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Installation Manual

SOLAR METER SOCKET ADAPTER V5.2

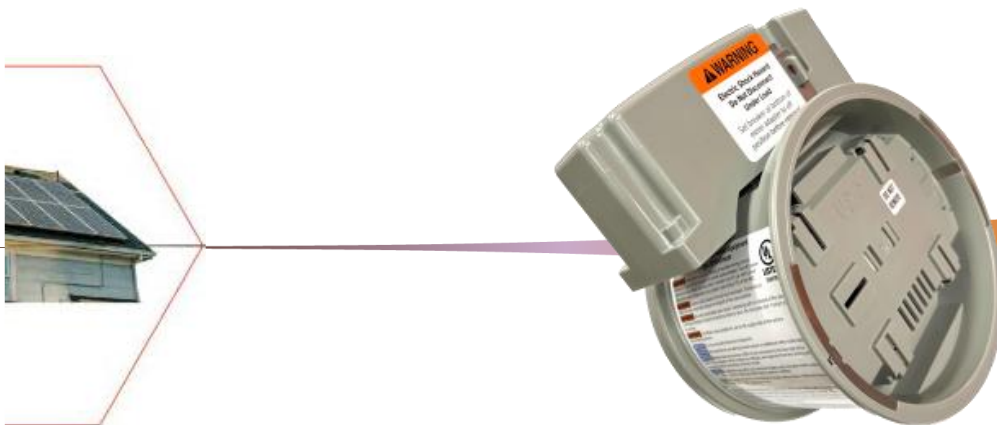


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SYMBOLS USED IN THIS MANUAL



WARNING

Designates information highlighting the risk of death, serious injury, or damage to property.



NOTE

Designates helpful information.

IMPORTANT SAFETY INFORMATION



WARNING – The ConnectDER Solar Meter Socket Adapter (MSA) contains live parts capable of causing death, injury, or damage to property. Wear appropriate PPE and follow your employer's safety procedures.

Always follow company and local safety/PPE requirements related to OSHA and NFPA 70E.

Installers must be intimately aware of local and company safety/PPE requirements. If safety/PPE requirements are unknown, STOP work. DO NOT proceed further. Installers must ensure all PPE has the minimum appropriate rating for the application.

The governing electric utility may require a power outage to de-energize the meter socket to perform work in and/or terminate the neutral conductor. A neutral conductor is furnished and must be installed with each Solar Meter Socket Adapter. Please follow the prescribed process for work in meter sockets by the governing utility.

The installer assumes all responsibility and risk associated with the safe and intended use of the Solar MSA as expressed in the current installation document. Any deviation from the methods or applications in this manual will violate the product's UL listing, NEC Article 110.3(B), and void the product warranty.

Contact ConnectDER, Inc. at support@connectder.com for technical support with installing, replacing, and/or servicing the Solar MSA. Always follow the requirements of the serving electric utility and Authority Having Jurisdiction (AHJ).

Please read these instructions in their entirety before installing a Solar MSA.

INTRODUCTION

It is the responsibility of the party (“the installer”) installing, replacing, and/or servicing the Solar MSA to obtain and follow the most current installation document, found here:

<https://connectder.com/installers/>

QR CODE



The Solar MSA is a UL Listed device that enables rapid interconnection of grid-ready distributed energy resources (DERs). It creates a safe, standardized, low-cost alternative to traditional wiring methods.

Underwriters Laboratories, Inc. (UL) grants its listing after verifying that products meet a high level of safety and quality, and conform to numerous codes and standards, including the 2023 edition of the National Electrical Code (NEC).

The Solar MSA operates in parallel with the utility grid. It is approved for use with interconnected electric power production sources in accordance with Article 705 of the NEC such as Listed grid-interactive photovoltaic (PV) systems where the inverter(s) meets UL 1741 requirements.

CAUTION - The Solar MSA is only intended for installation on the supply side of the service disconnecting means. The Solar MSA must be installed only with the connection module at the top and the PV/DER circuit breaker at the bottom. Do not install the Solar MSA in any other orientation. The installer must furnish an electrical insulation blanket and hot jaw safety cover mentioned in the installation steps in this document. Installation and servicing of the Solar MSA, associated wiring and interconnections must be performed only by qualified personnel.

Turn off the power supply and all other potential electricity sources before installing or servicing the Solar MSA. The graphics in this document mostly depict deenergized equipment.

Comply with national and local codes for rules governing backfeeding power. Follow the serving electric utility's meter removal and installation rules. The installer must furnish and use 1" trade size liquid-tight flexible conduit complying with the Standard for Liquid-Tight Flexible Metal Conduit, UL 360, or the Standard for Liquid-Tight Flexible Nonmetallic Conduit, UL 1660, and fittings complying with UL 514B. The Solar MSA has no Wi-Fi or other communications capability.

Use a calibrated voltmeter to confirm conductive parts are deenergized before touching. Install the Solar MSA using factory-insulated tools.

Do not alter the Solar MSA or any other equipment or conductor in a manner that would void its listing or warranty. Do not attempt to replace the integrated circuit breaker(s) or modify any other components. ConnectDER recommends practicing the installation and wiring of the Solar MSA using deenergized equipment before proceeding with live field installations.



NOTE – LOADS AND EVs. The MSA shall not be used to interconnect electric vehicle supply equipment (EVSE) or other non-controlled loads. The 200-amp combined utility and DER rating is permitted only when the DER is an input source to the MSA. Loads connected to the MSA must be limited to the minimal current that the inverter(s) requires to start, commission, and monitor a solar PV system.



NOTE – BATTERIES. While Solar MSA is primarily designed for grid-tied solar PV systems without battery energy storage, it can accommodate Battery Energy Storage Systems (BESS) for retail arbitrage. However, it does not support home backup because it lacks the capability to isolate your home from the grid. Any BESS connected to Solar MSA must be charged exclusively by solar PV, not by utility power. Consult your inverter's installation instructions for connecting BESS for retail arbitrage applications only. If interested in home backup applications, please ask your sales rep about our newest product, IslandDER MSA

SOLAR MSA FEATURES

- Enables rapid connectivity for PV systems and other DERs.
- Quick-connect and quick-release weatherproof connection module accommodates field wiring from the left or right side. Utility meter technicians can safely remove the connection module for inspection and servicing, leaving the DER branch circuit field wiring intact.
- Readily accessible supplemental PV/DER circuit breaker (located at the bottom of the MSA) for overcurrent protection and disconnecting means. Available in standard sizes from 15-80 amps and 10k or 22k AIC.
- Lockout/tagout capability for safety and security.
- Compatible with ringless, ring-type, and horn/lever bypass meter sockets* ANSI form 2S, 120/240v, ANSI form 12S, 120/208v, single phase, up to 200 amps maximum.

WARNING – *For lever bypass sockets, ConnectDER recommends:



- Locking out alternate/backup sources of power.
- Removing power from the premises loads and opening the main service disconnect.
- Actuating the lever bypass to facilitate meter removal.
- Removing the meter.
- Positioning the lever bypass to deenergize the load-side meter socket jaws.

- 200 amp continuous combined utility and PV/DER rating (load-side of meter PV/DER interconnection point).
- 190 amp continuous combined utility and PV/DER rating (line-side of meter PV/DER interconnection point). The Solar MSA has provisions for connecting to the line side of the meter with approval from the utility. These models can be ordered and used only through utility programs.

SOLAR MSA KEY COMPONENTS

The key components of the Solar MSA are shown in Figure 1. The connection module is reversible and accommodates conduit entry from the left side or the right side.

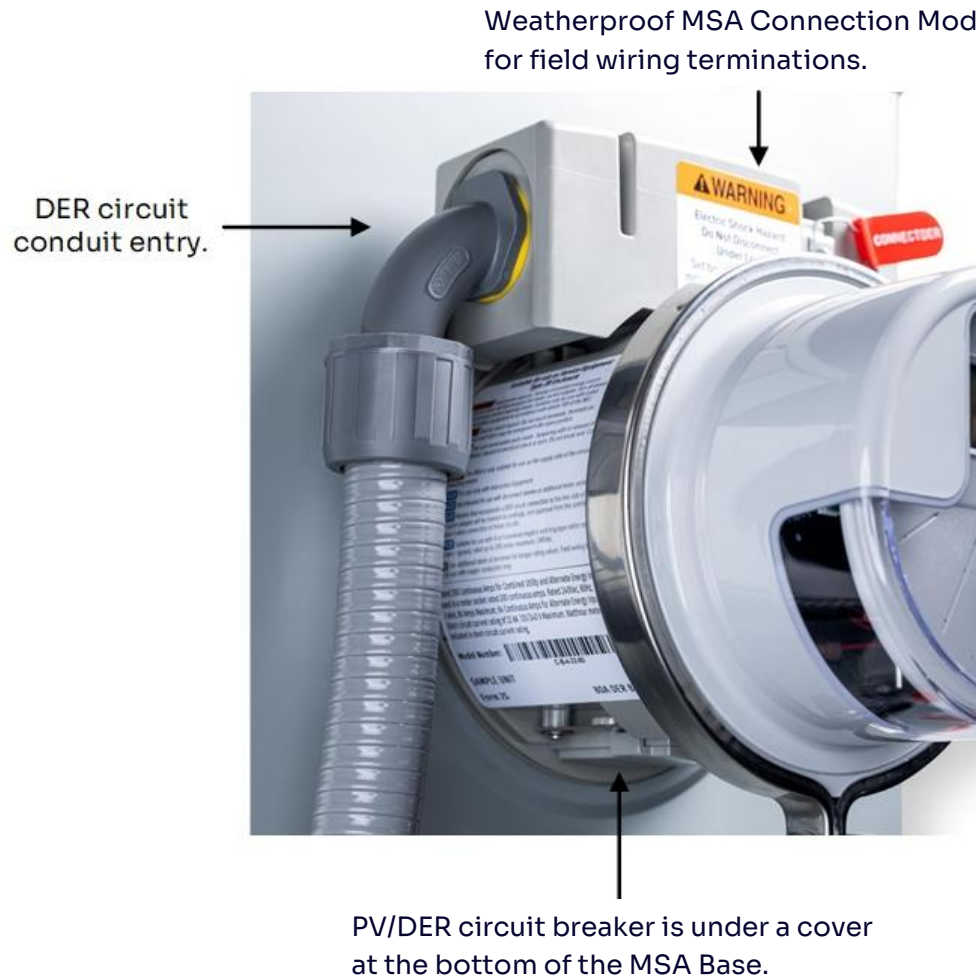


Figure 1 – Solar MSA Key Components.

WIRING SCHEMATICS

ONE-LINE SYSTEM DIAGRAM

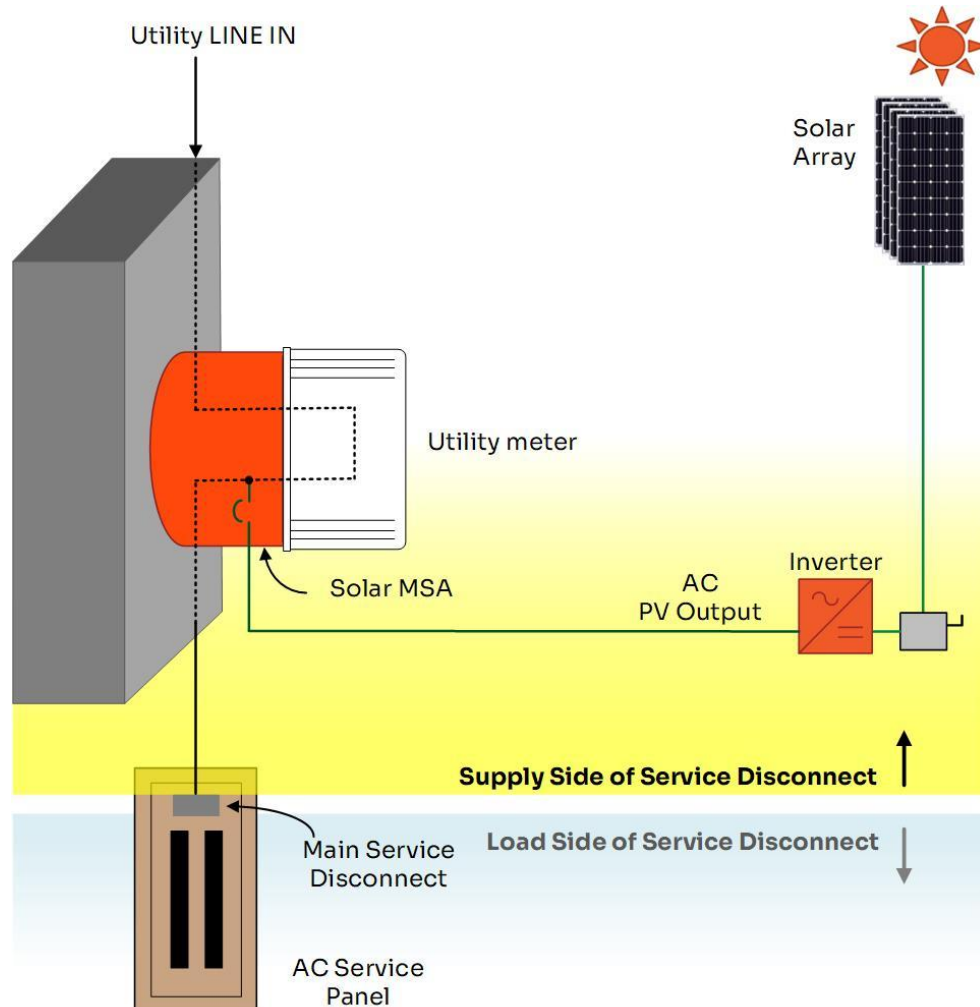


Figure 2 – One-Line System Diagram.



NOTE – The Solar MSA creates a supply side (of the main service disconnect) interconnection to the load side of the billing meter. The Solar MSA contains a factory-installed neutral-to-ground bond.

POWER WIRING SCHEMATIC – LOAD SIDE OF METER INTERCONNECTION

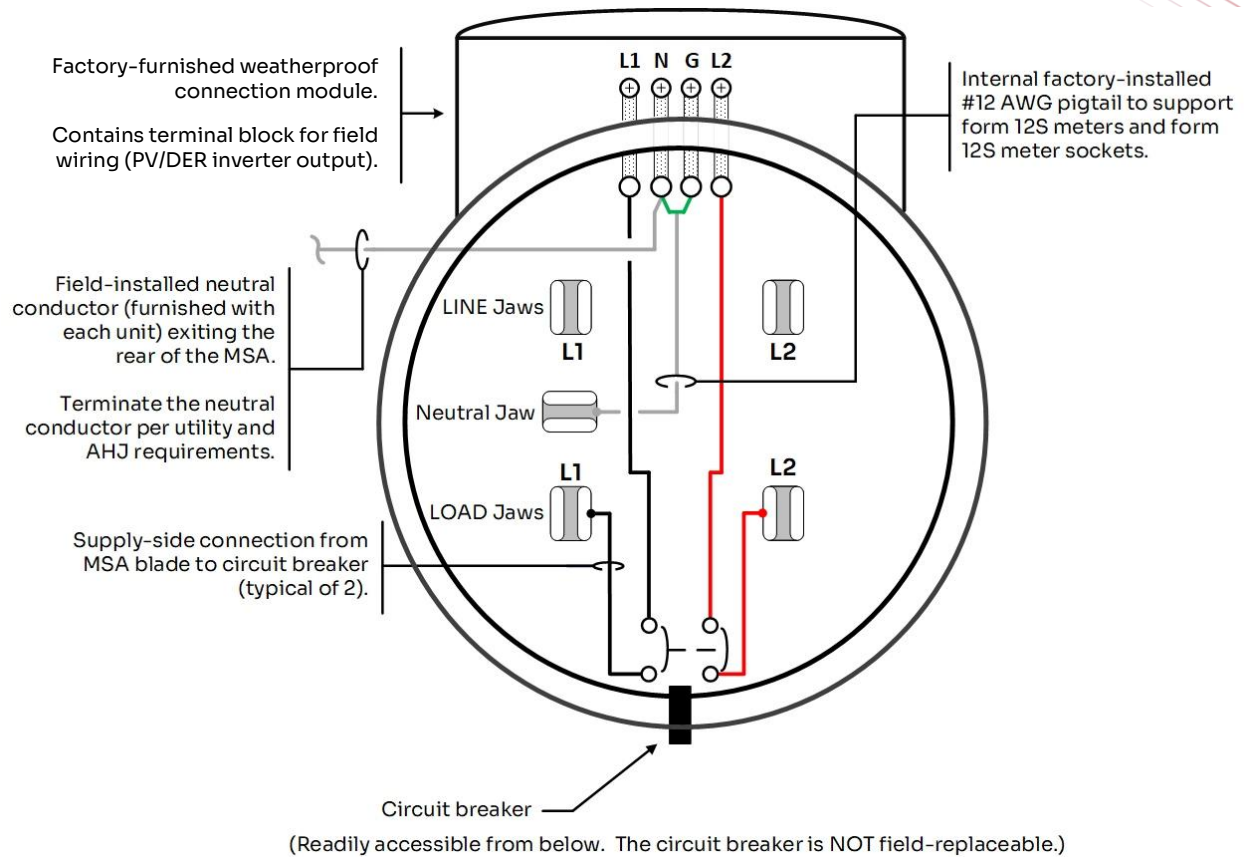


Figure 3 – Power Wiring Schematic, Solar MSA with Load-Side of Meter Interconnection.



NOTE –The Solar MSA has provisions for connecting to the line side of the meter with approval from the utility. These models can be ordered and used only through utility programs. See Reference 2 in the Appendix for a line-side (of billing meter) power wiring schematic diagram.



WARNING – The Solar MSA is only suitable for use on the supply side of the service disconnecting means.

The Solar MSA must be installed with the connection module at the top and the PV/DER circuit breaker at the bottom. Do not install the MSA in any other orientation.

BOX CONTENTS

Qty.	Item
1	Solar MSA base (Solar Meter Socket Adapter base).
1	MSA connection module assembly, with (qty. 1) 1" conduit trade size closure plug.
2	Spare connection module screws - 6/32 x 1/4" socket head machine screws.
1	Lock ring for attaching the meter to the MSA.
1	Neutral pigtail, white, #6, AWG THHN stranded copper, (furnished with units with PV/DER circuit breakers rated 60 amps or less).
1	Neutral pigtail, white, #4, AWG THHN stranded copper, (furnished with units with PV/DER circuit breakers rated 70 or 80 amps).
6	Tamper-resistant seals.
1	5 th stab and #4-20 x 5/16" thread-forming screw for use with 12S/5-jaw meter sockets.
1	Accessory bag with installation reminders & QR code link to Solar MSA documentation.
1	Installation Instructions (1-page printed front and back).
1	1" Type LFNC liquidtight flexible nonmetallic conduit connector.



NOTE – The Solar MSA installer must furnish and use 1" trade size liquid-tight flexible conduit complying with the Standard for Liquid-Tight Flexible Metal Conduit, UL 360, or the Standard for Liquid-Tight Flexible Nonmetallic Conduit, UL 1660, and fittings complying with UL 514B.



WARNING – It is the responsibility of the Solar MSA installer to ensure the white neutral pigtail is installed with every unit. Attach the neutral pigtail from the MSA to a neutral terminal in accordance with utility and AHJ requirements.

INSTALLATION PREPARATION

SITE INSPECTION

There are several types of residential meter sockets suitable for Solar MSA installation. Some common types, namely single gang/standalone, multi-gang, and combination meter socket/load centers are covered here. All three are available in ringless and ring type configurations.

Begin assessing the suitability of a meter socket by ruling out two instances:

1. Rule out shallow meter sockets (sometimes referred to as “button” or puck-type” meter sockets as shown in Figure 4. They lack the interior space and means to accommodate connection of a neutral pigtail.



Figure 4 – Shallow Meter Socket (not recommended).

2. Rule out all meter sockets lacking space to install a neutral pigtail, signs of damage, excessive rust, evidence of loose or damaged service conductors, and enclosures loosely secured to the structure.

3. Confirm if the serving electric utility is restricting MSA usage to ringless (Figure 5) or ring type (Figure 6) meter sockets. The Solar MSA supports both configurations.



Ringless meter sockets use a small raised flange to hold the meter in place with the cover closed. They do not use a separate locking ring.

Ringless meter sockets are locked through a sliding lever as shown here, or by other means implemented by the utility.

Figure 5 – Single Gang/Standalone Ringless Meter Socket.



Ring type meter sockets have an extruded flange on the cover...



...for a locking ring to secure the utility meter.

Figure 6 – Single Gang/Standalone Ring Type Meter Socket.

4. Confirm if multi-gang meter sockets (Figure 7) are on the utility's approved equipment list. They may present additional neutral wiring and service access issues over single gang meter sockets. ConnectDER recommends researching the manufacturer's documentation for potential compatibility.

Solar MSA compatibility with multi-gang meter sockets may be permitted by the utility on a case-by-case basis. Care must be taken to ensure that the Solar MSA connection module can be inserted and disconnected (lifted up a minimum of 2") and the field wiring raceway permits access to circuit breakers and the removal of meter socket covers.

Multi-gang meter sockets may accommodate only the top socket, or left & right sockets, or possibly none at all.



Figure 7 – Multi-Gang Meter Sockets.

5. Confirm if meter socket/load centers (Figure 8) are on the utility's approved equipment list. They may present additional neutral wiring and service access issues over single gang meter sockets. ConnectDER recommends researching the manufacturer's documentation for potential compatibility.



Figure 8 – Combination Meter Socket/Load Centers.



NOTE – The neutral pigtail is normally terminated in the meter socket compartment. The neutral pigtail is required as part of the installation with every unit. It is a component of the Solar MSA itself; therefore, it may be confined to the meter compartment. Verify with the AHJ and utility if the neutral connection must remain entirely within the meter socket compartment or terminate in the customer premises wiring section.



WARNING – Do not alter the Solar MSA or any other equipment in a manner that would void its listing or warranty.

6. A Solar MSA shall not be installed on meter sockets already equipped with another socket adapter as shown in Figure 9.



Figure 9 – Existing Meter and Meter Socket Adapter.

7. Account for other considerations:
- a. Check with the utility for other potential MSA prohibited installations. Do not install a Solar MSA where it is subject to physical damage.
 - b. Verify the Solar MSA model number(s) approved for use in the utility's service area.
 - c. Verify the Solar MSA would be accessible after the installation with adequate working clearance. The Solar MSA extends the billing meter approximately 4.6 inches forward from the meter socket.
 - d. Check with the utility and AHJ before installing an MSA indoors. The Solar MSA contains an overcurrent device. Overcurrent devices are not permitted in bathrooms, over steps of a stairway, and where subject to physical damage.
 - e. Verify the existing meter indicates the service voltage is 240v, 200 amps maximum, 3-wire, ANSI form 2S, or 208v, 200 amps maximum, 3-wire, form 12S. Some utilities require 12S/5-jaw meter sockets but are installing 2S/4-jaw meters. The Solar MSA is furnished with a 5th stab kit to support 12S/5-jaw meter sockets with the 5th jaw at the 9 o'clock position.

8. Additional examples of meter sockets NOT suitable for a Solar MSA installation:
- Meter socket enclosures with damage, excessive rust, or are poorly mounted. See Figure 10.



Figure 10 – Rusty, Damaged, Poorly-Mounted Meter Sockets.

- Meter sockets with vertical brackets as shown in Figure 11. The neutral pigtail furnished with the Solar MSA must be terminated at the 12 o'clock position at the rear of the MSA. The spot welds above and/or below the socket opening may indicate a bracket obstruction without removing the utility meter. Future MSA enhancements will address this issue.

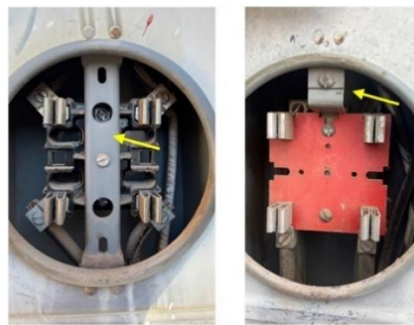


Figure 11 – Meter Socket Bracket Obstruction.

- c. Meter sockets with signs of corrosion or overheating as shown in Figure 12.

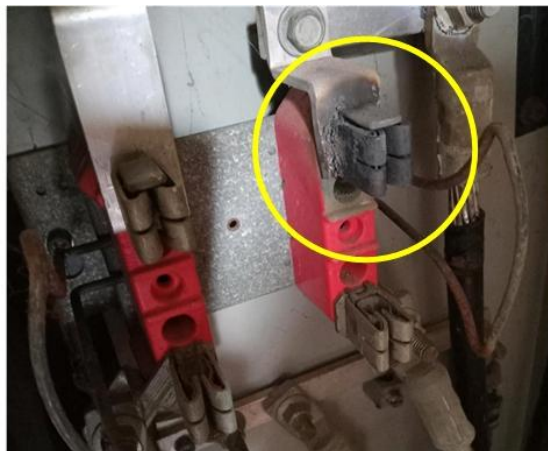


Figure 12 – Corroded Jaw.

9. Confirm the existing utility meter is either form 2S or 12S, 3-wire, 200 amps maximum. See Figure 13.



Figure 13 – Meter Form 2S and 12S.



NOTE – A 2S meter has 4 stabs. It fits into (and operates properly) in meter sockets with either 4 or 5 jaws. If the utility meter is form 12S, (5 stabs), OR if the existing meter socket has 5 jaws (even if a form 2S/4-jaw meter is installed), follow the steps starting on Page 18 to install the 5th stab that is furnished with every unit.

PACKAGE INSPECTION

1. Inspect the box and verify the contents are complete and in good condition. Take photos and contact ConnectDER at RMA@connectder.com in case of damaged or missing components.
2. Open the circuit breaker access door at the bottom of the Solar MSA and verify the ampere rating on the PV/DER circuit breaker handle matches what was ordered.

ITEMS REQUIRED FOR SOLAR MSA INSTALLATION



NOTE – The following items must be provided by the installer to install a Solar MSA into a meter socket. Use factory-insulated tools wherever possible. Field wiring termination is covered later in this document.

Qty.	Item
1	One or more calibrated torque drivers to cover a range from 5 to 50 in-lbs.
1	7/64" hex key.
1	7/64" hex bit for use with a torque driver.
1	1/4" flat blade screwdriver.
1	1/4" flat blade bit for use with a torque driver.
1	Wire cutter.
1	Knife or wire stripper for the neutral pigtail furnished with the MSA.
1	Calibrated digital volt-ohmmeter or other suitable metering equipment.
1	Approved wiring connector and tools to terminate the pigtail inside the meter socket, if needed.
1 lot	Additional tamper-prevention seals. Six are furnished with each unit to secure the connection module clasps, lock rings, etc.
1 lot	Insulation material for the neutral connection in the meter socket, if needed.
1	"Meter Grabber™" or equivalent tool to safely remove and reinstall the electric meter.

5TH STAB INSTALLATION FOR 12S/5-JAW METER SOCKETS

When to Install the 5 th Stab Kit on the Rear of the Solar MSA	
Utility Meter & Meter Socket Configuration	Install the 5 th Stab Kit?
Utility Meter = Form 12S/5-blade Meter Socket = Form 12S/5-jaw	YES
Utility Meter = Form 2S/4-blade Meter Socket = Form 12S/5-jaw	YES
Utility Meter = Form 2S/4-blade Meter Socket = Form 2S/4-jaw	NO



NOTE –The Solar MSA is only compatible in 12S meter sockets with the 5th jaw at the 9 o'clock position.

1. In the box contents, locate the 5th stab and #4-20 x 5/16" thread-forming screw for use with 12S/5-jaw meter sockets. See Figure 14.



Figure 14 – 5th Stab and Thread-Forming Screw.

2. Use a 1/4" flat-blade screwdriver to loosen the N/G lug located on the top of the Solar MSA Base, on the right side as viewed from the rear. This will allow the top tab of the 5th stab to insert into the lug. See Figure 15.

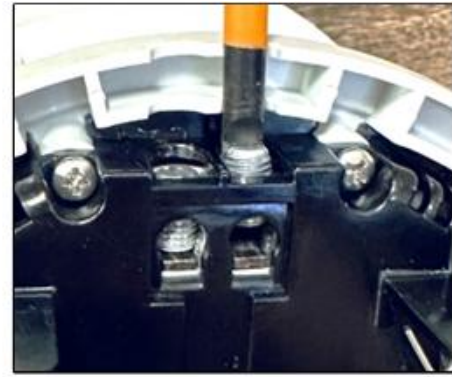


Figure 15 – Loosen the Right-Side N/G Screw.

3. Insert the 5th stab onto the rear of the Solar MSA Base until it sits in the plastic recess with the tab in the open lug. See Figure 16. Lightly tighten the lug screw.



Figure 16 – 5th Stab Inserted to the back of the Solar MSA Base.

4. Install the #4-20 thread-forming screw. Gently tighten until the screw is fully seated and the blade is secured. Be careful not to overtighten. Torque the top N/G lug to 35 in-lbs. See Figure 17.

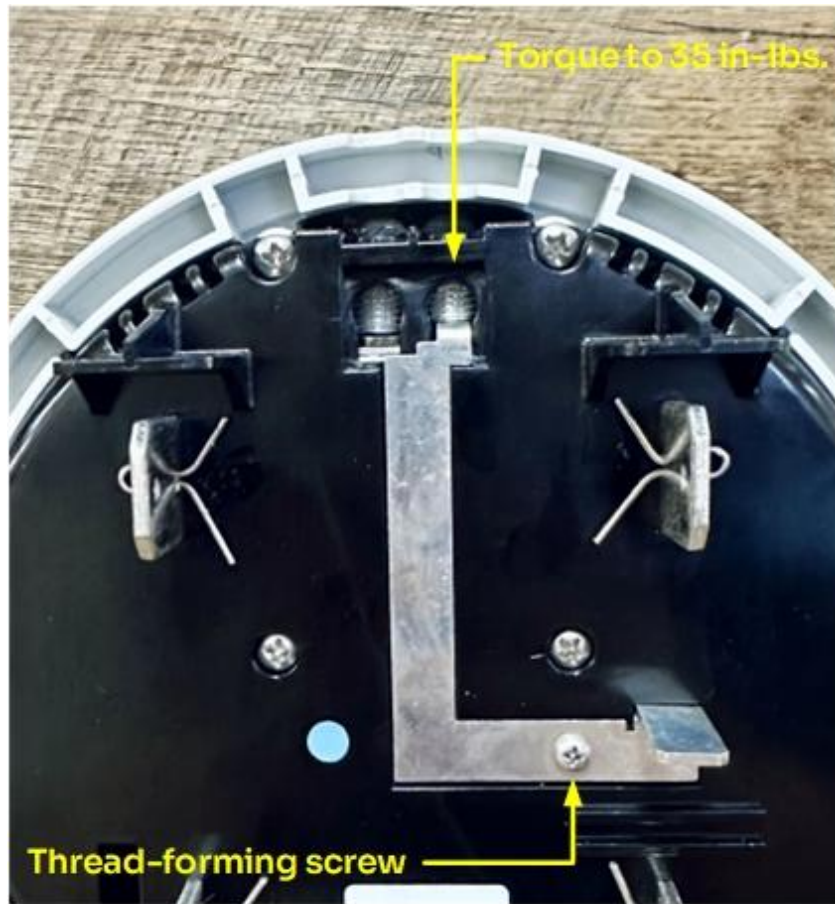


Figure 17 – 5th Stab Completely Installed on the back of the MSA Base.

SAFETY EQUIPMENT

Always follow company and local safety/PPE requirements related to OSHA and NFPA 70E.

Installers must be intimately aware of local and company safety/PPE requirements. If safety/PPE requirements are unknown, STOP work. DO NOT proceed further. Installers must ensure all PPE has the minimum appropriate rating for the application.

Example of common PPE and other protective devices are listed below:

Qty.	Item
1	Safety glasses.
1	Full-face arc flash shield.
1	Leather/rubber insulated electrical glove kit.
1 lot	Calorie rated clothing for the site's arc flash rating.
1 pair	Safety footwear.

ConnectDER recommends insulating energized parts within the meter socket using an appropriately rated electrical insulation blanket that can be cut to size, temporarily applied, then taped and/or clamped into place. A hot jaw safety cover may also suffice (Figure 18). Contact the serving utility for other safety tips or procedures.

Photo courtesy of
A.E. Products, Inc.



Electrical Insulation
Blanket



Figure 18 – Protection From Energized Parts.

INSTALLATION PROCEDURE



WARNING – Solar MSA installation must be performed by qualified personnel only. Electric shock, arc flash hazards, serious injury or death may result if power is not removed prior to the Solar MSA installation.

REMOVE THE EXISTING UTILITY METER

In some service territories, the meter must be removed by the utility. An increasing number of utilities are permitting qualified personnel to remove the meter and install the Solar MSA.

The governing electric utility may require a power outage to de-energize the meter socket to perform work in and/or terminate the neutral conductor. A neutral conductor is furnished and must be installed with each Solar Meter Socket Adapter. Please follow the prescribed process for work in meter sockets by the governing utility

1. Notify the homeowner that power will be interrupted.
2. Verify/assist the homeowner in isolating alternate electrical sources such as backup generators, battery systems, etc.
3. Turn off all power to the loads at the service equipment, then open the main service disconnect to prevent arcing when removing and reinstalling the meter. The line side meter socket jaws will remain energized unless the utility has disconnected the incoming power at the pole/street/transformer, etc.
4. Remove all jewelry, put on the appropriate PPE, and follow your employer's safety procedures. Remove the tamper-prevention seals.
5. Remove the locking ring (for ring-type meter sockets). For ringless meter sockets, remove the meter socket cover.
6. For lever bypass meter sockets, actuate the lever to permit meter removal.
7. Using a "Meter Grabber™" or similar tool, remove the utility meter and store it safely.
8. For lever bypass sockets, position the lever bypass to deenergize the load-side meter socket jaws.
9. Inspect the meter socket terminals for loose or broken wires, damaged jaws, and other signs of damage. Confirm the meter socket and service entrance conductors are in good condition. Comply with utility requirements and local codes.

INSTALL THE NEUTRAL LEAD

It is the responsibility of the Solar MSA installer to ensure a white neutral pigtail is installed with every unit. Attach the white neutral pigtail (furnished with the unit) from the rear of the MSA to a neutral point inside of the meter socket as follows:

1. Remove the neutral pigtail from the box and tape up/safe-off one end with electrical tape.
2. Put on the appropriate PPE.
3. Install an insulation blanket over live parts if the meter socket must remain energized.
4. Identify the method to terminate the neutral pigtail inside the meter socket. Figure 19 depicts the interior of a typical 4-jaw meter socket. This model has a single accessory position, circled in yellow. A second accessory position may be available where the blue dot is shown.

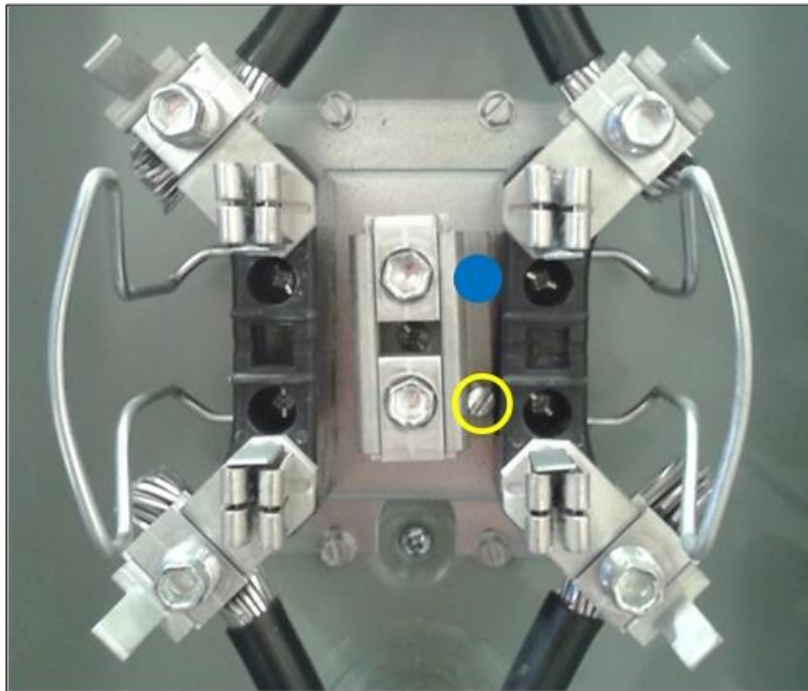


Figure 19 – 4-Jaw Meter Socket.

These accessory positions may contain pressure terminals or hardware for the connection of compression lug terminals. Terminate the neutral pigtail in accordance with the manufacturer's torque specifications.

5. Terminate the neutral pigtail to the meter socket using a spare accessory as shown in Figure 20. If no spare accessory position is available, terminate the neutral pigtail using an approved wiring termination method suitable for use in meter sockets, meter/main or meter/combo panels acceptable to the utility and the authority having jurisdiction (AHJ).

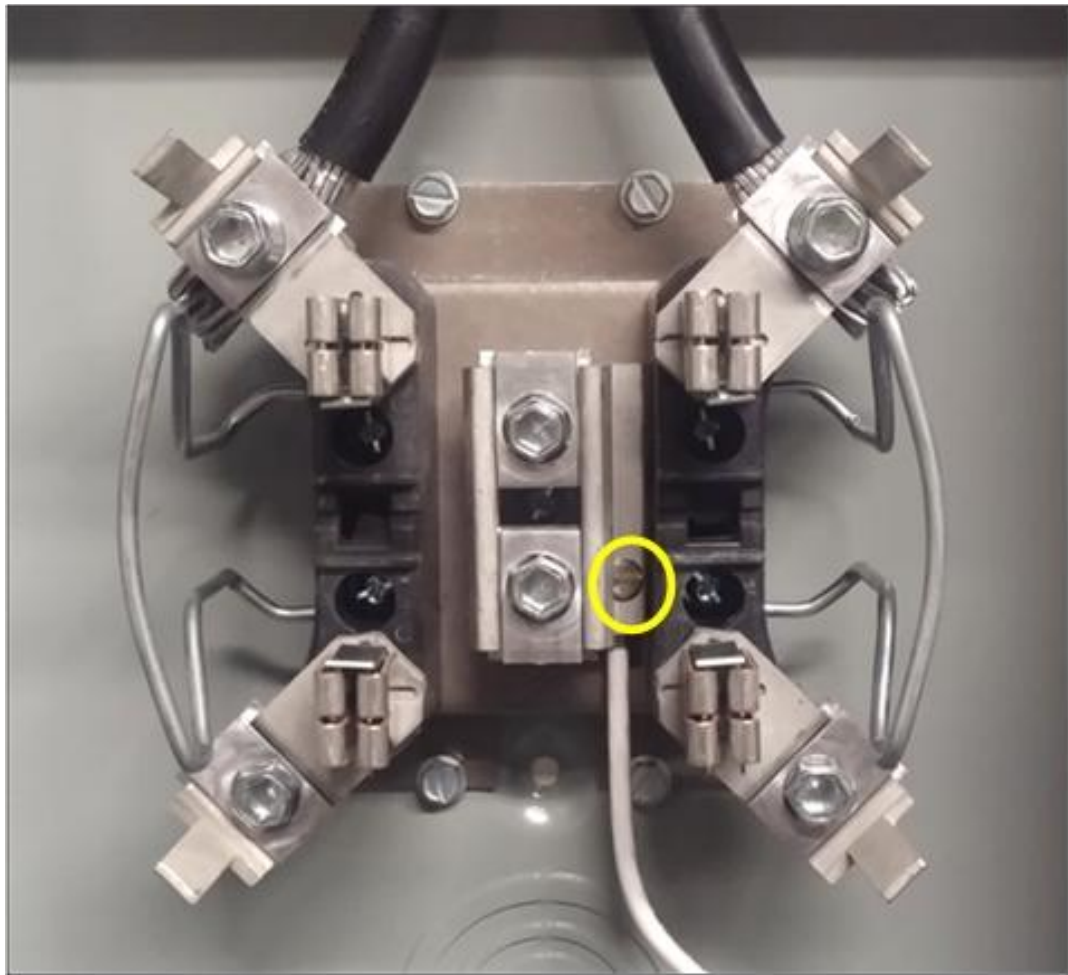


Figure 20 – Terminate the Neutral to the Meter Socket.



NOTE – In case an accessory position is unavailable: As of January 1, 2023, NEC 230.46 (2020 & 2023 editions) requires pressure connectors and devices for splices and taps installed on service conductors to be marked “suitable for use on the line side of the service equipment” or equivalent. If no product is available for that use case, the AHJ may permit products that comply with the most recent previous edition of the NEC that was adopted by the jurisdiction per NEC 90.4(D).

Figure 21 shows a parallel tap conductor that is UL Listed as suitable for use on the line side of service equipment.

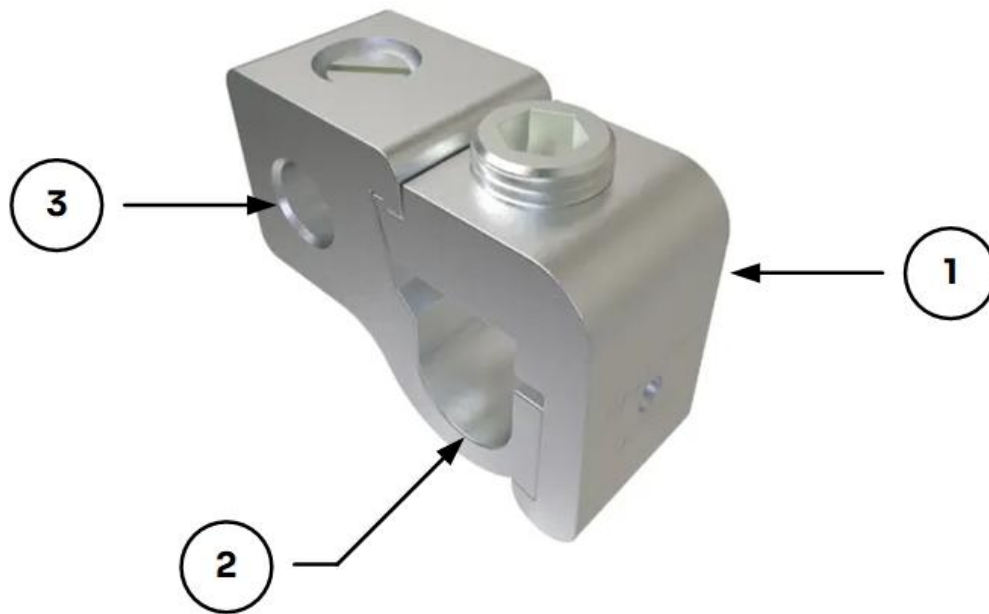


Figure 21 – IISCO GTA-250-0 Parallel Tap Connector.

This parallel tap connector has a removable component (1), leaving an open U-shaped groove (2) allowing the installer to slip the connector around the existing neutral conductor. The removable component is reinstalled and the connection is torqued to the manufacturer’s specifications. The remaining opening (3) accommodates the neutral pigtail supplied with the Solar MSA.

Figure 22 shows a similar parallel tap connector installed on the existing load side (of the meter) neutral service entrance conductor.

For more information on neutral connection options, please refer to Appendix Reference 7 – Neutral Connection Options.

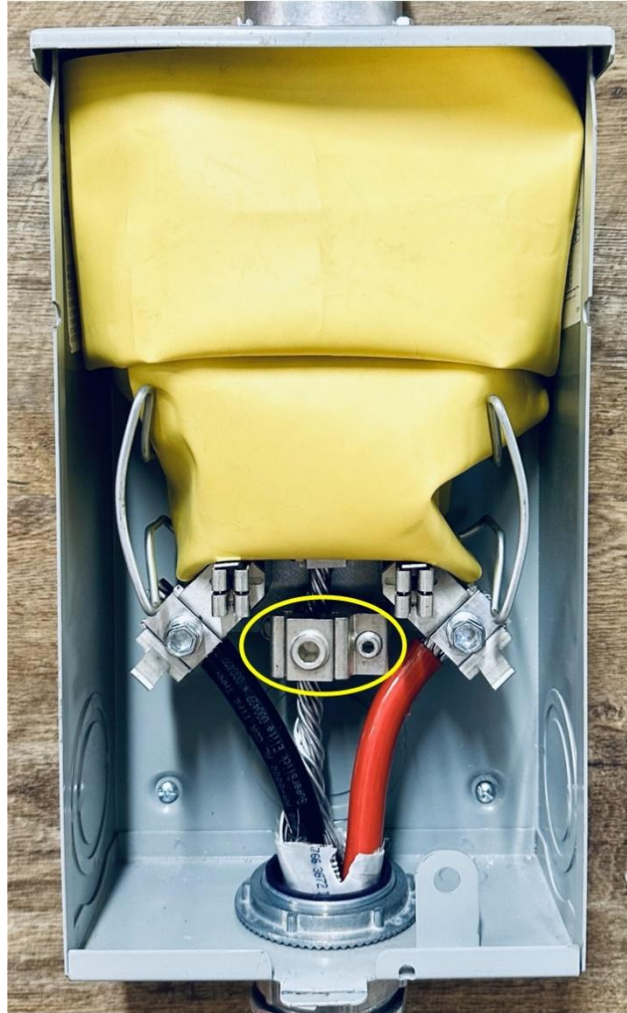


Figure 22 – Parallel Tap Connector Installed.



WARNING – It is the responsibility of the installer to verify that a pressure connector or device for splices and taps is suitable for use on the line side of the service equipment when following the 2020/2023 edition of the NEC.

6. Route the neutral conductor within the meter socket (Figure 23) in a manner to avoid damaging the insulation and remain clear of the meter socket jaws. Position the free end to terminate near the top and center of the Solar MSA.



Figure 23 – Route the Neutral Within Meter Socket.

7. For ring-type meter sockets, remove the insulation blanket and reinstall the meter socket cover. Route the neutral lead through the cover opening (Figure 24). For ringless meter sockets, connect the neutral lead to the Solar MSA before reinstalling the cover (see step #9).



Figure 24 – Reinstall the Ring-Type Cover.

8. Open the clasps on the Solar MSA and remove the connection module from the MSA base by hand, pulling it straight upward.
9. Strip $\frac{1}{2}$ " (approximately 13mm) of insulation from the neutral pigtail as shown in Figure 25.

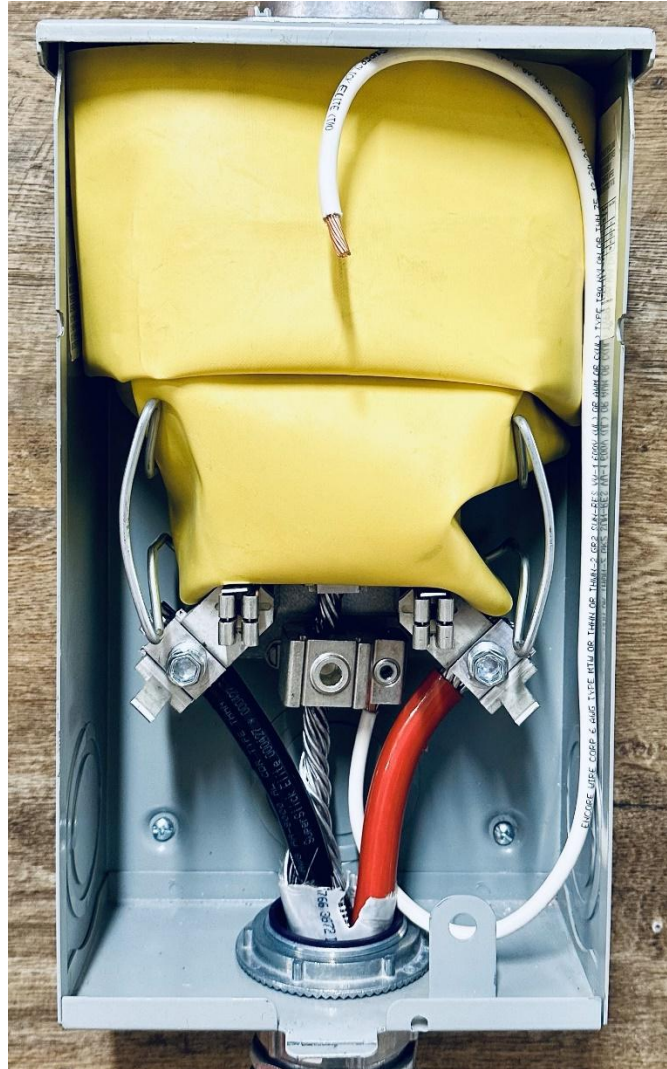


Figure 25 –Neutral Ready for Solar MSA Termination.

10. There are two lug terminals on the rear of the Solar MSA. Terminate the neutral pigtail to either lug on the MSA using a 1/4" flat blade screwdriver as shown in Figure 27. The spare terminal may be used in case the utility or AHJ requires a grounding electrode conductor.



Figure 27 – Terminate the Neutral to the Solar MSA Base.

11. Torque the neutral connection at the MSA to 45 in-lbs.

INSTALL THE SOLAR MSA INTO THE METER SOCKET

1. Confirm the Solar MSA PV/DER circuit breaker at the bottom of the unit is in the open (OFF) position. See Figure 28.



Figure 28 – Verify the PV/DER circuit breaker is open (OFF) on the bottom of the MSA Base.

2. Remove the temporary insulation protection.
3. Shut the circuit breaker cover.
4. Ensure the Solar MSA is positioned with the connection module power interface contacts at the top and the PV/DER breaker at the bottom.
5. Align the Solar MSA stabs with the socket jaws, ensuring all wire and additional terminations will avoid non-insulated parts within the meter socket.
6. Firmly insert the Solar MSA into the meter socket. Ensure the MSA stabs are securely seated in the meter socket jaws. The MSA should not move freely once properly seated. For lever bypass meter sockets, return the lever to the normal operating position.

7. For ringless meter sockets, reinstall the meter socket cover over the Solar MSA, taking care not to cause damage. Tight clearances may necessitate gentle manipulation of the cover around the Solar MSA base. See Figure 29.



Figure 29 – Reinstall the Meter Socket Cover.

8. For ring-type meter sockets, install a locking ring to secure the Solar MSA to the meter socket cover with the thicker/wider flange facing the meter socket.

9. Verify the meter socket cover is fully engaged. Confirm the PV/DER circuit breaker cover opens freely. See Figure 30.



Figure 30 – Circuit Breaker Cover open on the bottom of the MSA Base.

REINSTALL THE UTILITY METER

1. Using a “Meter Grabber™” or similar tool, align the utility meter stabs with the Solar MSA jaws.
2. Firmly insert the meter into the Solar MSA base, ensuring a secure fit.
3. Install a lock ring to secure the utility meter to the Solar MSA with the thicker/wider flange facing the meter socket.

VERIFY VOLTAGE AT THE SOLAR MSA

1. Place the PV/DER circuit breaker at the bottom of the Solar MSA in the ON position.
2. Using proper PPE, verify the presence of appropriate service voltage at power interface on the top of the MSA as shown in Figure 31. Check L1-L2, L1-N/G, and L2-N/G. Do not proceed with installation until the voltages meet expected values.

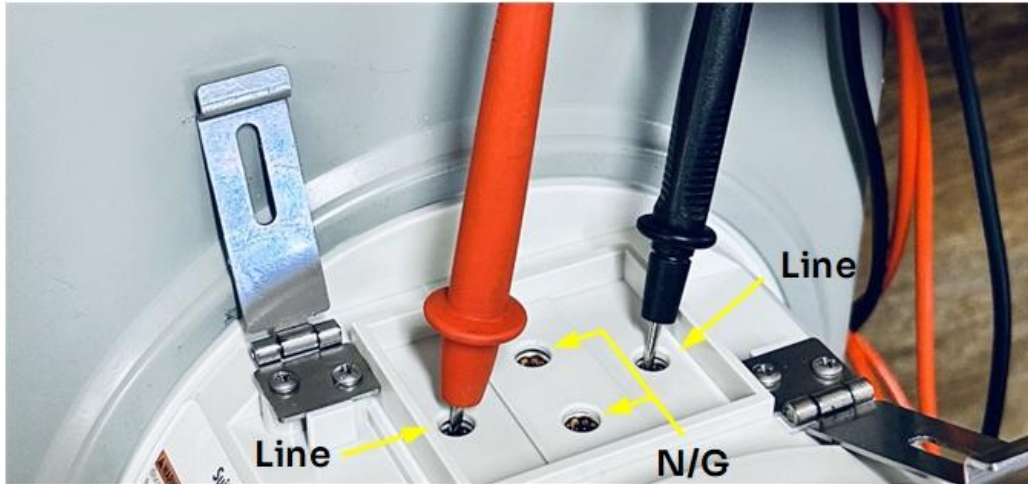


Figure 31 – Verify Voltage at the Power Interface of the MSA Base.

3. Return the PV/DER circuit breaker to the OFF position.
4. Re-test to verify there is no voltage at the power interface.
5. Shut the circuit breaker cover and lock it out until the PV/DER wiring is interconnected.

INSTALL THE SOLAR MSA CONNECTION MODULE

1. Confirm the Solar MSA PV/DER circuit breaker is OFF and locked out.
2. Flip open the connection module locking clasps as shown in Figure 32.



Figure 32 – Connection Module Clasps.

3. Confirm the 7/64" screws on the bottom of the connection module (Figure 33) are torqued to 8 in-lbs. in case they loosened during shipping.



Figure 33 – Torque the Connection Module Screws.

4. Install the connection module by aligning its pins with the MSA power interface on the MSA base and pressing firmly downward. Close the connection module clasps and ensure the conduit entry hole closure plug is installed as shown in Figure 34.



Figure 34 – Install the MSA Connection Module onto the MSA Base.

5. Install tamper-prevention seals on the lock ring(s), the meter socket cover, and connection module clasps as shown in Figure 35 unless directed otherwise by the utility or the AHJ.



Figure 35 – Tamper-Prevention Seals.

6. Verify with the homeowner that any alternate/backup power solutions are in position to restore utility power to the service equipment.
7. Restore utility power and shut the main service disconnecting means.
8. The installation of the Solar MSA is complete and ready for PV/DER interconnection.

INSTALL THE PV/DER FIELD WIRING

ITEMS REQUIRED FOR PV/DER FIELD WIRING INSTALLATION



NOTE – The following items (provided by the installer) are required to connect branch circuit wiring to the Solar MSA:

Qty.	Item
1	One or more calibrated torque drivers to cover a range from 5 to 50 in-lbs.
1	7/64" hex key.
1	7/64" hex bit for use with a torque driver.
1	5/16" flat blade screwdriver.
1	5/16" flat blade bit for use with a torque driver.
1	Wire cutter.
1	Knife or wire stripper for field wiring.
1	Calibrated digital volt-ohmmeter or other suitable metering equipment.
1 lot	Tools and materials to install PV/DER raceway to the Solar MSA connection module. Use 1" trade size liquid-tight flexible conduit complying with the Standard for Liquid-Tight Flexible Metal Conduit, UL 360, or the Standard for Liquid-Tight Flexible Nonmetallic Conduit, UL 1660, and fittings complying with UL 514B.
1 lot	Additional tamper-prevention seals. Six are furnished with each unit to secure the connection module clasps, meter socket rings and cover (if ringless).



WARNING – Solar MSA installation must be performed by qualified personnel only. Follow your employer's requirements for personal protective equipment (PPE) and procedures.

INSTALL PV/DER FIELD WIRING AT THE SOLAR MSA CONNECTION MODULE



NOTE – The reversible connection module accommodates conduit entry from the left or right side. A 45-degree or 90-degree connector is recommended to be used at the connection module. If possible, provide enough slack (i.e., service loop) in the flexible conduit to permit connection module removal (pulling straight up a minimum of 2 inches) for ease of utility inspection and maintenance.



NOTE – The Solar MSA connection module wiring should be terminated first. It is easier to accommodate an angled connector at the MSA connection module by wiring it first.

1. Use type THHN/THWN-2 insulated, copper conductors only. Select the wire gauge by following the ampacity at 75°C. Do not use aluminum or copper-clad aluminum conductors.
2. Verify the PV/DER field wiring is clear of faults using suitable metering equipment.
3. Remove jewelry, put on the appropriate PPE, and follow your employer's safety procedures.
4. Place the PV/DER circuit breaker in the open (OFF) position.
5. Shut the circuit breaker cover and lock it out following your company's lockout/tagout (LOTO) practices.
6. Follow procedures for removing the tamper-prevention seals from the connection module clasps.
7. Flip open the connection module clasps.
8. Pull the connection module up by hand to remove it from the Solar MSA base. Once removed, ensure that no moisture or debris enters the power interface of the MSA base while wiring the connection module. See Figure 36 on the next page.



Figure 36 – Connection Module Removed from the MSA Base.

9. Using a 7/64" hex key, remove the bottom cover of the connection module, taking care not to damage the gasket material. Set the screws aside in a safe place.
10. Remove the 1" weatherproof plug from the connection module and identify the terminals. See Figure 37.



Figure 37 – Connection Module Terminals.

11. Install the liquidtight conduit connector onto the connection module and tighten the locknut with the connector at the desired angle.
12. Pull the DER branch circuit wiring through the conduit connector.
13. Strip the conductor insulation to expose the copper 1/2" (approximately 13mm).
14. Slide each conductor into its individual lug. Ensure all strands from each conductor enter the screw terminal area.
15. Use a 5/16" flat blade screwdriver to hand-tighten the screw terminals ensuring that only the copper conductor is being compressed (not the insulation).
16. Perform a gentle "pull test" to ensure all connections are secure.
17. Torque each screw terminal according to conductor size. See Figure 38.

#14-#10 AWG: 35 in-lbs.

#8 AWG: 40 in-lbs.

#6-#4 AWG: 45 in-lbs.

#3 AWG – 2/0: 50 in-lbs.



Figure 38 – Connection Module Wiring.

18. Route the excess slack back through the conduit connector and reassemble the connection module.
19. Reinstall the 7/64" screws and torque to 8 in-lbs.
20. Slide the liquidtight raceway over the wiring and secure it to the raceway connector.

INSTALL THE CONNECTION MODULE

1. Verify the power interface area is clear of moisture and debris that could cause a fault. Align the pins of the connection module over the power interface in the Solar MSA base as shown in Figure 39.



Figure 39 – Align the Connection Module Pins over the Power Interface of the MSA Base.

2. Insert the connection module onto the MSA base. Press firmly to ensure it is seated.

3. Secure the connection module with the metal clasps in front of and behind the box.
See Figure 40.



Figure 40 – Secure the Connection Module Clasps.

4. Install two tamper-resistant seals – one each at the front clasp and rear clasp as shown in Figure 41.



Figure 41 – Tamper-Prevention Seals.

COMPLETE THE CONDUIT, WIRING, ENERGIZE AND TEST

1. Install, support and terminate the other end of the raceway and conductors to the next enclosure (such as an AC PV disconnect or PV production meter). Support the liquidtight conduit per NEC/AHJ requirements. If possible, provide enough slack (i.e., a service loop) in the flexible conduit to permit connection module removal (pulling straight up a minimum of 2 inches).
2. When ready to energize and commission the PV/DER system, remove the lockout/tagout device at the PV/DER branch circuit breaker and place it in the (ON) position.
3. Put on PPE and test for proper voltage and polarity at the next enclosure.
4. Follow your employer's safety and working procedures to extend the wiring as needed.
5. Follow the manufacturer's instructions to commission the PV/DER system.
6. Position the metal tabs on the PV/DER circuit breaker covers to hold it the closed (weatherproof) position. For additional protection, install spare tamper-prevention seals or other lockout devices.

TROUBLESHOOTING

See Table 1 below for troubleshooting tips.

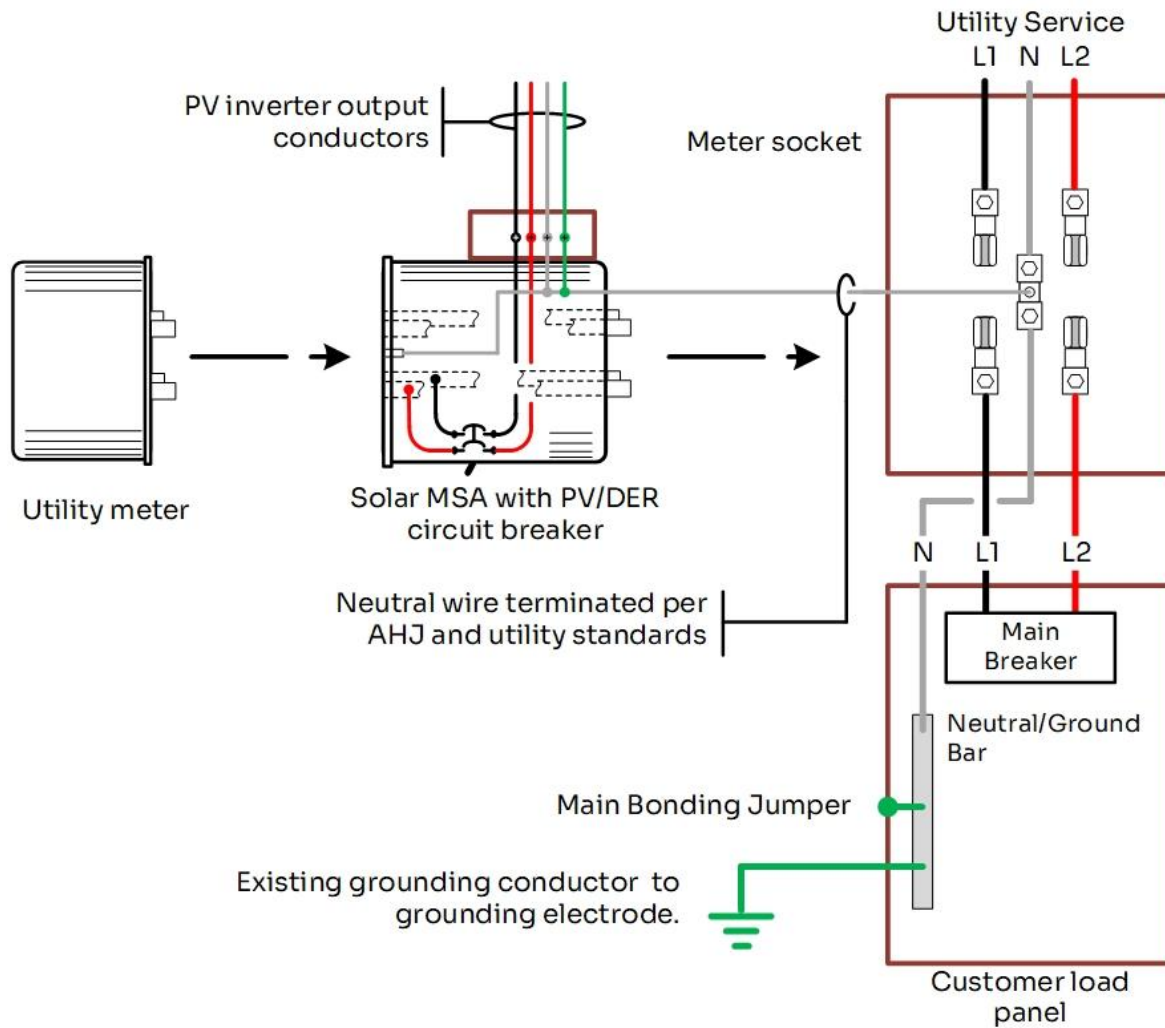
Symptom	Corrective Action
No voltage at the MSA connection module terminals.	Verify the PV/DER circuit breaker at the bottom of the Solar MSA is ON, not OFF or TRIPPED. If tripped, turn all the way OFF, then ON again.
The PV/DER circuit breaker trips repeatedly.	1) Verify the total inverter continuous output current is no more than 80% of the PV/DER circuit breaker rating. 2) Verify the field wiring is clear of faults.
Inverter(s) won't connect to the Internet.	The Solar MSA has no Wi-Fi or other communications capability. It provides a power connection for external equipment.
Out-of-range voltage readings at the MSA connection module terminals.	Confirm the neutral pigtail furnished with MSA is properly installed.

Table 1 – Troubleshooting the Solar MSA.

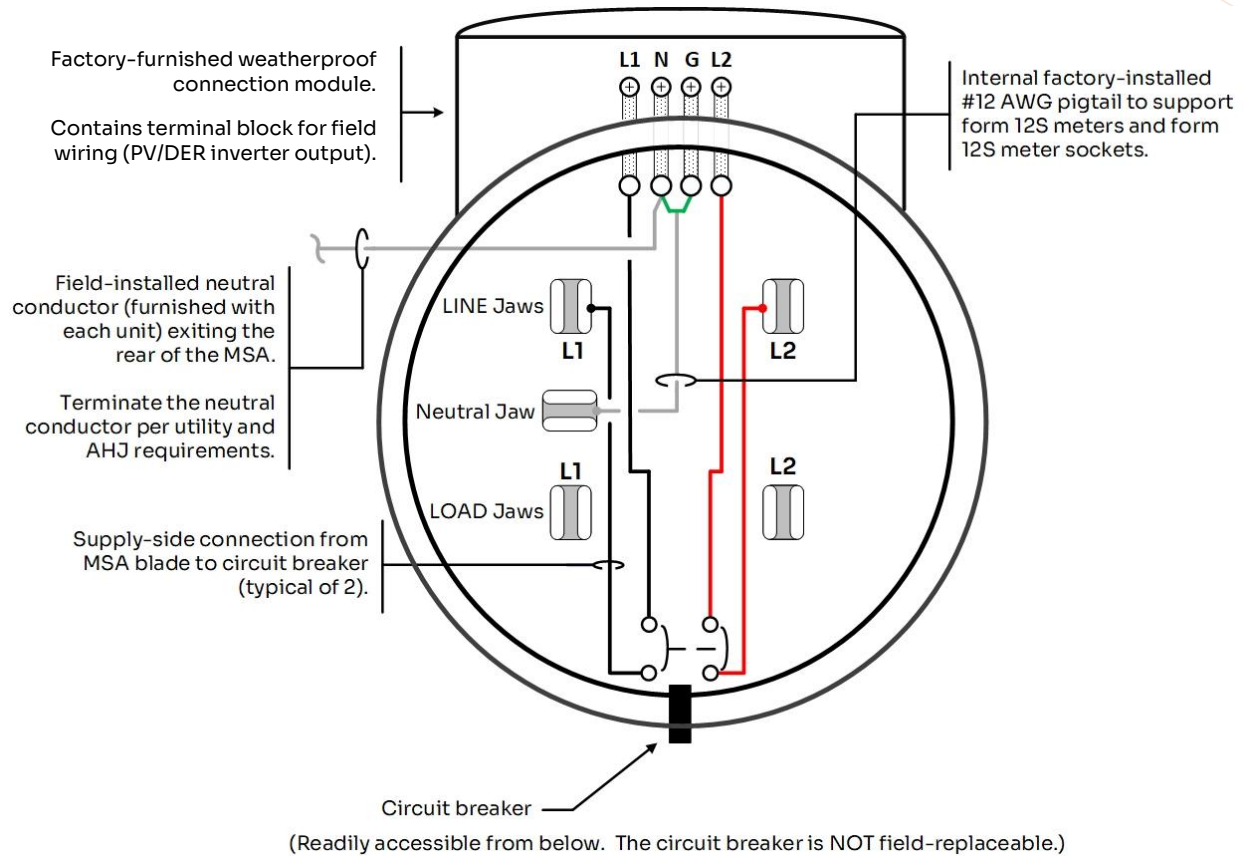
For more information, contact support@connectder.com.

APPENDIX

Reference 1 – Solar PV Interconnection Example – Load Side MSA

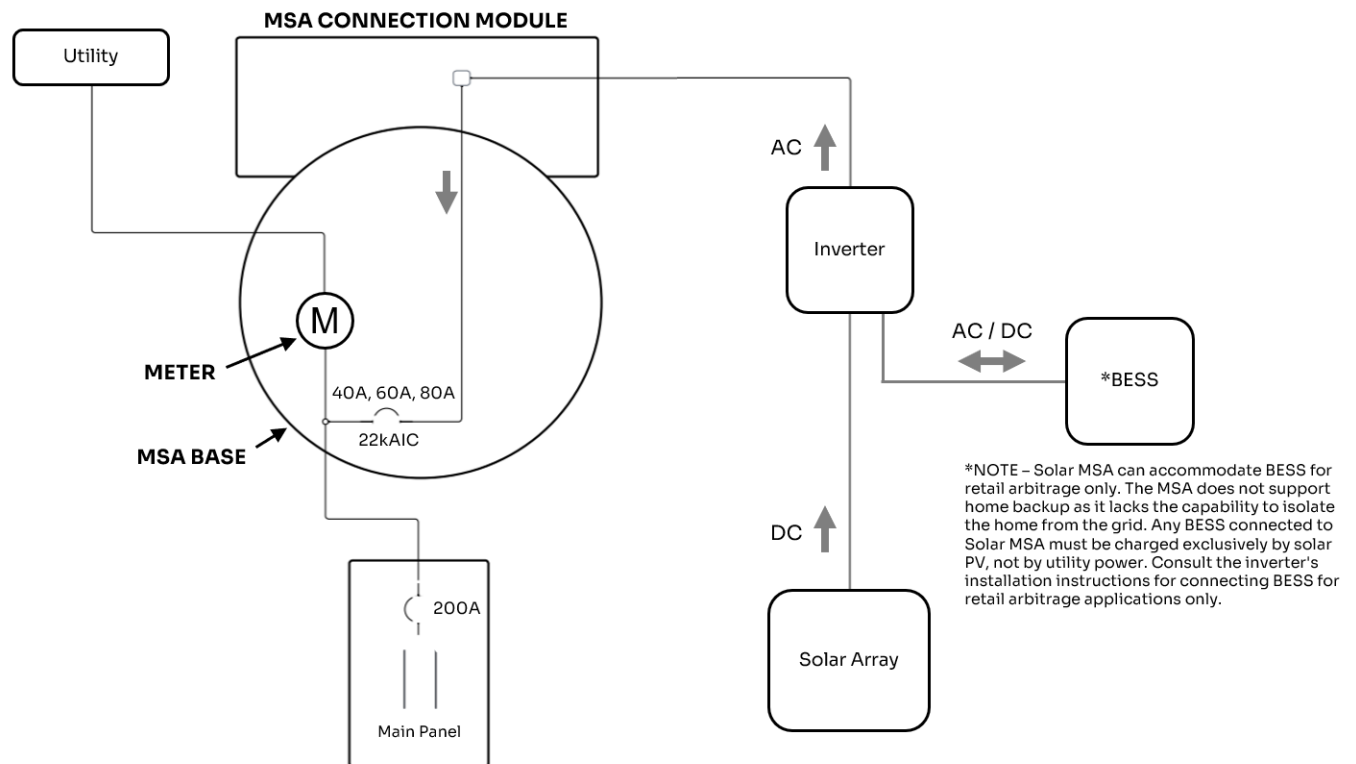


Reference 2 – Solar MSA Power Wiring Schematic – Line Side of Meter



NOTE –These models can be ordered and used only through utility programs.

Reference 3 – Solar MSA V5.2 Single Line Diagram



NOTE – Solar MSA does not support home backup because it lacks the capability to isolate your home from the grid. Any BESS connected to Solar MSA must be charged exclusively by solar PV, not by utility power.

Reference 4 – Solar V5.2 MSA Model Numbers

LOAD SIDE OF METER INTERCONNECTION

FORM 2S AND 12S COMPATIBLE						
Model Number	Product Version	Meter Connection	No. of Jaws	No. of Stabs	AIC Rating	PV/DER Circuit Breaker
C-B-5-10-15	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	15 Ampere
C-B-5-10-20	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	20 Ampere
C-B-5-10-25	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	25 Ampere
C-B-5-10-30	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	30 Ampere
C-B-5-10-35	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	35 Ampere
C-B-5-10-40	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	40 Ampere
C-B-5-10-45	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	45 Ampere
C-B-5-10-50	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	50 Ampere
C-B-5-10-55	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	55 Ampere
C-B-5-10-60	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	60 Ampere
C-B-5-10-70	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	70 Ampere
C-B-5-10-80	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	10,000	80 Ampere
C-B-5-22-15	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	15 Ampere
C-B-5-22-20	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	20 Ampere
C-B-5-22-25	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	25 Ampere
C-B-5-22-30	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	30 Ampere
C-B-5-22-35	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	35 Ampere
C-B-5-22-40	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	40 Ampere
C-B-5-22-45	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	45 Ampere
C-B-5-22-50	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	50 Ampere
C-B-5-22-55	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	55 Ampere
C-B-5-22-60	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	60 Ampere
C-B-5-22-70	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	70 Ampere
C-B-5-22-80	Simple 5.2	Load Side	5 Jaws	4, + 5 th Stab Kit	22,000	80 Ampere

LINE SIDE OF METER INTERCONNECTION – REQUIRES UTILITY APPROVAL

FORM 2S AND 12S COMPATIBLE						
Model	Product Version	Meter Connection	No. of Jaws	No. of Stabs	AIC Rating	PV/DER Circuit Breaker
C-T-5-10-15	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	15 Ampere
C-T-5-10-20	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	20 Ampere
C-T-5-10-25	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	25 Ampere
C-T-5-10-30	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	30 Ampere
C-T-5-10-35	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	35 Ampere
C-T-5-10-40	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	40 Ampere
C-T-5-10-45	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	45 Ampere
C-T-5-10-50	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	50 Ampere
C-T-5-10-55	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	55 Ampere
C-T-5-10-60	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	60 Ampere
C-T-5-10-70	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	70 Ampere
C-T-5-10-80	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	10,000	80 Ampere
C-T-5-22-15	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	15 Ampere
C-T-5-22-20	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	20 Ampere
C-T-5-22-25	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	25 Ampere
C-T-5-22-30	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	30 Ampere
C-T-5-22-35	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	35 Ampere
C-T-5-22-40	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	40 Ampere
C-T-5-22-45	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	45 Ampere
C-T-5-22-50	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	50 Ampere
C-T-5-22-55	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	55 Ampere
C-T-5-22-60	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	60 Ampere
C-T-5-22-70	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	70 Ampere
C-T-5-22-80	Simple 5.2	Line Side	5 Jaws	4, + 5 th Stab Kit	22,000	80 Ampere



NOTE –These models can be ordered and used only through utility programs.

Reference 5 – Solar V5.2 MSA Specifications

MECHANICAL SPECIFICATIONS		UTILITY-INTERACTIVE SOURCE RATINGS	
ENCLOSURE RATING	NEMA 3R	MAXIMUM POWER	15.36 KW AC using 80-amp DER breaker.
ENCLOSURE TYPE	Injection molded polycarbonate, UL 94 V0 flame rating	MAXIMUM VOLTAGE	240v
COOLING	Natural convection	MAXIMUM CONTINUOUS PV CURRENT	64A
DIMENSIONS (H X W X D)	6.7 x 6.7 x 4.6in collar only 8.6 x 7.0 x 4.6in with connection module	CONTINUOUS COMBINED CURRENT, PV/GRID	200A (load side of meter PV/DER interconnection) 190A (line side of meter PV/DER interconnection)
WEIGHT	4.1 lbs. (1.9kg)	INVERTER WIRING TERMINATION	Terminal block
SHIPPING WEIGHT	5.6lbs. (2.5kg)	GRID CONNECTION TYPE	Split-Ø/3W (2S/4-jaw), Single- Ø/3W (12S/5-jaw)
MOUNTING SYSTEM	Blade interface with 4-jaw or 5-jaw meter socket	GRID TERMINATION METHOD	Blade interface with meter socket for L1/L2, pigtail for neutral
ELECTRIC METER COMPATIBILITY	Type 2S, type 12S	FIELD TERMINAL RATING	75°C
METER SOCKET COMPATIBILITY	Ringless and ring-type meter sockets, horn and lever bypass	CONDUIT CONNECTION	1" trade size.
DER INTERFACE POINT	Factory configured, load side. Line side is available for utility use only	TERMINAL CONNECTIONS	L1, L2, N, G; Up to #3 AWG wire
SAFETY INFORMATION		OVERCURRENT PROTECTION	
APPLICABLE SAFETY STANDARDS	UL 414 – Meter Sockets	TYPE	Eaton type BR, Siemens type Q (10 kAIC) Eaton type BRH, Siemens type QH (22 kAIC) Thermal magnetic 240v, externally resettable
FILE NUMBER (STANDARDS)	E361188	OVERCURRENT RATINGS AVAILABLE	15A, 20A, 25A, 30A, 35A, 40A, 45A, 50A, 55A, 60A, 70A, 80A
AMBIENT AIR OPERATING TEMPERATURE RANGE	-22°F to 149°F (-30°C to 65°C)	CURRENT INTERRUPTING RATING	10 kAIC or 22 kAIC rating
AMBIENT AIR STORAGE TEMPERATURE RANGE	-40°F to 176°F (-40°C to 80°C)		

Reference 6 – Solar MSA Product Labels

Product Label:

**Suitable for use as Service Equipment
Type 3R Enclosure**

⚠ WARNING Dual power sources. Turning off parallel energy source disconnect does not de-energize the meter socket adapter. Turn off power from all sources before working inside. Suitable only for use with Listed utility interactive equipment in accordance with Article 705 of the NEC.

⚠ WARNING Electric shock hazard. Do not touch terminals. Terminals on both Line and Load sides may be energized in the open position.

⚠ WARNING No user serviceable parts inside. Tampering with or removal of this device is strictly prohibited. Hazard of electrical shock or burn. Do not break seal. Contact utility for service.

⚠ WARNING Suitable for use on the supply side of the service disconnecting means.

⚠ CAUTION For use only with Interactive Equipment

NOTICE Not intended for use with disconnect sleeves or additional meter socket adapters.

NOTICE Models that incorporate a DER circuit connection to the line side of the meter socket adapter will be marked accordingly, and approval from the serving utility is required before connection of these circuits.

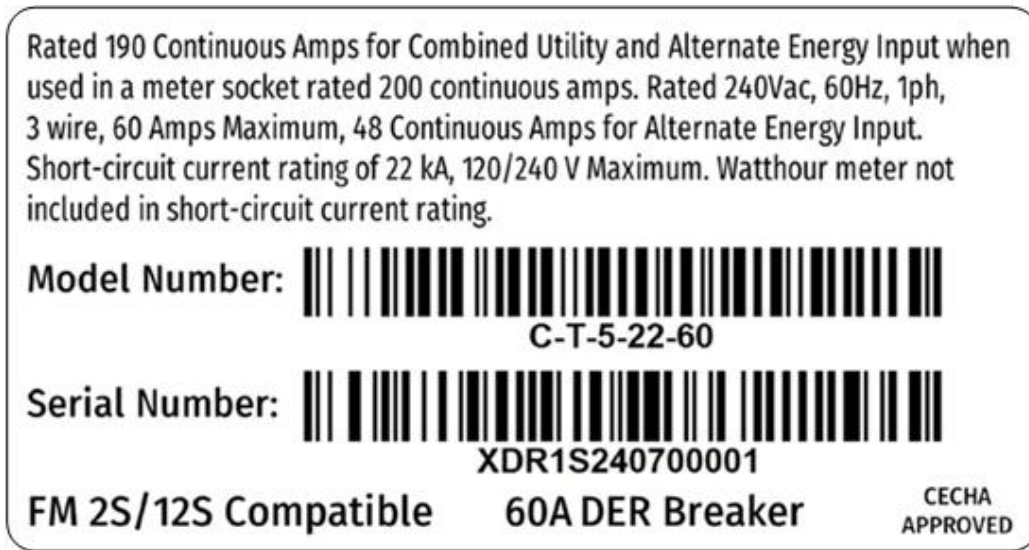
NOTICE Suitable for use with 4 or 5-terminal ringless and ring-type meter sockets, 1ph, 3 wire + ground, rated up to 200 amps maximum, 240Vac.

NOTE See additional labels at terminals for torque rating values. Field wiring terminal lugs for use with copper conductors only.



LISTED
**Meter Socket
Adapter
E361188**

Serial Number Label:



Connection Module Outer Label:



Connection Module Torque Values:

L/N/G Torque Values:
50 in-lbs (#3 AWG)
45 in-lbs (#4-6 AWG)
40 in-lbs (#8 AWG)
35 in-lbs (#10-14 AWG)

N/G Torque Values:

N/G Torque Values:
45 in-lbs (#4-6 AWG)
50 in-lbs (#3 AWG)

Reference 7 – Neutral Connection Options

The connectors listed below are 230.46-compliant and listed for use with both copper and aluminum conductors.

Part numbers cover wire ranges to support 100, 125, 150, 175, and 200-amp services. Research the part number for specifications including conductor size range.

Type	Manufacturer	Part Numbers	UL File Number
Split Bolt	ABB (includes T&B, Blackburn)	APS02, APS11, APS21, APS41	E9809
	Gardner Bender	GAK-2, GAK-1/0, GAK-2/0	E61528
	Erico	ESBP2, ESBP1/0, ESBP2/0	E323600
	Ideal	AS-2, AS-1/0, AS-2/0, AS-4/0	E5238
	IlSCO	SK-2, AK-2, AK-1/0, AK-2/0, AK-4/0	E6207
	Morris	90416, 90418, 90420	E175118
	Penn-Union	SWA-7, SWA-8, SWA-10	E12822
	Southwire	795	E155861
Parallel Tap	ABB	GP-2, GP-0, GP-250-0, GT-2, GT-0, GT-250-0, GT-250	E9089
	IlSCO	GTA-2-2, GTA-0-0, GTA-250-0	E6207
	Penn-Union	GPT-2, GPT-1/0, GPT-250-0, GPT-250	E12822

CALIFORNIA PROP 65 WARNING



WARNING: This product can expose you to chemicals including acrylonitrile, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

DISCLAIMER

The information presented in this document represents ConnectDER's understanding of standards / test procedures and is provided for informational purposes. ConnectDER makes no representation as to the accuracy, completeness, suitability, or validity of the information. ConnectDER will not be liable for any errors, omissions, losses, injuries, or damages arising from the use of this information.

For the official views of UL, consult the appropriate standard, or contact UL directly regarding the ConnectDER Solar MSA, UL File Number E361188.