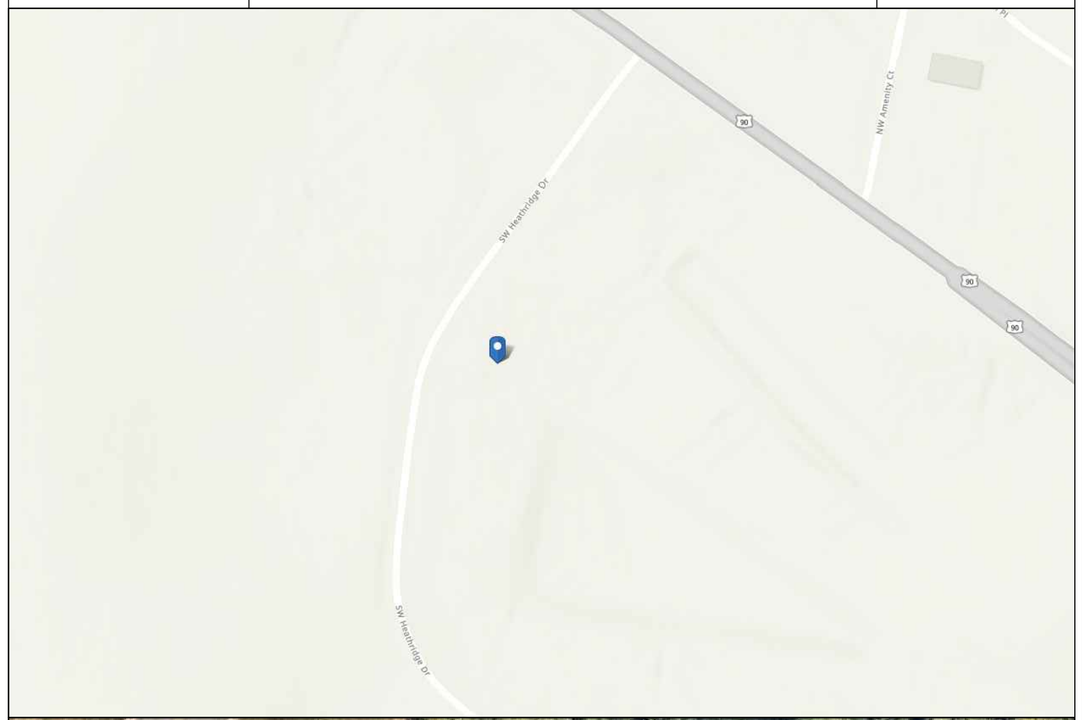
SCOPE of WORK	
This set of plans details the installation of a new energy storage system.	
PV SYSTEM DETAILS	
Existing PV Module Type	APTOS DNA-120-MF10-440
Existing PV Module Quantity	15
Solar PV DC System Rating (kWdc)	6.6
Solar PV AC System Rating (kWac)	5.61
Existing Inverter Type	ENPHASE IQ8PLUS-72-2-US
Existing Inverter Quantity	15
Battery Type	ENPHASE IQ 5P
Battery Quantity	2
SITE DETAILS	
Property Owner Name	John Goras
Site Coordinates	30.190292 , -82.725203
Property Address	231 SW Heathridge Dr, Lake City, FL 32024
Utility Company	FPL
EXPOSURE NOTES	
Wind Exposure Category	B
Design Wind Speed (mph)	140
Risk Category/Structure Type	II/Enclosed
NAVD Flood Elevation	N/A (Not in a Flood Zone)
GOVERNING CODES	
Structural Codes	2021 IBC/IEBC/IRC, FBC 2023 (ASCE 7-22)
Electrical Codes	2020 NEC, 2020 IEC, FBC 2023
Fire Safety Codes	2021 FFPC (8th/ Edition), NFPA 1 (2021 Ed.) Section 11.12 (With Local AHJ Amendments, if applicable) (All markings shall comply with Florida Fire Prevention Code 8th/ Edition NFPA-1 11.12)
STRUCTURAL & ELECTRICAL AFFIDAVITS/CERTIFICATIONS	
Electrical Certification	PURSUANT TO FLORIDA STATUE 377.705 (REVISED 7/1/2017) I, AMJAD MARDI, PE (FL93699), AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE SOLAR PHOTOVOLTAIC ELECTRICAL SYSTEM AND COMPONENTS ARE DESIGNED AND APPROVED USING THE CODE REQUIREMENTS AND STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE.

LEGEND

ACD	AC DISCONNECT	SS	SHUTDOWN SWITCH
IQC	ENPHASE IQ CONTROLLER III	CMB	COMBO METER/MAIN
5P	ENPHASE 5P BATTERY	P	PANEL
CP	COMBINER PANEL		EXISTING MODULE

Table Of Contents



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AMJAD K. MARDI LICENSE No. 93699 STATE OF FLORIDA PROFESSIONAL ENGINEER

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THE SEAL.

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Amjad Mardi

Digitally signed by Amjad Mardi
Date: 2024.09.05 18:13:26 +03'00'

PROJECT NAME:

JOHN GORAS RESIDENCE

PROJECT ADDRESS:

231 SW Heathridge Dr
Lake City, FL 32024

Date:	SEE P.E. STAMP
Designed By:	MER
Reviewed by:	AKM
REVISION HISTORY	

DRAWING SCALE:

N.T.S.

SHEET NAME:

COVER PAGE

SHEET NUMBER:

G1

LEGEND

ACD	AC DISCONNECT
IQC	ENPHASE IQ CONTROLLER III
5P	ENPHASE 5P BATTERY
CP	COMBINER PANEL
SS	SHUTDOWN SWITCH
CMB	COMBO METER/MAIN
P	PANEL
	EXISTING MODULE

GENERAL NOTES:

1. THE PROJECT IS DESIGNED IN GENERAL ACCORDANCE WITH 2023 FLORIDA BUILDING CODE AND OTHER REFERENCED CODES.
2. ABBREVIATIONS OTHER THAN AS PROVIDED ARE INDUSTRY STANDARD.
3. CONDITION AND CONSTRUCTION OF ROOF ASSEMBLY SHALL BE VERIFIED BY PHYSICAL INSPECTION AND ACCEPTED BY CONTRACTOR PRIOR TO COMMENCEMENT.
4. WORK TO BE COMPLETED SHALL BE VERIFIED BY INSTALLER AND ELECTRICIAN PRIOR TO COMMENCEMENT AND MATERIAL ORDER.
5. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL BE LICENSED BY THE STATE OF FLORIDA AND AS REQUIRED BY PERMITTING AGENCY; NO UNLICENSED CONTRACTORS OR CONSTRUCTION AND TRADE WORKERS SHALL BE ALLOWED ON JOBSITE.
6. ALL CONTRACTORS AND SUB-CONTRACTORS SHALL INSPECT THE SITE AND ALL RESPECTIVE BUILDINGS IMMEDIATELY BEFORE PREPARING ANY BID AND BEFORE ORDERING ANY MATERIALS, AND SHALL PROVIDE CONTRACTOR WRITTEN NOTICE OF ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND THE PLANS. AFTER VERIFICATION, MARDI ENGINEERING SHALL PREPARE ANY NECESSARY PLAN REVISION, GENERALLY WITHIN 72 HOURS OF SUCH NOTICE.
7. REQUIRED PLAN DIMENSIONS NOT PROVIDED SHALL BE CONFIRMED WITH ENGINEER OF RECORD. DIMENSIONS IN PARENTHESES ARE FOR ENGINEERING REFERENCE ONLY.
8. UNPLANNED ALTERATION OF STRUCTURAL ROOF OR WALL FRAMING SHALL REQUIRE WRITTEN APPROVAL BY THE EOR AND OWNER; PLANS SHALL BE SO REVISED.
9. FIRE PROTECTION PROCEDURES SHALL BE FOLLOWED IN ACCORDANCE WITH NEC 2020, Art. 690. 9. WORK SHALL BE INSPECTED PRIOR TO COVER BY BUILDING INSPECTOR, AND EOR UPON REQUEST.
10. BEST MANAGEMENT PRACTICES SHALL BE EXERCISED AT ALL TIMES TO MAINTAIN A SAFE AND CLEAN JOBSITE IN COORDINATION WITH PROPERTY OWNER AS APPLIES TO PARKING, TRASH REMOVAL, STORAGE, SOUND, UTILITIES AND TIMES OF WORK.
11. NO WORK SHALL BE PERFORMED IN RIGHT-OF-WAY OR EASEMENTS WITHOUT WRITTEN PERMISSION FROM THE APPROPRIATE PERMITTING AGENCY AND OWNER.
12. ALL MATERIALS NOT LISTED OR SPECIFIED HEREIN SHALL BE OBTAINED THROUGH CONTRACTOR-APPROVED VENDORS, GENERALLY NECESSARY TO COMPLETE TYPICAL SIMILAR CONSTRUCTION AND SHALL CONFORM TO CODE TABLE, INDUSTRY STANDARDS AND POLICIES OF THE PERMITTING AGENCY.
13. DETAILS OR SPECIFICATIONS ARE CALLED OUT BY LOCATION, ARRAY, ELEMENT OR AS OTHERWISE APPLIES.
14. IN THE EVENT OF WEATHER AND OTHER CIRCUMSTANCES THAT COULD MATERIALLY AFFECT BUILDING CONDITIONS OR INSTALLATION, CONTRACTOR SHALL PERFORM A RE-INSPECTION ALONG WITH OTHER CONTRACTORS AS REQUIRED THEN ADJUST PROJECT SCHEDULE TO INCLUDE RESPECTIVE PLAN REVISIONS.

ROOF FIRE SAFETY NOTES: (NFPA 11.12.2.2)

1. FIRE PROTECTION PROCEDURES SHALL BE FOLLOWED IN ACCORDANCE WITH NEC 2020, A. 690.9. WORK SHALL BE INSPECTED PRIOR TO COVER BY BUILDING INSPECTOR, AND EOR UPON REQUEST.
2. ACCESS POINT ARE LOCATED FOR FIRE DEPT. LADDER(S) CLEAR OF OPENINGS/OBSTRUCTIONS.
3. WORK SHALL BE PERFORMED IN ACCORDANCE WITH ROOF SAFETY RATING (CLASS A). (UL 790 / ASTM E108)

NOTE TO INSTALLER:

1. ALL PANELS SHALL BE ATTACHED TO EXISTING ROOF STRUCTURE USING THE REQUIRED NUMBER OF ATTACHMENTS IN THE PROPER CONFIGURATION AS DEFINED IN THIS PLAN SET.
2. ALL PANELS SHALL BE FULLY OUTSIDE OF ANY ROOF AREAS DEFINED AS "FIRE SETBACK" IN THIS SITE PLAN. FIRE SETBACKS ARE DEFINED BY THE DIMENSIONS IN RED AND ARE CONSIDERED ABSOLUTE.
3. ANY DIMENSIONS NOTED AS "MAX" SHALL BE BE UNDERSTOOD TO BE ABSOLUTE REQUIREMENTS WITH A TOLERANCE OF +0.0"
3. ANY DIMENSIONS NOTED AS "MIN" SHALL BE BE UNDERSTOOD TO BE ABSOLUTE REQUIREMENTS WITH A TOLERANCE OF -0.0"
4. STANDARD DIMENSIONS (NOT INCLUDING FIRE SETBACKS) SHALL BE UNDERSTOOD TO BE REQUIREMENTS WITH A TOLERANCE OF ±2.0"
5. ANY DIMENSIONS NOTED AS "APPROX" SHALL BE UNDERSTOOD TO BE APPROXIMATE IN NATURE AND SHOULD BE USED AS A GUIDE. EXACT PLACEMENT OF THE PANELS RELATIVE TO THESE DIMENSIONS ARE LEFT TO THE INSTALLERS DISCRETION ASSUMING THAT ALL OTHER DEFINED REQUIREMENTS ARE MET.
6. ANY DIMENSIONS IN PARENTHESES () ARE FOR ENGINEERING REFERENCE ONLY AND ARE NOT NEEDED FOR INSTALLATION.
7. IT IS THE CONTRACTOR RESPONSIBILITY TO INSTALL THE SYSTEM AND ITS SUPPORTS AS INDICATED IN THESE PLANS. THE CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD IF SITE CONDITIONS DIFFER FROM WHAT IS DEPICTED ON PLANS.

ATTACHMENT SYSTEM:
ATTACHMENT SYSTEM AND FLASHING METHOD SHALL BE CONSTRUCTED ACCORDING MANUFACTURER'S INSTALLATION MANUAL AND AS SPECIFIED BY EOR.

SUGGESTED ELECTRICAL EQUIPMENT MOUNTING LOCATION
THE SUGGESTED EQUIPMENT MOUNTING LOCATION MAY BE ADJUSTED AT INSTALLER'S DISCRETION SO LONG AS LOCAL AHJ REQUIREMENTS ARE ADHERED TO

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JOHN GORAS RESIDENCE

PROJECT ADDRESS:

231 SW Heathridge Dr
Lake City, FL 32024

Date:	SEE P.E. STAMP
Designed By:	MER
Reviewed by:	AKM
REVISION HISTORY	

DRAWING SCALE:

N.T.S.

SHEET NAME:

SITE & ELECTRICAL PLAN

SHEET NUMBER:

S1

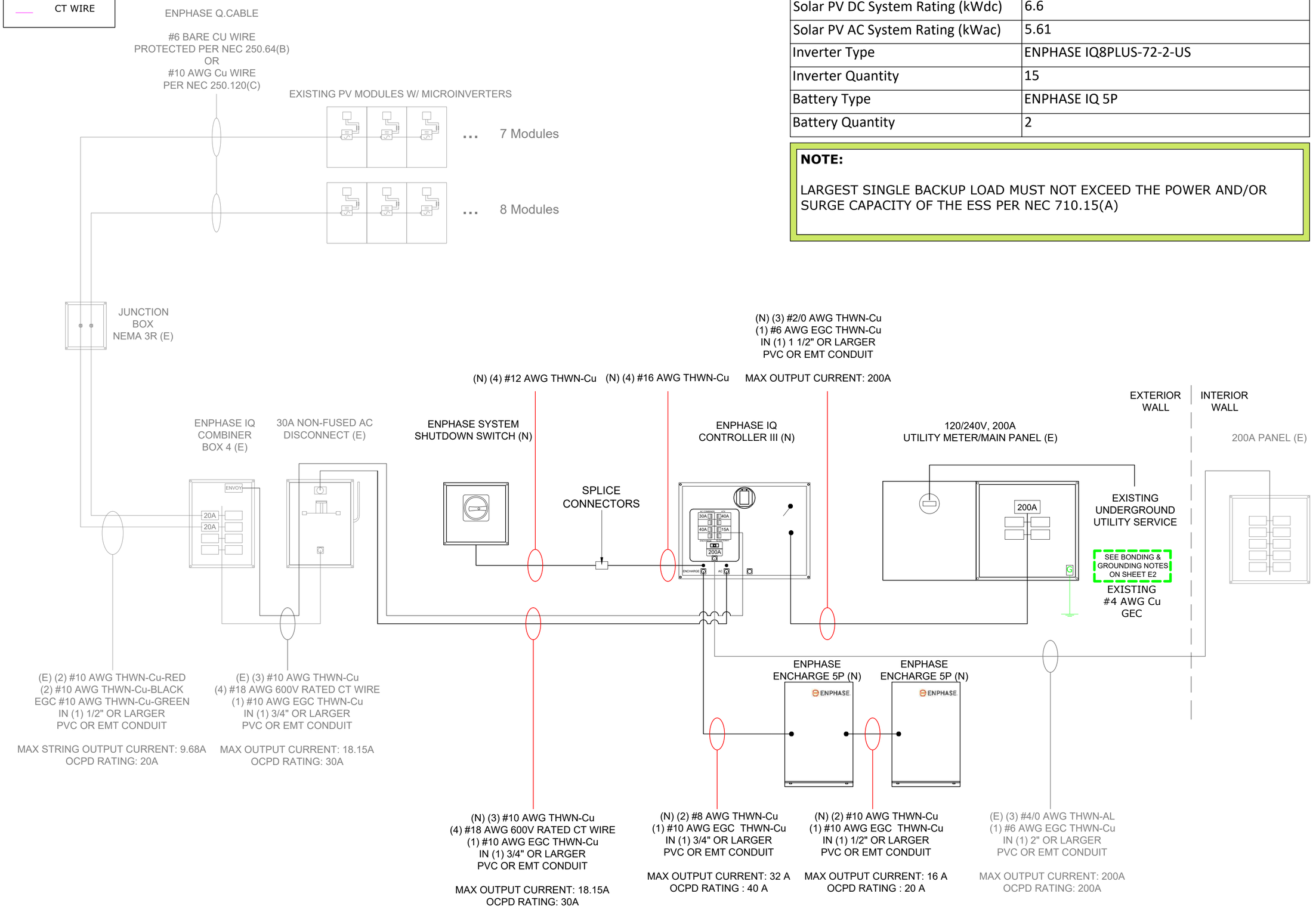
LEGEND

N	NEW
E	EXISTING
——	CT WIRE

SYSTEM DETAILS	
PV Module Type	APTOS DNA-120-MF10-440
PV Module Quantity	15
Solar PV DC System Rating (kWdc)	6.6
Solar PV AC System Rating (kWac)	5.61
Inverter Type	ENPHASE IQ8PLUS-72-2-US
Inverter Quantity	15
Battery Type	ENPHASE IQ 5P
Battery Quantity	2

NOTE:

LARGEST SINGLE BACKUP LOAD MUST NOT EXCEED THE POWER AND/OR SURGE CAPACITY OF THE ESS PER NEC 710.15(A)



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N.T.S.

SHEET NAME:

ELECTRICAL RISER DIAGRAM

SHEET NUMBER:

E1

EQUIPMENT NOTES:

1. NEW EQUIPMENT CLEARANCES: 36" (FRONT), 30" (WORK AROUND), 6 FT (OH) (NEC 110.26)
2. NEW EQUIPMENT AND COMPONENTS SHALL BE CERTIFIED BY A NATIONAL LABORATORY.
3. LABEL READING, "WARNING: THIS EQUIPMENT FED BY MULTIPLE SOURCES" SHALL BE PROPERLY AFFIXED.
4. EQUIPMENT SHALL BE INSTALLED AND USED ACCORDING TO INSTALLATION MANUAL OR SPECIFICATIONS (NEC 110.3(B)), AND SHALL BE RATED FOR OUTDOOR USE IF INSTALLED OUTSIDE (NEMA 3-6P, TABLE 110.28)

GENERAL NOTES:

1. INSTALLER SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY FOR THE INSTALLATION OF A COMPLETE ELECTRICAL SYSTEM PURSUANT TO THE PLANS IN ACCORDANCE WITH THE FBC, NEC, FHPA, OSHA AND ALL OTHER APPLICABLE CODES AND ORDINANCES.
2. ELECTRICAL WORK AND RESPECTIVE PREPARATION WORK SHALL BE PERFORMED BY PROPERLY LICENSED SUBCONTRACTORS.
3. MATERIALS SHALL BE INCLUDED IN THE PLANS AND ANY NECESSARY EQUIVALENT SUBSTITUTIONS SHALL BE APPROVED BY THE EOR.
4. CONDUCTORS SHALL BE COPPER OF 98% CONDUCTIVITY. CABLES SHALL BE 600V-RATED, SINGLE-CONDUCTOR IN THERMOPLASTIC INSULATION SUITABLE FOR CONTINUOUS OPERATION AT 75° C. CONDUCTORS AND CABLE SHALL BE NEC-CLASS TYPE THW OR THWN, EXCEPT AWG SIZE #10 AND SMALLER MAY BE TW. INSULATION SHALL BE COLOR-CODED #6 AND SMALLER. COLOR-CODED TAPE SHALL BE USED ON #4 AND LARGER.
5. CONDUCTORS SHALL BE RUN IN CONDUIT WHEN NOT BENEATH MODULES. EXPOSED CONDUIT IS PERMITTED IN GARAGES OR OTHER AREAS ACCEPTABLE TO OWNER AND AS APPROVED BY EOR. CONDUIT SHALL BE PAINTED TO MATCH SURFACE AS REQUIRED BY OWNER.
6. FLEXIBLE CONDUIT SHALL BE USED FOR VIBRATING EQUIPMENT AND RECESSED, MOUNTED FIXTURES AND SHALL BE SEALED WITH LIQUID TIGHT IF EXPOSED TO WEATHER WITH GREEN BOND CONDUCTOR INSTALLED TOGETHER AT CIRCUIT CONDUCTORS. GALVANIZED EMT WITH SET-SCREW MAY BE USED FOR INTERIOR LOCATIONS. PVC WITH GREEN BOND CONDUCTOR (NEC 250) MAY BE USED IN UG LOCATIONS.
7. EXISTING AND CONNECTED ELECTRICAL PANELS, CIRCUIT BREAKERS AND SAFETY SWITCH SHALL BE SQUARE D OR EQUIV. LOAD SIDE SOLAR PV-SYSTEM CIRCUIT BREAKERS SHALL BE INSTALLED AT OPPOSITE END OF BUSBAR.
8.
   - 8.1. FOR PIERCING TAPS, THE TOTAL AREA OF ALL CONDUCTORS, SPLICES, AND TAPS INSTALLED AT ANY CROSS SECTION OF THE WIRING SPACE SHALL NOT EXCEED 75 PERCENT OF THE CROSS-SECTIONAL AREA OF THAT SPACE (NEC 312.8.A).
   - 8.2. SERVICE-ENTRANCE CONDUCTORS SHALL BE PERMITTED TO BE SPLICED OR TAPPED IN ACCORDANCE WITH NEC 110.14, 300.5(E), 300.13, AND 300.15 (NEC 230.46).
   - 8.3. TAPPED ENCLOSURE SHALL BE LOCATED IN A READILY ACCESSIBLE LOCATION IN COMPLIANCE WITH NEC 230.70(A)(1).
   - 8.4. AC DISCONNECT SHALL BE READILY ACCESIBLE, OUTSIDE AND NO MORE THAN 10 FT FROM TAPPED CONDUCTORS.
   - 8.5. PV AC DISCONNECT SHALL BE SERVICE ENTRANCE RATED (NEC 230.66), LOCKABLE (NEC 110.25) AND SHALL COMPLY WITH NEC 690.13(A-E).
   - 8.6. ALL FUSES SHALL BE (R) RATED AND SHALL HAVE APPROPRIATE REJECTION CLIPS
9. CIRCUIT BREAKER DIRECTORY SHALL BE AFFIXED TO PANEL.
10. HVAC CONDUCTORS, CIRCUIT BREAKERS AD FUSES SHALL BE REPLACED AS NECESSARY TO COMPLY WITH MANUFACTURER'S RECOMMENDED OVER-CURRENT PROTECTION AT NO UP-CHARGE. CONDUIT AND BREAKERS SHALL BE COORDINATED WITH THE EQPT. NAMEPLATE. OTHER CIRCUITS PULLING 208-240V SHALL BE INSPECTED FOR COMPLIANCE WITH CONDUCTOR AND OVER-CURRENT PROTECTION REQUIREMENTS. REPLACEMENT SHALL BE THE RESPONSIBILITY OF THE OWNER AND PERFORMED BEFORE CONTRACTOR PERFORMS INITIAL SYSTEM TESTING.

CONDUIT NOTES:

PVC SCH 40 OR SCH 80 MAY BE USED AS REQUIRED FOR ADDITIONAL SAFETY OR FOR RUNS ≤ 3 FT WITH UPSIZE ACCORDING TO FILL TABLE.

ELECTRICAL METALLIC TUBING (EMT) NEC Art. 358:

1. EMT SHALL BE FASTENED EVERY 10 FT & FROM BOX, FITTING, TERMINAL POINT.
2. BENDS BETWEEN PULL POINTS SHALL COMBINE ≤ 360°.
3. CONNECTORS SHALL BE CORROSION RESISTANT.
4. GASKETS SHALL BE WATERTIGHT.
5. COUPLINGS AND CONNECTORS SHALL BE RAIN-TIGHT OR RAIN-TIGHT/INSULATED.

NEC FILL TABLES

RIGID PVC CONDUIT TABLE: SCHEDULE 80 - C10 / 40 - C11
FLEXIBLE METALLIC CONDUIT - TABLE C3
LIQUIDTIGHT FLEXIBLE CONDUIT TABLE- METALLIC C7 / NON-METALLIC (FNMC-B) - C5

ELECTRICIAN NOTES:

1. CONFIRM GROUND CONDUCTOR TO ELECTRODE
2. CONFIRM BUSBAR RATINGS & FEEDERS. IF ACTUAL CONDITIONS DIFFER, NOTIFY EOR.
3. CONDUCTORS MAY BE COMBINED USING RATED JUNCTIONS BOXES/CONDUIT UP-SIZE.

EXPANSION NOTE: FITTINGS SHALL BE INSTALLED BETWEEN SECURELY-MOUNTED ELBOWS AND TERMINATION POINTS (NOT INCL. WYES). IF JOINT IS VERTICAL, OPEN-END SHALL BE SECURELY FASTENED IN DOWN POSITION W/ COUPLING INSTALLED CLOSE TO TOP OF RUN W/ BARREL ALSO DOWN AND LOWER END SECURED AT BOTTOM TO ALLOW UPWARD MOVEMENT. (SEC. 352.44 NEC)

BONDING & GROUNDING NOTE:

1. MODULES SHALL BE BONDED BY BONDING MID-CLAMPS ACCORDING TO INSTALLATION MANUAL. MODULES WHICH CAN NOT BE FULLY BONDED SHALL BE PROPERLY GROUND USING GROUNDING LUG WIRED DIRECTLY TO SYSTEM GROUND WIRE. ALTERNATIVES REQUIRE A CUSTOMIZED PLAN FROM EOR.
2. (2) ROD AND PIPE ELECTRODES REQUIRED. ROD AND PIPE ELECTRODES SHALL NOT BE LESS THAN 2.44 M (8 FT) IN LENGTH AND SHALL CONSIST OF THE FOLLOWING MATERIALS: COPPER, GALVANIZED STEEL, STAINLESS STEEL.
3. GROUNDING ELECTRODES OF PIPE OR CONDUIT SHALL NOT BE SMALLER THAN METRIC DESIGNATOR 21 (TRADE SIZE 3⁄4) AND, WHERE OF STEEL, SHALL HAVE THE OUTER SURFACE GALVANIZED OR OTHERWISE METAL-COATED FOR CORROSION PROTECTION.
4. ROD-TYPE GROUNDING ELECTRODES OF STAINLESS STEEL AND COPPER OR ZINC-COATED STEEL SHALL BE AT LEAST 15.87 MM (5⁄8 IN.) IN DIAMETER, UNLESS LISTED. (2020 NEC)
5. THE METAL WATER PIPING SYSTEM SHALL BE BONDED AS REQUIRED PER NEC 250.104
6. INTERSYSTEM BONDING REQUIRED PER NEC 250.94

SMOKE ALARM NOTES:

INTERCONNECTED SMOKE ALARMS SHALL BE INSTALLED THROUGHOUT THE DWELLING, INCLUDING IN ROOMS, ATTACHED GARAGES, AND AREAS IN WHICH ESS ARE INSTALLED IN COMPLIANCE WITH LOCAL BUILDING CODE. WHERE ESS ARE INSTALLED IN AN ATTACHED GARAGE OR AREA IN WHICH SMOKE ALARMS CANNOT BE INSTALLED IN ACCORDANCE WITH THEIR LISTING, AN INTERCONNECTED LISTED HEAT ALARM SHALL BE INSTALLED AND BE CONNECTED TO THE SMOKE ALARM SYSTEM REQUIRED BY THE LOCAL BUILDING CODE PER NFPA 855 EDITION 2020 15.9.2.

ESS NOTES:

ESS SHALL BE PROTECTED FROM IMPACT FROM VEHICLE DAMAGE PER NFPA 855 EDITION 2020 15.10.

Surge Protection Notes:

WHERE SERVICE EQUIPMENT IS REPLACED, A SURGE PROTECTION DEVICE SHALL BE INSTALLED IN ACCORDANCE WITH NEC 230.67 & 242.12

Temperature Adjusted Conductor Ampacity - Assuming 45 °C						
Conductor Size (AWG)	Ampacity at 75 °C	Temp. Adjusted Ampacity (0.82 Adjustment Factor at 45 °C)	Temp. Adjusted Ampacity (4-6 Current-Carrying Conductors - 0.80 Adjustment Factor)	Ampacity at 90 °C	Temp. Adjusted Ampacity (0.87 Adjustment Factor at 45 °C)	Temp. Adjusted Ampacity (4-6 Current-Carrying Conductors - 0.80 Adjustment Factor)
14	20	16.4	13.12	25	21.75	17.4
12	25	20.5	16.4	30	26.1	20.88
10	35	28.7	22.96	40	34.8	27.90
8	50	41	32.8	55	47.9	38.3
6	65	53.3	42.64	75	65.3	52.2
4	85	69.7	55.76	95	82.7	66.2
3	100	82	65.6	110	95.7	76.6
2	115	94.3	75.44	130	113.1	90.5
1	130	106.6	85.28	150	130.5	104.4
1/0	150	123	98.4	170	147.9	118.3
2/0	175	143.5	114.8	195	169.7	135.8
3/0	200	164	131.2	225	195.8	156.6
4/0	230	188.6	150.88	260	226.2	181.0

Site Condition Assumptions	
Interconnection Frequency	60 Hz
Voltage - Line 1 to Neutral	120 V
Voltage - Line 2 to Neutral	120 V
Voltage Line 1 to Line 2	240 V
Environmental Assumptions	
Minimum Annual Temperature	10 °C
Maximum Annual Temperature	45 °C
PV Module Specifications	
Manufacturer	APTOS
Model Number	DNA-120-MF10-440W
Temperature Coefficient - Voltage	-0.27% / oC
Temperature Coefficient - Current	0.054% / oC
Temperature Coefficient - Power	-0.35% / oC
Specifications at STC	
Maximum Power - Pmp	440 W
Maximum Power Voltage - Vmp	33.72 V
Maximum Power Current - Imp	13.05 A
Open Circuit Voltage - Voc	41.02 V
Short Circuit Current - Isc	13.73 A
Temperature Adjusted	
Vmp Min	28.71 V
Voc Max	42.68 V
Inverter Specifications	
Manufacturer	ENPHASE
Model Number	IQ8PLUS-72-2-US
MPPT Voltage Range	29-45 V
Operating Voltage Range	25-58 V
Maximum Input Voltage	60 V
Max Continuous AC Output Power	290 VA
Max Continuous AC Output Current	1.21 A
Conduit Fill Calculations for Raceways Containing More than 3 Current-Carrying Conductors	
Current-Carrying Conductor Sizes (AWG)	#10
Conductor Cross Sectional Area (in2)	0.02036
Number of Current-Carrying Conductors	4
Total Cross Sectional Area of Conductors (in2)	0.081433223
Total Conduit Size (in)	0.5
Total Cross Area of Conduit (in2)	0.285
Conduit Fill Percentage (%)	28.57
Max Voltage Drop Percentage Calculation (%)	
From Rooftop Junction Box to Combiner Conductor Size (AWG)	#10
Max String OCPD Rating (Amps)	20
From Combiner Box to ACD & ACD to Point of Interconnection (AWG)	#10
Max PV OCPD Rating (Amps)	30
Max Circuit Distance (ft)	30
Voltage Drop Percentage From Rooftop Junction Box to Combiner Box (%)	0.9
Voltage Drop Percentage From Combiner Box to ACD & ACD to Point of Interconnection (%)	1.35

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Designed By:	MER
Reviewed by:	AKM
REVISION HISTORY	

DRAWING SCALE:

N.T.S.

SHEET NAME:

ELECTRICAL NOTES & EQUIPMENT SPECIFICATIONS

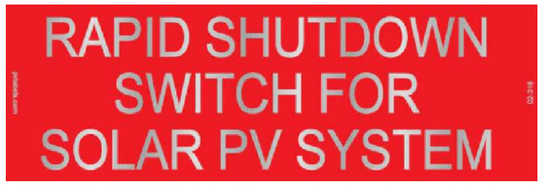
SHEET NUMBER:

E2

NEC 690.13(B) label is required at each PV system disconnecting means. This will include combiner boxes, AC/DC switches & AC Disconnects.

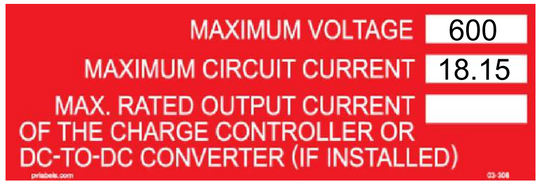
NEC 690.31(D)(2) label is required at all areas where PV system conductors are enclosed including junction boxes, raceways, conduit bodies, pull boxes, etc.

NEC 690.13(B) label is an optional addition to the previous label on systems where the line and load sides of the disconnect may be energized. This label is not required but “shall be permitted” by the NEC.

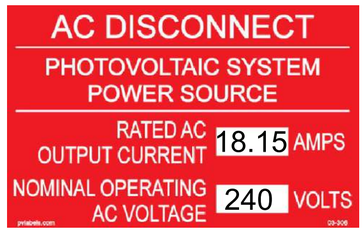


NEC 690.56(C)(2) label is required at the rapid shut down switch for the system. Typically, that is going to be the AC disconnect.

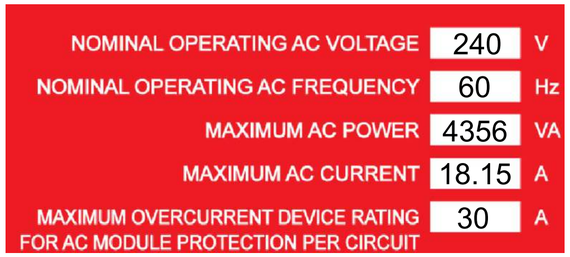
NEC 705.12(C) label is required at the main service equipment.



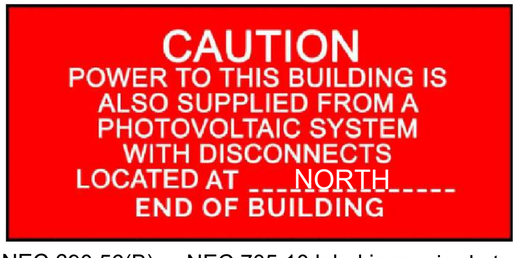
NEC 690.54 label is required at the point of interconnection disconnecting means, i.e. the AC disconnect.



NEC 690.54 label is required at the AC disconnecting means

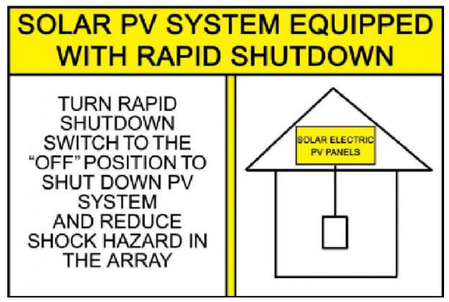


NEC 690.54 label is required at the AC disconnecting means

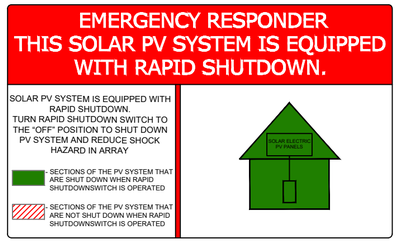


NEC 690.56(B) or NEC 705.10 label is required at every power source disconnecting means denoting location(s) of other power source(s) disconnecting means.

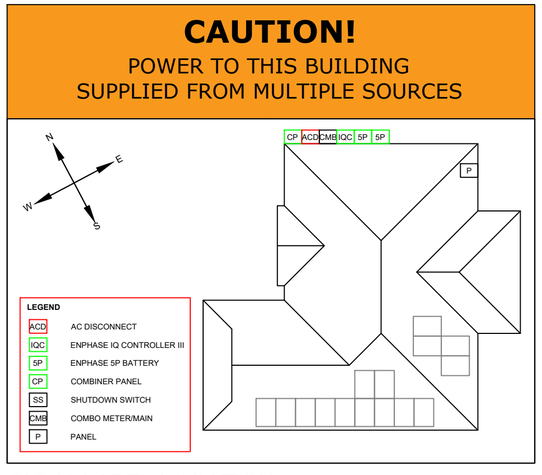
NEC 705.12(C) label is required at the main service equipment.



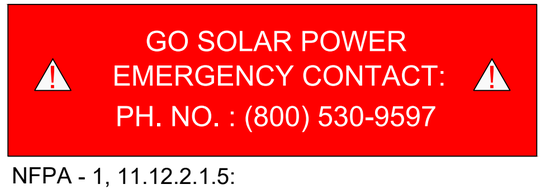
NEC 690.56(C) label is required at the service disconnecting means of the property.



NFPA 1.11.12.2.1.1 LABEL IS REQUIRED AT AC DISCONNECTING MEANS



705.10 LABEL LOCATION:
MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL,
PV DISCONNECT LOCATED NO MORE THAN 3FT (1M)
FROM THE SERVICE DISCONNECT
(TEXT HEIGHT SHOULD BE A MINIMUM OF 3/8")



NFPA - 1, 11.12.2.1.5:
THIS LABEL IS REQUIRED AT MAIN DISCONNECT

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JOHN GORAS RESIDENCE

PROJECT ADDRESS:

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Lake City, FL 32024

Date:	SEE P.E. STAMP
Designed By:	MER
Reviewed by:	AKM
REVISION HISTORY	

DRAWING SCALE:

N.T.S.

SHEET NAME:

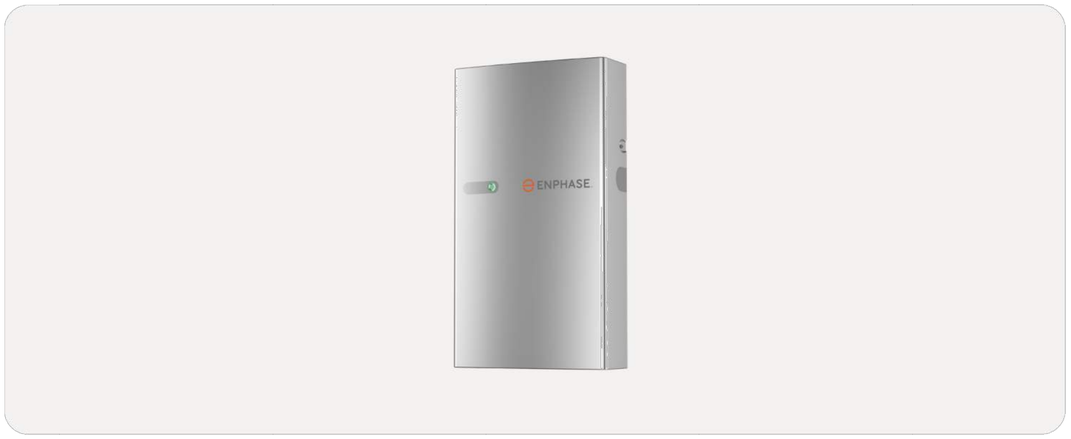
SOLAR PV LABELS

SHEET NUMBER:

E3

ENPHASE.

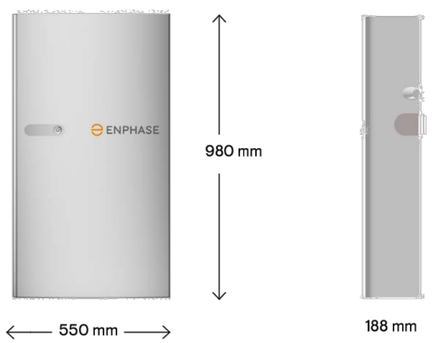
DATA SHEET | NA | PRELIMINARY

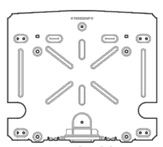


IQ Battery 5P

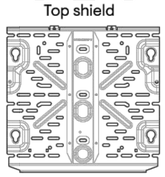
The IQ Battery 5P all-in-one AC-coupled system is powerful, reliable, simple, and safe. It has a total usable energy capacity of 5.0 kWh and includes six embedded grid-forming microinverters with a 3.84 kVA continuous power rating. It provides backup capability and installers can quickly design the right system size to meet the customer needs.

Dimensions





Top shield



Bottom mounting bracket

Enphase 15 year limited warranty

15-year limited warranty

LISTED

UL 9540A Certified

Powerful

- Provides 3.84 kVA continuous and 7.68 kVA peak power
- Doubles the available power per kWh of prior generations of IQ Battery 5P
- Includes six embedded IQ8D-BAT Microinverters

Reliable

- 15-year limited warranty
- Cools passively with no moving parts or fans
- Uses wired communication for fast and consistent connection
- Updates software and firmware remotely

Simple

- Fully integrated AC battery system
- Installs and commissions easily
- Supports Backup, Self-Consumption, and time-of-use (TOU) modes
- Offers homeowners remote monitoring and control from the Enphase App
- Field replaceable components

Safe

- Tested to meet UL 9540A, the highest industry standard for battery safety
- Uses lithium iron phosphate (LFP) chemistry for maximum safety and longevity

IQ Battery 5P

MODEL NUMBER	
IQBATTERY-5P-1P-NA	The IQ Battery 5P system with integrated IQ Microinverters and battery management system (BMS) with battery controller.
WHAT'S IN THE BOX	
IQ Battery 5P unit	IQ Battery 5P unit (B05-T02-US00-1-3)
ID cover and conduit cover	IQ Battery 5P cover with two conduit covers for left-side and right-side of the unit
Bottom mounting bracket and top shield	Bottom mounting bracket for mounting bracket on the wall. One top shield required for UL9540A
M5 seismic screws	Two M5 seismic screws for securing battery unit on bottom bracket
M4 grounding screws	Two M4 grounding screws to secure top shield on bottom wall-mount bracket
M5 ID cover grounding screws	Two M5 ID Cover grounding screws for EMI/EMC requirement
Cable ties	Six cable ties for securing field cables to the unit
CTRL connector	Spare CTRL connector without resistor for CTRL wiring
CTRL connector with resistor	Spare CTRL connector with resistor for CTRL wiring
Quick Install Guide (QIG)	QIG for instructions on IQ Battery unit installation
OPTIONAL ACCESSORIES AND REPLACEMENT PARTS	
IQ8D-BAT-RMA	IQ8D-BAT Microinverter for field replacement
B05-T02-US00-1-3-RMA	IQ Battery 5P Battery unit for field replacement
B05-CX-0550-O	IQ Battery 5P cover for field replacement
B05-PI-0550-O	IQ Battery 5P pedestal mount
B05-CP-096-O	IQ Battery 5P conduit plates for field replacement. Includes one left-side and one right-side conduit plate
B05-WB-0543-O	IQ Battery 5P wall bracket for field replacement. Includes one wall-mount bracket and one top shield
IQBATTERY-HNDL-5	IQ Battery 5P lifting handles. Includes one left-side and one right-side lifting handle
B05-ACFB-080-O	IQ Battery 5P AC filter board for field replacement
B05-BMSNA-0490-O	IQ Battery 5P BMS board for field replacement
B05-CANB-063-O	IQ Battery 5P control communication board for field replacement
B05-NICS-0524-O, B05-NUCS-0524-O	IQ Battery 5P control switch preinstalled on the wiring cover for field replacement
OUTPUT (AC)	**@240 VAC**
Rated (continuous) output power	3.84 kVA
Peak output power	7.68 kVA (3 seconds), 6.14 kVA (10 seconds)
Nominal voltage/Range	240/211-264 VAC
Nominal frequency/Range	60/57-63 Hz
Rated output current (@240 VAC)	16 A
Peak output current (@240 VAC)	32 A (3 seconds), 25.6 A (10 seconds)
Power factor (adjustable)	0.85 leading...0.85 lagging
Maximum output overcurrent protection	20 A per unit
Interconnection	Single-phase
AC round-trip efficiency[2]	90%
Chemistry	Lithium iron phosphate (LFP)
Altitude	Up to 2,500 meters (8,202 feet)
Mounting	Wall-mount or pedestal-mount (sold separately)

IQ Battery 5P

BATTERY	
Total capacity	5.0 kWh
Usable capacity	5.0 kWh
DC round-trip efficiency	96%
Nominal DC voltage	76.8 V
Maximum DC voltage	86.4 V
Ambient operating temperature range (charging)	-20°C to 50°C (-4°F to 122°F) non-condensing
Ambient operating temperature range (discharging)	-20°C to 55°C (-4°F to 131°F) non-condensing
Optimum operating temperature range	0°C to 30°C (32°F to 86°F)
Chemistry	Lithium iron phosphate (LFP)
MECHANICAL DATA	
Dimensions (HxWxD)	980 mm x 550 mm x 188 mm (38.6 in x 21.7 in x 7.4 in)
Lifting weight	66.3 kg (146.1 lbs)
Total installed weight	78.9 kg (174 lbs)
Enclosure	Outdoor–NEMA 3R
IQ8D-BAT Microinverter enclosure	NEMA type 6
Cooling	Natural convection
FEATURES AND COMPLIANCE	
Compatibility	Compatible with IQ and M Series Microinverters, IQ System Controller 3/3G, IQ Combiner 5/5C, IQ Gateway for grid-tied and backup operation
Communication	Wired control communication
Services	Backup, Self-Consumption, TOU, and NEM Integrity
Monitoring	Enphase Installer Platform and Enphase App monitoring options; API integration
Compliance	CA Rule 21 (UL 1741-SA), IEEE 1547:2018 (UL 1741-SB, 3rd Ed.) CAN/CSA C22.2 No. 107.1-16 UL 9540, UL 9540A, UN 38.3, UL 1998, UL 991, NEMA Type 3R, AC156 EMI: 47 CFR, Part 15, Class B, ICES 003 Cell Module: UL 1973, UN 38.3 Inverters: UL 62109-1, IEC 62109-2
LIMITED WARRANTY	
Limited warranty	>60% capacity, up to 15 years or 6,000 cycles[3]

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DRAWING SCALE:

N.T.S.

SHEET NAME:

ENPHASE ENCHARGE SPECIFICATION

SHEET NUMBER:

APP.1

ENPHASE.

DATASHEET

IQ System Controller 3/3G

The Enphase IQ System Controller 3/3G connects the home to grid power, the IQ Battery system, and solar PV. It provides microgrid interconnect device (MID) functionality by automatically detecting and seamlessly transitioning the home energy system from grid power to backup power in the event of a grid failure. It consolidates interconnection equipment into a single enclosure and streamlines grid-independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for residential applications.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (M Series, IQ6, IQ7, and IQ8 Series) dramatically simplify the installation process

IQ Battery 5P
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT microinverters

IQ Combiner 5/5C
Consolidates PV interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications

IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life

Enphase 10 year limited warranty

10-year limited warranty

UL LISTED

Easy to install

- Connects to service entrance[1] or main load center
- Includes neutral-forming transformer
- Mounts on single stud with centered brackets
- Provides conduit entry from the bottom, left, or right
- Includes color-coded wires for ease of wiring the System Shutdown Switch
- Integrates hold-down functionality to eliminate the need for hold-down kits and special breakers

Flexible

- Can be used for Sunlight Backup, Home Essentials Backup, or Full Energy Independence
- IQ System Controller 3 integrates with IQ Battery 5P
- IQ System Controller 3G integrates with select AC standby generators. See the Generator integration tech brief for a list of generators
- Provides a seamless transition to backup

Safe and reliable

- System Shutdown Switch can be used to disconnect PV, battery, and generator systems
- System Shutdown Switch acts as a rapid shutdown initiator of grid-forming IQ8 PV Microinverters for the safety of maintenance technicians/first responders
- 10-year limited warranty

(1) IQ System Controller 3 is not suitable for use as service equipment in Canada.

IQSC-3-DSH-00021-3.0-EN-US-2023-08-08

IQ System Controller 3/3G

DATASHEET

MODEL NUMBER	DESCRIPTION
SC200D111C240US01	IQ System Controller 3 streamlines the grid-independent capabilities of PV and storage installations. Integrates hold-down capability. Supports IQ Battery 5P units up to 40 kWH (without PCS*) and 80 kWh (with PCS*). **Does not support generator integration**
SC200G111C240US01	IQ System Controller 3G streamlines the grid-independent capabilities of PV and storage installations. Integrates hold-down capability. Supports IQ Battery 5P units up to 20 kWH (without PCS*) and 40 kWh (with PCS*). **Supports generator integration**
WHAT'S IN THE BOX	
IQ System Controller 3/3G	Includes neutral-forming transformer (NFT) and microgrid interconnect device (MID)
System Shutdown Switch	Includes pre-wired red, black, orange, and purple 12 AWG wire (EP200G-NA-02-RSD)
Wall-mounting bracket	Screws provided in the accessories kit for mounting
4-pole circuit breaker	Pre installed Quad breaker (BRK-20A40A-4P-240V), 20 A-40 A, 10 kAIC, Eaton BQC220240[2]
Accessories kit	IQ System Controller 3/3G literature kit, including labels, CTRL headers, screws, filler plates, and Quick Install Guide (QIG) (EP200G-LITKIT)
OPTIONAL ACCESSORIES AND REPLACEMENT PARTS	
CT-200-SPLIT	200 A split core current transformers for metering (accuracy: ±2.5%)[3]
CT-200-CLAMP	200 A clamp-type current transformers for metering (accuracy: ±2.5%)[3]
Main or load circuit breakers (order separately, as needed)[4]	• BRK-100A-2P-240V: 2-pole, 100A, 25kAIC, CSR2100N or CSR2100 • BRK-125A-2P-240V: 2-pole, 125A, 25kAIC, CSR2125N • BRK-150A-2P-240V: 2-pole, 150A, 25kAIC, CSR2150N • BRK-175A-2P-240V: 2-pole, 175A, 25kAIC, CSR2175N • BRK-200A-2P-240V: 2-pole, 200A, 25kAIC, CSR2200N
Distributed energy resource (DER) circuit breakers (order separately, as needed)[5]	• BRK-20A-2P-240V-B: 2-pole, 20 A, 10 kAIC, BR220B/BR220 • BRK-30A-2P-240V-B: 2-pole, 30 A, 10 kAIC, BR230 • BRK-40A-2P-240V-B: 2-pole, 40 A, 10 kAIC, BR240B/BR240 • BRK-60A-2P-240V: 2-pole, 60 A, 10 kAIC, BR260 • BRK-80A-2P-240V: 2-pole, 80 A, 10 kAIC, BR280
EP200G-HNDL-R1	IQ System Controller 3/3G installation handle kit (order separately)
CTRL-SC3-NA-01	Control cable, 500 ft. spool (order separately)
ALTERNATE DER CIRCUIT BREAKERS	
GE/ABB	THQL21xx (20/40/60/80 A)
Siemens	Q2xx (20/40/60/80 A)
Siemens (quad breaker)	Q24020CT2 (20/40 A)
ELECTRICAL SPECIFICATIONS	
Nominal voltage/Range (L-L)	240 V~[6]/±20%
Voltage measurement accuracy	±1% V nominal (±1.2V L-N and ±2.4V L-L)
Auxiliary (dry) contact for load control, excess PV control, and generator two-wire control	24 V, 1 A
Nominal frequency/Range	60 Hz/56–63 Hz
Frequency measurement accuracy	±0.1 Hz
Maximum continuous current rating	160 A
Maximum input overcurrent protection device	200 A
Maximum output overcurrent protection device	200 A
Maximum overcurrent protection device rating for generator circuit	80 A (IQ System Controller 3G only - SC200G111C240US01)
Maximum overcurrent protection device rating for storage circuit	2 x 80 A (IQ System Controller 3 - SC200D111C240US01), 1 x 80 A (IQ System Controller 3G - SC200G111C240US01)

(2) Factory installed quad breaker (Siemens or Eaton). NFT pre-wired to 40 A terminal of the quad breaker.
(3) Two units of CT-200-SPLIT or CT-200-CLAMP must be bought separately for generator integration.
(4) The IQ System Controller 3 is rated at 22 kAIC.
(5) Integrated hold-down kit support breakers (BR230/BR230/BR240) without predrilled hole.
Integrated hold-down kit also supports GE/ABB and Siemens as mentioned under section alternate DER circuit breakers.
(6) "~" indicates alternating current (AC) supply.
(*) Power Control System.

IQSC-3-DSH-00021-3.0-EN-US-2023-08-08

DATASHEET

ELECTRICAL SPECIFICATIONS		
Maximum overcurrent protection device rating for PV combiner unit	80 A	
Internal busbar rating	200 A	
Neutral-forming transformer (NFT)	• Breaker rating (pre-installed): 40 A between L1 and Neutral; 40 A between L2 and Neutral • Continuous rated power: 3,600 VA • Maximum continuous unbalance current: 30 A @ 120 V • Peak unbalanced current: 80 A @ 120 V for two seconds	
MECHANICAL DATA		
Dimensions (WxHxD)	50 cm x 91.6 cm x 24.6 cm (19.7 in x 36 in x 9.7 in)	
Weight	39.4 kg (87 lbs)	
Ambient temperature range	-40°C to 50°C (-40°F to 122°F)	
Cooling	Natural convection and a heat shield	
Enclosure environmental rating	Outdoor, NEMA type 3R, polycarbonate construction	
Maximum altitude	2500 meters (8200 feet)	
WIRE SIZES		
Connections (All lugs are rated to 90°C)	Main lugs and backup load lugs CSR breaker bottom wiring lugs AC combiner lugs, IQ Battery lugs, and generator lugs Neutral (large lugs)	Cu/Al: 6 AWG–300 kcmil Cu/Al: 2 AWG–300 kcmil 14 AWG–2 AWG Cu/Al: 6 AWG–300 kcmil
Neutral and ground bars	Large holes (5/16–24 UNF) Small holes (10–32 UNF)	14 AWG–1/0 AWG 14 AWG–6 AWG
COMPLIANCE		
Compliance (under progress)	UL 1741, UL 1741 SA, IEEE 1547:2018 (UL 1741-SB, 3rd Ed.), UL 1741 PCS CRD, UL1998, UL 869A, UL 875, UL 508[7], UL 50E[7] CSA 22.2 No. 107.1, 47 CFR Part 15 Class B, ICES 003, ICC ES AC156. The IQ System Controller 3/3G is approved for use as service equipment in the United States	
WARRANTY		
Limited warranty (restrictions apply)	Up to 10 years (EP200G-NA-02-RSD has a 5-year warranty)	
COMPATIBILITY[8]		
Battery	IQ Battery 5P (IQBATTERY-5P-1P-NA)	
Microinverters	IQ8, IQ7, IQ6, and M Series Microinverters[9]	
IQ Combiner	IQ Combiner 5/5C (X-IQ-AM1-240-5C, X-IQ-AM1-240-5)	
Communications Kit 2	COMMS-KIT-02	

(7) Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.
(8) For more details, refer to IQ System Controller 3/3G Quick Install Guide.
(9) M Series Microinverters can only be supported in states that have not yet adopted IEEE 1547:2018.
Enphase does not support mixing IQ8 Series Microinverters with other series on the same IQ Gateway.

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SHEET NAME:

ENPHASE IQ SYSTEM CONTROLLER II SPECIFICATION

SHEET NUMBER:

APP.2