LUCENT ENGINEERING
Solar Professional Engineering Consulting 2022.05.10

Lucent Engineering, P.C.
814 E 1475 N
Lehi, UT 84043
m: (309) 645-0999
admin@lucenteng.co

June 15, 2022

Vale Sollar
8726 Lovett Ave
Orlando, FL 32832

RE: Engineering Services
Romine Residence
224 SE Margaret Dr, Lake City, FL
8.99 kW System
Solo Job #2317394

To Whom It May Concern,

We have reviewed the following information regarding the solar panel installation for this project. Alterations to these documents or plans shall not be made without direct written consent of the Engineer of Record.

A. Assumptions from Field Observation provided by Vale Sollar

The following structural design regarding the proposed alterations have been prepared from these assumptions. The verification of the field observations is the responsibility of the contractor. **Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the sealed plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies.**

	Roof
Roof Finish :	Standing Seam Metal
Roof Underlayment :	OSB
Roof Profile :	Gable
Roof Structural System :	Rafter w/ Various Support
Truss Top Chord/Setup :	2 x 6 / Rafter
Chord/Rafter Wood Grade :	Southern Pine #2 or better
Truss/Rafter Spacing :	24" o.c.
Roof Slope :	18 deg
Max Top Chord/Rafter Span :	6.86 ft
Bearing Wall Type :	Convl Lt-Frame Constr
Foundation :	Permanent Concrete
Stories :	Single

B. Building Design Criteria

Code :	2020 FBC, 7th Ed (ASCE 7-16)	Risk Category :	II
Roof Live Load :	20 psf (0 psf at panels)	Occupancy Class :	R-3
Ground Snow Load :	0 psf	Roof Dead Load :	5.1 psf
Ult Wind Speed :	119 mph	PV Dead Load :	3 psf
Exposure Category :	C	Total Dead Load :	8.1 psf

C. Summary of Existing Structure Results

Roof
After review of the field observations and based on our calculations and in accordance with the applicable building codes and current industry standards, the existing roof structure supporting the proposed alterations consisting of the solar array has been determined to be:

- Adaquate to support the additional imposed loads. **No structural upgrades are required.**

D. Solar Panel Support Bracket Anchorage

1. Solar panels shall be designed, mounted, and installed in accordance with the most recent "ProteaBracket Manual", which can be found on the S-5 website (http://www.s-5.com).
2. Manufacturer's Panel Bracket Connection to Roof Chord/Rafter Member:

Fastener :	(1) 1/4" x 1" Set Screws per Bracket
NDS Withdrawl Value :	345 lbs/bracket
Min. Thread Length and Pentration Depth :	1.0"

3. Considering the existing roof's slope, size, spacing, condition, and calculated loads, the panel bracket supports shall be placed no greater than 36 in. o/c.

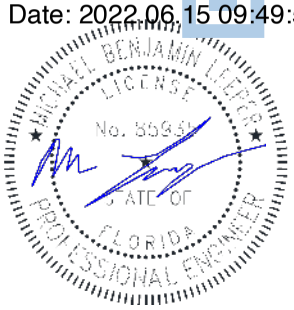
E. Overall Summary

Based on the information supplied to us at the time of this report, on the evaluation of the existing structure, and solar array panel bracket connection, it is our opinion that the roof system will adequately support the additional loads imposed by the solar array. This evaluation conforms to 2020 FBC, 7th Ed and current industry standards.

Should you have any questions regarding this letter or if you require further information, do not hesitate to contact me.

Sincerely,

Digitally signed by Michael Leeper
Date: 2022.06.15 09:49:50-08'00'



This item has been digitally signed and sealed by Michael Leeper, PE using a Digital Signature.
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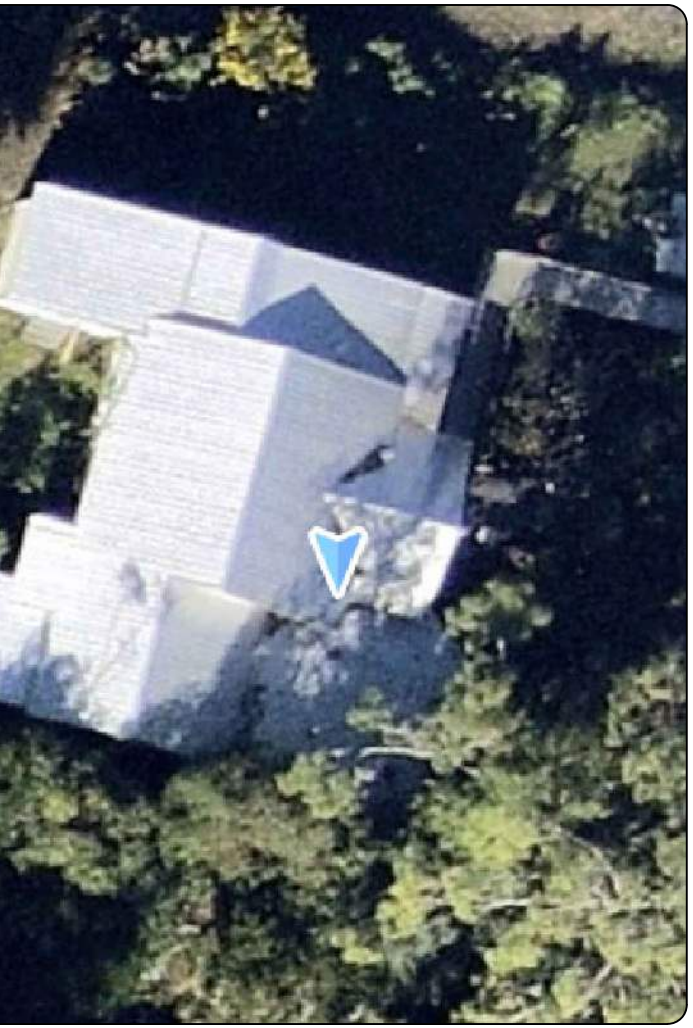
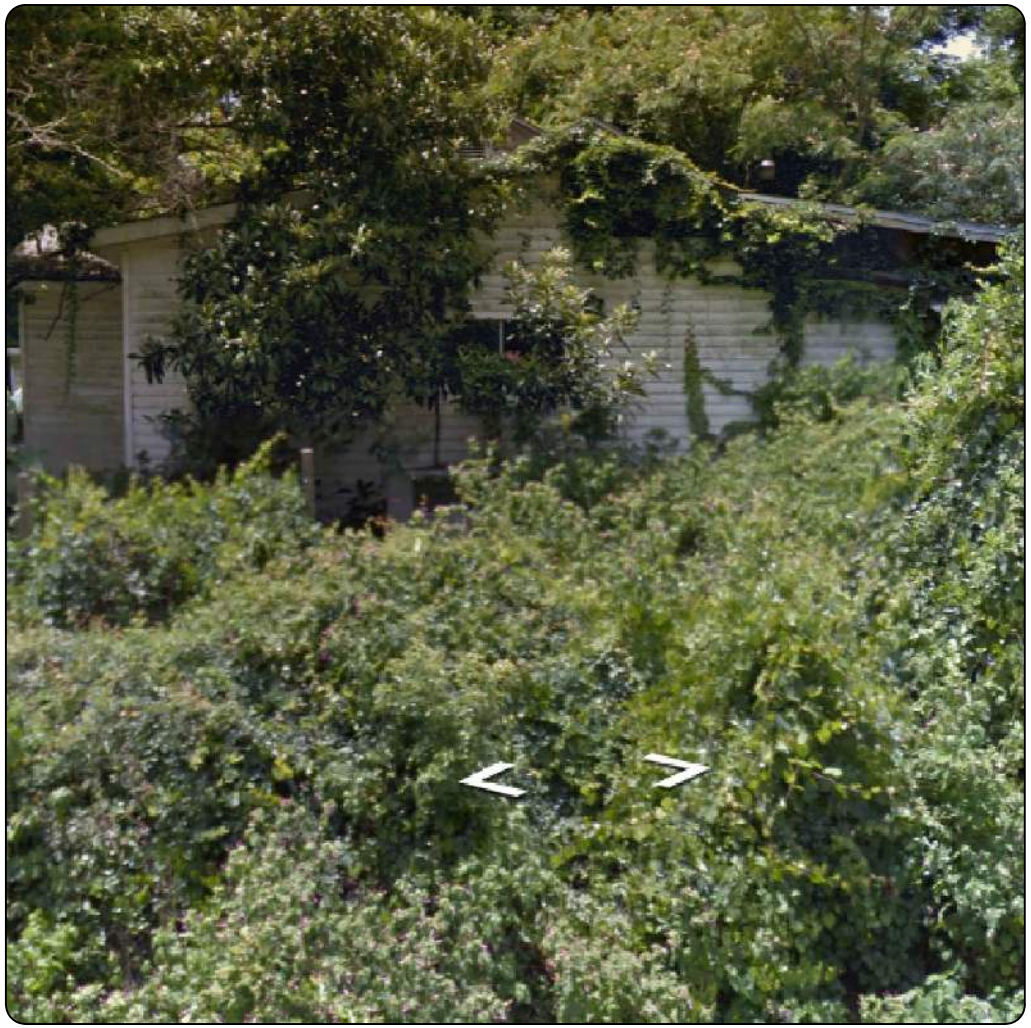
Michael Leeper, PE
License No. 85935

Limits of Scope of Work and Liablity

The existing structure is assumed to have been designed and constructed following appropriate codes at the time of erection and assumed to have appropriated permits. The calculations performed are only for the roof framing supporting the solar array installation referenced in the stamped plans and were completed according to generally recognized structural analysis standards and procedures, professional engineering, and design experience opinions and judgements. Existing deficiencies which are unknown or were not observed during the time the site observation are not included in this scope of work. All solar panel modules, racking, and mounting equipment shall be designed and installed per the manufacturer's approved installation specifications. The Engineer of Record and the engineering consulting firm assume no responsibility for misuse or improper installation. This analysis is not stamped for water leakage. Framing was determined on information in provided plans and/or photos, along with engineering judgement. Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies prior to starting construction. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation. The contactor shall also verify that there are no damage/deficiencies (i.e., dry rot, water damage, termite damage, framing member/connection damage, etc.) to framing that was not addressed in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any concerns prior to starting construction.





OLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE
NEC CODES WHERE NOTED OR EXISTING.

LEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL
NEC ARTICLE 110.

NDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM
CE WITH NEC ARTICLE 250

ED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER
STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES.

CORDING TO [NEC 690.8]

N PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]

CORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE

PHOTOVOLTAIC (PV) SYSTEM SPECIFICATIONS

EQUIPMENT:
AC SYSTEM SIZE: 8.99 kW AC
DC SYSTEM SIZE: 11.47 kW DC
(31) Silfab SIL-370 BK PV MODULES
(31) Enphase IQ7PLUS-72-2-US INVERTER(S)
RACKING: S-5! - S-5-U Clamp

MICHAEL BENJAMIN LEEPER LICENSE No. 86634 STATE OF FLORIDA PROFESSIONAL ENGINEER

APPLICABLE GOVERNING CODES

2017 NEC

2020 FBC 7TH EDITION, BUILDING

2020 FBC 7TH EDITION, RESIDENTIAL

SITE SPECIFICATIONS

OCCUPANCY: R-3

ZONING: RESIDENTIAL

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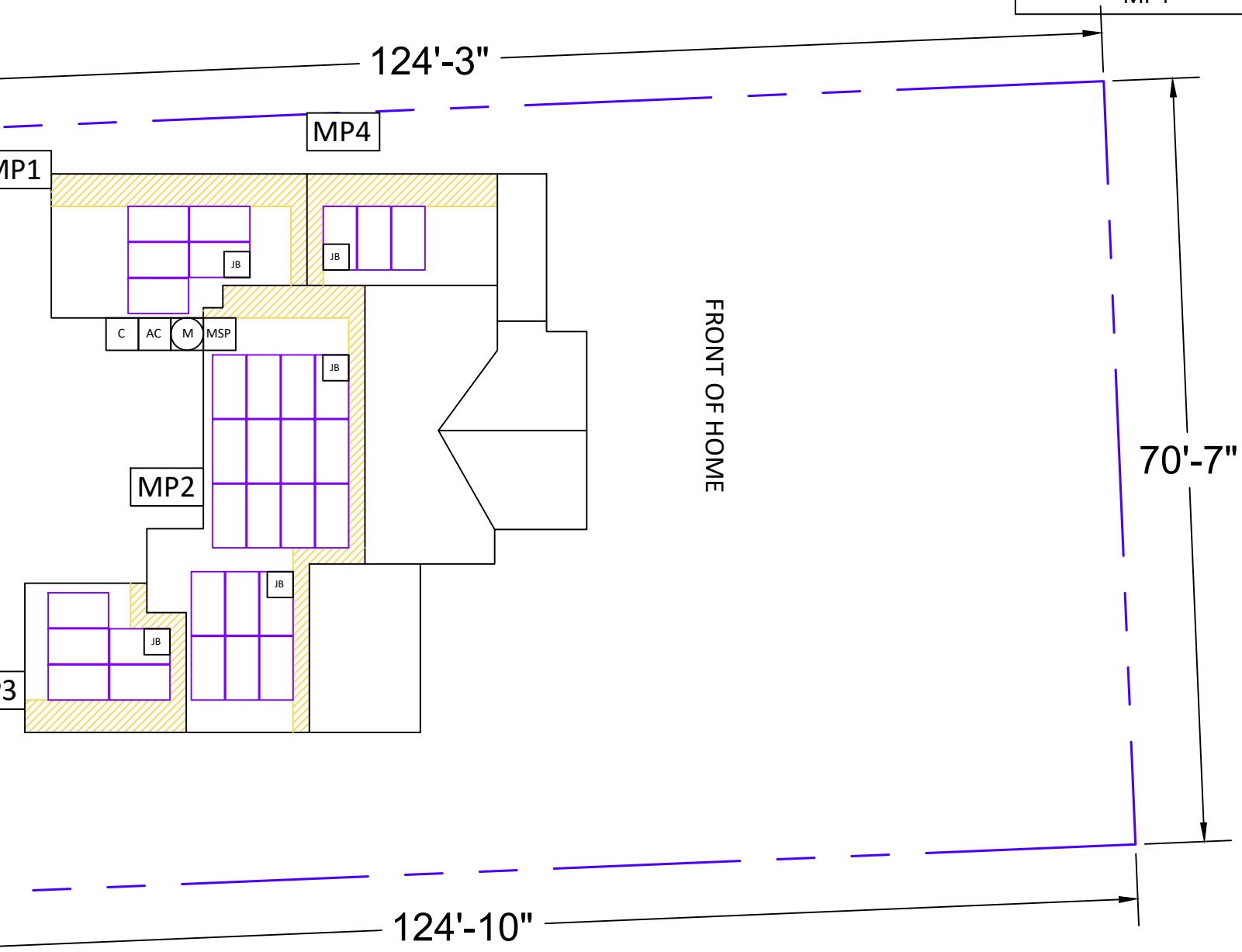
MOUNTING PLANE:	AZIMUTH:	TILT:
MP1	282°	18°
MP2	282°	18°
MP3	282°	18°
MP4	102°	18°



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EQUIPMENT LEGEND:

LE, LOCKABLE, LABELED

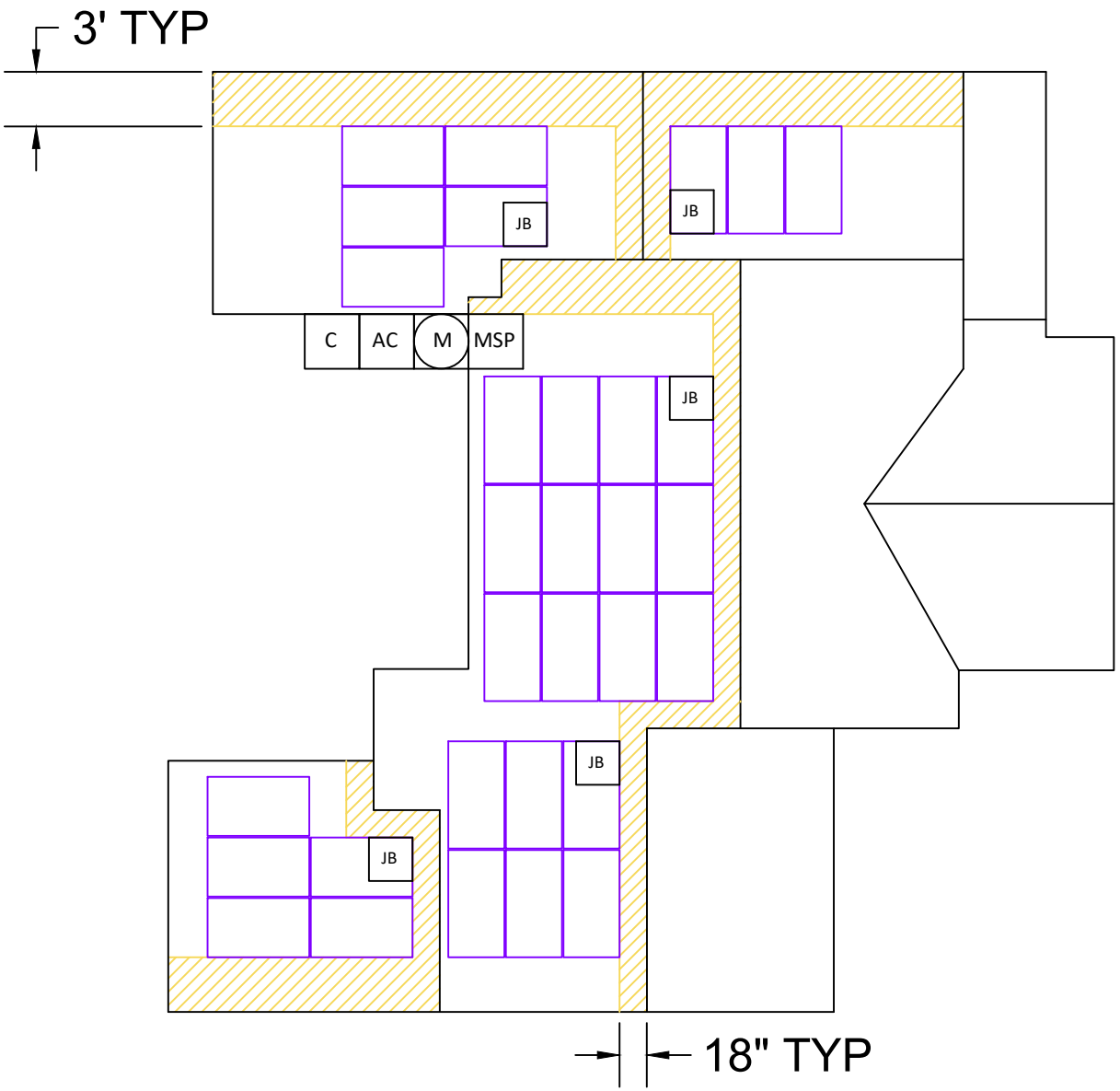
INV INVERTER

SUB SUB PANEL

SD SERVICE DISCONNECT

FIRE ACCESS PATHWAY (3' TYP)

VISIBLE, LOCKABLE, LABELED AC DISCONNECT



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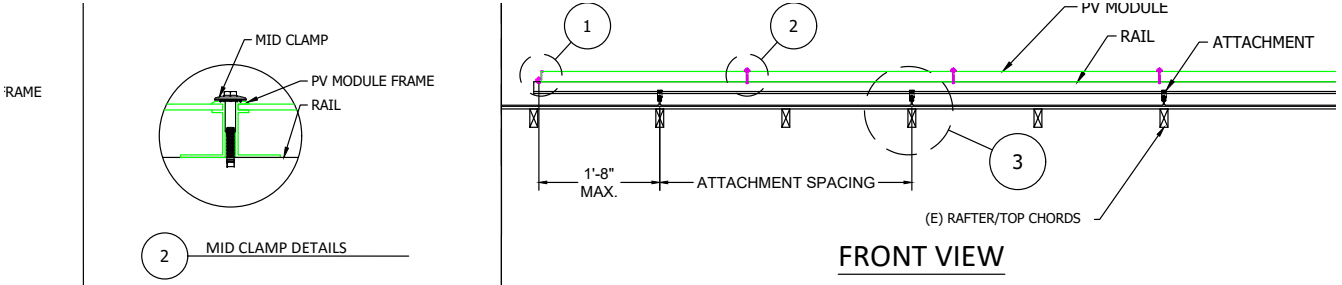
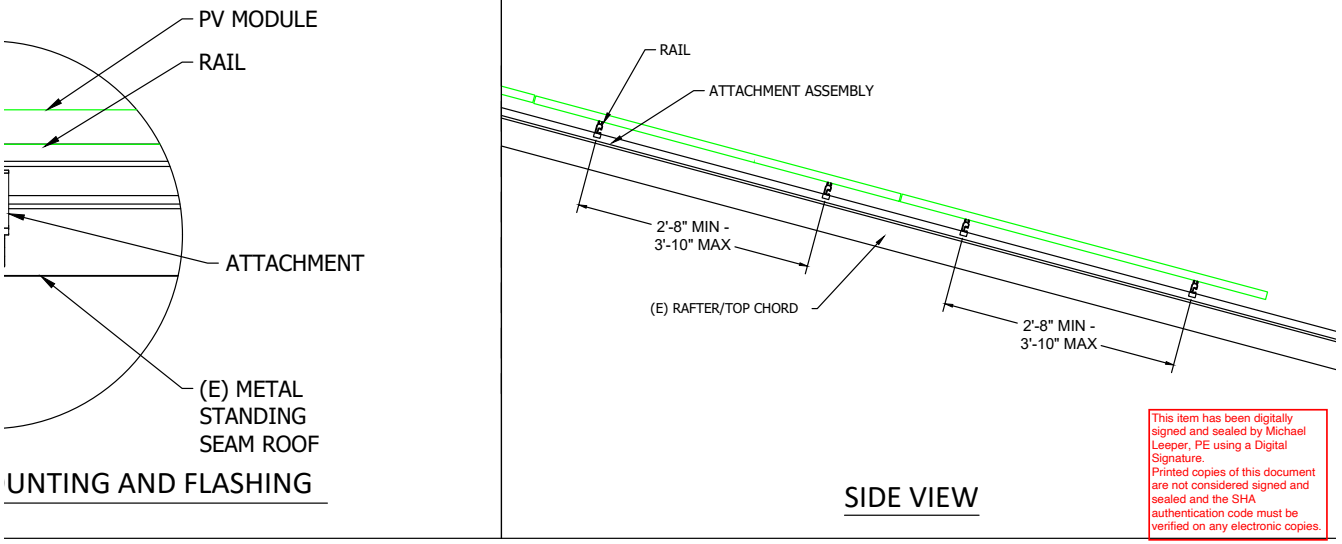
TION:	ROOF INFO:		PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA:	
Unirac	ROOF TYPE:	#N/A	PV MODULE COUNT:	31
SM	ROOF FRAMING:	Manufactured Truss	ARRAY AREA:	MODULE COUNT * 19.13 ft² = 593.03
! - S-5-U Clamp	RAFTER/TOP CHORD SIZE:	2x4	ROOF AREA:	1945 ft²
140	RAFTER/TOP CHORD SPACING:	24"	PERCENT OF ROOF COVERED:	30%
8	ATTACHMENT SPACING:	36''	ARRAY WEIGHT:	MODULE COUNT * 42 lbs = 1302 lbs





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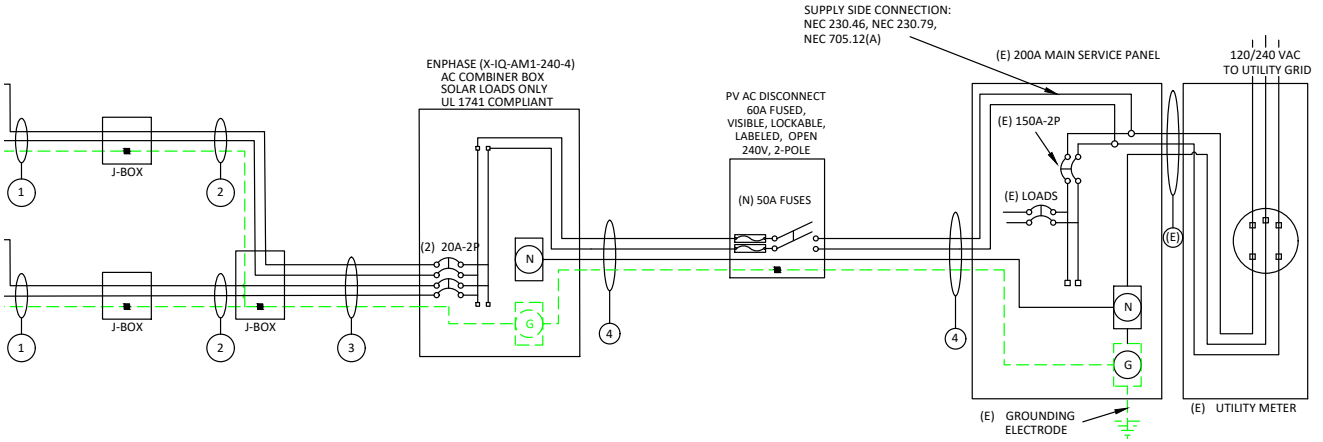
X DC SHORT CIRCUIT CURRENT:	15 A
MAXIMUM OUTPUT POWER:	290 W
MAXIMUM OUTPUT CURRENT:	1.21 A
NOM. OUTPUT VOLTAGE:	240 V
MAX UNITS PER 20A CIRCUIT:	13
1-Phase, 60 HZ, UL 1741 Listed	

MODULES:	(31)	Silfab SIL-370 BK	370 W
INVERTERS:	(31)	Enphase IQ7PLUS-72-2-US	290 W
AC DISCONNECTS:	(1)	PV AC Disconnect, 240V, 2-Pole	60 A

1	(2)	12-2	TC-ER, THWN-2, COPPER (L1, L2)	N/A - FREE AIR
	(1)	6 AWG	THWN-2 COPPER - (GROUND)	
2	(2)	10 AWG	THHN/THWN-2, COPPER - (L1, L2)	3/4" EMT
	(1)	10 AWG	THWN-2 COPPER - (GROUND)	
3	(6)	10 AWG	THHN/THWN-2, COPPER - (L1, L2)	3/4" EMT
	(1)	10 AWG	THWN-2 COPPER - (GROUND)	
4	(3)	6 AWG	THWN-2 COPPER - (L1, L2, NEUTRAL)	3/4" EMT
	(1)	8 AWG	THWN-2 COPPER - (GROUND)	



VISIBLE, LOCKABLE,
LABELED AC DISCONNECT

13.31A	12.10A
11	10
240V	240V
3190W	2900W
11470W	
37.51A	

ORS	PERCENT OF VALUES
	.80
	.70
	.50

# OF INVERTERS:	31
MAX OUTPUT CURRENT:	1.21A
(# OF INVERTERS) X (MAX OUTPUT CURRENT) X 125% <= OCPD RATING	
(31 X 1.21A X 1.25) = 46.8875A <= 50A, OK	

SUPPLY SIDE INTERCONNECTION	
MAIN BUSBAR RATING:	200A
MAIN DISCONNECT RATING:	150A
PV OCPD RATING:	50A
SERVICE RATING >= PV OCPD	
200A >= 50A, OK	

Conduit & Conductor Schedule

DESCRIPTION	CONDUIT SIZE	CONDUCTOR RATING	CONDUCTOR TEMP. RATE	AMBIENT TEMP	TEMP. DERATE	# OF CONDUCTORS DERATE	CONDUCTOR RATING W/DERATES	CONDUIT FILL
PER (L1, L2) ROUND)	N/A - FREE AIR	30A	90°C	34°C	0.96	N/A - FREE AIR	28.8A	N/A - FREE AIR
ER - (L1, L2) ROUND)	3/4" EMT	40A	90°C	34°C	0.96	1	38.4A	11.9%
ER - (L1, L2) ROUND)	3/4" EMT	40A	90°C	34°C	0.96	0.8	30.72A	27.8%
, L2, NEUTRAL) ROUND)	3/4" EMT	65A	75°C	34°C	0.96	1	62.4A	35.5%

NOTES:

UNDED, TRANSFORMER-LESS TYPE.

D BE SPLICED TO EXISTING ELECTRODE

NVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO

DE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.

IES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD -

ED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE

IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER

S IS LOCATED WITHIN 10' OF SERVICE DISCONNECT

INTERCONNECTION NOTES

1. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9] & [NEC 230.95]
2. SUPPLY SIDE INTERCONNECTION ACCORDING TO [NEC705.12(A)] WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH [NEC 240.21(B)]

DISCONNECT NOTES

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.

LOAD TERMINALS MAY BE ENERGIZED IN THE OPEN POSITION.
[NEC 690.13(B)]

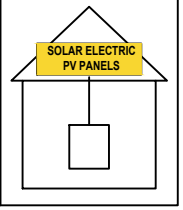
POWER SOURCE

ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)(3&4)]

LABEL 2
PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(2)(3)(b)]

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWICH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY

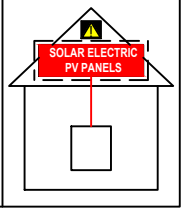


LABEL 7
FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)(A)]

LABEL 3
PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(2)(3)(c)]

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN CONDUCTORS OUTSIDE THE ARRAY. CONDUCTORS WITHIN THE ARRAY REMAIN ENERGIZED IN SUNLIGHT



LABEL 8
FOR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)(b)]

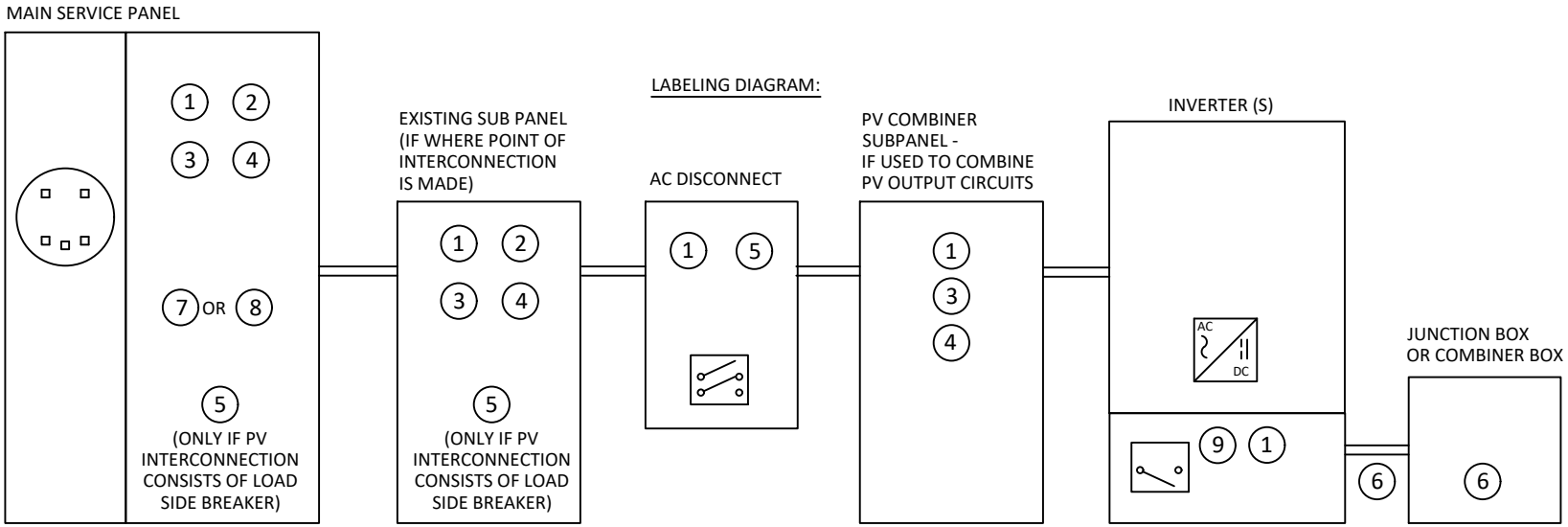
RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 9
SIGN LOCATED AT RAPID SHUT DOWN DISCONNECT SWITCH [NEC 690.56(C)(3)].

LABEL 4
EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES
[NEC 705.12(B)(3)]

LABEL 5
AT POINT OF INTERCONNECTION, MARKED AT AC DISCONNECTING MEANS.
[NEC 690.54, NEC 690.13 (B)]

LABELING DIAGRAM:



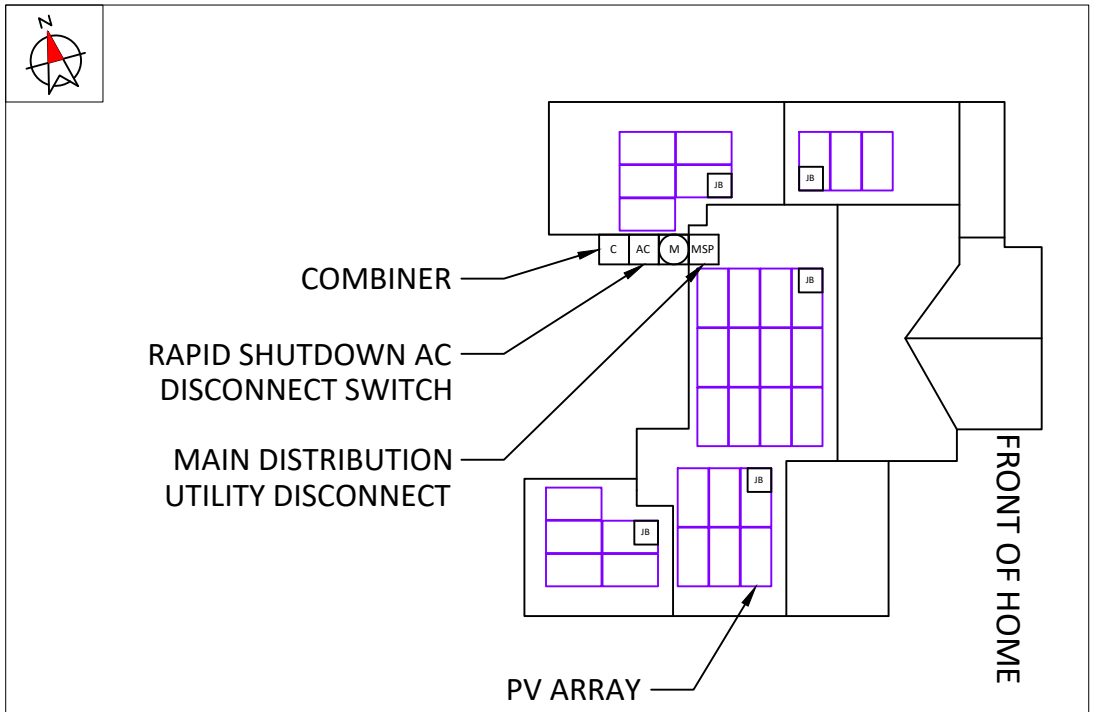
FIGURATIONS. ELECTRICIAN TO DETERMINE EXACT
CAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
AL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI

ORITY HAVING JURISDICTION.
D THE ENVIRONMENT INVOLVED [NEC 110.21(B)(3)]
TE ON RED BACKGROUND; REFLECTIVE, AND

*ELECTRICAL DIAGRAM SHOWN ABOVE IS FOR LABELING PURPOSES ONLY - NOT AN ACTUAL REPRESENTATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED - LABEL LOCATIONS

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:

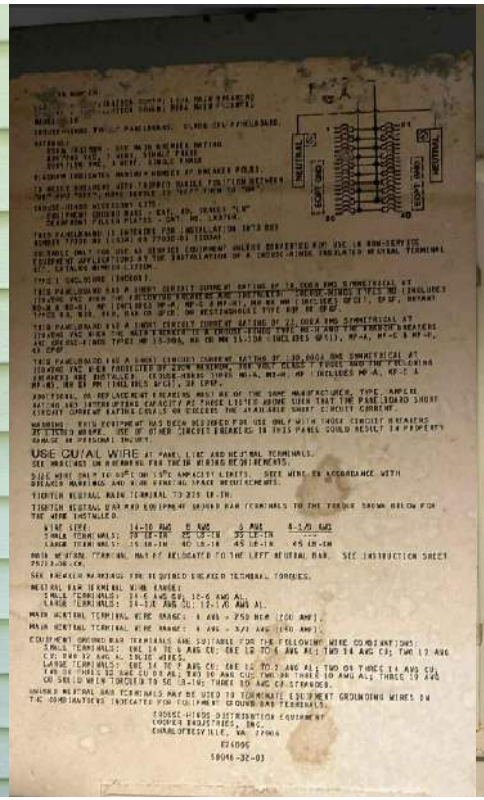


224 Se Margaret Dr, Lake City FL 32025

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(B)&(C), [NEC 705.10])



USE CU/AL WIRE AT PANEL LUG AND NEUTRAL TERMINALS.
SEE INSTRUCTIONS OR BREAKERS FOR TORQUE WIRING REQUIREMENTS.

SIZE WIRE ONLY TO SUPPORT CONDUCTOR AMPACITY LIMITS. SEE WIRE BEND SPACE REQUIREMENTS.

TIGHTEN NEUTRAL MAIN TERMINAL TO 275 LB-IN.

TIGHTEN NEUTRAL BAR AND EQUIPMENT GROUND BAR TERMINALS TO THE TORQUE SHOWN BELOW FOR THE WIRE INSTALLED.

WIRE SIZE	14-10 AWG	8 AWG	6 AWG	4-1/0 AWG
SMALL TERMINALS:	20 LB-IN	25 LB-IN	35 LB-IN	----
LARGE TERMINALS:	15 LB-IN	40 LB-IN	45 LB-IN	45 LB-IN

MAIN NEUTRAL TERMINAL MAY BE RELOCATED TO THE LEFT NEUTRAL BAR. SEE INSTRUCTION SHEET 2523-036-EN.

SEE BREAKER MARKINGS FOR REQUIRED BREAKER TERMINAL TORQUES.

NEUTRAL BAR TERMINAL WIRE RANGES:
SMALL TERMINALS: 14-6 AWG CU, 12-6 AWG AL.
LARGE TERMINALS: 14-1/0 AWG CU; 12-1/0 AWG AL.

MAIN NEUTRAL TERMINAL WIRE RANGE: 6 AWG - 250 MCM (100 AMP).

MAIN NEUTRAL TERMINAL WIRE RANGE: 6 AWG - 3/0 AWG (100 AMP).

EQUIPMENT GROUND BAR TERMINALS ARE SUITABLE FOR THE FOLLOWING WIRE COMBINATIONS:
SMALL TERMINALS: ONE 14 TO 6 AWG CU; ONE 12 TO 6 AWG AL; TWO 14 AWG CU; TWO 12 AWG CU; TWO 12 AWG AL SOLID WIRES.
LARGE TERMINALS: ONE 14 TO 2 AWG CU; ONE 12 TO 2 AWG AL; TWO OR THREE 14 AWG CU, TWO OR THREE 12 AWG CU OR AL; TWO 10 AWG CUS TWO OR THREE 10 AWG AL; THREE 12 AWG OR SOLID WIRE TORQUED TO 50 LB-IN; THREE 10 AWG CU STRANDED.

UNUSED NEUTRAL BAR TERMINALS MAY BE USED TO TERMINATE EQUIPMENT GROUNDING WIRES IN THE COMBINATIONS INDICATED FOR EQUIPMENT GROUND BAR TERMINALS.

EASYCUT-HI/AFB DISTRIBUTION EQUIPMENT
COOPER INDUSTRIES, INC.
CHARLOTTESVILLE, VA 22906

E56096

50096-32-03

BC Series
SIL-370 BK
(Early 2021)

BAA ARRA · 25 YEAR PRODUCT WARRANTY · AUTOMATED MANUFACTURING · JUST-IN-TIME · DNVGL TOP PERFORMER · TIER 1 BANKABLE $$$ · HIGH EFFICIENCY

INDUSTRY LEADING WARRANTY
All our products include an industry leading 25-year product workmanship and 30-year performance warranty.

MAXIMUM ENERGY OUTPUT
Silfab BC Series utilizes next generation Back Contact technology to reduce production/manufacturing steps and improve quality while maximizing power. Ideal for residential and commercial projects where maximum power density is preferred.

NORTH AMERICAN QUALITY
Silfab is the leading automated solar module manufacturer in North America. Utilizing premium quality materials and strict quality control management to deliver the highest efficiency, premium quality PV modules 100% made in North America.

NCY
k conductive back-
ng of 370Wp.

TION
xperience in the solar
anufacturing processes
Contact technologies
olar innovation.

red to meet Buy
epartment, US Military
eir solar installations.

conditions for test loads
ight frame is exclusively
tibility and durability.

ntrols during the entire
d facilities.

DOMESTIC PRODUCTION
Silfab Solar manufactures PV modules in two automated locations within North America. Our 500+ North American team is ready to help our partners win the hearts and minds of customers, providing customer service and product delivery that is direct, efficient and local.

SUPERIOR POWER
Super power achieved through relocation of tabbing ribbon to reduce shading on module front service and circuit resistance.

AESTHETICALLY PLEASING
Sleek aesthetics from black cells to black back-sheet without tabbing or bus-bar ribbons, ideal for residential applications.

STABLE PERFORMANCE
Enhanced life-time performance through reduced thermal stresses and increased current flow paths.

PID RESISTANT
PID Resistant due to advanced cell technology and material selection. In accordance to IEC 62804-1.

Electrical Specifications		SIL-370 BK mono PER
Test Conditions		STC
Module Power (Pmax)	Wp	370
Maximum power voltage (Vpmax)	V	38.3
Maximum power current (Ipmax)	A	9.66
Open circuit voltage (Voc)	V	45.0
Short circuit current (Isc)	A	10.29
Module efficiency	%	20.8
Maximum system voltage (VDC)	V	100
Series fuse rating	A	20
Power Tolerance	Wp	0 to +

Measurement conditions: STC 1000 W/m2 • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3% • Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +1

Temperature Ratings	SIL-370 BK mono PER
Temperature Coefficient Isc	+0.046
Temperature Coefficient Voc	-0.279
Temperature Coefficient Pmax	-0.377
NOCT (± 2°C)	43.5
Operating temperature	-40/+8

Mechanical Properties and Components	SIL-370 BK mono PER
	Metric
Module weight	19.0±0.2 kg
Dimensions (H x L x D)	1795 mm x 990 mm x 38 mm
Maximum surface load (wind/snow)*	4000 Pa rear load / 5400 Pa front load
Hail impact resistance	ø 25 mm at 83 km/h
Cells	66 high efficiency back contact mono-PERC c-Si cells
Glass	3.2 mm high transmittance, tempered, DSM anti-reflective coating
Cables and connectors (refer to installation manual)	1200 mm ø 5.7 mm, MC4 from Staubli
Backsheet	Multilayer, integrated insulation film a superior hydrolysis and UV resista
Frame	Anodized Alum
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking v
Junction Box	UL 3730 Certifi

Warranties	SIL-370 BK mono PER	
Module product workmanship warranty	25 yea	
Linear power performance guarantee	30 ye	
	≥ 97.1% end 1st year	≥ 91.6% end 12th year

Certifications	SIL-370 BK mono PER
Product	ULC ORD C1703***, UL1703***, CEC listed***, 61215-1/-1-1/-2***. IEC 61730-1/-2***, CSA Corrosion; IEC61701:2011 Salt Mist Cor
Factory	ISO900

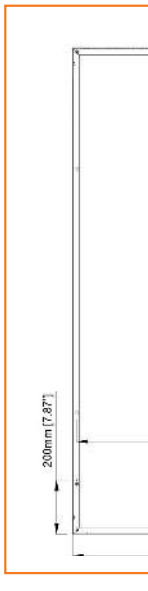
- Modules Per Pallet: 26
- Pallets Per Truck: 34
- Modules Per Truck: 884

*⚠ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.

**12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at www.silfabsolar.com.

***Certification anticipated November 2020.

PAN files generated from 3rd party performance data are available for download at: www.silfabsolar.com/downloads.



Silfab SOLAR

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240 Courtneypark Drive East
Mississauga ON L5T 2Y3 Canada
Tel +1 905-255-2501 | Fax +1 905-696-0267
info@silfabsolar.com | www.silfabsolar.com

Silfab Solar Inc.
800 Cornwall Ave
Bellingham WA 98225 USA

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell/120 half-cell and 72-cell/144 half-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell/144 half-cell modules.

Module compatibility	60-cell/120 half-cell PV modules only		60-cell/120 half-cell/144 half-ce
Maximum input DC voltage	48 V		60 V
Peak power tracking voltage	27 V - 37 V		27 V - 45 V
Operating range	16 V - 48 V		16 V - 60 V
Min/Max start voltage	22 V / 48 V		22 V / 60 V
Max DC short circuit current (module Isc)	15 A		15 A
Overvoltage class DC port	II		II
DC port backfeed current	0 A		0 A
PV array configuration	1 x 1 ungrounded array; No additional DC side protec AC side protection requires max 20A per branch circu		
OUTPUT DATA (AC)	**IQ 7 Microinverter**		**IQ 7+ Microin**
Peak output power	250 VA		295 VA
Maximum continuous output power	240 VA		290 VA
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)
Nominal frequency	60 Hz		60 Hz
Extended frequency range	47 - 68 Hz		47 - 68 Hz
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)
Overvoltage class AC port	III		III
AC port backfeed current	18 mA		18 mA
Power factor setting	1.0		1.0
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ...
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**
Peak efficiency	97.6 %	97.6 %	97.5 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %
MECHANICAL DATA			
Ambient temperature range	-40°C to +65°C		
Relative humidity range	4% to 100% (condensing)		
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5		
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)		
Weight	1.08 kg (2.38 lbs)		
Cooling	Natural convection - No fans		
Approved for wet locations	Yes		
Pollution degree	PD3		
Enclosure	Class II double-insulated, corrosion resistant polyme		
Environmental category / UV exposure rating	NEMA Type 6 / outdoor		
FEATURES			
Communication	Power Line Communication (PLC)		
Monitoring	Enlighten Manager and MyEnlighten monitoring optic Both options require installation of an Enphase IQ En		
Disconnecting means	The AC and DC connectors have been evaluated and disconnect required by NEC 690.		
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, I CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equ 2017, and NEC 2020 section 690.12 and C22.1-2015 R for AC and DC conductors, when installed according		

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compati
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

C

The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

I1-240-4

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

s, visit **enphase.com**

ENPHASE.

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board fo (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). I (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade c (Available in the US, Canada, Mexico, Puerto Rico, and the US Vir the installation area.) Includes a silver solar shield to match the I
ACCESSORIES AND REPLACEMENT PARTS	(not included, order separately)
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data pla - 4G based LTE-M1 cellular modem with 5-year AT&T data plar
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down ki
EPLC-01	Power line carrier (communication bridge pair), quantity - one
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Comb
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker i
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate constr
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductor • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G ba Mobile Connect cellular modem is required for all Ensemble instal
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not incl
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, Production metering: ANSI C12.20 accuracy class 0.5 (PV pro Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit **enphase.com**

SOLARMOUNT

UNIRAC

SOLARMOUNT defined the standard in solar racking. Features are designed to get installers off the roof faster. Our grounding & bonding process eliminates copper wire and grounding straps to reduce costs. Systems can be configured with standard or light rail to meet your design requirements at the lowest cost possible. The superior aesthetics package provides a streamlined clean edge for enhanced curb appeal, with no special brackets required for installation.

Now Featuring:

THE NEW FACE OF SOLAR RACKING

Superior Aesthetics Package

LOSE ALL OF THE COPPER & LUGS

System grounding through Enphase microinverters and trunk cables

SMALL IS THE NEXT NEW BIG THING

Light Rail is Fully Compatible with all SM Components

ENHANCED DESIGN & LAYOUT TOOLS

Featuring Google Map Capabilities within U-Builder

FAST INSTALLATION. SUPERIOR AESTHETICS

OPTIMIZED COMPONENTS • VERSATILITY • DESIGN TOOLS • QUALITY PROVIDER

SOLARMOUNT

UNIRAC

OPTIMIZED COMPONENTS

INTEGRATED BONDING & PRE-ASSEMBLED PARTS

Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps or bonding jumpers to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

VERSATILITY

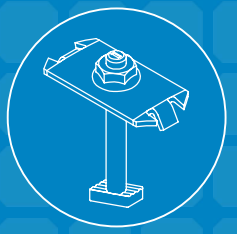
ONE PRODUCT - MANY APPLICATIONS

Quickly set modules flush to the roof or at a desired tilt angle. Change module orientation to portrait or landscape while securing a large variety of framed modules on flat, low slope or steep pitched roofs. Available in mill, clear and dark anodized finishes to outperform your projects financial and aesthetic aspirations.

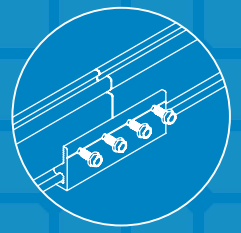
AUTOMATED DESIGN TOOL

DESIGN PLATFORM AT YOUR SERVICE

Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Save time by creating a user profile, and recall preferences and projects automatically when you log in. You will enjoy the ability to share projects with customers- there's no need to print results and send to a distributor, just click and share.

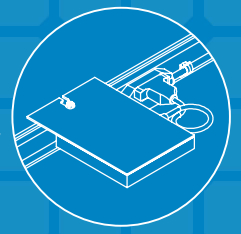


INTEGRATED BONDING MIDCLAMP



INTEGRATED BONDING SPLICE BAR

INTEGRATED BONDING L-FOOT w/ T-BOLT



INTEGRATED BONDING MICROINVERTER MOUNT w/ WIRE MANAGEMENT

LISTED **UL2703**

BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION

UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT

UNMATCHED EXPERIENCE | CERTIFIED QUALITY | ENGINEERING EXCELLENCE | BANKABLE WARRANTY | DESIGN TOOLS | PERMIT DOCUMENTATION

TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2015, 14001:2015 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

Don't leave your project to chance, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. SOLARMOUNT is covered by a twenty five (25) year limited product warranty and a five (5) year limited finish warranty.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

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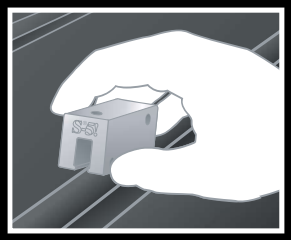

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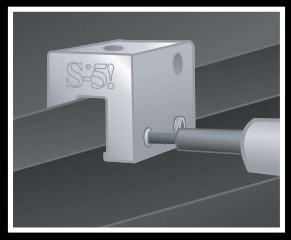


S-5-U and S-5-U M

The S-5-U clamp is our most popular and versatile clamp, fitting about 85% of the standing seam profiles

825-3432 | www.S-5.com |

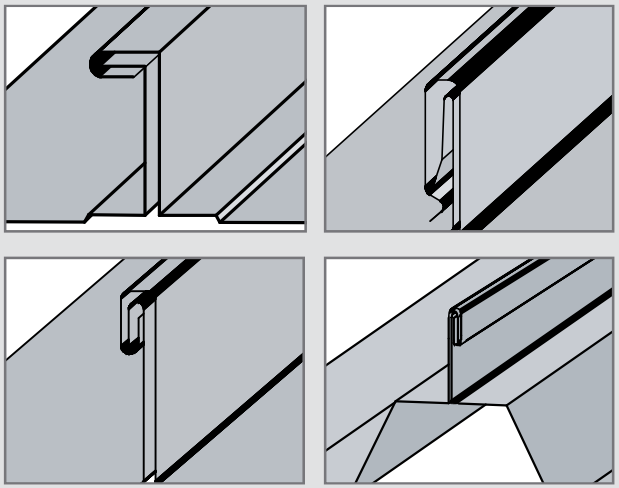
MADE IN THE USA

The Right Way!

The **S-5-U and S-5-U Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-U is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit **www.S-5.com** for more information including CAD details, metallurgical compatibilities and specifications.

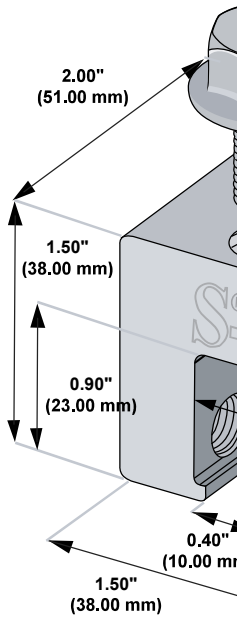
The S-5-U clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

Example Profiles

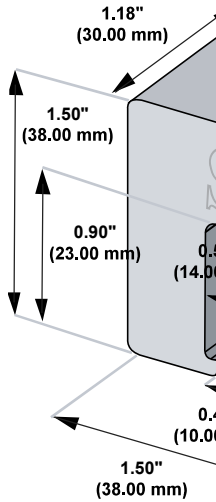


For horizontal seams under 0.65", do not use this clamp. Visit www.S-5.com for more detailed information and proper clamp usage.

S-5-U Cla



S-5-U Mini Cl



S-5!® Warning! Please use this product responsibly!

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