

## **PCS-RS40 Installation and Commissioning Checklist**

This checklist is intended as a quick reference guide to assist installation and commissioning of PCS-RS40 power conversion systems. It is not a substitute for thorough user's manual review and system-level engineering. If in doubt at any step, consult the user's manual. If the user's manual does not fully address your concern, please contact Trystar at 507.333.3990 for assistance.

Unit Model Number \_\_\_\_\_

Unit Serial Number \_\_\_\_\_

Installation Date \_\_\_\_\_

PCS INSTALLATION (individual unit)			
Step	Name	Description	Notes
<input type="checkbox"/>	1	Installation Environment	Ensure installation site meets environmental and physical constraints specified in user's manual.
<input type="checkbox"/>	2	DC and AC Voltages	Verify that battery voltage range and nominal AC grid voltage are within PCS operating voltage range specified in user's manual.
<input type="checkbox"/>	3	Unpacking	Verify that packaging is not damaged and verify the PCS's condition after unpacking.
<input type="checkbox"/>	4	PCS Installation	Install the PCS into the equipment rack. Be sure to only use Trystar supplied/authorized fasteners for securing mounting ears or brackets to the PCS. Verify adequate unit support for the application (rack shelf and/or rear mounting brackets) and ensure mounting bolts are properly tightened.
<input type="checkbox"/>	5	Ventilation	Ensure a minimum of 35mm (1 3/8") in front and behind unit to facilitate air flow.
<input type="checkbox"/>	6	DC and AC Power Connections	Ensure AC and DC power is off at the distribution panel. Connect cables per user's manual, ensuring that terminals are torqued to specifications. Double check DC connection polarity.
<input type="checkbox"/>	7	Over Current Protection	Ensure that AC branch and DC battery overcurrent protectors are appropriate for selected cable sizes and comply with local code requirements. <b>Note, the PCS front panel supplemental protector is not rated for branch circuit protection.</b>
<input type="checkbox"/>	8	Ground Cable	Ensure ground cable is properly attached and torqued to specifications.
<input type="checkbox"/>	9	Connect Commissioning Laptop	Connect laptop running Trystar Power Studio using a temporary commissioning test cable per PCS and Power Studio user's manuals. <b>Note, commissioning cable should include terminating jumper unless a separate jumper is installed on redundant PCS connector.</b>
<input type="checkbox"/>	10	Document Product	Record unit model and serial numbers, and installation date in space provided above.
<input type="checkbox"/>	11	Photograph Installation	Take photographs of unit installation, being sure to capture mounting and cabling details.

PCS COMMISSIONING (individual unit)			
Step	Name	Description	Notes
<input type="checkbox"/>	1	Power Unit	Enable AC and DC power to unit.
<input type="checkbox"/>	2	Verify Voltages	Measure AC and DC terminal voltages and verify that they are within the operating range specified in the user's manual.
<input type="checkbox"/>	3	Enable Bias Power	Assert the Bias_EN to enable internal bias power. <b>Note, the ESTOP pin must be driven high to disarm the ESTOP.</b>
<input type="checkbox"/>	4	Verify Communication	Using Trystar Power Studio, verify communication with PCS following instructions in Power Studio user's manual.
<input type="checkbox"/>	5	Download Configuration Settings	Using Trystar Power Studio, download previously developed configurations settings to PCS following instructions in Power Studio user's manual. <b>Note, default settings may not be appropriate for all installations and should be adjusted during initial engineering work.</b>
<input type="checkbox"/>	6	Verify Configuration Settings	Using Trystar Power Studio, verify configuration download completed successfully. Consult Power Studio user's manual for configuration readback instructions.
<input type="checkbox"/>	7	Enable Front Panel Breaker	If not already in the On position, enable the PCS's front panel circuit breaker.
<input type="checkbox"/>	8	Full Charge Power [1]	Command rated system charge power. Verify that the reported power matches the expected value. Verify no unexpected warnings are displayed.
<input type="checkbox"/>	9	Full Discharge Power [1]	Command rated system discharge power. Verify that the reported power matches the expected value. Verify no unexpected warnings are displayed.
<input type="checkbox"/>	10	Thermal Image [2]	Command rated charge or discharge power. Capture thermal image(s) using thermal imaging camera at five-minute intervals until temperature stabilizes. Verify cable and terminal temperatures are within ratings and local code requirements, allowing for additional temperature rise when operating at maximum ambient temperature.

<input type="checkbox"/>	11	Disable Bias Power	De-assert the Bias_EN to disable internal bias power. Note, the PCS should always be disabled using this input before removing high voltage power to ensure proper data logging operation.	
<input type="checkbox"/>	12	Connect System Control Cable [3]	Ensure AC and DC power is off at the distribution panel. Disconnect commissioning test control cable and connect system communication cable. Verify that serial communications terminating resistor jumper installed if not included in system communication cable.	
<input type="checkbox"/>	13	Power Unit	Enable AC and DC power to unit.	
<input type="checkbox"/>	14	Verify Operation Under EMS Control	Verify communication and operation through system-level energy management system (EMS) using documentation provided by EMS supplier.	

MULTI-PCS GANG COMMISSIONING [4]				
Step	Name	Description	Notes	
<input type="checkbox"/>	1	Individual Unit Commissioning	Commission each unit in a multi-gang system separately per the preceding PCS COMMISSIONING checklist. Be sure to set unique IDs for each PCS included in the gang.	
<input type="checkbox"/>	2	DC and AC Power Connections	Ensure AC and DC power is off at the distribution panel. Connect cables and/or bus bars to gang additional PCS units per user's manual, ensuring that terminals are torqued to specifications. Double check DC connection polarity.	
<input type="checkbox"/>	3	Configure multi-PCS gang Control Cable	Install control daisy chain cables between ganged units. Ensure terminating resistor jumper is installed on the last unit in the gang. <b>Note, only one terminating resistor may be connected, and it must be at the end of the daisy chain connection for proper operation.</b>	
<input type="checkbox"/>	4	Connect Commissioning Laptop	Connect laptop running Trystar Power Studio using a temporary commissioning test cable per PCS and Power Studio user's manuals. <b>Note, the commissioning cable should not include a terminating jumper to avoid over-terminating the bus.</b>	
<input type="checkbox"/>	5	Power System	Enable AC and DC power to unit.	

<input type="checkbox"/>	6	Verify Voltages	Measure AC and DC terminal voltages and verify that they are within the operating range specified in the user's manual.	
<input type="checkbox"/>	7	Enable Bias Power	Assert the Bias_EN to enable internal bias power. <b>Note, the ESTOP pin must be driven high to disarm the ESTOP.</b>	
<input type="checkbox"/>	8	Enable Front Panel Breakers	If not already in the On position, enable each PCS's front panel circuit breaker.	
<input type="checkbox"/>	9	Verify Communication	Using Trystar Power Studio, verify communication with each PCS following instructions in Power Studio user's manual.	
<input type="checkbox"/>	10	Full Charge Power [1]	Command rated system charge power. Verify each unit's reported power matches the expected value. Verify no unexpected warnings are displayed.	
<input type="checkbox"/>	11	Full Discharge Power [1]	Command rated system discharge power. Verify each unit's reported power matches the expected value. Verify no unexpected warnings are displayed.	
<input type="checkbox"/>	12	Thermal Image [2]	Command rated charge or discharge power. Capture thermal image(s) using thermal imaging camera at five-minute intervals until temperature stabilizes. Verify cable and terminal temperatures are within ratings and local code requirements, allowing for additional temperature rise when operating at maximum ambient temperature.	
<input type="checkbox"/>	13	Disable Bias Power	De-assert the Bias_EN to disable internal bias power. <b>Note, the PCS should always be disabled using this input before removing high voltage power to ensure proper data logging operation.</b>	
<input type="checkbox"/>	14	Connect System Control Cable	Ensure AC and DC power is off at the distribution unit. Disconnect commissioning test control cable from first unit in gang and connect system communication cable.	
<input type="checkbox"/>	15	Power Unit	Enable AC and DC power to unit.	
<input type="checkbox"/>	16	Verify Operation Under EMS Control	Verify communication and operation through system-level energy management system (EMS) using documentation provided by EMS supplier.	

**Notes:**

1. Full charge/discharge operation is readily accommodated in most grid-connected applications. For grid-forming systems, test loads and secondary power sources are needed to fully exercise the system. When possible, Trystar recommends first commissioning the system grid-connected and then verifying grid-forming operation.
2. Trystar recommends thermal imaging cameras from Teledyne Flir - <https://www.flir.com/>. FLIR offers several cost-effective cameras for verifying connection and cable integrity under load.
3. Omit this step for systems incorporating two or more PCS units and first commission each PCS individually.
4. These are optional steps for systems incorporating two or more PCS units.



