PHOTOVOLTAIC SYSTEMS

PV WORKSHEET – STANDARD STRING ARRAY

Solar photovoltaic (PV) systems have widely gained acceptance as an alternative energy source. Installations range from small arrays supplying bus stop luminaires to large arrays that cover acres. Since each installation comes with its own characteristics, this worksheet has been provided for the installer to complete and submit to his/her electrical inspector for obtaining a permit. The entire PV system installation must comply with Article 690 of the 2014 National Electrical Code (NEC).

To obtain a permit, please provide the following documentation to Rock Island County Building & Zoning:
1. Pages 2, 3, and 4 of this document
2. Equipment spec/cut sheets for grounding/bonding fittings, modules, inverters, micro inverters, or optimizers (if these are not available, complete Page 4 of this document)
3. A one-line diagram of the PV system including service interconnection
4. A site plan showing the relative location of the array and the PV equipment on the property. Also provide the location of service and distance from array

A PV installer is allowed to construct the support system; mount the modules, inverters, or optimizers; and connect the factory-provided module wiring harness (plug and play). The remainder of the installation, such as panelboards, raceways, boxes, fittings, breakers, and building wire, shall be installed by a licensed electrical contractor.

PHOTOVOLTAIC SYSTEMS

PV SYSTEM INFORMATION

TYPE OF ARRAY					
	Y	N		Y	N
Roof array?			Rapid shutdown required (690.12)?		
Ground array?			Guarding of conductors required (690.31A)?		

PV SYSTEM OVERVIEW		LOAD SIDE CONNECTION[1]	
Maximum system voltage		Service voltage	
# Modules/string		Service panel main breaker	
# Strings in system		Service panel bus rating	
Maximum circuit current		Service conductor size	
Battery storage?	Y N	PV system OCPD[2] rating	

CALCULATIONS:

MAXIMUM SYSTEM VOLTAGE – 690.7(A):

(Voc) (module label) x Thermal Coefficient[3] x # of modules/string = V_{MAX}

MAXIMUM CIRCUIT CURRENT – 690.8(a)(1):

(Isc) (module label) x (sum of paralleled modules) x 125% = I_{MAX}

OVERCURRENT DEVICE RATING – 690.9(B):

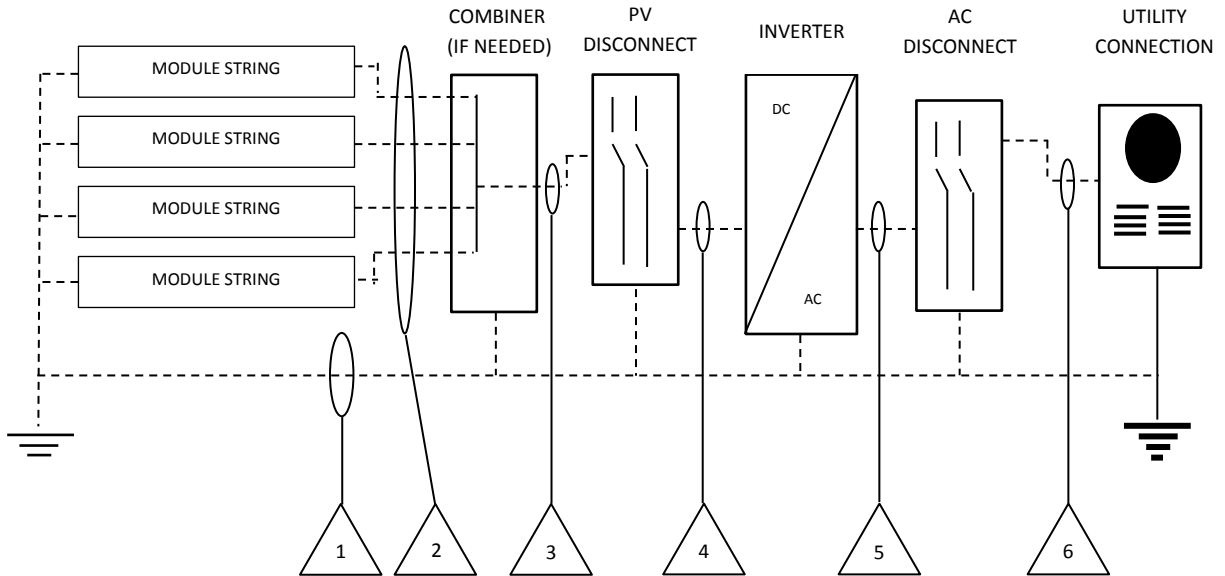(I_{MAX}) x 125% = OCPD

[1] Supply side connections may be allowed by your utility and shall comply with 705.12(A)

[2] OCPD – Overcurrent Protective Device

PHOTOVOLTAIC SYSTEMS

CONDUCTOR AND RACEWAY SCHEDULE

Δ	CONDUCTOR TYPE			CONDUCTOR AWG	CONDUIT TYPE	CONDUIT SIZE
1	Copper Grounding Electrode Conductor Copper Equipment Grounding Conductor					
2	PV Source Conductors Use-2 PV Wire					
3	THWN-2	XHHW-2	RHW-2			
4	THWN-2	XHHW-2	RHW-2			
5	THWN-2	XHHW-2	RHW-2			
6	THWN-2	XHHW-2	RHW-2			

PHOTOVOLTAIC SYSTEMS

PV WORKSHEET – MICRO-INVERTER ARRAY

Solar photovoltaic (PV) systems have widely gained acceptance as an alternative energy source, and installations range from small arrays supplying bus stop luminaires to large arrays that cover acres. Since each installation comes with its own characteristics, this worksheet has been provided for the installer to complete and submit to his/her electrical inspector for obtaining a permit. The entire PV system installation must comply with Article 690 of the 2014 National Electric Code (NEC).

To obtain a permit, please provide the following documentation to Rock Island County Building & Zoning:

1. Pages 2, 3, and 4 of this document
2. Equipment spec/cut sheets for grounding/bonding fittings, modules, inverters, micro inverters, or optimizers (if these are not available, complete page 4 of this document)
3. A one-line diagram of the PV system including service interconnection
4. A site plan showing the relative location of the array and the PV equipment on the property. Also provide the location of service and distance from array.

A PV installer is allowed to construct the support system; mount the modules, inverters, or optimizers; and connect the factory-provided module wiring harness (plug and play). The remainder of the installation, such as panelboards, raceways, boxes, fittings, breakers, and building wire shall be installed by a licensed electrical contractor.

PHOTOVOLTAIC SYSTEMS

PV SYSTEM INFORMATION

TYPE OF ARRAY					
	Y	N		Y	N
Roof array?			Rapid shutdown required (690.12)?		
Ground array?			Guarding of conductors required (690.31A)?		

PV SYSTEM OVERVIEW		LOAD SIDE CONNECTION[1]	
Maximum system voltage		Service voltage	
# Modules/string		Service panel main breaker	
# Strings in system		Service panel bus rating	
Maximum circuit current		Service conductor size	
Battery storage?	Y N	PV system OCPD[2] rating	

CALCULATIONS:

MAXIMUM SYSTEM VOLTAGE – 690.7(A):

(Voc) (module label) x Thermal Coefficient[3] x # of modules/string = V_{MAX}

MAXIMUM CIRCUIT CURRENT – 690.8(a)(1):

(Isc) (module label) x (sum of paralleled modules) x 125% = I_{MAX}

OVERCURRENT DEVICE RATING – 690.9(B):

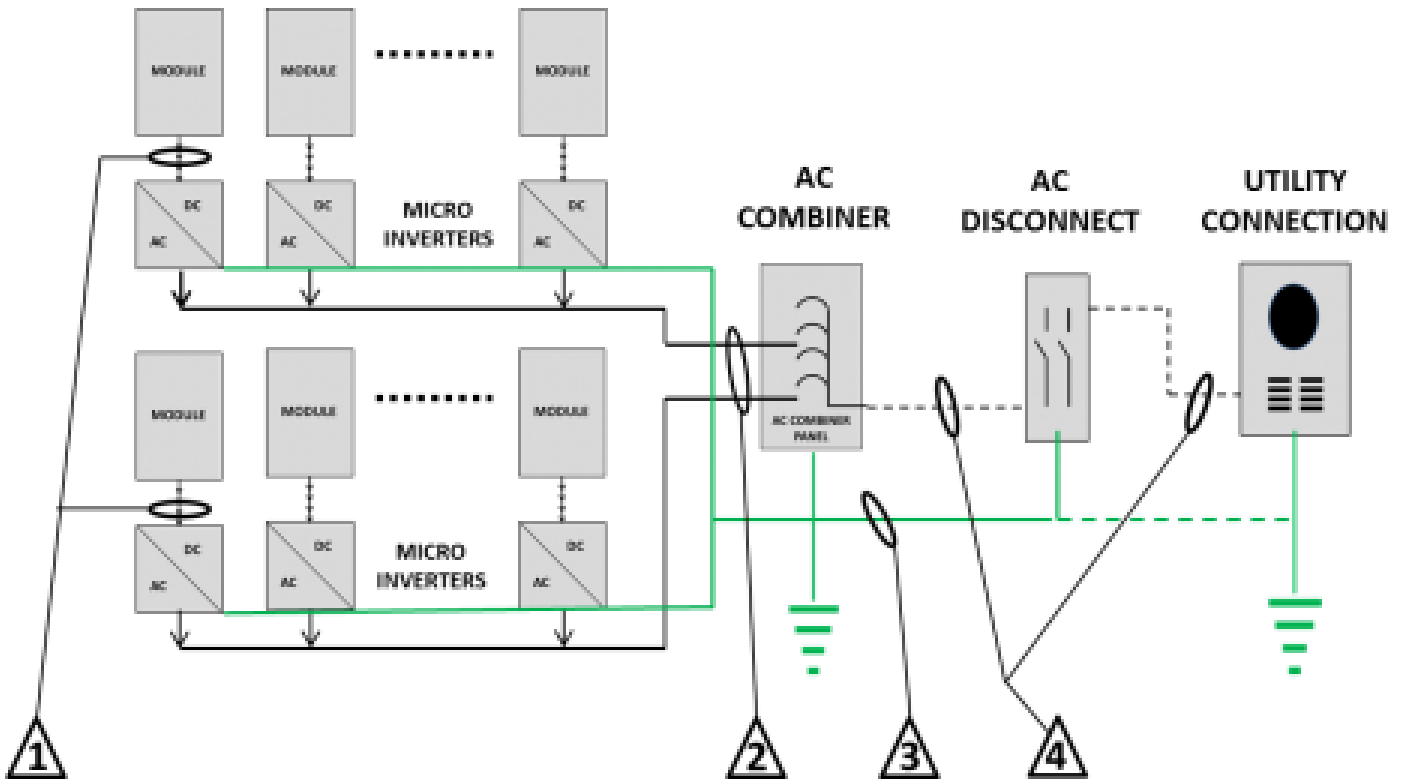(I_{MAX}) x 125% = OCPD

[1] Supply side connections may be allowed by your utility and shall comply with 705.12(A)

[2] OCPD – Overcurrent Protective Device

PHOTOVOLTAIC SYSTEMS

CONDUCTOR AND RACEWAY SCHEDULE

Δ	CONDUCTOR TYPE	CONDUCTOR AWG	CONDUIT TYPE	CONDUIT SIZE
1	PV Source Conductors USE-2 PV Wire	MFG Cable		
2	Exterior cable listed with inverter	MFG Cable		
3	Grounding electrode conductor/Equipment grounding conductor			
4	THWN-2 XHHW-2 RHW-2			

PHOTOVOLTAIC SYSTEMS

COMPONENT RATINGS

PV MODULE RATINGS	
Module Name	
Module Model	
Open Circuit Voltage	
Short Circuit Current	
Maximum Power	
Maximum Voltage	
Thermal Coefficient[3]	
INVERTER RATINGS	
Inverter Name	
Inverter Model	
Maximum DC Volt Rating	
Maximum Power at 40°	
Nominal AC Voltage	
Maximum AC Current	
Maximum OCPD	

[3]Use thermal coefficient as provided by manufacturer. If not provided, use 1.20. (690.7)