

EXISTING STRING CALCULATION

String #	No of Modules	Estimated Power	I _{max}	V _{oc}	V _{mpp}	V _{rise} (<= 2%)
1	10	4,600 W	19.75 AC	<30	240V AC	1.35+0.62 = 1.97
2	10	4,600 W	19.75 AC	<30	240V AC	1.18+0.62 = 1.8
3	10	4,600 W	19.75 AC	<30	240V AC	1.24+0.62 = 1.86
4	10	4,600 W	19.75 AC	<30	240V AC	1.18+0.62 = 1.8

EXISTING SYSTEM DETAIL

40 X REC460AA PURE-RX
460W
ENPHASE IQ8X-80-M-US MICROINVERTERS
380VA
RAPID SHUTDOWN EQUIPPED

The diagram illustrates the existing solar system layout. Four strings of 10 modules each are connected to a Sola Deck. The Sola Deck leads to an Attic containing an IQ COMBINER 5 with four 20A/2P breakers and a Cell Modem. A 100A NON-FUSIBLE AC DISCONNECT is located between the combiner and the IQ Controller 3. The IQ Controller 3 is connected to a MAIN LOAD PANEL with a B.B. rating of 225A and an M.B. rating of 200A. The system also includes a Utility Meter, a Factory Installed Quad Breaker (20A & 40A), an Enphase Rapid Shut down switch, and a Span Remote Meter Kit. The battery bank consists of four IQ Battery 5p units.

Existing System Detail

- System Size: 18,400W DC
- Battery Total Energy: 15.0 kWh
- (40) REC460AA Pure-RX
- (40) ENPHASE IQ8X-80-M-US MICROINVERTERS
- 03 x IQBATTERY-5P-1P-NA: IQ Battery 5P
- Inverter Output: 1.58A max @ 240 VAC (each microinverter)
- 380 VA AC output max (each micro inverter)
- 15.2 kVA AC output max

New System Detail

- Battery Total Energy: 5.0 kWh
- 01 x IQBATTERY-5P-1P-NA: IQ Battery 5P

Total System Detail

- Battery Total Energy: 20.0 kWh
- 04 x IQBATTERY-5P-1P-NA: IQ Battery 5P

Sr.No	#Wire	Conduit Size	Ground Wire	Amperage
1	1 x #12 Q Cable		#10 Bare Cu	20
2	4 x #10 MC Cable			20
3	8 x #10 THHN Cu	3/4" LFMC	#10 Green Cu	20
4	8 x #10 THHN Cu	3/4" EMT	#10 Green Cu	20
5	3 x #4 THHN Cu	1" LFNC	#6 Green Cu	80
6	3 x #3/0 THHN Cu	2" PVC		200
7	3 x #3/0 THHN Cu	2" PVC	#6 Green Cu	200
8	4 x #12 THHN Cu	3/4" LFNC	#10 Green Cu	16
9	2 x #4 THHN Cu	1" EMT	#8 Green Cu	80
10	2 x #4 THHN Cu	1" LFNC	#8 Green Cu	80
11	Enphase Control Cable (4 conductors)			
12	Lead Wire 18AWG, PVC Extruded			
13	2 x #10 THHN Cu			20

- The load center/disconnect will be visible, lockable, accessible to utility linesmen, and properly labeled per NEC requirements. It will be located on the exterior wall next to the utility meter.
- Prepare cable in usual manner.
- Stretch tape and apply half-lapped to form void-free joint. Degree of stretch is not critical and may vary in different sections of joint to accomplish void-free application.
- Protect the joint with two half-lapped layers of any scotch vinyl plastic electrical tape.

NEC Code (2020) and UL Standard References

Rapid Shut Down	NEC 690.12 (A-D), UL1741	Grounding	NEC Article 250.30(A)
Disconnecting Means	NEC 690.13	Conduit Fill	NEC Table C.9, 310.15(B)(3)(a)
Feeder Sizing	NEC Table 310, 15(B)(16, 17)	Interconnection	NEC 705.12
Over current Protection	NEC 690.9		

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Customer Signature:

Sheet Name:

Electrical One Line Diagram

JOB NUMBER:

25-222-JB

Date:

05/01/2025

Revision:

A

Sheet Size:

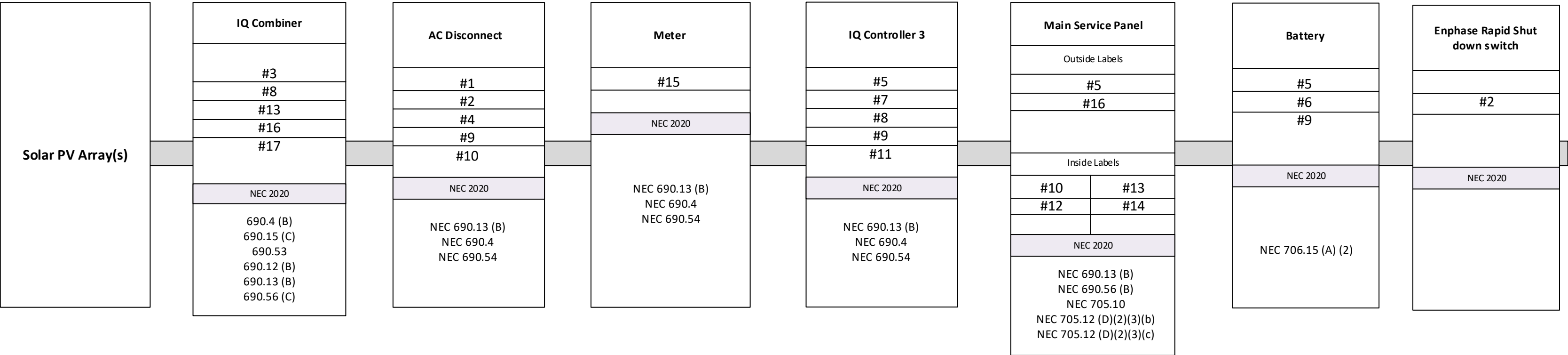
ANSI C
17" X 22"

Sheet Number:

PV1

NABCEP
CERTIFIED
PV Installation
Professional
Ali Buttar
PVIP #031310-32

05-05-2025



LABELING AND WARNING
SIGNS: NEC 2020

A. PURPOSE
PROVIDE EMERGENCY RESPONDERS WITH APPROPRIATE WARNING AND GUIDANCE WITH RESPECT TO ISOLATING THE SOLAR ELECTRIC SYSTEM. THIS CAN FACILITATE IDENTIFYING ENERGIZED ELECTRICAL LINES THAT CONNECT THE SOLAR PANELS TO THE INVERTER, AS SHOULD NOT BE CUT WHEN VENTING FOR SMOKE REMOVAL.

B. MAIN SERVICE DISCONNECT:

1. RESIDENTIAL BUILDINGS- THE MARKING MAY BE PLACED WITHIN THE MAIN SERVICE DISCONNECT. THE MARKING SHALL BE PLACED ON THE OUTSIDE COVER IF THE MAIN SERVICE DISCONNECT IS OPERABLE WITH THE SERVICE PANEL CLOSED.

2. COMMERCIAL BUILDINGS- THE MARKINGS SHALL BE PLACED ADJACENT TO THE MAIN SERVICE DISCONNECT CLEARLY VISIBLE FROM THE LOCATION WHERE THE LEVER IS OPERATED

3. MARKINGS, VERBIAGE, FORMAT AND TYPE OF MATERIAL

a. VERBIAGE: CAUTION; SOLAR ELECTRIC SYSTEM CONNECTED

b. FORMAT:

(1) WHITE LETTERING ON A RED BACKGROUND

(2) MINIMUM 3/8 INCH LETTER HEIGHT

(3) ALL LETTERS SHALL BE CAPITALIZED

(4) ARIAL OR SIMILAR FONT, NON-BOLD

c. MATERIAL:

(1) REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (USE UL-969) AS STANDARD FOR WEATHER RATING); DURABLE ADHESIVE MATERIALS MEET THIS REQUIREMENT.

C. MARKING REQUIREMENTS ON CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, COMBINERS AND JUNCTION BOXES;

1. MARKING: PLACEMENT, VERBIAGE, FORMAT AND TYPE OF MATERIAL.

a. PLACEMENT: MARKINGS SHALL BE PLACED EVERY 10 (TEN) FEET ON ALL INTERIOR AND EXTERIOR DC CONDUITS, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES, AT TURNS ABOVE AND/OR BELOW PENETRATIONS, ALL COMBINERS AND JUNCTION BOXES.

b. VERBIAGE: CAUTION SOLAR CIRCUIT

c. THE FORMAT AND TYPE OF MATERIAL SHALL ADHERE TO SECTION B-3.B & C ABOVE

D. INVERTERS ARE NOT REQUIRED TO HAVE CAUTION MARKINGS

#1

PHOTOVOLATIC

AC DISCONNECT

#6

BATTERY

#12

WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

#2

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

#7

MAIN BATTERY SYSTEM DISCONNECT

#13

WARNING

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

#3

PHOTOVOLTVIC POWER SOURCE

OPERATING AC VOLTAGE 240 V

MAXIMUN OPERATING AC OUTPUT CURRENT 63.2 A

#8

WARNING

THREE POWER SOURCES

SOURCES: UTILITY GRID, BATTERY AND PV SOLAR ELECTRIC SYSTEM

#14

WARNING

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

#4

AC DISCONNECT PHOTOVOLTAIC SYSTEM POWER SOURCE

RATED AC OUTPUT CURRENT 63.2 AMPS

NOMINAL OPERATING AC VOLTAGE 240 VOLTS

#9

SERVICE DISCONNECT LOCATED IN THE IQ CONTROLLER 3

#15

WARNING

THIS SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

#5

SOLAR AC DISCONNECT LOCATED AT SOUTH SIDE WALL OF THE HOUSE BESIDE THE UTILITY METER

#10

BATTERY DISCONNECT LOCATED IN THE IQ CONTROLLER 3

#16

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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

#11

WARNING

SOLAR ELECTRIC CIRCUIT BREAKER IS BACKFEED

#17

PHOTOVOLTAIC SYSTEM COMBINER PANEL DO NOT ADD LOADS



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PV Labels

JOB NUMBER:

25-222-JB

Date:

05/01/2025

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Sheet Size:

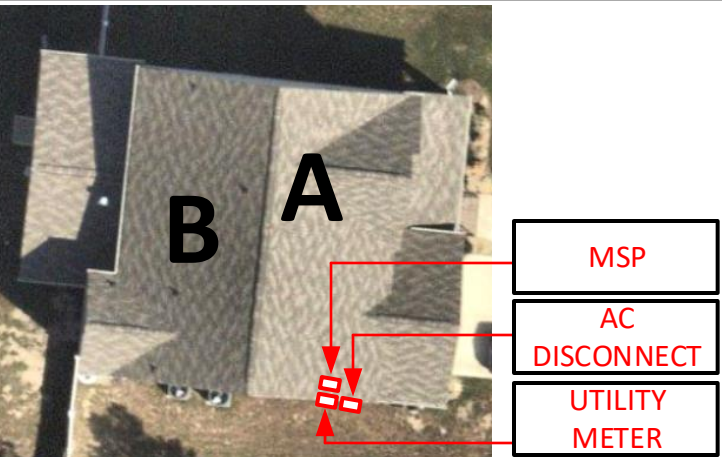
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Sheet Number:

PV3



05-05-2025



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Bill of Material

JOB NUMBER:

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Date:

05/01/2025

Revision:

A

Sheet Size:

ANSI C
17" X 22"

Sheet Number:

PV4



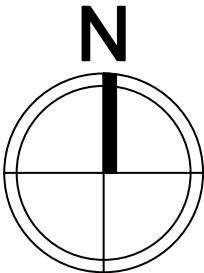
05-05-2025

PV LABELS		
Sr No	Code	Qty
05	8M-001	01
06	03-395	01
09	8M-002	01

ELECTRICAL ITEMS

- 01 x IQBATTERY-5P-1P-NA: IQ Battery 5P
- 01 x BRK-80A-2P-240V: Circuit Breaker, 2 pole, 80A (Eaton BR280B)
- 01 x CTRL-SC3-NA-01: Enphase Control Cable, 25ft

BILL OF MATERIAL
SCALE: 1/8" - 1'

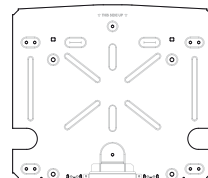
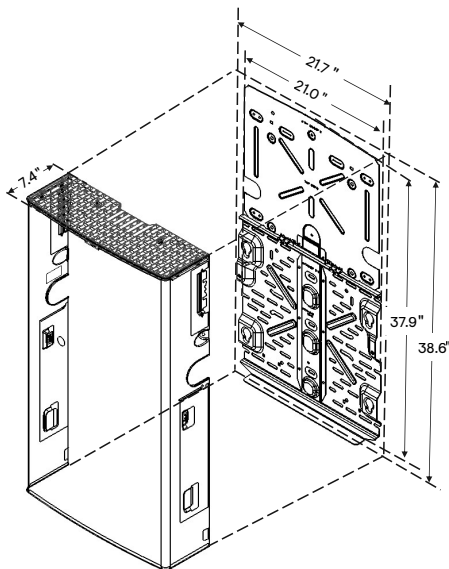




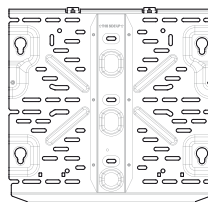
IQ Battery 5P

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



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
- 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

- Evaluated to UL 9540A for large scale fire testing and reduced separation distance as required in 2021 IRC R328.3.1, 2021 IFC 1207.1.5, and 2023 NFPA 855 15.3.1 and 9.1.5.¹
- 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 the left and right sides of the unit
Bottom mounting bracket and top shield	Bottom mounting bracket for mounting the battery on the wall. One top shield is required for UL9540A
M5 seismic screws	Two M5 seismic screws for securing the battery unit on the bottom mounting bracket
M4 grounding screws	Two M4 grounding screws for securing the top shield on the bottom mounting bracket
M5 ID cover grounding screws	Two M5 ID cover grounding screws for the EMI/EMC requirement
Cable ties	Six cable ties for securing field cables to the unit
Control (CTRL) connector	Spare CTRL connector without resistor for CTRL wiring
Control (CTRL) connector with resistor	Spare CTRL connector with resistor for CTRL wiring
Quick Install Guide (QIG)	QIG for IQ Battery unit installation instructions
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 bottom mounting 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 is preinstalled on the wiring cover for field replacement
OUTPUT (AC)	
@ 240 VAC ²	
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)
Load start capability	Up to 48 A LRA ³
Power factor (adjustable)	0.85 leading...0.85 lagging
Maximum units per 20 A branch circuit	One unit (single-phase)
Maximum conductor size supported	3 AWG
Overcurrent protection device (OCPD) for 3 AWG cable	80 A
Interconnection	Single-phase
AC round-trip efficiency ⁴	90%

²Supported in both grid-connected and backup/off-grid operation

³ Load start capability may vary

⁴ AC to the battery to AC at 50% power rating

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
Altitude	Up to 2,500 meters (8,202 feet)
Mounting	Wall-mount or pedestal-mount (sold separately)
FEATURES AND COMPLIANCE	
Compatibility	Compatible with IQ and M Series Microinverters, IQ System Controller 3/3G, IQ Combiner 5/5C, and 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 ⁵

⁵ Whichever occurs first. Restrictions apply

Revision history

REVISION	DATE	DESCRIPTION
DSH-00010-2.0	July 2023	<ul style="list-style-type: none">• Added battery isometric view on the first page.• Editorial updates.
DSH-00010-1.0	May 2023	Initial release.