

AEROCOMPACT®

COMPACTFLAT S

PV Hazard Control
System

UL 3741

PV HAZARD

CONTROL

INSTALLATION

ADDENDUM



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INTRODUCTION

AEROCOMPACT COMPACTFLAT S05, S10, S10+, AND S15 flat roof mounting systems are assembled in various orientations for mounting solar panels.

This document identifies the requirements to meet UL 3741 PV Hazard Control Standard for AEROCOMPACT COMPACTFLAT S05, S10, S10+, AND S15. Close adherence to this document and the installation manual are essential to meet UL 3741 requirements.

APPLICABLE DOCUMENTS

- UL 3741 Addendum
- Assembly instructions

ASSEMBLY INSTRUCTIONS

Assembly instructions describe the assembly procedure and must be strictly observed. Read assembly instructions carefully before starting the assembly. The personnel must have carefully read and understood instructions before starting any work. The basic prerequisite for safe working is compliance with all the safety notes and handling instructions given in the assembly instructions. Furthermore, the local accident prevention regulations and general safety regulations for the product's area of application apply.

WARNING: FOLLOW ALL INSTRUCTIONS TO REDUCE THE RISK OF HARM.

INSTALLER QUALIFICATIONS

Installation may only be carried out by a specialist company and must be carried out strictly in accordance with the specifications in the installation instructions, the project report and the planning documents. A specialized company is one that is familiar with the installation and maintenance of photovoltaic systems as part of its normal business operations. National and site-specific building codes, standards and environmental protection must be strictly adhered to. Trainee personnel may only perform work under the instruction and supervision of skilled personnel who are authorized to train personnel.

SAFETY

- The installation professional shall ensure that the necessary safety measures and the relevant provisions of labor law and occupational health and safety law are observed during the assembly of products from AEROCOMPACT Inc.
- Areas below the roof on which work is being carried out must be protected from any falling objects. Where this fails, the affected areas shall be closed to the public and to unauthorized personnel.
- Only use suitable, intact and tested ladders. Set up and secure ladders according to instructions. Separate rules apply to mechanical climbing aids (elevators, cherry pickers, etc.).
- Skylights, skylights, large vents, etc. usually cannot withstand the weight or impact of a person. Such objects must be secured in a similar way as the edge of the roof.
- Personal protective equipment is used to protect persons from impairment of safety and health at work. Personnel must wear personal protective equipment during assembly.

UL LISTED EQUIPMENT INCLUDED IN COMPACTFLAT S UL 3741

The COMPACTFLAT S grounding method conforms to ANSI/UL 2703, and is approved for use with photovoltaic modules listed under ANSI/UL 1703 and/or ANSI/UL 61730, whichever applies, and complies with the National Electrical Code, ANSI/NFPA 70.

The following equipment is included in the COMPACTFLAT S PV Hazard Control System:

COMPACTFLAT S RACKING (UL 2703 Listed)

- S05
- S10
- S15
- S10+

WIRE MANAGEMENT

- *AEROCOMPACT Cable Pipes: 706551, 706554, 706557 (evaluated in this application)
- *AEROCOMPACT Pipe Bracket: 706562 (evaluated in this application)
- *HellermanTyton Cable Tie: 156-02230 (UL 62275 Listed)
- *Wire Clips (UL 1565 Listed)
 - All Wire clips must be installed under the solar module, and not outside the boundary of the solar panel frame.

RACKING ACCESSORIES

- *SnapNrack MLPE Rail Attachment Kit: 242-02151 (UL 2703 Listed)

*Optional Equipment

WIRE MANAGEMENT CONTINUED

- *PV Wire (UL 4703 Listed)
- *PV Connectors (UL 6703 Listed) shall be compatible and approved for the application
- *Listed Conduit (all sizes apply)
 - Electrical Metallic Tubing (EMT) (UL 797 Listed)
 - Rigid Metal Conduit (RMC) (UL 6 Listed)
 - Intermediate Metal Conduit (IMC) (UL 1242 Listed)
- *Listed Tubing, Fittings, and Grounding Components
- *Ray Tray Solar Wire Management System (UL 870 Listed)

*Optional Equipment



Intertek
CONFORMS TO
UL STD 3741

Note: All PVHC system components, including inverter connections, must be installed within the array boundary

UL LISTED EQUIPMENT INCLUDED IN COMPACTFLAT S UL 3741

Canadian Solar Inverters

CSI-75K-T480GL03-U | CSI-80K-T480GL03-U
CSI-90K-T480GL03-U | CSI-100K-T480GL03-U

Chint Inverters

SCA25KTL-DO/US-208 | SCA25KTL-DO-R/US-480
SCA36KTL-DO/US-480 | SCA50KTL-DO/US-480
SCA60KTL-DO/US-480

SMA Core 1 Inverters

STP 33-US-41 | STP 50-US-41 | STP 62-US-41

Solectria Inverters

PVI 25TL-208
PVI 25TL-480-R
PVI 50TL-480
PVI 60TL-480

Solis Inverters

1P3.6K-4G-US PLUS | 1P5K-4G-US PLUS
1P6K-4G-US PLUS | 1P7.6K-4G-US PLUS
1P10K-4G-US PLUS | 25K-US | 30K-US | 36K-US
40K-US | 60K-US | 66K-US | S5-GC75K-US
S5-GC80K-US | S5-GC90K-US | S5-GC100K-US

Fronius Inverters

Symo Advanced 10.0-3 208-240/Lite | Symo Advanced
12.0-3 208-240/Lite | Symo Advanced 15.0-3 480/Lite |
Symo Advanced 20.0-3 480/Lite
Symo Advanced 22.7-3 480/Lite | Symo Advanced 24.0-3
480/Lite

Sungrow Inverters

SG36CX-US | SG60CX-US

Enphase MLPE

IQ8-60 | IQ8PLUS-72 | IQ8M-72 | IQ8A-72 |
IQ8H-208-72 IQ8H-240-72 | IQ6PLUS-72-2-US |
IQ6PLUS-72-5-US IQ6-60-2-US | IQ6-60-5-US
| IQ6PLUS-72-ACM-US IQ6-60-ACM-US | IQ7-
60 | IQ7PLUS-72 | IQ7X-96 IQ7XS-96 | IQ7A

APSystems MLPE

DS3-H | DS3 | DS3-L | DS3-S

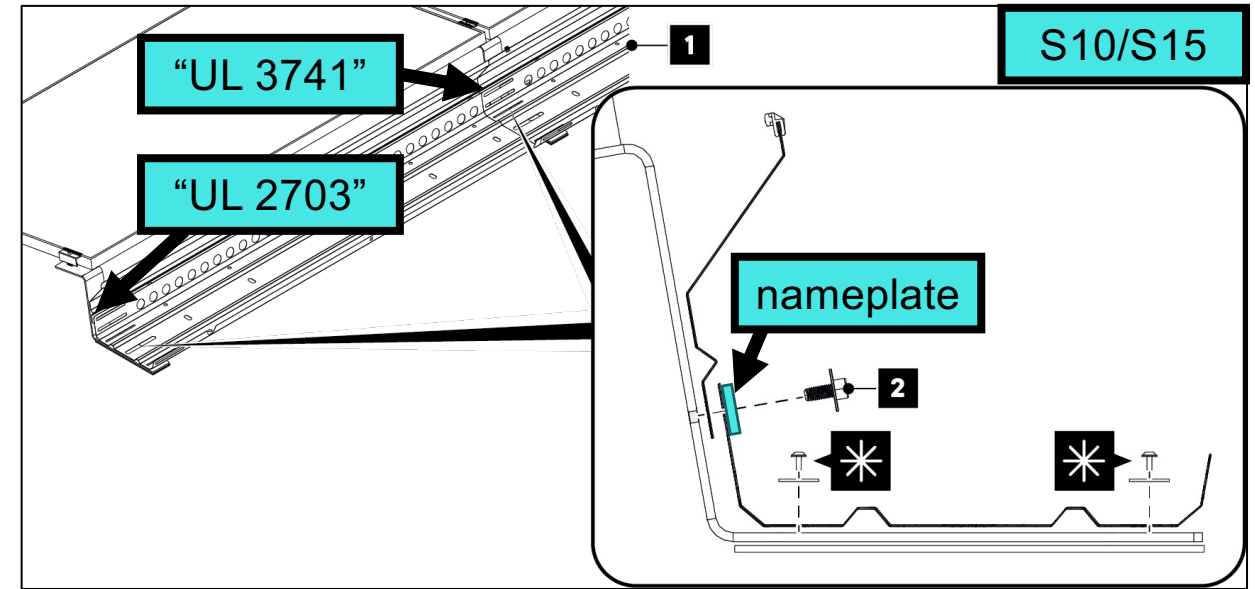
Solar Modules (UL 1703 Listed):

Please reference AEROCOMPACT UL 2703
certification for approved modules.

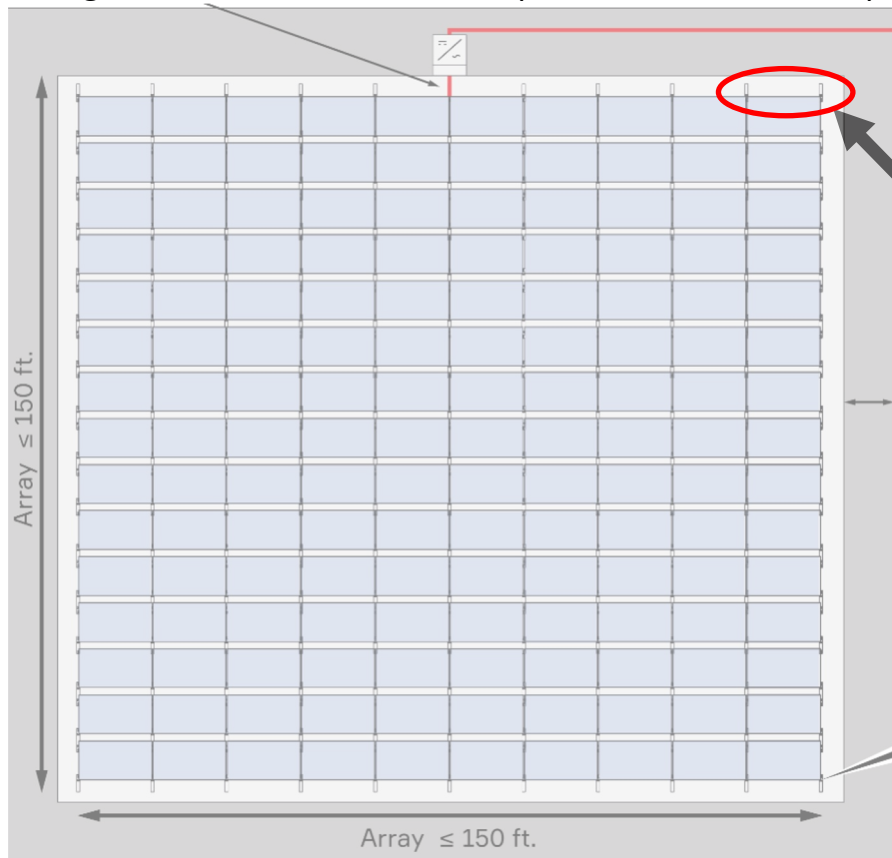
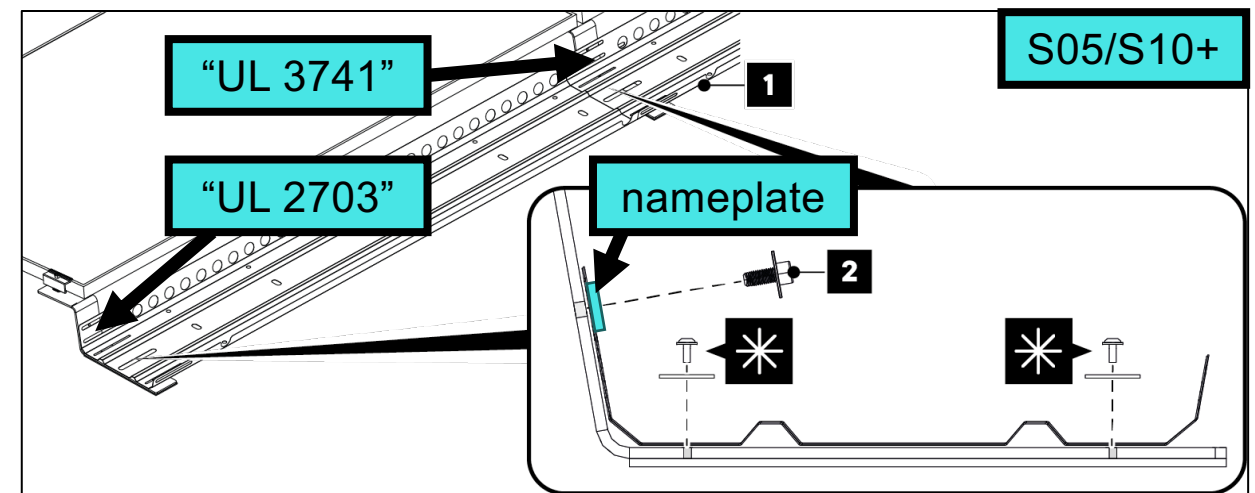
Note: All PVHC system components, including inverter connections, must be installed within the array boundary

MARKINGS

Markings are found on the AEROCOMPACT nameplates. There are two nameplates. One nameplate shows conformance to UL standard 2703, and the other nameplate shows conformance to UL standard 3741. Install the nameplates at the northern-most brackets of the east-most module. Install the nameplate showing conformance to UL standard 2703 at the east-most of the two brackets. Install the nameplate showing conformance to UL standard 3741 at the adjacent bracket. Install each nameplate using one M8x20 screw at the existing hole in the bracket. Install nameplates such that markings are visible. Tighten screws to 15NM (11ft-lbs / 132in-lbs).



Install the nameplates at the northern-most brackets of the east-most module.



INSTALLATION SCENARIOS

Scenarios shown below are examples of system configurations that comply with NEC 690.12(B) and meet requirements of UL 3741. These are example scenarios; other scenarios that provide a PV Hazard Control System that satisfies NEC 690.12(B) may exist.

SCENARIO 1: UL 3741 LISTED SYSTEM

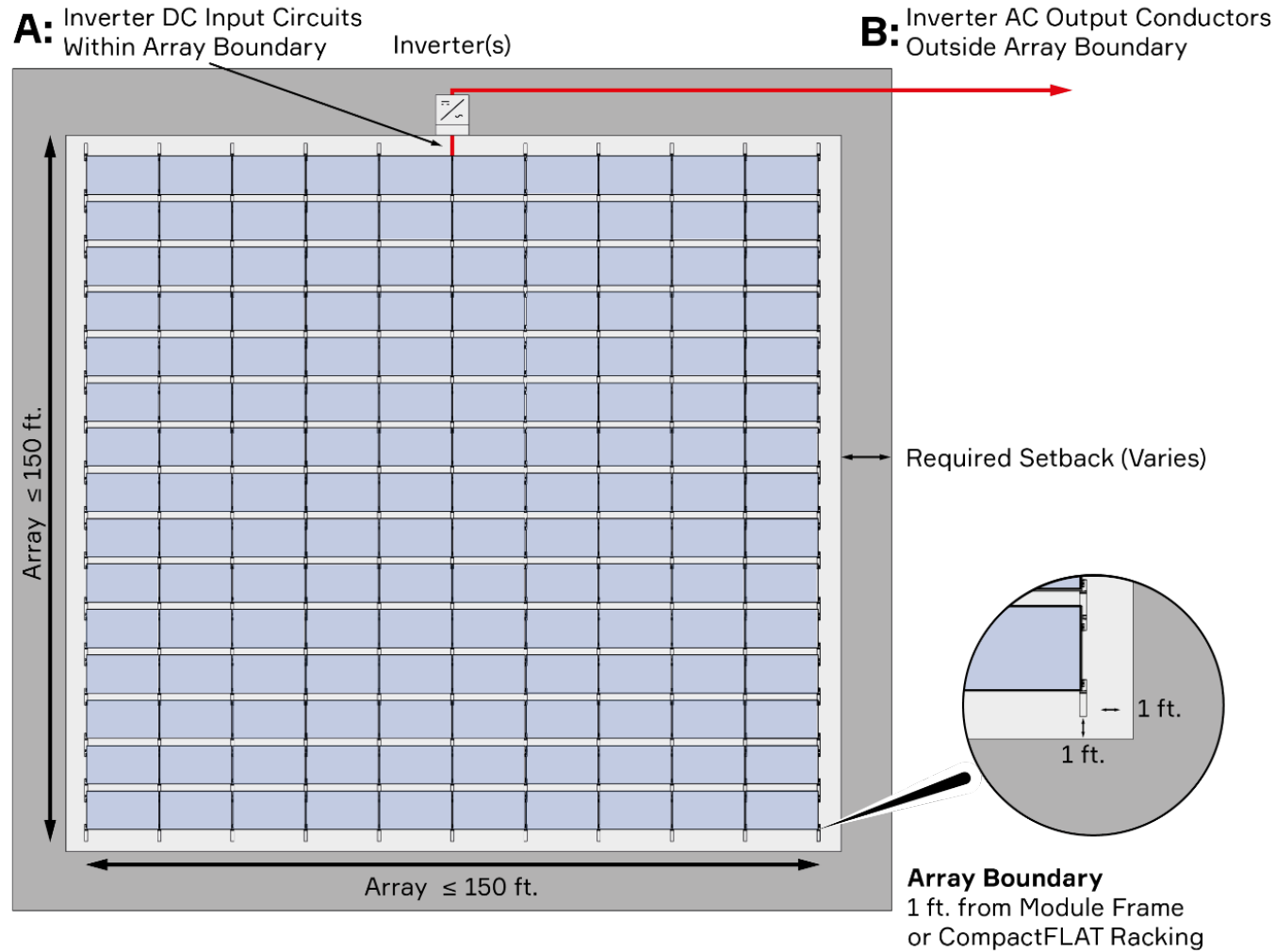
SCENARIO 2: UL 3741 LISTED SYSTEM WITH CONTIGUOUS SUB-ARRAY

SCENARIO 3: UL 3741 LISTED SYSTEM WITH NON-CONTIGUOUS SUB-ARRAY

SCENARIO 4: UL 3741 LISTED SYSTEM WITH MLPE SUB-ARRAY

UL 3741 ADDENDUM, SCENARIO 1:

PV ARRAY IS WITHIN THE ARRAY BOUNDARY; SCENARIO 1 COMPLIES WITH NEC 690.12



SCENARIO 1	REQUIREMENT	REQUIREMENT SATISFIED
NEC 690.12(B)(1)	CONDUCTORS OUTSIDE OF ARRAY BOUNDARY LIMITED TO 30V WITHIN 30 SECONDS AFTER RAPID SHUTDOWN INITIATION	YES
NEC 690.12(B)(2)(1)	PV HAZARD CONTROL SYSTEM INSTALLED	YES
NEC 690.7	ARRAY VOLTAGE NO GREATER THAN 1000 VOLTS	YES

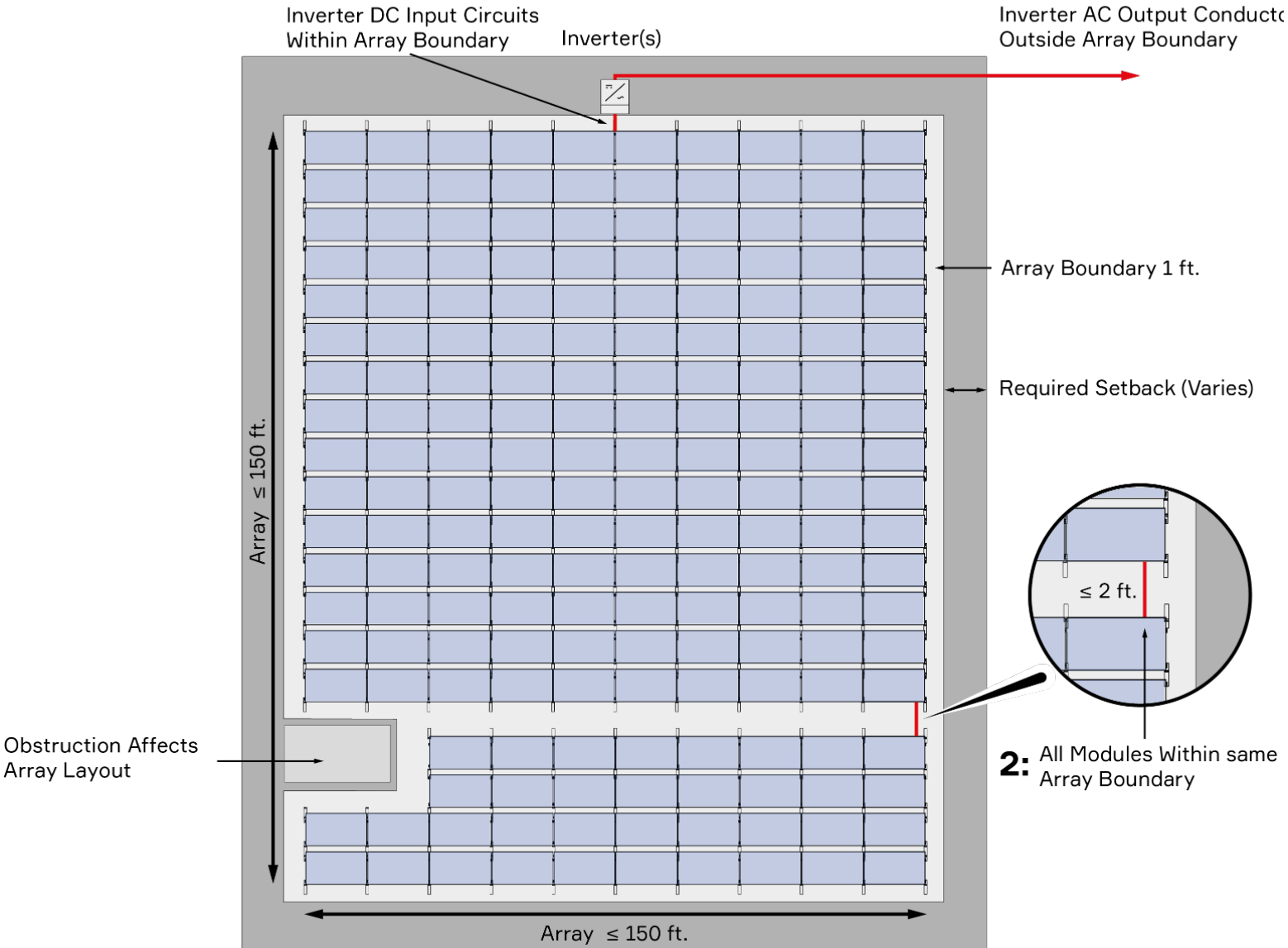
Scenario 1: PV Array satisfies NEC 690.12(B) requirement through an installed PV Hazard Control System.

All DC conductors are within the PV array boundary. No additional measures to reduce DC voltage are required after inverter shut down per NEC 690.12(B)(2)(1).

AC conductors are outside of array boundary and comply with NEC 690.12(B)(1) after inverter shut down. Note: Inverter must be UL listed and listed in this addendum.

UL 3741 ADDENDUM, SCENARIO 2:

SUBARRAY IS WITHIN ARRAY BOUNDARY; SCENARIO 2 COMPLIES WITH NEC 690.12



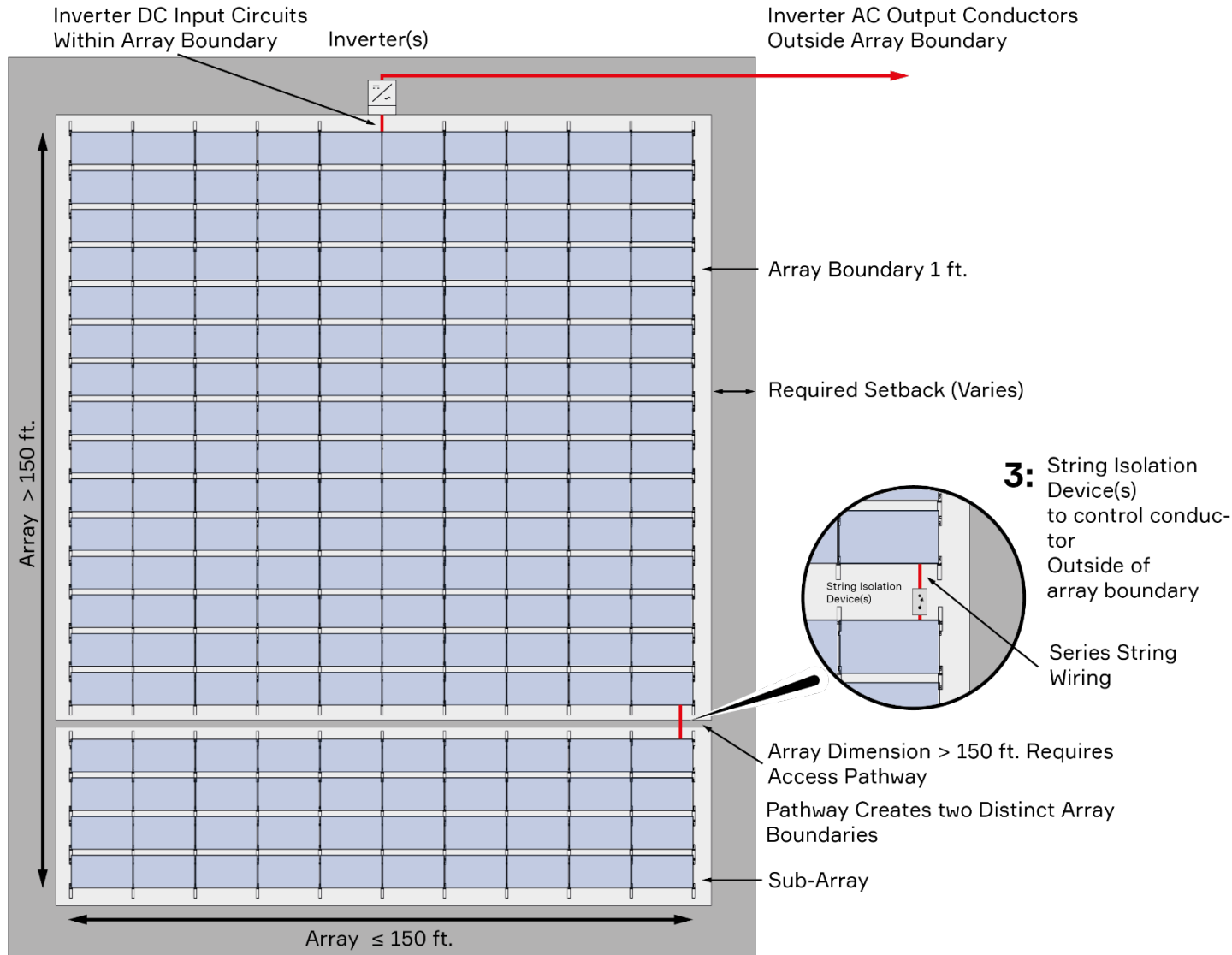
SCENARIO 2	REQUIREMENT	REQUIREMENT SATISFIED
NEC 690.12(B)(1)	CONDUCTORS OUTSIDE OF ARRAY BOUNDARY LIMITED TO 30V WITHIN 30 SECONDS AFTER RAPID SHUTDOWN INITIATION	YES
NEC 690.12(B)(2)(1)	PV HAZARD CONTROL SYSTEM INSTALLED	YES
NEC 690.7	ARRAY VOLTAGE NO GREATER THAN 1000 VOLTS	YES

Scenario 2: Array boundary is defined as 1 ft from the array in all directions. In Scenario 2, the subarray array boundary is within 1 ft of the array boundary and therefore the subarray is within the array boundary per NEC 690.12(B). Since the subarray is in the array boundary, no other control measures are necessary. Scenario 2 meets requirements outlined in NEC 690.12.

2: All Modules Within same Array Boundary

UL 3741 ADDENDUM, SCENARIO 3:

SUBARRAY IS OUTSIDE OF ARRAY BOUNDARY. CONDUCTORS OUTSIDE OF ARRAY BOUNDARY ARE CONTROLLED VIA STRING ISOLATION EQUIPMENT. SCENARIO 3 COMPLIES WITH NEC 690.12

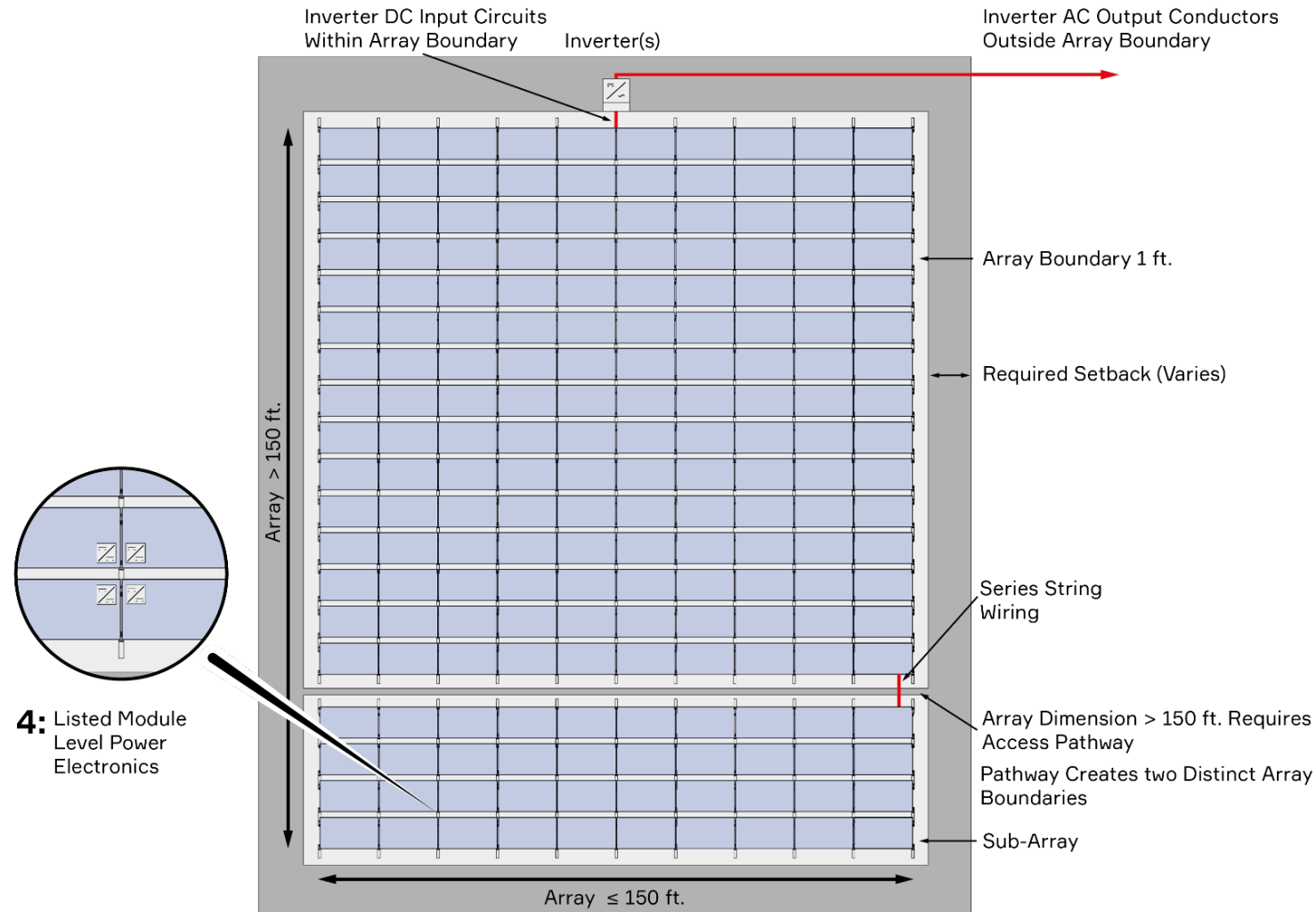


SCENARIO 3	REQUIREMENT	REQUIREMENT SATISFIED
NEC 690.12(B)(1)	CONDUCTORS OUTSIDE OF ARRAY BOUNDARY LIMITED TO 30V WITHIN 30 SECONDS AFTER RAPID SHUTDOWN INITIATION	YES
NEC 690.12(B)(2)(1)	PV HAZARD CONTROL SYSTEM INSTALLED	YES
NEC 690.7	ARRAY VOLTAGE NO GREATER THAN 1000 VOLTS	YES

Scenario 3: The subarray is outside of the array boundary; requirement NEC 690.12(B)(1) is met through the use listed string isolation device(s) that reduce the voltage of conductors outside the array to not more than 30V within 30 seconds of rapid shutdown initiation.

UL 3741 ADDENDUM, SCENARIO 4

SUBARRAY IS OUTSIDE OF ARRAY BOUNDARY. CONDUCTORS OUTSIDE OF ARRAY BOUNDARY ARE CONTROLLED VIA MODULE LEVEL POWER ELECTRONICS (MLPE). SCENARIO 4 COMPLIES WITH NEC 690.12



SCENARIO 4	REQUIREMENT	REQUIREMENT SATISFIED
NEC 690.12(B)(1)	CONDUCTORS OUTSIDE OF ARRAY BOUNDARY LIMITED TO 30V WITHIN 30 SECONDS AFTER RAPID SHUTDOWN INITIATION	YES
NEC 690.12(B)(2)(1)	PV HAZARD CONTROL SYSTEM INSTALLED	YES
NEC 690.12(B)(2)(2)	CONDUCTORS INSIDE OF ARRAY BOUNDARY LIMITED TO 80V WITHIN 30 SECONDS AFTER RAPID SHUTDOWN INITIATION	YES
NEC 690.7	ARRAY VOLTAGE NO GREATER THAN 1000 VOLTS	YES

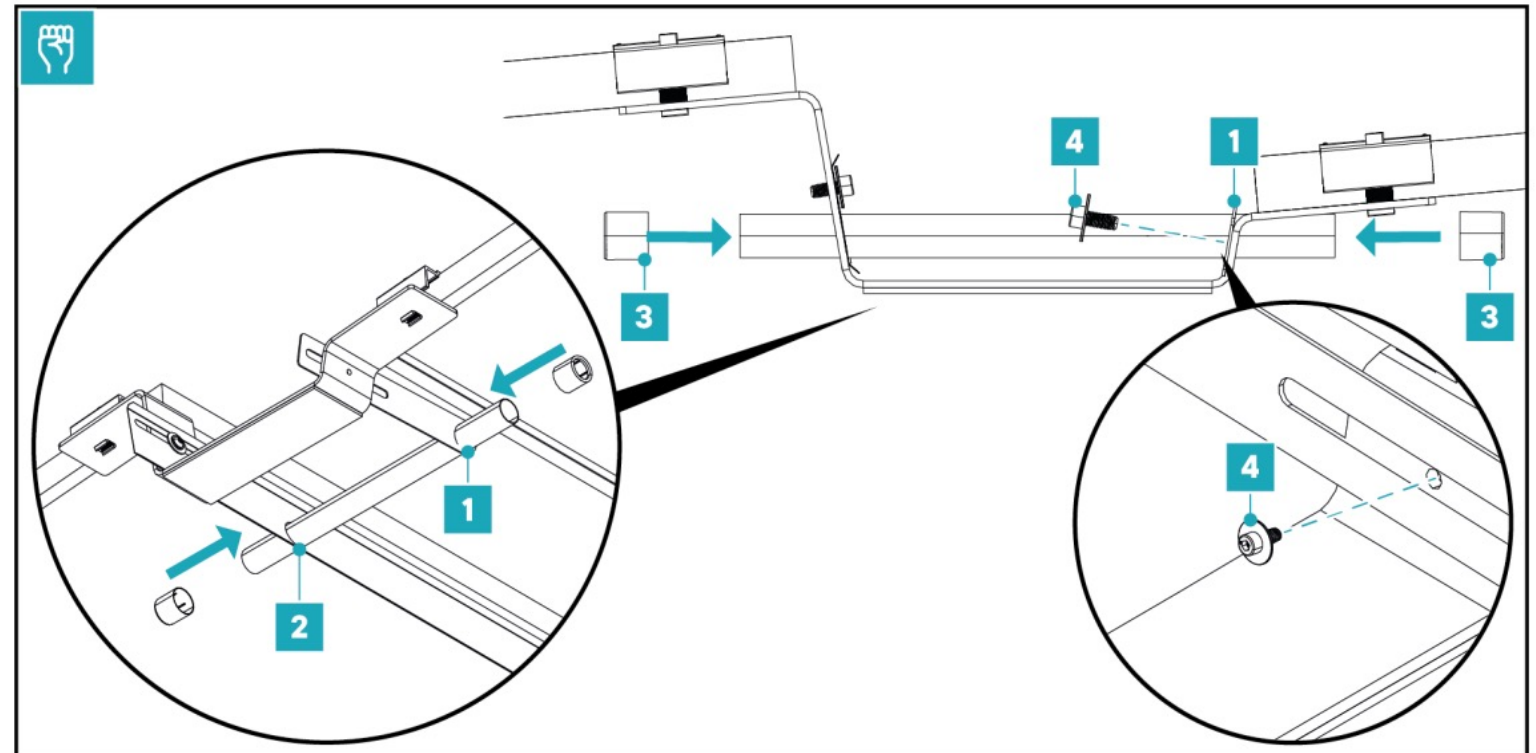
Scenario 4: The subarray is outside of the array boundary; requirement NEC 690.12(B)(1) and NEC 690.12(B)(2)(2) is met through the use listed module level power electronics (MLPE) at the subarray that reduce the voltage of conductors inside the array to not more than 80V within 30 seconds and reduce the voltage outside the subarray to not more than 30V within 30 seconds of shutdown initiation. The main array utilizes a PV Hazard Control System to comply with NEC 690.12.

WIRE MANAGEMENT

INSTRUCTIONS FOR WIRE MANAGEMENT

- All module wiring must be securely attached to the inside lip of the module with HellermanTyton 156-02230 Cable Ties to ensure that wiring never extends beyond the boundary of the module frame itself.
- All module connectors must be securely attached to the inside lip of the module frame, within 6 inches of the connector, using HellermanTyton 156-02230 Cable Ties to ensure that wiring never extends beyond the boundary of the module frame itself.
- All jumpers (or extension wiring) running under the modules must be securely attached to the module frame with HellermanTyton 156-02230 Cable Ties to ensure that wiring never extends beyond the boundary of the module frame itself.
- Any conductor that extends beyond the boundary of a module frame must be protected and contained in an approved conduit, cable pipe, or cable tray listed under “Wire Management” on page 3 of this document.
- Any module wiring must be routed such that PV wire does not make contact with module frame or any other conductive metal. Use HellermanTyton 156-02230 Cable Ties to create an air gap between PV wire and module frame or any other conductive metal.

INSTRUCTIONS FOR USE OF AEROCOMPACT CABLE PIPE



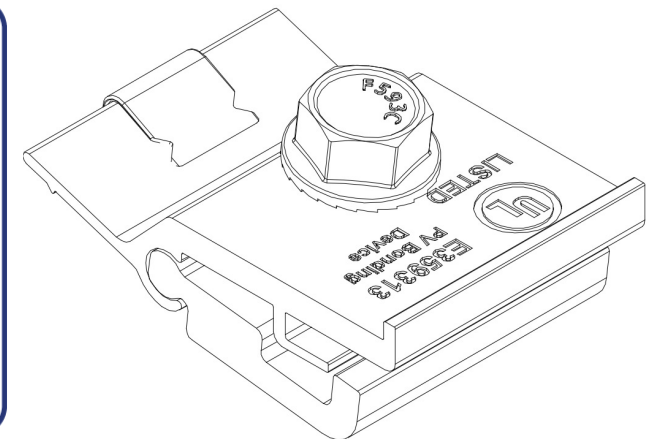
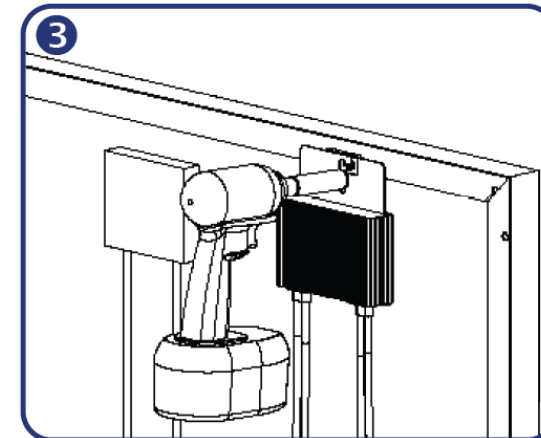
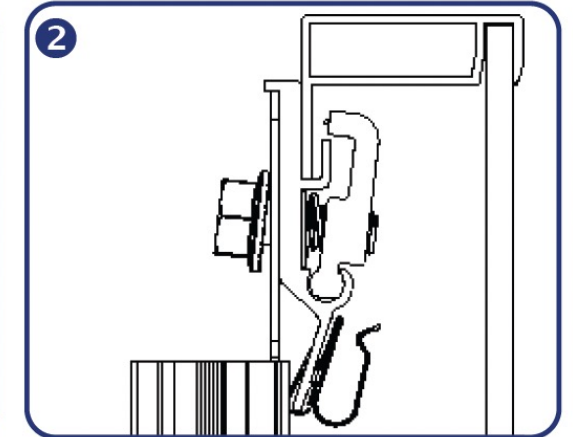
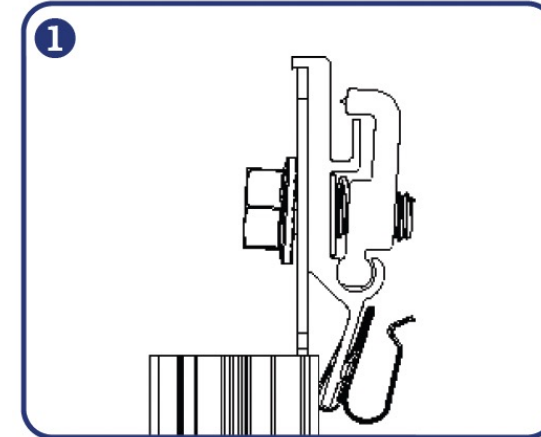
- Slide the cable pipe through the pipe bracket **1**.
- Slide the pipe through the appropriate hole in the long ballast tray **2**.
- Attach the plastic caps **3** to the end of the cable pipe.
- Hand-tighten the bracket to the connector bracket using the washer and furrow screw **4**.

MLPE INSTALLATION

REQUIRED TOOLS: SOCKET WRENCH | TORQUE WRENCH | 1/2" SOCKET

1. Slide the backplate channel of the MLPE device under the MLPE Frame Attachment Kit bolt. The MLPE mounting plate should rest against the MLPE mounting plate backstop on the MLPE Frame Attachment Kit.
2. Position the MLPE Frame Attachment Kit on the module frame in a location that will not interfere with mounting system components. The module frame should rest against the module backstop on the MLPE Frame Attachment Kit. **INSTALL NOTE:** Avoid blocking module frame drainage holes when installing the MLPE Frame Attachment Kit.
3. Tighten the mounting bolt on the MLPE Frame Attachment Kit to 13.5NM (10ft-lbs / 120in-lbs). **NOTE:** The MLPE Frame Attachment Kit bonds the following components: Module Frame and MLPE backplate.
4. Connect the module leads to the input connectors on the MLPE device and manage conductors using HellermanTyton 156-02230 Cable Ties.

WARNING: Route PV wire such that PV wire does not make contact with module frame or any other conductive metal. Use a HellermanTyton 156-02230 Cable Ties to create an air gap between PV wire and module frame or any other conductive metal.



Source: https://snapnack.com/wp-content/uploads/2019/07/SNR_MLPE-Frame-Attachment-Kit-Installation-Manual_v.1.3.pdf



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