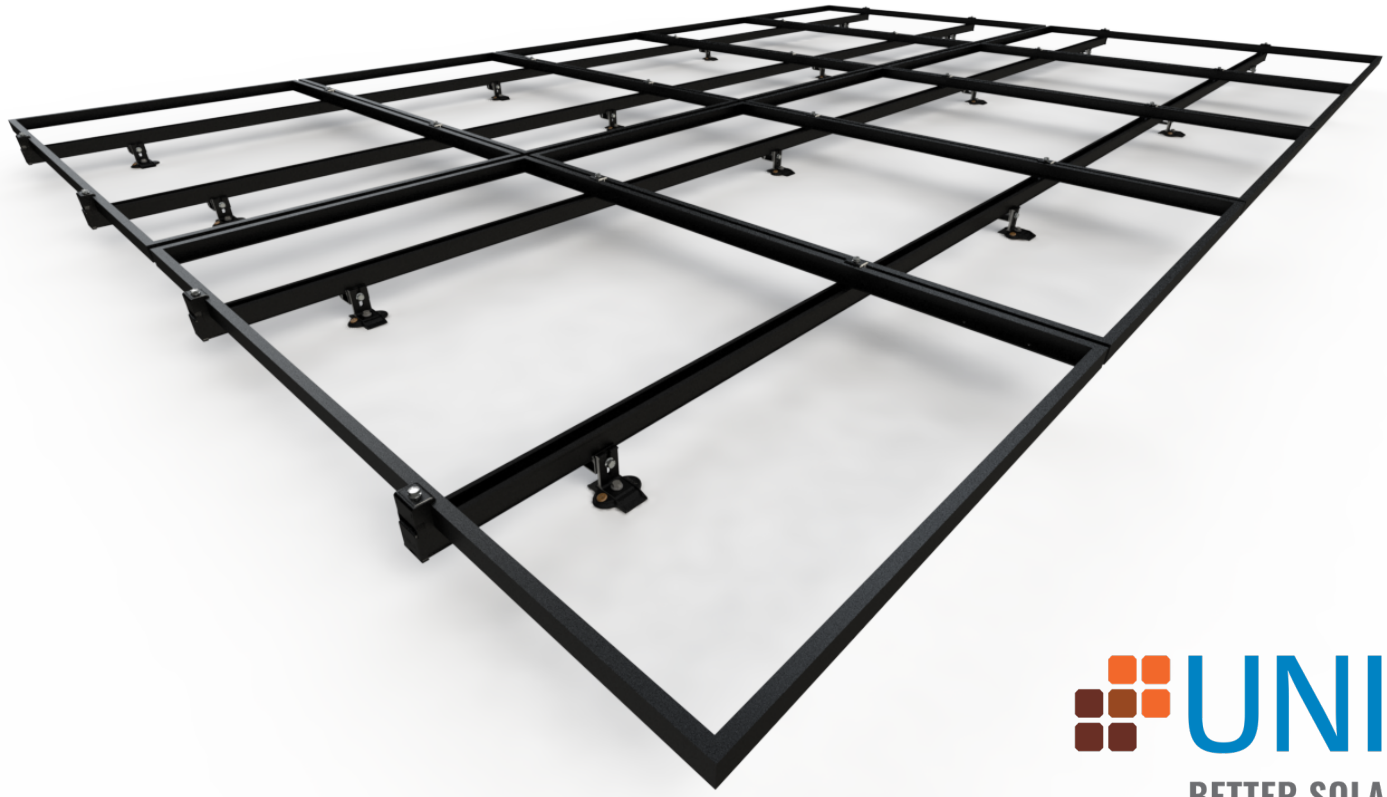
NXT UMOUNT™ INSTALLATION GUIDE



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BETTER SOLAR STARTS HERE

UL 3741 PV Hazard Control Installation Addendum

For NXT Umount Residential Roof Applications

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PUB2025JUL30

NXT UMOUNT™ INSTALLATION GUIDE

TABLE OF CONTENTS

INTRODUCTION

This manual describes the procedure to install the NXT UMOUNT product, including the NXT UMOUNT Tilt Legs product, to meet the requirements of the UL3741 PV Hazard Control Standard. All installers must thoroughly read this manual and have a clear understanding of the installation procedures prior to installation. Failure to follow the methods and procedures outlined in this manual may result in injury and/or damage to property.

The NXT UMOUNT Photovoltaic Hazard Control System (PVHCS) is a UL 3741 Listed system that complies with NEC 690.12(B)(2)(1), when installed by qualified individuals as per the installation procedures described in the NXT UMOUNT System installation manual and this addendum. In the following pages of this addendum, various example configurations of system designs that comply with 690.12(B)(2) are mentioned.

Brief Background of 2020 NEC 690.12

As per 2020 NEC 690.12 Rapid Shutdown of PV Systems on buildings, All PV arrays installed on or in buildings shall include rapid shutdown functions to reduce shock hazard for Fire Fighters (FF) in accordance with 690.12(A) through (D):

Brief Background of UL3741

UL3741 provide a means for evaluation of PV Hazard Control components, equipment and systems that provide a reduced level of shock hazard from energized PV system equipment and circuits located within the PV array after the operation of hazard control initiation function(s) where required, such as but not limited to any PV Rapid Shutdown Equipment (PVRSE) or PV Rapid Shutdown Systems (PVRSS) that comply with UL 1741 in the United States and CSA C22.2 No 330 in Canada.

Controlled Conductors for Rapid Shutdown

- DC circuits of PV system
- Inverter output circuits originating from inverters located within array boundary

Controlled Parameters for Rapid Shutdown

- Outside Array Boundary: ≤ 30V within 30 seconds
- Inside Array Boundary:
  a. Listed PV Hazard Control System (UL 3741)
  b. PV array with appropriate wire management to limit conductive parts exposure. ***See page 17***

NOTE:

- **NXT UMount was tested and evaluated up to 1000 Vdc, meeting safety standards.**
- **Per NEC 690.7(2), PV system DC circuits for one- and two-family dwellings are limited to 600 volts.**
- **Compliance with UL 3741 ensures adherence to NEC (NFPA 70, 2017 and later editions) and CE Code C22.1 requirements:**
  - **Controls electrical shock hazards within the PV array boundary (NEC section 690.12(B)(2)).**
  - **Inverters and power conversion systems must comply with the 30V in 30 seconds requirement outside the PV array (NEC 690.12(B)(1)), ensuring rapid shutdown for safety.**

IMPORTANT: Requirements for PV arrays addressed in UL 3741 are intended for compliance with the National Electrical Code (NEC), NFPA 70, 2017 and later editions and their requirements for controlling electrical shock hazards inside the array boundary as addressed in NEC section 690.12(B)(2), Rapid Shutdown of PV Systems on Buildings and with the Canadian Electrical Code (CE Code) C22.1. The Tesla equipment within this PVHCS additionally complies with the 30V in 30 seconds requirements outside the PV array as required in 690.12 (B)(1).

DEFINITIONS

INITIATION DEVICES
Device(s) that initiate the rapid shutdown function of the PV system

EQUIPMENT
Equipment that performs rapid shutdown functions other than initiation devices, such as listed disconnect switches, circuit breakers, or control switches.

ARRAY
NEC defines the array as a mechanically and electrically integrated grouping of modules with support structure, including any attached system components such as inverter(s) or dc-to-dc converter(s) and attached associated wiring. This indicates the NXT UMOUNT Racking and collocated inverters are part of the array.

ARRAY BOUNDARY
Per NEC 690.12(B), the zone extending 1ft from array in all directions. This indicates that the array boundary can extend 1ft from the edge of the NXT UMOUNT racking, inverter or module.

INSTALLER'S RESPONSIBILITY

- Ensure that NXT UMOUNT and other products are appropriate for the specific installation and are designed for the installation environment.
- Ensure all electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor.
- Comply with all applicable local or national building and fire codes, including any that may supersede this manual.
- Ensure provided information is accurate and appropriate. Issues resulting from inaccurate and inappropriate information are the installer's responsibility.
- Ensure the system is grounded and bonded to meet the requirements of the National Electric Code.
- Disconnect AC power before servicing or removing modules, AC modules, microinverters and power optimizers.
- Ensure routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system and all work must comply with national, state and local installation procedures, and safety standards.
- If loose components or loose fasteners are found during periodic inspection, re-tighten immediately. Any components showing signs of corrosion or damage that compromise safety must be replaced immediately.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- Review module manufacturer's documentation for compatibility and compliance with warranty terms and conditions.
- Use only Unirac parts or parts recommended by Unirac; substituting parts may void any applicable warranty.
- Installers must refer to the NXT UMOUNT installation manual for complete installation instructions.

⚠ WARNING

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS INJURY, DEATH, OR PROPERTY DAMAGE.

⚠ CAUTION

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS DAMAGE OR FAILURE OF EQUIPMENT.

CONFORMS TO STD ANSI/UL 3741
Maximum Photovoltaic Hazard Control System (PVHCS) Voltage: 600V

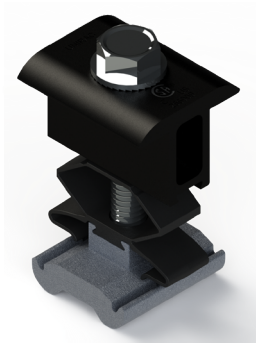
UL3741 LISTED

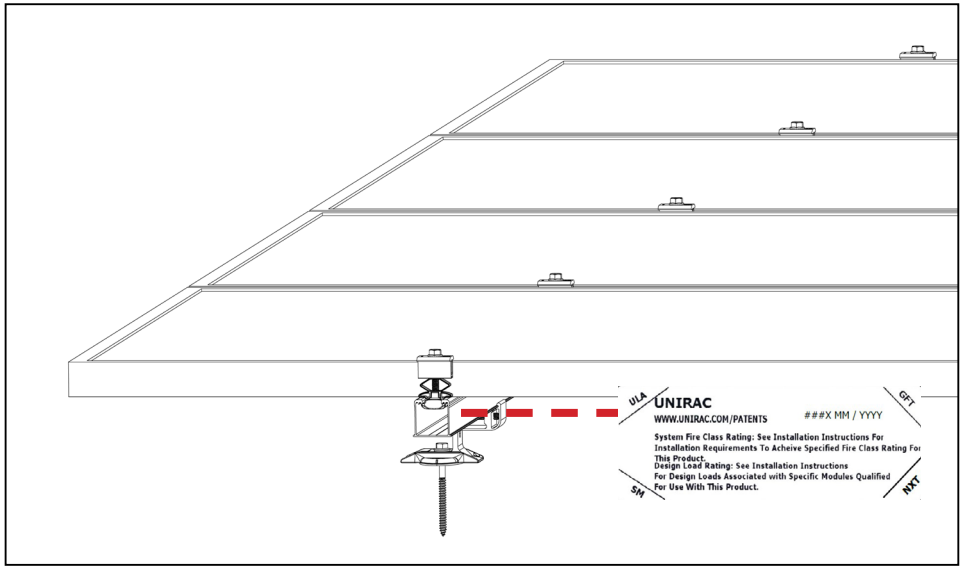
Intertek
311037

MARKINGS

Certification marking is embossed on all module clamps. Labels should be applied to the rail at the edge of the array as shown below

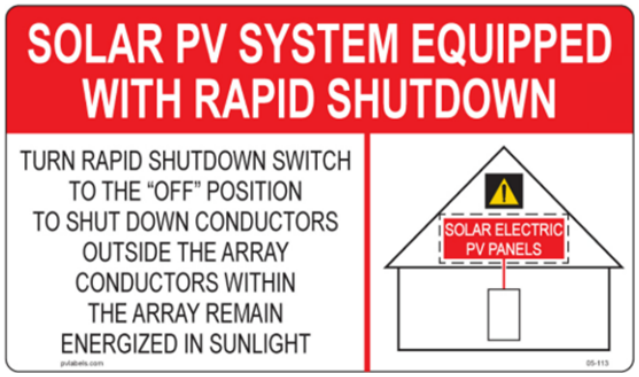
UNIRAC
C SA US
266909





MARKINGS (CONT.)

- Verify all rapid shut down switches are marked with a label indicating the function of the rapid shut down switch.
- Attach one label at or near each rapid shut down switch.
- Labels are provided with the racking by Unirac. Please contact your salesperson if you need additional labels.



Following are the list of approved PV Hazard Control Equipment or Components evaluated at 600V Max System Voltage:
(Not all listed items must be implemented in a single system to achieve compliance to UL3741. Rather these are the items approved for use to meet the criteria outlined in this manual)

1. MODULES
All modules that are fire rated as Type 1 or 2 and are listed in NXT UMOUNT Installation Guide with max module area of 29.49 ft²

2. NXT UMOUNT RACKING SYSTEM

3. Wire Clips (UL 62275 Listed)
- Hellermann Tyton Cable Ties & Edge Clips (Mnfr PNs 111-01561 (type T50L),111-01564 (type T50R),111-05256 (type T50I),156-02224 (type T50REC5B) & 156-02226 (type T50REC5A))
- **HEYCO PRODUCTS INC**
  - ***Heyco SunBundler Series,*** Part numbers - SunBundler 8 (S6408, S6409), SunBundler 10 (S6410, S6411), SunBundler 12 (S6412, S6413), SunBundler 14 (S6414, S6415), SunBundler 20 (S6420, S6421). Type 2S rated.
  - ***Heyco SunRunner Series,*** Part numbers - SunRunner EZ (S6407, S6447), SunRunner (S6405, S6490, S6445,S6495)
- EZ Solar CableLoc

4. PV Connectors (UL 6703 Listed) shall be compatible and approved for the application.

5. PV Wire (UL 4703 Listed)

6. RayTray v2 and RayTray v3 Solar Wire Management Systems (UL 870 Listed)

7. Listed Conduit (all sizes apply)
- Electrical Metallic Tubing (EMT) (Sizes 3/4" and greater) (UL 797 Listed)
- Rigid Metal Conduit (RMC) (Sizes 3/4" and greater) (UL 6 Listed)
- Intermediate Metal Conduit (IMC) (Sizes 3/4" and greater) (UL 1242 listed)
- Flexible Nonmetallic Conduit (Sizes 3/4" and greater) (UL1660 Listed)
- PVC - Schedule 40 or 80 (Sizes 3/4" and greater) (UL 651)
- Listed Tubing, Fittings and Grounding Components

INSTALLATION METHODS PER UL 3741 AND NEC 690.12

The following PV Design configurations are recommended by Unirac to show NXT UMOUNT system comply with NEC 690.12(B). Compliance is not limited to these configurations.

CONFIGURATION 1A: Array(s) with Listed UL 3741 PV Hazard Control System and MNSSR-600S – ***See page 8***
CONFIGURATION 2A: Array(s) and Sub Array(s) with Listed UL 3741 PV Hazard Control System Within Same Array Boundary – ***See page 9***
CONFIGURATION 3A: Arrays with Listed UL 3741 PV Hazard Control System With Distinct Array Boundaries – ***See page 10***

NXT UMOUNT INSTALLATION WITH SOLIS EQUIPMENT

The NXT Umount UL 3741 certification is applicable when used with Midnite Solar MNSSR-600S receiver in combination with the following Solis inverters. The listed inverters are factory integrated with an APS SunSpec transmitter.

MidNite Solar MNSSR-600S Receiver

- Max Input: 600VDC
- Max MPPT: 550VDC
- Max Output: 600VDC
- Max current 12 ADC @ -40 C to 80C, 10ADC @85C

Solis Inverters

- S6-EH1P10K-H-US
- S6-EH1P11.4K-H-US
- S6-EH1P3.8K-H-US
- S6-EH1P5K-H-US
- S6-EH1P7.6K-H-US
- S6-EH1P9.9K-H-US
- Solis-1P10K-4G-US
- Solis-1P2.5K-4G-US
- Solis-1P3.6K-4G-US
- Solis-1P3.8K-4G-US
- Solis-1P3K-4G-US
- Solis-1P4.6K-4G-US
- Solis-1P4K-4G-US
- Solis-1P5K-4G-US
- Solis-1P6K-4G-US
- Solis-1P7.6K-4G-US
- Solis-1P7K-4G-US
- Solis-1P8.6K-4G-US
- Solis-1P8K-4G-US
- Solis-1P9K-4G-US

NOTE: Refer to the applicable Solis and MNSSR-600S Receiver Installation Manuals for specific instructions, including MNSSR-600S mounting, clearances, ratings, compatible connectors, and rapid shutdown initiation methods.

Controlled Parameters after Rapid Shutdown Initiation for all configurations

Outside Array Boundary: ≤ 30V within 30 seconds
Inside Array Boundary: ≤ 600V

NXT UMOUNT INSTALLATION WITH TESLA EQUIPMENT

The NXT Umount UL 3741 certification is applicable when used with Tesla's MCI-1 or MCI-2 string isolation device in combination with either a Tesla PV Inverter, Powerwall+, or Powerwall 3 Power Conversion System (PCS).

String Isolation Devices (SID)

- **Tesla MCI-1 (1550379-00-F)**
  - Nominal Input DC Current Rating (Imp) = 13 A
  - Maximum Input Short Circuit Current (Isc) = 19 A
  - Maximum System Voltage = 600V
  - Maximum Disconnect Voltage = 600V DC
- **Tesla MCI-2**
  - Nominal Input DC Current Rating (Imp) = 13 A
  - Maximum Input Short Circuit Current (Isc) = 17 A
  - Maximum System Voltage = 600V
  - Maximum Disconnect Voltage = 165 V DC
- **Tesla MCI-2 High Current (1879359-15-B)**
  - Nominal Input DC Current Rating (Imp) = 15 A
  - Maximum Input Short Circuit Current (Isc) = 19 A
  - Maximum System Voltage = 600V
  - Maximum Disconnect Voltage = 165 V DC

PV Inverter (PVI)

- 7.6 kW (1538000)
- 3.8 kW (1534000)

Energy Storage Systems

- Powerwall+ (1850000)
- Powerwall 3 (1707000)

NOTE: Refer to the applicable Tesla Inverter or Powerwall Installation Manual for specific instructions, including MCI mounting, clearances, ratings, compatible connectors, and rapid shutdown initiation methods.

The following MCI-1 and MCI-2 installation configurations are specific to the NXT Umount UL 3741 Listing.

CONFIGURATION 1B: Single Series String Array with Tesla MCI-1s – ***See page 11***
CONFIGURATION 2B: Multiple Arrays Within Same Array Boundary Using MCI-1s – ***See page 12***
CONFIGURATION 3B: Multiple Arrays With Distinct Array Boundaries Using MCI-1s – ***See page 13***

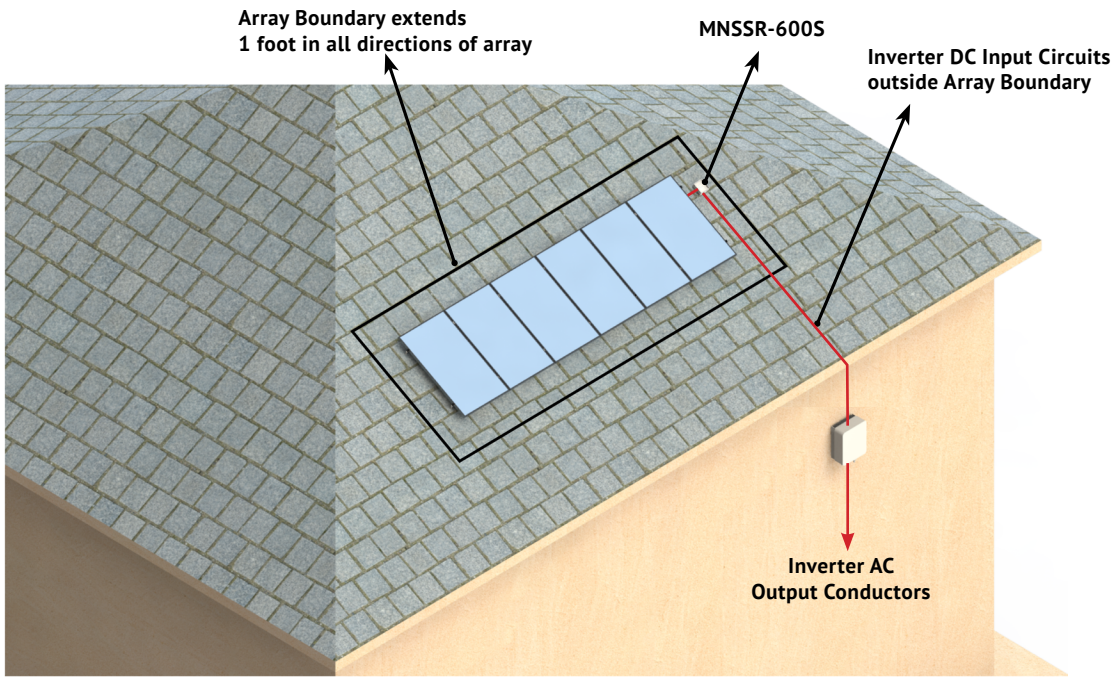
CONFIGURATION 1C: Single Series String Array with Tesla MCI-2s – ***See page 14***
CONFIGURATION 2C: Multiple Arrays Within Same Array Boundary Using MCI-2s – ***See page 15***
CONFIGURATION 3C: Multiple Arrays With Distinct Array Boundaries Using MCI-2s – ***See page 16***

Controlled Parameters after Rapid Shutdown Initiation for all configurations

Outside Array Boundary: ≤ 30V within 30 seconds
Inside Array Boundary: ≤ 600V

CONFIGURATION-1A

Array(s) with Listed UL 3741 PV Hazard Control System and MNSSR-600S



1. By using listed UL3741 PVHCS, array(s) complies with NEC 690.12(B)
2. Use MNSSR-600S as shown in above figure to control inverter input circuits (DC) that are outside of the array boundary and comply with NEC 690.12(B)(1).

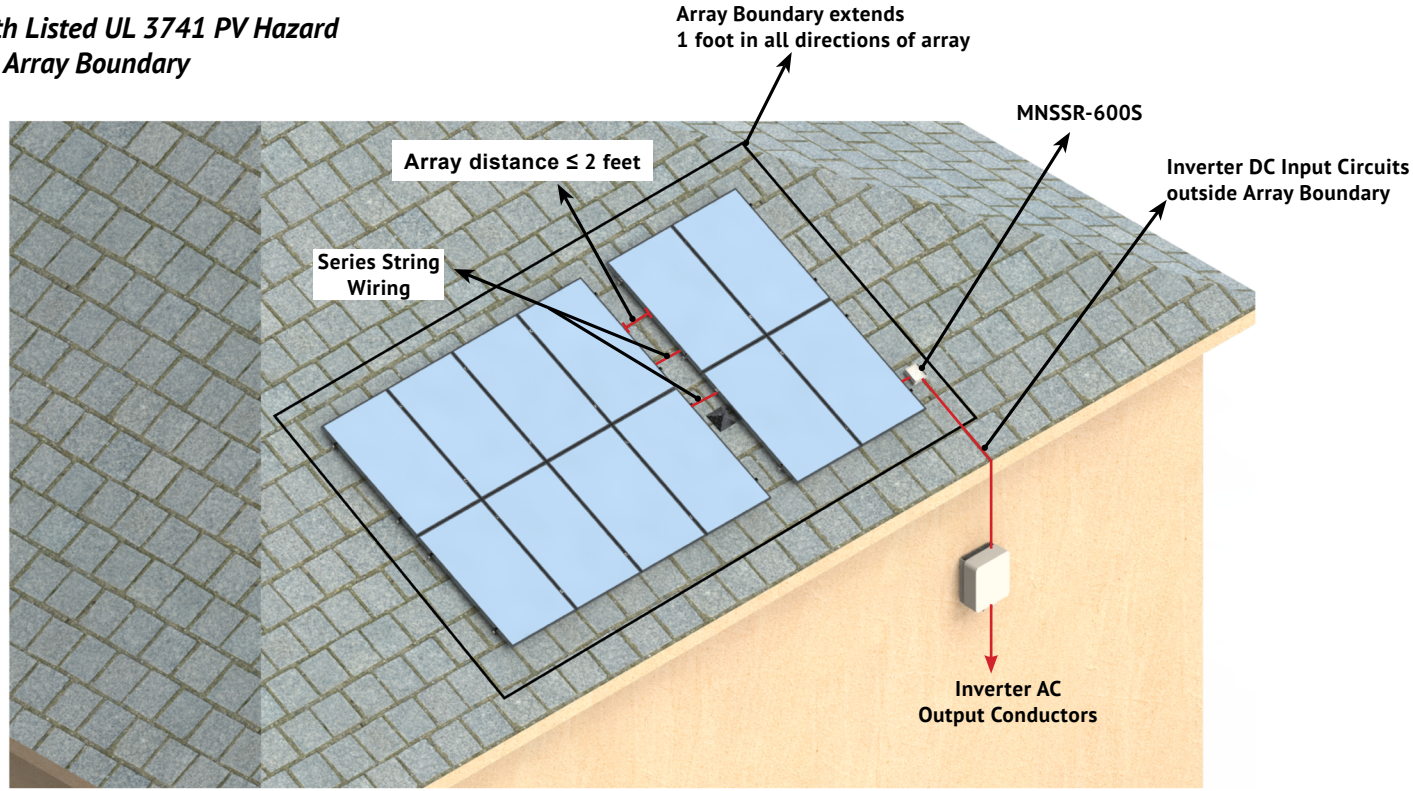
NOTE:

- **For controlled parameters information *See page 5***

Example array not specifically verified by Intertek.

CONFIGURATION-2A

Array(s) and Sub Array(s) with Listed UL 3741 PV Hazard Control System Within Same Array Boundary



1. When two or more arrays are located not more than 2 feet apart, this results in a single array boundary.
2. By using listed UL3741 PVHCS, array(s) complies with NEC 690.12(B)
3. Use MNSSR-600S as shown in above figure to control inverter input circuits (DC) that are outside of the array boundary and comply with NEC 690.12(B)(1).

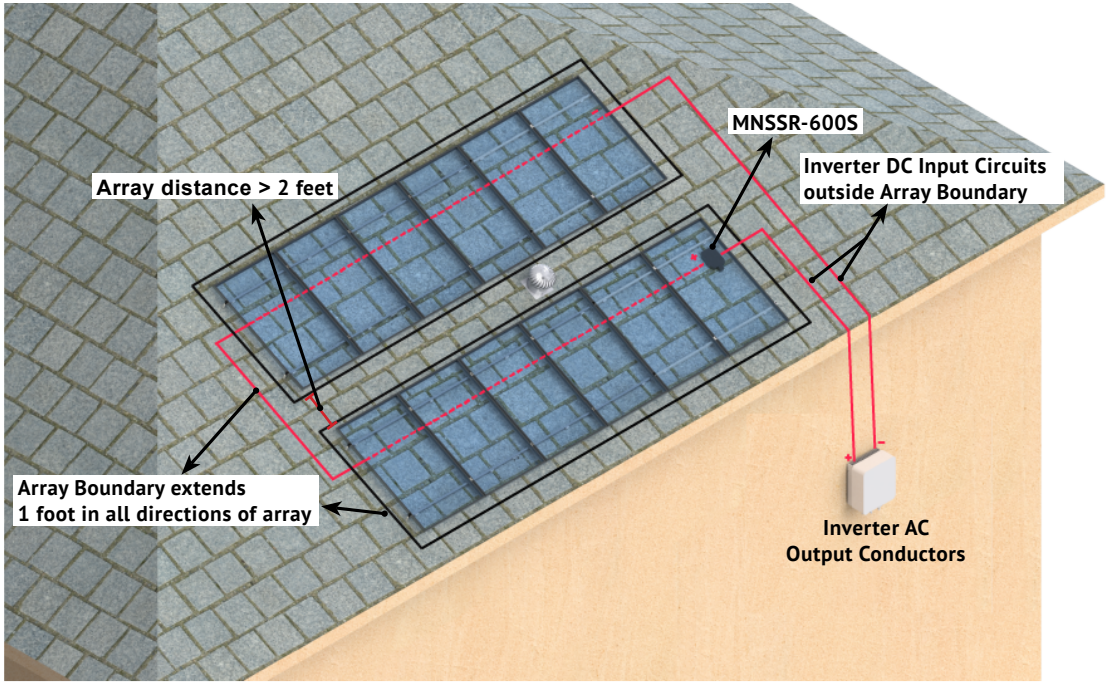
NOTE:

- **For controlled parameters information** ***See page 5***

Example array not specifically verified by Intertek.

CONFIGURATION-3A

Arrays with Listed UL 3741 PV Hazard Control System
With Distinct Array Boundaries



1. When two or more arrays are located more than 2 feet apart, this results in distinct array boundaries.
2. Array(s) uses UL3741 listed PVHCS and complies with 690.12(B)(2)(1)
3. Use MNSSR-600S at any end of the inverter's input circuit to control the series string and inverter input circuits (DC) outside the array boundary, ensuring compliance with NEC 690.12(B)(1).

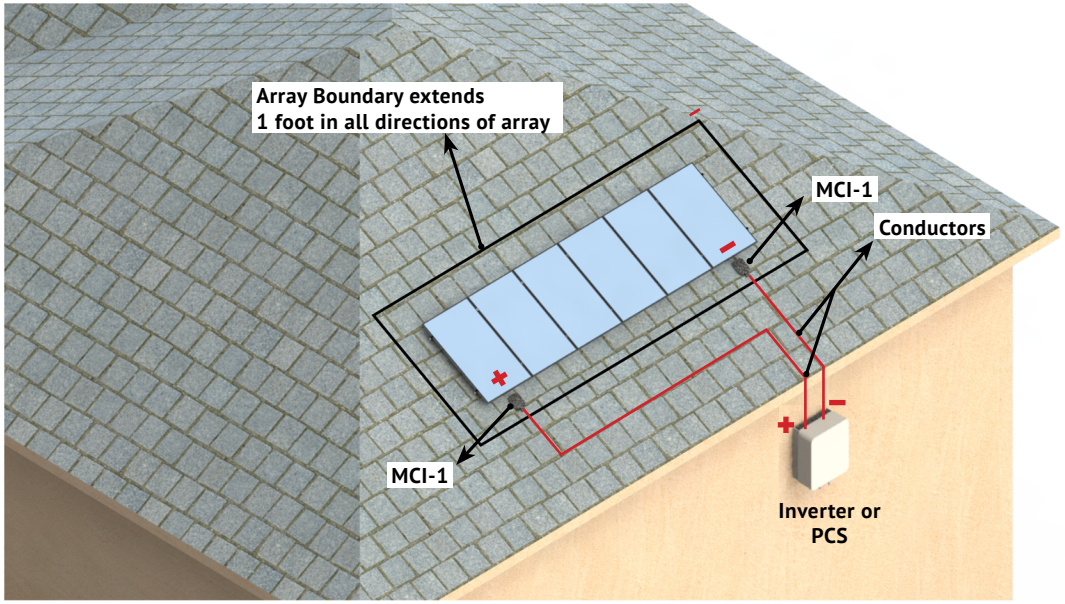
NOTE:

- **For controlled parameters information** ***See page 5***

Example array not specifically verified by Intertek.

CONFIGURATION-1B

Single Series String Array with Tesla MCI-1s



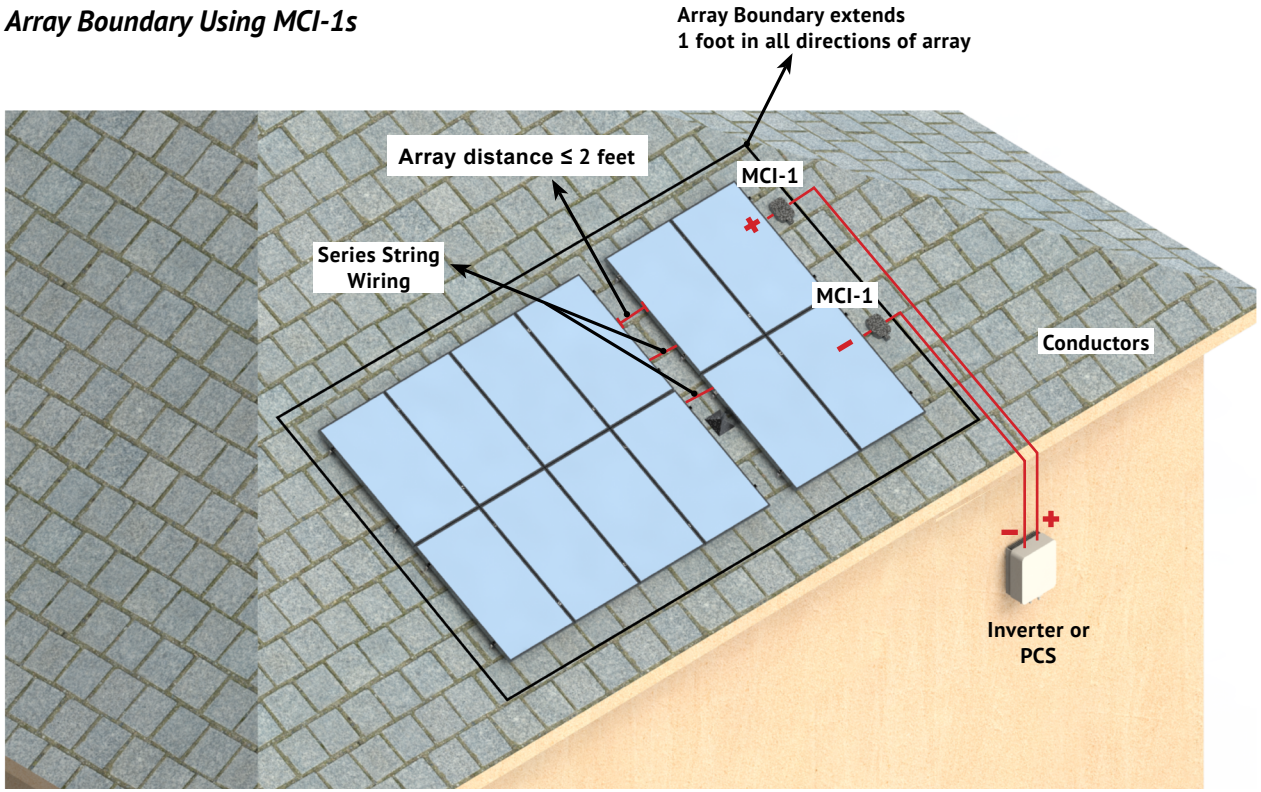
When a single string is connected within a single array, as illustrated above, it is essential to install Tesla MCI-1s at minimum at the positive and negative ends of the string, positioned between the end modules and the homerun leading to the PCS

NOTE:
For controlled parameters information ***See page 6***

Example array not specifically verified by Intertek.

CONFIGURATION-2B

Multiple Arrays Within Same Array Boundary Using MCI-1s

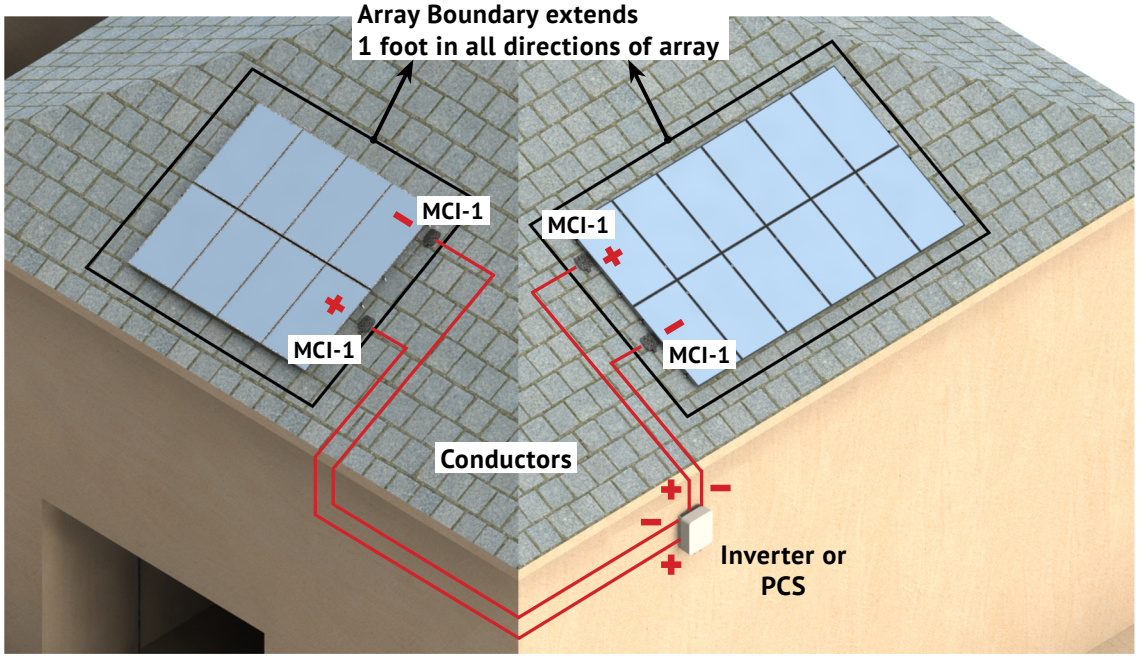


1. When two or more arrays are located not more than 2 feet apart, this results in a single array boundary.
2. When a two arrays are connected as illustrated above, it is essential to install Tesla MCI-1s at minimum at the positive and negative ends of the string, positioned between the end modules and the homerun leading to the PCS

NOTE:
For controlled parameters information ***See page 6***
Example array not specifically verified by Intertek.

CONFIGURATION-3B

Multiple Arrays With Distinct Array Boundaries Using MCI-1s



Distinct Arrays without String Sharing

When a two arrays are connected as illustrated above, it is essential to install Tesla MCI-1s at minimum at the positive and negative ends of the string, positioned between the end modules and the homerun leading to the PCS

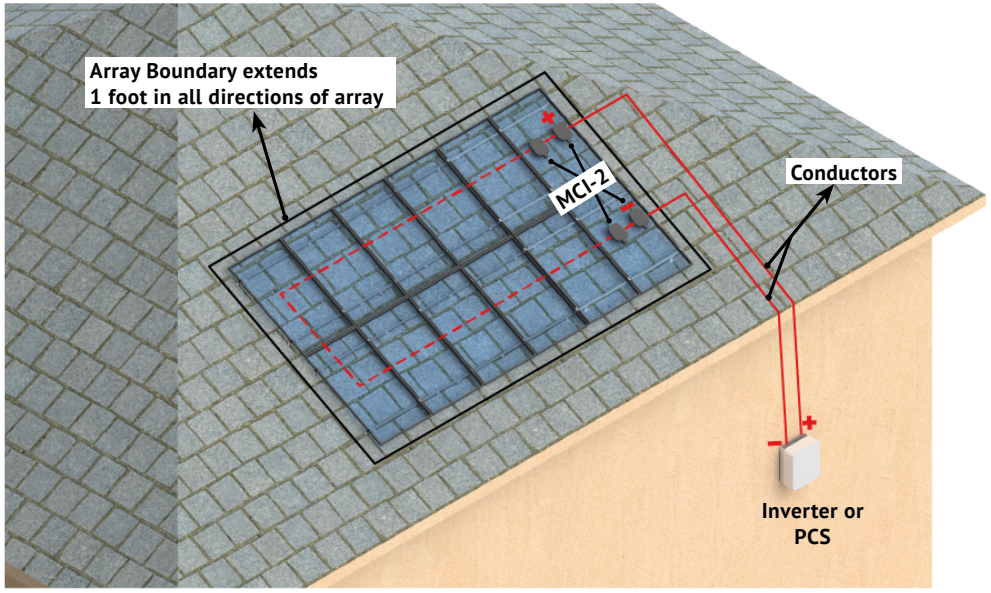
NOTE:

For controlled parameters information ***See page 6***

Example arrays not specifically verified by Intertek.

CONFIGURATION-1C

Single Series String Array with Tesla MCI-2s



While using MCI-2s:

- Maintain a maximum two arrays per string*.
- Place at least one MCI at each end of the string; the other two MCIs can be placed anywhere within the string, preferably close to the ends.
- Do not connect MCI-2s directly to each other, as this may damage the connectors if rotated.

***Rule created for simplicity. For rare design cases with 3 arrays per string, use Tesla's 165V inside-the-array PVHCS listing.**

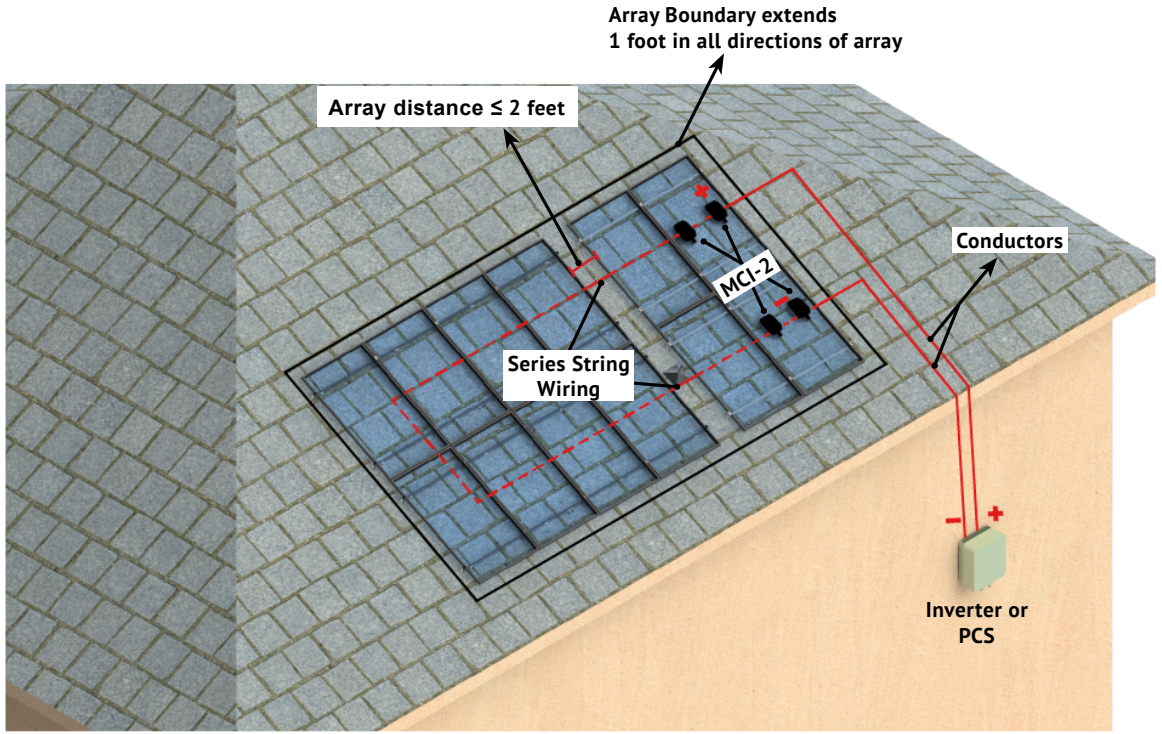
NOTE:

For controlled parameters information *See page 7*

Example array not specifically verified by Intertek.

CONFIGURATION-2C

Multiple Arrays Within Same Array Boundary Using MCI-2s



When two or more arrays are located not more than 2 feet apart, this results in a single array boundary

While using MCI-2s:

- Maintain a maximum two arrays per string*.
- Place at least one MCI at each end of the string; the other two MCIs can be placed anywhere within the string, preferably close to the ends.
- Do not connect MCI-2s directly to each other, as this may damage the connectors if rotated.

Rule created for simplicity. For rare design cases with 3 arrays per string, use Tesla's 165V inside-the-array PVHCS listing.

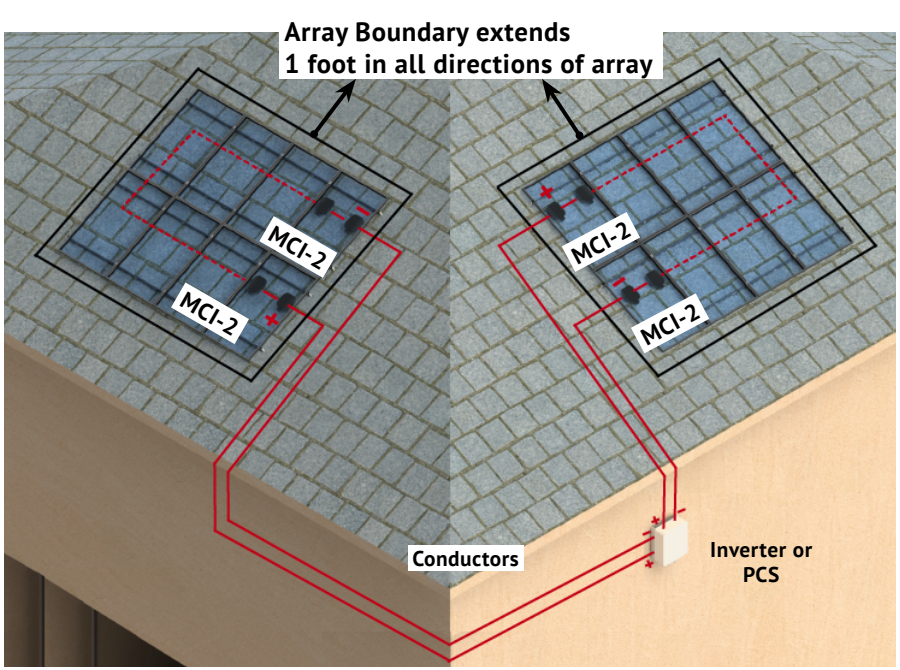
NOTE:

For controlled parameters information *See page 7*

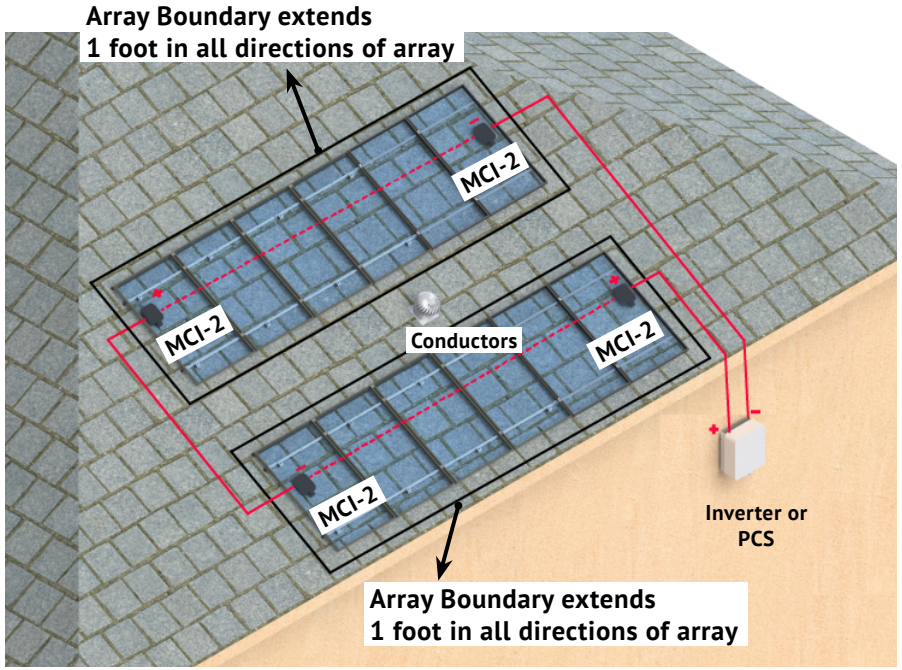
Example array not specifically verified by Intertek.

CONFIGURATION-3C

Multiple Arrays With Distinct Array Boundaries Using MCI-2s



Case-1: Distinct Arrays without String Sharing



Case-2: Distinct Arrays with String Sharing

When two or more arrays are located more than 2 feet apart, this results in a separate array boundary

While using MCI-2s:

- Maintain a maximum two arrays per string*.
- Place at least one MCI at each end of the string; the other two MCIs can be placed anywhere within the string, preferably close to the ends.
- Do not connect MCI-2s directly to each other, as this may damage the connectors if rotated.

Rule created for simplicity. For rare design cases with 3 arrays per string, use Tesla's 165V inside-the-array PVHCS listing.

NOTE:

For controlled parameters information *See page 7*

Example array not specifically verified by Intertek.

UL 3741 WIRE MANAGEMENT GUIDELINES

The NXT UMOUNT wire management components noted in the list of approved PVHCS equipment on ***page 5*** were evaluated and approved for providing wire protection against potential FF interactions. To achieve wire protection as required per UL 3741, all wires shall be routed such that they are not exposed to potential FF interactions. It is achieved using:

WIRE CLIPS

- Route wires under modules using approved wire clips. ***See figures 1, 2, 3&4***.
- Do not allow wires to sag between clips.
- Do not overtighten or pinch wires.
- Do not zip tie cables directly to the NXT UMOUNT rails, instead use approved edge clips module frames and/or approved conduits or raceways.
- For row-to-row connections, use wire clips to fasten wires to edge of the last module in row and first module in the next row.

NOTE: Conductors are allowed within the NXT rail as it is an approved wire way *See figures 5&6*.

WIREWAY

- Protect wires in exposed areas such as pathways and spaces between sub arrays by utilizing the listed wireway options on ***page 5*** (RayTray, conduit, etc.).
- Ensure that PV wire is not exposed to sharp edges when entering or exiting listed wireway.


Figure : 1


Figure : 2


Figure : 3


Figure : 4


Figure : 5


Figure : 6