

Current Transformer Paralleling

Summary: This article summarizes the application of paralleling Current Transformers to measure current through more than one electrical conductor.

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Product: Current Transformers (CTs)

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Information: Current Transformer paralleling allows for the use of a single electrical meter input to measure current (in amperes) through more than one electrical conductor. This practice reduces the total number of electrical meters needed to meet a project's needs.

This document contains supplemental application information and is not intended as replacement to the manual. Refer to the product manual for safety and installation information.

When can CTs be paralleled:

CTs can be placed in parallel when the following criteria is met:

1. The meter supports parallel CTs
2. All of the CTs are the exact same make, model, amperage rating, and secondary output type
3. The meter can support the total amperage rating of all CTs combined

Reasons to parallel:

Paralleling multiple CTs aggregates the current through multiple conductors into a single meter to avoid summing multiple readings from multiple individual electrical meters. This practice reduces the complexity of downstream data and may net a cost savings for meter hardware.

Reasons to not parallel:

Paralleling CTs changes the total system metering precision as additional elements are added. Each CT has a defined accuracy rating and each paralleled CT will cause the percent deviation to sum together. For example: if three CTs are to be paralleled and each have a $\pm 0.3\%$ accuracy rating or better individually, the result is an overall reduction in accuracy to $\pm 0.52\%$.

Additionally, if more than one CT is connected to a single element input on an electrical meter, it is difficult to troubleshoot for **incorrect phasing and polarity issues**. It is crucial to verify all CTs connected to a single input are associated with the corresponding voltage phase from the panel. Care must also be taken when orienting each CT and adhering to wiring polarity. Failure to do so will result in incorrect energy readings that may be difficult to troubleshoot and may not be immediately apparent.

	Mini Meter	Series 1000	Series 2000	Series 3500	Series 4000/4100 Split Core Models	Series 4000/4100 Rogowski Coil Models	Series 8000	Series 7000
Allowed	No	Yes	Yes	Yes	Yes	No	No	No
Max Number		3	3	3	3			
Configurable/Max Total Current Rating		Fixed 800A	Fixed 1,200A	Fixed 5,000A	Configurable up to 32,000A			
CT Output Type	Current (0.1A)	Current (0.1A)	Current (0.1A)	Current (0.1A)	Voltage (0.333V)	Proprietary	Current (0.1A)	Voltage (0.333V)

Specifying CT Amperage Rating Needed:

- Current CTs:**
 The CT size must be equal to or greater than the sum of the maximum amperage rating expected through all CTs combined. Example: if the conductors being metered have breakers, and Load X is 200A, Load Y is 400A, and Load Z is 600A, then each load will need a CT rated for 1200A or greater (200+400+600A = 1200A).
- Voltage CTs:**
 The CT size must be equal or greater than the highest rated amperage that will be monitored through any single CT. Example: if the conductors being monitored have breakers, and Load X is 200A, and Load Y is 400A, and Load Z is 600A, then all CTs should be sized for 600A or greater as 600A is the largest value of the three amperages.

Specifying The Right Meter:

For current output CTs, match the CT size to be used with a meter programmed for that specific current. Or, use a configurable meter that can be set to work with that particular size amperage.

For voltage output CTs, match the CT amperage size times the number of CTs being paralleled. The resulting number is the amperage size of the meter to be use. Match the number with a meter programmed for that specific current, or use a configurable meter that can be set to work with that particular amperage. Example: 200A CTs x 3 CTs paralleled = a meter setting of 600A.

Warning: failure to match the CT output with the correct meter, especially when paralleled, may cause unintended meter readings **or damage to the meter.**

Wiring Parallel CTs

The wiring from each CT should be paralleled together to the corresponding CT input on the electrical meter. As with any metering install, it is crucial that the polarity of the CT wiring to the meter is correct and that the CTs are all monitoring a load connected to the appropriate phase. Failure to do so will result in invalid readings.

This document does not cover the safety and regulatory aspects of a meter install.

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Please refer to the meter's manual or install guide for more details.

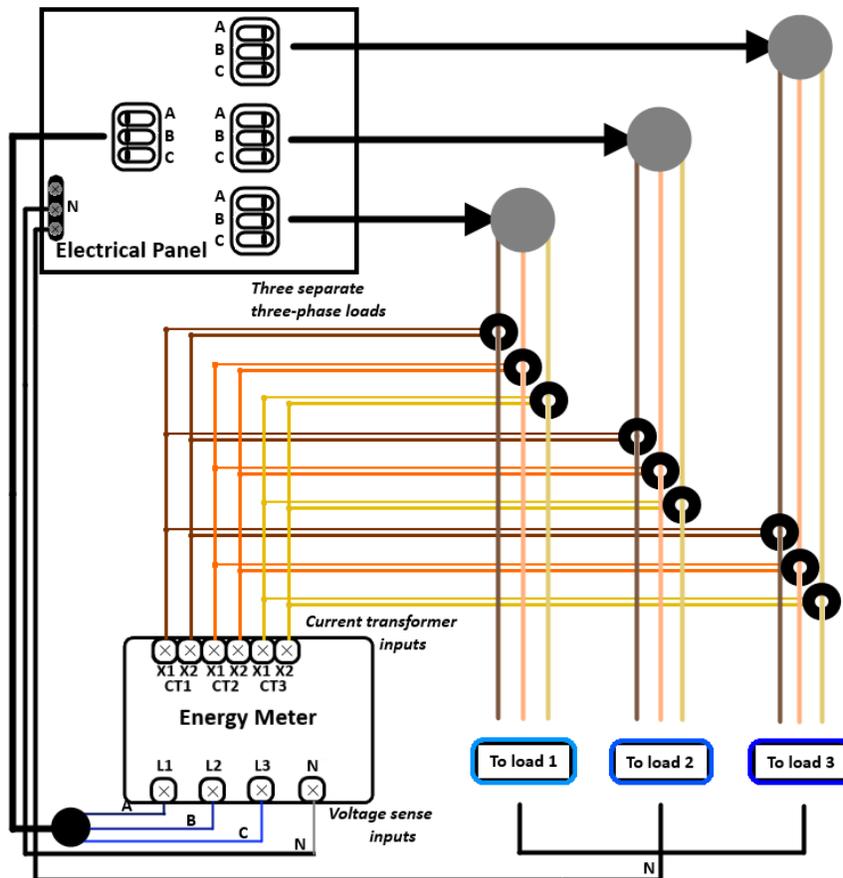


Figure 1: Example diagram of three loads, powered from three phases being monitored via paralleling three current transformers into a single CT input on an energy meter

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