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

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

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.

Schneider Electric: the global specialist in energy management and automation

Schneider Electric provides energy and automation digital solutions for efficiency and sustainability. We combine world-leading energy technologies, real-time automation, software and services into integrated solutions for homes, buildings, data centers, infrastructure and industries. For more information about Schneider Electric, please visit our global website at www.se.com/ww/en/about-us/company-profile/.

5%
of revenue devoted to R&D

27.2 billion
2019 revenue

41%
of revenues in new economies

135,000+
employees in over 100 countries

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

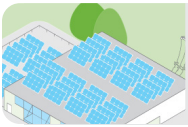
CL-60, CL50, CL36, and CL33 string inverters

We offer 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, CL33, CL36, CL50 and CL-60 offer the same flexibility, reliability, and easy setup, but with an added advantage of higher kVA rated power.

Commercial applications

Commercial rooftop solar for self-consumption with storage



Rooftop for feed-in-tariff / net metering

PV-Diesel hybridization

* CL36 & CL-60E only

String Inverters Now Compatible with Insight Energy Management

Monitor your solar system onsite or remotely with our control devices and software. For more information about Insight Energy Management, please see page 10.

String inverters

String inverters

The ideal solution for commercial and industrial buildings, carports, PV Diesel Hybrid and AC-Coupled systems.

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

	Part number	Product name	Description
	PVSCL60E	CL-60E (IEC standard)	• 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
	PVSCL36E	CL36 (IEC standard)	• 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
	PVSCL50E	CL50 (IEC standard)	• 55 kVA AC max. output power • 1100 V DC max. input voltage • 500 - 850 V MPPT voltage range for nominal power • 5 MPPT / max. 10 inputs • 98.7% max. efficiency
	PVSCL33E	CL33 (IEC Standard)	• 36.3 kVA AC max. output power • 1100 V DC max. input voltage • 500 - 850 V MPPT voltage range for nominal power • 3 MPPT / max. 6 inputs • 98.6% max. efficiency

Hybrid inverter and charger controller solutions for residential and commercial applications

Hybrid Inverters and Charge Controllers

Our hybrid inverters manage power conversion and battery charging, while our charge controllers optimize the solar energy harvest. 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.

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Residential applications

Residential grid-tie solar with battery backup

Residential self-consumption with storage

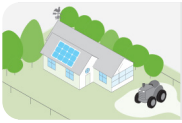
Residential off-grid

Residential backup power

Commercial applications

Commercial rooftop solar for self-consumption with storage

Commercial backup power



Commercial off-grid

Microgrids

Telecom towers

Hybrid inverter systems

XW Pro

Adaptable and scalable, the 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	XW Pro 8.5 kW 230V	• 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

XW+

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 XW+ is a scalable system. The Schneider Electric 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	XW+ 8.5 kW 230V	• 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 systems

SW

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

The 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	SW 4024 230V	• 4000 W overload 30 min • 7000 W overload 5 sec • 90 A maximum output charge current • 24 VDC nominal battery voltage
	865-4048-55	SW 4048 230V	• 4400 W overload 30 min • 7000 W overload 5 sec • 45 A maximum output charge current • 48 VDC nominal battery voltage

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 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	• 3500 W maximum output power (48 V systems) • 12, 24, 36, 48, 60 V nominal battery voltage • 150 V max. PV array open circuit voltage • Compatible with XW Pro, XW+ and SW
	865-1032	Conext™ MPPT 80 600 Charge Controller	• 4800 W maximum output power (48 V systems) • 24 and 48 V nominal battery voltage. 600 Voc max. PV array • 1-2 PV string installs • Compatible with XW Pro, XW+ and SW
	865-1034	Conext™ MPPT 100 600 Charge Controller	• 6000 W maximum output power (48 V systems) • 24 and 48 V nominal battery voltage. 600 Voc max. PV array • 1-2 PV string installs • Compatible with XW Pro, XW+ and SW

Insight Energy Management solutions for residential and commercial applications

Local and remote monitoring

Insight is a powerful yet simple energy management platform and is a part of Schneider Electric's residential and commercial solar & storage ecosystem. It provides intuitive mobile and web-browser based interfaces for homeowners and installers alike.

Residential applications

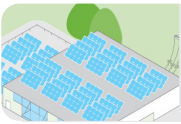
Residential grid-tie solar with battery backup

Residential self-consumption with storage

Residential off-grid

Residential backup power

Commercial applications



Rooftop for feed-in-tariff / net metering

Commercial rooftop solar for self-consumption with storage

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Insight and edge devices

Insight

Insight brings intuitive monitoring and control to both homeowners and commercial site operators as well as solar installers. Rich features such as monitoring, reporting, and remote control ensure that everyone can access critical system information when you need it from anywhere at any time.

	Description
	• Advanced data security. Compliance with international cybersecurity standards. • Access from anywhere at any time • Available through local, cloud, and mobile interfaces • Performance monitoring, reporting, and report control of your system • Multi-site management

Edge devices

Our edge devices connect customers' Schneider Electric solar and storage systems to the Insight app. InsightHome targets the residential solar and storage market globally. InsightFacility is for large residential and commercial solar and storage systems.

	Part number	Product name	Description
	865-0329	Conext™ Gateway	• Compatible with CL-60E, CL36, CL50, CL33, 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
	865-0330	InsightHome	• Compatible with CL-60E, CL36, CL50, CL33, XW Pro, XW+, SW and Conext™ accessories • Supports Xanbus, Canbus, and Modbus for connectivity to range of SE solar products • Support up to 25.5 kW of storage
	865-0335	InsightFacility	• Compatible with CL-60E, CL36, CL50, CL33, XW Pro, XW+, SW and Conext™ accessories • Supports Xanbus, Canbus, and Modbus for connectivity to range of SE solar products • Support up to 50 kW of storage

Download Insight mobile app that helps you stay on top of your energy

Download on the App Store

Google play

Broad range of balance of systems for residential and commercial applications

Power Distribution Panels 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

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Power Distribution Panels (PDP)

PDP and PDP accessories for XW systems

The XW PDP is factory-wired and labeled to support the integration of multiple XW Pro and XW+ hybrid inverters and MPPT Solar Charge Controllers with a single battery bank.

	Part number	Product name	Description
	865-1014-01	XW PDP (No AC circuit breakers)	• 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	• 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	• PDP accessory for connecting to XW series inverters and PDP • Wiring accessories not included

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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 XW Pro 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

Power Distribution Panels (PDP)

PDP and PDP accessories for SW systems

The 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	• 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	• AC breaker panel accessory for SW series inverters • Includes two 30 A AC breakers and one 60 A AC breaker

DC breaker accessories for XW Pro, XW+, and SW systems

	Part number	Product name	Description
	865-DCBRK-250	250A, 160VDC, Panel Mount DC Breaker	• XW / SW PDP accessory for inverter/charger connection to battery
	865-DCBRK-125	125A, 125VDC, Panel Mount DC Breaker	• XW / SW PDP accessory for MPPT 100 600 connection to battery
	865-DCBRK-100	100A, 125VDC, Panel Mount DC Breaker	• XW / SW PDP accessory for MPPT 80 600 connection to battery
	865-DCBRK-80	80A, 125VDC, Panel Mount DC Breaker	• XW / SW PDP accessory for MPPT 60 150 connection to battery
	865-DCBRK-60	60A, 160VDC, Panel Mount DC Breaker	• XW / SW PDP accessory for MPPT 60 150 input connection to PV array. Not used when the MPPT 60 150 is installed with MPPT Disconnect RS

Accessories

Accessories for XW Pro, XW+ and SW systems

	Part number	Product name	Description
	865-1155-01	Conext™ Configuration Tool	• 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)	• Control panel to set up and monitor the inverter charger system
	865-1060-01	Conext™ Automatic Generator Start (AGS)	• 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	• Indicates hours of battery based runtime and determines battery bank state of charge. • Compatible with XW Pro, XW+ and SW, as well as MPPT charge controllers

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System Configurations / Bill of Materials

AC- and DC-Coupled systems using XW series storage inverters

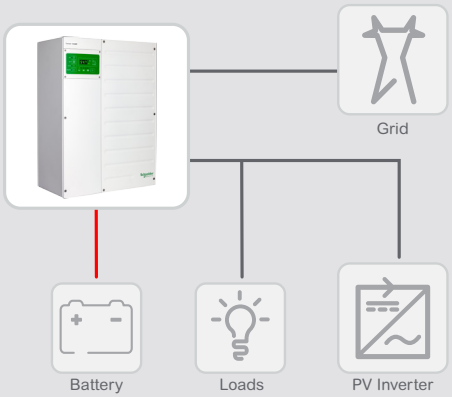
Flexible, ultimate backup power performance

The XW series inverters paired with MPPT charge controllers will provide ultimate backup performance while keeping flexible configurations. Our solutions are suitable for both AC-Coupling and DC-Coupling.

AC-Coupling

AC-Coupling is a great option if your customer's goal is retrofitting the existing PV system with a storage solution, or the loads coincide with PV generation. Our XW series inverters are compatible with third-party inverters and microinverters.

AC-Coupling Configuration Example



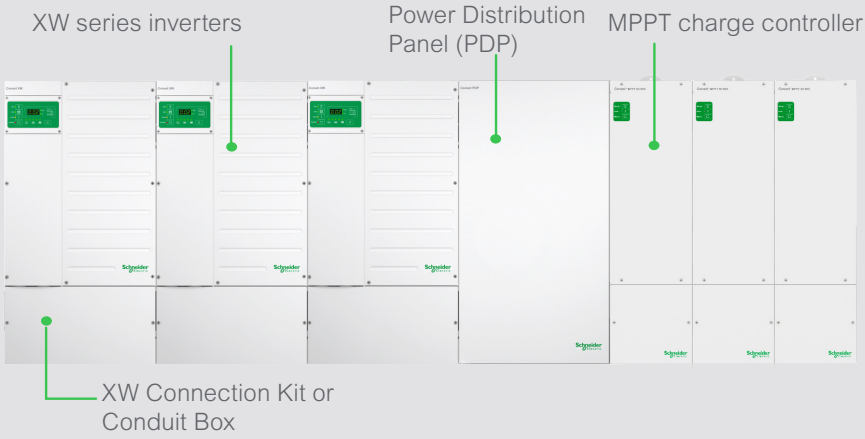
Read more about AC Coupling vs DC-Coupling

Learn advantages and disadvantages of each approach in Tech Notes.
See Page 34.

DC-Coupling

Prioritize storage of solar energy for later use with DC-Coupling. DC-Coupling is also suitable for prolonged blackouts. If the battery inverter shuts down due to discharged battery and no PV, the system automatically recovers through DC charging when PV returns).

DC-Coupling Configuration Example



Example system configurations for each system size

In the following pages, we show example ordering information for some typical configurations. Other configurations are also possible such as adding additional MPPT charge controllers. Please refer to each product's specifications and manuals for more information.

Residential 230 V Split Phase Example System

	Part Number	Solar w/ 8.5 kW Storage	Solar w/ 17 kW Storage	Solar w/ 25.5 kW Storage
Storage inverters				
XW Pro or XW+	865-8548-55 or 865-8548-61	1	2	3
Charge Controller Solutions for DC-Coupling[1]				
MPPT 100 600 or MPPT 80 600 or MPPT 60 150	865-1034 or 865-1032 or 865-1030-1	1	2	3
Power Distribution Panels[2]				
XW PDP without AC Breakers	865-1014-01	1	1	1
XW Connection Kit	865-1020-02	-	1	2
Charge Controller Output Breaker	Refer to DC breaker accessories	1	2	3
Monitoring and Control				
InsightHome or **Insight**Facility	865-0330 or 865-0335	1	1	1
Optional Accessories				
Automatic Generator Start	865-1060-01	1	1	1
Battery Monitor	865-1080-01	1	1	1

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[1] Additional charge controllers also require an additional charge controller output breaker. XW series inverters are also compatible with AC coupled PV inverters.

[2] AC breakers and bypass interlocks are purchased separately. Refer to the XW+ or XW Pro installation guides for detailed wiring diagrams.

Three Phase Example System

	Part Number	Solar w/ 25.5 kW Storage
Storage inverters		
XW Pro or XW+	865-8548-55 or 865-8548-61	3
Charge Controller Solutions for DC-Coupling[1]		
MPPT 100 600 or MPPT 80 600	865-1034 or 865-1032	3
Power Distribution Panels		
XW PDP without AC Breakers	865-1014-01	1
XW Connection Kit	865-1020-02	2
Charge Controller Output Breaker	Refer to DC breaker accessories (p. 15)	3
Optional: Extra AC Breakers for Generator Integration	Refer to AC breaker accessories	One 3-pole
Manual Bypass		Included with 865-1315-01
Monitoring and Control		
InsightHome or **Insight**Facility	865-0330 or 865-0335	1
Optional Accessories		
Automatic Generator Start	865-1060-01	1
Battery Monitor	865-1080-01	1

[1] Additional charge controllers also require an additional charge controller output breaker. XW series inverters are also compatible with AC coupled PV inverters.

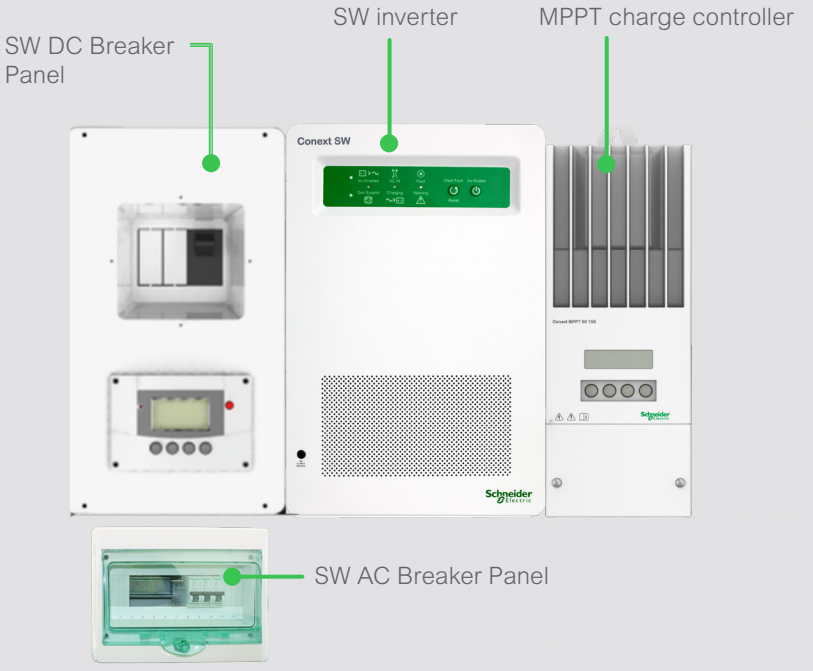
DC-Coupled systems using SW hybrid inverter/ charger

Proven hybrid inverter solution

The SW inverter paired with MPPT charge controllers is perfect for off-grid, backup power and self-consumption applications for small home systems.

For expanded off-grid capacity, SW can be integrated with generators. It's also self-consumption ready, able to prioritize solar consumption over the grid while maintaining zero grid export. The SW works with the grid to avoid peak utility charges and support the grid when utility supply is limited.

Configuration with the SW inverter



Example system configuration

The following table shows example ordering information for some typical configurations. Please refer to each product's specifications and manuals for more information.

	Part Number	Small Homes
Inverters and Charge Controller Solutions		
SW	865-4048	1
MPPT 100 600 or MPPT 80 600 or MPPT 60 150	865-1034 or 865-1032 or 865-1030-1	1
Power Distribution Panels		
SW DC Breaker Panel	865-1016	1
SW AC Breaker Panel 230V	865-1017-61	1
Charge Controller Output Breaker	Refer to DC breaker accessories (p. 15)	1
Monitoring and Control		
InsightHome or **Insight**Facility	865-0330 or 865-0335	1
Optional Accessories		
Automatic Generator Start	865-1060-01	1
Battery Monitor	865-1080-01	1

Introducing Insight, one platform you need for Energy Management

Keep track of all your installations with ease. Monitor and manage your portfolio of installations from a single platform.

Tech Notes

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

Summary: Schneider Electric's SW / XW+ / XW Pro 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. SW and XW series 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 battery inverters and charge controllers. The feature requires communication between the battery inverter and DC charge controller and therefore only works with Schneider Electric's solar and storage products.

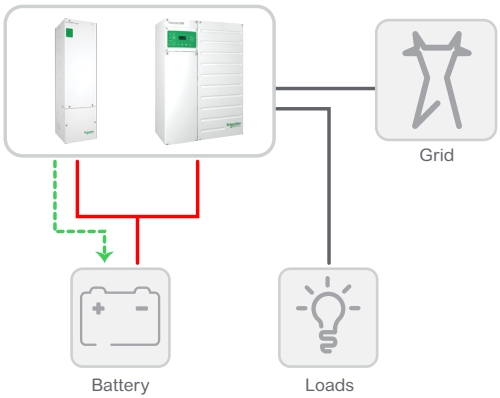
Enhanced Grid Support (EGS) applies to grid connected systems, for applications where the battery inverter is used for back-up or to maximize self-consumption. When EGS is active, the battery inverter and charge controller interact continuously during Bulk, Absorption and Float stages of charging. Through 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.

Why is unique about this?

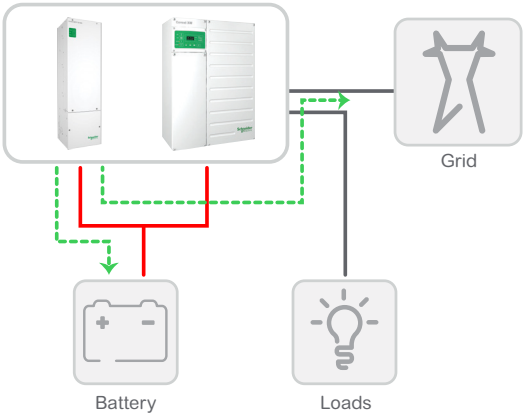
1. The Charge controller(s) are able to execute a full two or three stage charge cycle, to optimally charge the battery. This allows the battery to be charged at a charging voltage associated with each charge stage (Bulk, Absorption, Float) and efficiently returns the battery to a full state of charge. 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

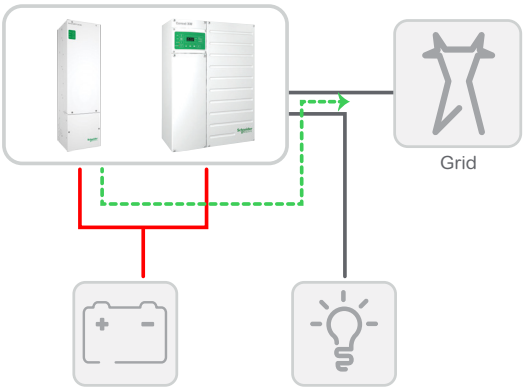


Just like Smart Charge for AC Coupled systems, Enhanced Grid Support is designed to maximize and prioritize storage loads. The value of this feature is that the stored energy can be used later when rates are higher (Time-of-Use). Or in applications where the grid is intermittent, EGS prioritizes storage 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, I**nsight**Home or **Insight**Facility needs to be installed in the system.

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

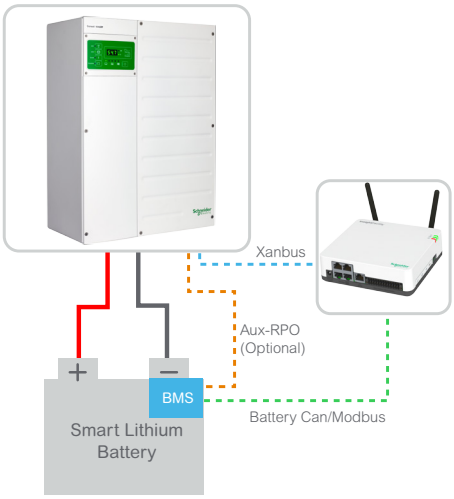
Float stage



Using Lithium-ion & Advanced Batteries with Our Hybrid Inverters & 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.The XW and SW series inverters now support operation with lithium batteries to increase your options for storage technology.

The 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.



Lithium-ion battery with closed loop control

InsightHome and **Insight**Facility retrieve the relevant charging and discharging parameters from the battery BMS and intelligently controls operation of the XW/ SW inverter and charge controller system accordingly. This type of control is known as closed loop control and allows the Schneider Electric solar and storage system to adapt to battery BMS operating limits, warnings and in real time. It is also possible to use your Schneider Electric Solar product with Lithium batteries that do not rely on communication with the inverter. Such lithium batteries are referred to as Lead Acid replacements.

For information on supported lithium battery models, please contact your battery manufacturer or Schneider Electric application engineers.

Benefits of 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 SW 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.

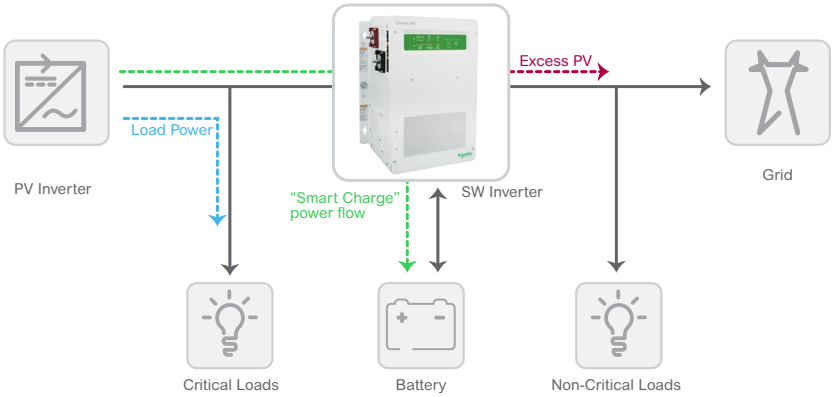
When smart charge is active, the battery inverter monitors the flow of excess PV power produced by the PV inverter flowing in through the AC Load terminal and out to the grid port. The battery inverter intelligently captures the excess PV power and re-directs it to charge the battery. As the battery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

SW inverter

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

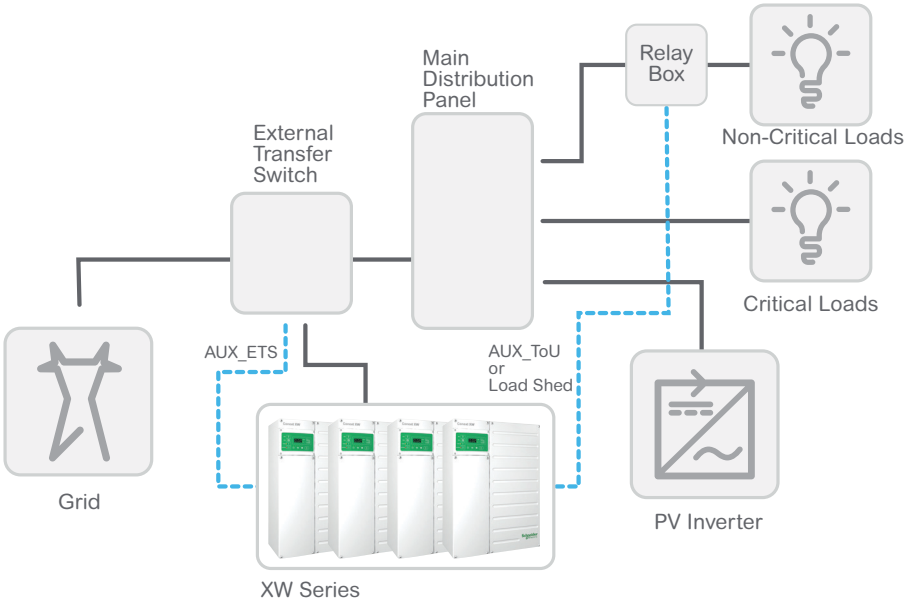
Getting the most out of XW+/ XW Pro Auxiliary Control Port

Summary: Schneider Electric's 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:

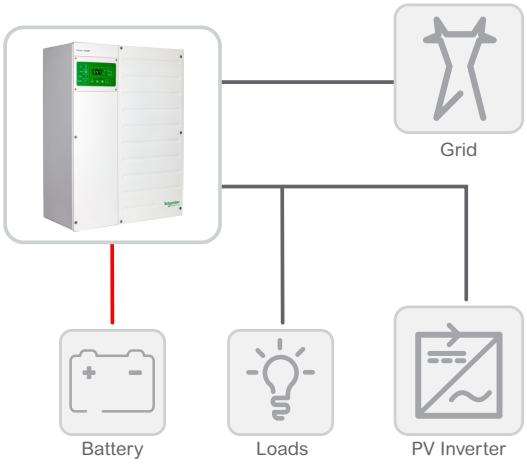
AC Coupling

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

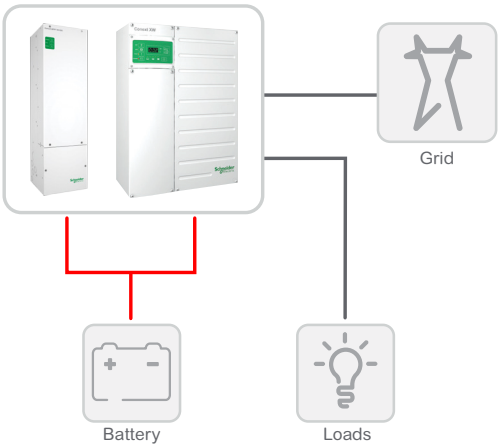
DC Coupling

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).

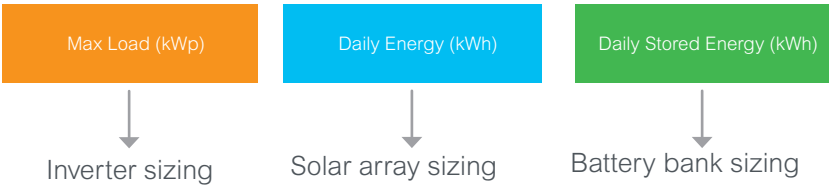
Step 1

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.

Using Two Generators with XW+ / XW Pro

Summary: The XW+ and XW Pro 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 XW Pro 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.

XW Pro hybrid inverter

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 hybrid inverters 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

BLUE PLANET ENERGY

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.

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Discover AES $LiFePO_4$ Batteries

Integration with Schneider Electric

Discover AES $LiFePO_4$ 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 hybrid inverters or direct connection with **Insight**Home or **Insight**Facility. 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 Schneider Electric hybrid inverters. Dynamic charge control offers up to 25% improvement in 0% to 100% SoC recharge time compared to open loop control.

Discover®
Innovative Battery Solutions

Discover Battery is a leader in energy storage innovation for solar, transportation and motive applications. Our battery brands include AES $LiFePO_4$, 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

solarsales@discoverbattery.com

Product Highlights

Discover AES $LiFePO_4$ 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 $LiFePO_4$ 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

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Fortress Power

Integration with Schneider Electric

Fortress Power deploys self-managed Battery Management System (BMS) which can to 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 **Insight**Home or **Insight**Facility.

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

eFlex 5.4: 48V, 105 AH, total energy 5.4 kWh, max 15 units in parallel; 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.

Website

www.fortresspower.com

Contact

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Tel: +1 (877) 497 6937

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Pylontech

Integration with Schneider Electric

Pylontech batteries are set up for BMS communication with Schneider Electric's XW Pro and **Insight**Home/ **Insight**Facility. The Pylontech batteries operate with closed-loop control with the XW Pro inverter, using the **Insight**Home/ **Insight**Facility as the CAN interface with the BMS.

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.

Website

www.pylontech.com.cn

Contact

Commercial: Rita.ping@pylontech.com.cn

Technical: Spenser.cheung@pylontech.com.cn

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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 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
Power. On Your Terms.™

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/

Contact
sales@simpliphipower.com

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Register Schneider Electric solar products at SEsolar.com/registration for free extended warranty

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

Ukraine
Commercial rooftop

Spain
Off-grid solar

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

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

Nigeria
Microgrids

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 SEsolar.com/myanmar

Philippines
Telecom Tower

Indonesia

Electrification of 60 remote villages across Indonesian islands

Learn more at SEsolar.com/indonesia

Australia
Battery storage solution

Indonesia
Off-grid solar

Australia 3-Phase solar + storage system

Living independently and resiliently off grid

Solution: solar and storage system using XW Pro inverters and MPPT 80 charge controllers.

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 SEsolar.com/new-zealand

North and South America

Commercial application Residential application

Ontario, Canada
Off-grid solar

California, USA
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

Life Is On | Schneider Electric

Schneider Electric Solar Spain
Avenida de Tenerife 4
San Sebastian de los Reyes
28703 Madrid
Spain

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