery solution designed specifically for free roam VR. While docked, the HP VR Backpack utilizes a 330W Smart AC adapter to handle a professional creation workload. When the HP VR Backpack is mounted on the wearable harness, it relies on the two external 73 WHr batteries powering the VR experience.

## TWO HOT-SWAPPABLE EXTERNAL BATTERIES

The HP VR Backpack requires two external 73 WHr 8-cell Lithium Ion Batteries for full professional VR performance. The batteries have four LED indicators for a visual cue of current battery charge level. With the convenient placement of the battery holders, the two external batteries can be replaced without having to take off the backpack or shutting down applications.<sup>1</sup>



A double battery charger is included to charge two external batteries at a time. The approximate charge time for the external batteries are:

- 80% charge in approximately 1 hour
- 100% charge in approximately 2 hours

The external batteries can be charged on the charger from any charge level and can be left on the charger for extended periods of time beyond what is needed to charge to full.



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## INTERNAL PC BATTERY

The HP VR Backpack is equipped with an internal 4-cell Lithium Ion Battery (36 WHr) enabling the user to hot swap the external batteries without losing power to help ensure an uninterrupted PC operation. Once the external batteries are removed or run out of power this internal battery is used to keep the PC operating, although performance of the system is throttled and degradation of a VR experience may be seen when running on the internal battery – it is only intended to enable the hot swap to charged external batteries, not to extend the runtime of VR experiences. In general, the internal battery can maintain approximately an hour of throttled runtime without needing to be charged.

## BATTERY MANAGEMENT AND BATTERY CHARGE LEVEL INDICATORS

The HP VR Backpack uses the LED HP logo and LED light bar located on the PC unit top to report the status of the internal and external battery charge levels. These LEDs are shown below.

For maximum performance while in battery operation mode, the external batteries must be charged. If they have no power remaining and the system is running on its internal PC battery as indicated by the PC LEDs, the VR experience will quickly become suboptimal and compromised if the external batteries are not swapped with charged batteries.



## PC LED BATTERY REPORTING BEHAVIOR

1. When the AVERAGE battery charge level of the internal AND external batteries is above 12%, both the HP logo and Light Bar will be solid ON and WHITE. This behavior can be overridden by user control to display custom behavior.
2. When the AVERAGE battery charge level of the internal AND external batteries falls to 12% or below, both the HP logo and Light Bar will turn YELLOW. This behavior cannot be overridden and will continue until the external batteries are replaced, or until the PC unit runs out of all battery power.



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# EXTERNAL BATTERY LED REPORTING BEHAVIOR

The external batteries for the HP VR Backpack have 4 LEDs that indicate charge level, as seen below.



The below table describes the behavior of these LEDs in relation to charge level:

Power Level	LED1	LED2	LED3	LED4
<25% (0%~24%)	ON	OFF	OFF	OFF
<50% (25%~49%)	ON	ON	OFF	OFF
<75% (50%~74%)	ON	ON	ON	OFF
≥ 75% (75%~100%)	ON	ON	ON	ON

## LIGHTING CONTROL

The HP VR Backpack Lighting Utility can be used to control the LED brightness as well as the color of the HP logo and bar on the face of the HP VR Backpack.

With administrator rights, the LED lighting on the HP VR Backpack can be controlled using this lighting application.

The backpack has two different lighting zones:

**Zone 1** – HP Logo

**Zone 2** – Vertical bar

You can set each zone to have a different color, if desired.



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To use the program, it must be accessed through a Windows command prompt.

#### Usage:

```
HPZVRBackpackLightingUtility.exe (<r g b br>) [<r g b br>]
```

#### Examples:

##### Set both zones to red:

```
HPZVRBackpackLightingUtility.exe 255 0 0 100
```

##### Set both zones to full brightness:

```
HPZVRBackpackLightingUtility.exe 255 255 255 100
```

##### Set zone 1 to red, set zone 2 to blue:

```
HPZVRBackpackLightingUtility.exe 255 0 0 100 0 0 255 100
```

##### Set zone 1 to blue, turn zone 2 off:

```
HPZVRBackpackLightingUtility.exe 0 0 255 100 255 255 255 0
```

##### Set both zones to half brightness:

```
HPZVRBackpackLightingUtility.exe 50
```

##### Set zone 1 to full brightness, set zone 2 to half brightness:

```
HPZVRBackpackLightingUtility.exe 100 50
```

##### Turn off lighting:

```
HPZVRBackpackLightingUtility.exe 0
```

##### Set to default lighting:

```
HPZVRBackpackLightingUtility.exe default
```

##### Restore to previous lighting:

```
HPZVRBackpackLightingUtility.exe
```

The program is invoked with color and brightness values for its arguments. A color is specified as the three-color channels that make up the color. The three channels are red, green, and blue (RGB). Each color channel should have a value in the range of 0-255, inclusive. Each channel should be separated by a space. The brightness should have a value in the range of 0-100, inclusive. If one color set is given, it applies to both zones. If two color sets are given, then the first color applies to the first zone and the second color applies to the second zone. The brightness values can be provided without the RGB values.

When this command is used, the lighting setting is stored. If no argument is given, the last given input is applied. The values may be restored retrieved between reboots and log-in/log-off. Each user account will store its own last-used setting, but the program must be invoked manually to trigger the lighting to be set.

**Note:** On HP Z VR Backpack G1 Workstation, only brightness can be set. RGB inputs will be converted to brightness values and optionally combined with an input brightness value.

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<sup>1</sup>Together they provide power for up to 1 hour of high-performance VR.

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