

Life Is On

Schneider
Electric

Schneider Electric Handbook for Solar Installers

IEC Standards



Solar products and tech notes
for residential and commercial
applications

solar.schneider-electric.com



Table of Contents

About Schneider Electric Solar Business

1

String inverter solutions

2

Hybrid inverter and charge controller solutions

3

Monitoring and control

4

Balance of systems

5

Tech notes

6

Li-ion compatibility

7

Smarter investment in PV solutions for grid-tie, off-grid and backup power installations

1



When it comes to grid-tie, off-grid and backup power residential and commercial solar systems, Schneider Electric has both the experience and the proven technology to help make your investment a success.

Schneider Electric solutions for residential and commercial installations are specially designed by keeping your needs in mind. Our balance-of-system solutions include everything you need to efficiently distribute and manage locally generated solar energy, from the DC output to the AC grid connection.

Bankability, Connectivity, Service and Support

 Commitment & experience <ul style="list-style-type: none">• 181 year old company• Commitment to solar as a megatrend in power generation• Dedicated business unit for solar	 Expert in power conversion <ul style="list-style-type: none">• Product lines spans UPS, drives, & inverters for solar power• Technology expertise and supply chain synergies	 Customer focus <ul style="list-style-type: none">• Access to fast and efficient field services	 Global scale <ul style="list-style-type: none">• A global business operating in over 100 countries• We have the scale to support installation anywhere
 Connectivity & IoT ready <ul style="list-style-type: none">• Availability and efficiency maximized with connected offers and advisor software	 Extensive product line <ul style="list-style-type: none">• CIB segments:<ul style="list-style-type: none">• Commercial• Residential & off-grid• IoT ready monitoring	 We think "local" <ul style="list-style-type: none">• Our reach is global, and our philosophy is to think local• Our local service manager is only a phone call away	 We offer more <ul style="list-style-type: none">• End to end solutions

Why choose Schneider Electric's solar products and solutions?



Trusted brand for over 180 years



Designed for reliability



Flexibility



Schneider Electric's ecosystem of products and solutions



Long-term, trusted service partner



IoT enabled solutions for Smart Homes and Buildings

Three-Phase string inverters for commercial applications

CL125, CL-60, and CL36 string inverters



We offer full suite of three-phase string inverters in multiple power ranges to address all your solar product needs.

Building on Schneider Electric's core design principles, Conext™ CL36, CL-60 and CL125 offer the same flexibility, reliability, and easy setup, but with an added advantage of higher kVA rated power.

2

Commercial applications



Commercial rooftop solar for self-consumption with storage



Rooftop for feed-in-tariff / net metering



PV-Diesel hybridization

CL36 and CL-60 String Inverters Now Compatible with Conext™ Gateway and Conext™ Insight 2

Monitor your solar system onsite or remotely with our control devices and software. For more information about Conext™ Gateway and Insight 2, please see page 8.




String inverters

Conext™ CL125

The Conext™ CL125 is the three-phase string inverter from Schneider Electric designed for 1500V projects.

With 125kW of output power, industry-leading efficiency, fast commissioning, and easy installation and service, Conext™ CL125 delivers maximum ROI for your PV plants.


	Part number	Product name	Description
	PVSC125E	Conext™ CL125 (IEC standard)	<ul style="list-style-type: none"> • 125 kW AC max. active power • 1500 V DC max. input voltage • 860 - 1250 V DC full power MPPT voltage range (PF=1) • 98.7% Euro efficiency

2

Conext™ CL-60

Turn a rooftop or unused land into a profitable source of green, renewable energy, with the Conext™ CL-60 String Inverter.


The Conext™ CL-60 string inverter offers a highly integrated configuration, easy installation, commissioning and services, and world-leading efficiency performance.

	Part number	Product name	Description
	PVSC160E	Conext™ CL-60E (IEC standard)	<ul style="list-style-type: none"> • 66 kW AC max. output power • 1000 V DC max. input voltage • 570 - 850 V DC full power MPPT voltage range (PF=1) • 1 MPPT / max. 14 inputs • 98.5% Euro efficiency

Conext™ CL36

The ideal solar solution for commercial and industrial buildings, carports, PV Diesel Hybrid and AC coupled systems in IEC markets

Scalable and flexible PV architecture together with Schneider Electric's broad range of low voltage products makes CL36 the ideal choice for commercial and industrial buildings.

	Part number	Product name	Description
	PVSC136E	Conext™ CL36 (IEC standard)	<ul style="list-style-type: none"> • 36 kW nominal AC output power • 1100 V max. PV input voltage • 500 - 850 V MPPT voltage range for nominal power • 3 MPPT / max. 8 inputs • 98.3% Euro efficiency

Hybrid inverter and charger controller solutions for residential and commercial applications

Hybrid Inverters and Charge Controllers



Our inverter / chargers manage power conversion and battery charging, while our charge controllers optimize the solar energy harvest. Conext™ XW Pro, XW+ and SW along with MPPT charge controllers are suitable for grid-tie solar with storage, backup power, self-consumption, and off-grid power for homes, small businesses, and remote communities.

3

Residential applications



Residential grid-tie solar with battery backup



Residential self-consumption with storage



Residential off-grid



Residential backup power

Commercial applications



Commercial rooftop solar for self-consumption with storage



Commercial backup power



Commercial off-grid



Microgrids




Telecom towers

Hybrid inverter / charger systems

Conext™ XW Pro

Adaptable and scalable, the Conext™ XW Pro provides the one solution you need for grid-tie solar with storage, backup power, self-consumption, and off-grid for homes, small businesses and remote communities.

Designed for the ultimate backup power performance and product quality, the XW Pro builds on Schneider Electric's extensive track record in solar + storage applications. The XW Pro includes enhanced controls for evolving utility interconnect requirements, as well as BMS integration with compatible Li-ion batteries.


	Part number	Product name	Description
	865-8548-55	Conext™ XW Pro 8.5 kW 230V	<ul style="list-style-type: none"> • Single phase and stackable 3 phase operation • 8500 W output power (30 min) at 25°C • 12000 W overload 60 sec • 140 A maximum output charge current • 48 VDC nominal battery voltage

3

Conext™ XW+

Conext™ XW+ is an adaptable single-phase and three-phase hybrid inverter with grid-tie functionality and dual AC power inputs

From a single unit to clusters up to 76.5 kW, the Conext™ XW+ is a scalable system. The Schneider Electric Conext™ XW+ system is suitable for grid-interactive and off-grid, residential and commercial, solar and backup power applications.

	Part number	Product name	Description
	865-8548-61	Conext™ XW+ 8.5 kW 230V	<ul style="list-style-type: none"> • Supports single-phase and stackable three-phase operations • 8500 W output power (30 min) at 25°C • 12000 W overload 60 sec • 140 A maximum output charge current • 48 VDC nominal battery voltage

Hybrid inverter / charger systems

Conext™ SW

Conext™ SW is a pure sine wave, hybrid inverter system with switchable 50/60 Hz frequencies, providing power for every need.

The Conext™ SW is a proven inverter/charger for off-grid, backup power and self-consumption applications for homes and small businesses.



Part number	Product name	Description
865-4024-55	Conext™ SW 4024 230V	<ul style="list-style-type: none"> • 4000 W overload 30 min • 7000 W overload 5 sec • 90 A maximum output charge current • 24 VDC nominal battery voltage
865-4048-55	Conext™ SW 4048 230V	<ul style="list-style-type: none"> • 4400 W overload 30 min • 7000 W overload 5 sec • 45 A maximum output charge current • 48 VDC nominal battery voltage



3

Charge Controller Solutions

Conext™ MPPT charge controller solutions

Conext™ MPPT charge controllers are used for DC Coupled systems.

The Conext™ MPPT charge controllers provide maximum power point tracking of PV arrays to optimize solar energy harvest while regulating the battery charge. When combined with the Conext™ XW Pro, XW and SW series inverters, surplus power is used to power AC loads. The MPPT 80 600 is rated for 600 V PV strings, helping to reduce balance of system costs.

	Part number	Product name	Description
	865-1030-1	Conext™ MPPT 60 150 Charge Controller	<ul style="list-style-type: none"> • 3500 W maximum output power (at nominal 48 V) • 12, 24, 36, 48, 60 V nominal battery voltage • 150 V max. PV array open circuit voltage including temperature correction factor • Compatible with XW Pro, XW+ and SW
	865-1032	Conext™ MPPT 80 600 Charge Controller	<ul style="list-style-type: none"> • 4800 W maximum output power • 24 and 48 V nominal battery voltage • 600 V max. PV array open circuit voltage • Compatible with XW Pro, XW+ and SW

Monitoring and control solutions for residential and commercial applications

Local and remote monitoring



Introducing the powerful local and remote monitoring solution for battery-based and grid-tie solar systems. The Conext™ Gateway together with Conext™ Insight 2 will bring system monitoring and remote management to the cloud.

Residential applications



Residential grid-tie solar with battery backup



Residential self-consumption with storage



Residential off-grid



Residential backup power

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Commercial applications



Rooftop for feed-in-tariff / net metering



Commercial rooftop solar for self-consumption with storage



PV-Diesel hybridization



Commercial backup power



Commercial off-grid



Microgrids




Telecom towers

Conext™ Insight 2 and Gateway

Conext™ Insight 2


The Conext™ Insight 2 is a cloud-based platform for end users and installers to remain connected to and manage a portfolio of customer sites. It is a simple tool for users to track their system performance locally and remotely.

	Description
	<ul style="list-style-type: none"> • Easily analyze your energy use and production • Optimize your operations with powerful remote troubleshooting • Minimize truck rolls and reduce installers travel expenses • Configure your key operating parameters to extend equipment life • Monitor and analyze a single site or your complete portfolio of sites • Drill-down from a multi-sites overview to the detailed diagnosis of specific equipment on site • Manage data of all key installed devices from a single login

Conext™ Gateway

The new Conext™ Gateway provides local system configuration and management as well as live system monitoring for the residential and commercial solar and battery applications.

The Conext™ Gateway together with Conext™ Insight 2 will bring system monitoring and remote management to the cloud.

	Part number	Product name	Description
	865-0329	Conext™ Gateway	<ul style="list-style-type: none"> • Compatible with CL-60E, CL36, XW Pro, XW+, SW and Conext™ accessories • Supports Xanbus, Canbus, and Modbus for connectivity to range of SE solar products • Supports Wi-Fi and Ethernet for easy connectivity



Compatible with our inverters

Our monitoring solutions are compatible with the following string & hybrid inverters:

- ✓ Conext™ CL-60E string inverter
- ✓ Conext™ CL36 string inverter
- ✓ Conext™ XW Pro and XW+ hybrid inverter
- ✓ Conext™ SW hybrid inverter



Conext Solar mobile app that helps you stay on top of your energy

* Being released in stages in different countries around the world - Coming soon in Europe



Download on the
App Store



ANDROID APP ON

Google play

Broad range of balance of systems for residential and commercial applications

Power Distribution Panels, Charge Controllers and Accessories



We offer broad range of balance of systems that are compatible with our storage inverter / chargers and monitoring solutions.

Leverage Schneider Electric's ecosystem of products and solutions.

Residential applications



Residential grid-tie solar with battery backup



Residential self-consumption with storage



Residential off-grid



Residential backup power

5

Commercial applications



Commercial rooftop solar for self-consumption with storage



Commercial backup power



Commercial off-grid



Microgrids



Telecom towers

Power Distribution Panels (PDP)

PDP and PDP accessories for XW systems


The Conext™ XW PDP is factory-wired and labeled to support the integration of multiple XW Pro and XW+ inverter/chargers and MPPT Solar Charge Controllers with a single battery bank.

	Part number	Product name	Description
	865-1014-01	Conext™ XW PDP (No AC circuit breakers)	<ul style="list-style-type: none"> • Power distribution panel accessory for single, 2 or 3 unit XW Pro and XW+ inverter systems • 250 A DC breaker for inverter/charger connection to battery
	865-1020-02	Conext™ XW Inverter Connection Kit	<ul style="list-style-type: none"> • Connection kit for connecting a second or third XW inverter to the XW PDP • Includes a conduit box, a 250 A DC breaker, and wiring
	865-1025-01	Conext™ XW Conduit Box	<ul style="list-style-type: none"> • PDP accessory for connecting to XW series inverter / chargers and PDP • Wiring accessories not included
5	865-1065	Master Pack QTY 6, Breaker 250A, 160VDC	<ul style="list-style-type: none"> • XW / SW PDP accessory for inverter/charger connection to battery
	865-1070	Master Pack QTY 12, Breaker 80A, 125VDC, Panel Mount	<ul style="list-style-type: none"> • XW / SW PDP accessory for MPPT 60 150 output, battery side
	865-1075	Master Pack QTY 48, Breaker 60A, 160VDC, Panel Mount	<ul style="list-style-type: none"> • XW / SW PDP accessory for MPPT 60 150 input, PV array side
	865-1080	Master Pack QTY 12, Breaker 100A, 125 VDC, Panel Mount	<ul style="list-style-type: none"> • XW / SW PDP accessory for MPPT 80 600 output, battery side

Power Distribution Panels (PDP)

Battery fuse combiner box for XW systems



The Conext™ Battery Fuse Combiner Box combines XW+ inverter / chargers with one battery bank using a single battery pole disconnect method and provides fuse protection for cables, batteries and inverter / chargers.

	Part number	Product name	Description
	865-1031-01	Conext™ Battery Fuse Disconnect Box for 250A DC Fuses	Combines up to three XWPro or XW+ inverter / chargers with one battery bank
	865-1030-01	Conext™ Battery Fuse Disconnect Box for 160 A DC Fuses	Combines up to three XW Pro or XW+ inverter / chargers with one battery bank

PDP and PDP accessories for SW systems





The Conext™ SW Power Distribution Panels are pre-wired out of the box and labeled to support the integration of SW inverter / chargers with a MPPT Solar Charge Controller, battery bank and load centers. Designed to save installers significant time, effort and costs on every installation, the Distribution Panels offer excellent value when compared to customized options.

The solution set includes a DC distribution panel complete with a pre-installed 250 A DC breaker and additional breaker slots for integrating multiple DC power sources.

	Part number	Product name	Description
	865-1016	Conext™ SW DC Breaker Panel	<ul style="list-style-type: none"> • DC Breaker panel accessory for SW series inverters • 250 A DC Breaker for inverter/charger connection to battery
	865-1017-61	Conext™ SW AC Breaker Panel 230 V	<ul style="list-style-type: none"> • AC breaker panel accessory for SW series inverters • Includes two 30 A AC breakers and one 60 A AC breaker
	865-1065	250A, 160 Vdc Breaker Master Pack (6 units)	• XW / SW PDP accessory for inverter/charger connection to battery
	865-1070	80A, 125 Vdc Breaker Master Pack (12 units)	• XW / SW PDP accessory for MPPT 60 150 output, battery side
	865-1075	60A, 160 Vdc Breaker Master Pack (48 units)	• XW / SW PDP accessory for MPPT 60 150 input, PV array side
	865-1080	100A, 125VDC Breaker Master Pack (12 units)	• XW / SW PDP accessory for MPPT 80 600 output, battery side

Accessories

Accessories for XW+ and SW systems

	Part number	Product name	Description
	865-1155-01	Conext™ Configuration Tool	<ul style="list-style-type: none"> • PC-based software tool to simplify system configuration and reduce installation time • Compatible with XW Pro, XW+ and SW, as well as MPPT charge controllers
	865-1050-01	Conext™ System Control Panel (SCP)	<ul style="list-style-type: none"> • Control panel to set up and monitor the Conext inverter charger system, • Compatible with XW Pro, XW+ and SW, as well as MPPT charge controllers
	865-1060-01	Conext™ Automatic Generator Start (AGS)	<ul style="list-style-type: none"> • Automatically activate or stop a generator in response to changing power requirements. • Compatible with XW Pro, XW+ and SW, as well as MPPT charge controllers
	865-1080-01	Conext™ Battery Monitor	<ul style="list-style-type: none"> • Indicates hours of battery based runtime and determines battery bank state of charge. • Compatible with XWPro, XW+ and SW, as well as MPPT charge controllers

Tech Notes



Benefits of Conext™ SW / XW+ / XW Pro Enhanced Grid Support feature

Summary: Schneider Electric's Conext™ SW / XW+ Battery Inverter products are designed for maximum flexibility and can be integrated with PV generators on the or AC output (Load side) or DC side (Battery side). These two methods of connecting PV generators and storage inverters are commonly referred to as AC and DC coupling respectively. Conext™ battery inverters support both methods of PV integration. For more on this application, see our Tech note on AC & DC Coupling.

Enhanced Grid Support is Schneider Electric's proprietary control algorithm for energy management and is based on Schneider's patent US8076907B2.

This feature is designed to maximize energy storage when DC coupling is used with Schneider Electric's Conext™ products family of battery inverters and charge controllers. The feature requires communication between the battery inverter and DC charge controller and therefore only works with Schneider's Conext™ range of products.

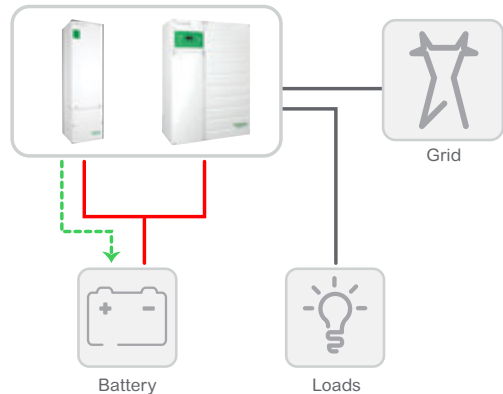
Enhanced Grid Support (EGS) applies to grid connected systems, for applications where the battery inverter is used for back-up or to maximize self-consumption. When EGS is active, the battery inverter and charge controller interact continuously during Bulk, Absorption and Float stages of charging. Through the charging stages, the system intelligently exports the excess PV power not stored by the battery, while adjusting to the charge voltage settings of the charge controller.

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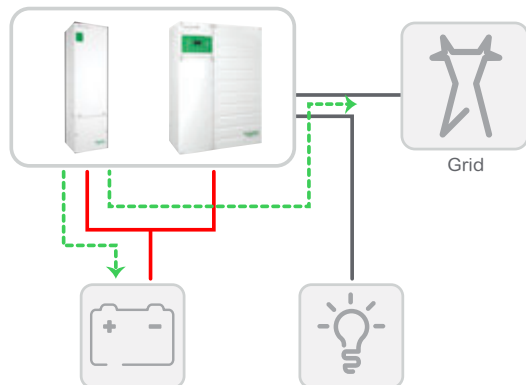
Why is unique about this?

1. The Charge controller(s) are able to execute a full two or three stage charge cycle, to optimally charge the battery. This allows the battery to be charged at a charging voltage associated with each charge stage (Bulk, Absorption, Float) and efficiently returns the battery to a full state of charge. For flooded batteries, the elevated battery voltage during Absorption stage promotes agitation of electrolyte which reduces stratification of the acid.
2. In most other DC coupled systems, a fixed voltage is used to regulate battery charging and excess PV export. The fixed charging voltage is likely to result in partial state of charge of the battery and could degrade battery performance over time

Bulk stage



Absorption stage

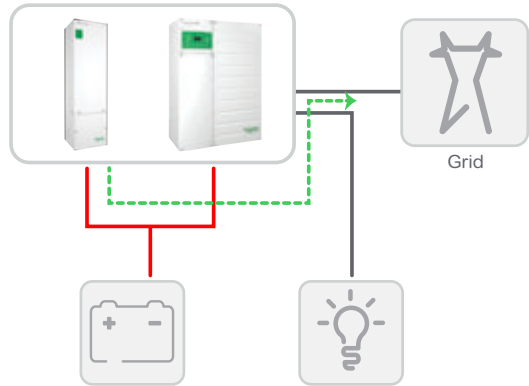


Just like Smart Charge for AC Coupled systems, Enhanced Grid Support is designed to maximize and prioritize storage loads. The value of this feature is that the stored energy can be used later when rates are higher (Time-of-Use). Or in applications where the grid is intermittent, EGS prioritizes storage of your PV production to maximize readiness for potential grid outage.

NOTE: Enhanced Grid Support is not compatible with lithium-ion batteries with BMS integration due to the need for closed loop control communication with BMS in the lithium-based battery. To achieve Enhanced Grid Support functionally with BMS integration, a Conext™ Gateway needs to be installed in the system.

For more information on enhanced grid support feature, refer to respective product manuals.

Float stage

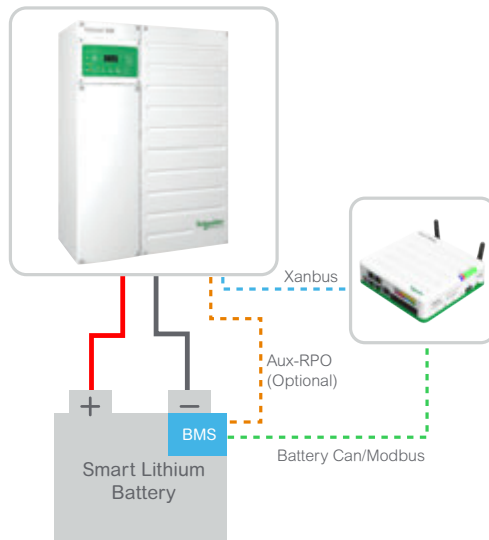


Using Lithium-ion & Advanced Batteries with Conext™ Series of Inverter / Chargers & Charge Controllers

Summary: Lithium-ion batteries continue to increase in popularity due to improved affordability, superior cycle life and longevity compared to traditional lead acid batteries. However, Lithium batteries require controlled charging and discharging for optimal and safe operation which necessitates changes to traditional battery charging algorithms to adapt to the chemistry's sensitivities. Conext™ inverter / chargers now support operation with lithium batteries to increase your options for storage technology.

The Conext™ XW, SW and MPPT charge controller family of products can be used with Smart Lithium-ion Batteries. Smart batteries have an internal Battery Management System (BMS) that monitors critical internal parameters and determines safe charging or discharging parameters.

The Conext™ Gateway retrieves the relevant charging and discharging parameters from the battery BMS and intelligently controls operation of the Conext™ inverter and charge controller system accordingly. This type of control is known as closed loop control and allows the Conext™ system to adapt to battery BMS operating limits, warnings and in real time. It is also possible to use your Conext™ product with Lithium batteries that do not rely on communication with the inverter. Such lithium batteries are referred to as Lead Acid replacements.



Lithium-ion battery with closed loop control

Benefits of Conext™ SW Smart Charge Feature

Summary: As utilities struggle with excess generation from distributed PV, a phenomenon commonly known as the “duck curve”, storage is becoming a key component of a long-term solution. Through incentive programs, end users are being encouraged to add storage and store excess PV during peak generation (mid-day) periods, for use during peak demand hours (early evening), e.g. Time-of-Use rates. For existing PV installations, this means adding storage as a retrofit. Smart charge facilitates easy time of use by automatically storing excess generation from your existing PV inverter system.

Smart Charge is Schneider Electric's proprietary control algorithm and is based on Schneider Electric's patent US9917446B2.

This feature is designed to maximize energy storage in AC coupled systems. The feature does not require any communication between the battery inverter and PV Inverter, and thus works with any brand of PV Inverter.

For the feature to work, the PV inverter must be installed downstream of the Conext™ battery inverter, or to the AC Output port of the inverter which would typically also connect to a critical load panel. This feature is used for grid connected systems, where the storage inverter is used for back-up or to maximize self-consumption.

When smart charge is active, the battery inverter monitors the flow of excess PV power produced by the PV inverter flowing in through the AC Load terminal and out to the grid port. The battery inverter intelligently captures the excess PV power and re-directs it to charge the battery. As the battery approaches full charge, excess PV power that cannot be stored by the battery is

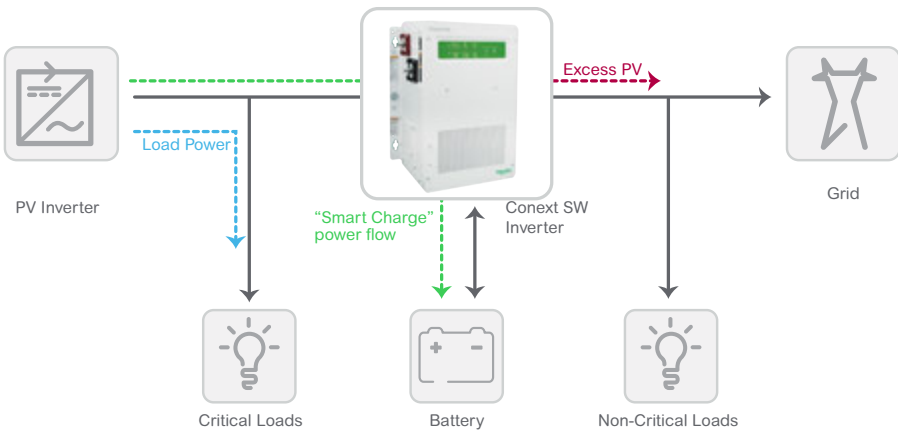


Conext™ SW inverter / charger

allowed to flow out to the inverter grid input port and support other loads in the home or for eventual export to the grid where allowed.

Just like Enhanced Grid Support for DC coupled systems, Smart Charge is intended to maximize and prioritize storage over non-critical loads in AC coupled systems. The added value of this feature is that the stored energy can be used later when rates are higher (Time-of-Use). In applications where the grid is intermittent, Smart Charge prioritizes storage of your excess PV production to maximize readiness for potential grid outage.

For more on Smart Charge feature, refer to the respective product manual.



Smart Charge automatic power flow

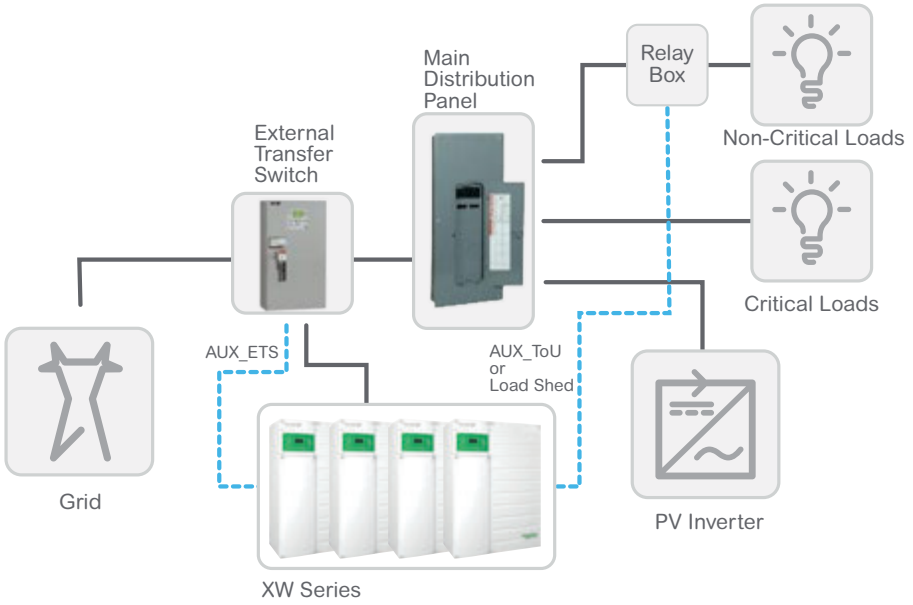
Getting the most out of Conext™ XW+ / XW Pro Auxiliary Control Port

Summary: Schneider Electric's Conext™ XW product line is designed for maximum flexibility. A useful feature is the Auxiliary port (Aux Port). This is a 5-position terminal block located at the lower right side of the inverter and is software configurable to perform several functions.

The Aux port can be used to control other devices based on certain conditions in the system. Some uses include the following applications.

1. Large installations using multiple inverters.
 - For large three phase systems with 3 or more inverters, the Aux port is used to control an external transfer or disconnect switch to switch the loads between the XW systems and an alternate AC source (grid or generator).
 - For stacked single phase systems, the port can be used to control an external load switch when loads in the system exceed 60A. This avoids damage to XW's internal transfer relays when used with large loads in a stacked system.
2. Load shedding: Can be used to disconnect a non-critical load based on battery state of charge to prolong autonomy in back-up mode. An external relay is required.
3. Simple AGS control: Can be used to start/stop a two-wire generator based on battery voltage or State of Charge.
4. Battery Cabinet venting: Can be used to control a fan in a battery cabinet. Programmable to start the fan at a specific battery voltage or charge stage (e.g. bulk exit) and stop at completion of Absorption Phase.
5. Outdoor cabinet cooling fan: Can be used to activate a cabinet cooling fan based on internal temperature of the XW. This can be used if the XW is installed in a cabinet that is exposed to high ambient temperature but has a cabinet cooling fan.
6. Time of Use Load shedding: Can be used to disconnect non-critical loads in the home during a high tariff period (e.g. ToU).

Note: In each of the above applications, an appropriately rated external relay must be used to switch each respective load.



Example: External transfer and load shedding applications using XW Series Aux in a system.

AC Coupling vs DC Coupling

Summary: AC or DC coupling refers to how power from Solar panels connects or couples with power from a battery inverter. It can connect on the battery inverter's AC output terminals (AC coupling) or to the battery side (DC coupling).

The question of which of the two approaches is better has been debated at length among solar installers and system integrators. Each approach has its advantages and disadvantages which depend on the needs of an application. One analogy is that of vehicle propulsion options, front vs rear drive vs all-wheel drive. The choice depends on use case, e.g. whether for city driving or racing or off-road driving.

Here are some pros and cons of each approach:

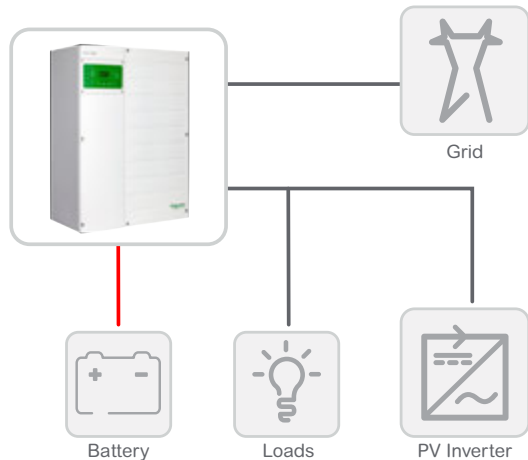
AC Coupling

Pros:

- More efficient if loads coincide with PV generation (e.g. commercial building, offices).
- Easier to retrofit storage.

Cons:

- Lacks black start capability. (If battery inverter shuts down due to discharged battery and no PV, system will not recover when PV returns).
- There are constraints on AC coupled PV system sizing in comparison to the power rating of the battery inverters.



AC coupled system

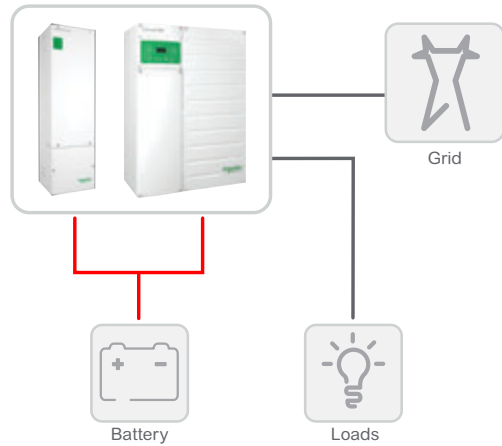
DC Coupling

Pros:

- More efficient if prioritizing storage of PV for later use (e.g. residential, off-grid communities)
- Battery inverter is sized to match the load.
- Supports black start. If the battery inverter shuts down due to discharged battery and no PV, the system automatically recovers through DC charging when PV returns).

Cons:

- PV inverter must be replaced with charge controller for retrofit systems.
- Less efficient if loads are coincident with PV generation.



DC coupled system

Five Steps to Sizing The Solution You Need

When sizing any solar and storage system it is important to always work backwards – understand the load you want to run. Understand when you want to run it (day or night) and for how long. Based on this, the design engineer can select the inverters, the PV array sizing and size the battery bank (or storage).

Step

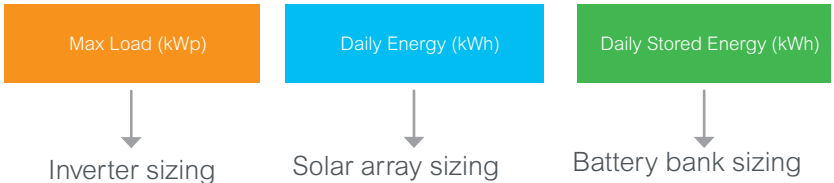
1

Load Profile

Always start here. Understand how much power your system needs to provide at its highest point in demand and also understand how many kWh of power needs to be produced on a daily basis.

Also determine how much energy needs to be stored in kWh for night time usage daily.

Three things to determine:



Step

2

Inverter Sizing

Once the maximum instantaneous power of a given site is determined, we know what the peak power rating of our inverters should be.

It is also important to make sure that all the critical loads can be run for enough time. Be aware of the inverters capabilities over time and at different temperature ranges.

Step

3

Solar Array Sizing

It is sized based on daily kWh and whether grid export is allowed. Decide AC coupling or DC coupling or both.

1. Size the array that will fulfill your daytime consumption requirements. For larger systems this will typically be installed on grid tied inverters (AC Coupled).
2. Size the array that will charge your batteries for night time usage. For most systems this will be installed on charge controllers (DC Coupled).

Step

4

Battery Bank Sizing

Depending on the weather conditions where your installation is taking place, nighttime consumption of your system and the storage technology suited for you site, it is recommended that the battery bank be sized with a reasonable oversizing factor to ensure uninterrupted supply of power.

Battery bank sizing should take into account the system use case such as self-consumption or time-of-use rate optimization. It may as consider the household critical loads and desired number of hours of autonomy in case of a grid failure.

Step

5

Back-up Power Sources

If you are installing a system in an area with extended periods of bad weather or very heavy loads that only run occasionally you may need to install a backup generator or get a grid connection to ensure that you have the excess power available.

Work closely with your installer to understand this, simply installing a generator for emergency or exceptional conditions can drastically reduce what you need to spend on your overall system.

6

Using Two Generators with The Conext™ XW+ / XW Pro

Summary: The Conext™ XW+ multi-mode inverters offer a broad flexibility to accommodate your application needs. Some off-grid installations (e.g. remote hospitals, resorts, etc), use multiple energy sources to increase autonomy and maximize resiliency. One solution is the use of two generators to add redundancy.

The Conext™ XW is a perfect solution for redundant generator application. The two AC inputs on the XW can be used to manage the two AC sources. Two Conext™ AGSs will also have to be installed in the system to control the generators. To setup the system, stagger the following configuration settings:

- Select a primary generator and configure the start/stop triggers on the associated Conext™ AGS as appropriate.
- On the back up AGS, set the start/stop configuration settings slightly lower than on chosen for the primary AGS.



Conext™ XW+ storage inverter / charger

6

Once installed and configured, simply select the primary running generator by configuring the “AC source priority” parameter on the Master in the XW System. The primary generator will always start first since trigger settings are higher. If the primary generator does not start for any reason (e.g. out of fuel) the battery voltage or battery State of Charge (SoC) will continue to drop. Eventually the trigger conditions for the second AGS will be met and the back-up generator will start.

Li-ion Compatibility



Blue Planet Energy

Integration with Schneider Electric

Blue Planet Energy has megawatt-hours of fielded energy storage systems coupled with Schneider Electric Conext™ series inverter / chargers and solar charge controllers. These systems power grid-independent residences in off-grid and non-export energy markets, as well as commercial installations that provide business continuity, resilience, and financial savings. As part of an American Red Cross resilience project, Blue Planet Energy and Schneider Electric power more than 100 emergency shelters in schools located throughout Puerto Rico.

Blue Ion 2.0 integrates seamlessly with Schneider Electric power conversion equipment. The open-loop communication configuration requires a single voltage setpoint. Blue Ion's high-power BMU optimizes battery charging down to the cell-pack level, while providing best-in-class online system performance monitoring. Together, Schneider Electric and Blue Planet Energy offer integrators a field-proven solution for durable, high-performance solar energy storage projects



Designed, assembled, and tested in Hawaii by Blue Planet Energy, Blue Ion is a best-in-class energy storage system that provides unparalleled safety, reliability, and performance. Our company, design process, and craftsmanship are guided by Aloha, a Hawaiian principle that encompasses love, patience, attention, kindness, respect, and a connection to nature.

Website

BluePlanetenergy.com

Contact

Sales@BluePlanetEnergy.com

Product Highlights

Blue Ion 2.0 is precisely engineered to offer simple, fast, and repeatable design and installation. It offers the safety of Lithium Ferrous Phosphate (LFP), the confidence of a 15-year performance warranty, and the durability of 100% depth of discharge with no impact on cycle life. Every Blue Ion system you install is backed by the coolest and most experienced team in energy storage.

Listed to UL 9540, Blue Ion 2.0 is available with configurable energy capacities of 8 kWh, 12 kWh, and 16 kWh. Integrators can parallel units for a maximum system capacity of 448 kWh. Blue ion 2.0 has a continuous power rating of 8 kW and surges to 10 kW for 30 minutes and 17 kW for one second. It supports AC- and DC-coupled system topologies as well as seamless integration with 3-phase services.

7

Discover AES LiFePO₄ Batteries

Integration with Schneider Electric

Discover AES LiFePO₄ batteries are built for demanding off-grid, whole home backup and microgrid applications. Discover AES batteries offer 1C continuous charge / discharge capabilities for the fastest recharge possible and support 3C peak output to handle in-rush and starting loads. They are field serviceable and have a 10-year replacement warranty. Each battery has an independent Battery Management System (BMS) that can be networked with up to 20 Discover AES batteries in parallel (133 kWh) and will communicate directly with the world's leading hybrid inverter systems.

Discover AES batteries are Xanbus devices for easy, plug-and-play integration with Schneider Electric Conext™ series inverter / chargers or direct connection with the Conext™ Gateway. Closed-loop communication provides real-time battery data/status reporting over the Xanbus network and enables the internal BMS to automatically set, optimize and dynamically manage the charge and discharge configuration of Conext™ inverter / chargers. Dynamic charge control offers up to 25% improvement in 0% to 100% SoC recharge time compared to open loop control.

Product Highlights

Discover AES LiFePO₄ 6.65 kWh

- p/n 42-48-6650
- Useful 6.65 kWh (130 Ah) 100% DoD
- Nominal: 51.2 V
- Continuous Discharge / Charge: 130 A (each)
- Peak Current: 300 A (each)
- Communication: Xanbus, CAN, Modbus TCP / IP
- Parallel: Up to 20 batteries per network string
- IEC 62133, UL 1973, UN 38.3

Discover AES LiFePO₄ 2.8 kWh

- p/n 44-24-2800
- Useful 2.8 kWh (110 Ah) 100% DoD
- Nominal: 25.6 V
- Continuous Discharge / Charge: 110 A (each)
- Peak Current: 300 A (each)
- Communication: Xanbus, CAN, Modbus TCP / IP
- Parallel: Up to 20 batteries per network string
- IEC 62133, UL 1973, UN 38.3

Discover[®]
Innovative Battery Solutions

Discover Battery is a leader in energy storage innovation for solar, transportation and motive applications. Our battery brands include AES LiFePO₄, Advanced Tubular, MIXTECH, Gel Cell and Dry Cell.

Discover Battery is a Canadian company headquartered in Vancouver, BC with offices and distribution around the world and multiple manufacturing facilities located in Asia.

Website

discoverbattery.com/solar

Contact

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Fortress Power

Integration with Schneider Electric

Fortress Power deploys self-managed Battery Management System (BMS) which can be easily integrated into Schneider Electric equipment. Using open loop control, the installer simply configures the battery charging and discharging parameters (high and low cut off voltage, max. charging and discharging current, etc.) via Conext™ System Control Panel.

The Fortress eVault 18.5 has CAN and RS 485 ports for communication.

Product Highlights

eVault 18.5: 48V, 360AH, total energy 18.5kWh, max. 12 units in parallel for 222kWh; CAN/RS 485 communication

LFP-10: 48V, 100AH, total energy 10 kWh, max 2 in parallel; no communication

LFP-5K-48V: 48V, 100AH, total energy 5kWh, max 2 in parallel; no communication

LFP-5K-24V: 24V, 200AH, total energy 5kWh, max 2 in parallel; no communication



Fortress Power is a Pennsylvania-based global leader in lithium battery manufacturing that focuses on helping solar installers use the safest and most reliable energy storage for their projects.

Fortress Lithium Iron Phosphate Battery has industry-leading technology with a Battery Management System that integrates multilevel safety concepts for best reliability.

The High-Performance Fortress Lithium Battery is easy to install, safe, long lasting and super-efficient. It provides a low lifetime energy cost for both new solar customers and retrofit customers.

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Pylontech



Integration with Schneider Electric

Pylontech batteries are set up for BMS communication with Schneider Electric's Conext™ XW Pro and Conext™ Gateway. The Pylontech batteries operate with closed-loop control with the XW Pro inverter, using the Conext™ Gateway as the CAN interface with the BMS.

Compatible Conext™ Gateway and Conext™ XW Pro firmware is expected in Q4 2019.

Product Highlights

US2000:

- 48V nominal
- 50Ah, 2.4 kWh
- Up to 8 battery packs in parallel, expandable with LV-Hub
- CAN, RS485 communication



US3000:

- 48 V nominal
- 74 Ah, 3.552 kWh
- Up to 8 battery packs in parallel, expandable with LV-Hub
- CAN, RS485 communication



LV-Hub

- Connect up to 5 battery piles
- Each battery pile can configure maximum 8 pcs US2000 or US3000



Pylontech is a unique manufacturer of lithium batteries with vertical integration from cell to module integration with its own BMS for different ESS application. With self-developed key technologies and dedication to ESS applications, Pylontech has delivered over 1.6GWh of batteries for the global ESS market since 2013.

Pylontech is proudly contributing our strength in changing the way people generating, transferring and using the electricity.

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SimpliPhi Power

Integration with Schneider Electric



SimpliPhi's entire line of non-hazardous LFP PHI batteries have been successfully integrated with Schneider Electric inverters worldwide for nearly a decade in a diverse range of on- and off-grid residential, commercial and microgrid applications.

SimpliPhi also offers its all-in-one AccESS Energy Storage System featuring 3 or 4 PHI 3.8 kWh batteries with the Conext™ XW+, with both AC Coupled or DC Coupled options, prewired in a NEMA-3R-rated cabinet. The Rule 21 compliant AccESS with Schneider Electric is ideal for backup power, TOU, peak-shaving, and self-consumption of solar, and UPS functions.



PHI Battery Product Features

- Up to 100% DoD and 98% efficiency
- 10-year, 10,000-cycle warranty
- LFP battery chemistry free of cobalt hazards —no risk of overheating, fire, fumes or off-gassing
- No thermal monitoring, fire suppression, cooling or ventilation equipment required
- Indoor and outdoor use in all climates
- Modular and scalable
- Can install in small or unique spaces
- Full range of capacity and voltage options



SimpliPhi Power designs and manufactures efficient, non-toxic and enduring energy storage and management systems that utilize lithium ferro phosphate (LFP) battery chemistry. Based in Oxnard, California, SimpliPhi combines the nonhazardous LFP chemistry with its proprietary cell and battery architecture, power electronics, Battery Management System (BMS) and manufacturing processes to create safe, reliable, durable and highly scalable on-demand power solutions for residential, commercial and emergency response applications. Integral to all SimpliPhi solutions is a proprietary management system that further optimizes the lifecycle, efficiency, overall performance and durability of its batteries. SimpliPhi storage system components are UL certified and have been rigorously tested and passed requirements by the U.S. Army and Marine Corps.

Website

simpliphipower.com/

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Coming in 2020

Insight - Schneider Electric's new energy management platform for solar & storage applications



Customer Success Stories



“The village is now able to access to electricity 24 hours from our Minigrid - where they used to have only 4 hours per day.

I would like to thank Schneider Electric for their supports and commitments throughout the project.”

— Barani Aung, Managing Director of Techno-Hill Engineering

Learn more at solar.schneider-electric.com/myanmar

Europe, Middle East and Africa

● Commercial application ● Residential application



Germany
Commercial rooftop



Finland
Commercial rooftop



Finland
Commercial rooftop

Rooftop solar in total PV capability over 1,200 kW installed by Aii Energy Systems. Production is used for self-consumption.

Solution: 19 units of CL-60E string inverters.



UK
Commercial rooftop



France
Commercial rooftop



Spain
Off-grid solar



Ukraine
Commercial rooftop



Egypt
PV plant



Nigeria
Commercial off-grid

170 schools and 11 healthcare centers throughout Lagos State powered by solar

Solution: XW+ inverter / chargers with the online monitoring solution

Learn more at solar.schneider-electric.com/nigeria



Nigeria
Microgrids



South Africa
Residential off-grid

One Everton - A South African flagship for community energy independence

Solution: centralized storage solution using nine XW+ inverters

Learn more at solar.schneider-electric.com/one-everton

Asia Pacific

● Commercial application ● Residential application



Myanmar Microgrids

Powering a remote fishing and farming village in Kenti island

Solution: microgrid solution using six XW+ inverter / chargers with 14 MPPT 60 charge controllers that are connected to 288,000 Ah battery bank.

Learn more at solar.schneider-electric.com/myanmar



Indonesia Off-grid solar



Philippines Telecom Tower



Australia Battery storage solution



Indonesia Off-grid DC-coupled systems

Electrification of 60 remote villages across Indonesian islands

Solution: off-grid DC-coupled solar systems range in capacity from 15kW to 75kW, using XW+ inverters and MPPT 60 charge controllers.

Learn more at solar.schneider-electric.com/indonesia



New Zealand Residential off-grid

Portable all-in-one energy supply alternatives in New Zealand

Solution: solar battery system using three XW+ inverters, four MPPT 80 charge controllers, and the monitoring solution. The battery bank was composed of eight Li-ion batteries.

Learn more at solar.schneider-electric.com/new-zealand

North and South America

● Commercial application ● Residential application



California, USA
Off-grid solar



Ontario, Canada
Off-grid solar



Vermont, USA
Residential off-grid

Homeowner in VT gains energy independence from the grid

Solution: multi-cluster off-grid system including XW+ inverter / chargers, MPPT 80 600 charge controllers and compatible batteries



Hawaii, USA



Puerto Rico
Microgrids

100 schools are powered by Microgrids through Red Cross's community resiliency project

Solution: microgrids using XW+ inverter / chargers, MPPT 60/80 charge controllers and other communication devices.

Learn more at solar.schneider-electric.com/red-cross



Argentina
Microgrid



Schneider Electric Industries SAS
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