

INTELLIGENT POWER VAULT

MULTI-BATTERY POWER SOURCE
FROM ACCUTRONICS

The logo for entellion features the word "entellion" in a bold, sans-serif font. The letters "e", "n", "t", "e", "l", "l", "i", and "o" are purple, while the "n" at the end is black and contains a white stylized battery symbol. Below the main text, the tagline "pre engineered power solutions" is written in a smaller, grey, lowercase sans-serif font. The background of the logo area consists of several overlapping, wavy lines in shades of purple and blue, creating a sense of motion and energy.

entellion
pre engineered power solutions

Entellion products are smart, innovative portable power products, designed to meet the emerging needs of feature-laden devices in professional markets. Created and manufactured by Accutronics, Entellion combines our expertise in custom OEM battery products with our understanding of professional OEM requirements and market trends. Entellion products are available off the shelf and can also be customised for your application, getting you to market quickly and confidently.

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INTELLIGENT POWER VAULT MULTI-BATTERY POWER SOURCE

UNLOCKING THE POWER OF LITHIUM ION

The Intelligent Power Vault is a multi-battery power source that incorporates the latest Lithium Ion smart battery technology, intelligent charging circuitry and efficient regulated power control in a high energy, rechargeable battery system that is easily designed into professional transportable & power backup devices across medical and industrial markets.

The innovative use of modular VR420 'cartridge' batteries allows for simple fitting and removal. 'Hot swapping' is also possible for when runtime on batteries needs to be extended. Available in configurations accepting two, four, six or eight batteries and storing up to 714Wh, the Intelligent Power Vault is the ideal rechargeable source for mission critical devices.



The innovative use of modular VR420 'cartridge' batteries allows for simple fitting and removal



536Wh 'IPV06' installed in a medical workstation



TRANSPORTATION: A SIMPLE SOLUTION

International regulations impose restrictions on the transportation of Lithium Ion batteries, with additional restrictions imposed on those capable of storing >100Wh. These additional restrictions increase both shipping time and cost.

A >100Wh lithium Ion battery must be consigned as class 9 dangerous goods, regardless of whether it is packed alone, packed with, or contained within equipment. The shipper must also be dangerous goods certified, which adds further complexity throughout the supply chain.

The Intelligent Power Vault simplifies the transportation problem - it is easier to ship across various modes of transport because its Lithium Ion batteries are <100Wh, modular and removable.

For example, when shipping by air, the Intelligent Power Vault is classed as 'equipment' and can be packed along with its VR420 batteries (and up to two spares) under section II of packing instruction 966 (UN3481). A shipper's declaration of dangerous goods is not required and the shipper needs only limited training.



“ Its simple to ship across various modes of transport ”

OUTPUT OPTIONS

When external DC is supplied to the Intelligent Power Vault this is passed through to the output, with excess energy used to charge the batteries.

When the external supply is removed or fails, the Intelligent Power Vault instantly draws power from the batteries and passes it to the output, either as raw battery power or as a regulated supply.

ENERGY

The Intelligent Power Vault has a gravimetric energy density two and a half times greater than that of lead acid batteries - this makes it the ideal choice for transportable applications, where the weight of lead acid batteries makes equipment difficult to move.

MOUNTING OPTIONS

The Intelligent Power Vault can be mounted in any direction, with mounting brackets available for screw fixing.

CUSTOMISATION

The Intelligent Power Vault and VR420 batteries can be specially customised to suit a particular customer requirement. Customisation includes labelling, programming, regulatory approval and mounting options.



Example: IPV08 fitted with eight VR420A batteries

VR420

At the heart of the Intelligent Power Vault is the Entellion 'VR420', a compact, rechargeable Lithium Ion smart battery that has been specifically designed with energy density, functionality and safety in mind. Each VR420 is SMBus and SBS Rev 1.1 compliant and meets the requirements of ST/SG/AC.10.11 Rev5 (transportation), UL2054 and IEC 62133 (safety).

Each installed VR420 battery communicates with the smart charging circuitry and control module inside the Intelligent Power Vault, requesting voltage and current when charging is required and providing runtime information when being discharged. The Intelligent Power Vault manages the charge and discharge of up

to eight VR420 batteries, ensuring safe and efficient operation at all times.

The VR420 features a push button activated 5-Bar LED visual state of charge indicator, that allows the user to easily distinguish between charged and discharged batteries when they are separated from the Intelligent Power Vault.



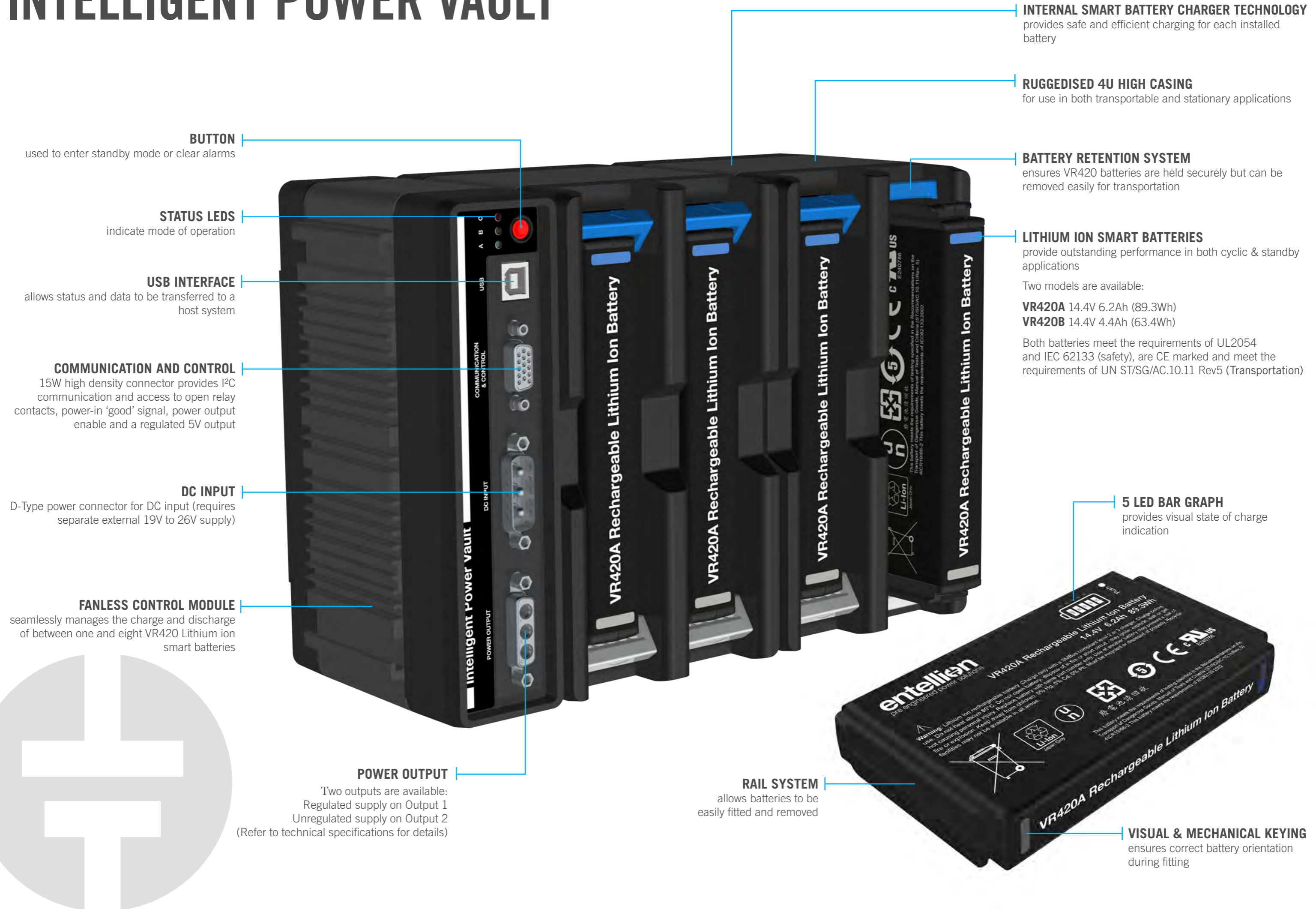
VR420A

Two versions of the VR420 battery are available depending on application requirements:

VR420A is rated at 14.4V and has a capacity of 6.2Ah (89.3Wh). This 6.2A capable version provides the longest runtime and is suitable for applications with lower ambient temperatures.

VR420B is also rated at 14.4V and has a capacity of 4.4Ah (63.4Wh). This 8.0A capable version is suited to applications with higher ambient temperatures or when runtime is less critical.

INTELLIGENT POWER VAULT



INTERNAL SMART BATTERY CHARGER TECHNOLOGY
provides safe and efficient charging for each installed battery

RUGGEDISED 4U HIGH CASING
for use in both transportable and stationary applications

BATTERY RETENTION SYSTEM
ensures VR420 batteries are held securely but can be removed easily for transportation

LITHIUM ION SMART BATTERIES
provide outstanding performance in both cyclic & standby applications

Two models are available:

VR420A 14.4V 6.2Ah (89.3Wh)

VR420B 14.4V 4.4Ah (63.4Wh)

Both batteries meet the requirements of UL2054 and IEC 62133 (safety), are CE marked and meet the requirements of UN ST/SG/AC.10.11 Rev5 (Transportation)

BUTTON

used to enter standby mode or clear alarms

STATUS LEDS

indicate mode of operation

USB INTERFACE

allows status and data to be transferred to a host system

COMMUNICATION AND CONTROL

15W high density connector provides I²C communication and access to open relay contacts, power-in 'good' signal, power output enable and a regulated 5V output

DC INPUT

D-Type power connector for DC input (requires separate external 19V to 26V supply)

FANLESS CONTROL MODULE

seamlessly manages the charge and discharge of between one and eight VR420 Lithium ion smart batteries

POWER OUTPUT

Two outputs are available:
Regulated supply on Output 1
Unregulated supply on Output 2
(Refer to technical specifications for details)

RAIL SYSTEM

allows batteries to be easily fitted and removed

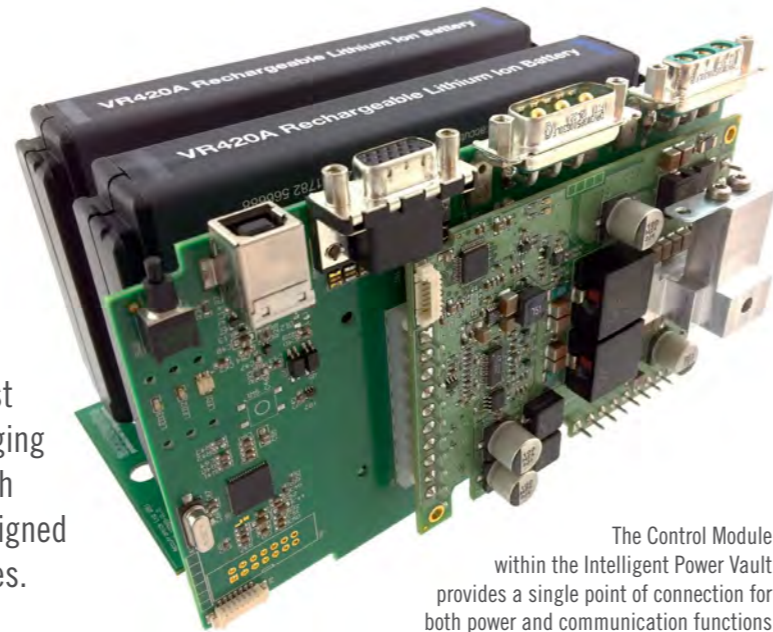
5 LED BAR GRAPH

provides visual state of charge indication

VISUAL & MECHANICAL KEYING

ensures correct battery orientation during fitting

ITS ALL IN THE DETAIL



The Control Module within the Intelligent Power Vault provides a single point of connection for both power and communication functions

This multi-battery power source incorporates the latest Lithium-ion smart battery technology, intelligent charging circuitry and efficient regulated power control in a high energy, rechargeable battery system that is easily designed into professional transportable & power backup devices.

COMMUNICATION & CONTROL

Host devices can communicate with the Intelligent Power Vault via USB. The following information can be obtained:

- Manufacturer name
- Part number
- Design capacity
- Software version
- Hardware version
- Manufacture date
- Serial number
- Input raw voltage (mV)
- Raw current (mA)
- Regulated voltage (mV)
- Regulated current (mA)
- Relative state of charge (%)
- Remaining capacity (mAh)
- Full charge capacity (mAh)
- Run time to empty (mins)
- Run time to full (mins)
- Status
- Alarms
- DC input current (mA)
- System population
- Host override

Three LEDs on the front of the Intelligent Power Vault control module show if external DC is present, if the system is in standby or active modes, if the batteries are being charged or if they are being discharged.

An 'always on' 5V (180mA max) supply is available via the communication and control connector. This supply is available in both standby and active modes and allows you to feed power to your equipment, in order for you to make a software startup of your system.

The Intelligent Power Vault provides an open drain output and an open relay contact which are activated when a low capacity alarm or a general alarm is broadcast. These useful outputs can be used to drive external circuitry if required.

POWER SUPPLY

The Intelligent Power Vault requires an external 19V to 26V DC supply. This supply is passed through to power host equipment with excess energy being used to charge the VR420 batteries. The rating of the supply depends on the power requirements of the output, the number of VR420 batteries installed and the desired charge time. Please contact us to discuss these requirements.

REGULATORY APPROVAL

The Intelligent Power Vault is certified to UL/IEC 60950-1 (safety). Each VR420 battery is SMBus- and SBS Rev1.1 compliant and meets the requirements of UN ST/SG/AC.10.11 Rev5 (transportation), UL2054 and IEC 62133 (safety).

SOFTWARE / APPLICATION SUPPORT

Demonstration software is available to get you communicating with the Intelligent Power Vault quickly and easily. Our application support enables you to design your own applications with minimal effort.



TECHNICAL SPECIFICATIONS



MADE IN THE UK

The Intelligent Power Vault and VR420 batteries are designed and assembled in the United Kingdom by Accutronics Ltd.

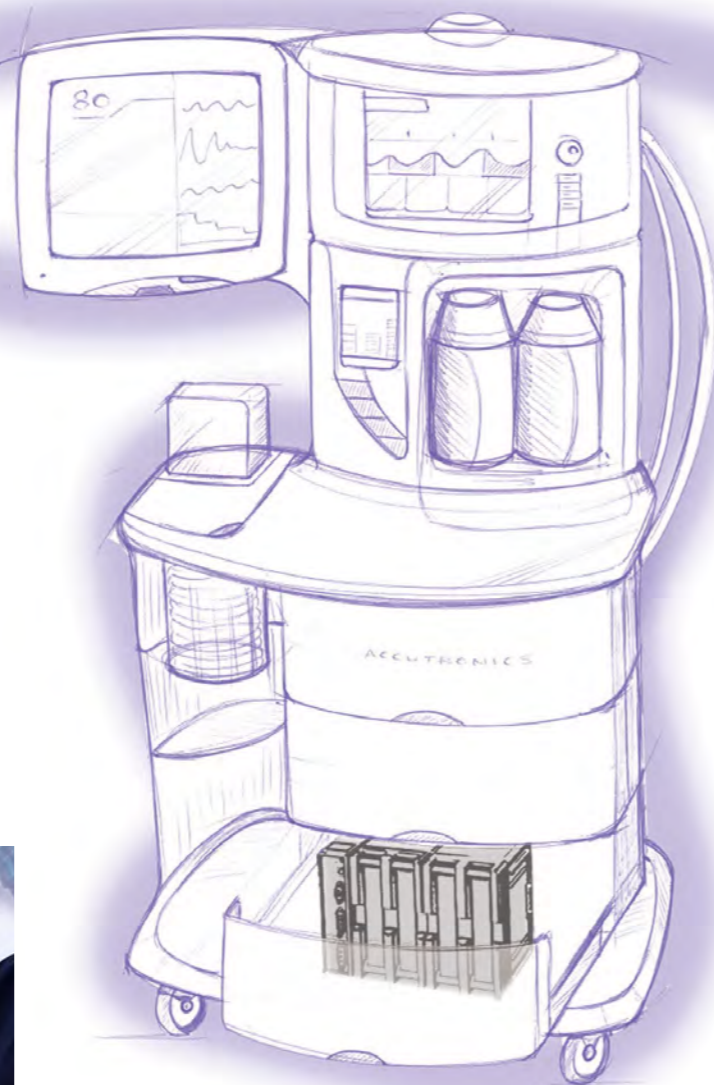
IPV MECHANICAL SPECIFICATIONS		IPV02	IPV04	IPV06	IPV08
Batteries		2	4	6	8
Width		152.1mm (5.988")	248.6mm (9.787")	345.1mm (13.586")	441.6mm (17.385")
Height		176.0mm (6.929")			
Depth		110.0mm (4.330")			
Weight	Without Batteries	1.575Kg (3.472lb)	2.450Kg (5.401lb)	3.325Kg (7.330lb)	4.200Kg (9.259lb)
	With Batteries	2.515Kg (5.544lb)	4.330Kg (9.546lb)	6.145Kg (13.547lb)	7.960Kg (17.548lb)
19" Rack Option		No			Yes

IPV ELECTRICAL SPECIFICATIONS		IPV02	IPV04	IPV06	IPV08
Batteries		2	4	6	8
Stored Energy (Wh)	VR420A	179	357	536	714
	VR420B	127	254	380	507
Input		24V typical (19V to 26V)			
Output	Output 1 (Regulated)	Regulated output fed from an internal boost convertor. The convertor is factory set to between 19V & 26V. The higher of (a) the regulated output or (b) the input supply is available on Output 1. Excess energy is used to charge the internal batteries. If the input supply is removed or fails the Intelligent Power Vault switches to battery power & the regulated output is available on Output 1 until all installed batteries are discharged. The maximum current available from this output is 10A but is dependent on the number of batteries installed and their state of charge.			
	Output 2 (Unregulated)	Unregulated output. The input supply is passed through to Output 2. If the input supply is removed or fails then the Intelligent Power Vault switches to battery power (between 12.0V and 16.8V) & this is available until all installed batteries are discharged. The maximum current available from this output is 10A but is dependent on the number of batteries installed and their state of charge.			

VR420 BATTERY SPECIFICATIONS		VR420A	VR420B
Operating Voltage		V(Maximum) = 16.8V V(Typical) = 14.4V V(Cut-off) = 9.6V	
Rated Capacity		6200mAh (Typical) / 5580mAh (Minimum)	4400mAh (Typical) / 3960mAh (Minimum)
Rated Energy		89.3Wh (Typical)	63.4Wh (Typical)
Charge Voltage / Current		16.8V / 3A	16.8V / 4A
Discharge Current		6.2A Maximum	8.0A Maximum
Environmental Temperature	Charge	0°C to +45°C (with limited charging permitted between +45°C and +53°C)	
	Discharge	-20°C to +60°C (performance is reduced at low temperatures)	
	Storage	-20°C to +60°C (Storage is optimised between +5°C and +25°C)	
Dimensions		152.0mm (5.984") x 87.9mm (3.460") x 22.8mm (0.897") typical	
Weight		470g (1.036lb) typical	
Fuel Gauge		SMBus & SBS Rev1.1 compliant impedance tracking fuel gauge	
Safety Certification		IEC 62133 & UL2054	
Transportation Certification		ST/SG/AC.10.11 Rev 5	
CE		EMC Directive 2004/108/EC and EN62104-3:2001	

TYPICAL APPLICATIONS

- Automated laboratory equipment
- Dental scanning
- Acute ventilators
- Anaesthesia workstations
- Embedded computing devices
- Medical workstations
- Patient monitoring systems
- In Flight Entertainment WiFi
- Organ Transportation



When specified for use in an acute ventilator or anaesthesia machine, the UPS function of the Intelligent Power Vault means that power is assured if mains AC is interrupted.



MADE IN THE UK

The Intelligent Power Vault and VR420 batteries are designed and assembled in the United Kingdom by Accutronics Ltd.










The Intelligent Power Vault can power aircraft WiFi systems for long haul flights without connection to aircraft systems



The Intelligent Power Vault allows medical carts to be made lighter and more portable than those using heavy lead acid batteries.

ACCESSORIES

AK001	15 PIN D CONNECTOR KIT
	<p>AK001 comprises of a 15 pin male D connector, plastic shell, twin thumb screws, cable clamp and screws. It mates with the female communication and control connector on the control module of the Intelligent Power Vault. Customers may use this part to create their own custom wiring harnesses. Connections to the D connector are made via solder buckets.</p>
AK002	3 PIN INPUT CONNECTOR KIT
	<p>AK002 is a 3-way D-Sub connector kit for the Intelligent Power Vault. AK002 is supplied as two parts - the connector body and the plastic shell which is supplied with thumb screws and cable clamp. AK002 can be used by customers who want to make their own DC input lead for their Intelligent Power Vault.</p>
AK003	3 PIN OUTPUT CONNECTOR
	<p>AK003 is a 3-way D-Sub connector kit for the Intelligent Power Vault. AK002 is supplied as two parts - the connector body and the plastic shell which is supplied with thumb screws and cable clamp. AK003 can be used by customers who want to make their own DC output lead for their Intelligent Power Vault.</p>
AK004	15 PIN ENABLE DONGLE WITH FLYING LEAD
	<p>AK004 is a 15-way D-Sub connector and cable assembly for the Intelligent Power Vault. Internally, DC_IN_PG is connected to 5V_SB which indicates to the Intelligent Power Vault that a valid input power supply is connected. The 750mm flying lead is terminated in two wires which are internally connected to ENABLE_IPV and 5V_SB. Once AK004 is connected to the Intelligent Power Vault, connecting the two wires (by means of a switch) will enable the output.</p>
AK005	19VDC 250W DESKTOP PSU
	<p>AK005 is a 19V 250W desktop power supply which is suitable for powering the Intelligent Power Vault. The input to the AK005 is 80-264VAC via a standard IEC connector (available separately). The output connector is a D-Sub combo receptacle which mates with the input connector on the Intelligent Power Vault. Note that the power requirements for the Intelligent Power Vault depend on the number of batteries in the system and the amount of power required in pass-through mode. Please contact us to discuss your requirements.</p>
AK006	OUTPUT CABLE WITH DC BARREL CONNECTOR
	<p>AK006 is a DC output cable for the Intelligent Power Vault. At one end, a mixed D-sub connector allows connection to the DC output connector on the Intelligent Power Vault control module. At the other end, a DC barrel connector allows connection to a host device. The DC barrel has an internal diameter of 2.5mm (positive) and an outside diameter of 5.5mm (negative). The overall length of the assembly is 520mm.</p>
AK007	IPV ENABLE DONGLE
	<p>AK007 is a 15-way D-Sub connector dongle for the Intelligent Power Vault. Internally, 5V_SB is connected to both DC_IN_PG and ENABLE_IPV. These internal connections tell the Intelligent Power Vault that a valid input supply is available and command it to enable its output.</p>

- Specification details are correct at the time of printing.
- For the latest data please refer to published specifications which are available on our website at www.accutronics.com
- ACCUTRONICS and ENTELLION are European Community registered trade marks of Accutronics Ltd
- The Intelligent Power Vault is a registered design (Reg No. 002311787-0001)
- Operator & regional variations may apply to the transport of Lithium Ion batteries. Check with your operator.

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**Battery
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