FORTRESS Power
SECURE YOUR ENERGY

WELCOME TO OUR WEBINAR

JULY 16, 2020

Life Is On Schneider Electric

Conext™ XW Pro UL

True grid interactive capability for storage, backup and off-grid applications

Jack Crose

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Life Is On Schneider Electric

Introduction to Schneider Electric and its Solar Portfolio

Complete Family of Accessories

Solar Charge Controllers

Conext™ MPPT 60

Conext™ MPPT 80

Monitoring

Conext™ Gateway

Conext™ Insight 2

Conext™ Battery Monitor

Conext™ XW Pro

Conext™ Disconnect RS

Configuration / Commissioning

Conext™ Config tool

Generator Control

Conext™ AGS

Distribution Panels

Conext ™ PDP

Conext™ Battery Fuse Combiners

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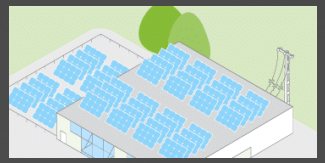
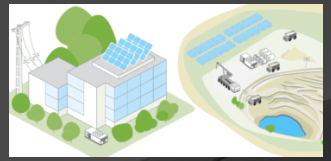
Applications Summary

Commercial & Industrial applications



Grid-tie Solar

Self-consumption with storage



PV-Diesel Hybridization

Microgrids / off-grid

Telecom towers

Residential applications

Residential grid-tie with full home backup

Residential grid-tie with critical load backup

Self-consumption with storage

Residential off-grid

More evolution of the platform you know and love…

Conext™ XW

Released in 2006

- First Inverter 120/240V with dual input in the market
- Pure sine wave inverter/charger
- Single and three phase systems
- Fast transfer time

Conext™ XW+

Released in 2014

- Support for multi-unit and multi-cluster systems
- Support for AC coupling

Conext™ XW Pro

Released in 2019 UL / 2020 IEC

- Designed for evolving grid code requirements
- Li-ion with closed loop integration
- Enhanced AC coupling
- Integrated with Conext™ Gateway & Insight 2

Conext™ XW Pro Specifications

PN 865-6848-21

Conext™ XW Pro 6.8 kW 120/240V	
DC side	
DC maximum output charge current	140 A
DC output charge voltage range	40 – 64 V (48V nominal)
Charge control	Three stage, two stage, boost, external BMS, custom
Compatible battery types	Flooded (default), Gel, AGM, Lithium-ion, custom
AC side	
AC output power (continuous) at 25°C	6800 W
AC overload 30 min/60 sec at 25°C	8500 W/12000 W
Grid Sell power	6000 W
AC frequency (selectable)	50 /60Hz
AC output voltage	120/240 V
Installation	
Operating air temperature range	-25 C to 70 C (power derated above 25C)
Enclosure type	IP 20
Configuration & monitoring	Conext Gateway
AC-coupling	Frequency Shifting

XW Pro Architecture

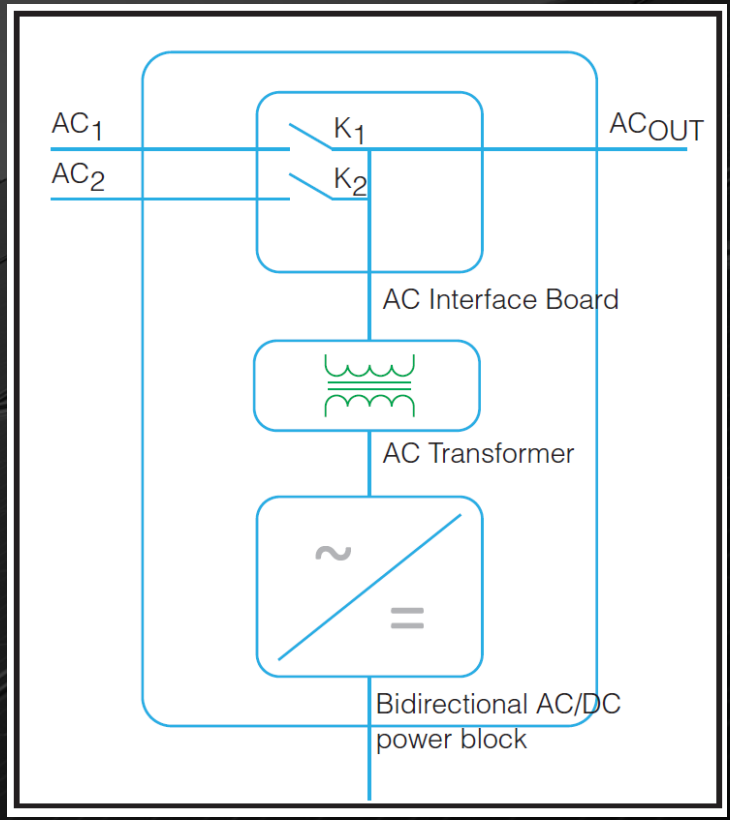
AC1 – Grid

AC2 – Generator

AC Out – Backup Loads

Relays K1 and K2 are 60A rated

- 60 A rating is the limit for AC Out loads for single or multiple inverters in parallel
- Use an external ATS to switch >60A loads



Conext™ XW Pro 6848 Hybrid Inverter/Charger

Grid tied with backup, off-grid, and microgrid applications – Residential & Commercial

XW Pro 6848 120/240V

The ultimate backup power performance & reliability

Scalable, modular and flexible solutions

Easy to install

Smart energy management controls

Li-ion battery compatibility

Designed for the latest utility interconnect requirements

What's new? XW Pro vs XW+

Lithium-Ion Battery Compatibility

- State of Charge control vs Voltage control
- Communication with external BMS via Conext Gateway using CAN or Modbus RS485
- State of Charge control from the Conext Battery Monitor

AC coupling

- Faster frequency shifting

Self consumption

- Export limiting capability via Conext Gateway & power meter

Latest grid codes:

- Freq/Watt, Volt/var, voltage & frequency ride through
- UL1741SA Phase 2+3, HECO, PREPA, IEEE2030.5
- Utility and VPP protocols

Conext™ XW Pro 6848 Hybrid Inverter/Charger

XW Pro 6848 120/240V

The ultimate backup power performance

- Dual input Grid and generator
- Overload power rating
  - 8500W 30minutes/12000W 60 seconds
- 8mS transfer switch
- 140A DC battery charger

Conext™ XW Pro 6848 Hybrid Inverter/Charger

XW Pro 6848 120/240V

Scalable and flexible solutions

- 120/240 V stacking capability (4 units)
  - 3ph 120/208 coming soon!! Up to 9 with XW+
- DC coupled or AC coupled systems
- Lithium Ion battery integration (closed and open loop)
- Grid Tied and off-grid systems

Conext™ XW Pro 6848 Hybrid Inverter/Charger

XW Pro 6848 120/240V

Easy to install

- Monitoring/Control with Conext™ Gateway and Insight 2
- AC Out port for backup loads
- Compatible accessories (PDP, Gateway, AGS, SCP, Battery Monitor)

Conext™ XW Pro 6848 Hybrid Inverter/Charger

XW Pro 6848 120/240V

Smart energy management

- Optimize for time of use rates
- Reduce peak loads and demand charges
- Self-consumption of solar energy
- Export excess solar energy to the grid when allowed

Apps, Analytics, Services
Edge Control
Connected Products

Conext™ Gateway

IoT ready

The Conext Gateway provides local system configuration and management as well as live system monitoring. It enables remote control and monitoring combined with Conext Insight 2

- Configuration Wizards, intuitive navigation for fast and efficient system settings
- Easy access to device status during operations, event tracking, management features to guide users through process of resolving warnings
- Simple and efficient firmware upgrade with bulk update and advanced progress tracking

Conext Gateway features:

- Local system configuration and Management
- Bulk firmware upgrade
- Live System Monitoring
- Remote settings & upgrades paired with Insight 2

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Apps, Analytics, Services

Edge Control

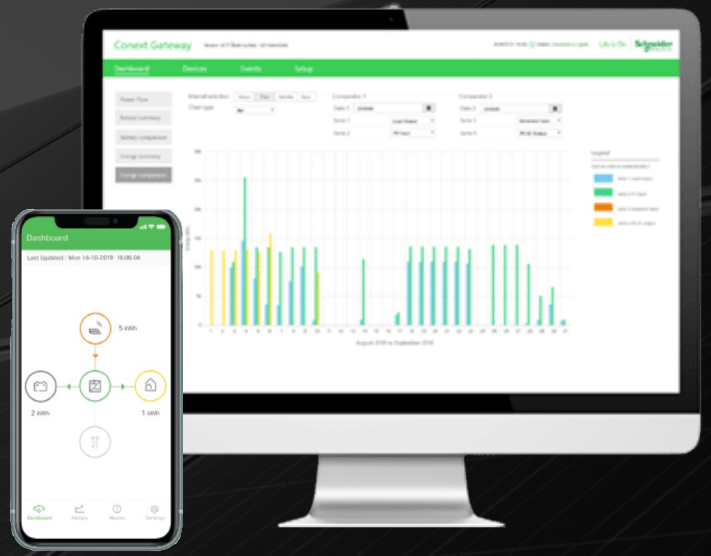
Connected Products

Conext™ Insight 2

Monitor and control your PV system from anywhere in the world

Conext™ Insight 2 is a powerful yet simple cloud-based energy management platform for residential and commercial users.

- Simple and intuitive user experience
- Powerful remote control with Conext Gateway
- Multi-site management
- System and device-level historical performance analytics
- Reporting and customizable dashboard



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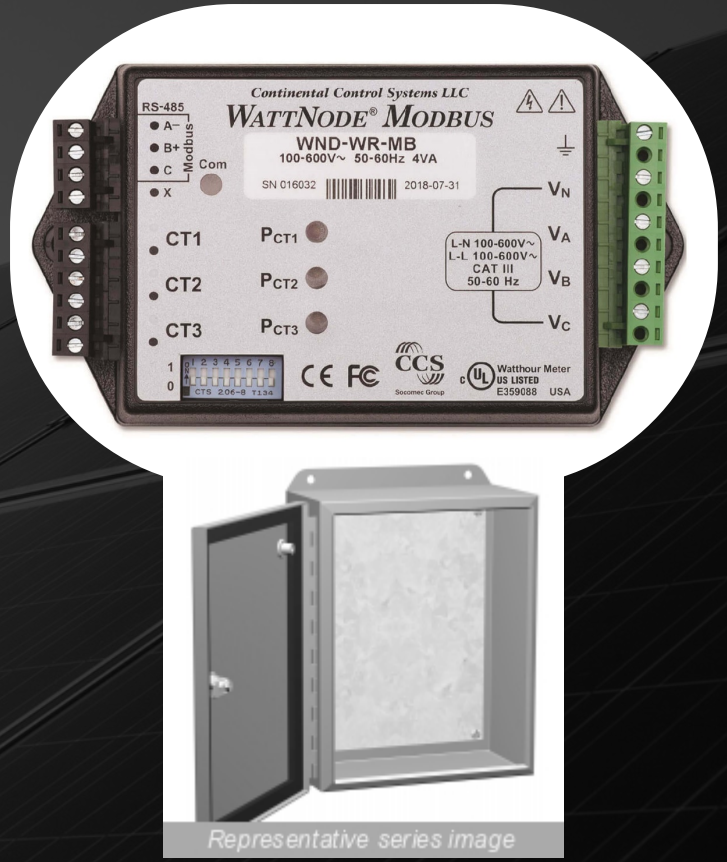
Compatible Meter and Accessories

Description	Manufacturer Part Number
Meter	
WattNode Wide-Range Modbus Meter	Continental WND-WR-MB
CT Options	
200A Split Core CT	Continental ACTL-0750-200
400A Split Core CT	Continental ACTL-1250-400
Example Enclosure Options	
Metal Enclosure, NEMA 4	Hammond Mfg EJ1084
Polycarbonate Enclosure, NEMA 4	Allied AMP1084NLF



https://ctlsys.com/product/wattnode-modbus-wide-range/

- UL Listed (US and Canada), file number E359088
- UL / IEC 61010-1, 3rd Edition
- FCC: Class B, FCC Part 15
- Meets European Parliament Directive 2014/35/EU: Low Voltage Directive
- Meets European Parliament Directive 2011/65/EU: Hazardous Substances
- Meets European Parliament Directive 2014/30/EU: Electromagnetic Compatibility
- CE, RoHS compliant

Conext™ XW Pro 6848 Hybrid Inverter/Charger Summary

XW Pro 6848 120/240V

The ultimate backup power performance

- Reliable operation of backup power and off-grid loads with a high overload power rating (1.75x)
- Seamless transition to backup power with an integrated high speed transfer switch
- Grid and generator input ports
- Field proven product quality and reliability

Scalable and flexible solutions

- 120/240 V split phase output with stacking capability
- Integrates with Conext MPPT charge controllers as well as grid tied PV inverters for DC coupled or AC coupled systems
- Lithium Ion battery integration
- Grid Tied and off-grid systems

Easy to install

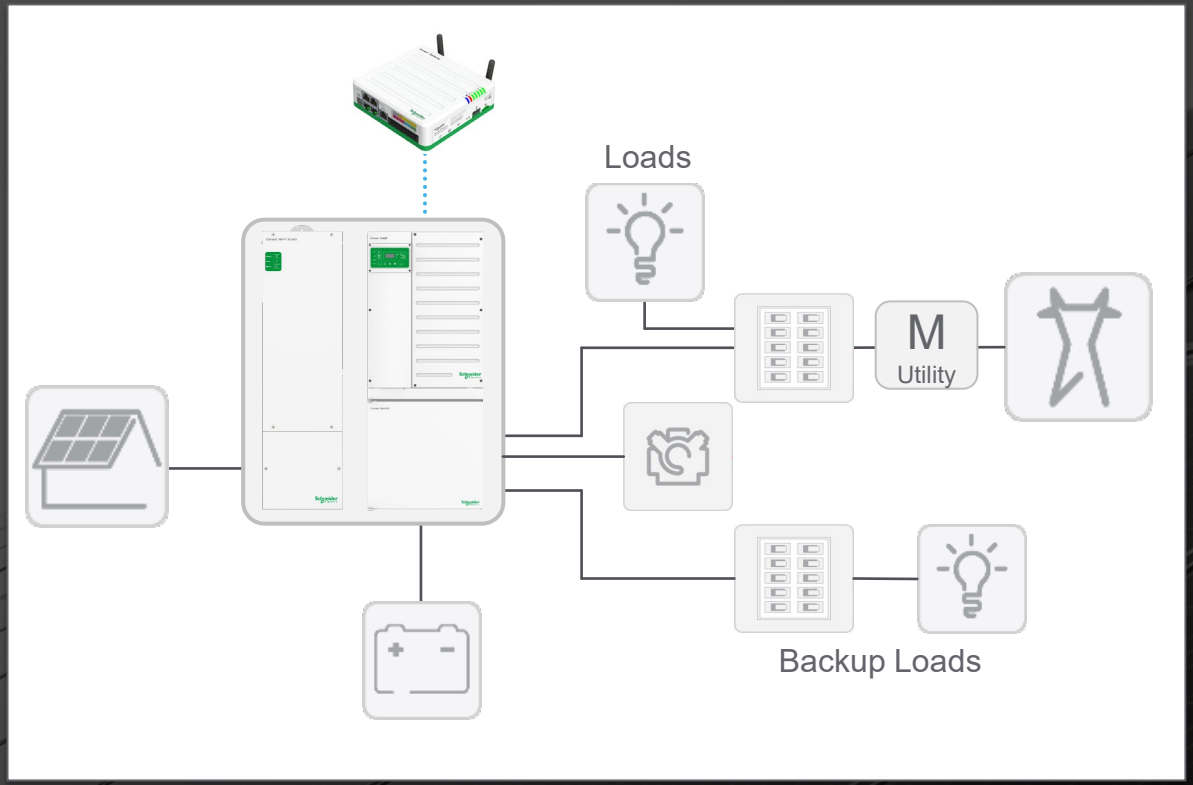
- Configures quickly using the Conext Gateway and Conext Insight 2
- AC Out port for backup loads
- Full ecosystem and accessories for single unit or scalable systems

Smart energy management

- Optimize for time of use rates
- Reduce peak loads and demand charges
- Self-consumption of solar energy
- Export excess solar energy to the grid

DC Coupled Systems

Coupled Systems with Conext MPPT Charge Controllers

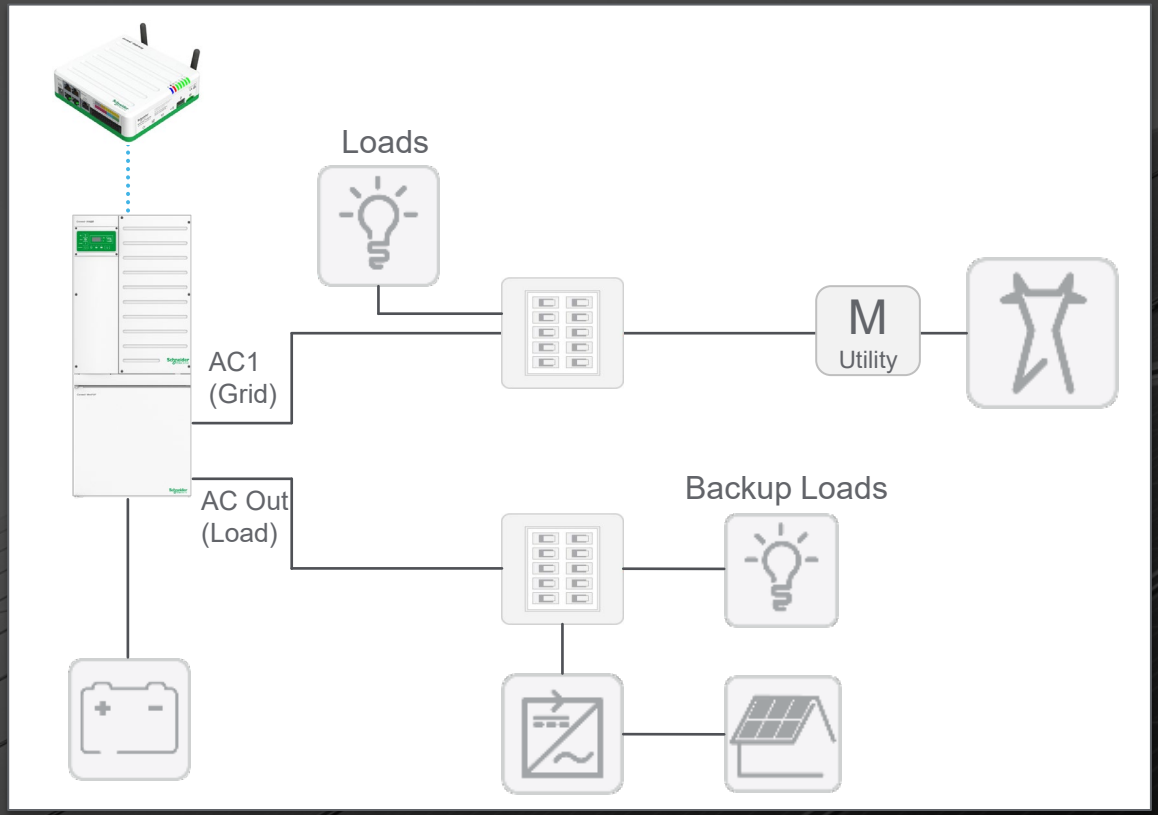


DC Coupling

- Integrate solar with MPPT 60 or MPPT 80 charge controllers
- Optional generator integration on AC2
- Grid-Tie sell (Export)
- Self-Consumption
- Best backup power performance

AC Coupled Systems with XW Pro

AC Coupled Systems with Conext CL String Inverters or 3rd party PV inverters



AC Coupling

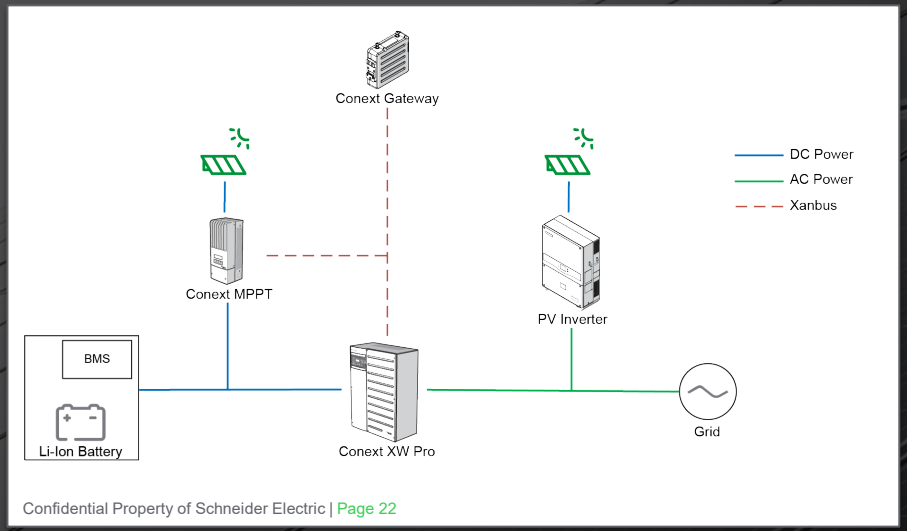
- AC coupled PV inverters connect to the grid through the XW Pro AC pass-through
- During a grid failure, XW Pro forms the grid to keep the PV inverter online
- PV power that exceeds the loads is used to charge batteries
- XW Pro uses frequency shifting to regulate the charge
- Refer to AC Coupling Solution Guide for detailed application information

Li-ion Compatibility

Open Loop vs Closed Loop Battery Management

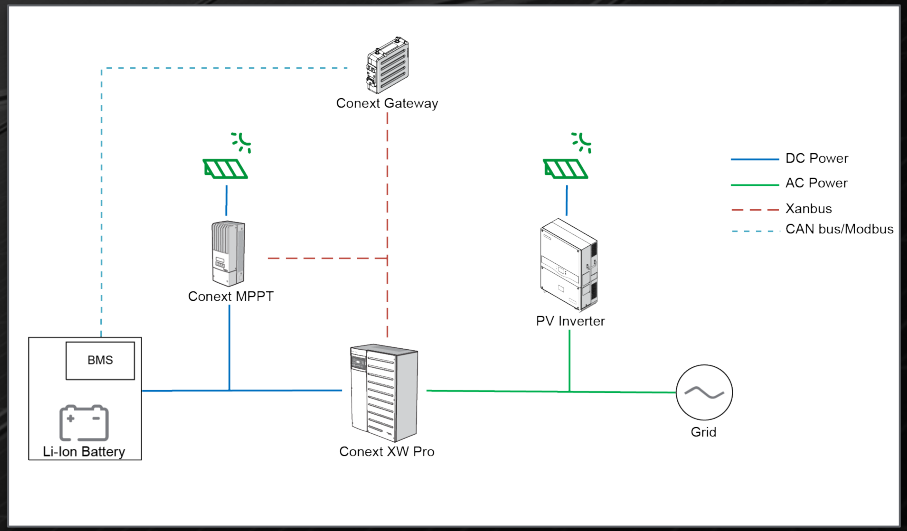
Open Loop Control

- No BMS communication between inverter and battery
- Inverter uses manual charge settings provided by battery manufacturer (static)
- Li-ion BMS must provide final protection functions



Closed Loop Control

- BMS communication between inverter and battery
- Inverter regulates charge/discharge according to the BMS (updated dynamically)
- Inverter provides battery protection as dictated by the BMS (de-rating or trip off)



Closed Loop BMS Integration

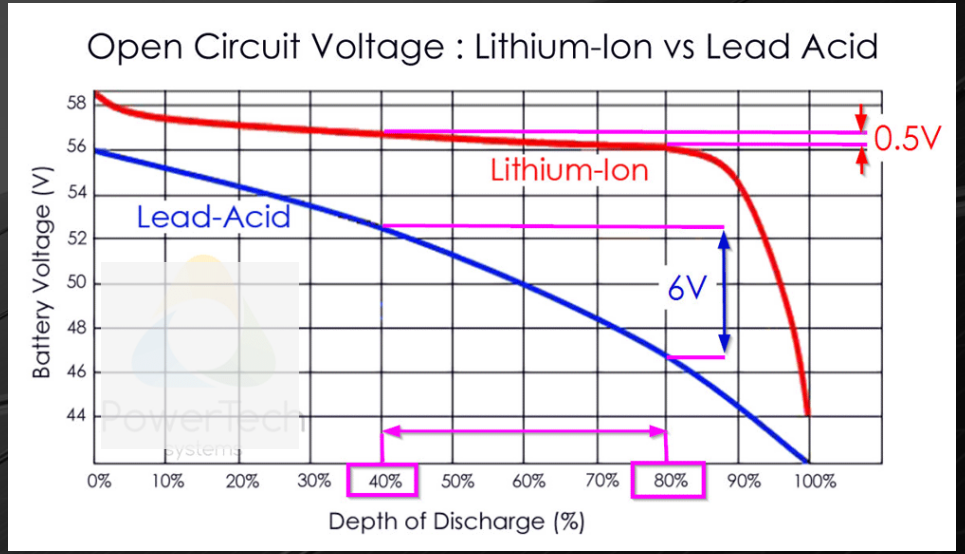
- ✓ Better utilization of the full range of battery capacity
- ✓ Better utilization of the maximum available charge / discharge current based on ambient conditions e.g. temperature
- ✓ Improved state transitions and charge regulation using the SOC information from the BMS
- ✓ Improved regulation to avoid nuisance tripping by the battery BMS
- ✓ Improved AC coupling

Open Loop Control w/ Li-ion: Manual Charge Settings

- Conext Battery Monitor is required for State of Charge measurement
- Can be considered for batteries not available with BMS integration
- Charge/Discharge Settings must be provided by the battery manufacturer
- Use case must be validated by the battery manufacturer (warranty)

Why does SOC control matter for Li-ion?

- Li-ion battery voltage is flat through most of the SOC range
- Li-ion Controls based on SOC provide significantly improved accuracy for state transitions (e.g. Re-charge, Grid Support, Load Shave, AC Coupled Charge Regulation)
- Control based on battery voltage works well for lead-acid with more linear slope of voltage vs SOC



DC Coupled System - Bill of Material

Hybrid Solar with Storage System	Part Number
Conext™ XW Pro	865-6848-21
Mini-Power Distribution Panel (Mini PDP); or Power Distribution Panel (PDP)	865-1013-01 865-1015-01
Conext™ Gateway	865-0329
Conext™ MPPT 80 600; or Conext™ MPPT 60 150	865-1032 865-1030-1
Meter	Refer to compatible meter information

Accessories	Part Number
Conext™ System Control Panel	865-1050-01
Automatic Generator Starter	865-1060-01
Conext™ Battery Monitor	865-1080-01

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Welcome to our webinar

- About Fortress Power
- Lithium Battery
- Our Products & Fortress Power eFlex
- Close Loop Control Advantage & System Setup

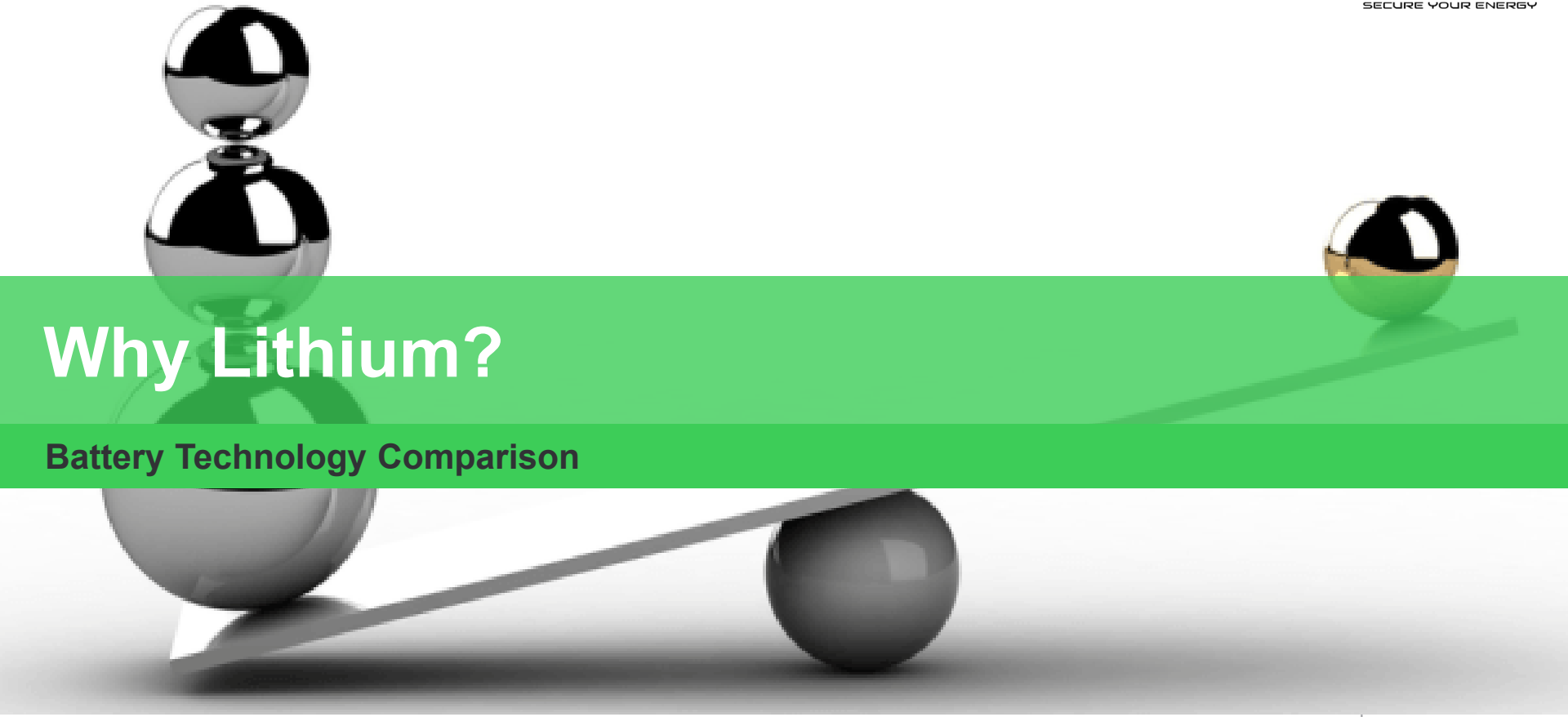
Take a Poll

About Fortress Power

U.S. Headquarters

A world-leading manufacturer who brings automotive Lithium Ferro Phosphate batteries to the energy sector

- U.S. Headquarters: Southampton, PA
- 30,000 Sqf Facility for R&D, Sales and Logistic
- Logistic Centers in California and Florida
- Over 70 MWH Installs Worldwide
- Exclusive Lithium Battery Partner for a local railway company

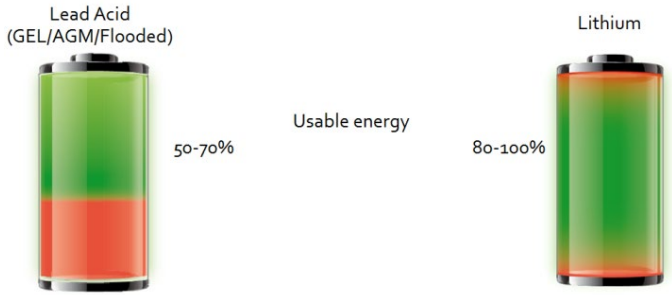


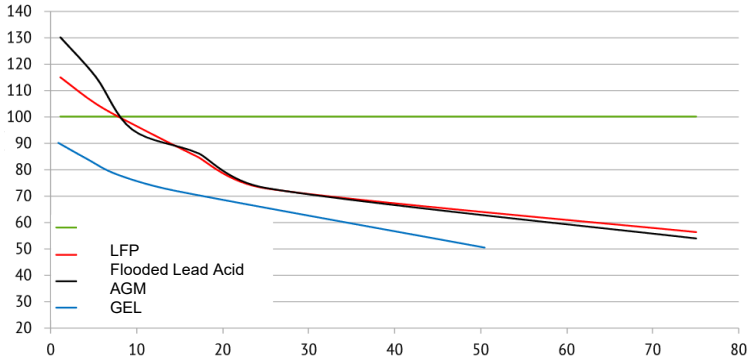
Why Lithium?

Battery Technology Comparison

Why Lithium?

Lithium vs Other Battery Technology





- ✓ Low Energy Cost in Long-term
- ✓ Long Lifespan
- ✓ 98% Roundtrip Efficiency
- ✓ Compact and Light-weight
- ✓ No Ventilation needed
- ✓ Zero Maintenance
- ✓ 100% Depth of Discharge
- ✓ Fast Charge/Discharge with 100% DOD
- ✓ Consistent Discharge Power

Why Lithium?

Lithium vs Other Battery Technology

	LFP	Flooded LA	AGM	Nickel Iron
Round trip efficiency	98%	80%	88%	65%
Cycle Life @ 80% DOD	6,000	300	500	8,000
Off Grid Years	16.4	1	1.4	21.9
Energy Throughput ** in MWH	**47**	1.9	3.5	41.6
The Homeowner Cost of 10 kWh	**6,900**	1,200	2,200	18,000
Cost per kWH	**0.14**	0.74	0.57	0.19
Safety	Yes	No	No	Yes
Free Maintenance	Yes	No	Yes	No

Energy Throughput=Nominal capacity x DoD x Efficiency x Cycle Life

Energy Throughput: The total amount of energy a battery can be expected to store and deliver over its lifetime.

Why Lithium?

LFP Technology Advantage

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	LFP	Lithium Ion	Li-Polymer
Round trip efficiency	98%	95%	95%
Cycle Life @ 80% DOD	6,000	2,800	1,500
Off Grid Years	16.4	6.8	4
Energy Throughput MWH	47	21.5	11.5
Homeowner Cost of 10 kWh	6,900	6,500	4,500
Cost per kWH	0.14	0.30	0.40
Safety	Yes	No	No
Free Maintenance	Yes	Yes	Yes
Energy Density	Medium	High	High

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Why Lithium?

LFP Technology Advantage

Lithium Iron Phosphate Technology (Fortress Power)

Nickel-Manganese-Cobalt Technology (Tesla)

View LFP vs. NMC nail test video on YouTube

Fortress Power Products

Overview

	eVault 18.5	eFlex 5.4	LFP-10	LFP-5
Total Energy [KWH]	18.5	5.4	10.2	5.1
Capacity [AH]	360	105	200	100
Battery Voltage [V]	48V Nominal (Actual = 51.2V)			
Max. Charge Current (Continuous) [A]	160	100	80	80
Max Discharge Power (Continuous) [KW]	9 (180A)	5 (100A)	5 (100A)	4 (80A)
Peak Output [KW]	12 (240A)	6.6 (130A)	7.5 (150A) 5 Mins	7.5 (150A) 10S
Parallel Stacking	12	15	2	3
LCD Monitoring	Yes	No	No	No
Communication	CAN/RS485	CAN/RS485	N/A	N/A
Breaker/Fuse	250A	125A	150A	125A

Fortress Power Products

Continuous Improvements

Reliability

Smart
Scalability
Live monitoring
High Power output

Smarter & Flexibility
Weather resistance
Wi-Fi Monitoring
Latest Pack Technology
Etc……..

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Fortress Power Products

eFlex

Smarter

- Close Loop Communication
  CAN 2, Modbus, Mqtt....
- Dynamic charge/discharge management
- Single cell management
- IOT Ready - Preventive service plan

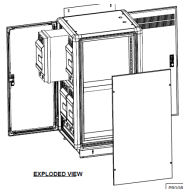
Pack Technology

- Cell to Pack Architecture
- IP65 Rating – weather resistant
- 5 times better Thermal Performance
- High Strength aluminum enclosure
- Support Super Charge – 45 minutes

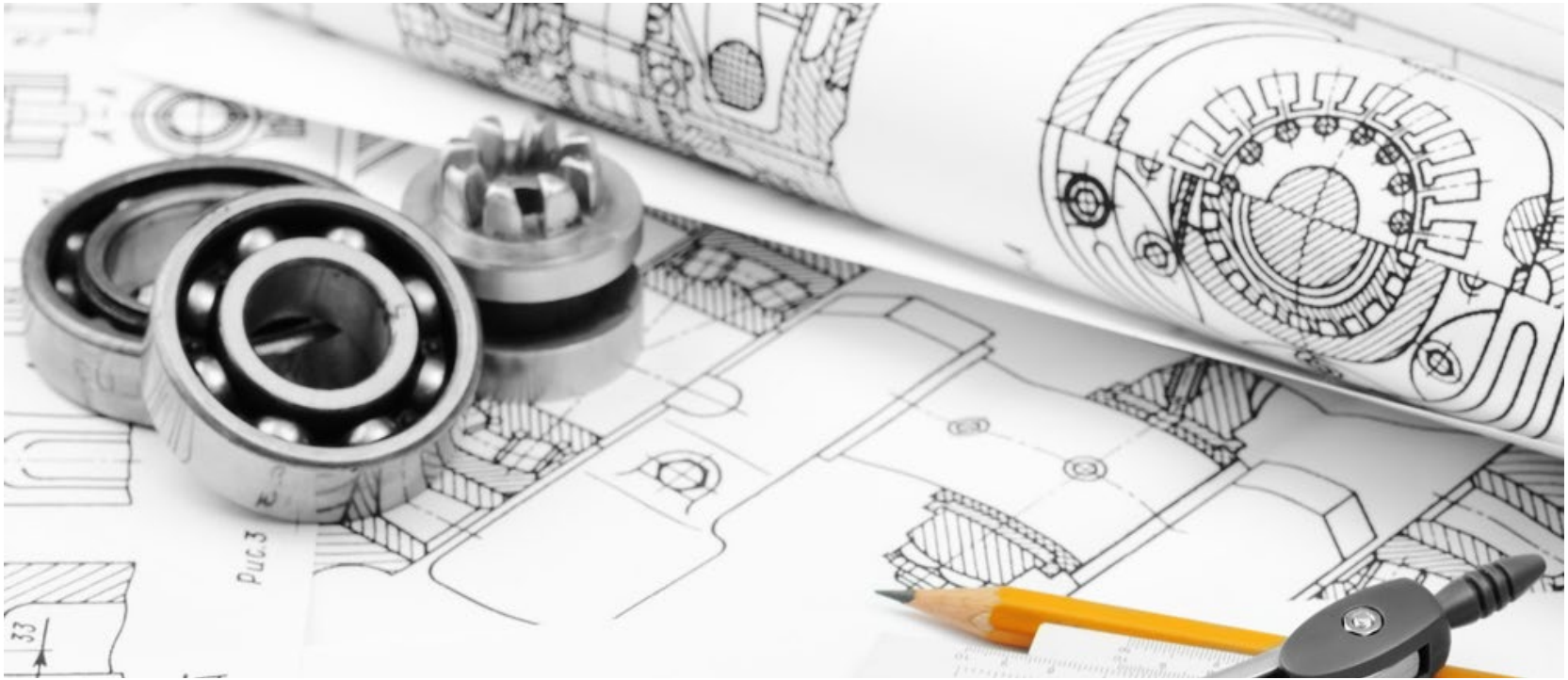
Flexibility

- Design for versatile application
  Home ESS
  RV
  telecom. Server power back up
  etc.
- Design for flexible installation
  Outdoor/indoor
  Compatible to 24-inch server rack
  Wall mount/floor mount
- Design for stackability
  Stackable up to 15 units
  50 units per customer special order



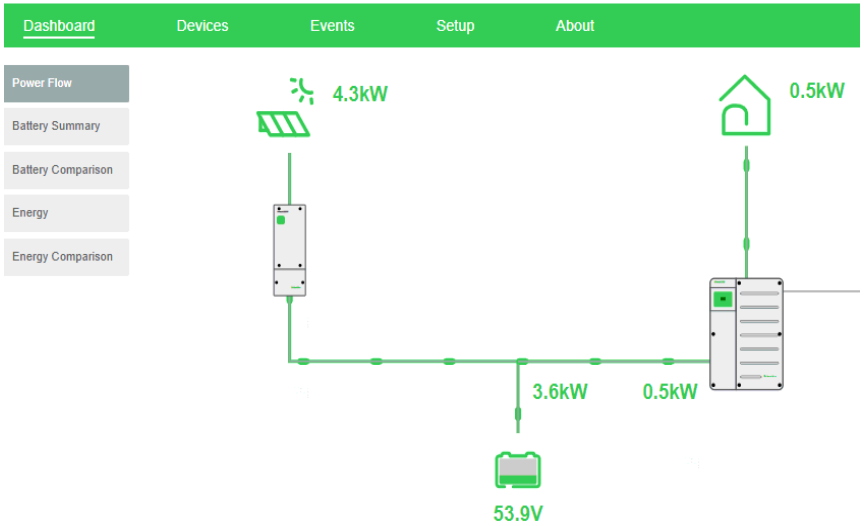




Close Loop Communication



Close Loop Control & System Setup

Benefits



Improved Efficiency ~ 5%

- BMS Controlled Charge and Discharge Logic

Accuracy

- BMS Controlled Charge and Discharge Curve
- Build in battery chemical/electrical characteristic model
- Dynamic interaction between the eFlex and Inverter

Improve User Experiences

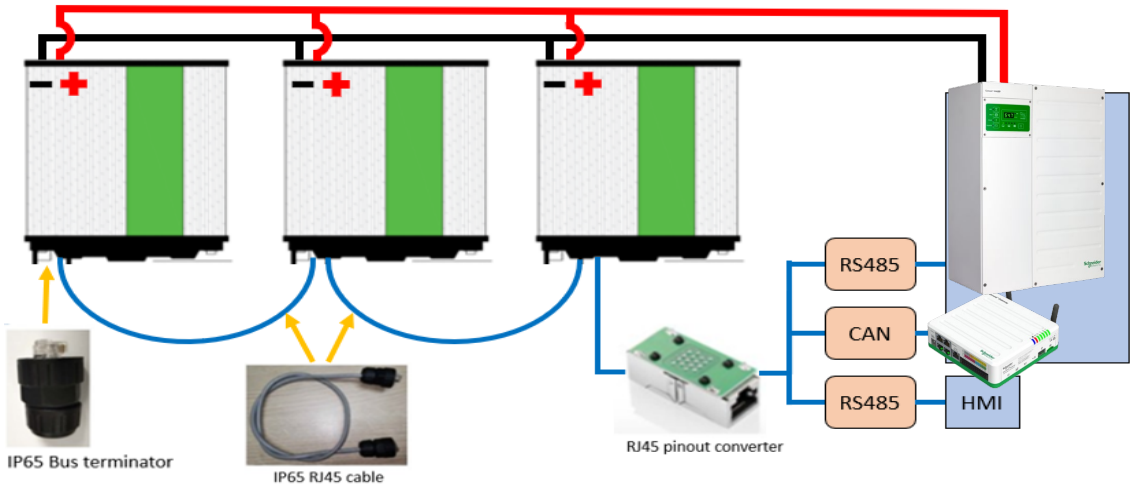
- Plug & Play-> Less Parameter settings
- Remote monitoring & Control

Close Loop Control & System Setup

Understand equipment

Close Loop Control & System Setup

System Setup

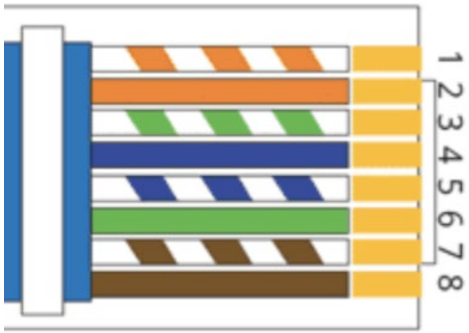


What You Need:

Schneider Gateway

eFlex Battery and Accessories
- RJ45 Converter

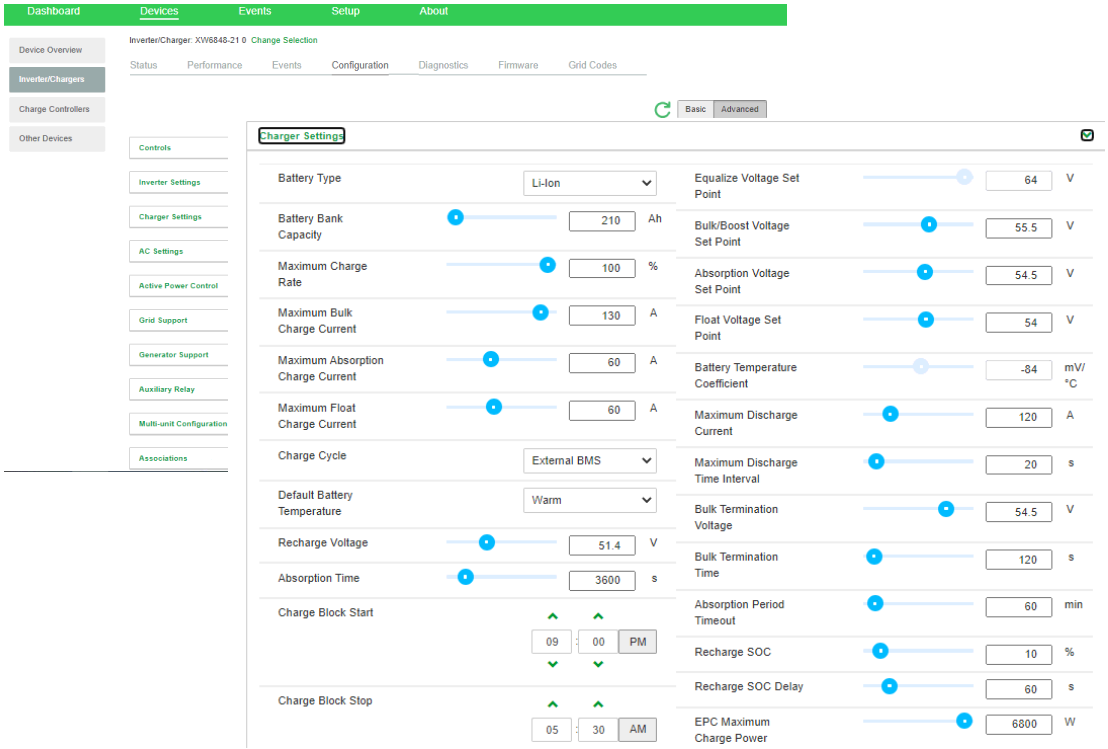
One extra Standard RJ45 Cable



Pin	Color	Assignment
1	White Orange	CAN1_H
2	Orange	CAN1_L
3	White Green	RS485A2
4	Blue	CAN2_H
5	White Blue	CAN2_L
6	Green	RS485B2
7	White Brown	RS485A1
8	Brown	RS485B1

Close Loop Control & System Setup

System Setup



Step 1:

Battery Type: Li-ion

Step 2:

Charge Cycle

External BMS

Thank You & Contact Us

If you want to go fast, go alone;
if you want to go far, go together!

For More Information:
Sales: sales@fortresspower.com
Tel: +1 (877) 497-6937
www.fortresspower.com

Support: techsupport@fortresspower.com
Marketing: jamieb@fortresspower.com

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