2.1.1 **SITE NOTES**:
2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.
2.1.6 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

2.2.1 **EQUIPMENT LOCATIONS**
2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.
2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).
2.2.3 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
2.2.4 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.
2.2.5 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
2.2.6 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 **STRUCTURAL NOTES:**
2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.
2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.
2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.
2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.
2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 **GROUNDING NOTES:**
2.4.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVISES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
2.4.3 PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR. ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.136(A). ONLY THE DC CONDUCTORS ARE UNGROUNDED.
2.4.4 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.
2.4.5 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURE CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).
2.4.6 EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.
2.4.7 THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
2.4.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]
2.4.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.
2.4.10 DC PV ARRAYS SHALL BE PROVIDED WITH DC GROUND-FAULT PROTECTION MEETING THE REQUIREMENTS OF 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

2.5.1 **INTERCONNECTION NOTES:**
2.5.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]
2.5.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(B)(2)(3)].
2.5.4 THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(B)(2)(3)].
2.5.5 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).
2.5.6 FEEDER TAP INTERCONECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)
2.5.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42
2.5.8 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].

2.6.1 **DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:**
2.6.2 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).
2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.
2.6.4 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED. THEREFORE BOTH MUST OPEN WHERE A DISCONNECT IS REQUIRED, ACCORDING TO NEC 690.13.
2.6.5 ISOLATING DEVICES OR EQUIPMENT DISCONNECTING MEANS SHALL BE INSTALLED IN CIRCUITS CONNECTED TO EQUIPMENT AT A LOCATION WITHIN THE EQUIPMENT, OR WITHIN SIGHT AND WITHIN 10 FT OF THE EQUIPMENT. AN EQUIPMENT DISCONNECTING MEANS SHALL BE PERMITTED TO BE REMOTE FROM THE EQUIPMENT WHERE THE EQUIPMENT DISCONNECTING MEANS CAN BE REMOTELY OPERATED FROM WITHIN 10 FT OF THE EQUIPMENT, ACCORDING TO NEC 690.15 (A).
2.6.6 PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D)
2.6.7 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.
2.6.8 BOTH POSITIVE AND NEGATIVE PV CONDUCTORS ARE UNGROUNDED, THEREFORE BOTH REQUIRE OVER-CURRENT PROTECTION, ACCORDING TO NEC 240.21. (SEE EXCEPTION IN NEC 690.9)
2.6.9 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

2.7.1 **WIRING & CONDUIT NOTES:**
2.7.2 ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.
2.7.3 ALL CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.
2.7.4 EXPOSED PV SOURCE CIRCUITS AND OUTPUT CIRCUITS SHALL USE WIRE LISTED AND IDENTIFIED AS PHOTOVOLTAIC (PV) WIRE [690.31 (C)]. PV MODULES WIRE LEADS SHALL BE LISTED FOR USE ON PV ARRAYS, ACCORDING TO NEC 690.31 (A).
2.7.5 PV WIRE BLACK WIRE MAY BE FIELD-MARKED WHITE [NEC 200.6 (A)(6)].
2.7.6 MODULE WIRING SHALL BE LOCATED AND SECURED UNDER THE ARRAY.
2.7.7 ACCORDING TO NEC 200.7, UNGROUNDED SYSTEMS DC CONDUCTORS COLORED OR MARKED AS FOLLOWS:
DC POSITIVE- RED, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN
DC NEGATIVE- BLACK, OR OTHER COLOR EXCLUDING WHITE, GREY AND GREEN
2.7.8 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:
PHASE A OR L1- BLACK
PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE
PHASE C OR L3- BLUE, YELLOW, ORANGE*, OR OTHER CONVENTION
NEUTRAL- WHITE OR GREY

* IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

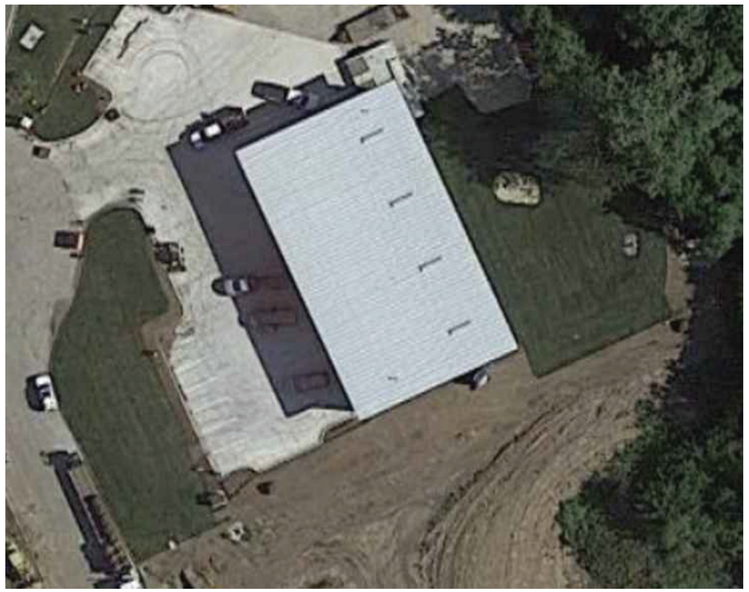
SYMBOL LEGEND

E MAIN ENTRANCE DOOR	CBR COMBINER BOX	M (E) UTILITY METER	PROPERTY LINE	SOLAR (PV) MODULE	D1 A-201 DETAIL INDICATOR
MEP MAIN ELECTRICAL PANEL	TB TAP BOX	V PV REVENUE METER	ROOF RAFTERS	RAILS	D1 A-201 ELEVATION INDICATOR
JB JUNCTION BOX	SUB SUB (AC) PANEL	U UTILITY POLE	MODULE STRINGING	ATTACHMENTS	N W E S NORTH INDICATOR
S AC DISCONNECT	M/M METER/MAIN	A MODULE STRINGING	EQUIPMENT GROUND	26 SHEET KEYNOTE INDICATOR	
I DC/AC INVERTER	RSD RAPID SHUTDOWN	B MODULE STRINGING	CONDUIT		
DCSW DC DISCONNECT	CBR (DC) COMBINER BOX	C MODULE STRINGING	FIRE CLEARANCE		
PNL AC PANELBOARD		D MODULE STRINGING			

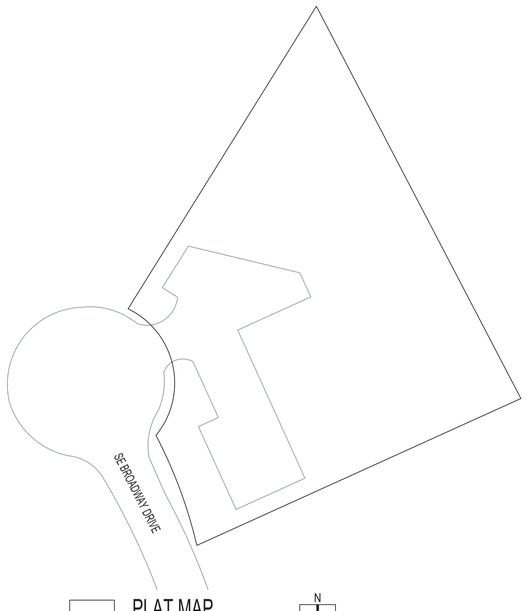
DISCLAIMER: PLEASE NOTE THAT THE ABBREVIATIONS, ANNOTATIONS, AND SYMBOLS LISTED ARE INTENDED TO ILLUSTRATE THOSE THAT ARE COMMONLY USED; NOT ALL ARE NECESSARILY UTILIZED WITHIN THIS SET OF DRAWINGS.

NEW PV SYSTEM: 14.88 kWp
MAR BUILDING SOLUTIONS

1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081



01 AERIAL PHOTO
NOT TO SCALE



02 PLAT MAP
NOT TO SCALE

SHEET SCHEDULE

PROJECT INFORMATION

OWNER
NAME: MAR BUILDING SOLUTIONS

DEVELOPER
NAME: A-LINE ENERGY SOLUTIONS
PHONE: 816-282-0220

AUTHORITIES HAVING JURISDICTION
BUILDING: CITY OF LEE'S SUMMIT
ZONING: CITY OF LEE'S SUMMIT
UTILITY: EVERGY

DESIGN SPECIFICATIONS
GROUND SNOW LOAD: 20 PSF
WIND EXPOSURE: B
WIND SPEED: 115 MPH

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2018, IRC 2018, IMC2018
IPC 2018, IFGC 2018
ELECTRICAL: NEC 2017, ICC/ANSI A117.1-2017
FIRE: IFC 2018

SCOPE OF WORK
SYSTEM SIZE: STC: 65 x 400 = 26.000kW
PTC: 65x 375.3 = 24.395kW DC
(65) TRINA SOLAR TSM-400DE15M(II)
(1) SOLAR EDGE SE30KUS (277/480V)

ATTACHMENT TYPE: BALLAST UNIRAC RM10

A-LINE ENERGY SOLUTIONS
CREATING CLEAN ENERGY FOR THE FUTURE

CONTRACTOR
A-LINE ENERGY SOLUTIONS
207 N INDIANA AVE,
KANSAS CITY MO 64123
PHONE: 816-282-0220
LIC. NO.: 2015571072

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PROJECT
NEW PV SYSTEM: 14.88 kWp
MAR BUILDING SOLUTIONS
1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD
STATE OF MISSOURI
KURT T. KRASICK
NUMBER PE-2016001265
PROFESSIONAL ENGINEER
10/23/20

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE:
COVER PAGE
(SHEET 1 OF 8)

DATE: 10.20.2020
DESIGN BY: A.S.
CHECKED BY: M.G.
SHEET NUMBER:
T-001.00

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. SEE SHEET T-001 FOR LEGEND OF SYMBOLS

01 SITE PLAN
1/16" = 1'-0"
0 8' 16'

N
W E
S

A-LINE ENERGY SOLUTIONS
CREATING CLEAN ENERGY FOR THE FUTURE

CONTRACTOR

A-LINE ENERGY SOLUTIONS
207 N INDIANA AVE,
KANSAS CITY MO 64123
PHONE: 816-282-0220
LIC. NO.: 2015571072

REVISION / RELEASE

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MAR BUILDING SOLUTIONS

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LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD

STATE OF MISSOURI
KURT T. KRASICK
NUMBER PE-2016001265
PROFESSIONAL ENGINEER
10/27/20

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE:
SITE PLAN
(SHEET 2 OF 8)

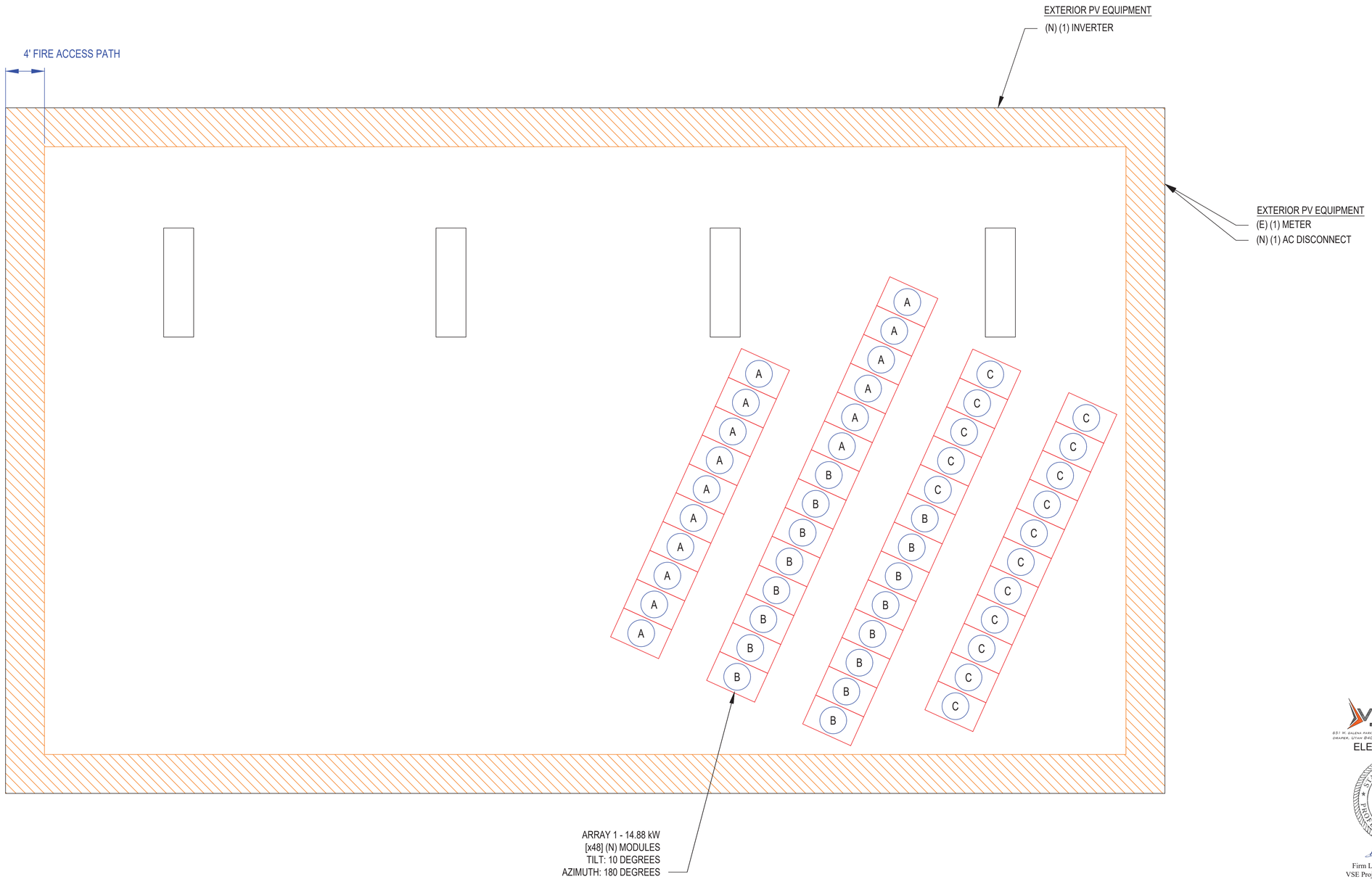
DATE: 10.20.2020
DESIGN BY: A.S.
CHECKED BY: M.G.
SHEET NUMBER:
A-101.00

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. SEE SHEET T-001 FOR LEGEND OF SYMBOLS

FIRE ACCESS PATH

A . . . C MODULE STRINGING



01 ELECTRICAL ROOF PLAN
3/16" = 1' 0 2'-4" 4'-8"

39.05"
65"
MODULE:
JINKO
JKM310M-60
310 WATTS

VECTOR ENGINEERS
657 W. GALENA PARK BLVD. STE. 101 DRAPER, UTAH 84020 PHONE (801) 990-1775 www.vectorse.com

ELECTRICAL ONLY

STATE OF MISSOURI
DEAN P. LEVORSEN
NUMBER PE-2008009297
PROFESSIONAL ENGINEER
10/30/2020

Firm License Number: 2011009604
VSE Project Number: U3049.0001.201

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REVISION / RELEASE

NO.	DESCRIPTION	DATE

PROJECT

NEW PV SYSTEM: 14.88 kWp

MAR BUILDING SOLUTIONS

1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE:
ELECTRICAL ROOF PLAN

(SHEET 3 OF 8)

DATE: 10.20.2020
DESIGN BY: A.S.
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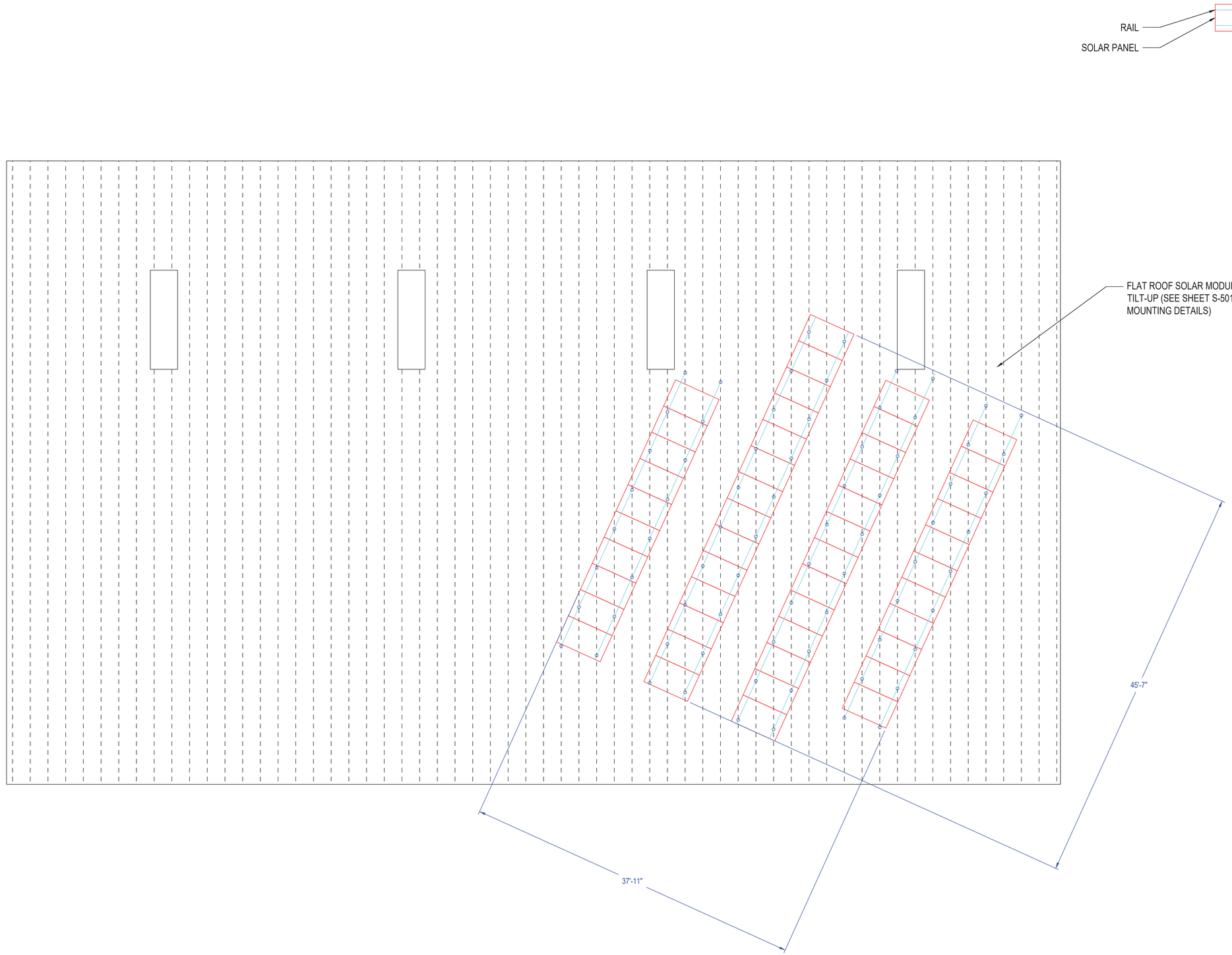
SHEET NUMBER:
A-102.00



01 ROOF FRAMING PLAN

3/16" = 1'

0 2'-4" 4'-8"

A-LINE ENERGY SOLUTIONS
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CONTRACTOR

A-LINE ENERGY SOLUTIONS
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KANSAS CITY MO 64123
PHONE: 816-282-0220
LIC. NO.: 2015571072

REVISION / RELEASE

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PROJECT

NEW PV SYSTEM: 14.88 kWp

MAR BUILDING SOLUTIONS

1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD

STATE OF MISSOURI
KURT T. KRASICK
NUMBER PE-2016001265
PROFESSIONAL ENGINEER
12/7/20

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE:

ROOF FRAMING PLAN

(SHEET 4 OF 8)

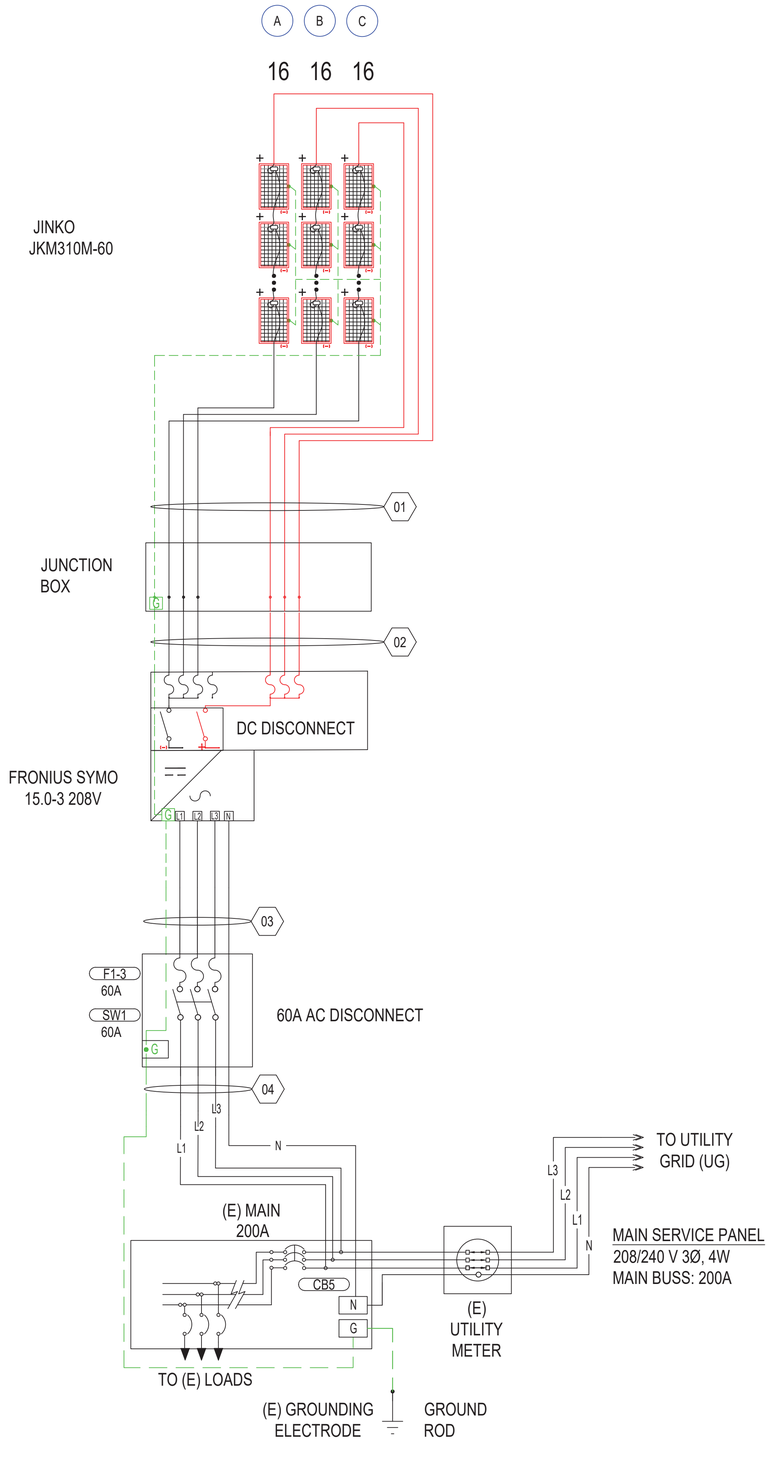
DATE: 10.20.2020

DESIGN BY: A.S.

CHECKED BY: M.G.

SHEET NUMBER:

A-103.00



01 SINGLE LINE DIAGRAM

NOT TO SCALE

A-LINE ENERGY SOLUTIONS
CREATING CLEAN ENERGY FOR THE FUTURE

CONTRACTOR

A-LINE ENERGY SOLUTIONS
207 N INDIANA AVE,
KANSAS CITY MO 64123
PHONE: 816-282-0220
LIC. NO.: 2015571072

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PROJECT

NEW PV SYSTEM: 14.88 kWp

MAR BUILDING SOLUTIONS

1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD

VECTOR ENGINEERS
631 W. GALENA PARK BLVD. STE. 101, DRAPER, UTAH 84020 PHONE (801) 990-1775 www.vectorse.com

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STATE OF MISSOURI
DEAN P. LEVORSEN
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PROFESSIONAL ENGINEER
10/30/2020

Firm License Number: 2011009604
VSE Project Number: U3049.0001.201

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE:

SINGLE LINE DIAGRAM

(SHEET 5 OF 8)

DATE: 10.20.2020

DESIGN BY: A.S.

CHECKED BY: M.G.

SHEET NUMBER:

E-601.00

SYSTEM SUMMARY	
	INVERTER #1
	MPPT #1
MODULES IN SERIES	48
ARRAY VMP	528V
ARRAY IMP	28.2A
ARRAY VOC	648V
ARRAY MAX VOC	737.1V
ARRAY ISC	29.76A
ARRAY STC POWER	14,880W
ARRAY PTC POWER	13,738W
MAX AC CURRENT	41.6A
MAX AC POWER	15,000W
DERATED (CEC) AC POWER	13,257W

MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-48	48	JINKO JKM310M-60	310W	286.2W	9.92A	9.4A	40.5V	33V	-0.117V/°C (-0.29%/°C)	20A

INVERTERS

REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1	1	FRONIUS SYMO 15.0-3 (208V)	208V	FLOATING	60A	15000W	41.6A	50A	1000V	96.5%

DISCONNECTS

REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	SQUARE D D322NRB OR EQUIV.	60A	240VAC

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
F1-3	3	60A	240VAC

ASHRAE EXTREME LOW	-22.6°C (-8.7°F), SOURCE: CHARLES B WHEELER D (39.12°; -94.59°)
ASHRAE 2% HIGH	36.2°C (97.2°F), SOURCE: CHARLES B WHEELER D (39.12°; -94.59°)

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
01	3	10 AWG PV WIRE, COPPER	FREE AIR	2	N/A	6 AWG BARE, COPPER	0.71 (58.2 °C)	1	12.4A	15.5A	55A	39.05A	75°C	50A
02	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	6	N/A	10 AWG THWN-2, COPPER	0.71 (58.2 °C)	0.8	12.4A	15.5A	40A	22.72A	75°C	35A
03	1	6 AWG THWN-2, COPPER	0.75" DIA EMT	3	60A	6 AWG THWN-2, COPPER	0.91 (36.2 °C)	1	41.6A	52A	75A	68.25A	75°C	65A
04	1	6 AWG THWN-2, COPPER	0.75" DIA EMT	3	N/A	6 AWG THWN-2, COPPER	0.91 (36.2 °C)	1	41.6A	52A	75A	68.25A	75°C	65A

BILL OF MATERIALS

CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION
MODULE	JINKO	JKM310M-60	PM1-48	48	PIECES	1	JINKO JKM310M-60 310W 60 CELLS, MONOCRYSTALLINE SILICON
INVERTER	FRONIUS	SYMO 15.0-3 (208V)	I1	1	PIECE	1	FRONIUS SYMO 15.0-3 (208V) 15000W INVERTER
DISCONNECT	SQUARE D	D223NRB	SW1	1	PIECE	1	SQUARE D D223NRB, 3-POLE, 60A, 240VAC OR EQUIVALENT
WIRING		GEN-10-AWG-PV-WIRE-CU	WR1	270	FEET	1	10 AWG PV WIRE, COPPER (POSITIVE AND NEGATIVE)
WIRING		GEN-6-AWG-BARE-CU	WR1	135	FEET	1	6 AWG BARE, COPPER (GROUND)
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR2	60	FEET	1	10 AWG THWN-2, COPPER, RED (POSITIVE)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR2	60	FEET	1	10 AWG THWN-2, COPPER, BLACK (NEGATIVE)
WIRING		GEN-10-AWG-THWN-2-CU-GR	WR2	20	FEET	1	10 AWG THWN-2, COPPER, GREEN (GROUND)
WIRING		GEN-6-AWG-THWN-2-CU-BLK	WR3-4	20	FEET	1	6 AWG THWN-2, COPPER, BLACK (LINE 1)
WIRING		GEN-6-AWG-THWN-2-CU-RD	WR3-4	20	FEET	1	6 AWG THWN-2, COPPER, RED (LINE 2)
WIRING		GEN-6-AWG-THWN-2-CU-BL	WR3-4	20	FEET	1	6 AWG THWN-2, COPPER, BLUE (LINE 3)
WIRING		GEN-6-AWG-THWN-2-CU-WH	WR3-4	20	FEET	1	6 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-6-AWG-THWN-2-CU-GR	WR3-4	20	FEET	1	6 AWG THWN-2, COPPER, GREEN (GROUND)
WIREWAY		GEN-EMT-0.75" DIA	WW2-4	40	FEET	1	EMT CONDUIT, 0.75" DIA
OCPD	GENERIC MANUFACTURER	GEN-FU-60A-240VAC	F1-3	3	PIECES	1	FUSE, 60A, 240VAC
TRANSITION BOX	GENERIC MANUFACTURER	GEN-AWB-TB-4-4X	JB1	1	PIECE	1	TRANSITION/PASS-THROUGH BOX, WITH 4 TERMINAL BLOCKS

VECTOR ENGINEERS
851 W. GALENA PARK BLVD. STE. 101, DRAPER, UTAH 84020 — PHONE (801) 990-1775 — WWW.VECTORSE.COM

ELECTRICAL ONLY

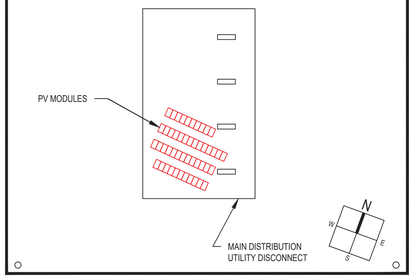
STATE OF MISSOURI — DEAN P. LEVORSEN — NUMBER PE-2008009297 — PROFESSIONAL ENGINEER

10/30/2020

Firm License Number: 2011009604
VSE Project Number: U3049.0001.201

!CAUTION!

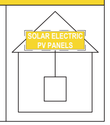
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:



LABELING NOTES
1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL 1
AT RAPID SHUTDOWN SYSTEM
[NEC 690.56(C)(1)(A)].

! WARNING !
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPLOSED TO SUNLIGHT

LABEL 3
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.15]

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

LABEL 4
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.13 AND 690.15]

MAXIMUM VOLTAGE: 1000 V DC
MAXIMUM CIRCUIT CURRENT: 29.76 A DC

LABEL 5
AT EACH DC DISCONNECTING MEANS
[NEC 690.53]

PHOTOVOLTAIC AC DISCONNECT
OPERATING CURRENT: 41.6 A AC
OPERATING VOLTAGE: 208 V AC

LABEL 6
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS
[NEC 690.54]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 7
AT RAPID SHUTDOWN DISCONNECT SWITCH
[NEC 690.56(C)(3)].

! WARNING !
POWER SOURCE OUTPUT CONNECTION - DO NOT RELOCATE THIS OVERCURRENT DEVISE

LABEL 15
AT POINT OF INTERCONNECTION OVERCURRENT DEVICE
[NEC 705.12(B)(2)(3)(B)]

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 13
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)]

ALL SIGNAGE MUST BE PERMANENTLY ATTACHED AND BE WEATHER RESISTANT/SUNLIGHT RESISTANT AND CANNOT BE HAND-WRITTEN PER NEC 110.21(B)

! WARNING !
DUAL POWER SOURCES. SECOND SOURCE IS PV SYSTEM

LABEL 8
AT POINT OF INTERCONNECTION; LABEL, SUCH AS LABEL 5 OR LABEL 6 MUST IDENTIFY PHOTOVOLTAIC SYSTEM
[NEC 705.12(B)(4)]

! CAUTION !
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL 9

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED SE IN THE BUILDING

PLAQUE

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL 10
AT UTILITY METER
[NEC 690.56(B)]

PHOTOVOLTAIC DC DISCONNECT

LABEL 11
AT EACH DC DISCONNECTING MEANS
[NEC 690.13(B)]

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL 12
AT RAPID SHUTDOWN SWITCH
[NEC 690.56(C)].

PHOTOVOLTAIC AC DISCONNECT

LABEL 14
AT EACH AC DISCONNECTING MEANS
[NEC 690.13(B)]

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION
[NEC 690.56(B)]

WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS.
PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS
[NEC 690.4(D),(E)]

A-LINE ENERGY SOLUTIONS
CREATING CLEAN ENERGY FOR THE FUTURE

CONTRACTOR
A-LINE ENERGY SOLUTIONS
207 N INDIANA AVE,
KANSAS CITY MO 64123
PHONE: 816-282-0220
LIC. NO.: 2015571072

REVISION / RELEASE

NO.	DESCRIPTION	DATE

PROJECT
NEW PV SYSTEM: 14.88 kWp

MAR BUILDING SOLUTIONS

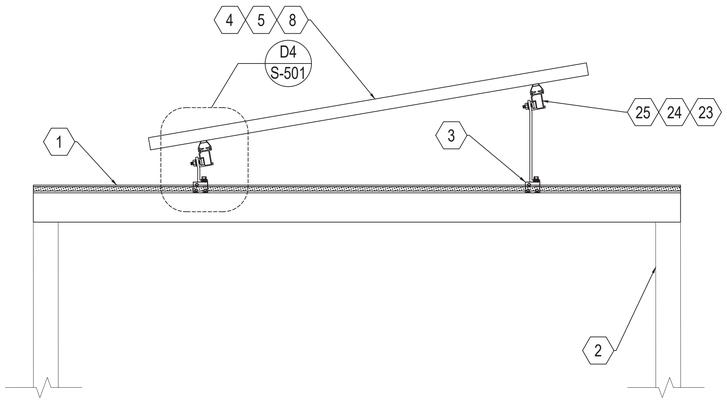
1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081

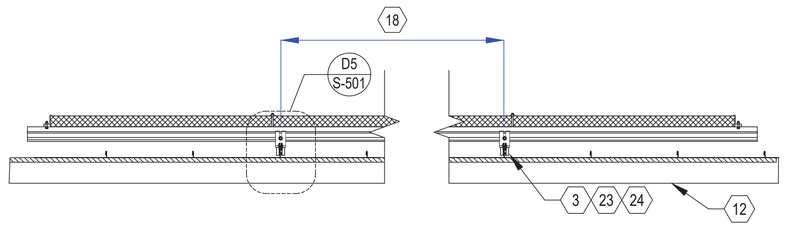
ENGINEER OF RECORD

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE:
PLACARDS
(SHEET 6 OF 8)

DATE: 10.20.2020
DESIGN BY: A.S.
CHECKED BY: M.G.
SHEET NUMBER:
E-602.00



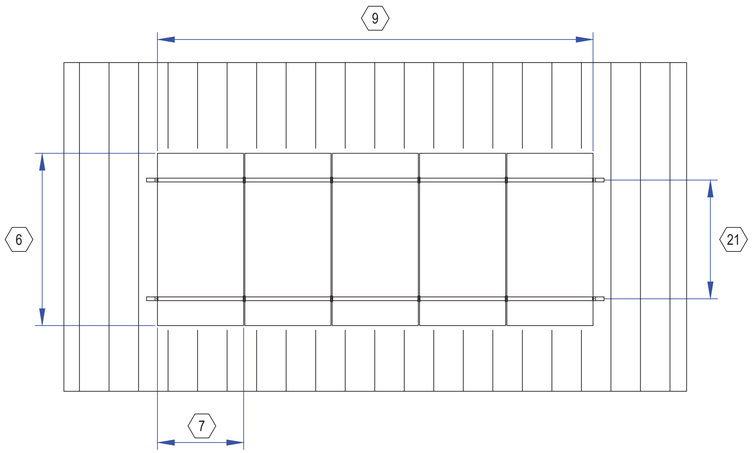


D2 RACKING DETAIL (LONGITUDINAL)

NOT TO SCALE

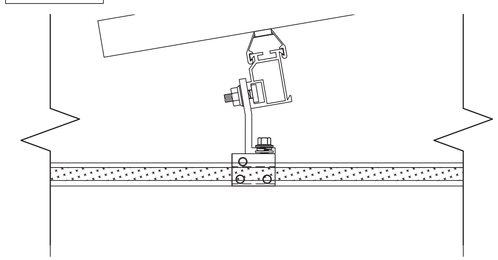
D1 RACKING DETAIL (TRANSVERSE)

NOT TO SCALE



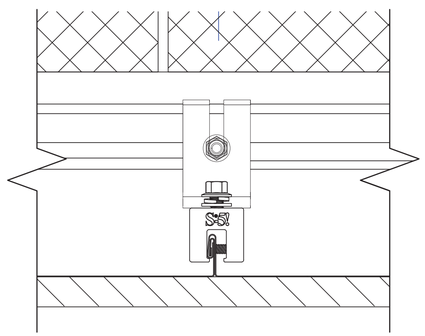
D3 RACKING DETAIL (TOP)

NOT TO SCALE



D4 DETAIL (TRANSVERSE)

NOT TO SCALE



D5 DETAIL (LONGITUDINAL)

NOT TO SCALE

SHEET KEYNOTES

1. ROOF MATERIAL: STANDING SEAM METAL
2. ROOF STRUCTURE: METAL BEAM
3. ATTACHMENT TYPE: S5! S-5-S CLAMP WITH RS-TL 10
4. MODULE MANUFACTURER: JINKO
5. MODULE MODEL: JKM310M-60
6. MODULE LENGTH: 65 IN.
7. MODULE WIDTH: 39.05 IN.
8. MODULE WEIGHT: 40.8 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: 4' FROM ALL SIDES MIN
11. SEAM SPACING: 24 IN. O.C.
12. RAFTER SIZE: 2X8 NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 3-1/4 IN.
15. TOTAL # OF ATTACHMENTS: 119
16. TOTAL AREA: 846.08 SQ. FT.
17. TOTAL WEIGHT: 2242.84 LBS.
18. WEIGHT PER ATTACHMENT: 18.85 LBS.
19. DISTRIBUTED LOAD: 2.65 PSF.
20. MAX. HORIZONTAL STANDOFF: 60
21. MAX. VERTICAL STANDOFF:
    LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER: RBI SOLAR
24. RAIL MODEL: RS-VS
25. RAIL WEIGHT: 0.547 PLF.
26. MAX. RAIL SPAN: N/A IN.
27. MAX. RAFTER SPAN: N/A FT.

The building structure was designed with a 3 psf collateral load and is thus capable of supporting the 2.65 psf distributed load imparted by the solar panels and racking. - Kurt Krasick, PE 10/27/2020

A-LINE ENERGY SOLUTIONS
CREATING CLEAN ENERGY FOR THE FUTURE

CONTRACTOR

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PROJECT

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LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD

STATE OF MISSOURI
KURT T. KRASICK
NUMBER PE-2016001265
PROFESSIONAL ENGINEER
10/27/20

PAPER SIZE: 36" x 24" (ARCH D)

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DATE: 10.20.2020
DESIGN BY: ASSEMBLY DETAILS
CHECKED BY: M.G.

SHEET NUMBER:

S-501.00

www.jinkosolar.com

JinKO Solar — Building Your Trust in Solar

Eagle PERC 60M
290-310 Watt
MONO CRYSTALLINE MODULE

Positive power tolerance of 0~+3%

ISO9001:2008、ISO14001:2004、OHSAS18001 certified factory.
IEC61215、IEC61730 certified products.

KEY FEATURES

5 Busbar Solar Cell: 5 busbar cell design improves module efficiency and offers better aesthetic appearance for rooftop in stallation.

High Efficiency: Higher module conversion efficiency(up to 18.94%) benefit from Passivated Emmiter Rear Contact (PERC) technology.

PID RESISTANT: Eagle modules pass PID test, limited power degradation by PID test is guaranteed for mass production.

Low-light Performance: Advanced glass and cell surface textured design ensure excellent performance in low-light tenvironment.

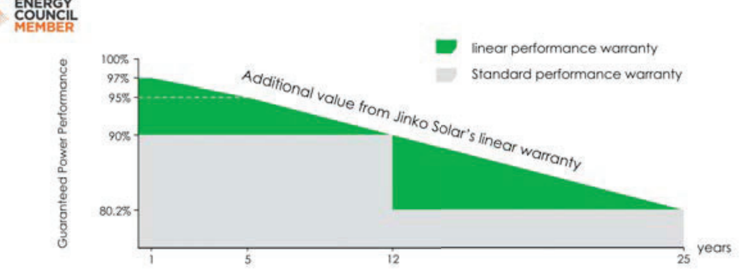
Severe Weather Resilience: Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).

Durability against extreme environmental conditions: High salt mist and ammonia resistance certified by TUV NORD.

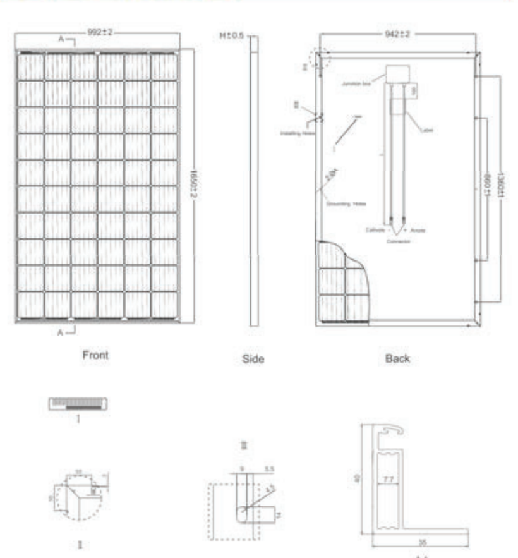
PV CYCLE · TÜVRheinland CERTIFIED · CE · POSITIVE QUALITY · CLEAN ENERGY COUNCIL MEMBER

LINEAR PERFORMANCE WARRANTY

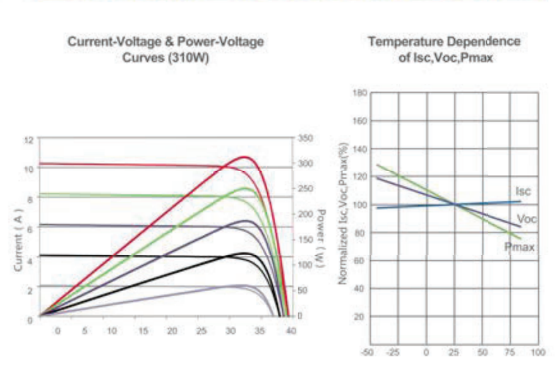
10 Year Product Warranty • 25 Year Linear Power Warranty



Engineering Drawings



Electrical Performance & Temperature Dependence



Packaging Configuration

(Two pallets =One stack)

26pcs/pallet , 52pcs/stack, 728 pcs/40'HQ Container

Mechanical Characteristics

Cell Type	Mono-crystalline PERC 156×156mm (6 inch)
No.of cells	60 (6×10)
Dimensions	1650×992×40mm (65.00×39.05×1.57 inch)
Weight	18.5 kg (40.8 lbs)
Front Glass	3.2mm, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	TÜV 1×4.0mm², Length: 900mm or Customized Length

SPECIFICATIONS

Module Type	JKM290M-60		JKM295M-60		JKM300M-60		JKM305M-60		JKM310M-60	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	290Wp	216Wp	295Wp	220Wp	300Wp	224Wp	305Wp	227Wp	310Wp	231Wp
Maximum Power Voltage (Vmp)	32.2V	30.2V	32.4V	30.4V	32.6V	30.6V	32.8V	30.8V	33.0V	31.0V
Maximum Power Current (Imp)	9.02A	7.15A	9.10A	7.24A	9.21A	7.32A	9.30A	7.40A	9.40A	7.49A
Open-circuit Voltage (Voc)	39.5V	36.6V	39.7V	36.8V	40.1V	37.0V	40.3V	37.2V	40.5V	37.4V
Short-circuit Current (Isc)	9.55A	7.81A	9.61A	7.89A	9.72A	8.01A	9.83A	8.12A	9.92A	8.20A
Module Efficiency STC (%)	17.72%		18.02%		18.33%		18.63%		18.94%	
Operating Temperature(℃)	-40℃~+85℃									
Maximum system voltage	1000VDC (IEC)									
Maximum series fuse rating	20A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.40%/℃									
Temperature coefficients of Voc	-0.29%/℃									
Temperature coefficients of Isc	0.048%/℃									
Nominal operating cell temperature (NOCT)	45±2℃									

STC: Irradiance 1000W/m² · Cell Temperature 25°C · AM=1.5

NOCT: Irradiance 800W/m² · Ambient Temperature 20°C · AM=1.5 · Wind Speed 1m/s

* Power measurement tolerance: ± 3%

/ Perfect Welding / Solar Energy / Perfect Charging

Fronius

FRONIUS SYMO

/ Powering commercial projects that last. The Fronius Symo.

/ Featuring ten models ranging from 10 kW to 24 kW, the transformerless Fronius Symo is the ideal compact three-phase inverter for all commercial applications. The high system voltage and wide input range ensure maximum flexibility in system design. With low roof loading, NEMA 4X and 1000 V DC rating, the Fronius Symo can be mounted in many different ways, including flat on a roof or on a pole. The modern design is equipped with the SnapINverter mounting system, allowing for lightweight, secure and convenient installation. Several industry-leading features are available with the Fronius Symo including Wi-Fi®* and SunSpec Modbus interfaces for seamless monitoring and datalogging, field proven Arc Fault Circuit Interruption (AFCI), NEC 2014 compliant, and Fronius' superb online and mobile monitoring platform Fronius Solar.web.

INPUT DATA		SYMO 10.0-3 208-240	SYMO 12.0-3 208-240	SYMO 10.0-3 480	SYMO 12.5-3 480	SYMO 15.0-3 208
Recommended PV power (kWp)		8.0 - 13.0	9.5 - 15.5	8.0 - 13.0	10.0 - 16.0	12.0 - 19.5
Max. usable input current (MPPT1/MPPT 2)		25.0 A / 16.5 A				50.0 A
Max. usable input current total (MPPT 1 + MPPT 2)		41.5 A				50.0 A
Max. array short circuit current		37.5 A / 24.8 A				75.0 A
Nominal input voltage	208 V	350 V	350 V	N/A	N/A	325 V
	240 V	370 V	370 V	N/A	N/A	N/A
	480 V	N/A	N/A	675 V	685 V	N/A
Operating voltage range		200-600 V		200-1000 V		325-1000 V
DC startup voltage		200 V				360 V
MPP Voltage range		300-500 V		300-800 V		325-850 V
Max. input voltage		600 V		1000 V		
Admissable conductor size DC		AWG 14-AWG 6 copper direct, AWG 6 aluminum direct, AWG 4-AWG 2 copper or aluminum with input combiner				
Integrated DC string fuse holders		NA				6- and 6+
Max (Isc) input terminal rating		33A				12A
Number of MPPT		2				1

OUTPUT DATA		SYMO 10.0-3 208-240	SYMO 12.0-3 208-240	SYMO 10.0-3 480	SYMO 12.5-3 480	SYMO 15.0-3 208
Max. output power	208 V	9995 VA	11995 VA	NA	NA	15000 VA
	240 V	9995 VA	11995 VA	NA	NA	NA
	480 V	NA	NA	9995 VA	12495 VA	NA
Output configuration		208/240 V		480 V Delta +N**		208 V
Frequency range (adjustable)		45-65 Hz				
Nominal operating frequency		60 Hz				
Admissable conductor size AC		AWG 14-AWG 6				
Total harmonic distortion		<1.5 %	<1.75 %		<1.5 %	<3.5 %
Power factor range		0-1 ind./cap.				
Max. continuous output current	208 V	27.7 A	33.3 A	NA	NA	41.6 A
	240 V	24.0 A	28.9 A	NA	NA	NA
	480 V	NA	NA	12.0 A	15.0 A	NA
OCPD/AC breaker size	208 V	35 A	45 A	NA	NA	60 A
	240 V	30 A	40 A	NA	NA	NA
	480 V	NA	NA	15 A	20 A	NA
Max. Efficiency		97.0 %	97.0 %	98.1 %	98.1 %	97.3%
CEC Efficiency	208 V	96.5 %	96.5 %	NA	NA	96.5%
	240 V	96.5 %	96.5 %	NA	NA	NA
	480 V	NA	NA	96.5 %	97.0 %	NA

TECHNICAL DATA (10.0-3 208/240, 12.0-3 208/240, 10.0-3 480, 12.5-3 480, 15.0-3 208)

GENERAL DATA	STANDARD WITH ALL FRONIUS SYMO MODELS
Dimensions (width x height x depth)	20.1 x 28.5 x 8.9 inches
Protection Class	NEMA 4X
Night time consumption	< 1 W
Inverter topology	Transformerless
Cooling	Variable speed fan
Installation	Indoor and outdoor installation
Ambient operating temperature range	-40°F - + 140 °F (-40 - +60 °C)
Permitted humidity	0 - 100 % (non-condensing)
Elevation	2000 m (6562 ft) with a max. input voltage of 1000 V / 3400 m (11155 ft) with a max. input voltage of 850 V
DC connection terminals	6x DC+ and 6x DC- screw terminals for copper (solid / stranded / fine stranded) or aluminum (solid / stranded)
AC connection terminals	Screw terminals 14-6 AWG
Certificates and compliance with standards	UL 1741-2010 Second Edition (incl. UL1741 Supplement SA 2016-09 for California Rule 21 and Hawaiian Electric Code Rule 14H), UL1998 (for functions: AFCI, RCMU and isolation monitoring), IEEE 1547-2003, IEEE 1547a-2014, IEEE 1547.1-2003, ANSI/IEEE C62.41, FCC Part 15 A & B, NEC 2017 Article 690, C22. 2 No. 107.1-16, UL1699B Issue 2 -2013, CSA TIL M-07 Issue 1 -2013

GENERAL DATA	SYMO 10.0-3 208-240	SYMO 12.0-3 208-240	SYMO 10.0-3 480	SYMO 12.5-3 480	SYMO 15.0-3 208
Weight	91.9 lbs.		76.7 lbs.		78.3 lbs.

PROTECTIVE DEVICES	STANDARD WITH ALL FRONIUS SYMO MODELS
DC reverse polarity protection	Yes
Anti islanding	Internal; in accordance with UL 1741-2010, IEEE 1547-2003 and NEC
Over temperature protection	Output power derating /Active cooling
AFCI	Yes
Rapid shutdown compliant	Yes (according to NEC 2014)
Ground Fault Protection with Isolation Monitor Interrupter	Yes
DC disconnect	Yes

INTERFACES	AVAILABLE WITH ALL FRONIUS SYMO MODELS
USB (A socket)	Datalogging and inverter update possible via USB
2x RS422 (RJ45 socket)	Fronius Solar Net, interface protocol
AVAILABLE WITH THE FRONIUS DATAMANAGER 2.0 CARD (ONLY ONE CARD REQUIRED FOR UP TO 100 INVERTERS)	
Wi-Fi/Ethernet/Serial/ Datalogger and webserver	Wireless standard 802.11 b/g/n / Fronius Solar.web, SunSpec Modbus TCP, JSON / SunSpec Modbus RTU
6 inputs and 4 digital I/Os	Load management; signaling, multipurpose I/O

TECHNICAL DATA (15.0-3 480, 17.5-3 480, 20.0-3 480, 22.7-3 480, 24.0-3 480)

INPUT DATA		SYMO 15.0-3 480	SYMO 17.5-3 480	SYMO 20.0-3 480	SYMO 22.7-3 480	SYMO 24.0-3 480
Recommended PV power (kWp)		12.0 – 19.5	14.0 - 23.0	16.0 - 26.0	18.0 - 29.5	19.0 - 31.0
Max. usable input current (MPPT1/MPPT 2)		33.0 A / 25.0 A				
Max. usable input current total (MPPT 1 + MPPT 2)		51 A				
Max. array short circuit current (MPPT 1/MPPT 2)		49.5 A / 37.5 A				
Nominal input voltage	480 V	685 V	695 V	710 V	720 V	
Operating voltage range		200-1000 V				
DC startup voltage		200 V				
MPP-voltage range		350-800 V	400-800 V	450-800 V	500-800 V	
Max. input voltage		1000 V				
Admissable conductor size DC		AWG 14 - AWG 6 copper direct, AWG 6 aluminum direct, AWG 4 - AWG 2 copper or aluminum with input combiner				
Integrated DC string fuse holders		NA	NA	6- and 6+		
Max (Isc) input terminal rating		33A	33A	12A		
Number of MPPT		2				

RS-VS
VS-R & VS-C RAILS

Pitched Roof — Part #	Description	QTY	Weight
401127	**VS-R Rail - 62"** Mill Finish	1-pc	3.1 lbs.
400443	**VS-R Rail - 123"** Mill Finish	1-pc	6.2 lbs.
400444	**VS-R Rail - 163.5"** Mill Finish	1-pc	8.2 lbs.
400445	**VS-R Rail - 204"** Mill Finish	1-pc	10.2 lbs.
400167	**VS-C Rail - 123"** Mill Finish	1-pc	7 lbs.
400169	**VS-C Rail - 163.5"** Mill Finish	1-pc	9.3 lbs.
400198	**VS-C Rail - 204"** Mill Finish	1-pc	11.6 lbs.

All rails are sold individually, but can be ordered/shipped in packs of 50 upon request.

All rails are standard, mill finished, additional anodized options and coloring upon request.

Custom rail lengths are available by inquiry.
Special Order Items have a minimum 6-week lead time.

RS-TL
TILT LEGS

Low-Slope Roof — Part #	Description	QTY	Weight
461013	**Portrait Orientation** 10° Tilt	20-pack	20 lbs.
461021	**Portrait Orientation** 5° Tilt	20-pack	18 lbs.
401125	**Facet Anchor**	1-pc	1.2 lbs.
401126	**Facet TPO Flashing** Available in PVC and by membrane manufacturer	1-pc	0.6 lbs.
301002	**Support Pad**	40-pack	20 lbs.
921007	**T-bolt Kit** For use w/ Support Pad • 20x M8 t-bolt • 20x M8 serrated flange nut	20-pack	1.4 lbs.
921013	**IB T-bolt Kit** For use w/ double-rail configuration only • 20x M8 serrated t-bolt • 20x M8 serrated flange nut	20-pack	1.4 lbs.
270496	**Lateral Bracing** IB T-bolt Kit required	1-pc	0.4 lbs.

S-5!®
The Right Way!

The right way to attach almost anything to metal roofs!

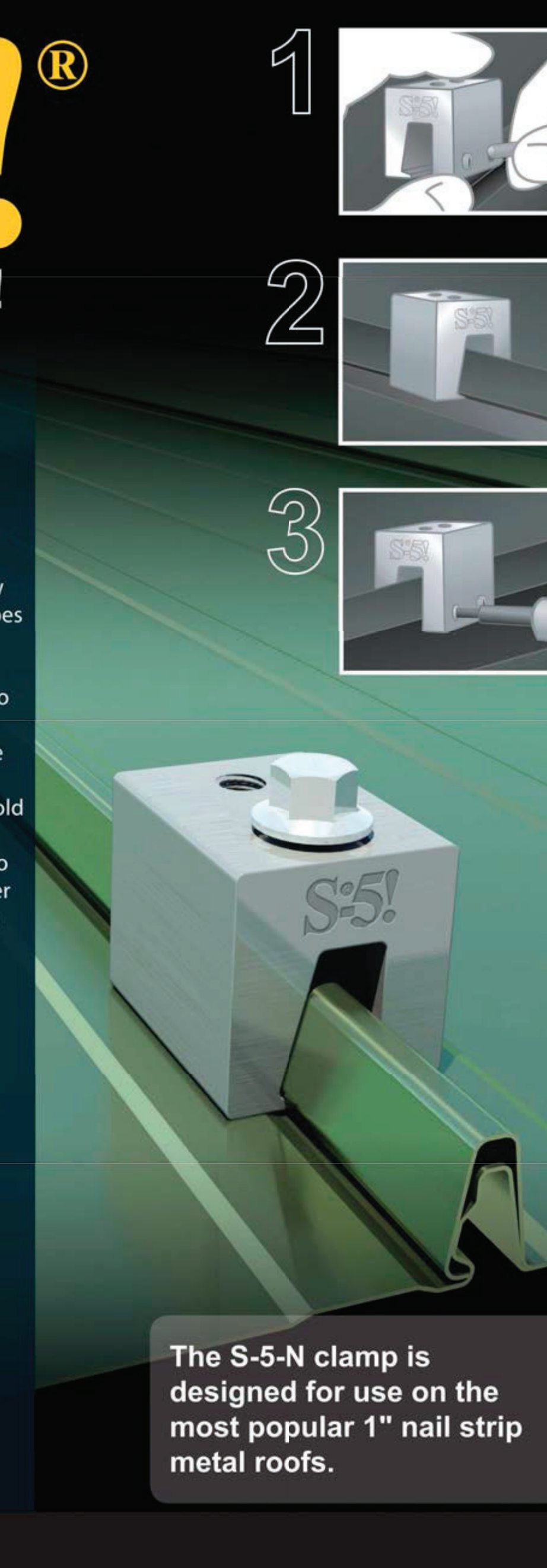
S-5-N and S-5-N Mini

S-5-N Clamp

S-5-N and S-5-N Mini clamps were designed with patented S-5!® zero-penetration technology for application on the popular 1" nail strip metal roof profiles: Taylor Metals' Easy Lock™, ASC Building Products' Skyline Roofing®, McElroy Metals' Meridian, New Tech Machinery's FF100, and roofing types with similar profiles. The clamp boasts a wider throat that accommodates most nail strip profiles, minimizing the need to field crimp. An angled wall with a nose permits the S-5-N to engage the triangle type profiles during the installation process—there is no longer a need to hold the clamp in place while setscrews are tensioned. The combination of these two features allows the clamp to sit straighter on the seam. Nail strip profiles just got a whole lot simpler!

S-5-N Mini Clamp

The S-5-N Mini is a bit shorter than the S-5-N and has one setscrew rather than two. The Mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*



The S-5-N clamp is designed for use on the most popular 1" nail strip metal roofs.

888-825-3432 | www.S-5.com

*S-5! Mini clamps are not compatible with, and should not be used with, S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.

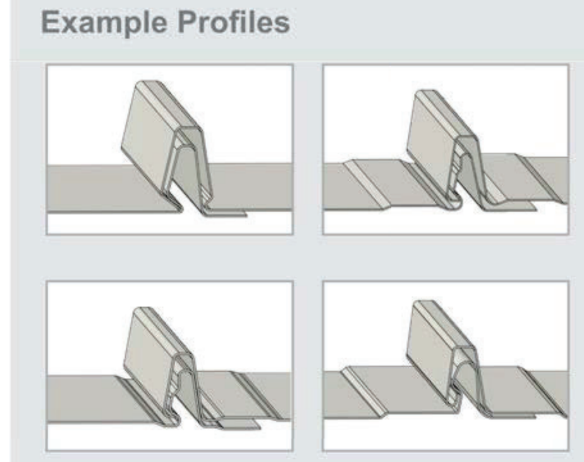
S-5!® The Right Way!

The S-5-N boasts a wider throat that accommodates most nail strip profiles, minimizing the need to field crimp.

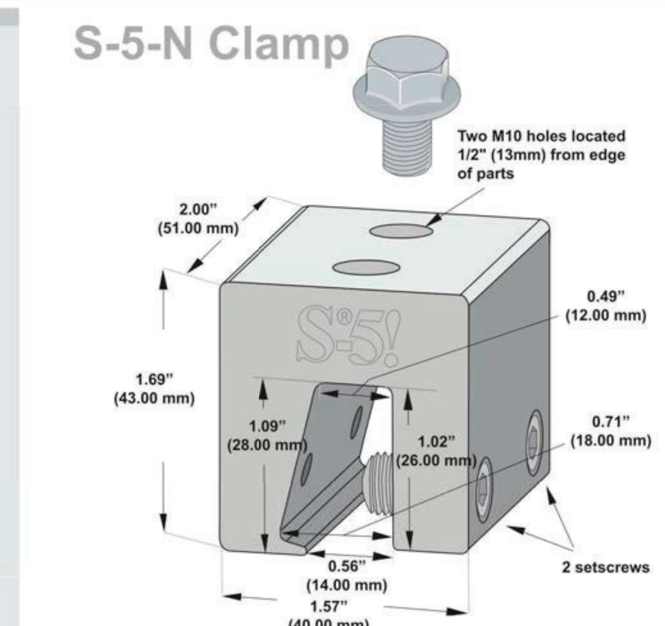
The **S-5-N and S-5-N Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-N is compatible with most common metal roofing materials excluding copper. All included hardware is 300 series stainless steel. Please visit **www.S-5.com** for more information including CAD details, metallurgical compatibilities, and specifications.

The S-5-N clamp has been tested for load-to-failure results on most major brands of 1" nail strip 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.

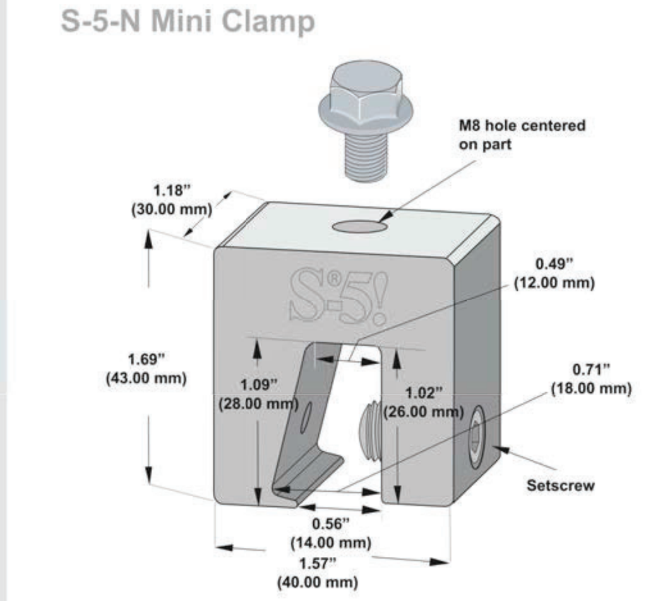
Example Profiles



S-5-N Clamp



S-5-N Mini Clamp



Please note: All measurements are rounded to the second decimal place.

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

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be verified using a calibrated torque wrench between 160 and 180 inch pounds when used on 22ga steel, and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength.

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CREATING CLEAN ENERGY FOR THE FUTURE

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REVISION / RELEASE

NO.	DESCRIPTION	DATE

PROJECT

NEW PV SYSTEM: 14.88 kWp

MAR BUILDING SOLUTIONS

1445 SE BROADWAY DRIVE,
LEE'S SUMMIT, MO 64081

ENGINEER OF RECORD

PAPER SIZE: 36" x 24" (ARCH D)

SHEET TITLE: RESOURCE DOCUMENTS

(SHEET 8 OF 8)

DATE: 10.20.2020

DESIGN BY: A.S.

CHECKED BY: M.G.

SHEET NUMBER: R-001.00