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CSU-20 Central Service Unit



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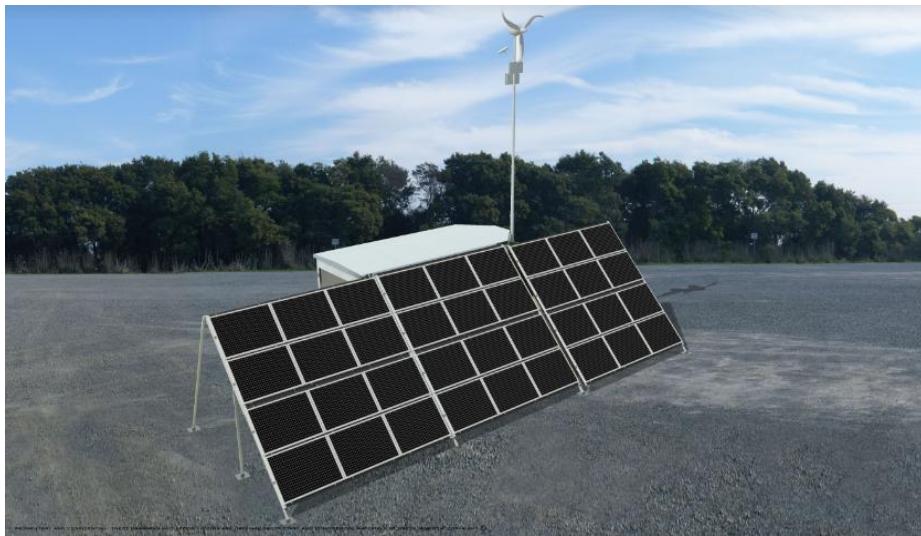
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The Central Service Unit (CSU-20) is built using our patented folding/expansion technology. The CSU-20 was designed for remote station deployment to provide power generation, and communications and monitoring/security capabilities for any situation requiring power on-demand in urban or remote areas. Also, the CSU-20 ships behind a 1-ton truck for quick mobility and efficiently packaged to contain a complete power solution.



Once deployed, in less than two hours, the solar array produces approximately 8,640 watts of power to complement the energy produced by the GenSet, Hydrogen Fuel Cell, and wind turbines.





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CSU-20-HFC

Hydrogen Fuel Cell technology solution



CSU-20-GS

GenSet technology solution





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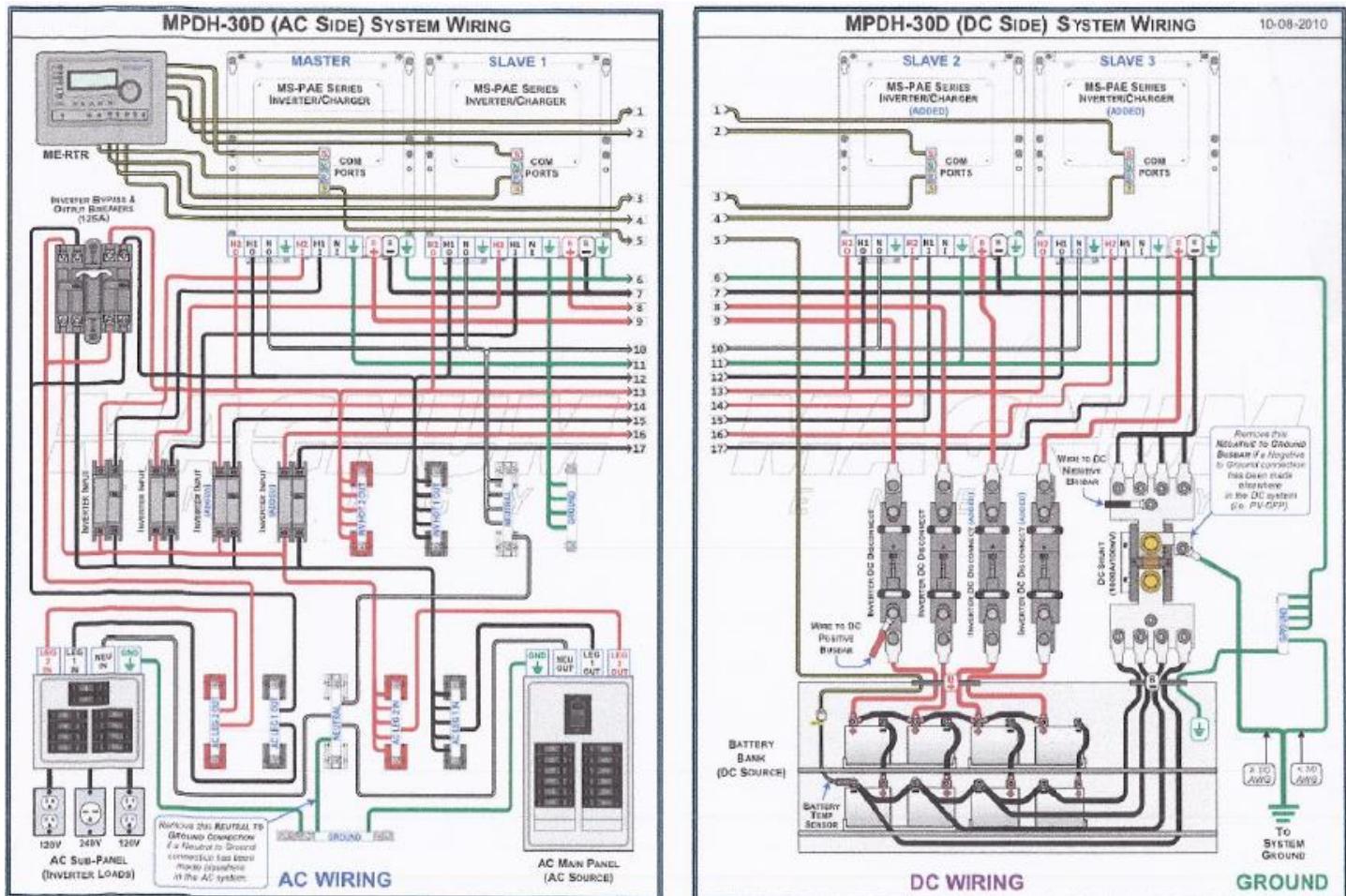
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The Central Service Unit (CSU) was designed for remote station power deployment to provide power generation, communications and monitoring/security when standard services are interrupted or non-existent.

Once on-site the CSU uses a hydraulic self-leveling equalization system for deploying the support legs, extending the solar panels to optimal sunlight exposure, and leveling the CSU. Once secured in place with a cross-anchoring system the CSU can withstand winds up to 150 mph

The physical design characteristics of the CSU-20-GS compared to most other systems allows deployment of multiple applications where square footage is scarce or expensive. The CSU-20-GS can be used for military applications, first responders, and telecommunication switching locations across different voltage requirements. Providing both extended power and frequency regulation allow the CSU to be used in industrial, telecommunications, schools and medical center applications that require clean power and no power outages.





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Power grid efficiency and reliability help improve utilization and performance of existing power and central generation for utilities.

As a power center the CSU-20-GS eliminates short duration outages through parallel storage. It also eliminates a number of power performance issues including those that occur with wide area restarts. Also, extended run time capability in remote areas can assist power providers in repurposing energy as it comes back online after outages,



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advanced energy storage solutions

U-Charge® XP

Battery Modules

U-Charge® XP is a range of 12, 18 & 36 volt Lithium Iron Magnesium Phosphate battery modules, offering intrinsic safety with twice the run-time and less than half the weight of similar sized lead-acid battery modules.

Overview

U-Charge® XP includes one ideal when Advanced Energy Systems are required. Excellent float and cycle life with zero maintenance offers end-users significant cost of ownership savings and complete peace of mind, through safety inherent in Valence Lithium Phosphate chemistry. Tens of thousand U-Charge® systems have been deployed in a range of equipment since 2002.

The U-Charge® XP Battery Management System is also designed to offer excellent command and control functionality (including remote monitoring) when coupled with U-Charge® XP Battery Modules.

Valences monitoring and diagnostic kits are also available enabling system data recording and detailed performance status indicators.



Features

- ⊕ 3900 cycles at 100% DOD
- ⊕ Exceptional voltage stability
- ⊕ Application voltages from 12V - 700V
- ⊕ Maintenance free
- ⊕ Inter module balancing
- ⊕ Can be charged using most standard lead-acid chargers
- ⊕ Communication of monitored data via Battery Management System (BMS)
- ⊕ Rugged mechanical design
- ⊕ Flame retardant plastic
- ⊕ LED battery status indicator
- ⊕ Carrying Straps (U24, U27, UEV)
- ⊕ Manufactured in standard BCI sizes

Specifications	U1-12XP	U24-12XP	U27-12XP	UEV-18XP*	U27-36XP
Nominal Module Voltage	12.8 V	12.8 V	12.8 V	19.2 V	38.4 V
Nominal Capacity (C/5, 23°C)	40 Ah	110 Ah	138 Ah	69 Ah	45Ah
Weight (approximate)	8.5 kg	15.8kg	18.5 kg	14.8kg	19.8kg
Dimension Incl. Terminal LxWxH (mm)	197x131x182	280x172x225	306x172x225	260x148x248	306x172x225
BCI Group Number	U1R	Group 24	Group 27	N/A	Group 27
Terminals, Female-Threaded	M8 x 1.0	M8 x 1.25	M8 x 1.25	M8 x 1.25	M8 x 1.25
Specific Energy	79 Wh/kg	69 Wh/kg	81 Wh/kg	89 Wh/kg	91 Wh/kg
Energy Density	110 Wh/l	130 Wh/l	148 Wh/l	124 Wh/l	148 Wh/l
Standard Discharging @ 25°C	Max. Continuous Load Current	80 A	150 A	150 A	120 A
	Peak Load Current (30 sec.)	120 A	300 A	300 A	135 A
	Cut-off Voltage	10V	10V	10 V	15 V
Standard Charging	Max. Charge Voltage	14.8 V	14.8 V	14.8 V	21.6 V
	Rest Voltage	13.8 V	13.8 V	13.8 V	20.7 V
	Charge Time c/2 *	2.5 hrs	2.5 hrs	2.5 hrs	2.5 hrs
DC Internal resistance (max)	16 mΩ	5 mΩ	5 mΩ	10 mΩ	25 mΩ
Equivalent Lithium Content Per Module (g)	48.8	127.98	160.38	121.5	160.38
Part Number	1004434	1004426	1004428	1004431	1005219

* Charging under recommended conditions

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advanced energy storage solutions

Common specifications

Discharge temperature	-10°C to 50°C
Charge temperature	0°C to 45°C
Storage temperature	-40°C to 50°C
Operating humidity	5% to 95%, non-condensing
Water/dust resistance	IP58
Shock and vibration	IEC62133, DIN-VG96 824
Certifications	RoHS Class 2, CE, UL1642 (cells only)
Shipping Classification	UN 3480, Class 9

Accessories

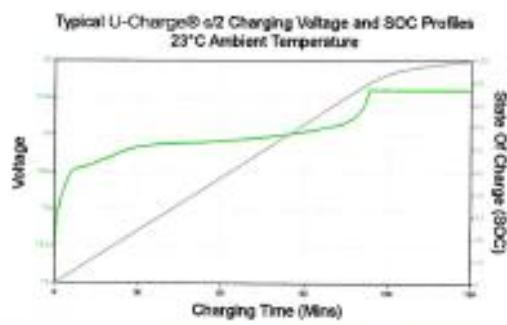
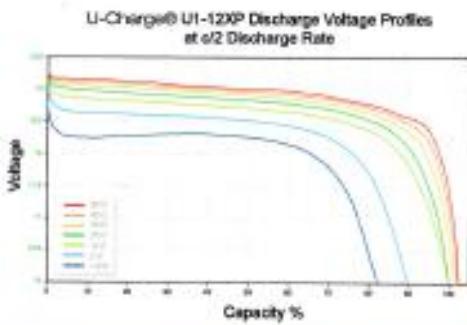
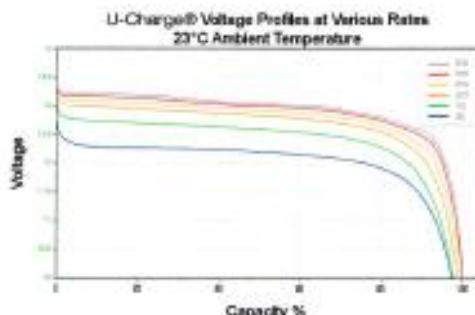
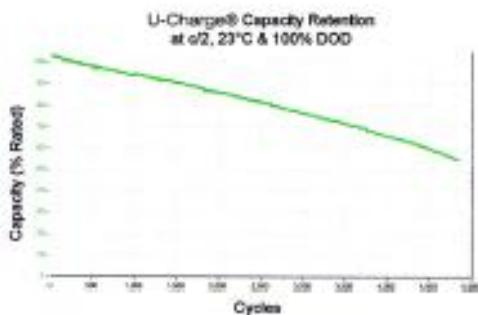
The Battery Management System maintains battery-to-battery balance control, direct control capability for up to four contactors, and monitoring and control of data systems.

- U-BMS-HV operates at 100V - 450V
- U-BMS-LV operates at 10V - 150V
- U-BMS-SHV operates at 350V - 700V



For further information:

Please refer to separate datasheet on U-BMS products or visit www.valence.com



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Tell us about your application at: www.valence.com/cas

July 2011
XP Datasheet



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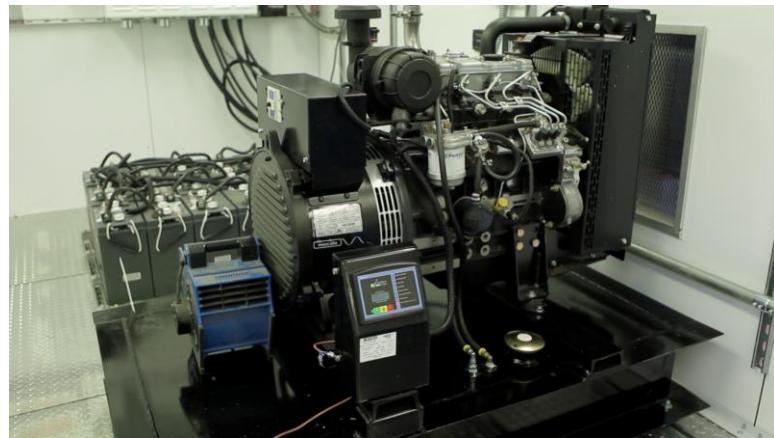
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Optional renewable energy integration components creates an on-demand resource for power that is more valuable and eco-friendly

Once on-site the CSU uses a hydraulic self-leveling equalization system for deploying the support legs, extending the solar panels to optimal sunlight exposure, and leveling the CSU. Once secured in place with a cross-anchoring system the CSU-20-GS can withstand winds up to 120 mph

Scalable

The CSU provides up to 100,000 watts of power with a combined system on the inverter and solar systems when combined with two diesel generators.



The hydrogen fuel cell also provides 5 kW, and up to 15kW, of charge power for the batteries and 18 composite tanks for easy replacement.



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Storage can also reduce the variability of resources and make power generation more predictable. The system has a high power advanced battery cell technology developed for use as storage cells. We merged advanced technologies of several companies to produce a state-of-the-art system that uses:

- system integration technology
- leading power management and controls technology developed by Intelligent Energy
- Green Horizon's state-of-the-art eco-friendly packaging and system development
- Next generation lithium polymer nano-battery technology and cell packaging manufactured in collaboration with Electric Vehicle International and other advanced battery cell technologies.

The CSU-20-GS uses simple plug and play connectivity and do not require installers to wire cell to cell like with traditional lead-acid solutions. The system utilized in conjunction with off the shelf converters supply varying AC and DC outputs. The systems are available for low power, long duration scenarios and high power fast discharge UPS-type applications.

The CSU battery system can contain up to five banks of batteries (9,200 amp hours/bank) to provide up to 46,000 total amp hours of energy. With a combination of new and improved technologies both the residential and commercial distributed power storage system offers break-through performance characteristics including extended cycle life, greater power densities, higher rates of charge/discharge, system efficiency, a smaller footprint and rapid response time.

The communication system has wifi , internet phone and cable. A monitoring/security system is also included. For the voice and cat5e connections the jacks have rubber covers and shrouds that keep the connections rain tight both in and out of use. Both jacks are cat5e rated; one for voice and one for internet. The system also includes a 20' pre-terminated cable that contains rubber shrouds on each end to maintain the rain tight rating.



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Intelligent Energy provides a software system in which the system can be monitored from remote locations. The power can also be regulated thru this system.





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Intelligent Energy and Green Horizon Mfg

Providing the eco-friendly, renewable green solution to those in need

The Green Horizon Mfg proprietary panel system used in the QuickHab allows for multiple expansion and configuration possibilities beyond those used to construct QuickHab. These panels allow Green Horizon Mfg the ability design and construct single, and multi level structures, or connect multiple QuickHab Units together to form larger interior spaces for office areas and sleeping quarters.



Green Horizon is dedicated to green products and uses recycled and recyclable materials. For the materials that are not recycled or recyclable, we seek the highest quality, "greenest" product possible. Each panel used in the CSU-20 and QuickHab is constructed using anti-microbial materials. Therefore, no nutrients are available to support mold or mildew growth and is also formaldehyde/volatile organic compound (VOC) compliant..





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Using CSU technology along with the QuickHab stacked panelized form shipping allows both the CSU20 and QuickHab to be stored for long periods then deployed when the need arises.



The CSU has connections that provide power, communications, and security monitoring for 20 QuickHab housing units (or other units). The system uses a quick connect system that contributes to the rapid deploy nature of the product. The quick connects are both a cord connection and disconnect so this eliminates the need for a separate disconnect. They are also rated to be in use outside in rain and even sitting in puddles.





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CSU 20 Technical Data:

Hydrogen tank capacity	10 kg	Battery capacity	400 Ahr
Number of tanks	16	Battery voltage	12 V
Fuel cell output energy per unit H2	15 kWhrs/kg	Batteries per pack	8
Total hydrogen energy	2400 kWhr	Battery pack capacity	38.4 kWhr
Solar panel power rating	0.4 kW	Battery c-rating for sustained power	1 hr ⁻¹
Solar panel derating	25%	Batter pack power sustained power rating	38.4 kW
Number of solar panels	18	Number of battery packs (packs)	2
Peak solar power	7 kW	Total battery energy storage	76.8 kWhr
Solar panel energy between refills	86.4 kWhr	Total battery power rating	76.8 kW
Inverter sustainable power rating	3.7 kW	Battery + fuel cell peak power	100 kW
Inverter peak power rating	6 kW	Name plate deployment before refill	48.0 hr
Number of inverters	5	Total energy between refills	2486.4 kWhr
Total inverter sustainable power	18.5 kW	Average power between refills	40.5 kW
Total inverter peak power	30 kW	Name plate average power	12.0 kW
Fuel cell module power rating	1.25 kW	Name plate peak power	30.0 kW
Number of fuel cell modules	10	Average power OK	Y
Total fuel cell power	12.5 kW	Peak power OK	Y

Hydrogen tank weight	150.0 kg
Fuel cell module weight	10.0 kg
Solar panel weight	36.0 kg
Inverter weight	50.0 kg
Battery weight	40.0 kg
Total hydrogen weight	80.0 kg
Total hydrogen tank weight	2400.0 kg
Total fuel cell module weight	100.0 kg
Total solar panel weight	648.0 kg
Total inverter weight	250.0 kg
Total battery weight	640.0 kg
Trailer frame weight	681.8 kg
Trailer body weight	454.5 kg
Solar panel frame weight	409.1 kg
Total weight	5663.5 kg
Total weight	12459.6 lb

This analysis is based on data compiled by Intelligent Energy for the CSU-40. Certain assumptions were made to apply this data to the CSU-20