Conext™ XW+ Commissioning Checklist

976-0329-01-01/A
July 2015
Application Note

⚠ DANGER

RISK OF FIRE, ELECTRIC SHOCK, EXPLOSION, AND ARC FLASH

This Application Note is in addition to, and incorporates by reference, the relevant product manuals for each product in the Conext series. Before reviewing this Application Note you must read the relevant product manuals. Unless specified, information on safety, specifications, installation, and operation is as shown in the primary documentation received with the product. Ensure you are familiar with that information before proceeding.

Failure to follow these instructions will result in death or serious injury.

Objective

This Application Note consists of a step-by-step checklist which serves as a guideline for the commissioning engineer and a commissioning device information table which is used to record all devices that are used in the power system.

The commissioning engineer uses this Application Note to facilitate the commissioning procedure beginning with pre-commissioning activities, to actual commissioning including powering up and configuration, testing the operation of the devices, and ending the procedure with after commissioning work. All these activities ensure smooth functionality of the system.

Author: Edna Seah. For local customer technical support go to: http://solar.schneider-electric.com/tech-support.

Use Case Scenario

A typical XW+ power system consists of Conext XW+ inverter/chargers, MPPT Solar Charge Controllers, Conext accessories such as System Control Panel, Automatic Generator Start ComBox, Battery Monitor, and Balance of Systems (BOS) protection boxes like the XW+ Power Distribution Panel.

This Application Note is based on a typical scenario listed below of a single phase installation with PV arrays (also called, solar or photovoltaic arrays) using one battery bank and the following list of equipment and their quantity.

Conext Product	Product Number	Quantity
XW+ inverter/charger - XW+ 6848 NA	865-6848-01	2
MPPT 80 600 solar charge controller	865-1032	4
System Control Panel - SCP	865-1050	1
Automatic Generator Start - AGS	865-1060	1
ComBox monitoring device	865-1058	1
Battery Monitor - BM	865-1080-01	1
XW+ Power Distribution Panel (PDP)	865-1015-01	1
XW+ Installation Kit for INV2, INV3 PDP	865-1020-01	1
120/240 VAC Breaker Kit for the XW+ PDP	865-1215-01	1

Introduction

The commissioning checklist is split into five sections arranged sequentially: Pre-commissioning, Commissioning, Powering Up and Configuration, Basic Equipment Operational Test, and Post Commissioning.

Commissioning Checklist

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Any equipment must only be installed and serviced by qualified electrical personnel.
- Never operate equipment energized with covers removed.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.

Failure to follow these instructions will result in death or serious injury.

① Pre-Commissioning

Verify the power system design (Design Verification) by checking the following:

✍	Single Line Diagram File and Version:		
✍	Communication Network Design File and Version:		
	XW+ inverter/charger Master & Slave function ❑	AC output connection:	
		Three-phase ❑	
✍	# of Xanbus devices connected to 1 ComBox:	Single-phase ❑	
	Equipment's protection gear and rating, wire gauge sizing compliant to local code ❑	Number of battery strings per battery bank as per battery manufacturer's recommendation ❑	

XW+ System Commissioning Device Information

1. Fill up Table 2, "Conext XW+ System Commissioning Device Information Table" on page 11.
2. Fill up the devices' serial numbers in the "Conext XW+ System Commissioning Device Information Table" and identify if any firmware upgrade is needed for the devices.

② Commissioning

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Any equipment must only be installed and serviced by qualified electrical personnel.
- Never operate equipment energized with covers removed.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.

Failure to follow these instructions will result in death or serious injury.

Visual Inspection

1. Equipment mounted securely	❑
2. Thermal ventilation of the equipment	❑
Allowance of spacing above and below equipment according to the installation guide.	
3. Environmental condition	❑
Suitable for NEMA Type 1, IP20 Indoor, and according to battery manufacturer guidelines	
4. Separated conduits and “trunking” for DC, AC, and communication cables	❑
NOTE: Communication cables should cross electrical cables at 90° angle.	
5. Color coding for cables (see Table 1)	❑

Table 1 Typical Cable Colors Used in the System

Cable Type	Cable Description	Typical Color
AC synch communication cable	CAT5E straight cable	Blue
Xanbus communication cable	CAT5E straight cable	White
Modbus RS485 communication cable	Shielded twisted pair cable (2 or 4 wire)	Black
Battery Temperature Sensor cable	AWM20251 E213453 4C cable	Grey
Ethernet cable	CAT5E Patch cord crossover cable	Green
Analog signal cable	CAT5E straight cable	Orange

Verification of Installation against Design

1. Photovoltaic Array Module			
	a. Module rating	❑	b. Number of modules in string and number of string ❑
	c. Module frame grounding (or wiring grounding)		❑
2. Array Combiner Box			

	a.	Protection devices - brand ❑ type ❑ rating ❑ all to be switched off ❑	b.	Conductor - wire gauge ❑ insulation class ❑ labeling ❑ polarity connection ❑ torque ❑	
	c.	Enclosure grounding ❑	d.	Check array open circuit voltage is within MPPT limit ❑	
3.	Photovoltaic Disconnect Switch				
	a.	Switch is to be turned OFF ❑	b.	Check the switch incoming voltage = 0 V ❑	
	c.	Conductor - wire gauge ❑ insulation class ❑ labeling ❑ polarity connection ❑ torque ❑	d.	Chassis grounding ❑	
4.	Conext MPPT 80 600 Solar Charge Controller				
	a.	Check the photovoltaic incoming ❑ and battery outgoing voltage = 0 V ❑	b.	Conductor - wire gauge ❑ insulation class ❑ labeling ❑ polarity connection ❑ torque ❑	
	c.	Check for MPPT internal ground fault protection. ❑ For grounded array: is fuse installed? ❑ For ungrounded array: is fuse removed? ❑	d.	Chassis grounding ❑	
	e.	Xanbus cable connection. ❑ End of network: Install a network terminator ❑			
5.	Battery Protection and Battery Monitoring system				
	a.	Protection devices - brand ❑ type ❑ rating ❑ all to be switched off ❑	b.	Conductor - wire gauge ❑ insulation class ❑ labeling ❑ polarity connection ❑ torque ❑	
	c.	Analogue signal cable connection ❑	d.	Battery shunt – Total current carrying capacity not more than rated capacity of 500A, ❑ If rated capacity is more than 500A, provide the correct rated battery shunt ❑	
6.	XW+ PDP				
	a.	Protection devices - AC off? ❑ DC off? ❑	b.	Conductor - polarity connection, ❑ torque per install guide ❑	

	c.	Battery incoming cables – less than 15 feet (4.5m), If more than 15 feet (4.5m), all battery incoming cables have to be of equal length		❑ ❑
7.	XW+ inverter/chargers			
	a.	Conductor - for DC and AC cable: polarity connection, ❑ torque per install guide ❑	b.	Communication cable – AC synch cable connection, ❑ Xanbus cable connection, ❑ End of network: Install a network terminator, ❑ Battery temperature sensor cable connection ❑
8.	AGS			
	a.	Communication cable - Xanbus cable connection, End of network: Install a network terminator, Generator signal: number of signal cables, correct wire connection		❑ ❑ ❑ ❑
9.	SCP			
	a.	Communication cable – Xanbus cable connection, End of network: Install a network terminator		❑ ❑
10.	Conext ComBox			
	a.	Communication cable – Xanbus cable connection, End of network: Install a network terminator		❑ ❑

③ Powering Up and Configuration

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Any equipment must only be installed and serviced by qualified electrical personnel.
- Never operate equipment energized with covers removed.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.

Failure to follow these instructions will result in death or serious injury.

1.	Turn ON the DC battery connections to XW+ inverter/charger, MPPT Solar Charge Controller and Battery Monitor.	❑
2.	XW+ inverter/charger should be turned ON and be on Standby mode. Displays **STB** on the LED screen.	❑
3.	Check that all devices can be detected on the SCP. If not, check the Xanbus cables.	❑ ❑
4.	Write down all firmware versions of the devices in the "Conext XW+ System Commissioning Device Information Table" (see Table 2). If needed, update the firmware. Check http://solar.schneider-electric.com for the latest.	❑ ❑
5.	Configure each device setting according to the sequence below.	
	a. XW+ Multi Unit configuration setting	❑
	b. XW+ Charger setting	❑
	c. XW+ Inverter and AC setting	❑
	d. XW+ Auxiliary setting and Advance features	❑
	e. MPPT Solar Charge Controller setting	❑
	f. Battery Monitor	❑
	g. Automatic Generator Start - AGS	❑
	h. Conext ComBox	❑

NOTE: Configuring device settings are done using either of these devices: SCP, Conext Configuration Tool, or ComBox.

④ Basic Equipment Operational Test

NOTE: Put all devices into operational mode in order to begin testing their individual functional capabilities.

For the XW+ inverter/charger, the basic operational test consists of 3 parts: Invert, Pass-through, and Charge.

XW+ Invert

1.	Switch the XW+ inverter/charger to Operating mode. The XW+ inverter/charger status should be on **Inverting**.	❑
2.	Measure the XW+ inverter/charger output voltage (L-N).	❑
3.	Verify that the output voltages of the XW+ inverter/chargers are within 0.5Vac difference between each other.	❑
	By reading from the SCP, if you find that the difference in output voltages is more than 0.5Vac, you have to change the XW+ inverter output voltage closer to nominal voltage using the Conext Configuration Tool AI. For more information, please consult with a Schneider Electric Solution Application Engineer.	❑

XW+ Pass-through

1.	Switch the XW+ inverter/charger to Standby mode.	❑
2.	Turn ON the AC1 grid incoming breaker and ensure the Bypass switch is turned OFF.	❑
3.	Measure the AC1 terminal on the XW+ inverter/charger for grid voltage.	❑
4.	Check for zero AC voltage on the sub panel/critical load panel.	❑
	If the AC voltage on the sub panel/critical load panel is not zero, check the wiring of the sub panel/critical load panel because there maybe leakage from the AC main panel to the sub panel.	❑
5.	Check for zero voltage at the AC load terminal on the XW+ inverter/charger.	❑
6.	Turn OFF the AC1 grid incoming breaker.	❑
7.	Disable the XW+ inverter function.	❑
8.	Switch the XW+ inverter/charger to Operating mode.	❑
9.	Turn ON the AC1 grid incoming breaker and ensure the Bypass switch is turned OFF.	❑
10.	Check for grid voltage at the AC load terminal on the XW+ inverter/charger.	❑

XW+ Charge

1.	Switch the XW+ inverter/charger to Standby mode.	❑
2.	Enable the XW+ charger function.	❑
3.	Switch the XW+ inverter/charger to Operating mode.	❑
4.	Enable the XW+ charger force charge function.	❑
5.	Check for the charging current on the XW+ inverter/charger and the Battery Monitor.	❑
6.	Check for current at the battery cable.	❑

Charge Controller

1.	Switch the XW+ inverter/charger to Standby mode.	❑
2.	Turn ON the PV disconnect switch and the Array Combiner Box.	❑
3.	Check for charging current value on the MPPT Solar Charge Controller.	❑
4.	Observe voltage increase on the battery bank and check for current at the battery cable.	❑

Automatic Generator Start

1.	Set the Automatic Generator Start to Manual On.	❑
2.	Check for the generator to crank up and start up.	❑
3.	Set the Automatic Generator Start to Manual Off.	❑
4.	Check for the generator to spin down and cool down.	❑

Final configuration check

Check all devices' configuration and make sure all configurations are reverted back to the system commissioning configuration settings.	❑

⑤ Post Commissioning

1.	Record (or save) the configuration settings of all the devices.	❑
	(Optional) Use the Conext Configuration Tool AI to save all devices' configuration into an xml file. ✍ Filename:	❑
2.	Take photos of the entire installation setup.	❑
3.	Complete the "Conext XW+ System Commissioning Device Information Table".	❑
4.	Review the "Commissioning Checklist" again for items that are not "checked off".	❑
	✍ Comments:	
5.	Record the differences between the system design and actual installation setup.	❑
	✍ Comments:	
6.	Recommend improvements on the installation setup.	❑
	✍ Comments:	

Exceptions and Precautions

NOTE: This commissioning checklist does not cover the additional commissioning step required in an XW+ multi-cluster system or in Modbus devices installed in the system.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Any equipment must only be installed and serviced by qualified electrical personnel.
- Never operate equipment energized with covers removed.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.

Failure to follow these instructions will result in death or serious injury.

Appendix

Table 2 Conext XW+ System Commissioning Device Information Table

Client Name:	**Date:**
Address/Location:	
Installation Company:	**Commissioning Engineer:**

Device Label	Association Names		Firmware Version	Serial Number	Unique (Silicon) ID
	DC Component	AC Component			

Example of DC component Association: Battery Bank Number
Examples of AC component Association: Phase Master or Phase Slave, Phase 1 or Phase 2 or Phase 3
Firmware versions are found through the SCP, ComBox, or Configuration Tool.
Serial Numbers are found on the equipment's ratings or product label.
Unique (Silicon ID) are found through the ComBox. This allows technical support to trace back the unit from manufacturing.