

Series 3000 Specification and Installation Instructions



Technical Specifications

1.1 Model Number Description

S3480-R0101-021-00-00

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

Figure 1: Series 3000 model number format

1. Meter Series
S3 – Series 3000 meter
2. Voltage Configuration: Rated voltage
208 - 1, 2 or 3PH, 2, 3 or 4 W (120V, 208V, 120/240V): Voltage rating.
480 - 1, 2 or 3PH, 2, 3 or 4 W (277/480V): Voltage rating.
600 - 1, 2 or 3PH, 2, 3 or 4 W (347/600V): Voltage rating.
3. Enclosure
R – Outdoor, UL4X (NEMA 4X) rated, with clear lid
N – Indoor surface mount (Not suitable for outdoor use)
4. Meter Capacity: Enclosure maximum capacity
5. Number of Installed Meters
6. CT Ratings

011 – 100:0.1	161 – 1600:0.1
021 – 200:0.1	301 – 3000:0.1
041 – 400:0.1	501 – 5000:0.1
081 – 800:0.1	

7. Additional Options

- 00 – No Options
- 01 – Demand
- 03 – Delta

8. Firmware Options

1.2 Serial Number Description

The Series 3000 serial number format is shown below in Figure 2.

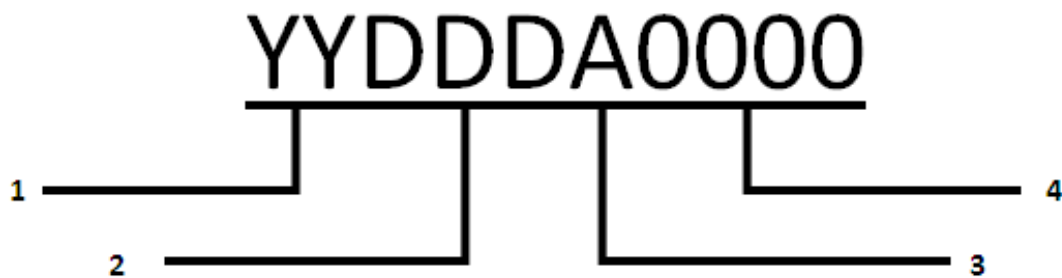


Figure 2: Meter serial number description

1. YY: Last two digits of the manufacturing year
2. DDD: Day of manufacture, 1-365 or 366
3. A: First digit of meter serial number, alphabetic A-Z
4. 0000: Last three digits of meter serial number, numeric 0-9

Physical Description

1.3.1 Enclosures

Series 3000 meters are available in two enclosures: a UL4X rated plastic enclosure for outdoor applications and a metal enclosure for indoor only use. The dimensions of the two enclosures are shown below in figure 3 and 4:

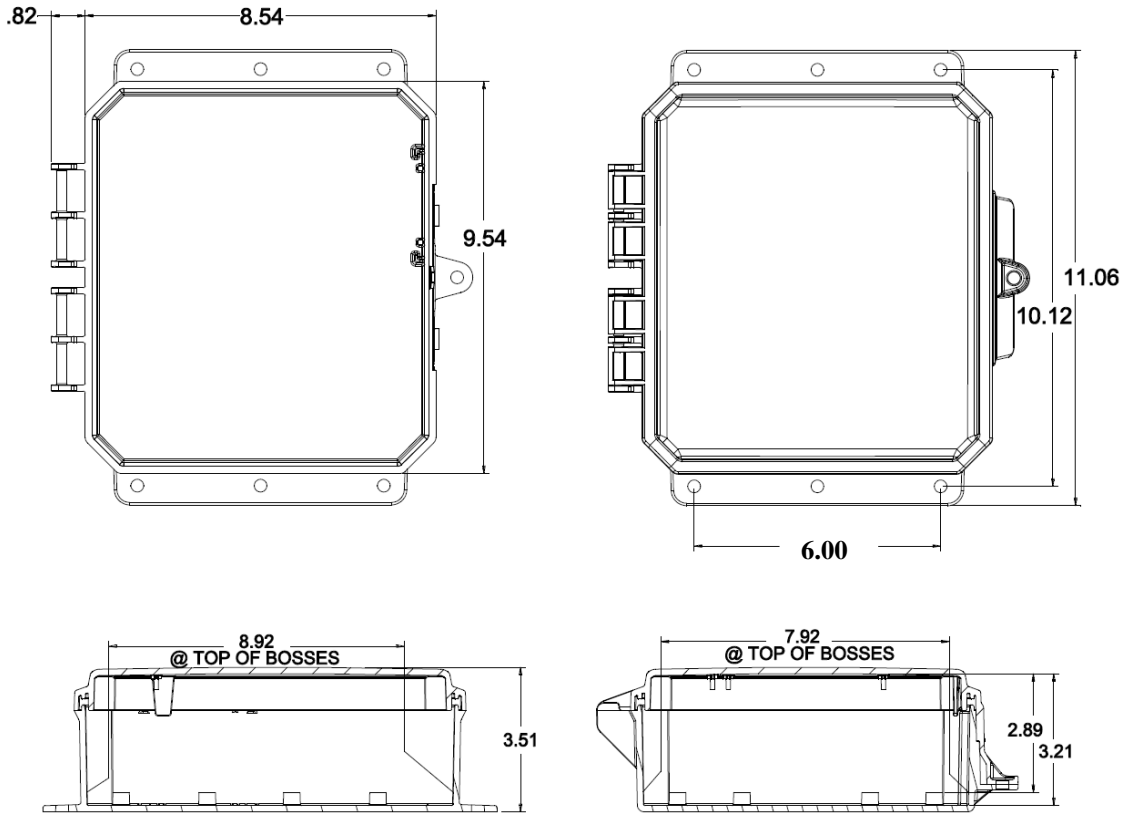


Figure3: ULType 4x Outdoor Enclosure

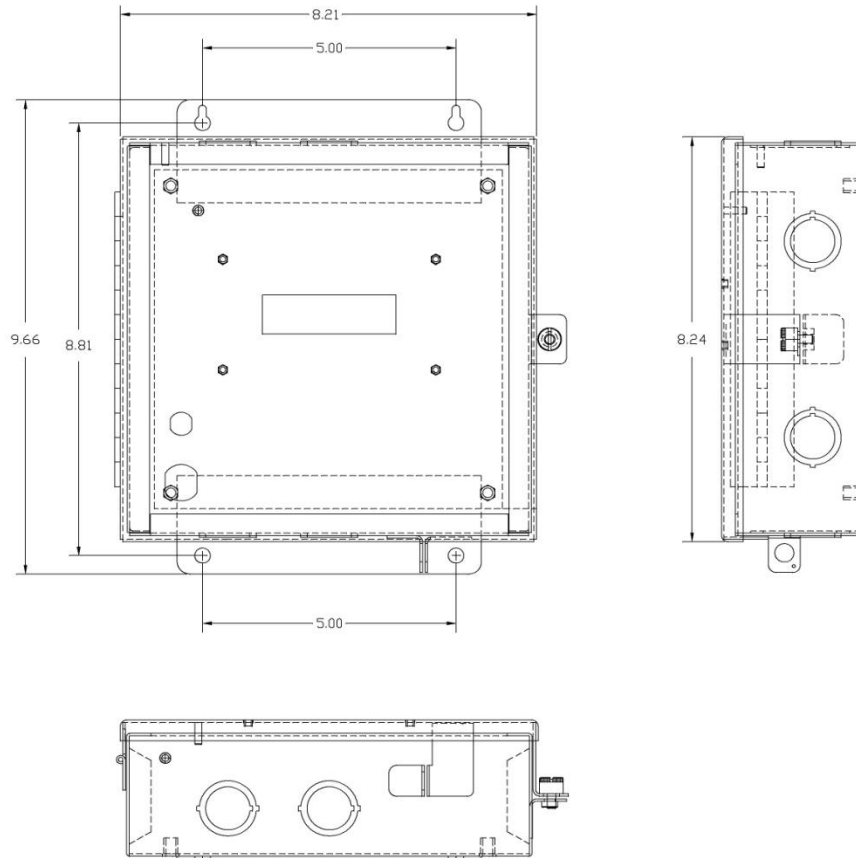


Figure4: Metal indoor use only enclosure.

1.3 Electrical Specification

Input Configurations	1 Phase, 2 wire (120 V or 277 V)	1 or 2 Phase, 3 Wire (120/208, 120/240 or 277/480 V)
Supply Voltage – +/- 15% due to supply voltage fluctuation	120VAC +/-15% 277VAC +/- 15%	120VAC +/-15% 277VAC +/- 15%
Maximum Input Power	7 VA	7 VA
Maximum Rated Current	<u>Primary</u> : Max Oper. Current + 10% <u>Secondary</u> : 0.12 A	<u>Primary</u> : Max Oper. Current + 10% <u>Secondary</u> : 0.12 A
Line Frequency	50-60 Hz	50-60 Hz
Power Factor Range	0.5 to 1.0 leading or lagging	0.5 to 1.0 leading or lagging
Accuracy ¹	+/- 0.5% of registration @ 1.0pf, 1% to 100% of rated current +/- 0.75% of registration @ 0.5pf, 1% to 100% of rated current	+/- 0.5% of registration @ 1.0pf, 1% to 100% of rated current +/- 0.75% of registration @ 0.5pf, 1% to 100% of rated current
Meter Operating Temperature	-30 to +60 degrees C	-30 to +60 degrees C
Display Operating Temperature	-20 to +50 degrees C	-20 to +50 degrees C
Rated Pollution Degree ²	2	2
Rated Relative Humidity	80%	80%
Terminal Blocks: Voltage Terminal:	14-18 AWG 12 in-lb of torque maximum	14-18 AWG 12 in-lb of torque maximum
CT Terminal	14-18 AWG 4.4 in-lb of torque maximum	14-18 AWG 4.4 in-lb of torque maximum
I/O Terminal	13-18 AWG 4.4 in-lb of torque maximum	13-18 AWG 4.4 in-lb of torque maximum

Table 1: 1PH, 2W and 1or 2 phase, 3W Series 3000 electrical specifications

¹Accuracy based on Leviton solid core current transformers (included), with 100mA secondary output. Meter input burden resistance at 2 Ohm.

²Pollution Degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

1.3 Electrical Specifications

Input Configurations	2Phase, 2 Wire Delta 3 Phase, 3 Wire Delta (208, 480, 600 V)	3 Phase, 4 Wire Wye (120/208 , 240/416, 277/480 or 347/600 V)
Supply Voltage	Line to Line: 208VAC +/-15% 416VAC +/-15% 480VAC +/-15% 600VAC +/-15%	Line to Neutral: 208VAC +/-15% 240VAC +/-15% 480VAC +/-15% 600VAC +/-15%
Maximum Input Power	7 VA	7 VA
Maximum Rated Current	<u>Primary</u> : Max Oper. Current + 10% <u>Secondary</u> : 0.12 A	<u>Primary</u> : Max Oper. Current + 10% <u>Secondary</u> : 0.12 A
Line Frequency	50-60 Hz	50-60 Hz
Power Factor Range	0.5 to 1.0 leading or lagging	0.5 to 1.0 leading or lagging
Accuracy ¹	+/- 0.5% of registration @ 1.0pf, 1% to 100% of rated current +/- 0.75% of registration @ 0.5pf, 1% to 100% of rated current	+/- 0.5% of registration @ 1.0pf, 1% to 100% of rated current +/- 0.75% of registration @ 0.5pf, 1% to 100% of rated current
Meter Operating Temperature	-20 to +60 degrees C	-20 to +60 degrees C
Display Operating Temperature	-20 to +50 degrees C	-20 to +50 degrees C
Measurement CAT III ³ - 600V	Do not use on CAT IV applications. 6000V Surge	Do not use on CAT IV applications. 6000V Surge
Rated Pollution Degree ²	2	2
Rated Relative Humidity	80%	80%

Table 2: 2PH, 2W and 3PH, 3 or 4W Series 3000 electrical specifications

¹Accuracy based on Leviton solid core current transformers (included), with 100mA secondary output. Meter input burden resistance at 2 Ohm.

²Pollution Degree Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

³Measurement category III is for measurements performed in the building installation.

2. I/O Connections and User Display

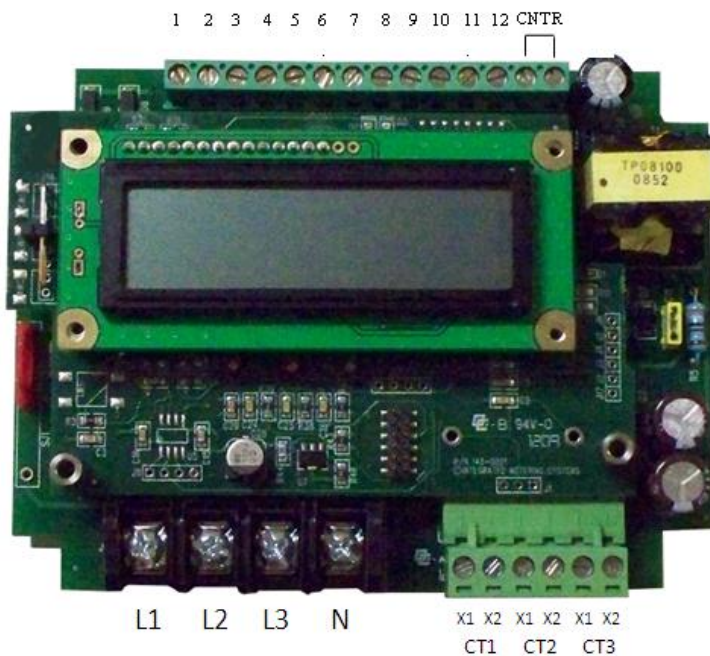


Figure 5: Series 3000 connections and display

<u>Voltage Inputs</u>	<u>Description</u>
L1	Voltage Input, Line 1
L2	Voltage Input, Line 2
L3	Voltage Input, Line 3
N	Neutral input (No connect for Delta meters)
<u>CT Inputs</u>	
CT1 : X1	Current Transformer input, CT1. Colored wire of CT1
CT1 : X2	Current Transformer input, CT1. White wire of CT1
CT2 : X1	Current Transformer input, CT2. Colored wire of CT2
CT2 : X2	Current Transformer input, CT2. White wire of CT2

CT3 : X1	Current Transformer input, CT3. Colored wire of CT3
CT3 : X2	Current Transformer input, CT3. White wire of CT3
<u>Outputs (Pin Number)</u>	Future use
1	Future use
2	Future use
3	Future use
4	Future use
5	Future use
6	Future use
7	Future use
8	Future use
9	Future use
10	Future use
11	Future use
12	Future use
13	Output to optional electromechanical kWh counter
14	Output to optional electromechanical kWh counter

Table 3: Series 3000 I/O connections

3. Installation Instructions

The following section contains installation and wiring instructions for single Series 3000 meters in an outdoor enclosure. If technical assistance is required at any

point during the installation, contact information can be found at the end of this manual. Leviton is not responsible for damage to the meter caused by incorrect wiring.

3.1. Explanation of Warning Symbols



Indicates the presence of electric shock hazards. Prior to proceeding, de-energize the circuit and consult the operation manual.

Also.

Indicates the need to consult the operation manual due to the presence of a potential risk.

Table 4: Warning symbols

3.2 Safety Precautions

WARNING

- **Installation of electric meters requires working with possibly hazardous voltages. These instructions are meant to be a supplement to aid trained, qualified professionals.**
- **Turn off all power supplying the equipment before performing any wiring operations. Use a properly rated voltage sensing device to confirm power is off.**
- **Installations should be done in accordance with local codes and current National Electric Code requirements.**
- **Bonding is not automatic for metal conduit connections; separate bonding is to be provided¹.**
- **Must be secured using the provided key lock once installation is complete. The purpose of the lock is to prevent access to live parts that pose potential safety risks.**
- **Equipment used in a manner not specified by this document impairs the protection provided by the equipment.**

Failure to follow these warnings could result in death, injury or property damage.

¹ Bonding kit must be UL recognized. Leviton recommends Rockwell Automation 855BM-ABK

3.3 Preparation

1. Verify the model number and electrical specifications of the meter being installed to confirm they are appropriate for the intended electrical service (see Section 1.1).
2. Consult local codes for any possible permits or inspections required before beginning electrical work.
3. For outdoor applications, conduit and conduit fittings must be rated UL Type 4X for outdoor enclosures. Failure to use the appropriate conduit impairs the degree of equipment protection. Indoor applications may use rigid conduit.
4. Make sure all tools to be used during installation have proper insulation ratings.
5. Look inside the meter enclosure and electrical panel for possible exposed wire, broken wire, damaged components or loose connections.

3.4 List of Materials

- Series 3000 meter and associated mounting materials.
- Line 1, Line 2, Neutral and Ground hook-up wires as required for the electrical service. Wires must be 14 AWG or larger and insulated for 600 VAC min at 75 deg C min.
- Current Transformers (CTs): This product is designed for use with Leviton CTs.
- Flexible, non-metallic conduit and fittings; UL Type 4X for outdoor applications.

3.5 Mounting the Enclosure

3.5.1 Mounting Location

- Series 3000 meters require a switch or circuit breaker as part of the building installation.
- The switch or circuit breaker must be marked as the disconnecting device for the meter.
- It is recommended that the enclosure be mounted near the disconnecting device in an area with adequate ventilation.
- The enclosure should not be positioned in a manner that makes it difficult to operate the disconnecting device.
- Ensure that the CT and voltage lead lengths (and conduit lengths) are capable of reaching the enclosure from the breaker panel.
- If a suitable mounting location near the panel cannot be found, additional in-line fuses or circuit breaker may be required in accordance with NEC regulations.

3.5.2 Making Conduit Holes

Steel Enclosure

The Series 3000 steel enclosure comes with five 1 1/16" knockouts (3/4" conduit); two on the bottom of the enclosure, two on the top, and one on the side. To remove a knockout, use a flathead screwdriver (or other rigid device) to puncture the indentations first, and then pry off and discard the knockout.



Figure 6: Steel enclosure knockouts

Outdoor Plastic Enclosure

The bottom, top, and non-hinge side of the plastic enclosure can be used as the conduit location. The bottom and lower-half of the side panel will make connecting wires the easiest. Conduit openings should be as far away from inner components as possible for the installation. Opening sizes must be appropriate to fittings, and large enough to fit all voltage and CT wiring. Care should be exercised to keep drill bit away from components inside the enclosure.

3.5.3 Mounting Procedure and Conduit Installation

1. Fasten the enclosure to the selected surface using the provided mounting holes and screws.
2. Figure 7 depicts the top mounting holes for both enclosures. There are also mounting holes on the bottom of each enclosure. See Section 1.3 for mounting dimensions.
3. Verify that the enclosure is not loose and that all connections are secure.
4. Attach the conduit between enclosure and load center, routing wires as necessary for later use. **UL Type 4X conduit and fittings must be used in order to maintain the outdoor rating of the enclosure.**
5. Make sure the conduit fittings are aligned properly and tightened securely to prevent moisture from entering the enclosure (outdoor applications).

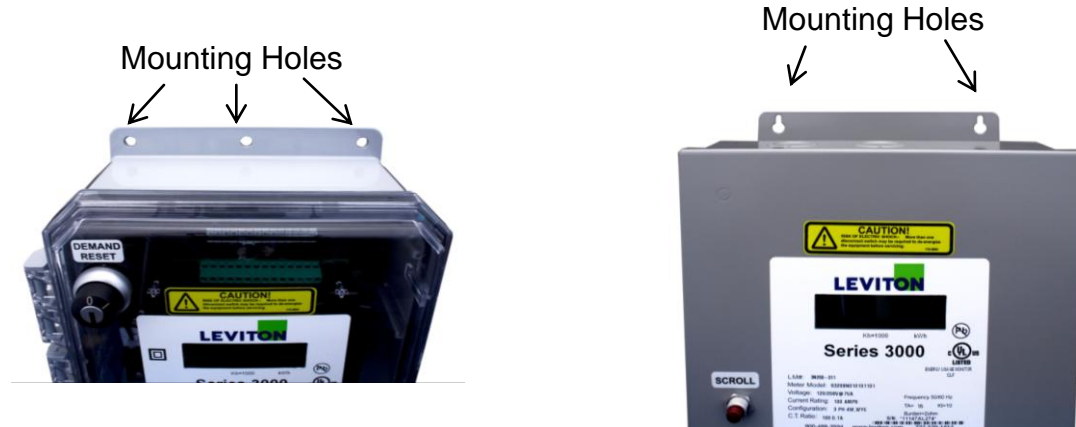


Figure 7: Enclosure mounting holes

3.6 Installation of Voltage Lines



Check to make sure electrical service is off before any connections are made. Verify if additional in line fuses are required based on National and Local electrical codes.

1. Field wired voltage connections are made to the Series 3000 voltage terminal block. Wire selection dependent on over current protection used. See section 3.7
2. Connect 14Awg, 75 deg C, 600 V min. insulated wiring for Lines, Neutral and Ground to the appropriate locations in the breaker panel, in accordance with all national and local electrical codes; see Figure 9 for 1Ph, 2-wire applications; Figure 10 for 2PH 2-wire applications; Figure 11 for 1 or 2 Ph, 3-wire applications; Figure 12 for 3 Ph, 4-wire applications; and Figure 13 for 3 Ph, 3-wire applications.
3. Route wires through the conduit if not already done.
4. Trim the wire to the appropriate length to avoid coils of excess wiring.
5. Connect additional inline fuses if required; See section 3.7.
6. For connections to the Series 3000 terminal, strip wiring to approximately .300 inches and connect to the appropriate terminals. Wires should be tightened so that they are held snugly in place, but do not to over-tighten, as this may compress and weaken the conductor.

3.7 External Switch Mechanism Installation

To ensure a safe installation, the Series 3000 meter requires an external switch mechanism, such as a circuit breaker, be installed on the Series 3000 MAINS input wiring. The switch mechanism must be installed in close proximity to the meter and easily reachable for the operator. This device must also be marked as the disconnecting device for the Series 3000 meter. A 15Amp circuit breaker must be used for over current protection. Corresponding UL approved wire 14AWG, 75 deg C. min, must be used for the input voltage and ground connections.

3.8 Variations and Installation of Current Transformers



To reduce risk of electric shock, always open or disconnect the circuit from the power distribution system of a building before installing or servicing current transformers.

In accordance with NEC, CTs may not be installed in any panel board where they exceed 75% of the wiring space of any cross-sectional area.



Shown: 100A or 200A solid core CTs Installing solid core CTs

1. Route CT wires through the conduit if not already done.
 2. Trim the wire to the appropriate length to avoid coils of excess wiring.
 3. At meter, strip insulation from wires to approximately .300 inches.
 4. Connect CT leads to the appropriate terminals.
 5. With power turned off, disconnect each monitored conductor and slide on a CT, ensuring the CT is correctly oriented as noted above.
 6. Reconnect the conductors.
- Leviton split core CTs (Figure 8): The side with the white dot, H1, must face the incoming LINE. White wire connects to X2 terminal, black wire connects to X1 terminal.

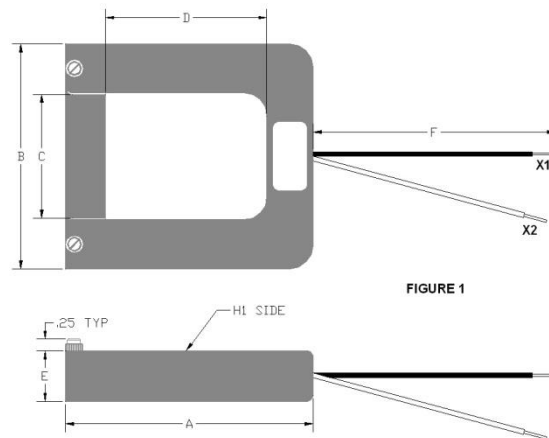


Figure 8: Leviton split core CTs

Installing split core CTs

1. Route CT wires through conduit if not already done.
2. Trim the wire to the appropriate length to avoid coils of excess wiring.
3. Strip wiring to approximately .300 inches.
4. Connect the CT leads to the appropriate meter as described above.
5. With power to the conductors turned off, place one CT around each conductor, ensuring that the white dot or label identifying source is facing the line side.

Failure to install CTs in the correct orientation will lead to inaccurate meter readings. Figure 9 through Figure 13 show wiring diagrams for the various voltage configurations.

4.0 Hookup Diagrams

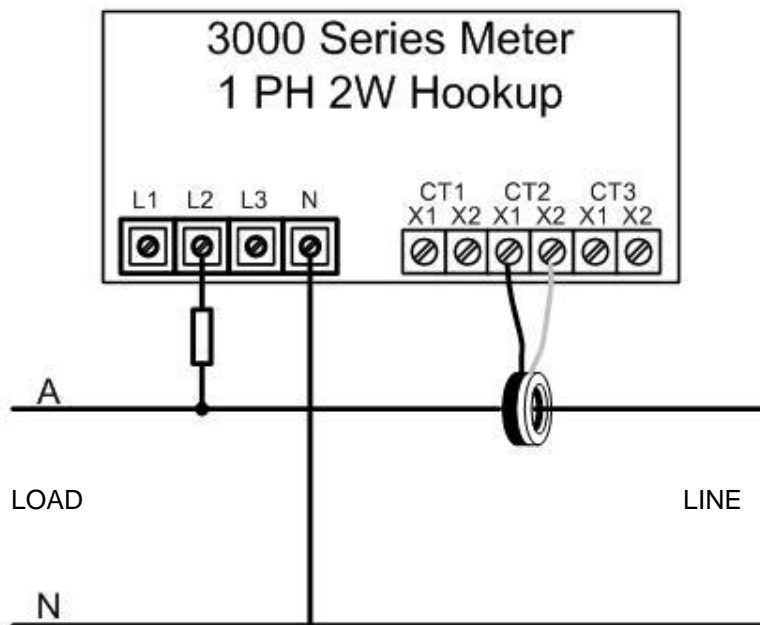


Figure 9: 1-phase, 2-wire hookup diagram. White side of CT faces incoming power.

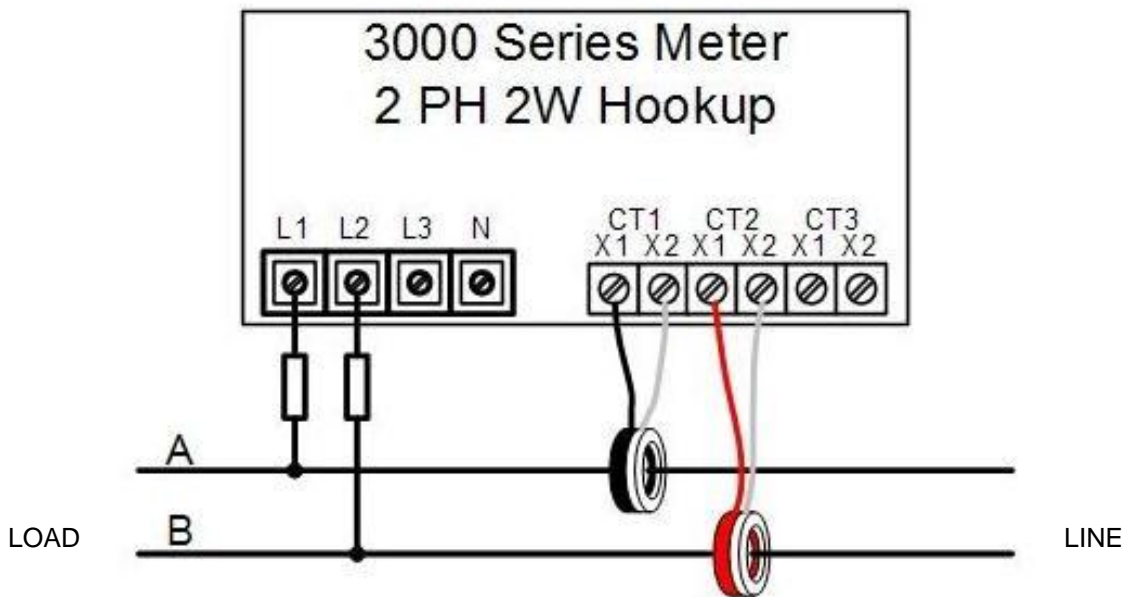


Figure 10: 2-phase 2-wire hookup diagram. White side of CT faces incoming power.

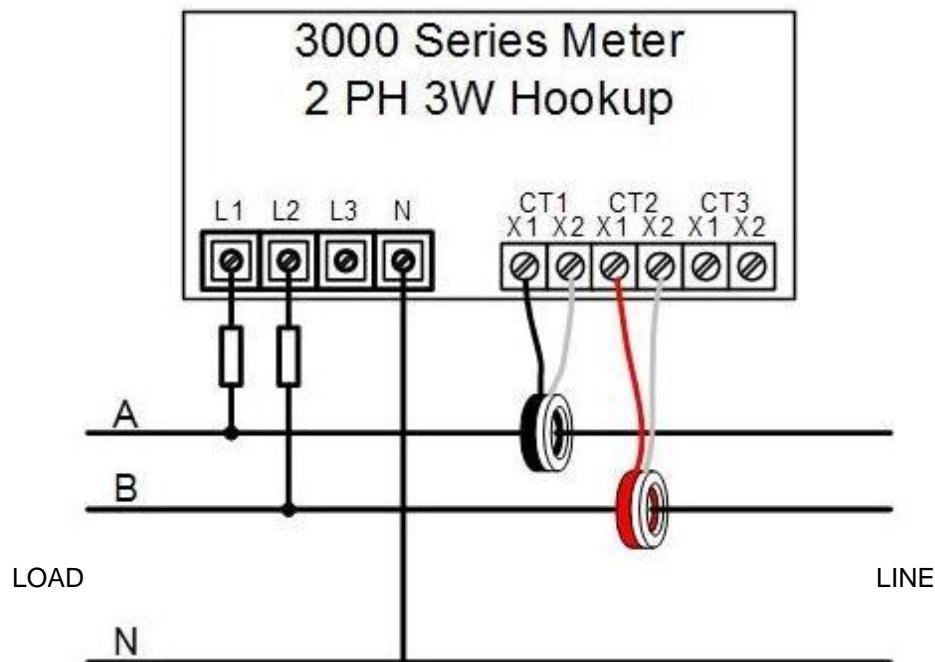


Figure 11: 1-phase, 3-wire (split phase) or 2-phase, 3-wire hookup diagram. White side of CT faces incoming power.

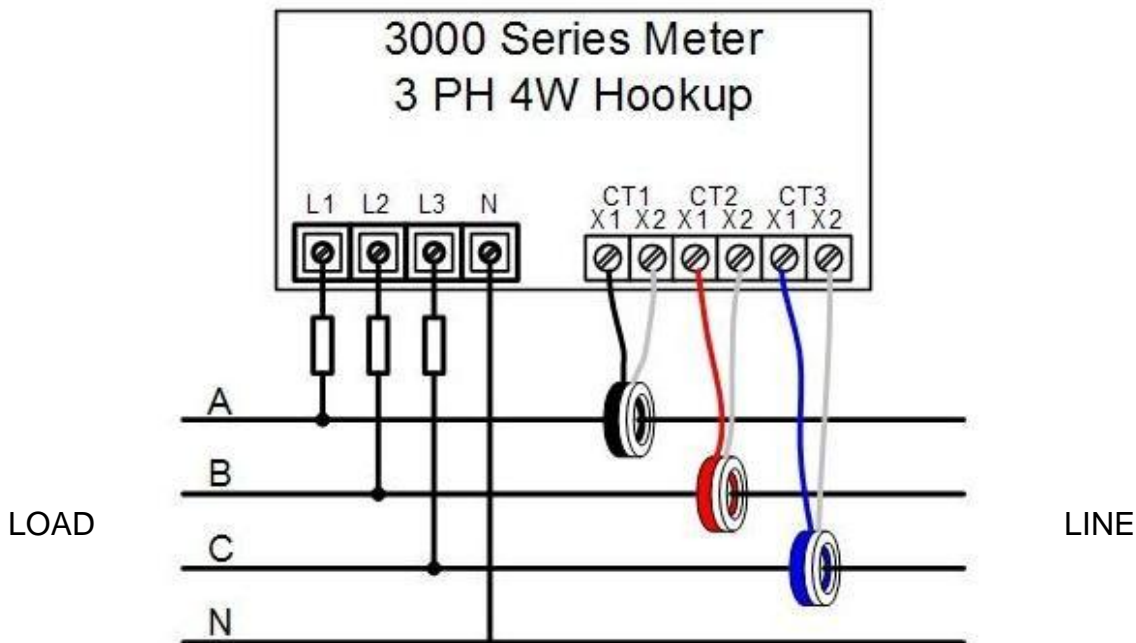


Figure 12: 3-phase, 4-wire hookup diagram. White side of CT faces incoming power.

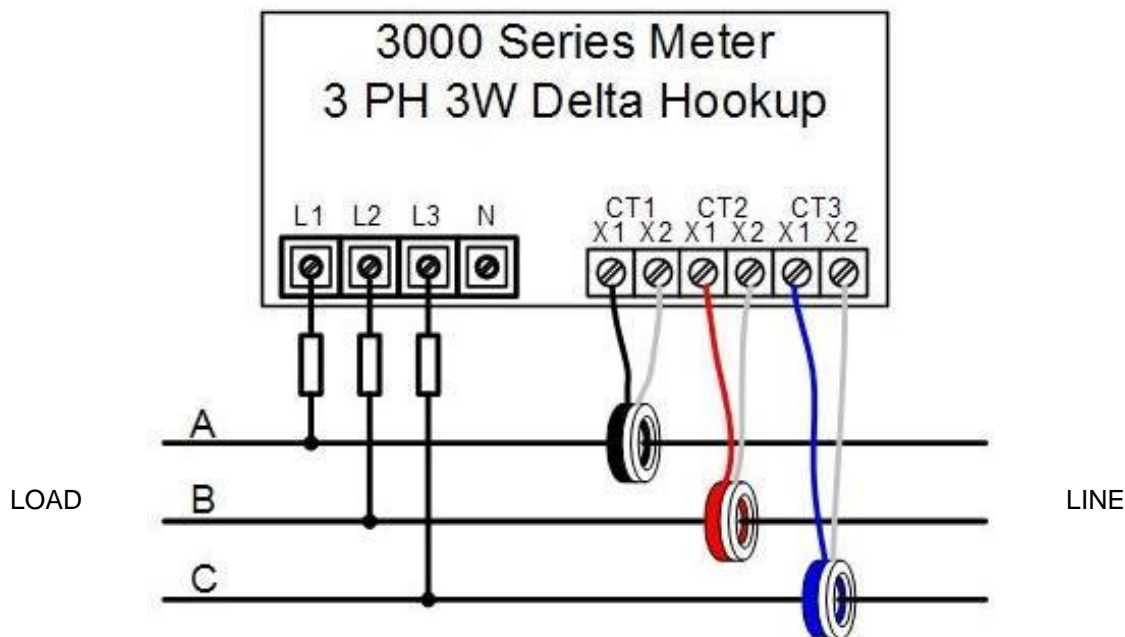


Figure 13: 3-phase, 3-wire hookup diagram. White side of CT faces incoming power.

General Requirements:

- Splices on the CT leads must be within the meter enclosure, not inside the conduit. Leviton provided CT leads are 48 inches minimum. Wire insulation should be stripped so that the bare conductor length that connects to the meter terminal block does not exceed 0.300 inches.
- CTs should be securely fastened such that they will not slide down to live terminals.
- Wires should be tightened so that they are held snugly in place, but do not to over-tighten, as this may compress and weaken the conductor. Maximum rated torque for CT terminal blocks is 4.4 in-lb.
- For poly-phase electrical panels, current and voltage inputs must be installed 'in phase' for accurate readings (e.g. CT1 on Line 1, CT2 on Line 2, CT3 on Line 3); see Figures 10-13.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CT Variations

Leviton solid core CTs: In accordance with CT label, the LINE side of CT must face incoming Line. White lead connects to X2 of CT connection (CT1: X2, CT2: X2 or CT3: X3). Colored lead connects to X1 of the corresponding CT connection (CT1: X1, CT2: X1 or CT3: X3).

5.0 Power-on Sequence

When the Series 3000 meter is initially powered on it displays the following sequence of information:

1. Meter Serial Number

The Meter Serial Number screen is shown below. The lower left number is the alphabetical digit from the meter serial number (from 01=A to 26=Z), and the main display shows the numerical portion of the Serial Number. For example, the image below represents meter serial number XXXXXC6149, with the X's indicating the manufacturing day and year. See section 1.2 for more information on meter serial numbers.



2. Hardware Version

The Hardware Version screen displays the word 'Hard' and the meter's hardware version.



3. Software Version

The Software Version screen displays the word "Soft" and the meter's software version.



4. CT Ratio

The CT Ratio screen displays the meter's programmed CT ratio.



5. Hello Screen



6. Compute Engine Test Runs

The compute engine performs 10 test runs before the meter starts normal operation. The test runs are indicated by the TEST icon and the words 'Pass X', where X is the test run number.



5. Advanced Diagnostic Features

5.1 Low Voltage Detection

Diagnosis and Response

The Series 3000 meter provides low line voltage monitoring capabilities. The threshold for this detection is 80% of rated voltage, and the voltage must stay below that level for approximately 20ms before the voltage drop is confirmed. When the voltage drop is confirmed, the Series 3000 meter attempts to store the current time of the RTC and the current kWh readings. Only the most recent power loss time is saved in the EEPROM.

In order to preserve the lifetime of the EEPROM, the meter readings are only stored when the initial voltage drop is confirmed. The meter then returns to normal operation. Once the voltage returns to proper levels, the meter will again save immediately on the next voltage drop. **Based on this operation, a consistently unstable voltage can significantly decrease the lifetime of the EEPROM.** For more information see the Series 3000 users' manual.

Display

When low voltage is detected on a phase, it is indicated with a simultaneous blinking of the 'V' and the corresponding phase letter.

5.2 Reverse Phase Indication

Diagnosis and Response

Series 3000 meters are designed specifically to measure energy consumption. As a consumption-only meter, it is expected that the energy flow will always be from the power grid and in the same direction across all lines. If the measured power usage on a phase is negative, the meter will report the corresponding CT as being reversed.

Display

When a reverse CT is detected, it is indicated with a simultaneous blinking of the 'A' and the corresponding phase letter. For more information see the LCD section in the Users Manual.

5.0 Troubleshooting FAQ

FAQ

Q: Can you use additional sets of current transformers (CT's) with a submeter to accommodate more circuits?

A: Yes, you can use up to three sets of CTs in parallel per meter. Just make sure you do not exceed the current rating per phase. CTs should be sized according to the rated amperage of the meter. Example: Monitoring 3, 100 amp circuits with a 400 amp meter would require the use of 400 amp CTs.

Q: What is AMR equipment?

A: AMR is Automatic Meter Reading equipment. This typically consists of radio transmitters, repeaters, and a collector that monitors, records, and transmits data to a Leviton Energy Manager, data concentrator, or Building/ Energy Management System.

Contact Leviton for more information

Q: Why do I need a third party billing service (RBC)?

A: RBC's are typically used with larger facilities that want to generate bills for the tenants. These companies will install, initialize, maintain, and monitor the meters not only for electrical usage but for trouble signals as well.

Q: Why are the 100A and 200A solid core current transformers color coded (Black & white, red & white, and blue & white)?

A: CT1 needs to monitor the same phase used to power the meter on line 1, CT2 needs to monitor the same phase used to power line 2, etc.

Q: Can digital input/output wires be routed through the same conduit as voltage input and current sensing wires?

A: No. In accordance with NEC and UL requirements, Class 2 wiring (digital inputs/outputs) must be separated from Class 1 wiring.

Q: I still can't get my meter to work, what now?

A: Contact technical support via phone or on our website given in the following section.

Contact Information

Mailing Address

20497 SW Teton Avenue Tualatin, Oregon 97062

Hours

Technical Support: Mon-Fri 6:00 AM-4:00 PM PST

Customer Service: Mon-Fri 8:00 AM-5:00 PM PST

Telephone Numbers

1-800-959-6004 Technical Support Toll-free

1-503-404-5501 Technical Support Local Portland, OR

1-503-404-5601 Technical Support Fax

For Orders or General Sales Inquiries

1-800-736-6682 Customer Service Toll-free

1-503-404-5500 Customer Service Local Portland, OR

1-503-404-5594 Customer Service Fax