



STEP #	STEP NAME
REF	COVER SHEET
REF	MECHANICAL PARTS OVERVIEW
REF	ELECTRICAL PARTS OVERVIEW
REF	ASSEMBLE DUAL TILT CHASSIS
REF	INSTALL MODULE CLIPS
01	ESTABLISH ARRAY LINES
02	INSTALL TRAYS & CHASSIS
03	INSTALL CROSS TRAYS
04	INSTALL EDGE DEFLECTORS & SKIRTS
REF	REFERENCE BALLAST DESIGN
05	INSTALL BALLAST
06	INSTALL ANCHORS
REF	ARRAY STRINGING MAP
07	INSTALL WIRE MANAGEMENT
08	INSTALL HOMERUN CONDUCTORS
09	INSTALL PV MODULES
10	COMPLETE MODULE & DC WIRING
11	ASSEMBLE POWER STATION RACKS
12	MOUNT POWER STATION TO ARRAY
13	INSTALL DC HARNESS
14	INSTALL INVERTER & AC COMBINER
15	SUB-ARRAY GROUNDING & BONDING JUMPERS
16	INSTALL AC COMBINER EXIT & SYSTEM GROUND
17	CONNECT DC HOMERUNS
18	CONNECT INVERTERS & AC COMBINER
19	COMPLETE COMMUNICATION WIRING

NOTE:
1. THIS RACKING SYSTEM MAY BE USED TO GROUND AND/OR MOUNT A PV MODULE COMPLYING WITH UL 1703 ONLY WHEN THE SPECIFIC MODULE HAS BEEN EVALUATED FOR GROUND AND/OR MOUNTING IN THE COMPLIANCE WITH THE INCLUDED INSTRUCTIONS.

2. FOLLOW ALL FASTENER TORQUE SPECIFICATIONS OUTLINED HEREIN THIS DOCUMENT IN ORDER TO ENSURE PROPER ASSEMBLY AND BONDING FOR THE SYSTEM PER UL 1703. ALL CONNECTIONS REQUIRE PERIODIC RE-INSPECTION TO VERIFY THAT THERE ARE NO LOOSE COMPONENTS, LOOSE FASTENERS, OR CORROSION. IF LOOSE COMPONENTS, LOOSE FASTENERS, OR CORROSION IS FOUND, AFFECTED COMPONENTS SHOULD BE IMMEDIATELY REPLACED.

3. THE HELIX ROOF SYSTEM WAS EVALUATED UNDER UL 2703 WITH A MAXIMUM SERIES FUSE RATING OF 20A.

4. IN ADDITION TO THE INSTRUCTIONS OUTLINED IN THIS DOCUMENT, IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE COMPLIANCE WITH NFPA 70 U.S. NATIONAL ELECTRICAL CODE.

5. THE HELIX ROOF MOUNTING SYSTEM HAS COMPONENTS WHICH HAVE BEEN EVALUATED FOR BONDING AND MECHANICAL LOADING WITH THE FOLLOWING LISTED PHOTOVOLTAIC MODULES: ALL NON-GRV 5 TRIMMED UL LISTED MODULES BY SUNPOWER (E246423 AND E33841); MODELS SPR-XXY-###, WHERE YY REPRESENTS NUMBERS 18, 19, 20, 21 OR 22, AND ### REPRESENTS ANY NUMBER FROM 345 TO 310; SPR-17Y-###, WHERE YY REPRESENTS NUMBERS 18, 19, 20 OR 21, AND ### REPRESENTS ANY NUMBER FROM 345 TO 285.

6. THE HELIX ROOF MOUNTING SYSTEM HAS BEEN EVALUATED FOR A CLASS A SYSTEM FIRE CLASSIFICATION FOR A LOW-SLOPED ROOF USING TYPE 2 MODULES. REFER TO FA302, FA303, & FA304 FOR ADDITIONAL FIRE CLASSIFICATION REQUIREMENTS.

7. THE HELIX ROOF SYSTEM IS A NON-SEPARATELY DERIVED SYSTEM. IN ORDER TO MAINTAIN A LISTING FOR GROUNDING AND BONDING, LISTED (2002) OR RECOGNIZED (2002S) WIRE MANAGEMENT DEVICES MUST BE ASSEMBLED ACCORDING TO MANUFACTURER INSTRUCTIONS.

8. THE SYSTEM HAS BEEN EVALUATED FOR A DOWNWARD LOAD OF 30 PSF, AN UPWARD LOAD OF 10 PSF, AND A DOWNSLOPE LOAD OF 5.2 PSF.

SUNPOWER		1414 HARBOUR WAY SOUTH RICHMOND, CA 94804 USA (510) 540-0550	
ENGINEER'S STAMP			
SUNPOWER HELIX ROOF DUAL TILT FIELD ASSEMBLY SHEETS			
COVER SHEET			
REV	DESCRIPTION	DATE	BY





SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

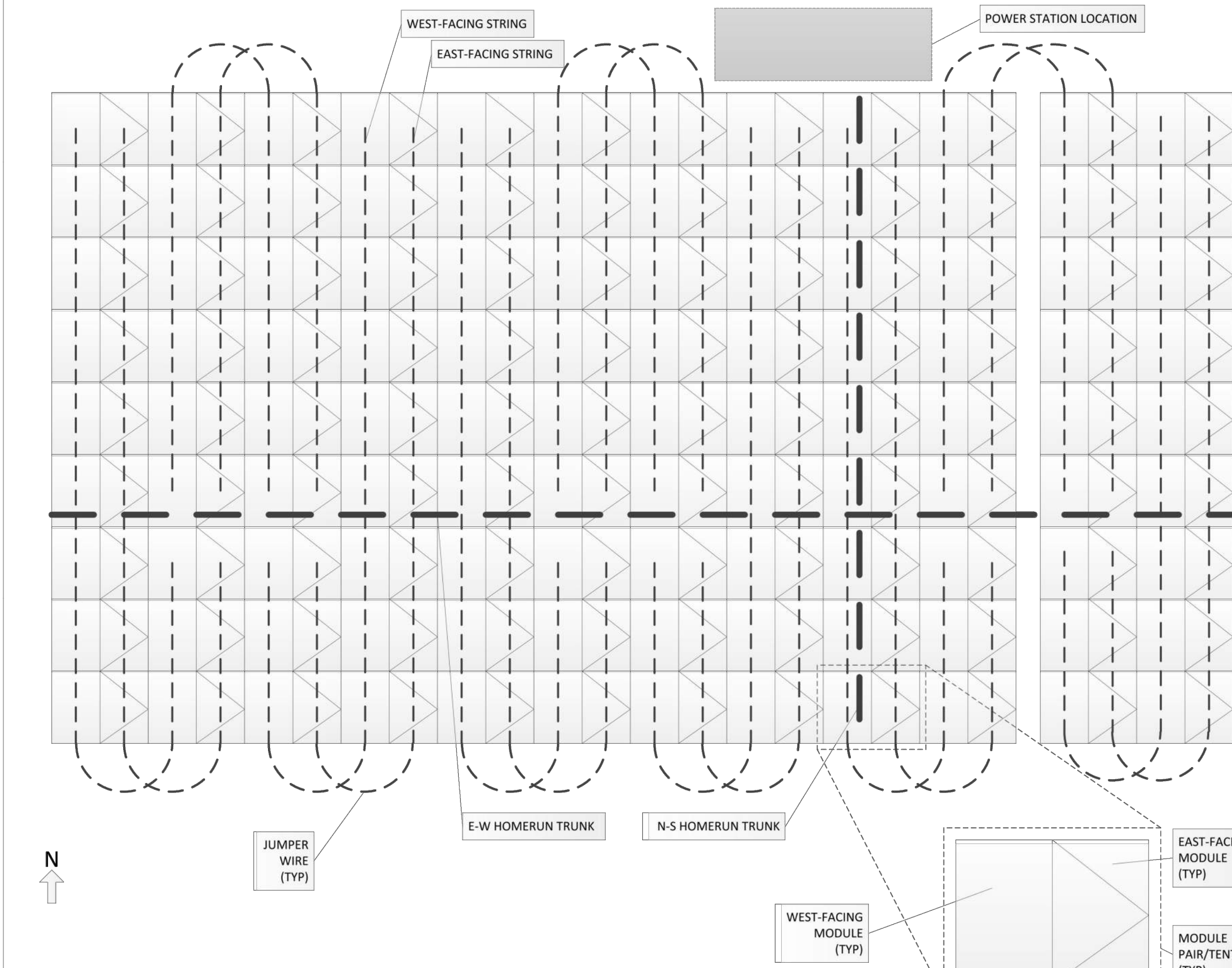


SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

MARK	DATE	DESCRIPTION
⚠	11/14/16	AS BUILT
⚠	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

ASSEMBLY
SHEET-DUAL



REFERENCE BALLAST DESIGN

REFERENCE – ARRAY STRINGING MAP
NOTE:
1. DUE TO E-W ORIENTATION OF MODULES, STRINGS SHOULD BE ROUTED IN THE N-S DIRECTION WITH MODULES WIRED IN THE LANDSCAPE DIRECTION.
2. INDIVIDUAL STRINGS SHOULD ONLY CONTAIN EAST-FACING OR WEST-FACING MODULES, AND STRINGS SHOULD NOT CONTAIN A MIXTURE OF EAST-FACING AND WEST-FACING MODULES.
3. EAST-FACING AND WEST-FACING STRINGS SHOULD BE WIRED TO SEPARATE INVERTER MPPT INPUTS, AND EAST-FACING AND WEST-FACING STRINGS SHOULD NOT BE CONNECTED TO THE SAME MPPT INPUT ON AN INVERTER.
4. A STRING LENGTH OF 12 MODULES IS SHOWN TO THE LEFT. THIS MAY VARY BY PROJECT.
5. PRIOR TO DEVELOPING A STRING MAP AND LAYING OUT WIRE MANAGEMENT COMPONENTS, IT IS ADVISED THAT LOCATIONS OF POWER STATIONS AND N-S AND E-W HOMERUN TRUNK LINES BE ESTABLISHED.

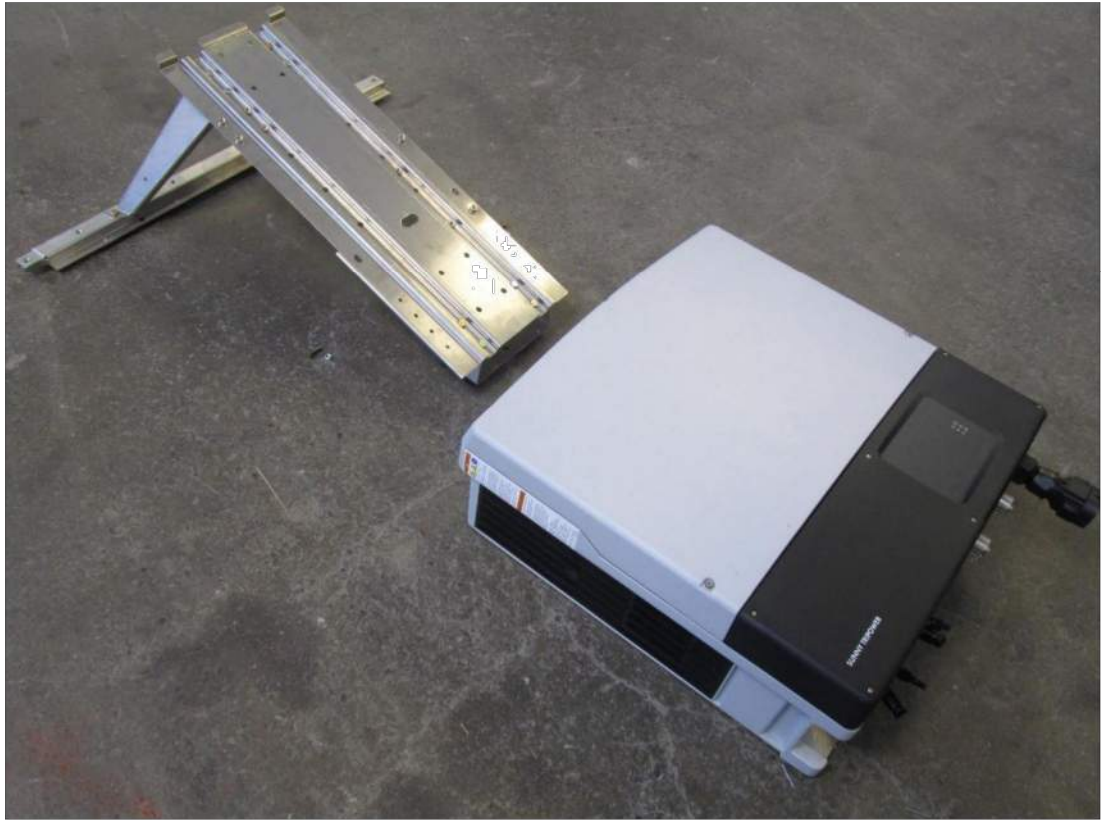
SUNPOWER		1424 HARBOUR WAY SOUTH RICHMOND, CA 94804 USA (510) 540-0550	
ENGINEER'S STAMP			
SUNPOWER HELIX ROOF DUAL TILT FIELD ASSEMBLY SHEETS			
REFERENCE ARRAY STRINGING MAP			
REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			
71			
72			
73			
74			
75			
76			
77			
78			
79			
80			
81			
82			
83			
84			
85			
86			
87			
88			
89			
90			
91			
92			
93			
94			
95			
96			
97			
98			
99			
100			
101			
102			
103			
104			
105			
106			
107			
108			
109			
110			
111			
112			
113			
114			
115			
116			
117			
118			
119			
120			
121			
122			
123			
124			
125			
126			
127			
128			
129			
130			
131			
132			
133			
134			
135			
136			
137			
138			
139			
140			
141			
142			
143			
144			
145			
146			
147			
148			
149			
150			
151			
152			
153			
154			
155			
156			
157			
158			
159			
160			
161			
162			
163			
164			
165			
166			
167			
168			
169			
170			
171			
172			
173			
174			
175			
176			
177			
178			
179			
180			
181			
182			
183			
184			
185			
186			
187			
188			
189			
190			
191			
192			
193			
194			
195			
196			
197			
198			
199			
200			
201			
202			
203			
204			
205			
206			
207			
208			
209			
210			
211			
212			
213			
214			
215			
216			
217			
218			
219			
220			
221			
222			
223			
224			
225			
226			
227			
228			
229			
230			
231			
232			
233			
234			
235			
236			
237			
238			
239			
240			
241			
242			
243			
244			
245			
246			
247			
248			
249			
250			
251			
252			
253			
254			
255			
256			
257			
258			
259			
260			
261			
262			
263			
264			
265			
266			
267			
268			
269			
270			
271			
272			
273			
274			
275			
276			
277			
278			
279			
280			
281			
282			
283			
284			
285			
286			
287			
288			
289			
290			
291			
292			
293			
294			
295			
296			
297			
298			
299			
300			
301			
302			
303			
304			
305			
306			
307			
308			
309			
310			
311			
312			
313			
314			
315			
316			
317			
318			
319			
320			
321			
322			
323			
324			
325			
326			
327			
328			
329			
330			
331			
332			
333			
334			
335			
336			
337			
338			
339			
340			
341			
342			
343			
344			
345			
346			
347			
348			
349			
350			
351			
352			
353			
354			
355			
356			
357			
358			
359			
360			
361			
362			
363			
364			
365			
366			
367			
368			
369			
370			
371			
372			
373			
374			
375			
376			
377			
378			
379			
380			
381			
382			
383			
384			
385			
386			
387			
388			
389			
390			
391			
392			
393			
394			
395			
396			
397			
398			
399			
400			
401			
402			
403			
404			
405			
406			
407			
408			
409			
410			
411			
412			
413			
414			
415			
416			
417			
418			
419			
420			
421			
422			
423			
424			
425			
426			
427			
428			
429			
430			
431			
432			
433			
434			
435			
436			
437			
438			
439			
440			
441			
442			
443			
444			
445			
446			
447			
448			
449			
450			
451			
452			
453			



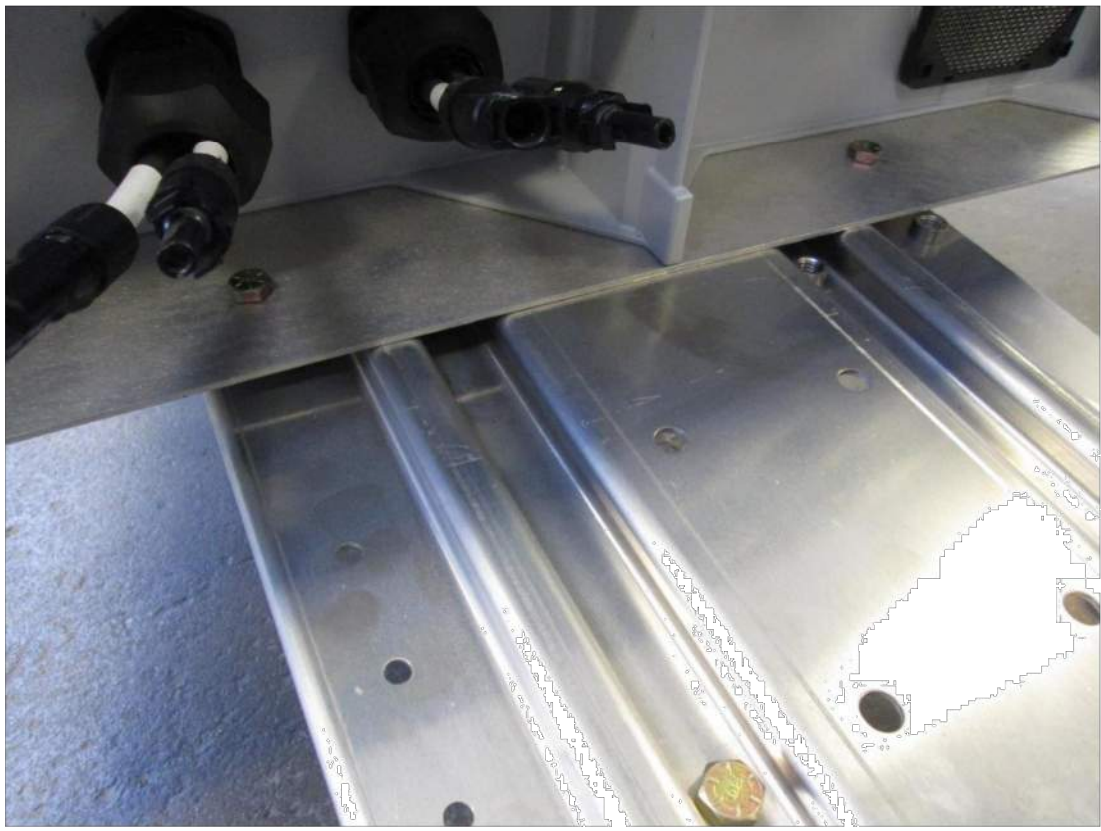
STEP B – ALIGN MOUNTING TAB WITH INVERTER SLOT



STEP D – SECURE AC COMBINER TO POWER STATION RACK



STEP A – STAGE INVERTER AT POWER STATION



STEP C – SECURE INVERTER TO POWER STATION RACK

STEP 14 – INSTALL INVERTER AND AC COMBINER TO POWER STATION RACKS

A. STAGE INVERTER AT POWER STATION

1. AT EACH POWER STATION AND INVERTER LOCATION, VERIFY THE SIZE/RATING OF THE INVERTER TO BE INSTALLED.

B. ALIGN MOUNTING TAB WITH INVERTER SLOT.

1. PLACE INVERTER ON MOUNTING BACK PLATE OF POWER STATION RACK.
2. INVERTER SLOT SHOULD FIT SECURELY OVER TOP OF MOUNTING BACK PLATE.

C. SECURE INVERTER TO POWER STATION RACK

1. SECURE INVERTER TO MOUNTING BACK PLATE WITH HARDWARE PROVIDED WITH INVERTER.
2. TORQUE ACCORDING TO INVERTER MANUFACTURER SPECIFICATIONS.

D. SECURE AC COMBINER TO POWER STATION RACK

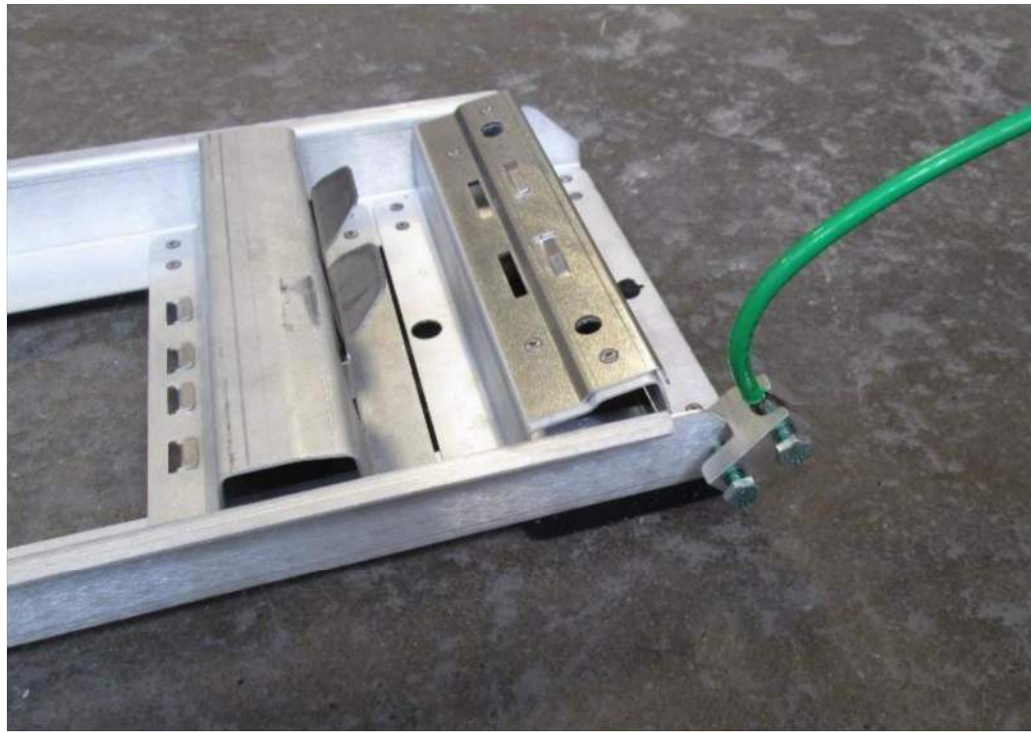
1. ATTACH PREINSTALLED MOUNTING STRUT TO MOUNTING BACK PLATE WITH TWO 3/8-16 FASTENERS AND STRUT NUTS AT HIGH END OF POWER STATION RACK.
2. ATTACH PREINSTALLED MOUNTING STRUT TO MOUNTING BACK PLATE WITH TWO 3/8-16 FASTENERS AND STRUT NUTS AT LOW END OF POWER STATION RACK.
3. SECURE THE INTEGRATED GROUNDING WIRE FROM THE AC COMBINER BOX TO THE BACK PLATE USING SUPPLIED HARDWARE. TORQUE TO 150 IN-LBS (17 N-m).

NOTE:

1. REFER TO PROJECT DRAWINGS FOR SITE SPECIFIC INVERTER AND AC COMBINER CONFIGURATIONS.

2. SUNPOWER PVS WILL ALSO MOUNT TO A POWER STATION RACK FOLLOWING SIMILAR MEANS AND METHODS.

SUNPOWER	
1414 HARBOUR WAY SOUTH RICHMOND, CA 94804 USA (510) 540-0550	
ENGINEER'S STAMP	
SUNPOWER HELIX ROOF DUAL TILT FIELD ASSEMBLY SHEETS	STEP 14 INSTALL INVERTER & AC COMBINER
REVISIONS	DATE
REV	DESCRIPTION
1	11 FEB 2016
2	T. PETAS
3	NTS
4	FA702



STEP B – BOND ARRAYS AT SERVICE AISLES



STEP A – PREPARE ILSCO SGB-4 GROUND LUGS

STEP 15 – SUB-ARRAY GROUNDING & BONDING JUMPERS

A. PREPARE ILSCO SGB-4 GROUND LUGS

1. IDENTIFY QUANTITY AND LOCATIONS OF GROUND LUGS TO BE INSTALLED.
2. BACK OUT SCREWS ON GROUND LUGS

B. BOND ISOLATED ARRAYS

1. ATTACH A GROUND LUG TO THE END OF THE SIDE RAIL OF A CHASSIS OR TRAY ALONG AN ARRAY GAP.
2. TORQUE TO 50 IN-LBS (5.6 N-m).
3. REPEAT INSTALLATION OF A GROUND LUG AT OPPOSITE SIDE OF ARRAY GAP.
4. ATTACH A #6 AWG BARE SOLID COPPER BONDING JUMPER BETWEEN THE TWO PREVIOUSLY INSTALLED GROUNDING LUGS AND TORQUE TO 35 IN-LBS (4 N-m).

NOTE:

1. ALL COMPONENTS WITHIN AN ARRAY ARE ELECTRICALLY BONDED THROUGH MODULE CLIPS AND RACKING STRUCTURE.

2. AC COMBINERS ARE GROUNDING THROUGH THE POINT OF INTERCONNECT. AC COMBINERS MUST BE ELECTRICALLY BONDED TO THE POWER STATION RACKING WITH A BONDING JUMPER.

3. ARRAYS MAY BE GROUNDING THROUGH AN ATTACHED POWER STATION WHICH INCLUDES A GROUND LUG AT OPPOSITE SIDE OF ARRAY GAP.

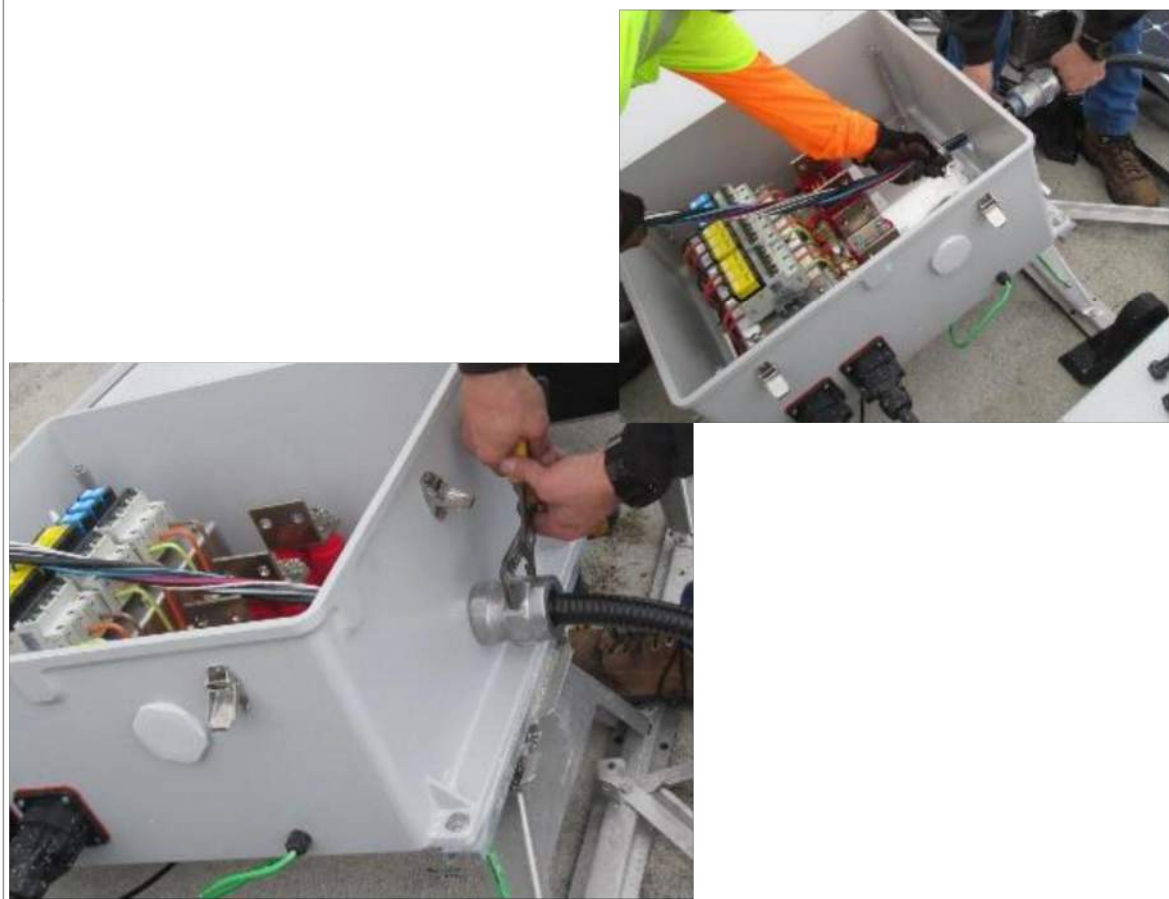
4. ISOLATED ARRAYS MUST BE ELECTRICALLY BONDED TO A GROUND LUG AT OPPOSITE SIDE OF ARRAY GAP.
5. REFER TO ARTICLE 250 OF NFPA 70 U.S. NATIONAL ELECTRICAL CODE AND PROJECT DOCUMENTATION FOR FURTHER GUIDANCE RELATED TO THE SIZING OF BONDING JUMPERS AND GROUNDING CONDUCTORS.

6. THE HELIX ROOF SYSTEM WAS EVALUATED UNDER UL 2703 WITH A MAXIMUM SERIES FUSE RATING OF 20A.

7. SYSTEM GROUNDING AND BONDING JUMPERS SHOULD NOT BE ATTACHED TO LEADING TRAYS OR TO CHASSIS COMPONENTS AT THE OUTER CORNERS OF ARRAYS. ONLY CHASSIS, FOLLOWING TRAYS, AND LEADING TRAYS WHICH SECURE A MINIMUM OF TWO MODULES SHOULD BE USED FOR A BONDING/ GROUNDING POINT TO ENSURE THAT REMOVAL OF A MODULE FOR REGULAR SERVICE DOES NOT INTERRUPT THE GROUND PATH FOR ANY ARRAY. IF MULTIPLE MODULES ARE REMOVED AT ANY GIVEN TIME, INSTALL A BONDING JUMPER USING #6 AWG CU CONDUCTOR WITH AN ILSCO SGB-4 ATTACHED AT BOTH ENDS TO ENSURE CONTINUITY OF SYSTEM GROUND BETWEEN THE ARRAY AND SYSTEM GROUND AT THE POWER STATIONS AND AC COMBINER.

8. TO AVOID INTERFERENCE WITH EDGE DEFLECTORS DO NOT LOCATE CHASSIS ATTACHED BONDING JUMPERS AT ARRAY EDGE LOCATIONS.

SUNPOWER	
1414 HARBOUR WAY SOUTH RICHMOND, CA 94804 USA (510) 540-0550	
ENGINEER'S STAMP	
SUNPOWER HELIX ROOF DUAL TILT FIELD ASSEMBLY SHEETS	STEP 15 SUB-ARRAY GROUNDING
REVISIONS	DATE
REV	DESCRIPTION
1	11 FEB 2016
2	T. PETAS
3	NTS
4	FA801



STEP B – INSTALL CONDUIT FITTING / MC CABLE AND CONDUCTORS



STEP A – DRILL CONDUIT EXIT INTO AC COMBINER

STEP 16 – INSTALL AC COMBINER EXIT & SYSTEM GROUND

A. DRILL CONDUIT EXIT INTO AC COMBINER

1. REMOVE AC COMBINER DEAD FRONT.
2. REFER TO PROJECT AND CONDUIT EXIT DETAILS TO DETERMINE SIZE OF CONDUIT EXIT.
3. USING HOLE SAW, DRILL HOLE INTO TOP OF AC COMBINER ENCLOSURE.

B. INSTALL CONDUIT FITTING/MC CABLE AND CONDUCTORS

1. INSTALL CONDUIT FITTING OR MC CABLE WITH FITTING INTO PREVIOUSLY DRILLED ENTRY INTO AC COMBINER.
2. TIGHTEN ALL FITTINGS ACCORDING TO MANUFACTURER INSTRUCTIONS AND PROJECT DOCUMENTATION.
3. PULL AND ROUTE CONDUCTORS INTO AC COMBINER.

C. INSTALL & TERMINATE SYSTEM GROUND

1. USING DIE-BASED COMPRESSION TOOL, INSTALL A COMPRESSION LUG ONTO THE GROUNDING CONDUCTOR.
2. USING PROVIDED HARDWARE, SECURE GROUNDING CONDUCTOR LUG TO GROUNDING TERMINAL IN AC COMBINER. TORQUE TO LUG MANUFACTURER'S RECOMMENDATION.
3. REPEAT ABOVE STEPS 1 AND 2 FOR NEUTRAL CONDUCTOR.

D. TERMINATE POWER CONDUCTORS

1. REPEAT STEP C FOR ALL THREE LINES OF POWER CONDUCTORS USING DIE-BASED COMPRESSION TOOLS AND LUGS.
2. REINSTALL AC COMBINER DEAD FRONT.

NOTE:

1. ALL COMPONENTS WITHIN AN ARRAY ARE ELECTRICALLY BONDED THROUGH MODULE CLIPS AND RACKING STRUCTURE.
2. AC COMBINERS ARE GROUNDING THROUGH THE POINT OF INTERCONNECTION. AC COMBINERS MUST BE ELECTRICALLY BONDED TO THE POWER STATION RACKING WITH A PREINSTALLED BONDING JUMPER.

3. ARRAYS MAY BE GROUNDING THROUGH AN ATTACHED POWER STATION AND POWER STATION RACK VIA ARRAY LINKS OR A BONDING JUMPER.

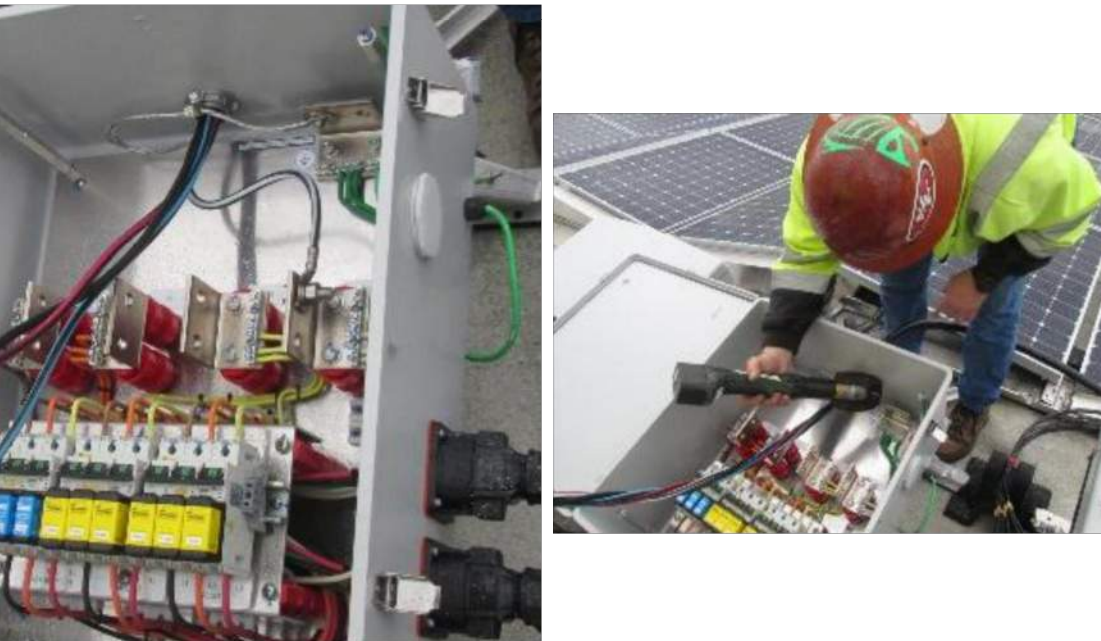
4. ISOLATED ARRAYS MUST BE ELECTRICALLY BONDED TO A GROUND LUG AT OPPOSITE SIDE OF ARRAY GAP.

5. REFER TO ARTICLE 250 OF NFPA 70 U.S. NATIONAL ELECTRICAL CODE AND PROJECT DOCUMENTATION FOR FURTHER GUIDANCE RELATED TO THE SIZING OF BONDING JUMPERS AND GROUNDING CONDUCTORS.

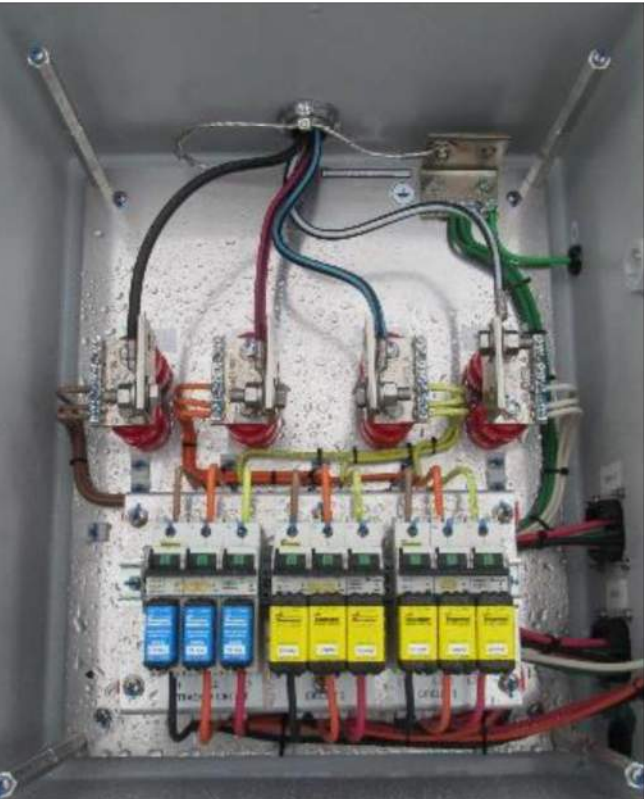
6. THE HELIX ROOF SYSTEM WAS EVALUATED UNDER UL 2703 WITH A MAXIMUM SERIES FUSE RATING OF 20A.

7. ENSURE THAT ALL FITTINGS USED WITH AC COMBINER BOX MEET A MINIMUM SPECIFICATION OF NEMA 4X

SUNPOWER	
1414 HARBOUR WAY SOUTH RICHMOND, CA 94804 USA (510) 540-0550	
ENGINEER'S STAMP	
SUNPOWER HELIX ROOF DUAL TILT FIELD ASSEMBLY SHEETS	STEP 16 INSTALL AC COMBINER EXIT
REVISIONS	DATE
REV	DESCRIPTION
1	11 FEB 2016
2	T. PETAS
3	NTS
4	FA802



STEP C – INSTALL & TERMINATE SYSTEM GROUND



STEP D – TERMINATE POWER CONDUCTORS

DETAILS TO BE PROVIDED IN FUTURE REVISION

SUNPOWER	
1414 HARBOUR WAY SOUTH RICHMOND, CA 94804 USA (510) 540-0550	
ENGINEER'S STAMP	
SUNPOWER HELIX ROOF DUAL TILT FIELD ASSEMBLY SHEETS	STEP 17 CONNECT DC HOMERUNS
REVISIONS	DATE
REV	DESCRIPTION
1	11 FEB 2016
2	T. PETAS
3	NTS
4	FA901

STEP 17 – CONNECT DC HOMERUNS

A. TEST OPEN CIRCUIT VOLTAGE AND POLARITY OF EACH STRING

1. TEST OPEN CIRCUIT VOLTAGE BETWEEN POSITIVE AND NEGATIVE ENDS OF A STRING'S HOMERUN LEADS AT THE POWER STATION END.
2. TEST POLARITY BETWEEN POSITIVE AND NEGATIVE ENDS OF A STRING'S HOMERUN LEADS AT THE POWER STATION END.

B. CONNECT HOMERUNS TO DC HARNESS

C. CONNECT DC HARNESS TO DC INVERTER INPUT

NOTE:

1. ENSURE THAT HOMERUN ENDS ARE TERMINATED WITH TYCO PV-4 CONNECTORS AND MATCH THOSE INSTALLED ON THE DC HARNESS INPUTS.

2. ALL HOMERUN CONDUCTORS SHOULD BE LABELLED ACCORDING TO PROJECT DRAWINGS.

PROJECT SITE

THIRD MUTUAL
LAGUNA WOODS VILLAGES

24351 EL TORO RD.
LAGUNA WOODS, CA 92637

PROJECT DEVELOPER



SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

CONTRACTOR



SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

SIGNATURE

STAMP

CITY APPROVAL STAMP

REVISION

MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

SHEET TITLE

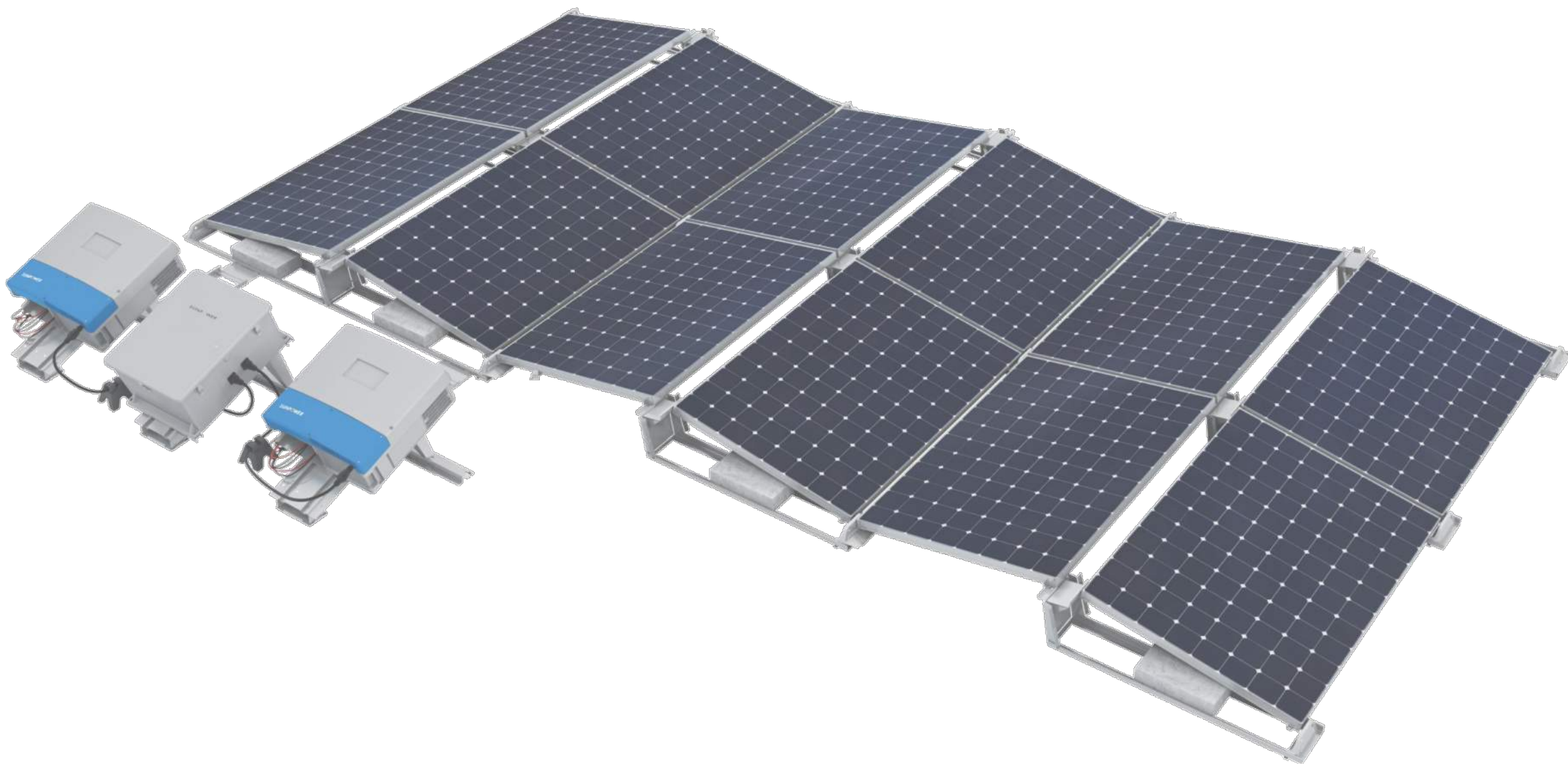
ASSEMBLY
SHEET-DUAL

SHEET NUMBER

AS13

SUNPOWER® | HELIX™ ROOF

Each Helix™ product is a complete solution, fully engineered and optimized so that all components operate as a unified system



Simpler

- Array integrated inverters
- Snap-in module installation
- Highly adaptable ballasting options

Faster

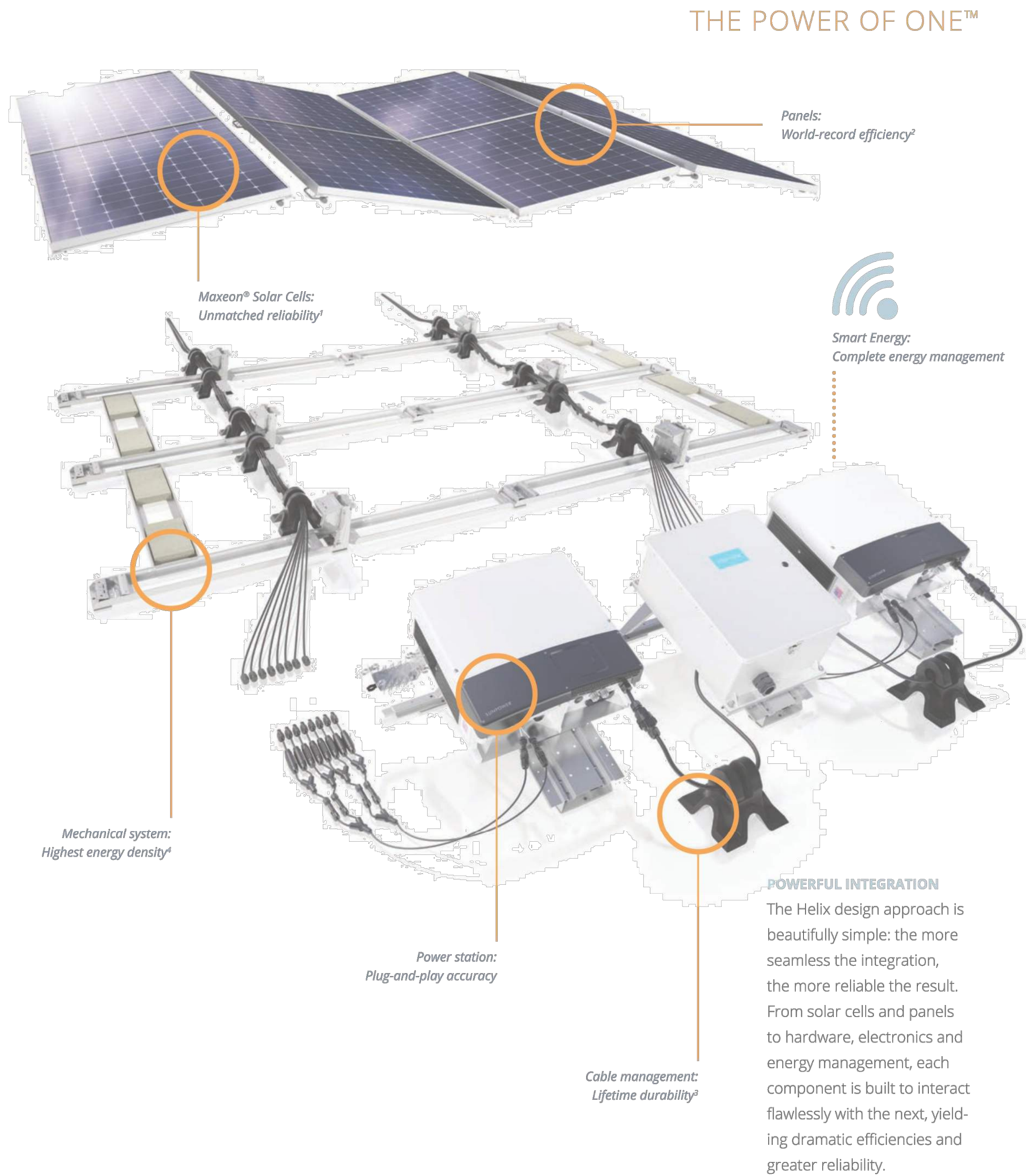
- Pre-configured parts eliminate 67% of electrical connections
- Integrated grounding
- No bolts or tools required for eBOS installation

Better

- Industry-leading roof coverage¹
- World record efficiency SunPower solar modules²
- Optimized and robust cable management
- Aluminum and stainless steel design
- 62% more energy in year ¹
- Designed to evolve for a Smart Energy future

¹ Internal SunPower analysis
² Highest of over 3,200 silicon solar panels. Photon Module Survey, Feb 2014.

Dual Tilt: Optimize NPV




PROJECT SITE


THIRD MUTUAL
LAGUNA WOODS VILLAGES

24351 EL TORO RD.
LAGUNA WOODS, CA 92637


PROJECT DEVELOPER


SOLAR OPTIMUM
SOLAR OPTIMUM, INC.
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

CONTRACTOR


SOLAR OPTIMUM
SOLAR OPTIMUM, INC.
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

SIGNATURE



STAMP

CITY APPROVAL STAMP

REVISION

MARK	DATE	DESCRIPTION
⚠	11/14/16	AS BUILT
⚠	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

SHEET TITLE

EQUIPMENT SPECIFICATIONS

SHEET NUMBER

SPO

HELIX ROOF Mounting System



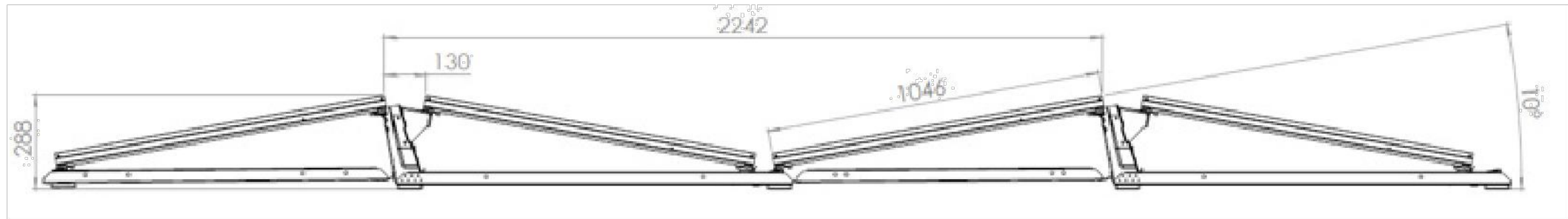
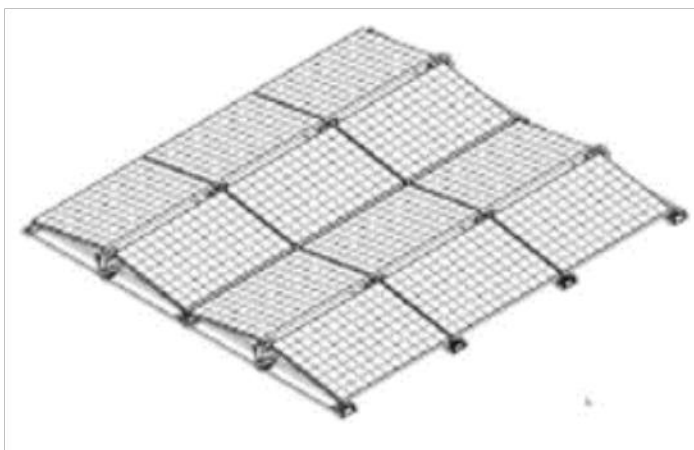
HELIX DT



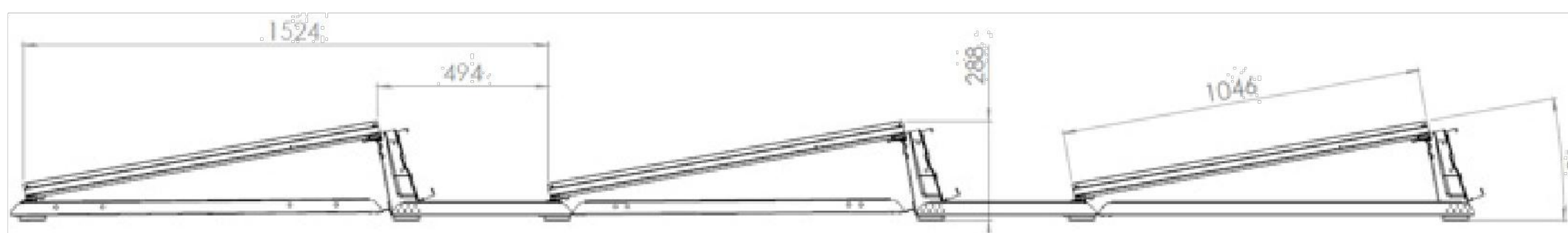
HELIX ST

General	HELIX DT	HELIX ST
Configuration	Dual Tilt	Single Tilt
Tilt angle	10 degrees	
Module compatibility	SPR-E20-327-COM (327 W DC)*	
Ground coverage ratio (GCR)	0.91	0.67
Base system weight	9.3 kg/m² (1.9 psf)	12.2 kg/m² (2.5 psf)
Maximum ballast capacity	58.6 kg/m² (12 psf)	
Warranty	25 years	
Certifications	UL 2703	
Wind tunnel testing	ASCE 7-10 and SEAOC PV2 compliant	
Material (structure)	5052 H32 aluminum and 301 stainless steel	
Material (foot pad)	Recycled rubber (92% approx.), polyurethane binder (8% approx.)	
Compatible roof anchors	EcoFasten Solar® Eco-65/F-202, OMG PowerGrip™, OMG PowerGrip Plus™	

DT Mechanical Dimensions



ST Mechanical Dimensions



(dimensions in mm)

*Request Helix-compatible version

HELIX ROOF Mounting System



Components			
DT		Chassis Platform (#514057)	
ST		Chassis (#513831)	Following Tray (#513832)
Common		RH Deflector (#513842)	Leading Tray (#517871)
Optional		LH Deflector (#513841)	
		Link Tray (#513833)	


#516950 Rev B

PROJECT SITE

THIRD MUTUAL
LAGUNA WOODS VILLAGES


24351 EL TORO RD.
LAGUNA WOODS, CA 92637

PROJECT DEVELOPER




SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

CONTRACTOR



SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

SIGNATURE



STAMP

CITY APPROVAL STAMP

REVISION

MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

SHEET TITLE

HELIX ROOF
MOUNTING SYSTEM

SHEET NUMBER

SP1



SunPower® E-Series Commercial Solar Panels | E20-327-COM

Helix™ Compatible Modules

Factory-installed flanges enable tool-free panel installation, decreasing installation time and minimizing business disruption.¹

More than 20% Efficiency

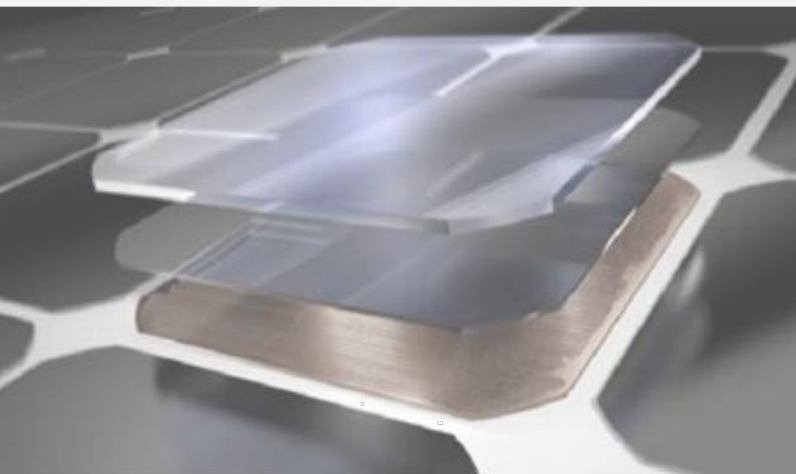
Captures more sunlight and generates more power than Conventional Panels.

High Performance

Delivers excellent performance in real world conditions, such as high temperatures, clouds and low light.^{2,3,5}

Commercial Grade

Optimized to maximize returns and energy production, the E-Series panel is a bankable solution for commercial solar applications.



Maxeon® Solar Cells: Fundamentally better.
Engineered for performance, designed for reliability.

Engineered for Peace of Mind

Designed to deliver consistent, trouble-free energy over a very long lifetime.^{4,5}

Designed for Reliability

The SunPower Maxeon Solar Cell is the only cell built on a solid copper foundation. Virtually impervious to the corrosion and cracking that degrade Conventional Panels.⁴

#1 Rank in Fraunhofer durability test.¹⁰
100% power maintained in Atlas 25+ comprehensive Durability test.¹¹

High Performance & Excellent Reliability



SPR-E20-327-COM



Helix-compatible
version now available

High Efficiency⁶

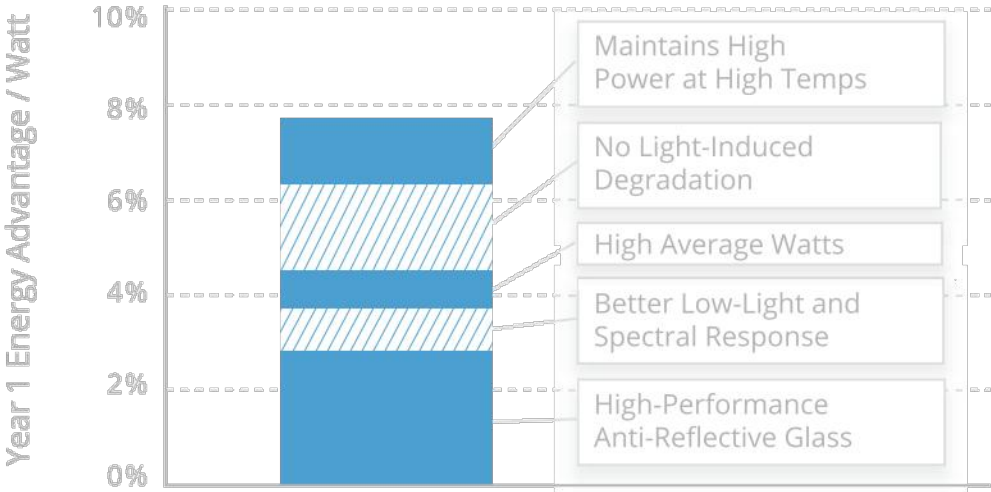
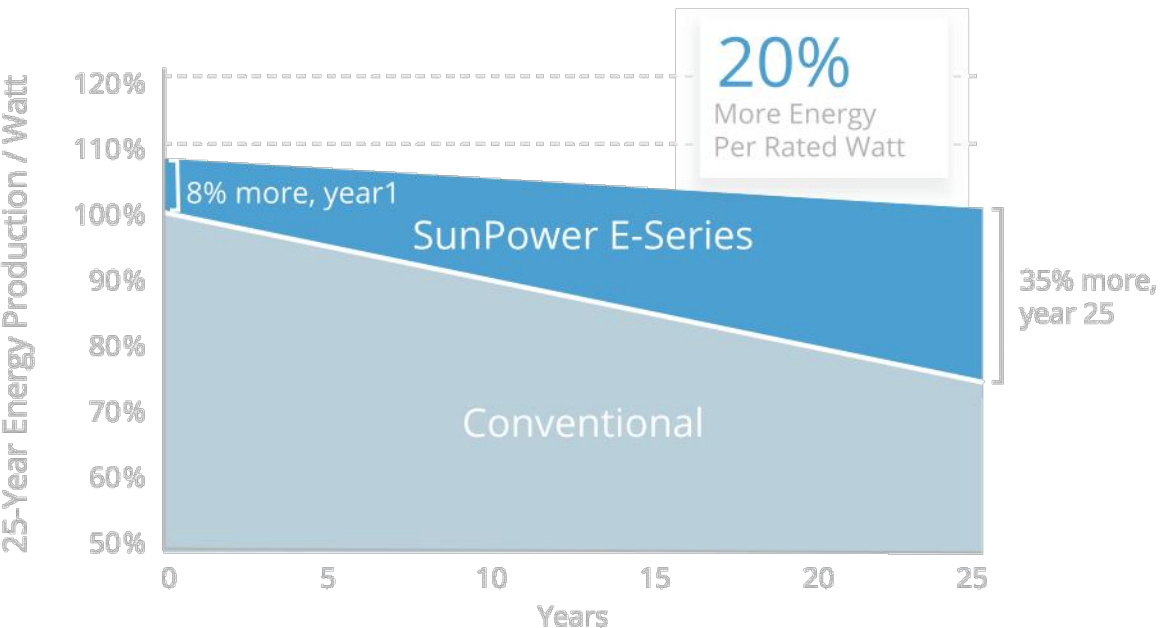
Generate more energy per square foot

E-Series commercial panels convert more sunlight to electricity producing 31% more power per panel,² and 60% more energy per square foot over 25 years.^{2,3,4}

High Energy Production⁷

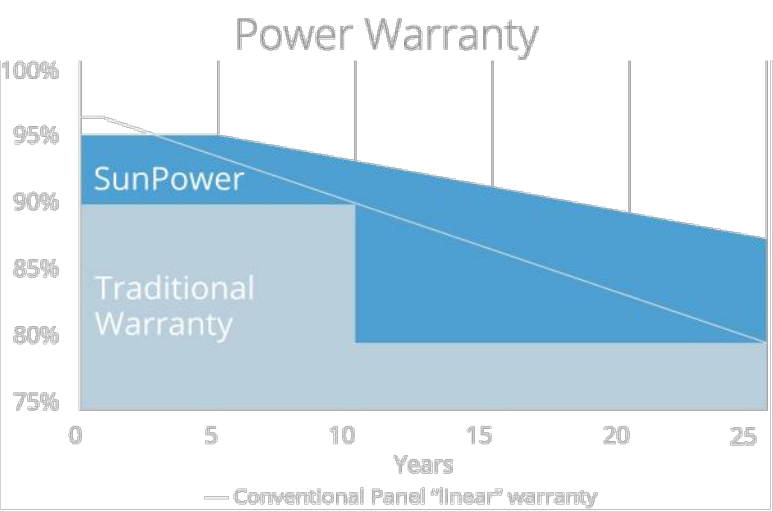
Produce more energy per rated watt

More energy to power your operations. High year one performance delivers 7-9% more energy per rated watt.³ This advantage increases over time, producing 20% more energy over the first 25 years to meet your needs.⁴



SunPower® E-Series Commercial Solar Panels | E20-327-COM

Sunpower Offers The Best Combined Power And Product Warranty

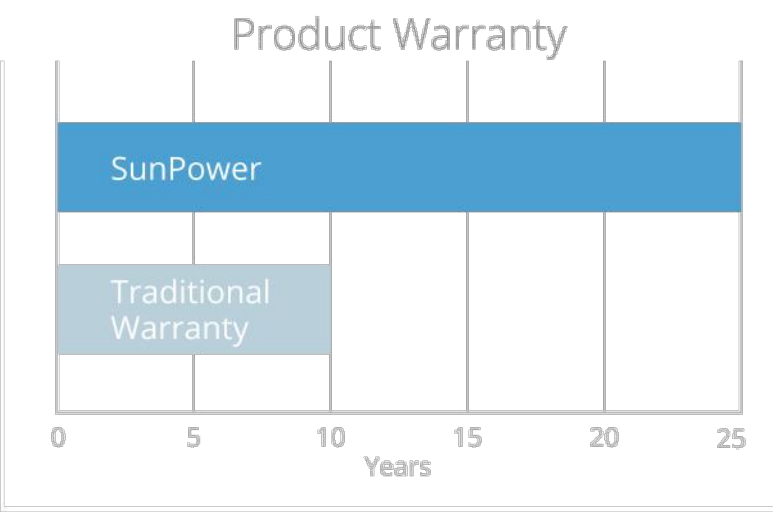


More guaranteed power: 95% for first 5 years,
-0.4%/yr. to year 25.⁸

Electrical Data		
	SPR-E20-327-COM	SPR-E19-310-COM
Nominal Power (P _{nom}) ¹²	327 W	310 W
Power Tolerance	+5/-3%	+5/-3%
Avg. Panel Efficiency ¹³	20.3%	19.3%
Rated Voltage (V _{mpp})	54.7 V	54.7 V
Rated Current (I _{mpp})	5.98 A	5.67 A
Open-Circuit Voltage (V _{oc})	64.9 V	64.4 V
Short-Circuit Current (I _{sc})	6.46 A	6.05 A
Max. System Voltage	1000 V UL & 1000 V IEC	
Maximum Series Fuse	15 A	
Power Temp Coef.	-0.38% / °C	
Voltage Temp Coef.	-176.6 mV / °C	
Current Temp Coef.	3.5 mA / °C	

REFERENCES:
1 Helix™ compatible modules may not be compatible with other racking systems.
2 All comparisons are SPR-E20-327 vs. a representative conventional panel: 250W, approx. 1.6 m², 15.3% efficiency.
3 Typically 7-9% more energy per watt, BEW/DNV Engineering "SunPower Yield Report," Jan 2013.
4 SunPower 0.25%/yr degradation vs. 1.0%/yr conv. panel. Campeau, Z. et al. "SunPower Test Report," NREL, Q1-2015.
5 "SunPower Module 40-Year Useful Life" SunPower white paper, May 2015. Useful life is 99 out of 100 panels operating at more than 70% of rated power.
6 Second highest, after SunPower X-Series, of over 3,200 silicon solar panels, Photon Module Survey, Feb 2014.
7 8% more energy than the average of the top 10 panel companies tested in 2012 (151 panels, 102 companies), Photon International, Feb 2013.
8 Compared with the top 15 manufacturers. SunPower Warranty Review, May 2015.
9 Some restrictions and exclusions may apply. See warranty for details.
10 5 of top 8 panel manufacturers tested in 2013 report; 3 additional panels in 2014. Ferrara, C., et al. "Fraunhofer PV Durability Initiative for Solar Modules: Part 2". Photovoltaics International, 2014.
11 Compared with the non-stress-tested control panel. Atlas 25+ Durability test report, Feb 2013.
12 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25° C). NREL calibration Standard: SOMS current, LACCS FF and Voltage.
13 Based on average of measured power values during production.
14 Type 2 fire rating per UL1703:2013, Class C fire rating per UL1703:2002.
15 See sales person for details.

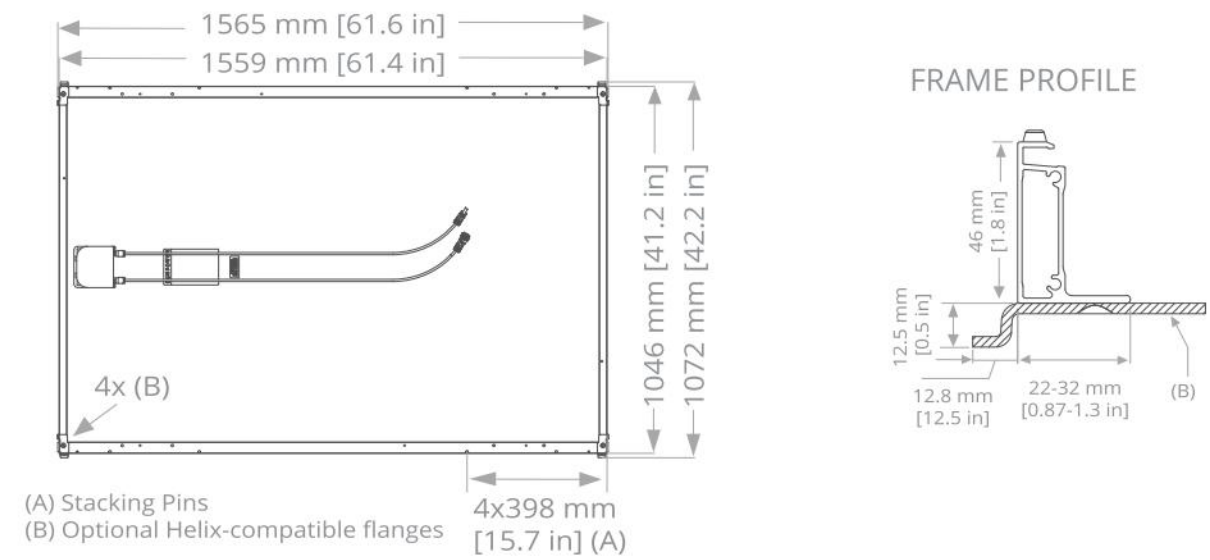
See www.sunpower.com/facts for more reference information.
For more details, see extended datasheet: www.sunpower.com/datasheets.



Combined Power and Product defect 25 year coverage
that includes panel replacement costs.⁹

Tests And Certifications	
Standard tests ¹⁴	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Certs	ISO 9001:2008, ISO 14001:2004
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, REACH SVHC-155, PV Cycle
Sustainability	Cradle to Cradle (eligible for LEED points) ¹⁵
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	Potential-Induced Degradation free: 1000 V ¹⁰
Available listings	UL, CEC, TUV, JET, MCS, FSEC

Operating Condition And Mechanical Data	
Temperature	-40° F to +185° F (-40° C to +85° C)
Impact Resistance	1 inch (25mm) diameter hail at 52 mph (23 m/s)
Appearance	Class B
Solar Cells	96 Monocrystalline Maxeon Gen II
Tempered Glass	High transmission tempered Anti-Reflective
Junction Box	IP-65, MC4 Compatible
Weight	41 lbs (18.6 kg)
Max. Load	Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins



Please read the safety and installation guide.
Flanges installed on Helix-compatible modules only.
Flanges are not removable and may not be compatible with non-Helix racking.

Document # 515662 REVA /LTR_US



SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10



SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10



REVISION		
MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

SUNNY TRIPOWER
12000TL-US / 15000TL-US / 20000TL-US / 24000TL-US



RATED FOR
1000 V DC & 600 V DC
SYSTEMS

Design flexibility

- 1000 V DC or 600 V DC
- Two independent DC inputs
- 15° to 90° mounting angle range
- Detachable DC Connection Unit

System efficiency

- 98% CEC, 98.5% Peak
- 1000 V DC increases system efficiency
- OptiTrac advanced MPPT
- OptiTrac Global Peak MPPT

Enhanced safety

- Integrated DC AFCI
- Floating system with all-pole sensitive ground fault protection
- Reverse polarity indicator

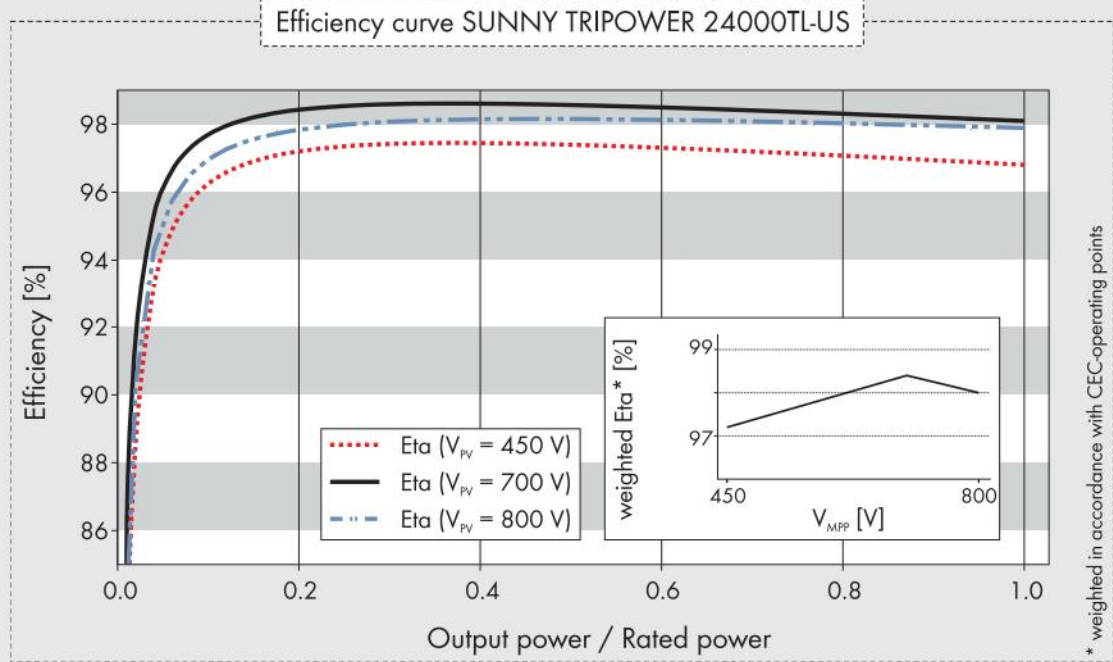
Future-proof

- Complete grid management feature set
- Cluster Controller, WebConnect/Speedwire
- Bi-directional Ethernet communications
- Ability to satisfy future utility requirements

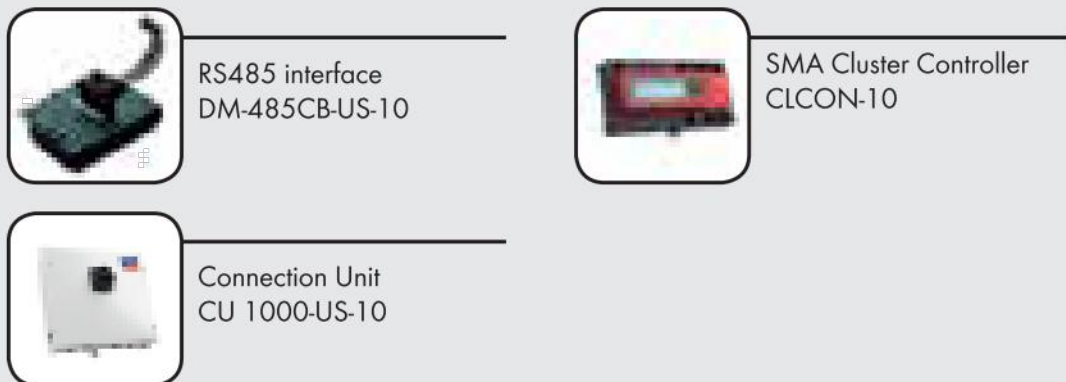
SUNNY TRIPOWER
12000TL-US / 15000TL-US / 20000TL-US / 24000TL-US

The ultimate solution for decentralized PV plants

The world's best-selling three-phase PV inverter, the SMA Sunny Tripower TL-US, is raising the bar for decentralized commercial PV systems. This three-phase, transformerless inverter is UL listed for up to 1000 V DC maximum system voltage and has a peak efficiency above 98 percent, while OptiTrac Global Peak minimizes the effects of shade for maximum energy production. The Sunny Tripower delivers a future-proof solution with full grid management functionality, cutting edge communications and advanced monitoring. The Sunny Tripower is also equipped with all-pole ground fault protection and integrated AFCI for a safe, reliable solution. It offers unmatched flexibility with a wide input voltage range and two independent MPP trackers. Suitable for both 600 V DC and 1,000 V DC applications, the Sunny Tripower allows for flexible design and a lower levelized cost of energy.



Accessories



Standard features, Optional features, Not available
Data at nominal conditions

Technical data	Sunny Tripower 12000TL-US	Sunny Tripower 15000TL-US	Sunny Tripower 20000TL-US	Sunny Tripower 24000TL-US
Input (DC)				
Max. usable DC power (@ cos φ = 1)	12250 W	15300 W	20400 W	24500 W
Max. DC voltage *	1000 V	1000 V	1000 V	1000 V
Rated MPPT voltage range	300 V...800 V	300 V...800 V	380 V...800 V	450 V...800 V
MPPT operating voltage range	150 V...1000 V	150 V...1000 V	150 V...1000 V	150 V...1000 V
Min. DC voltage / start voltage	150 V / 188 V	150 V / 188 V	150 V / 188 V	150 V / 188 V
Number of MPP tracker inputs	2	2	2	2
Max. input current / per MPP tracker input	66 A / 33 A	66 A / 33 A	66 A / 33 A	66 A / 33 A
Output (AC)				
AC nominal power	12000 W	15000 W	20000 W	24000 W
Max. AC apparent power	12000 VA	15000 VA	20000 VA	24000 VA
Output phases / line connections	3 / 3-N-PE			
Nominal AC voltage	480 / 277 V WYE			
AC voltage range	244 V...305 V			
Rated AC grid frequency	60 Hz			
AC grid frequency / range	50 Hz, 60 Hz / -6 Hz...+5 Hz			
Max. output current	14.4 A	18 A	24 A	29 A
Power factor at rated power / adjustable displacement	1 / 0.8 leading...0.8 lagging			
Harmonics	< 3 %			
Efficiency				
Max. efficiency	98.2 %	98.2 %	98.5 %	98.5 %
CEC efficiency	97.5%	97.5%	97.5%	98.0%
Protection devices				
DC reverse polarity protection	•	•	•	•
Ground fault monitoring / Grid monitoring	•	•	•	•
All-pole sensitive residual current monitoring unit	•	•	•	•
DC AFCI compliant to UL 1699B	•	•	•	•
AC short circuit protection	•	•	•	•
Protection class / overvoltage category	I / IV	I / IV	I / IV	I / IV
General data				
Dimensions (W / H / D) in mm (in)	665 / 690 / 265 (26.1 / 27.1 / 10.4)			
Packing dimensions (W / H / D) in mm (in)	780 / 790 / 380 (30.7 / 31.1 / 15.0)			
Weight	55 kg (121 lbs)			
Packing weight	61 kg (134.5 lbs)			
Operating temperature range	-25 °C...+60 °C			
Noise emission (typical)	51 dB(A)			
Internal consumption at night	1 W			
Topology	Transformerless			
Cooling concept	OptiCool			
Electronics protection rating	NEMA 3R			
Features				
Display / LED indicators (Status / Fault / Communication)	- / •	- / •	- / •	- / •
Interfaces: Speedwire / RS485	• / o	• / o	• / o	• / o
Mounting angle range	15°...90°	15°...90°	15°...90°	15°...90°
Warranty: 10 / 15 / 20 years	• / o / o	• / o / o	• / o / o	• / o / o
Certifications and approvals	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN/CSA C22.2 107.1-1			
NOTE: US inverters ship with gray lids				
* Suitable for 600 V DC max. systems				
Type designation	STP 12000TL-US-10	STP 15000TL-US-10	STP 20000TL-US-10	STP 24000TL-US-10

Toll Free +1 888 4 SMA USA
www.SMA-America.com

SMA America, LLC

PROJECT SITE

THIRD MUTUAL
LAGUNA WOODS VILLAGES

24351 EL TORO RD.
LAGUNA WOODS, CA 92637

PROJECT DEVELOPER

SOLAR OPTIMUM
SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

CONTRACTOR

SOLAR OPTIMUM
SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

SIGNATURE

[Signature]

STAMP

CITY APPROVAL STAMP

REVISION

MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

SHEET TITLE

INVERTER
SPECIFICATIONS

SHEET NUMBER

SP3

Safety Switches

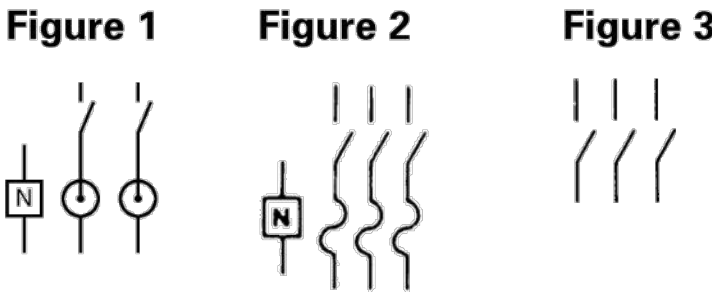
General Duty — 30–600 Amp, 10,000 & 100,000 Amp Withstand Cartridge Fuse
Type 1 & Type 3R



Switch Selection with Class “H” Fuse Holders 30–600 Amps
(Convertible to Class “R”) ①

Indoor TYPE 1										Outdoor TYPE 3R					Horsepower Rating		
															Single Phase	Three Phase	
															240V AC	240V AC	250V DC
Symbol	Amps	Cat #	List Each	Std. Pkg.	Approx. Wgt. Lbs.	Cat #	List Each	Std. Pkg.	Approx. Wgt. Lbs.	Hub	Std	Max ②	Std	Max ②	Std		
FUSIBLE 2 POLE 3 WIRE S/N 240V AC (INSULATED GROUNDABLE NEUTRAL) ③ ④ ⑤																	
Fig-1	30	GHN321N ③	135.00	10	35.00	GHN321NW ③	215.00	10	35.00	ECHA	1½	3	3	7½	5		
	60	GHN322N ③	230.00	1	14.00	GHN322NW ③	354.00	1	14.00	ECHS	3	10	7½	15	10		
	100	GHN323N ③	463.00	1	23.00	GHN323NW ③	522.00	1	24.00	ECHS	7½	15	15	30	20		
	200	GHN324N ③	961.00	1	47.00	GHN324NW ③	1364.00	1	48.00	ECHS	15	—	25	60	40		
	400	GHN325NH ②	2918.00	1	128.00	GHN325NWH ②	3954.00	1	130.00	ECHV ④	15	—	50	125	50		
	400	GHN325N	2940.00	1	153.00	GHN325NW	3977.00	1	157.00	ECHV ④	15	—	50	125	50		
	600	GHN326NH ②	5764.00	1	133.00	GHN326NWH ②	7311.00	1	135.00	ECHV ④	15	—	75	200	—		
	600	GHN326N	5795.00	1	159.00	GHN326NW	7345.00	1	159.00	ECHV ④	15	—	75	200	—		
FUSIBLE 3 POLE 4 WIRE S/N 240V AC (INSULATED GROUNDABLE NEUTRAL) ⑤																	
Fig-2	30	GHN421N	215.00	5	24.00	GHN421NW	320.00	5	24.00	ECHA	1½	3	3	7½	5		
	60	GHN422N	354.00	1	15.00	GHN422NW	481.00	1	15.00	ECHS	3	10	7½	15	10		
	100	GHN423N	616.00	1	25.00	GHN423NW	890.00	1	25.00	ECHS	7½	15	15	30	20		
	200	GHN424N	1364.00	1	49.00	GHN424NW	1615.00	1	50.00	ECHS	15	—	25	60	40		
	400	GHN425NH ②	3458.00	1	136.00	GHN425NWH ②	4170.00	1	138.00	ECHV ④	15	—	50	125	50		
	400	GHN425N	3484.00	1	158.00	GHN425NW	4192.00	1	162.00	ECHV ④	15	—	50	125	50		
	600	GHN426NH ②	6456.00	1	138.00	GHN426NWH ②	8661.00	1	141.00	ECHV ④	15	—	75	200	—		
	600	GHN426N	6491.00	1	161.00	GHN426NW	8697.00	1	165.00	ECHV ④	15	—	75	200	—		
NON-FUSIBLE 3 POLE 240V AC (SEE PREVIOUS PAGE FOR 2 POLE, 30 AMPS; USE 3 POLE FOR 2 POLE APPLICATION FOR 60–200 AMPS)																	
Fig-3	30	GUN321	176.00	5	24.00	GUN321AW	332.00	5	24.00	ECHA	—	3	—	7½	5		
	60	GUN322	230.00	1	12.00	GUN322AW	494.00	1	13.00	ECHS	—	10	—	15	10		
	100	GUN323	543.00	1	23.00	GUN323AW	925.00	1	24.00	ECHS	—	15	—	30	20		
	200	GUN324	940.00	1	46.00	GUN324AW	1595.00	1	47.00	ECHS	—	15	—	60	40		

Accessories and Lug Data —
See pages 5-11 and 5-12.
Dimensions —
See pages 5-13, 5-14 and 5-15.
Knockout Drawings —
See pages 5-16 and 5-17.



① “G” Series switches are UL Listed for use on circuits capable of delivering up to 100,000 Amps RMS symmetrical fault currents, provided Class “R” or “T” fuses and appropriate rejection or adapter kits are installed. T-fuses can only be used on 100–600 Amp. 100–600A switches can also be used with Class J fuses.

② Starting current of motors above standard horsepower rating may require use of time delay fuses.

③ These switches are UL Listed for application on grounded B systems.

④ Suitable for 3-pole motor loads.

⑤ Has service entrance label, neutral factory installed.

⑥ 400A and larger Type 3R switches have no provisions for mounting hubs. Drill or punch hole in the field to accommodate hub size desired.

⑦ Height reduced switch (45.25 rather than 56 inches in height) for use with 500MCM or smaller conductors.

PROJECT SITE

THIRD MUTUAL
LAGUNA WOODS VILLAGES

24351 EL TORO RD.
LAGUNA WOODS, CA 92637

PROJECT DEVELOPER




SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

CONTRACTOR



SOLAR OPTIMUM, INC
501 WEST GLENOAKS BLVD.
GLENDALE, CA 91202
800-552-9970
WWW.SOLAROPTIMUM.COM
LICENSE NUMBER 972228 C10

SIGNATURE


STAMP

CITY APPROVAL STAMP

REVISION		
MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY: SCOTT
CHECKED BY: T.T.T.
SCALE: AS SHOWN
DATE: 12/21/16

SHEET TITLE

PV AC DISCONNECT

SHEET NUMBER

SP4

5 SAFETY SWITCHES

HELIX ROOF Power Station



General

Operating temp. -4 to 140° F (-20 to 60° C)

- Components
- Helix plug-and-play SMA Tripower Inverter
 - Helix plug-and-play AC Combiner
 - Helix plug-and-play DC Branch
 - Helix plug-and-play AC Whip
 - Helix eBOS Mount
 - Helix Cable Clip and Cable Clip+
 - Helix Cable Cone
 - Helix Cable Tray

Warranty 10-year factory warranty
(Extension available up to 20 years)

Inverter

Model	Helix plug-and-play SMA Tripower (STP-US)
AC power ratings	12, 15, 20, 24 kW AC
Rated grid voltage	480 V / 277 V WYE
Max. DC input voltage	1000 V
Dimensions (w × h × d)	665 × 650 × 265 mm (26.2 × 25.6 × 10.4 in.)
Weight	55 kg (121 lbs.)
Enclosure rating	NEMA 3R
DC connector	H4-UTX-XL
AC connector	APP Mid-Power SPEC Pak®
Communications connector	RJ-45
Communications protocol	Modbus TCP-IP

AC Combiner

Model	Helix plug-and-play AC Combiner
Rated amperage	250 A
Inverter input options	2, 3, and 4 inverter input configurations
Inverter input max. amperage	50 A
Optional auxiliary input rated amperage	15 A
Dimensions (w × h × d)	699 × 561 × 297 mm (27.2 × 22.2 × 12 in.)
Enclosure rating	NEMA 4X non-metallic
AC connector	APP Mid-Power SPEC Pak®

HELIX ROOF Power Station



DC Branch

Model	Helix plug-and-play DC Branch
String input options	2, 3, and 4 string
String fuse rating	15 A
Conductor size	#12 to #8 AWG
Conductor insulation rating	Sunlight-resistant PV Wire
Voltage rating	2000 VDC
Fusing	12 A
Connectors	String side: Tyco PV4 Solarlock Combined side: Amphenol H4-UTX-XL



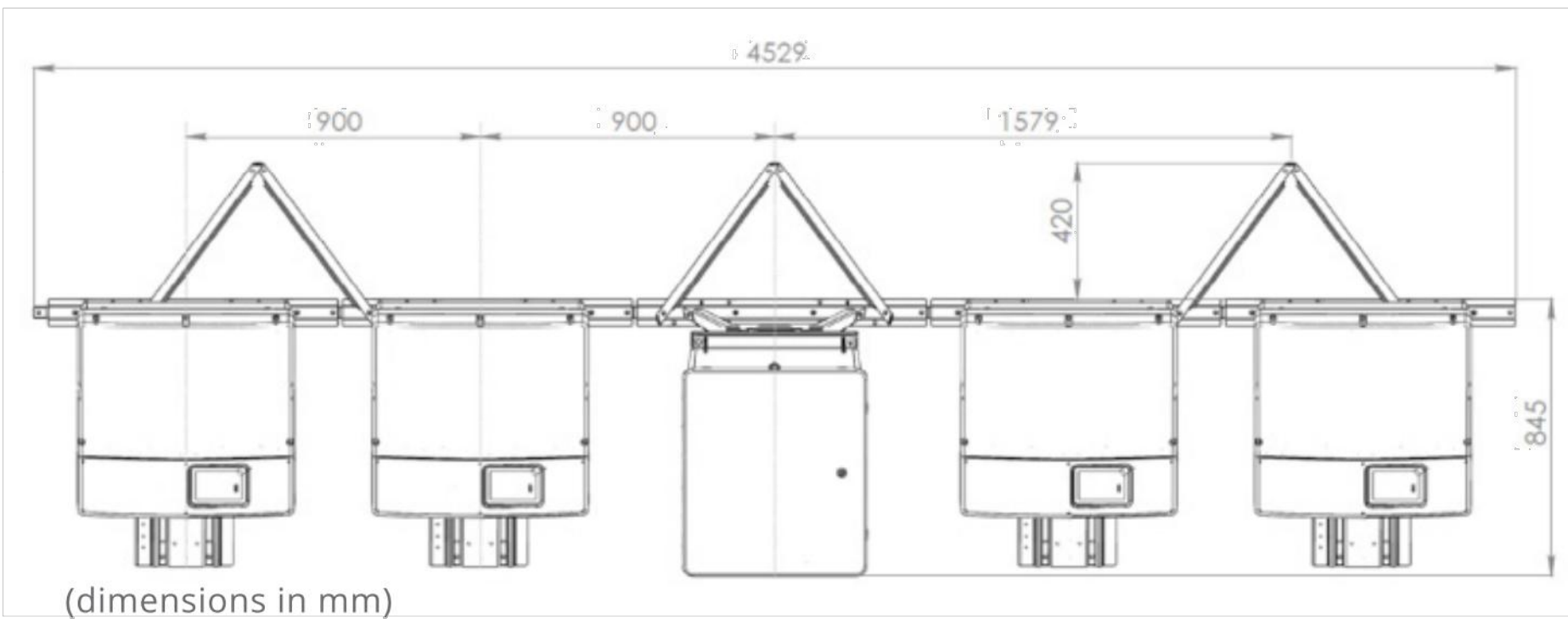
AC Whip

Model	Helix plug-and-play AC Combiner
Length	1.8 m (71 in.)
Conductor size	#8 AWG 5-strand multiconductor
Conductor insulation rating	Sunlight-resistant TC-ER
Voltage rating	600 V
AC connector type	APP Mid-Power SPEC Pak®



eBOS Mount

Mounting structure model	Helix eBOS Mount
Mounting structure material	5052 H32 aluminum 301 stainless steel
Roof pad material	Recycled rubber
Tilt angle	15 degrees
Sunshade	Optional



(dimensions in mm)

Rev 1.1

REVISION		
MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY:	SCOTT
CHECKED BY:	T.T.T.
SCALE:	AS SHOWN
DATE:	12/21/16

HELIX ROOF Cable Management



General

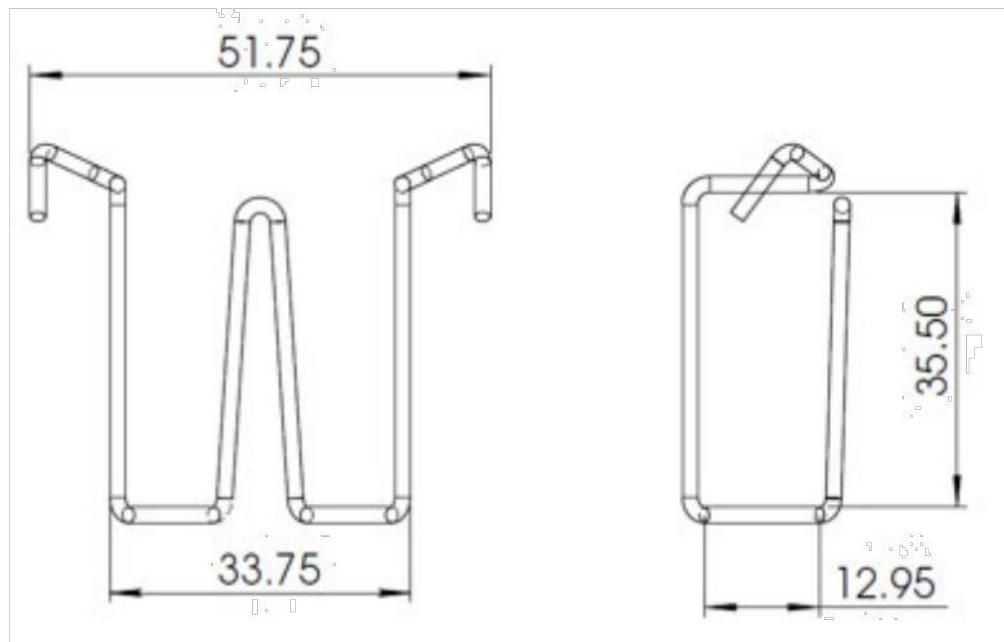
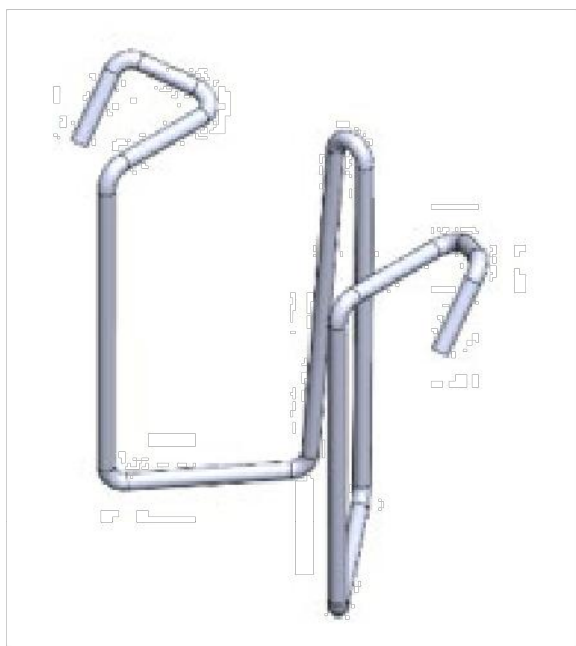
Operating temp. -13 to 140° F (-25 to 60° C)

- Components
- Helix Cable Clip
 - Helix Cable Clip+
 - Helix Cable Cone
 - Helix Cable Tray
 - Helix Cable Tray Cover

Warranty 20-year factory warranty

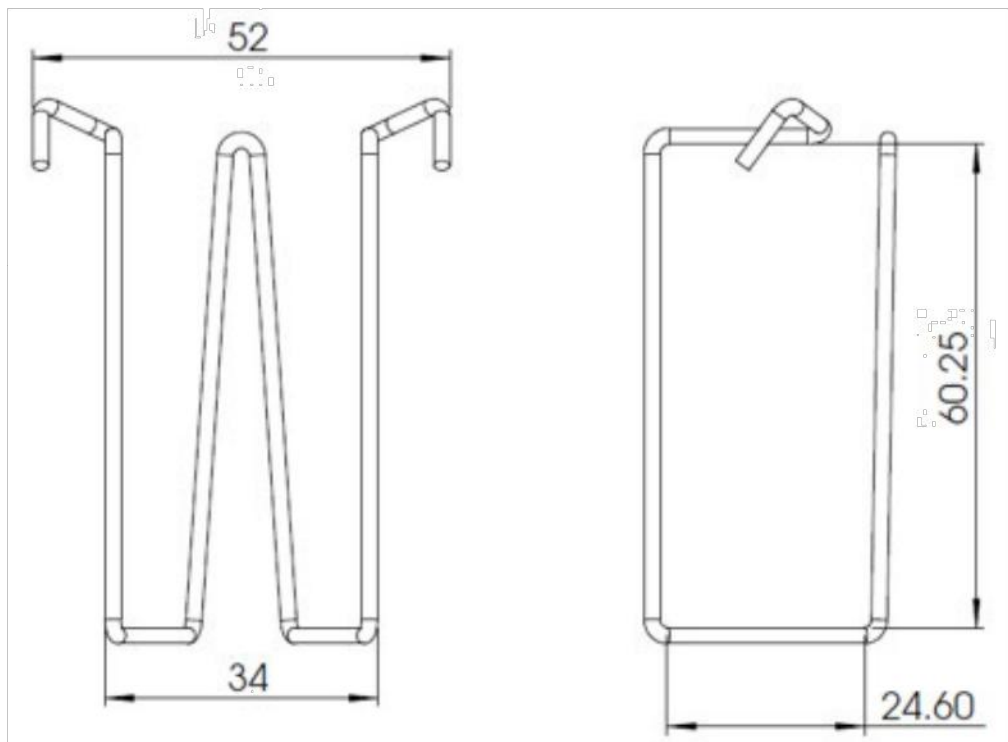
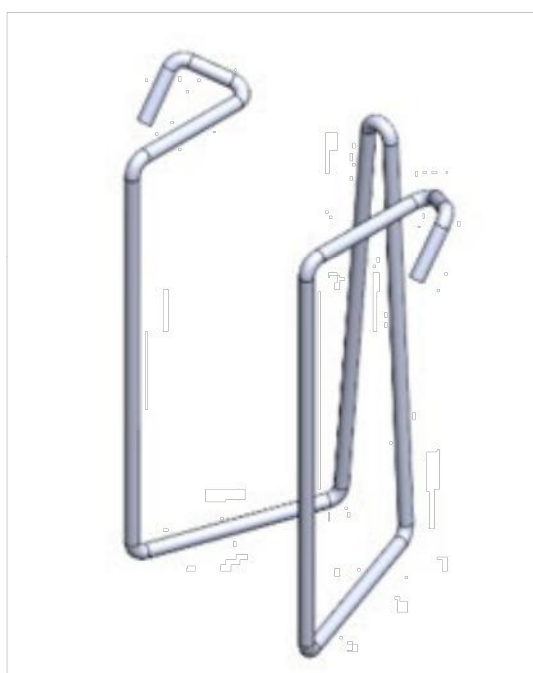
Cable Clip (#512199)

Material	302 stainless steel
Installation	Attaches to module frame and supports DC cables within the array
Max. cable bundle	Quantity 10 of #8 AWG, supports DC, AC, and communications cables



Cable Clip + (#512198)

Material	302 stainless steel
Installation	Attaches to module frame and supports DC cables within the array
Max. cable bundle	Quantity 32 of #8 AWG, supports DC, AC, and communications cables

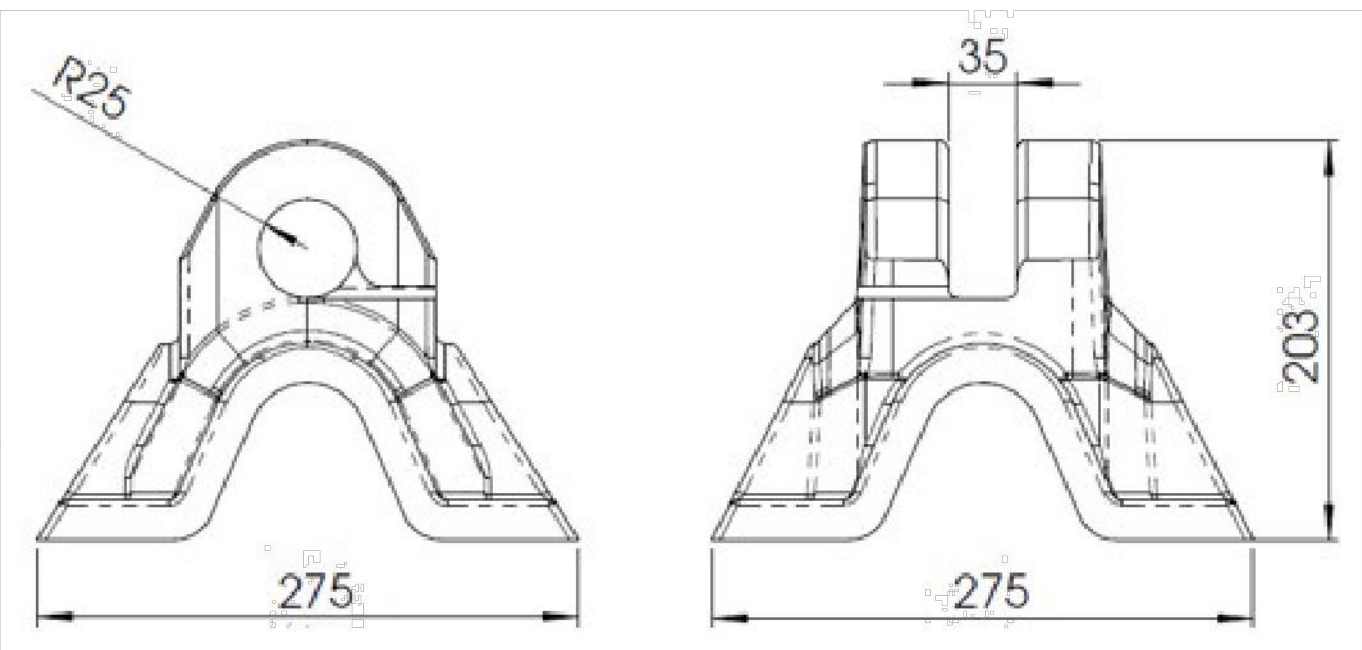


(dimensions in mm)

HELIX ROOF Cable Management

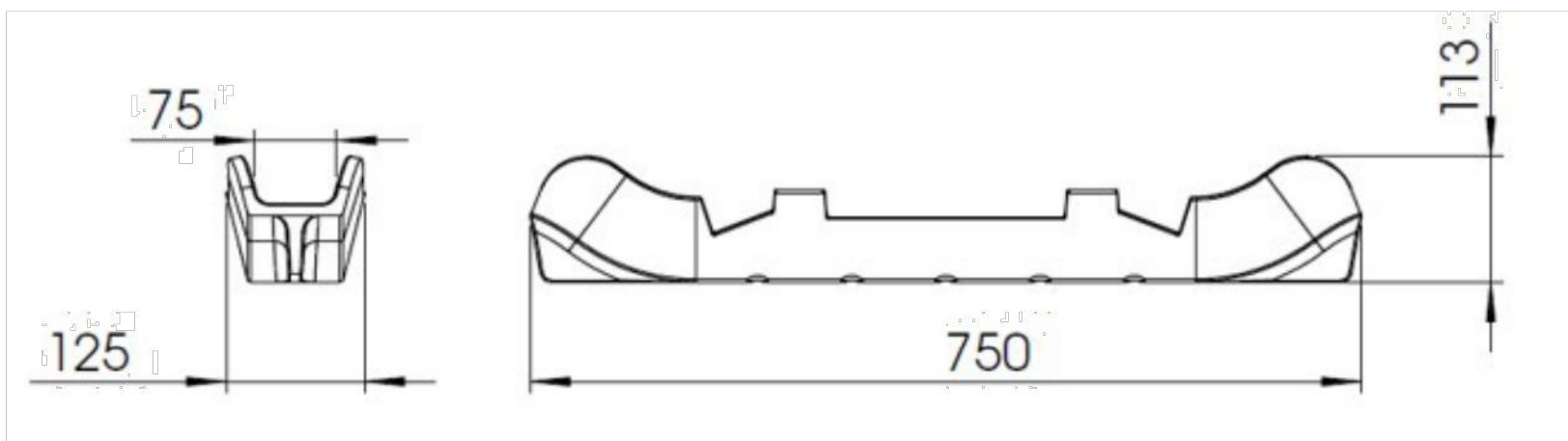
Cable Cone (#512021)

Material	Recycled rubber (92% approx.), polyurethane binder (8% approx.)
Installation	Placed strategically to support DC, AC, or communications cables under modules or outside of the array
Max. cable bundle	50 mm (1.97 in.) o.d., or quantity 32 of #8 AWG



Cable Tray (#512511)

Material	Recycled rubber (92% approx.), polyurethane binder (8% approx.)
Installation	Placed strategically to support DC, AC, or communications cables under modules or outside of the array
Max. cable bundle diameter	Quantity 32 of #8 AWG
Cable Tray Cover (#512510)	Optional (same material as Cable Tray)



(dimensions in mm)

Rev 1.1

REVISION		
MARK	DATE	DESCRIPTION
△	11/14/16	AS BUILT
△	12/14/16	AS BUILT

DRAWN BY:	SCOTT
CHECKED BY:	T.T.T.
SCALE:	AS SHOWN
DATE:	12/21/16

