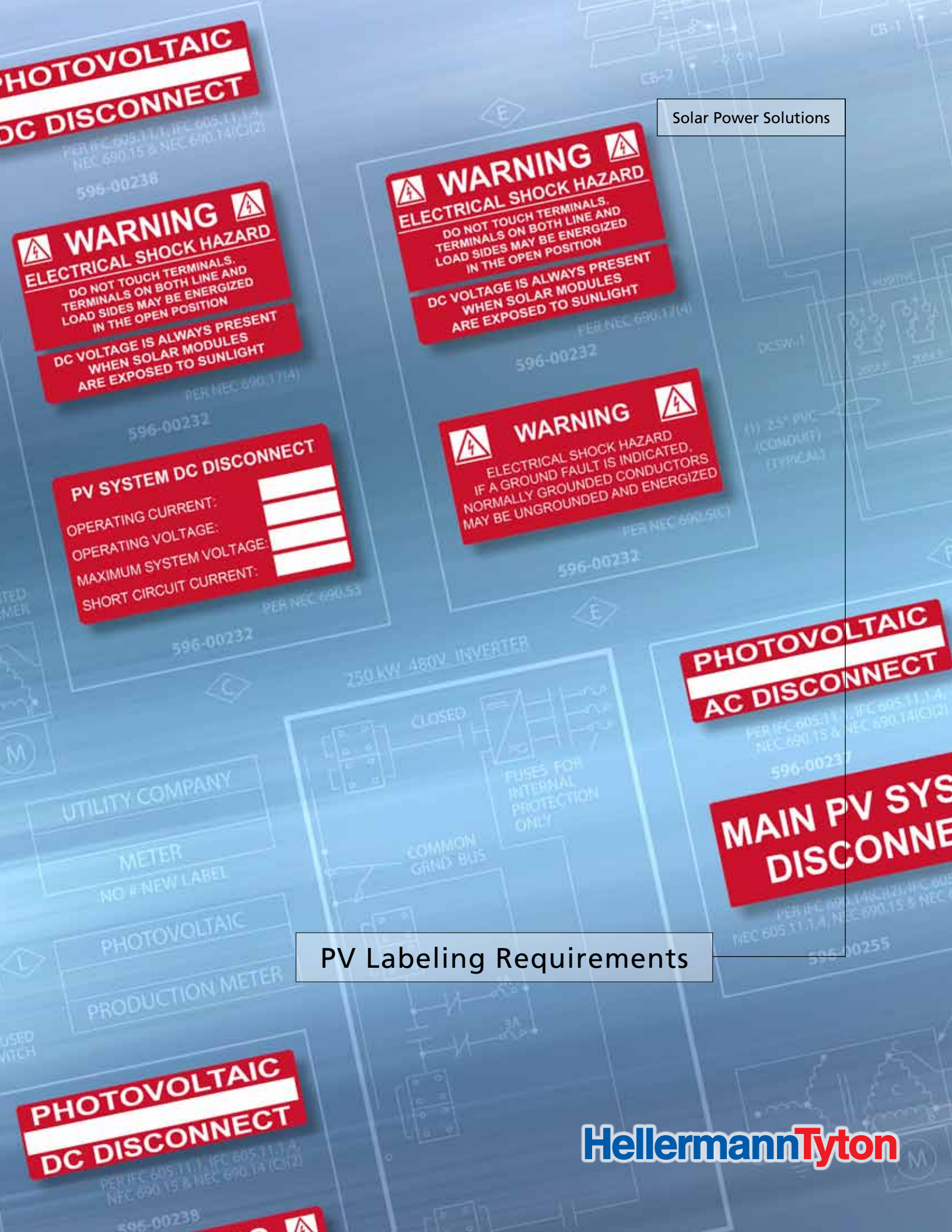
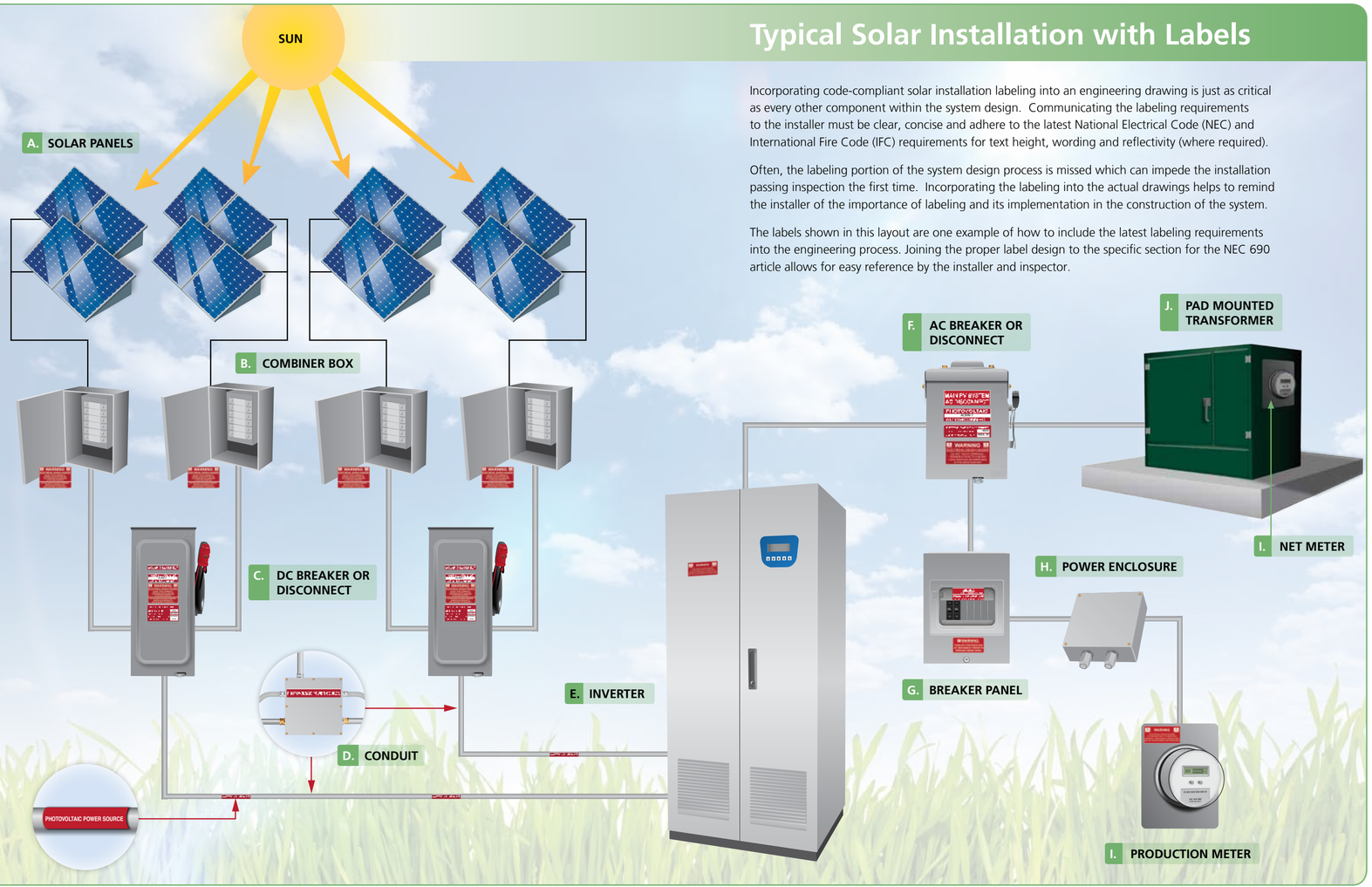


Solar Power Solutions

PV Labeling Requirements

HellermannTyton

Typical Solar Installation with Labels



Incorporating code-compliant solar installation labeling into an engineering drawing is just as critical as every other component within the system design. Communicating the labeling requirements to the installer must be clear, concise and adhere to the latest National Electrical Code (NEC) and International Fire Code (IFC) requirements for text height, wording and reflectivity (where required).

Often, the labeling portion of the system design process is missed which can impede the installation passing inspection the first time. Incorporating the labeling into the actual drawings helps to remind the installer of the importance of labeling and its implementation in the construction of the system.

The labels shown in this layout are one example of how to include the latest labeling requirements into the engineering process. Joining the proper label design to the specific section for the NEC 690 article allows for easy reference by the installer and inspector.

A. SOLAR PANEL — Solar Photovoltaic panels convert energy from the sun into DC power.

B. COMBINER BOX — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.

C. DC BREAKER or DC DISCONNECT — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.

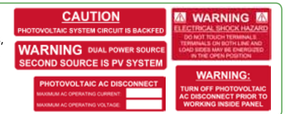
D. CONDUIT — The conduit routes and protects the solar power cables.

Must be reflective per IFC 605.11.1.1

E. INVERTER — The transformer converts the DC voltage into AC Voltage that can be sold back to the utility or consumed onsite.

F. AC BREAKER or AC DISCONNECT — The AC breaker cuts power coming from the transformer. The AC Breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a plaque or sign is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

G. BREAKER PANEL — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.



H. POWER ENCLOSURE — A power enclosure is simply a point where multiple power cables are spliced together.

I. PRODUCTION / NET METER — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offset the utility's electrical usage, saving both energy use and money.

J. PAD MOUNTED TRANSFORMER — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.

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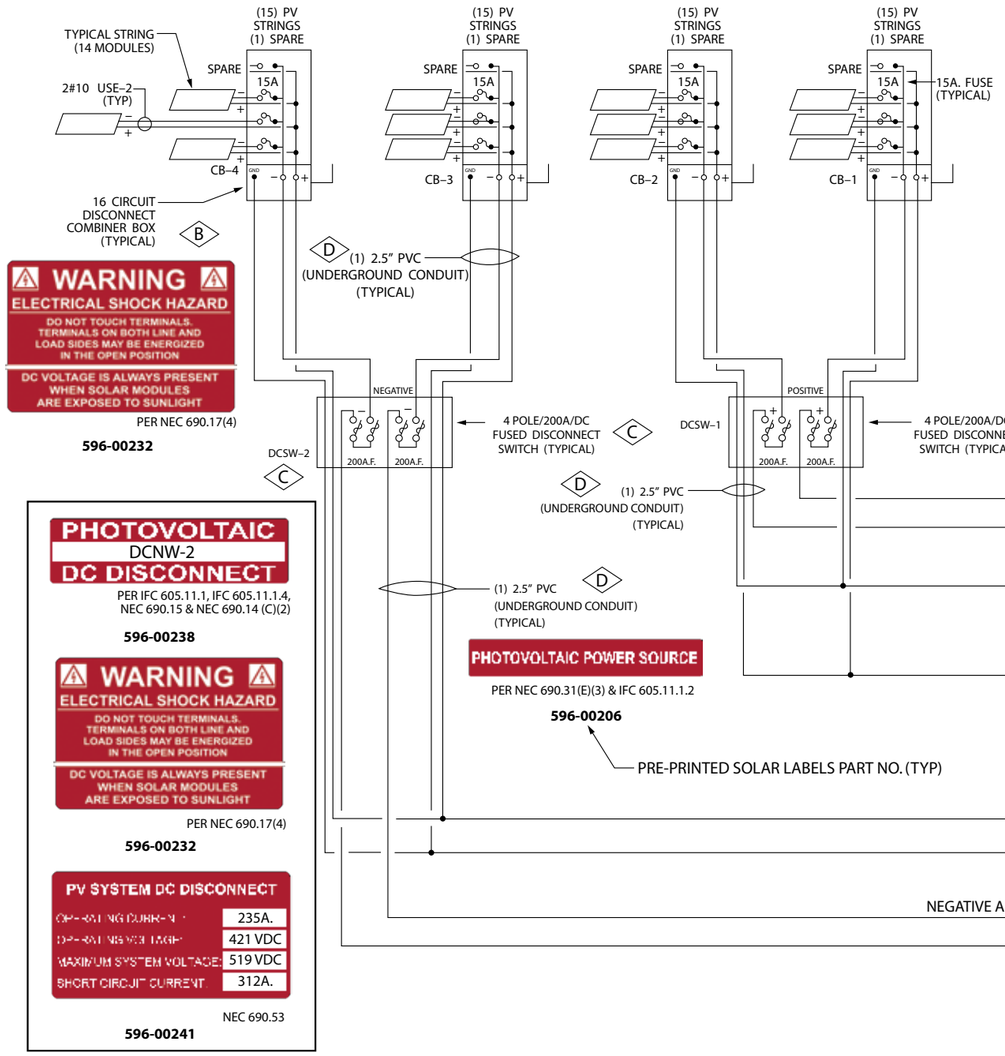
Engineering Schematic



PHOTOVOLTAIC
DCNW-1
DC DISCONNECT

PER IFC 605.11.1, IFC 605.11.1.4, NEC 690.15 & NEC 690.14(C)(2)

596-00238

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

PER NEC 690.17(4)

596-00232

PV SYSTEM DC DISCONNECT

OPERATING CURRENT:	235A.
OPERATING VOLTAGE:	421 VDC
MAXIMUM SYSTEM VOLTAGE:	519 VDC
SHORT CIRCUIT CURRENT:	312A.

PER NEC 690.53

596-00232

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

PER NEC 690.17(4)

596-00232

WARNING
ELECTRICAL SHOCK HAZARD
IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

PER NEC 690.5(C)

596-00232

PHOTOVOLTAIC
ACNW-1
AC DISCONNECT

PER IFC 605.11.1, IFC 605.11.1.4, NEC 690.15 & NEC 690.14(C)(2)

596-00237

MAIN PV SYSTEM AC DISCONNECT

PER IFC 605.14.(C)(2), IFC 605.11.1, NEC 690.11.1.4, NEC 690.15 & NEC 690.53

596-00255

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

PER IFC 690.17(4)

596-00233

PHOTOVOLTAIC AC DISCONNECT

MAXIMUM AC OPERATING CURRENT:	480V.
MAXIMUM AC OPERATING VOLTAGE:	400A. 3P.

PER NEC 690.14(C)(2)

596-00239

PHOTOVOLTAIC
DCNW-2
DC DISCONNECT

PER IFC 605.11.1, IFC 605.11.1.4, NEC 690.15 & NEC 690.14 (C)(2)

596-00238

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

PER NEC 690.17(4)

596-00232

PV SYSTEM DC DISCONNECT

OPERATING CURRENT:	235A.
OPERATING VOLTAGE:	421 VDC
MAXIMUM SYSTEM VOLTAGE:	519 VDC
SHORT CIRCUIT CURRENT:	312A.

NEC 690.53

596-00241

PHOTOVOLTAIC
ACNW-2
AC DISCONNECT

PER IFC 605.11.1, IFC 605.11.1.4, NEC 690.15 & NEC 690.14(C)(2)

596-00237

MAIN PV SYSTEM AC DISCONNECT

PER IFC 690.14(C)(2), IFC 605.11.1, NEC 605.11.1.4, NEC 690.15 & NEC 690.53

596-00255

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS. TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

PER NEC 690.14(4)

596-00233

PHOTOVOLTAIC AC DISCONNECT

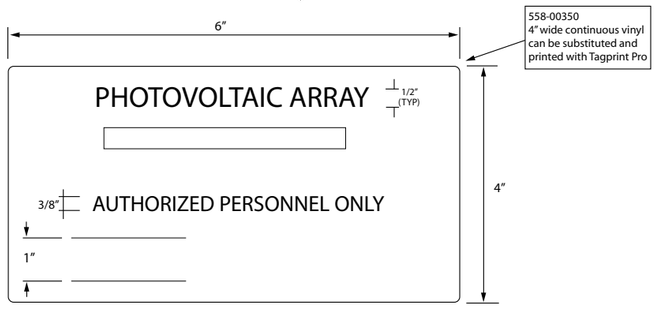
MAXIMUM AC OPERATING CURRENT:	480V.
MAXIMUM AC OPERATING VOLTAGE:	30A. 3P.

PER NEC 690.14(C)(2)

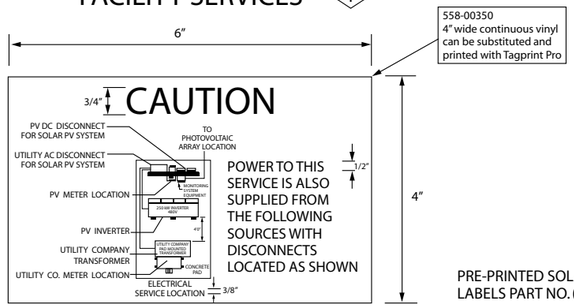
596-00239

PRE-PRINTED SOLAR LABELS PART NO. (TYP) → **596-00239**

WEST ENTRANCE 3



FACILITY SERVICES 1



LABEL AND MARKINGS LEGEND:

- B — PHOTOVOLTAIC COMBINER BOX GENERIC WARNING LABEL APPLIED TO ALL PHOTOVOLTAIC COMBINER BOXES; 1 PER COMBINER BOX (4 TOTAL).
- C — PHOTOVOLTAIC SYSTEM DC DISCONNECT WARNING LABEL WITH SYSTEM SPECIFICATIONS, APPLIED TO ALL PHOTOVOLTAIC DC DISCONNECTS; 1 PER DC DISCONNECT (2 TOTAL).
- D — PHOTOVOLTAIC SYSTEM WARNING. ELEVTRICAL SHOCK HAZARD, DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNDERGROUND AND MAY BE ENERGIZED. 1 PER UNDERGROUND FEEDER (10 TOTAL).
- E — PHOTOVOLTAIC INVERTER GENERIC WARNING APPLIED TO ALL INVERTERS; 1 PER INVERTER (1 TOTAL).
- F — PHOTOVOLTAIC SYSTEM AC DISCONNECT WARNING LABEL WITH SYSTEM SPECIFICATIONS, APPLIED TO ALL PHOTOVOLTAIC AC DISCONNECTS; 1 PER AC DISCONNECT (2 TOTAL).
- I — LABEL FOR SYSTEM OWNER KWH PRODUCTION METER; 1 PER MONITORING SYSTEM METER (1 TOTAL).
- J — UTILITY CONNECTION GENERIC WARNING LABEL APPLIED TO UTILITY PHOTOVOLTAIC SYSTEM TRANSFORMER; 1 PER UTILITY SERVICE (1 TOTAL).
- 1 — PROVIDES THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC DISCONNECTING MEANS. THIS PLAQUE SHALL BE APPLIED TO THE MAIN SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC DISCONNECTION MEANS; 1 PER POCC (1 TOTAL).
- 2 — LABEL FOR REQUIRED UTILITY COMPANY METER SOCKET; 1 PER UTILITY METER (1 TOTAL).
- 3 — LABEL FOR WEST ENTRANCE. INSTALL SIGNAGE ON ENTRANCE DOOR AT EYE LEVEL.

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