



Town of Erwin

Zoning Application & Permit

Planning & Inspections Department

Permit #
25-101

Rev Sep2014

Each application should be submitted with an attached plot/site plan with the proposed use/structure showing lot shape, existing and proposed buildings, parking and loading areas, access drives and front, rear, and side yard dimensions.

Name of Applicant	Phillips Energy Systems LLC	Property Owner	Raymond Walker
Home Address	7901 Allen Black Road,	Home Address	905 Duke Street
City, State, Zip	Charlotte NC 28227	City, State, Zip	Erwin NC 28339
Telephone	704.497.0367	Telephone	910.309.8976
Email		Email	

Address of Proposed Property	905 Duke Street Erwin NC 28339		
Parcel Identification Number(s) (PIN)		Estimated Project Cost	50,941.94
What is the applicant requesting to build / what is the proposed use of the subject property? Be specific.	14 Roof Mounted Solar Photovoltaic Modules with Battery back up		
Description of any proposed improvements to the building or property	14 Roof Mounted Solar Photovoltaic Modules on existing residence with battery back up		
What was the Previous Use of the subject property?	Residential		
Does the Property Access DOT road?			
Number of dwelling/structures on the property already	1	Property/Parcel size	
Floodplain SFHA <u> </u> Yes <u> </u> No	Watershed <u> </u> Yes <u> </u> No	Wetlands <u> </u> Yes <u> </u> No	
MUST circle one that applies to property	Existing/Proposed Septic System <u> </u> Or Existing/Proposed County/City Sewer <u> </u> X		

Owner/Applicant Must Read and Sign

The undersigned property owner, or duly authorized agent/representative thereof certifies that this application and the forgoing answers, statements, and other information herewith submitted are in all respects true and correct to the best of their knowledge and belief. The undersigning party understands that any incorrect information submitted may result in the revocation of this application. Upon issuance of this permit, the undersigning party agrees to conform to all applicable town ordinances, zoning regulations, and the laws of the State of North Carolina regulating such work and to the specifications of plans herein submitted. The undersigning party authorizes the Town of Erwin to review this request and conduct a site inspection to ensure compliance to this application as approved.

Michael Whitson		2/25/2025
Print Name	Signature of Owner or Representative	Date

For Office Use

Zoning District	R15	Existing Nonconforming Uses or Features	
Front Yard Setback	35	Other Permits Required	<u> </u> Conditional Use <u> </u> Building <u> </u> Fire Marshal <u> </u> Other
Side Yard Setback	10	Requires Town Zoning Inspection(s) <u> </u> Foundation <u> </u> Prior to C. of O.	
Rear Yard Setback	35	Zoning Permit Status	<input checked="" type="checkbox"/> Approved <u> </u> Denied
		Fee Paid: 25	Date Paid: <u> </u> Staff Initials: <u> </u>

Comments	Trades from Harnett County
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Signature of Town Representative:	Date Approved/Denied: 2/28/25
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PV LETTERS

Phillips Energy Systems

Contractor Address: 7901 Allen Black Rd, Mint Hill, NC 28227

February 24, 2025

Subject: Proposed Solar Panel Installation
Raymond Walker Residence, 905 Duke St, Erwin, NC
DC System Size: 5.670 kW
PV Letters Job #004-19365

To Whom it May Concern,

We have reviewed information, provided by our client, related to the proposed solar panel installation at the above-referenced address. The purpose of the review was to determine if the existing roof is structurally adequate for the proposed installation. Based on our review and analysis of the given information, and in accordance with governing building codes, I certify that the capacity of the structural roof framing that directly supports the additional gravity loading due to the solar panel supports and modules had been reviewed and determined to meet or exceed the requirements in accordance with the Design Criteria.

Design Parameter Summary

Governing Building Code: 2018 North Carolina Residential Code
Risk Category: II
Wind Exposure: C
Design Wind Speed: 120 mph
Ground Snow Load: 15 psf

Roof Information

Roof Structure: 2x4 Manufactured Trusses @ 24" O.C. (assumed)
Roofing Material: Asphalt Shingles
Roof Slope: 18 degrees

Roof Connection Details

Framing Mount Wood Screws: (2) #14 Self-Drilling Screw with a minimum penetration depth of 1.75" into roof truss top chord only, at 72" O.C. max
Decking Mount Wood Screws: (6) #14 Self-Drilling Screw with a minimum penetration depth of 0.25", at 72" O.C. max
Note: Required installation of 75% / 25% between Framing and Decking Mounts.

Engineering Analysis

The proposed installation - including weight of panels, racking, mounts, and inverters where applicable - will be approximately 3 psf. In the areas where panels are installed, roof live loads will not be present. The reduction of roof live load is adequate to fully or partially compensate for the addition of the panel installation. Because the member forces in the area of the solar panels are not increased by more than 5%, and so per provisions in the adopted building codes, the structure need not be altered for gravity loading.

The proposed installation will be 6" max. above the roof surface (flush mounted) and parallel to the roof surface. Therefore, any increase in wind loading on the building structure from the solar panel installation is expected to be negligible. Wind is the governing lateral load case. Because the increase in lateral loading is not increased by more than 10%, per provisions in the adopted building codes, the structure need not be altered for lateral loading.

Wind uplift on the panels has been calculated in accordance with the relevant provisions of ASCE 7-10. This loading has been used to verify the adequacy of the connection specified above. Connection locations should be in accordance with design drawings.

IronRidge XR10 rails will support the modules and will fasten to the roof structure with IronRidge QuickMount Halo Ultragrip along the rail.

Conclusion

The roof structure need not be altered for either gravity loading (including snow) or lateral loading (including wind). Therefore, the existing structure is permitted to remain unaltered. Connections to the roof must be made per the "Roof Connection Details" section above. Copies of all relevant calculations are enclosed.

Limitations and Disclaimers

The opinion expressed in this letter is made in reliance on the following assumptions: the existing structure is in good condition; the existing structure is free from defects in design or workmanship; and the existing structure was code-compliant at the time of its design and construction. These assumptions have not been independently verified, and we have relied on representations made by our client with respect to the foregoing. The undersigned has not inspected the structure for defects, although we have reviewed the information provided by our client, including pictures where applicable.

Electrical design is excluded from this analysis. Waterproofing is the sole responsibility of the installer and is also excluded from this analysis. Solar panels must be installed per manufacturer specifications. Structural design and analysis of the adequacy of solar panels, racks, mounts, and other components is performed by each component's respective manufacturer; the undersigned makes no statement of opinion regarding such components. This letter and the opinions expressed herein are rendered solely for the benefit of the permitting authority (city or county building department) and your office, and may not be utilized or relied on by any other party.

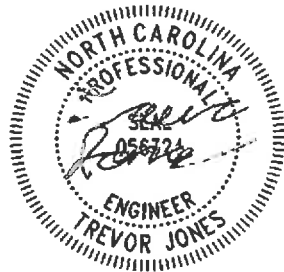
If you have any questions or concerns, please contact us at (208)-994-1680, or by email at Projects@pvletters.com.

Sincerely,



Trevor A. Jones, P.E.

2/24/2025





PV LETTERS

Standard Loading Comparison

This calculation justifies the additional solar load by comparing existing to proposed gravity loads in the location of the solar panels.

	<u>Without Solar</u>	<u>With Solar</u>	
Dead Load			
Asphalt Shingles	5	5	psf
1/4" Plywood	1	1	psf
Framing	4	4	psf
Insulation	1	1	psf
1/2" Gypsum Ceiling	2	2	psf
M,E, & Misc	1.5	1.5	psf
Solar Panel	0	3	psf
Total Dead Load	14.5	17.5	psf
Snow Load			
Ground Snow Load, P_g	15		psf
Exposure Factor, C_e	1.00		
Thermal Factor, C_t	1.1		
Importance Factor, I_s	1		
Flat Roof Snow Load	12		ASCE 7 Eqn. 7.3-1 or jurisdiction min.
Slope	18		degrees
Unobstructed Slippery Surface?	No	No	
Slope Factor, C_s	1.00	1.00	
Sloped Roof Snow Load	11.6	11.6	psf
Live Load			
Roof Live Load	20	0	psf
Load Combination			
D + Lr	34.5	17.5	psf
D + S	26.1	29.1	psf
Max. Load	34.5	29.1	psf
% of original		84.20%	

Result:

Because the total forces are decreased, per the relevant code provisions stated in the body of the letter, the existing roof structure is permitted to remain unaltered.



PV LETTERS

Wood Screw Calculation (per ASCE 7-10)

This calculation justifies the connection of the solar panels to existing roof members, by showing the connection capacity is equal to or greater than the uplift force demands.

Connection Demand

Spacing perpendicular to rail, in	34
Roof Angle, degrees	18
Roof Layout	Gable
Wind Speed, mph	120
Exposure Coefficient, K_z	0.85 (Table 26.10-1)
Topographic Factor, K_{zt}	1.00 (Table 26.8.1)
Directionality Factor, K_d	0.85 (Table 26.6-1)
Elevation Factor, K_e	1.00 (Table 26.9-1)
Velocity Pressure q_z , psf	26.5 (Table 26.10-1)

Zones:

	<u>1</u>	<u>2</u>	<u>3</u>
Spacing parallel to rail, in	72	72	72
GC_p (max)(Figure 29.4-7)	0.90	2.20	2.60
Exposed Panels? ($\gamma_E = 1.5$) (Fig. 29.4-7)	No	No	No
Effective Wind Area on each con., ft ²	17.0	17.0	17.0
Pressure Equalization Factor, γ_a (Figure 29.4-8)	0.71	0.71	0.71
Uplift Force, psf (Equation 29.4-7)	16.9	41.3	48.8
Max. Uplift Force / Connection (0.6 WL), lbs	171.8	420.0	496.4
Solar Dead Load (0.6 DL). Lbs	30.5	30.5	30.5
Max. Uplift Force (0.6 WL - 0.6 DL), lbs	141.3	389.5	465.9

Connection Capacity

	IronRidge QuickMount Halo Ultragrip	
	Framing	Decking
Attachment FTG	Wood Screw	Wood Screw
Attachment location	0.242	0.242
Fastener Type	1.75	0.25
Fastener Diameter, in	SPF #2 (Assumed)	
Embedment Length, in	213	30.4
Lumber Species & Grade	2	6
Nominal Withdrawal Capacity W, lbs	1.6	1.6
# of Screws	681	292
Load Duration Factor C_d	1606	374
Screw Adj. Withdrawal Cap. W', lbs	75%	25%
Attachment FTG Strength with Cd, lbs	466	
Assumed attachment distribution	584	
Max applied load, lbs		
Max allowable load, lbs		

Compare Adjusted Withdrawal Capacity to ASD Factored Demand

<u>Zones:</u>	<u>1</u>	<u>2</u>	<u>3</u>
	O.K.	O.K.	O.K.

PHOTOVOLTAIC ROOF MOUNT SYSTEM

14 MODULES-ROOF MOUNTED - 5.670 kW DC, 5.700 kW AC
905 DUKE ST, ERWIN, NC 28339



PHILIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD., MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
DESCRIPTION INITIAL DESIGN	02/24/2025	



STRUCTURAL ONLY
02/24/2025

PROJECT NAME & ADDRESS

RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-1

GENERAL NOTES

- ALL COMPONENTS ARE UL LISTED AND CEC CERTIFIED, WHERE WARRANTED.
- THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2017.
- THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
- ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
- WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
- HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH CEC 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ALUMINUM CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #6 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
- PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
- PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
- ALL SINGAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SINGAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHI.
- INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
- THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS (NEC 690.4(C))
- ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
- ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
- SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
- PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
- DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM (NEC 690.13(A))
- ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
- WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
- ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL 1703
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.

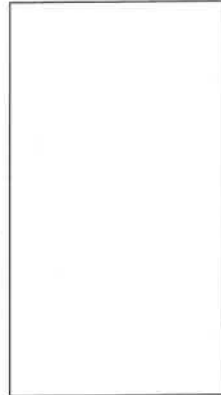
PROJECT DATA

PROJECT ADDRESS: 905 DUKE ST,
ERWIN, NC 28339
OWNER: RAYMOND WALKER
DESIGNER: ESR
SCOPE: 5.670 kW DC ROOF MOUNT
SOLAR PV SYSTEM WITH
14 JA SOLAR: JAM54S31-405/MR 405W
PV MODULES WITH
14 SOLAREGE: S440 POWER OPTIMIZERS AND
01 SOLAREGE: SE5700H-US (240V/5700W)
INVERTER
01 10 kWh SOLAREGE ENERGY BANK
AUTHORITIES HAVING JURISDICTION:
BUILDING: HARNETT COUNTY
ZONING: HARNETT COUNTY
UTILITY: DUKE ENERGY PROGRESS

SHEET INDEX

- PV-1 COVER SHEET
- PV-2 SITE PLAN
- PV-3 ROOF PLAN & MODULES
- PV-4 ELECTRICAL PLAN
- PV-5 STRUCTURAL DETAIL
- PV-6 ELECTRICAL LINE DIAGRAM
- PV-7 WIRING CALCULATIONS
- PV-8 LABELS
- PV-9+ EQUIPMENT SPECIFICATIONS

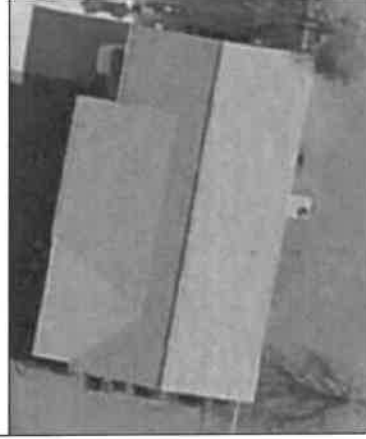
SIGNATURE



VICINITY MAP



HOUSE PHOTO



CODE REFERENCES

- 2018 NORTH CAROLINA BUILDING CODE
- 2018 NORTH CAROLINA RESIDENTIAL CODE
- 2015 NORTH CAROLINA FIRE CODE
- 2017 NATIONAL ELECTRICAL CODE

PROJECT DESCRIPTION:

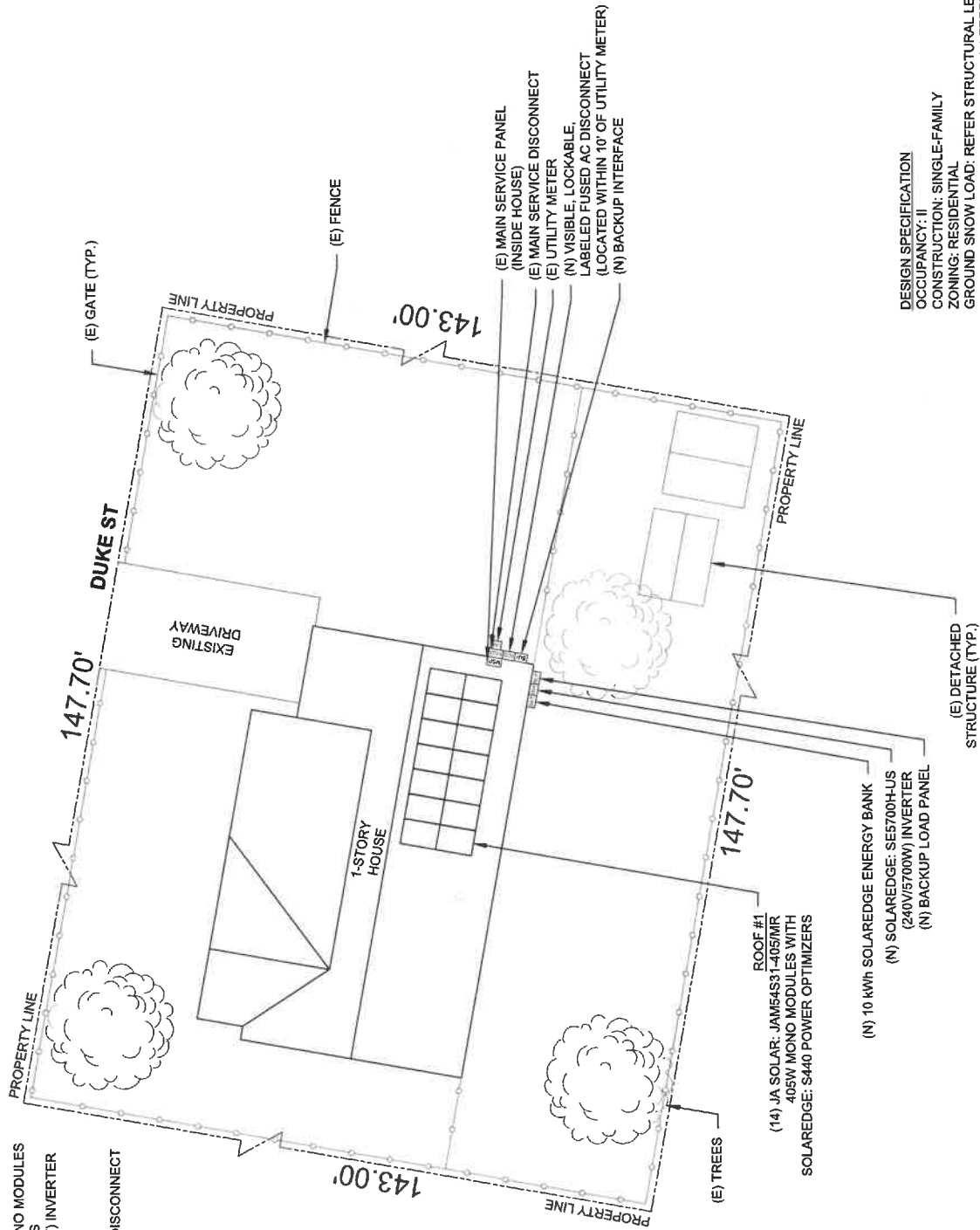
14 X JA SOLAR: JAM54S31-405/MR 405W MONO MODULES
 ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
 DC SYSTEM SIZE: 5.670 KW DC
 AC SYSTEM SIZE: 5.700 KW AC

EQUIPMENT SUMMARY

14 JA SOLAR: JAM54S31-405/MR 405W MONO MODULES
 14 SOLAREDDGE: S440 POWER OPTIMIZERS
 01 SOLAREDDGE: SE5700H-US (240V/5700W) INVERTER
 01 10 kWh SOLAREDDGE ENERGY BANK

ROOF ARRAY AREA #1: 294.14 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT
 LOCATED WITHIN 10' OF UTILITY METER



DESIGN SPECIFICATION
 OCCUPANCY: I
 ZONING: SINGLE-FAMILY RESIDENTIAL
 GROUND SNOW LOAD: REFER STRUCTURAL LETTER
 WIND EXPOSURE: REFER STRUCTURAL LETTER
 WIND SPEED: REFER STRUCTURAL LETTER

PHILLIPS ENERGY SYSTEMS
 7801 ALLEN BLACK RD, MINT HILL,
 NC 28227, UNITED STATES

REVISIONS	DATE	REV
DESCRIPTION	02/24/2025	
INITIAL DESIGN		

STRUCTURAL ONLY
 02/24/2025

PROJECT NAME & ADDRESS
RAYMOND WALKER RESIDENCE
 905 DUKE ST,
 ERWIN, NC 28339

DRAWN BY
 ESR

SHEET NAME
 SITE PLAN

SHEET SIZE
 ANSIB
 11" X 17"

SHEET NUMBER
 PV-2

1 SITE PLAN
 PV-2
 SCALE: 1/16" = 1'-0"

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 14 MODULES
 MODULE TYPE = JA SOLAR: JAM54S31-405/MR 405W MONO MODULES
 MODULE WEIGHT = 47.39 LBS / 21.5 kg.
 MODULE DIMENSIONS = 67.79" x 44.65" = 21.01 SF



ROOF DESCRIPTION				
ROOF TYPE	ASPHALT SHINGLE			
ROOF LAYER	1 LAYER			
ROOF #1	# OF MODULES	ROOF PITCH	ROOF AZIMUTH	TRUSS SIZE
	14	18°	190°	2"x4"
				TRUSS SPACING
				24"

ARRAY AREA & ROOF AREA CALC'S		
TOTAL PV ARRAY AREA (SQ. FT.)	294.14	2383.42
TOTAL ROOF AREA (Sq. Ft.)		
ROOF AREA COVERED BY ARRAY (%)		12

PHILLIPS ENERGY SYSTEMS
 7901 ALLEN BLACK RD, MINT HILL, NC 28227, UNITED STATES

REVISIONS	DESCRIPTION	DATE	REV
	INITIAL DESIGN	02/24/2025	

PROFESSIONAL ENGINEER
 TREVOR JONES
 STRUCTURAL ONLY
 02/24/2025

RAYMOND WALKER RESIDENCE
 905 DUKE ST,
 ERWIN, NC 28339

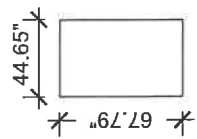
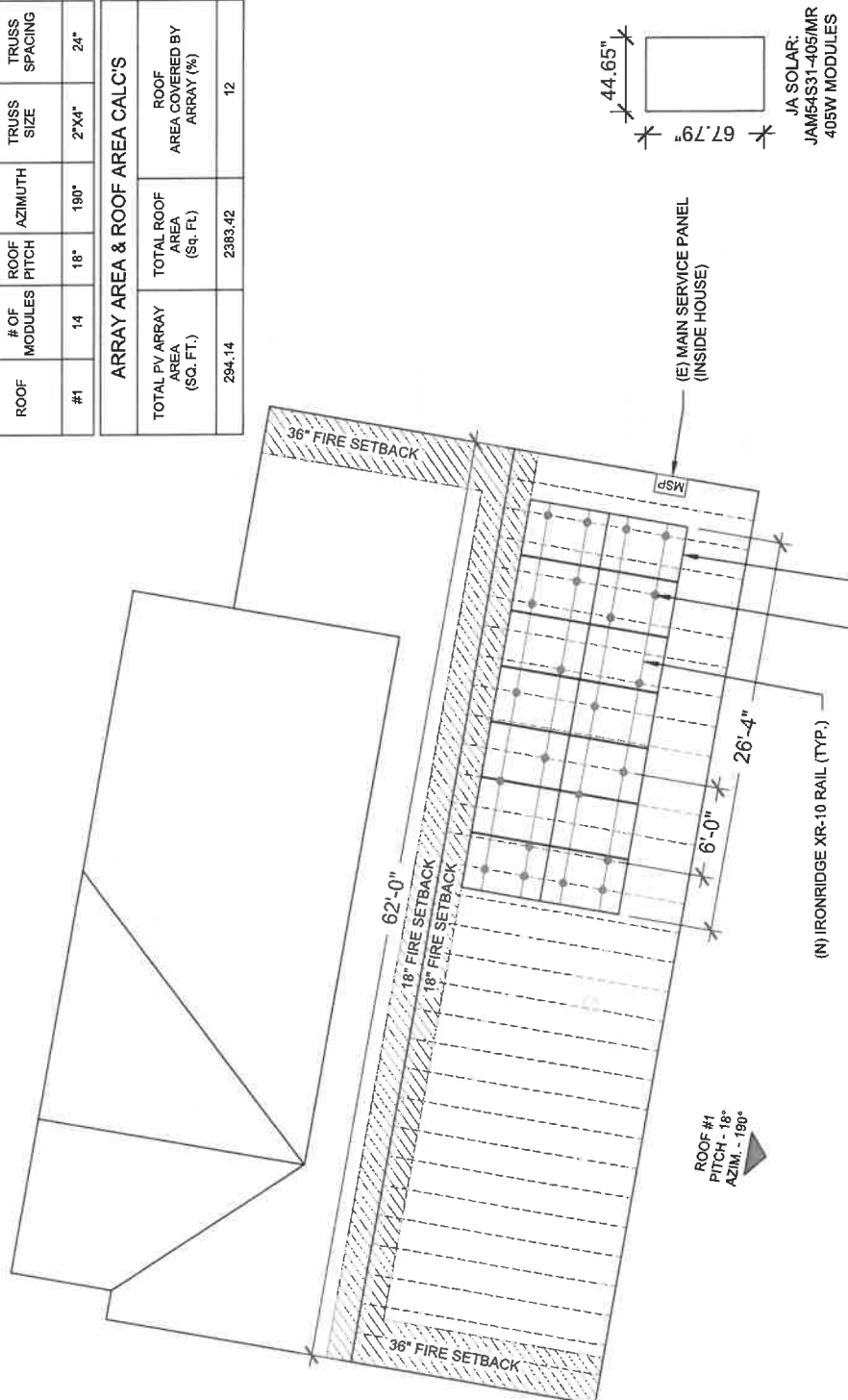
PROJECT NAME & ADDRESS

DRAWN BY
ESR

SHEET NAME
ROOF PLAN & MODULES

SHEET SIZE
**ANSI B
 11" X 17"**

SHEET NUMBER
PV-3



JA SOLAR:
 JAM54S31-405/MR
 405W MODULES

LEGEND

- [BAT] - SOLAREDGE BATTERY
- [BLP] - BACKUP LOAD PANEL
- [BU] - BACKUP INTERFACE
- [ACD] - AC DISCONNECT
- [UM] - UTILITY METER
- [MSD] - MAIN SERVICE DISCONNECT
- [MSP] - MAIN SERVICE PANEL
- [SUB] - SUB PANEL
- [INV] - INVERTER
- [JB] - JUNCTION BOX
- [VENT] - VENT, ATTIC FAN (ROOF OBSTRUCTION)
- [ATT] - ROOF ATTACHMENT
- [TRUSS] - TRUSS
- [CONDUIT] - CONDUIT

1 | ROOF PLAN & MODULES

SCALE: 1/8" = 1'-0"

PV-3



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
DESCRIPTION		
INITIAL DESIGN	02/4/2025	

RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

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ESR

SHEET NAME
ELECTRICAL PLAN

SHEET SIZE
**ANSI B
11" X 17"**

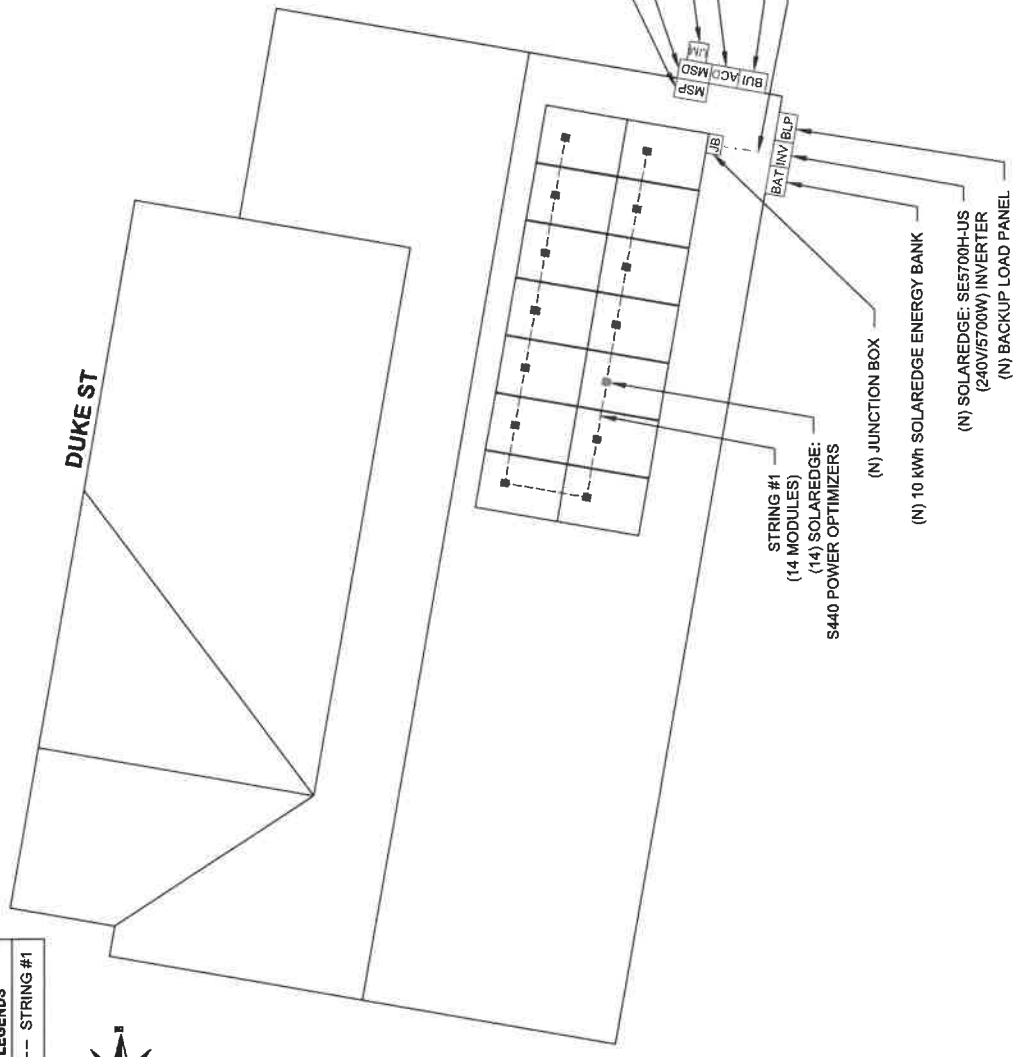
SHEET NUMBER
PV-4

BILL OF MATERIALS

EQUIPMENT DESCRIPTION	QTY
SOLAR PV MODULES: JA SOLAR, JAM64S31-405MR 405W MODULE	14
OPTIMIZERS: SOLAREDDGE: S440 POWER OPTIMIZERS	14
INVERTER: SOLAREDDGE: SE5700H-US (240V/5700W) INVERTER	01
BATTERY: 10 kWh SOLAREDDGE ENERGY BANK	1
BACKUP INTERFACE: SOLAREDDGE BACKUP INTERFACE BI-NUSGN-01	1
200A RATED, 240V NEMA 3R, UL LISTED	
JUNCTION BOX: JUNCTION BOX UL 1741,	
NEMA 3R CSA C22.2 NO.290	
AC DISCONNECT: FUSED AC DISCONNECT, 60A FUSED,	
(2) 30A FUSES 240V NEMA 3R, UL LISTED	
IRONRIDGE XR10 RAIL (RAIL 168" (14 FEET) CLEAR) (XR-10-168A)	8
BONDED SPLICE, XR10 (XR10-BOSS-01-M1)	4
UNIVERSAL MODULE CLAMP, CLEAR (UFC-CL-01-A1)	24
END FASTENING OBJECT (END CLAMP, 30-40MM), MILL (UFO-END-01-A1)	8
GROUNDING LUG (XR-LUG-03-A1)	2
IRONRIDGE HALO ULTRAGRIP ATTACHMENTS (QM-HUG-01-M1)	22
RD STRUCTURAL SCREW 3.0L (HW-RD1430-01-M1)	44
T-BOLT BONDING HARDWARE (BHW-TB-02-A1)	
(PRODUCT CODE 590-0116)	
OPTIMIZER BONDING HARDWARE T-BOLT (BHW-MI-01-A1)	
(PRODUCT CODE 270-0152)	14

DC SYSTEM SIZE: 5.670 KW DC
AC SYSTEM SIZE: 5.700 KW AC
(14) JA SOLAR: JAM64S31-405MR 405W MONO MODULES
WITH (14) SOLAREDDGE: S440 POWER OPTIMIZERS
LOCATED UNDER EACH PANEL AND
01 SOLAREDDGE: SE5700H-US (240V/5700W) INVERTER

STRING LEGENDS
----- STRING #1



LEGEND

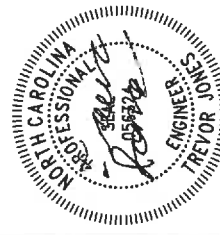
BAT	- SOLAREDDGE BATTERY
BLP	- BACKUP LOAD PANEL
BLU	- BACKUP INTERFACE
ACD	- AC DISCONNECT
UM	- UTILITY METER
MSD	- MAIN SERVICE DISCONNECT
MSP	- MAIN SERVICE PANEL
SUB	- SUB PANEL
INV	- INVERTER
JB	- JUNCTION BOX
	- VENT. ATTIC FAN (ROOF OBSTRUCTION)
	- ROOF ATTACHMENT
	- TRUSS
	- CONDUIT

1 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
DESCRIPTION		
INITIAL DESIGN	02/24/2025	



STRUCTURAL ONLY
02/24/2025

PROJECT NAME & ADDRESS

RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

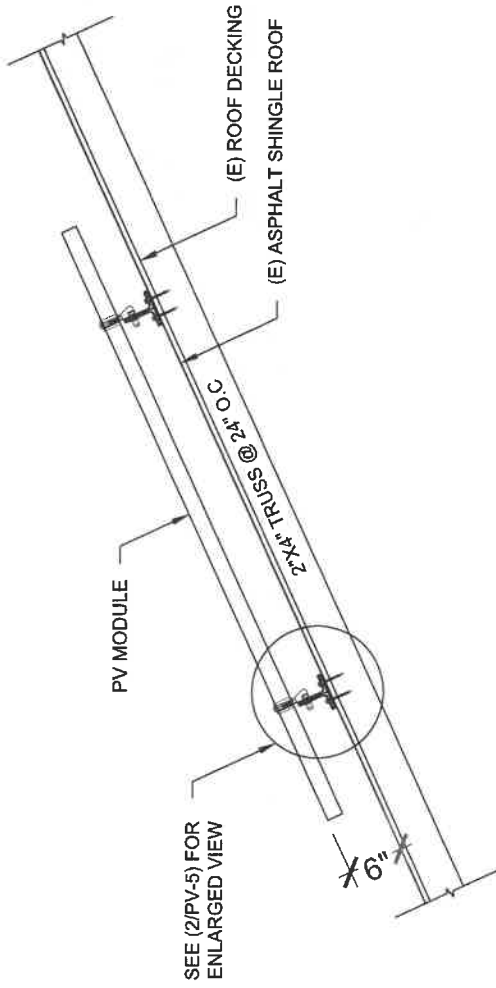
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SHEET NAME

STRUCTURAL DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

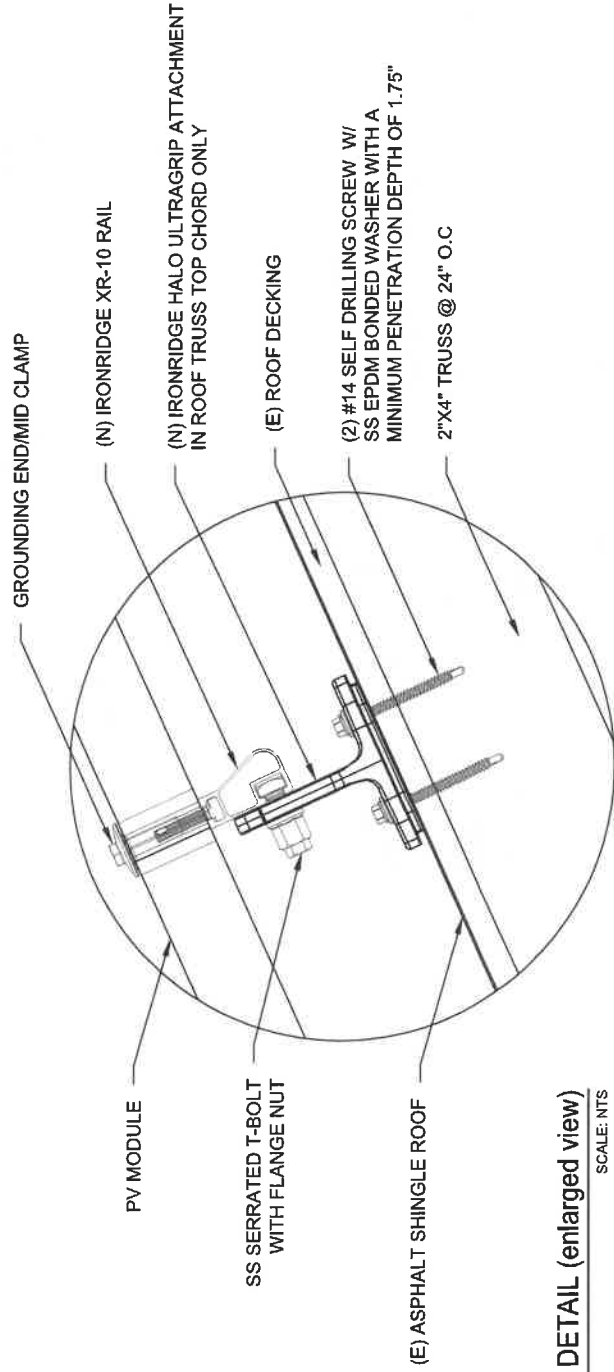


SEE (2/PV-5) FOR ENLARGED VIEW

1 STRUCTURAL ATTACHMENT (Side view)

PV-5

SCALE: N.T.S



2 ATTACHMENT DETAIL (enlarged view)

PV-5

SCALE: N.T.S



PHILLIPS ENERGY SYSTEMS
7801 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
INITIAL DESIGN	02/24/2025	

PROJECT NAME & ADDRESS
RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

DRAWN BY	ESR
SHEET NAME	ELECTRICAL LINE DIAGRAM
SHEET SIZE	ANSI B 11" X 17"
SHEET NUMBER	PV-6

GROUNDING & GENERAL NOTES:

1. PV GROUNDING ELECTRODE SYSTEM NEEDS TO BE INSTALLED IN ACCORDANCE WITH (NEC 690.43)
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 78" ABOVE THE ROOF USING CONDUIT SUPPORTS.

RACKING NOTE:

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

INTERCONNECTION NOTES:

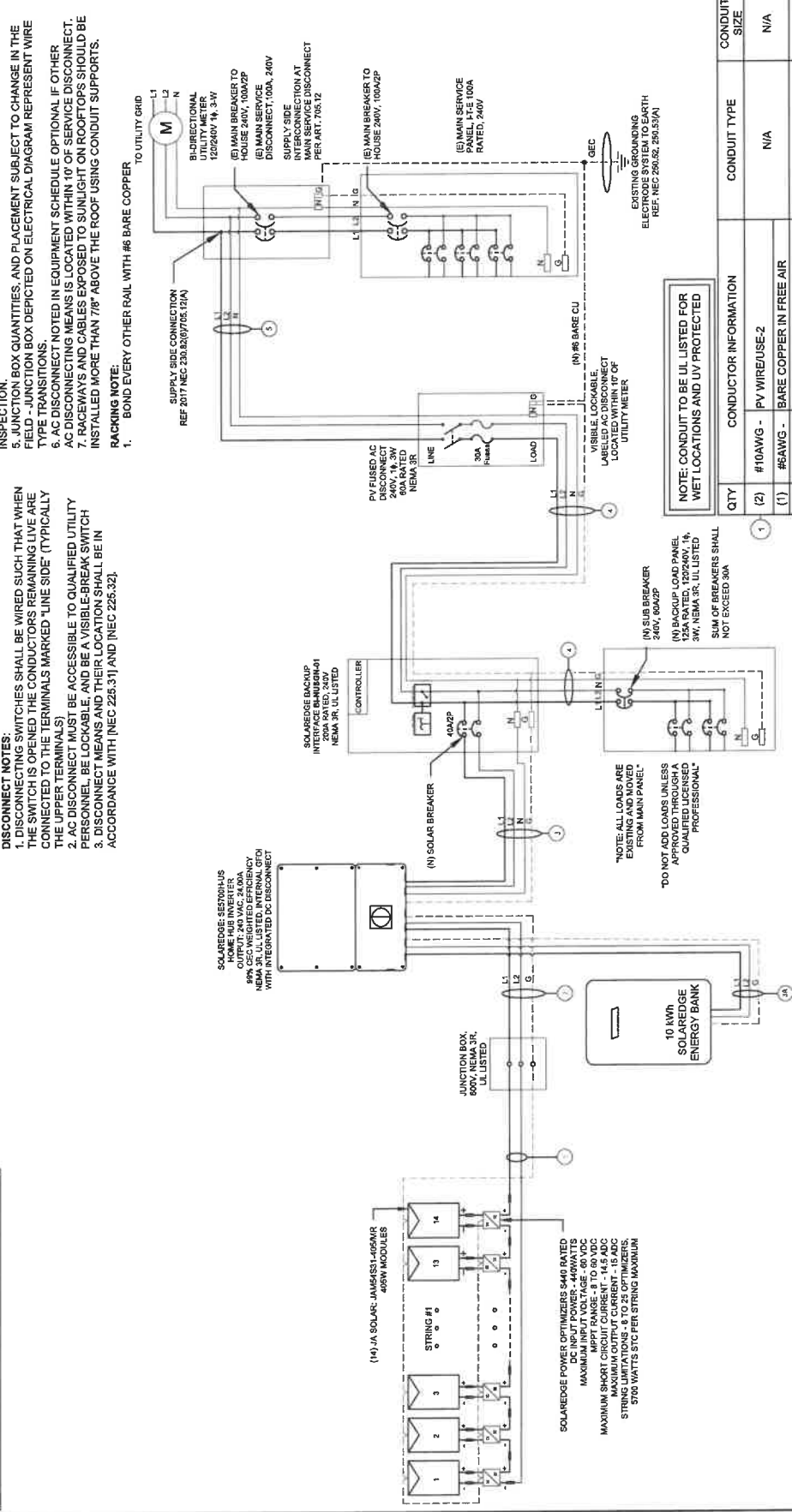
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH (NEC 705.12) AND (NEC 690.59).
2. PROVIDE FAULT PROTECTION IN ACCORDANCE WITH (NEC 210.8), (NEC 240.96).
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

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
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH (NEC 225.31) AND (NEC 225.32).

DC SYSTEM SIZE: 5.670 kW DC
AC SYSTEM SIZE: 5.700 kW AC

(14) JA SOLAR: JAM54S31-405MR 405W MONO MODULES WITH (14) SOLAREDGE: S440 POWER OPTIMIZERS LOCATED UNDER EACH PANEL (240V) AND (01) SOLAREDGE: SE5700H-US (240V/5700W) INVERTER (01) STRING OF 14 MODULES ARE CONNECTED IN SERIES



NOTE: CONDUIT TO BE UL LISTED FOR WET LOCATIONS AND UV PROTECTED

QTY	CONDUCTOR INFORMATION	CONDUIT TYPE	CONDUIT SIZE
1	(2) #10AWG - PV WIRE/USE-2	N/A	N/A
1	(1) #6AWG - BARE COPPER IN FREE AIR		
2	(1) #10AWG - CU, THWN-2	EMT OR LFMC IN ATTIC	3/4"
2	(1) #8AWG - CU, THWN-2	EMT, LFMC OR PVC	3/4"
1	(1) #10AWG - CU, THWN-2	EMT, LFMC OR PVC	3/4"
2	(1) #10AWG - CU, THWN-2	EMT, LFMC OR PVC	3/4"
1	(1) #4AWG - CU, THWN-2	EMT, LFMC OR PVC	1"
2	(1) #4AWG - CU, THWN-2	EMT, LFMC OR PVC	1"

1 ELECTRICAL LINE DIAGRAM
SCALE: NTS

PV-6



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
INITIAL DESIGN	02/24/2023	

AMBIENT TEMPERATURE SPECS	
AMBIENT TEMP (HIGH TEMP 2%)	38°
RECORD LOW TEMPERATURE	-9°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.275%/°C

INVERTER SPECIFICATIONS	
SOLAREXSE: SE5700H-US (240V/5700W)	
MANUFACTURER / MODEL #	INVERTER
NOMINAL AC POWER	5,700 kW
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	24.00A

PERCENT OF VALUES		NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT	
.80		4-6	
.70		7-9	
.50		10-20	

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	JAM64S31-405MPR 405W MODULE
VMP	31.21V
IMP	12.86A
VOC	37.23V
ISC	13.67A
TEMP. COEFF. VOC	-0.275%/°C
MODULE DIMENSION	67.75" L x 44.65" W x 1.18" D (in inch)

DC FEEDER CALCULATIONS																					
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCBP SIZE (A)	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPCITY CHECK #1	AMBIENT TEMP (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMP (90°C)	90°C AMPCITY DERATED (A)	AMPCITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/FT)	VOLTAGE DROP AT FLA (%)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
STRING 1	JUNCTION BOX	360	15.00	18.75	20	BARE COPPER #6 AWG	CU #10 AWG	95	PASS	38	2	40	0.91	36.4	PASS	5	1.24	0.069	0.069	N/A	N/A
JUNCTION BOX	INVERTER	360	15.00	18.75	20	CU #10 AWG	CU #10 AWG	95	PASS	38	2	40	0.91	36.4	PASS	20	1.24	0.196	0.196	3/4" EMT	11.87617
INVERTER	SOLAREXSE BANK	360	13.16	16.45	20	CU #10 AWG	CU #10 AWG	95	PASS	38	2	40	0.91	36.4	PASS	20	1.24	0.172	0.172	3/4" EMT	11.87617

String 1 Voltage Drop: 0.245

AC FEEDER CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCBP SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPCITY CHECK #1	AMBIENT TEMP (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMP (90°C)	90°C AMPCITY DERATED (A)	AMPCITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/FT)	VOLTAGE DROP AT FLA (%)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
INVERTER	BACKUP INTERFACE	240	24	30	40	CU #18 AWG	CU #18 AWG	50	PASS	38	2	55	0.91	50	PASS	5	0.778	0.078	0.078	3/4" EMT	24.5581	
BACKUP INTERFACE	BACKUP LOAD PANEL	240	60	75	80	CU #18 AWG	CU #18 AWG	50	PASS	38	2	55	0.91	50	PASS	5	0.778	0.077	0.077	1" EMT	24.4292	
BACKUP INTERFACE	AC DISCONNECT	240	24	30	40	CU #18 AWG	CU #18 AWG	50	PASS	38	2	55	0.91	50	PASS	5	0.778	0.093	0.093	1" EMT	24.4292	
AC DISCONNECT	BOI	240	24	30	40	N/A	CU #18 AWG	85	PASS	38	2	55	0.91	50	PASS	5	0.308	0.093	0.093	1" EMT	24.6111	

CUMULATIVE VOLTAGE DROP: 0.216

PROJECT NAME & ADDRESS
RAYMOND WALKER RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-7

ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE RATED UP TO 600V FOR RESIDENTIAL AND 1000V FOR COMMERCIAL AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULLY APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEBB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
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**RAYMOND WALKER
RESIDENCE**
905 DUKE ST.
ERWIN, NC 28339

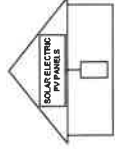
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ESR

SHEET NAME
LABELS

SHEET SIZE
**ANSI B
11" X 17"**

SHEET NUMBER
PV-8

**SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**



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

LABEL- 6:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)(1)(A)

**RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM**

LABEL- 7:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.59(C)(2)

DC DISCONNECT

LABEL- 8:
LABEL LOCATION:
INVERTER
CODE REF: NEC 690.13(B)

**AC DISCONNECT
PHOTOVOLTAIC SYSTEM
POWER SOURCE**

NOMINAL OPERATING AC VOLTAGE **240 V**
RATED AC OUTPUT CURRENT **24.00 A**

LABEL- 9:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.54

MAXIMUM VOLTAGE **480 V**
MAXIMUM CIRCUIT CURRENT **30.50 A**
**MAXIMUM RATED OUTPUT
CURRENT OF THE CHARGE
CONTROLLER OR DC-TO-DC
CONVERTER (IF INSTALLED)**

LABEL- 10:
LABEL LOCATION:
ON THE RIGHT SIDE OF THE INVERTER (PRE-EXISTING ON THE INVERTER)
CODE REF: NEC 690.53

PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT & ENCLOSURES

LABEL- 1:
LABEL LOCATION:
DC/EMT CONDUIT RACEWAY
SOLAR DECK / JUNCTION BOX
CODE REF: NEC 690.31 (D)(2)

WARNING
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY
BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.13(B)

WARNING
DUAL POWER SUPPLY
SOURCE: UTILITY GRID AND
PV SOLAR ELECTRIC SYSTEM

LABEL- 3:
LABEL LOCATION:
MAIN SERVICE PANEL
CODE REF: NEC 705.12(C) & NEC 690.59

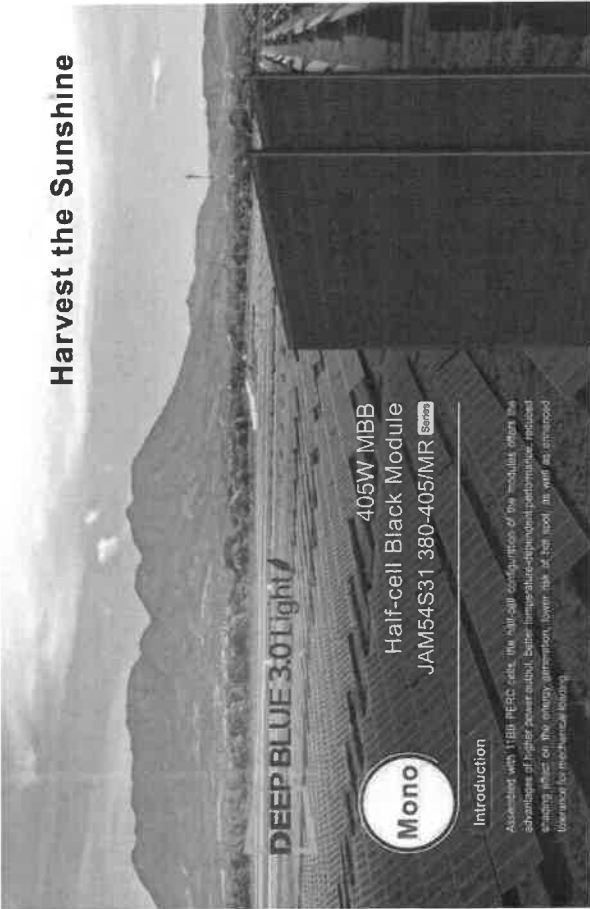
**SOLAR PV BREAKER:
BREAKER IS BACKFED
DO NOT RELOCATE**

LABEL- 4:
LABEL LOCATION:
MAIN SERVICE PANEL
CODE REF: NEC 705.12(C) & NEC 690.59

WARNING
**POWER SOURCE OUTPUT
CONNECTION. DO NOT
RELOCATE THIS
OVERCURRENT DEVICE**

LABEL- 5:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

Harvest the Sunshine



DEEP BLUE 3.0 Light

405W MBB
Half-cell Black Module
JAM54S31 380-405/MR Series



Introduction

Associated with I.T.E.B.I. HEBE sets the full-cell configuration of the modules offers the advantages of higher power output, better temperature coefficient performance, reduced shading effect on the array, increased lower risk of hot spot, the array has supported standard for mechanical loading.



Higher output power



Less shading and lower resistive loss



Lower LCOE



Better mechanical loading tolerance

Superior Warranty

- 25-year product warranty
- 25-year linear power output warranty

Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules - Guidelines for increased confidence in PV module design qualification and type approval

• New linear power warranty • Standard module linear power warranty



JA SOLAR

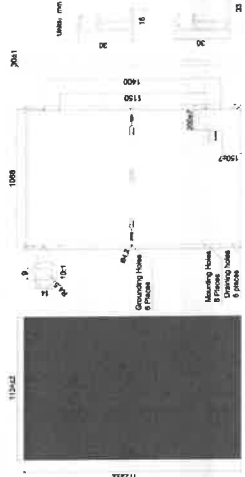


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JASOLAR

JAM54S31 380-405/MR

MECHANICAL DIAGRAMS



SPECIFICATIONS

Cell	Mono
Weight	21.5kg±3%
Dimensions	1722±0.2mm×1342±0.2mm×90±1mm
Cable Cross Section Size	4mm ² (IEC) ; 12 AWG(U.L)
No. of cells	108(6x18)
Junction Box	IP68, 3 diodes
Connector	MC4-EV02(1500V)
Cable Length (Including Connector)	Positive: 200mm(+/-40mm(-)) Negative: 120mm(+/-20mm(-))
Packaging Configuration	36pcs/Pallet, 864pcs/40ft Container

Remark: customized frame color and cable length are available upon request

ELECTRICAL PARAMETERS AT STC

TYPE	JAM54S31-380MR	JAM54S31-385MR	JAM54S31-400MR	JAM54S31-405MR
Rated Maximum Power(P _{max}) [W]	380	385	390	405
Open Circuit Voltage(V _{oc}) [V]	38.58	38.71	38.86	37.20
Maximum Power Voltage(V _{mp}) [V]	30.28	30.46	30.84	31.21
Short Circuit Current(I _{sc}) [A]	13.44	13.52	13.81	13.79
Maximum Power Current(I _{mp}) [A]	12.55	12.84	12.73	12.86
Module Efficiency [%]	19.5	19.7	20.0	20.5
Power Tolerance	±2%			
Temperature Coefficient of P _{max} (P _{oc})	-0.045%/°C			
Temperature Coefficient of V _{oc} (V _{oc})	-0.275%/°C			
Temperature Coefficient of P _{max} (P _{mp})	-0.350%/°C			

STC Irradiance: 1000W/m², cell temperature 25°C, AM1.5G

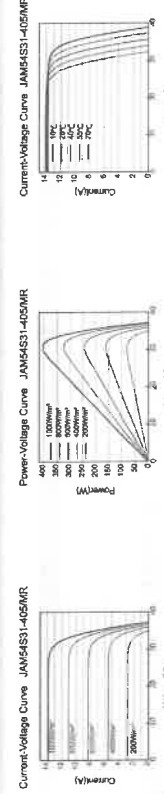
OPERATING CONDITIONS

Maximum System Voltage	1000V/1500V DC
Operating Temperature	-40°C ~ +85°C
Maximum Series Fuse Rating	25A
Maximum Static Load Front	5400Pa(12lb/ft ²)
Maximum Static Load Back	2400Pa(50lb/ft ²)
Temperature Class	4542°C
Fire Performance	UL Type 1

ELECTRICAL PARAMETERS AT NOCT

TYPE	JAM54S31-380MR	JAM54S31-385MR	JAM54S31-400MR	JAM54S31-405MR
Rated Max Power(P _{max}) [W]	281	284	290	302
Open Circuit Voltage(V _{oc}) [V]	34.38	34.49	34.75	35.12
Max Power Voltage(V _{mp}) [V]	28.51	28.68	29.05	29.47
Short Circuit Current(I _{sc}) [A]	10.75	10.82	10.88	11.10
Max Power Current(I _{mp}) [A]	10.03	10.11	10.16	10.38
NOCT	Irradiance 800W/m ² , ambient temperature 20°C, wind speed 1m/s, AM1.5G			

CHARACTERISTICS



Operating Conditions

Maximum System Voltage	1000V/1500V DC
Operating Temperature	-40°C ~ +85°C
Maximum Series Fuse Rating	25A
Maximum Static Load Front	5400Pa(12lb/ft ²)
Maximum Static Load Back	2400Pa(50lb/ft ²)
Temperature Class	4542°C
Fire Performance	UL Type 1



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DESCRIPTION	DATE	REV
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PROJECT NAME & ADDRESS
RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9

Residential Power Optimizer

For North America

S440 / S500B / S650B



PV power optimization at the module level!

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss from manufacturing tolerance to partial shading
- Faster installations with simplified wire management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

/ Residential Power Optimizer

For North America

S440 / S500B / S650B

INPUT	S440	S500B	S650B
Rated Input DC Power ¹	440	500	550
Absolute Maximum Input Voltage (Voc)	60	60	60
MPP Operating Range	8-60	12.5-105	12.5-85
Maximum Input Current (Maximum I _{sc} of Connected PV Module) ²	14.5	15	15
Maximum Input Short-Circuit Current ³	18.75	19.5	19.5
Maximum Efficiency	99.5	99.5	99.5
Weighted Efficiency	98.6	98.6	98.6
Overage Category	1	1	1

OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)	S440	S500B	S650B
Maximum Output Voltage	60	60	60
Maximum Output Current	15	15	15
Output During Standby (Power Optimizer Disconnected from SolarEdge Inverter or Inverter Off)	0	0	0
Standby Output Current	1.4	1.4	1.4

STANDARD COMPLIANCE	S440	S500B	S650B
Photovoltaic Rapid Shutdown System	Yes	Yes	Yes
Safety	UL 94 V-0 UV Resistant	UL 94 V-0 UV Resistant	UL 94 V-0 UV Resistant
Material	RoHS	RoHS	RoHS
Free Safety	Yes	Yes	Yes

INSTALLATION SPECIFICATIONS	S440	S500B	S650B
Maximum Allowed System Voltage	60	60	60
Dimensions (W x L x H)	129 x 155 x 30	129 x 155 x 45	129 x 155 x 49
Weight	7.0	7.0	7.0
Input Connector	MC4	MC4	MC4
Input Wire Length	0.17 (0.32)	0.17 (0.32)	0.17 (0.32)
Output Connector	MC4	MC4	MC4
Output Wire Length	0.17 (0.32)	0.17 (0.32)	0.17 (0.32)
Operating Temperature Range ⁴	-40 to +85	-40 to +85	-40 to +85
Protection Rating	IP68 / NEMA 6P	IP68 / NEMA 6P	IP68 / NEMA 6P
Relative Humidity	0 - 100	0 - 100	0 - 100

PV System Design Using a SolarEdge Inverter	Single Phase	Three Phase for 200V Grid	Three Phase for 277/480V Grid
Maximum String Length (Power Optimizer)	510	510	510
Maximum String Length (Power Optimizer)	510	510	510
Maximum Output Power (Per String)	5700W	5700W	5700W
Maximum Allowed Connected Power per String ^{5,6}	5700W	5700W	5700W
Parallel Strings of Different Lengths or Orientations	Yes	Yes	Yes

1) Based on power of the module at STC. All inverters are rated for DC power. Modules with up to 5% power tolerance are allowed.
 2) The maximum input current is limited by the inverter and the maximum input current is 15A.
 3) The maximum input current is limited by the inverter and the maximum input current is 15A.
 4) The maximum operating temperature is 85°C. The device is designed for year-round operation. Installation should be done in accordance with NEC and CEA.
 5) Power rating is based on ambient temperature above -40°C, 11°F for S440 and for ambient temperature above +75°C, 165°F for S500B and S650B. Refer to the Basic Operation Temperature.
 6) Parallel stringing is not allowed for more than 1 string.



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PROJECT NAME & ADDRESS
RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10



RoHS
Compliant



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
DESCRIPTION		
INITIAL DESIGN	02/24/2025	

PROJECT NAME & ADDRESS
RAYMOND WALKER RESIDENCE 905 DUKE ST, ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B 11" X 17"

SHEET NUMBER
PV-13

/ Backup Interface for North America

BI-EUSGN-01 / BI-NUSGN-01

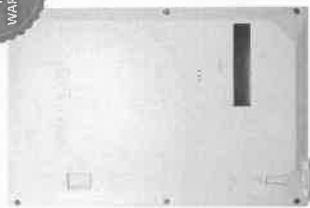
INPUT FROM GRID		BI-EUSGN-01	BI-NUSGN-01
AC Current Input	200	A	A
AC Output Voltage (Nominal)	240	Vac	Vac
AC Output Voltage Range	211 - 264	Vac	Vac
AC Frequency (Nominal)	60	Hz	Hz
AC Frequency Range	59.3 - 60.5	Hz	Hz
Microgrid Interconnection Device Rated Current	200	A	A
Service Side AC Main Circuit Breaker Rated Current	100	A	A
Service Side AC Main Circuit Breaker Interrupt Current	N/A		
Grid Disconnection Switchover Time	<100	ms	ms
OUTPUT TO MAIN DISTRIBUTION PANEL			
Maximum AC Current Output	200	A	A
AC L-L Output Voltage (Nominal)	240	Vac	Vac
AC L-L Output Voltage Range	211 - 264	Vac	Vac
AC Frequency (Nominal)	60	Hz	Hz
AC Frequency Range	59.3 - 60.5	Hz	Hz
Maximum Inverters AC Current Output in Backup Operation	76	A	A
Inverter Compensation in Backup Operation	5000	V	V
AC L-N Output Voltage in Backup (Nominal)	120	V	V
AC L-N Output Voltage Range in Backup	102 - 132	V	V
AC Frequency Range in Backup	55 - 65	Hz	Hz
INPUT FROM INVERTER			
Number of Inverter Inputs	3	#	#
Rated AC Power	7,600	W	W
Maximum Continuous Input Current @ 240V	32	A	A
Rated AC Power in Continuous Backup Operation	6,000	W	W
Maximum Continuous Input Current in Backup Operation	26	A	A
Peak AC Power (1-10 sec) in Backup Operation	7,000	W	W
Peak AC Current (1-10 sec) in Backup Operation	30	A	A
Inverter Input AC Circuit Breaker	40	A	A
Upgradability	Up to 32 65A CB ¹⁾		
GENERATOR ¹⁾			
Maximum Rated AC Power	15,000	W	W
Maximum Continuous Input Current	61	Ack	Ack
Dry Contact Switch Voltage Rating	250/250	Vac/250	Vac/250
Dry Contact Switch Current Rating	5	A	A
2-wire Start Switch	Yes		
ADDITIONAL FEATURES			
Installation Type	Suitable for use as per wire equipment		For main lug only
Number of Communication Inputs	2		
Communication	RS485		
Energy Meter (for Import/Export)	Yes		
Manual Control Over Microgrid Interconnection Device	Yes		
<small>(1) Each 40A CB supports up to one 15kW inverter with each 65A CB supporting one 15kW and one 11kW inverter. The CB upgrade kit is available with the following part numbers: 15-40A-CB (CB15P-40-1) for 65A CB (CB15P-65-1) and 15-65A-CB (CB15P-65-1) for 65A CB (CB15P-65-1).</small>			

STOREDGE®

Backup Interface for North America

BI-EUSGN-01 / BI-NUSGN-01

12 YEAR WARRANTY



Backup Interface for Flexible Backup

- Automatically provides backup power to home loads in the event of grid interruption
- Full flexibility in which loads to backup - the entire home or selected loads
- Scalable solution to support higher power & higher capacity¹⁾
- Built-in Auto Transformer and Energy Meter for easier and faster installation
- Seamless integration with the Energy Hub Inverter with Prism Technology to manage and monitor both PV generation and energy storage
- Generator connection support¹⁾

¹⁾ Requires supporting Inverter & more

solaredge.com



/ Backup Interface for North America

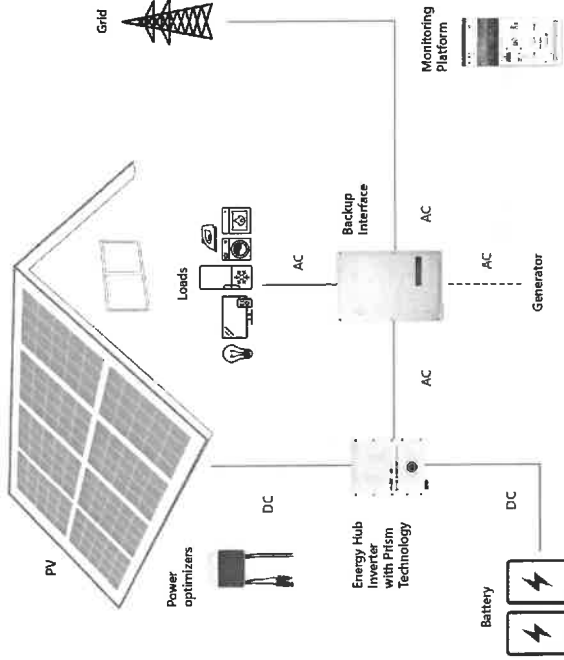
BI-EUSGN-01 / BI-NUSGN-01

STANDARD COMPLIANCE

Safety	UL1741, CSA 222, NO. 907	BI-NUSGN-01
Emissions	UL666A	N/A
	FCC part 15 class B	

INSTALLATION SPECIFICATIONS

Supported Inverters	StorEdge single phase inverter, Single phase Energy Hub inverter with Prism technology
AC From Grid Conduit Size / AWG Range	2" conduit / #0 - 4/0 AWG
AC Inverter Conduit Size / AWG Range	1" conduit / 14 - 4 AWG
AC Generator Input Conduit Size / AWG Range	1" conduit / 6 - 3 AWG
Communication Conduit Size / AWG Range	3/4" / 24 - 10 AWG
Weight	73 / 33 lb / Kg
Cooling	Fan (user replaceable)
Noise	< 50 dBA
Operating Temperature Range	-40 to +122 / -40 to +50 T / °C
Protection Rating	NEMA 3R, IP44
Dimensions (HxWxD)	20.19 x 13.38 x 8.62 / 523.5 x 352.5 x 219 in / mm



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PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

REVISIONS	DATE	REV
DESCRIPTION		
INITIAL DESIGN	02/24/2023	

PROJECT NAME & ADDRESS
RAYMOND WALKER
RESIDENCE
905 DUKE ST,
ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14

SolarEdge Energy Bank 10kWh Battery For North America

10
YEAR
WARRANTY



solarEdge

/ SolarEdge Energy Bank 10kWh Battery For North America

BATTERY SPECIFICATION	
Usable Energy (100% Depth of Discharge)	9700 Wh
Continuous Output Power	5000 W
Peak Output Power (10 to 60 seconds)	7500 W
Peak Roundtrip Efficiency	94.5 %
Warranty*	10 Years
Voltage Range	330-450 Vdc
Communication Interfaces	Wireless
Emergency Power Inverter	Up to 3 ¹
STANDARD COMPLIANCE	
Safety	UL1642, UL1973, UL9540, UN38.3
Emissions	FCC Part 15 Class B
MECHANICAL SPECIFICATIONS	
Dimensions (W x H x D)	31.1" x 46.4" x 9.94" / 793x 1179 x 250
Weight	87 / 121 lb / kg
Mounting	Back or wall mount*
Operating Temperature	+14 to +132 F / -10 to +50 °C
Storage Temperature (more than 3 months)	+14 to +186 F / -10 to +90 °C
Storage Temperature (less than 3 months)	-27 to +140 F / -30 to +60 °C
Altitude	6562 / 2000 ft / m
Enclosure Protection	IP55 (NEMA 3R - Indoor and outdoor indoor and dust protection)
Coating	Natural construction
Noise (at 1m distance)	<25 dBA

* The SolarEdge Energy Bank is designed to use with SolarEdge Energy Hub for wireless communication. The inverter must feature matching SolarEdge Energy Hub Plug-in Inverter. Details below.
 † Please refer to the SolarEdge Energy Bank Battery Connection and Configuration Application Note for compatible inverters.
 ‡ These specifications apply to pure lithium-ion (Li-ion) technology.
 § The SolarEdge Energy Bank is designed to be used with SolarEdge Energy Hub for wireless communication. The inverter must feature a pair of lithium-ion connection (DC+) and (DC-) per battery, excluding the inverter battery. Support for 3-batteries is pending supporting inverter firmware. The battery connection should be purchased separately.
 ¶ The SolarEdge Energy Bank is designed to be used with SolarEdge Energy Hub for wireless communication. The inverter must feature a pair of lithium-ion connection (DC+) and (DC-) per battery, excluding the inverter battery. Support for 3-batteries is pending supporting inverter firmware. The battery connection should be purchased separately.
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Optimized for SolarEdge Energy Hub Inverters^{††}

- Maximized system performance, gaining more energy to store and use for on-grid and backup power applications
- Integrates with the complete SolarEdge residential offering, providing a single point of contact for warranty, support, training, and simplified logistics & operations
- DC coupled battery featuring superior overall system efficiency, from PV to battery to grid
- Scalable solution for increased power and capacity with multiple SolarEdge inverters and batteries
- Solar, storage, EV charging, and smart devices all monitored and managed by a single app to optimize solar production, consumption and backup* power
- Wireless communication to the inverter, reducing wiring, labor and installation faults
- Simple plug and play installation, with automatic SetApp-based configuration
- Includes multiple safety features for battery protection

* Backup application is subject to local regulation and may require additional components and firmware upgrade.

solarEdge.com



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7901 ALLEN BLACK RD, MINT HILL,
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DRAWN BY
ESR

SHEET NAME
**EQUIPMENT
SPECIFICATION**

SHEET SIZE
**ANSI B
11" X 17"**

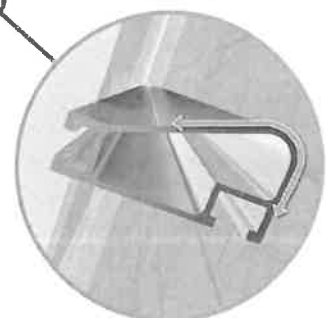
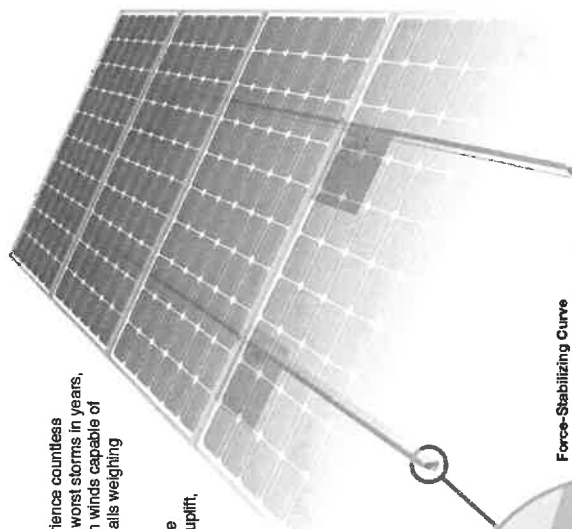
SHEET NUMBER
PV-15



Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails® are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails® is specially designed to increase strength in both directions while resisting the twisting. This unique design allows XR Rails to resist extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails® are compatible with flat roofs and pitched roof attachments.



Corrosion-Resistant Materials

All XR Rails® are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface corrosion and also provides a more attractive appearance.



Tech Brief

XR Rail® Family

The XR Rail® Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail® to match.

XR10



XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splice available

XR100



XR100 is a residential and commercial mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splice available

XR1000



XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splice available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8° to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load	Rail Span				
	4'	5' 4"	6'	10'	12'
None	XR10	XR100	XR100	XR1000	XR1000
20	XR10	XR100	XR100	XR1000	XR1000
30	XR10	XR100	XR100	XR1000	XR1000
40	XR10	XR100	XR100	XR1000	XR1000
80	XR10	XR100	XR100	XR1000	XR1000
120	XR10	XR100	XR100	XR1000	XR1000

*Table is meant to be a simplified summary of our capabilities. Use approved certification letters for actual design guidance.



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7901 ALLEN BLACK RD, MINT HILL,
NC 28227, UNITED STATES

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PROJECT NAME & ADDRESS

RAYMOND WALKER
RESIDENCE
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ERWIN, NC 28339

DRAWN BY
ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-16



UFO® Family of Components

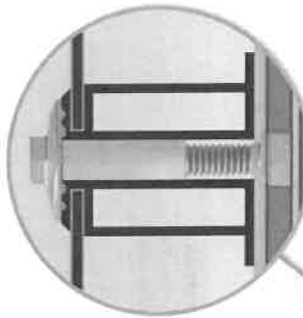
Tech Brief

Simplified Grounding for Every Application

The UFO® family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge® XR Rails®. All system types that feature the UFO® family—Flush Mount®, Tilt Mount® and Ground Mount®—are fully listed to the UL 2703 standard.

UFO® hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

Only for installation and use with IronRidge products in accord with written instructions. See IronRidge.com/UFO



Universal Fastening Object (UFO)
The UFO® securely bonds solar modules to XR Rails®. It comes assembled and unskooled, and can fit a wide range of module heights.



Stopper Sleeve
The Stopper Sleeve snaps onto the UFO®, converting it into a bonded end clamp.



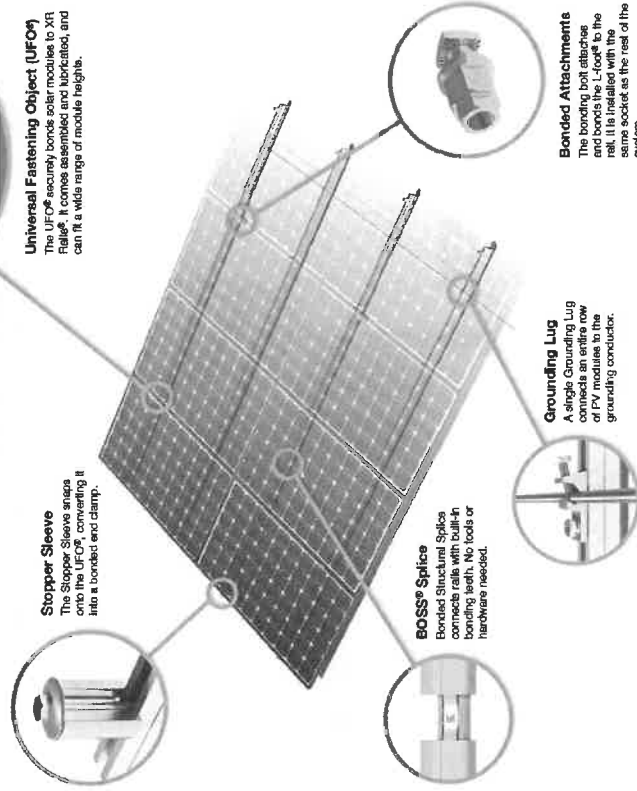
BOSS® Splice
Bonded Structural Splice connects rails with built-in bonding path. No tools or hardware needed.



Grounding Lug
A single Grounding Lug connects an entire row of rails to the system's grounding conductor.

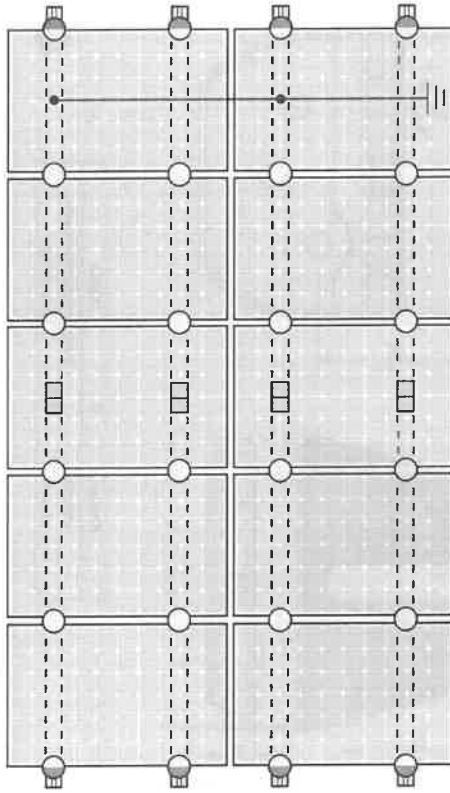


Bonded Attachments
The bonding bolt attaches to the rail. It is installed with the same socket as the rest of the system.



Tech Brief

System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Enphase cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge® Flush Mount®, Tilt Mount®, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to IronRidge.com/UFO

Feature	Cross-System Compatibility			
	Flush Mount	Tilt Mount	Ground Mount	Ground Mount
XR Rails®	✓	✓	XR100 & XR1000	✓
UFO®/Stopper	✓	✓	✓	✓
BOSS® Splice	✓	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Compatible with most MLPE manufacturers. Refer to system installation manual.			
Fire Rating	Class A	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules. Refer to installation manuals for a detailed list.			



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ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-17



QuickMount® Halo UltraGrip

Cut Sheet

Release Liner shown for reference

RD STRUCTURAL SCREW PN RD-1430-01-M1
SOLD SEPARATELY
SHOWN FOR REFERENCE

ITEM NO	DESCRIPTION	QTY IN KIT
1	CM Halo UltraGrip (Mill or Black)	1

PART NUMBER	DESCRIPTION
CM-HUG-01-M1	Halo UltraGrip - Mill
CM-HUG-01-B1	Halo UltraGrip - Black

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Cut Sheet

1. Halo UltraGrip

Dimensions: .38, 3.35, 3.83, 1.63, .40, 1.56, .34, 2.99, $\phi .26$

Property	Value
Material	3000 Series Aluminium
Finish	Mill or Black

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SPECIFICATION

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11" X 17"

SHEET NUMBER
PV-18



QuickMount® RD Structural Screw

Cut Sheet

ITEM NO	DESCRIPTION	QTY IN KIT
1	Self Drilling Screw, #14, Wood Tip	1
2	Washer, EPDM Backed	1

PART NUMBER	DESCRIPTION
RD-1430-01-M1	RD Structural Screw

1. Self Drilling Screw, #14, Wood Tip

Property	Value
Material	300 Series Stainless Steel
Finish	Clear

2. Washer, EPDM Backed

Property	Value
Material	300 Series Stainless Steel
Finish	Clear

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PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD, MINT HILL,
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RAYMOND WALKER
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905 DUKE ST,
ERWIN, NC 28339

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ESR

SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE

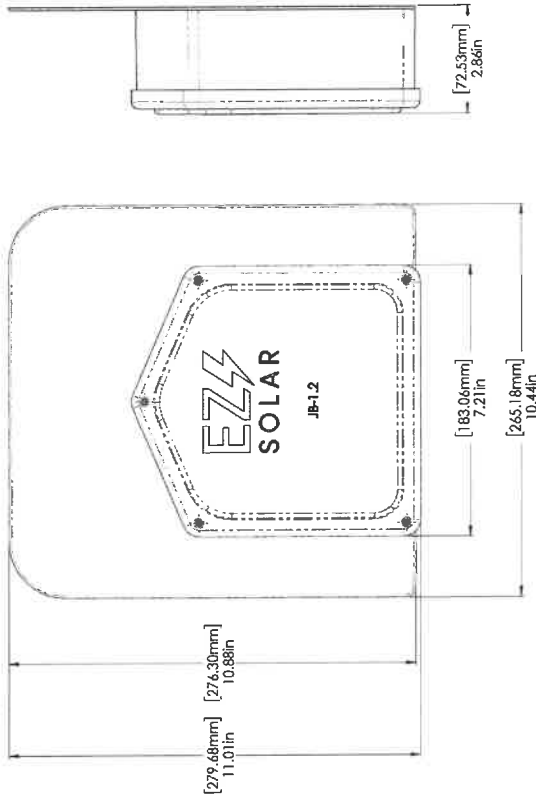
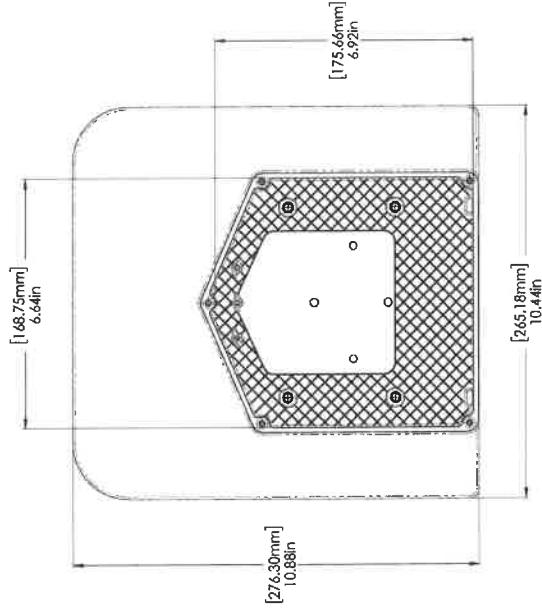
ANSI B
11" X 17"

SHEET NUMBER

PV-19

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	JB-12 BODY	POLYCARBONATE WITH UV INHIBITORS	1
2	JB-12 LID	POLYCARBONATE WITH UV INHIBITORS	1
3	#10 X 1-1/4" PHILLIPS PAN-HEAD SCREW		6
4	#8 X 3/4" PHILLIPS PAN-HEAD SCREW		6

SIZE	DWG. NO.	REV
B	JB-12	
SCALE: 1:2	WEIGHT: 1.45 LBS	SHEET 1 OF 3
TORQUE SPECIFICATION:	15-20 LBS	
CERTIFICATION:	UL 1741, NEMA 3R CSA C22.2 NO. 290	
WEIGHT:	1.45 LBS	



PHILLIPS ENERGY SYSTEMS
7901 ALLEN BLACK RD. MINT HILL,
NC 28227, UNITED STATES

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INITIAL DESIGN		

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SPECIFICATION

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ANSI B
11" X 17"

SHEET NUMBER
PV-20



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