

# OVER-THE-COUNTER ELECTRICAL PERMIT CHECKLIST FOR RESIDENTIAL SOLAR PHOTOVOLTAIC SYSTEMS

Contractors can apply for an Over-The-Counter (OTC) permit where the PV system meets the requirements listed in this Checklist and use a template electrical diagram provided by the City or other approved diagram. All project plans and supporting documentation must be provided on site for the inspector.

-----TO BE COMPLETED BY APPLICANT-----

## 1 Project Information

Property Owner Name:			
Project Address:		Parcel #	
	City:	State:	ZIP:
Day Phone:			
Contractor Name			
Contractor License #:			
Contractor Day Phone:			
PV system description (include manufacturer and model # of PV modules and inverters):			

## 2 Determine if your project qualifies for an Over-the-Counter electrical permit

	Yes	No	N/A
1. PV modules, inverters, and combiner boxes are identified for use in PV systems.	<input type="checkbox"/>	<input type="checkbox"/>	
2. The inverters are listed and labeled in accordance with UL 1741 and are listed for utility interaction. [IRC M2302.4]	<input type="checkbox"/>	<input type="checkbox"/>	
3. The AC interconnection point is on the load side of service disconnect. [NEC 690.64(B)]	<input type="checkbox"/>	<input type="checkbox"/>	
4. The system meets all current NEC, City and Washington Cities Electrical Code requirements.	<input type="checkbox"/>	<input type="checkbox"/>	
5. For Split-Buss modules the AC interconnection must be one of the six service disconnects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Maximum load added to the panelboard is based on the rating of the panelboards bus/main OCPD combination in accordance with NEC 705.12(D)(2)(3)(b), and is limited to (check combination that applies):			
<input type="checkbox"/> 225 amp bus/200 amp main OCPD - 13,440 AC watts, maximum 70 amp inverter OCPD.			
<input type="checkbox"/> 225 amp bus/225 amp main OCPD - 8,640 AC watts, maximum 45 amp inverter OCPD.			
<input type="checkbox"/> 200 amp bus/200 amp main OCPD - 7,860 AC watts, maximum 40 amp inverter OCPD.			
<input type="checkbox"/> 150 amp bus/150 amp main OCPD - 5,760 AC watts, maximum 30 amp inverter OCPD.			
<input type="checkbox"/> 125 amp bus/125 amp main OCPD - 4,800 AC watts, maximum 25 amp inverter OCPD.			
<input type="checkbox"/> 125 amp bus/100 amp main OCPD - 9,600 AC watts, maximum 50 amp inverter OCPD.			

<input type="checkbox"/> 100 amp bus/100 amp main OCPD - 3,840 AC watts, maximum 20 amp inverter OCPD. <input type="checkbox"/> Other- Electrical Permit with Plan Review Required <i>Note 1: Listed un-altered factory main/bus combination. Alteration of the panelboard main OCPD will require plan review.</i> <i>Note 2: The circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents as calculated in 690.8(A). The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B) and (C).NEC 690.8(B)(1)</i> <i>Note 3: If a panelboard employs a snap switch rated 30 amperes or less in any branch circuit, it cannot be rated more than 200 amperes unless there is a supply side overcurrent protection at 200 amperes or less within the panelboard. This requirement does not apply to panelboards equipped with circuit breakers. Section 408.36(A) of the NEC.</i>	
7. I have attached the following Electrical One-Line Diagram: <input type="checkbox"/> Standard Electrical Diagram- 6 Strings or Less <input type="checkbox"/> Standard Electrical Diagram- 4 Strings or Less <input type="checkbox"/> Standard Electrical Diagram- Micro Inverter <input type="checkbox"/> None of the above- Electrical Permit with Plan Review Required	
Comments:	

 If you answered yes to all of the above questions, your project qualifies for over the Over-the-Counter electrical permit.

**3** Submit this Checklist, the Electrical Permit Application, One-line Diagram, and Site Plan to:

*[insert contact info for jurisdiction having authority]*

 As the property owner or authorized representative of the above listed property, I attest that all information in this checklist is accurate to the best of my knowledge

Applicant Signature:	Date:
Applicant Name (Please Print):	

-----TO BE COMPLETED BY CITY STAFF-----

Qualifies for Electrical OTC? <input type="checkbox"/> Yes <input type="checkbox"/> No	Permit #:
Staff Initials _____ Date:	

## Solar PV Electrical One-Line Diagram Requirements

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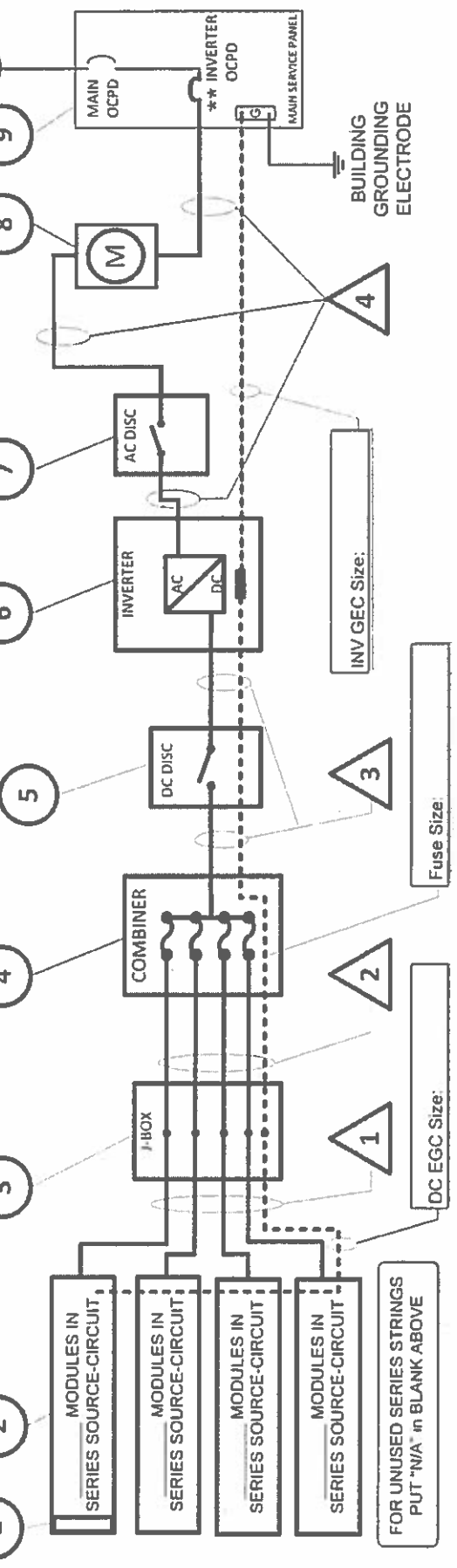
The electrical one-line diagram must be used to accurately represent the electrical components of the solar PV system and shall include:

- The correct conductor sizing based on the ambient temperature, number of conductors, and distance of conduit off the roof.
  - The correct "Output circuit" conductors sizing from the combiner to the inverter based on the number of strings multiplied by the "Max amps."
  - Where a combiner box is installed, or where more than two strings of modules are electrically connected together in "parallel," each individual string shall be protected by its own overcurrent protection device or feeders are for the sum of the short circuit current of all strings. The fuse or breaker shall be listed as being suitable for use in a DC circuit and shall meet or exceed the maximum voltage of the circuit. The rating of the fuse or circuit breaker shall not be larger than the maximum size specified on the lowest rated module in the string.
  - Per NEC Section 690.31(E), metallic raceway and enclosures must be used where DC wiring is installed inside of the house.
  - Grounding on the DC side of the inverter requires a minimum #8 copper grounding electrode conductor run un-spliced from the factory identified system grounding terminal of the inverter to the grounding electrode system of the house.
  - The inverter shall be listed and labeled by a recognized electrical testing laboratory and be identified as "Utility interactive."
  - Inverter ground fault protection (GFP) shall comply with NEC 690.5.
  - A performance meter and a safety disconnect switch may be required to be installed between the PV power source and the electrical utility equipment. Contact the local serving utility for requirements. Where a performance meter is required by the local utility to record the power produced by the PV system, the output wiring from the inverter shall always connect to the "LINE" side terminals of the meter.
  - Where disconnect switches (with or without fuses) are installed in the circuit from the inverter output terminals to the house electrical panel, the wiring originating at the inverter(s) shall always connect to the "LOAD" side terminals of ANY disconnect that has been installed.
  - The connection to the service panel shall be through a dedicated circuit breaker that connects to the panel bus bars in an approved manner.
  - "Load Side Taps" where the inverter AC wiring does not terminate using a dedicated breaker or set of fuses are prohibited under ANY condition by NEC 690.64(B).
  - The location of the PV backfed breaker must be identified per 690.64(B)(7) with the following verbiage: **"WARNING INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THE OVERCURRENT DEVICE."**
  - Where it is not possible to locate the PV breakers at opposite ends of the panel bus, the sum of the two PV breakers is not permitted to exceed 100% of the bus rating per NEC 690.64(B)(7)
  - Per NEC 690.53, a permanent label for the DC power source shall be installed at the PV DC disconnecting means. This label shall show the following:
    - Rated maximum power-point current.
    - Rated maximum power-point voltage.
    - Maximum system voltage.
    - Short circuit current of the PV system.
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### EQUIPMENT SCHEDULE

TAG	MAKE	MODEL	HEIGHT FROM ROOF	WIDTH	HEIGHT	NEMA RATING
1	SOLAR PV MODULE					
2	PV ARRAY					
3	J-BOX					
4	COMBINER					
5	DC DISCONNECT					
6	DC/AC INVERTER					
7	AC DISCONNECT					
8	PRODUCTION METER					
9	SERVICE PANEL					

MAIN OCPD: \_\_\_\_\_ BUS AMP: \_\_\_\_\_ INVERTER OCPD: \_\_\_\_\_  
 METER # \_\_\_\_\_  
 DC AMP: \_\_\_\_\_ MAKE: \_\_\_\_\_  
 VDC: \_\_\_\_\_  
 VAC: \_\_\_\_\_  
 AMPS: \_\_\_\_\_ MODEL: \_\_\_\_\_  
 (Check with serving utility for meter requirements & location)



**Standard Electrical Diagram - Residential Small Scale PV System**  
**Central Inverter Systems**  
 THIS PLAN MUST BE PROVIDED TO THE INSPECTOR AT THE JOB SITE  
 Site Name: \_\_\_\_\_  
 Site Address: \_\_\_\_\_  
 This plan is NOT intended to be used with micro inverters or transformer-less inverters. Conductors, where installed outdoors in raceways shall be "W" rated and have an insulation rating of 90 deg C.  
 Rev - 02/21/2013

Conductor Insulation Type	CU/AL	Conductors		#Dereated Amps	Raceway		Ambient Temp		Distance of Roof
		Size	Num		Size	Type	Roof	Attic	
1									
2									
3									
4									

\* Note Derating of conductors based on number of conductors in raceway, ambient temp and distance of roof where applicable. (NEC 310.15)  
 \*\* Note Conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents. (NEC 690.8(B))

**NOTES for Residential Small Scale PV System Electrical Diagram**

Permit #:	Date:
Contractor:	
Job Address:	
Contact Name:	
Contact Phone:	

**SIGNS**

<b>SIGN FOR DC DISCONNECT</b>	
PHOTOVOLTAIC POWER SOURCE	
RATED MPP CURRENT	A
RATED MPP VOLTAGE	V
MAX SYSTEM VOLTAGE	V
MAX CIRCUIT CURRENT	A
WARNING: ELECTRICAL SHOCK HAZARD—LINE AND LOAD MAY BE ENERGIZED IN OPEN POSITION	
SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)	
SOLAR PV SYSTEM	
AC POINT OF CONNECTION	
AC OUTPUT CURRENT	A
NOMINAL AC VOLTAGE	V
THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)	

**PV MODULE RATINGS**

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT ( $I_{mp}$ )	A
MAX POWER-POINT VOLTAGE ( $V_{mp}$ )	V
OPEN-CIRCUIT VOLTAGE ( $V_{oc}$ )	V
SHORT-CIRCUIT CURRENT ( $I_{sc}$ )	A
MAX SERIES FUSE (OCPD)	A
MAXIMUM POWER ( $P_{max}$ )	W
MAX VOLTAGE (TYP 600V <sub>dc</sub> )	V
VOC TEMP COEFF (mV/°C □ or %/°C □)	
IF COEFF SUPPLIED, CIRCLE UNITS	

**INVERTER RATINGS**

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	V
MAX POWER @ 40°C	W
NOMINAL AC VOLTAGE	V
MAX AC CURRENT	A
MAX OCPD RATING	A

LOWEST EXPECTED AMBIENT TEMP:	°C
HIGHEST CONTINUOUS TEMPERATURE:	°C

INVERTER	PANELBOARD	
	OCPD Size	Main Bus
Maximum Current	Main OCPD	Main OCPD
56 amps	70 amps	225 amps
36 amps	45 amps	225 amps
33 amps	40 amps	200 amps
24 amps	30 amps	150 amps
20 amps	25 amps	125 amps
16 amps	20 amps	100 amps

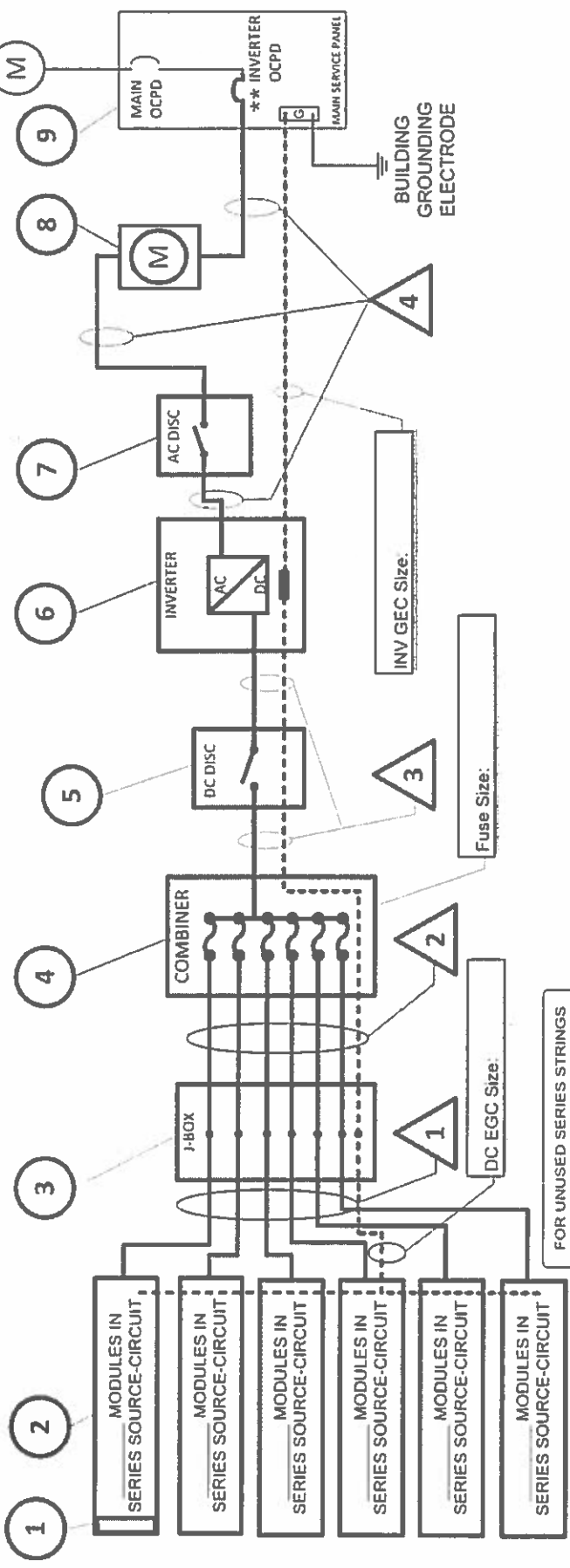
NEC 690.8(B) Photovoltaic system currents shall be considered continuous.  
 NEC 690.8(B)(1) The circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents calculated in 690.8(A).  
*Exception: Circuits containing an assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be utilized at 100 percent of its rating.*  
 All signage and markings shall be a phenolic or metallic plate or other similar material in block letters 1/4 inch or greater in height, and suitable for the environment. Letters and background shall be in contrasting colors. Screws, rivets or other approved means shall be used to affix plates to equipment.

### EQUIPMENT SCHEDULE

Permit #:	Contractor - Installer Information	
Name:	Date:	
Address:		
Contact Name:		
Contact Phone:		
Email:		

1	SOLAR PV MODULE	MAKE:	MODEL:	(Attach Cut Sheet - See notes for ratings)
2	PV ARRAY	WEIGHT:	HEIGHT FROM ROOF:	(Attach cut sheet of mounting system)
3	J-BOX	LENGTH:	WIDTH:	HEIGHT:
4	COMBINER	MAKE:	MODEL:	NEMA RATING:
5	DC DISCONNECT	VDC:	DC AMP:	MAKE:
6	DC/AC INVERTER	MAKE:	AMPS:	MODEL:
7	AC DISCONNECT	VAC:	AMPS:	MODEL:
8	PRODUCTION METER	METER #:	(Check with serving utility for meter requirements & location)	
9	SERVICE PANEL	VAC:	MAIN OCPD:	BUS AMP:
				INVERTER OCPD:



**Standard Electrical Diagram - Residential Small Scale PV System  
Central Inverter Systems**

THIS PLAN MUST BE PROVIDED TO THE INSPECTOR AT THE JOB SITE

Site Name: \_\_\_\_\_  
 Site Address: \_\_\_\_\_

This plan is NOT intended to be used with micro inverters or transformer-less inverters. Conductors, where installed outdoors in raceways shall be "W" rated and have an insulation rating of 90 deg C.

FOR UNUSED SERIES STRINGS PUT "N/A" IN BLANK ABOVE

TAG	Conductor Insulation Type	CU/AL	Conductors		*Dereated Amps	Raceway		Ambient Temp		Distance off Roof
			Size	Num		Size	Type	Roof	Attic	
1										
2										
3										
4										

\* Note: Derating of conductors based on number of conductors in raceway, ambient temp and distance off roof where applicable. (NEC 310.15)  
 \*\* Note: Conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents. (NEC 690.8(B))

**NOTES for Residential Small Scale PV System Electrical Diagram**

Permit #:	Date:
Contractor:	
Job Address:	
Contact Name:	
Contact Phone:	

**SIGNS**

**SIGN FOR DC DISCONNECT**

PHOTOVOLTAIC POWER SOURCE	
RATED MPP CURRENT	A
RATED MPP VOLTAGE	V
MAX SYSTEM VOLTAGE	V
MAX CIRCUIT CURRENT	A
WARNING: ELECTRICAL SHOCK HAZARD—LINE AND LOAD MAY BE ENERGIZED IN OPEN POSITION	

**SIGN FOR INVERTER OCPD AND AC DISCONNECT (IF USED)**

SOLAR PV SYSTEM AC POINT OF CONNECTION	
AC OUTPUT CURRENT	A
NOMINAL AC VOLTAGE	V
THIS PANEL FED BY MULTIPLE SOURCES (UTILITY AND SOLAR)	

**PV MODULE RATINGS**

MODULE MAKE	
MODULE MODEL	
MAX POWER-POINT CURRENT ( $I_{mp}$ )	A
MAX POWER-POINT VOLTAGE ( $V_{mp}$ )	V
OPEN-CIRCUIT VOLTAGE ( $V_{oc}$ )	V
SHORT-CIRCUIT CURRENT ( $I_{sc}$ )	A
MAX SERIES FUSE (OCPD)	A
MAXIMUM POWER ( $P_{max}$ )	W
MAX VOLTAGE (TYP 600V <sub>DC</sub> )	V
VOC TEMP COEFF (mV/°C □ or %/°C □)	
IF COEFF SUPPLIED, CIRCLE UNITS	

**INVERTER RATINGS**

INVERTER MAKE	
INVERTER MODEL	
MAX DC VOLT RATING	V
MAX POWER @ 40°C	W
NOMINAL AC VOLTAGE	V
MAX AC CURRENT	A
MAX OCPD RATING	A

LOWEST EXPECTED AMBIENT TEMP:	°C
HIGHEST CONTINUOUS TEMPERATURE:	°C

INVERTER	PANELBOARD	
Maximum Current	Main Bus	Main OCPD
56 amps	225 amps	200 amps
36 amps	225 amps	225 amps
33 amps	200 amps	200 amps
24 amps	150 amps	150 amps
20 amps	125 amps	125 amps
16 amps	100 amps	100 amps

NEC 690.8(B) Photovoltaic system currents shall be considered continuous.  
 NEC 690.8(B)(1) The circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents calculated in 690.8(A).  
*Exception: Circuits containing an assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be utilized at 100 percent of its rating.*  
 All signage and markings shall be a phenolic or metallic plate or other similar material in block letters 1/4 inch or greater in height, and suitable for the environment. Letters and background shall be in contrasting colors. Screws, rivets or other approved means shall be used to affix plates to equipment.

**SITE PLAN**  
RESIDENTIAL SMALL SCALE PV SYSTEM

Permit #: \_\_\_\_\_ Date: \_\_\_\_\_

Job Address: \_\_\_\_\_

Contractor: \_\_\_\_\_ Contractor Phone: \_\_\_\_\_

Contact Name: \_\_\_\_\_ Contact Phone: \_\_\_\_\_

Provide roof outline with location of all PV panels, j-box, combiner and DC disconnect.