FLASHLOC DUO

DESIGN & ENGINEERING GUIDE

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Getting Started

This manual is for professional engineers, designers, installers, and permitting authorities. For assistance with your array's engineering and a Bill of Materials, see our U-builder at https://design.unirac.com/

The Flashloc Duo attachment is designed to be used with the Unirac SOLARMOUNT Flush-to-Roof system.

Some of the features of this product include:

- Designed per the ASCE 7-10 and ASCE 7-16 Building Code
- Component testing
- Rigorous Engineering Analysis
- Ability to be attached both to a rafter or directly to roof sheathing that meets the requirements outlined in this document
- Flashloc triple seal technology which saves time, preserves the roof, and protects the penetration
- Kitted with two rafter screws, sealant, and rail attachment hardware for maximum convenience
- Compatible with comp shingle and rolled comp roofs

Installer Responsibility & Disclaimer

Please review this guide and the SOLARMOUNT Installation Guide thoroughly before installing your SOLARMOUNT system. These guides provide supporting documentation for building permit applications, planning, and assembling the SOLARMOUNT system.

The installer is solely responsible for:

- Complying with all applicable local or national building codes, including code requirements that can be more stringent than the guidelines set forth in this manual;
- Maintaining and enforcing all aspects of a safe working environment;
- Ensuring that Unirac and other products are appropriate for the particular installation and the installation environment;
- Ensuring that the roof, its rafters, connections, and any other structural support members can support the array under all code level loading conditions (this total building assembly is referred to as the building structure);
- Using only Unirac parts and installer-supplied parts as specified by Unirac (substitution of parts may void the warranty and invalidate the letters of certification in all Unirac publications);
- Ensuring that attachment strength is adequate to support loads in your installation location
- Ensuring the attachment of the roof deck to the rafters is adequate to support all loads when attaching to sheathing (See Expedited Permit Process at https://www.dvrpc.org/solar/pdf/Structural_Commentary_for_the_National_Simplified_Residential_Roof_Photovoltaic_Array_Permit_Guidelines_2017-06-03.pdf;
- Maintaining the waterproof integrity of the roof, including selection and proper installation of appropriate flashing techniques, if required;
- Ensuring safe installation of all electrical aspects of the PV array, including proper grounding/bonding;
- Array shading and output analysis;
- Ensuring correct and appropriate design parameters are used in determining the design loading used for design of the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer;
- Comply with module manufacturer's specifications.

Unirac shall not be liable for any losses, damages, or injuries that directly or indirectly result from any non-conformance with the above

TECHNICAL SPECIFICATIONS:
Material Types: A380 diecast aluminum
Seals: Injection molded EPDM
Hardware: 300 series stainless steel
Bonding and Grounding: See SOLARMOUNT D&E GUIDE

TOOLS REQUIRED OR RECOMMEND FOR LAYOUT, ATTACHMENTS, AND INSTALLATION:
- Drill (**Do Not Use an Impact Driver**)
- 5/16” Socket
- Torque Wrench
- Tape Measure
- Chalk Reel

GENERAL HARDWARE:
- #12-14 x 2.5” Hex Head, Self-drilling, Screws

SAFETY:
All applicable OSHA safety guidelines should be observed when working on a PV installation job site. The installation and handling of PV solar modules, electrical installation and PV racking systems involves handling components with potentially sharp metal edges. Rules regarding the use of gloves and other personal protective equipment should be observed.

Detail drawings available for basic geometry at Unirac.com

TEST DATA:

Wood Types for sheathing attached systems:

- 24/16 APA rated 7/16" OSB,
- 32/24 APA rated 15/32" Plywood

Test Setup:

- Performed on sheathing thicknesses per IRC 2018.
- Performed with the farthest upslope screw in a 1/8" gap between sheathing panels.
- Included rail and clamp connections, meaning allowable loads cover entire racking system
- Applies only when rails are mounted parallel to eave and ridge
- Assume all installation requirements are followed correctly

TESTS RESULTS:

- OSB
    - Allowable load in Uplift = 135 lbs
    - Allowable load in Downforce = 124 lbs
    - Allowable load in Shear = 82 lbs
    - Allowable load in Lateral = 102 lbs

- Plywood
    - Allowable load in Uplift = 166 lbs
    - Allowable load in Downforce = 170 lbs
    - Allowable load in Shear = 127 lbs
    - Allowable load in Lateral = 140 lbs

- Rafter
    - Allowable load in Uplift = 495 lbs
    - Allowable load in Downforce = 907 lbs
    - Allowable load in Shear = 190 lbs
    - Allowable load in Lateral = 488 lbs

Spans are calculated such that the point loads on the roof will not exceed these allowable loads.

INSTALLATION MUST BE IN ACCORDANCE WITH UNIRAC'S FLASHLOC DUO INSTALLATION MANUAL

SHEATHING MOUNT:
Flashloc Duo attachment has provisions for 6 wood screws. It is mandatory to drive 6 wood screws when attachment is attached only to sheathing. Reference spans in state certification letters for sheathing-only attachment. Span tables are valid only for east-west rail orientation (eave-to-ridge rafter orientation).

RAFTER MOUNT:
Insert 2 wood screws instead of 6 when attachment is installed on Rafter. Reference spans in state certification letters for Rafter mount. Span tables are valid only for east-west rail orientation (eave-to-ridge rafter orientation).

COMBINATION OF DECK & RAFTER MOUNT:
Drive 6 wood screws for attachment installed on deck and drive 2 wood screws for attachment installed in rafters. For spans, consider average of deck mount span and rafter mount span. For this method, it is required that at least half of the mounts are installed in a rafter.

LANDSCAPE ORIENTATION:
When mounting modules in landscape orientation, confirm short side clamping is allowed by module manufacturer, account for module manufacturer pressure derating.

MAXIMUM CANTILEVER:
1/3 span

THERMAL EXPANSION:
The maximum length of continuously spliced rail is limited due to thermal expansion. For thermal expansion rules, see Appendix A.

RAIL DIRECTION:
Rails must be mounted parallel to the eave and ridge of the roof.

THERMAL BREAKS

Thermal breaks prevent failure of rails, rail/splice connections, attachments or system failure due to thermal expansion or contraction. Determine location of thermal breaks prior to installation of attachments and rails. To create a thermal break, set gap between rails that is sufficient for proper installation of end clamps and tooling to achieve required torque, or 0.5" minimum**. A thermal break is required when a continuous length of spliced rails exceeds the length, in feet, shown in the following tables. For additional concerns on thermal breaks in your specific project, please consult a licensed structural engineer.**

A thermal break must not be spanned by a PV module. Installing a module over a thermal break would defeat the goal of a thermal break and could result in damage to the array.

The values displayed are the maximum allowed, spliced rail length, in feet, without a thermal break. These values do not include cantilever. These values apply only to Flashloc Duo. The installer is responsible for determining the maximum temperature difference (ΔT) used to establish the maximum spliced rail length, without a thermal break, at the install location. ΔT refers to the maximum difference in the temperature of the rail during installation and the extreme high or low temperature of the install location. The temperature at the time of install may be measured using an infrared thermometer. If determining ΔT by measurement of the rail temperature with an infrared thermometer, be sure to follow instructions of the temperature measurement device, as some devices do not work properly on reflective surfaces, such as the mill finish rail. Alternatively, if the rail temperature at the time of install cannot be measured, ΔT is the difference between the extreme high and the extreme low for your location. The Extreme Annual Design Conditions table at the following URL can be used as a reference when determining ΔT.
http://ashrae-meteo.info/

OSB Sheathing

Maximum Continuous Spliced Rail Length (ft.)

	Solarmount Standard						Solarmount Light					
	Attachment Span						Attachment Span					
ΔT (°F)	12"	24”	36"	48"	60"	> 60"	12"	24”	36"	48"	60"	> 60"
0-40	35	50	63	76	84	84	31	42	57	60	75	78
40-50	33	46	57	67	67	67	27	38	51	60	65	66
50-60	29	42	51	56	56	56	25	38	45	52	55	56
60-70	27	38	48	48	48	48	23	34	39	48	48	48
70-80	25	38	42	42	42	42	21	30	39	42	42	42
80-90	25	34	37	37	37	37	21	30	37	37	37	37
90-100	23	34	34	34	34	34	19	30	33	34	34	34
100-120	23	31	31	31	31	31	19	26	31	31	31	31
120-140	21	28	28	28	28	28	19	26	28	28	28	28

These lengths for OSB sheathing-attached systems were determined by limiting the deflection of the rail to protect against screw pullout from the sheathing and failure of the rail splice. Interpolation is not allowed. If your span falls between published values, use the next smaller span to determine rail length.

Plywood Sheathing
Maximum Continuous Spliced Rail Length (ft.)

	Solarmount Standard						Solarmount Light					
	Attachment Span						Attachment Span					
ΔT (°F)	12"	24”	36"	48"	60"	> 60"	12"	24”	36"	48"	60"	> 60"
0-40	33	46	57	60	65	78	29	38	45	52	55	66
40-50	29	42	51	52	65	66	25	34	39	44	55	54
50-60	27	38	45	52	55	54	23	30	39	44	45	54
60-70	25	34	39	44	48	48	21	30	33	36	45	42
70-80	23	30	39	42	42	42	19	26	33	36	35	42
80-90	21	30	33	36	37	37	19	26	33	36	35	37
90-100	21	26	33	34	34	34	17	22	27	28	34	34
100-120	19	26	31	31	31	31	17	22	27	28	31	30
120-140	19	26	27	28	28	28	15	22	27	28	28	28

These lengths for plywood sheathing-attached systems were determined by limiting the deflection of the rail to protect against screw pullout from the sheathing and failure of the rail splice. Interpolation is not allowed. If your span falls between published values, use the next smaller span to determine rail length.

Rafter

Maximum Continuous Spliced Rail Length (ft.)

	Solarmount Standard			Solarmount Light		
	Attachment Span			Attachment Span		
ΔT (°F)	24"	48"	72"	24"	48"	72"
0-40	75	102	129	67	94	105
40-50	67	94	117	59	78	93
50-60	63	86	105	55	70	93
60-70	55	78	93	51	70	81
70-80	51	70	93	47	62	81
80-90	51	70	81	43	62	69
90-100	47	62	81	39	54	69
100-120	43	62	69	35	54	57
120-140	39	54	69	35	46	57

These lengths for rafter-attached systems were determined by limiting the deflection of the rail to protect against screw pullout from the sheathing and failure of the rail splice. Interpolation is not allowed. If your span falls between published values, use the next smaller span to determine rail length.