

## CT Installation and Wiring

---

**SAFETY WARNING!** Current transformers (CTs) are typically installed in electrical equipment with lethal high voltage levels. Before attempting to install CTs read the [CT Installation Safety](#) page on the CCS website.

**CAUTION!** WattNode meters are designed to work only with CTs that have a 333 mV output. This type of CT has a built-in burden resistor that produces a safe low voltage output signal. The use of any other type of CT will result in incorrect power measurements, may permanently damage the WattNode meter and void the warranty.

### Key Points

---

- Install CTs on the phase conductor that corresponds to the voltage input phase.
- Install CTs with the arrow or label “THIS SIDE TOWARD SOURCE” facing towards the current source.
- Connect the white and black CT leads to the corresponding white and black CT input terminals.

### Opening and Closing CTs

---

Solid-core CTs (also called toroidal or donut CTs) require that the phase conductor being measured be disconnected at one end so that it can be passed through the opening in the CT. This is not difficult when the wire gauge is small but becomes impractical with larger wire gauges and multi parallel feed conductors.

Split-core CTs (opening CTs) have an opening section, so that they can be installed around a conductor, without disconnecting the circuit. These CTs have two parts, a ‘U’ shaped body and an ‘I’ section which opens for easy installation around the conductor. Different models have different opening mechanisms, so you should familiarize yourself with the CT mechanism before starting the installation.

- ACT Series split-core CTs open by simply squeezing the latch and the hinged top pops open; install around the conductor and snap closed. Accu-CTs can be open and installed with one hand while wearing safety gloves!
- CTS Series split-core CTs open by pulling the ‘I’ section straight-out of the ‘U’ shaped body. A strong pull is required, especially when the CT is brand new. The removable section only fits one way, so as it is removed, notice how the steel core pieces fit together. When closing CTS Series CTs, be sure to match up the ends the same way. If the CT seems to jam and does not close, the steel core pieces are probably not aligned correctly. **Do Not Use Excessive Force!** Instead, reposition or rock the removable portion until the CT closes without excessive force.
- CTB Series split-core (high current bus bar CTs) are opened by first removing the thumb-screws that secure the ‘I’ section. Then pull the ‘I’ section straight-out of the ‘U’ shaped body. (Follow the instructions above for CTS Series split-core CTs)
- CTM Series CTs open by releasing the latch on the side of the CT. When closing, be sure the “I” section is fully latched, usually the second click.

ACT Series split-core CTs have flat mating surfaces. When installing this type of CT, make sure that the mating surfaces are clean. Any debris between the mating surfaces will increase the gap, decreasing accuracy.

After the CT is installed, a nylon cable tie can be threaded through the opening window and around the conductor to secure the CT in place on the conductor.

With CTS and CTM Series CTs, a second nylon cable tie may be placed around the perimeter of the CT to prevent accidental opening. On CTB bus bar models, reinstall the nylon thumb screws and tighten them with your fingers. **Do Not Use A Screwdriver!** Note that CTS and CTB Series CTs with removable 'I' sections are calibrated as a single unit. For best accuracy, these parts should not be interchanged with other CTs.

---

## Phase Conductors

---

For correct measurements, CTs must be installed on the same phase conductor that corresponds to the meter's voltage input connection. The voltage input connections are on the green, five position screw terminal block. For example, the ØA CT must be installed on the same phase conductor that is connected to the ØA Voltage input. Likewise, the ØB CT is installed on the same phase as the ØB Voltage input, and the ØC CT input is installed on the same phase as the ØC Voltage input. Use the colored phase labels supplied with the CTs or colored tape to help identify the wires.

To reduce magnetic interference between CTs on adjacent phases, it is a good practice to separate them by about 1 inch (25 mm). This also helps to prevent dust and debris from forming a bridge across the phase conductor terminals or bus bars and possibly causing a flashover arc.

For best accuracy, the CT opening window shouldn't be more than 50% larger than the phase conductor. Ideally, for best accuracy the conductor should be positioned in the center in the CT window. But in practice, this is typically not feasible, so the next best option is to position the conductor in the bottom of the 'U' shaped half of the CT, away from the opening end where there is magnetic flux leakage. Refer to the [CT Selection](#) page for more information on choosing CTs.

---

## Orientation and Polarity

---

CTs are marked with a label and/or symbol (arrow) which indicates the correct mechanical orientation of the CT on the conductor being measured. Find the arrow or label that says "THIS SIDE TOWARD SOURCE" on the CT and install the CT with the label or arrow facing toward the current source: generally the utility meter or the circuit breaker.

In addition to installing CTs with the correct mechanical orientation, electrical polarity, as indicated by their white and black wires must also be correct. Each pair of CT wires connects to the appropriate terminal on the black six position CT input terminal block. The terminals are labeled ØA CT, ØB CT, and ØC CT. The polarity of each pair of terminals is indicated by a white and black dot on the label. Be sure to connect the white wire to the phase terminal aligned with the white dot, and the black wire to the terminal with the black dot.

Remember that both the physical orientation and the electrical polarity of each phase must be correct for proper operation. If a phase is reversed either electrically or mechanically, and current flows in the reverse direction, the WattNode meter will measure, depending on the model, zero or negative energy for that phase.

---

## CT Lead Wires

---

If the CT lead wires are longer than necessary, they can be shortened. Short CT lead wires help to minimize interference from electrical noise. If the CT lead wires need to be longer than 8 feet, they can be extended. It is generally better to install the WattNode near the conductors being measured instead of extending the CT wires. However, it is possible to extend the CT wires by 300 feet (100 m) or more by using shielded twisted-pair cable and by not running the CT wires close to high current or high voltage conductors. Refer to the [CT Wire Extension](#) page for more information.

---

## Making Connections

---

Because the CT inputs of the WattNode submeter are susceptible to damage from electrostatic discharge (ESD), always ground yourself momentarily by touching the electrical enclosure or other grounded metal object before touching the meter. This is a good practice to follow with all electronic equipment sensitive to ESD.

To connect the CT lead wires to the CT input terminals, first strip about 1/4" (6 mm) of insulation off the end of one of the wires, twist the bare strands together, insert the end into the terminal block, and tighten the screw securely. It will be easier to connect the wires to the terminal block if the block is first plugged into the meter.

Unused CT inputs could possibly pickup electrical noise, so it is a good practice to short out unused CT inputs. Short out an unused CT input by connecting a wire jumper about 1 inch long between the white and black CT terminals.

---

## See Also

---

[CT Installation Safety](#)

[Current Transformers \(CTs\) Explained](#)

[CT Selection](#)

[CT Wire Extension](#)

[Measuring Multiple Circuits with One CT](#)

[Fitting Multiple Conductors Through a CT](#)

[Measuring Parallel Conductors](#)

[Paralleling Current Transformers](#)

[CT Common Terminals](#)

[Current Crest Factor](#)

[Current Transformer Crosstalk](#)