

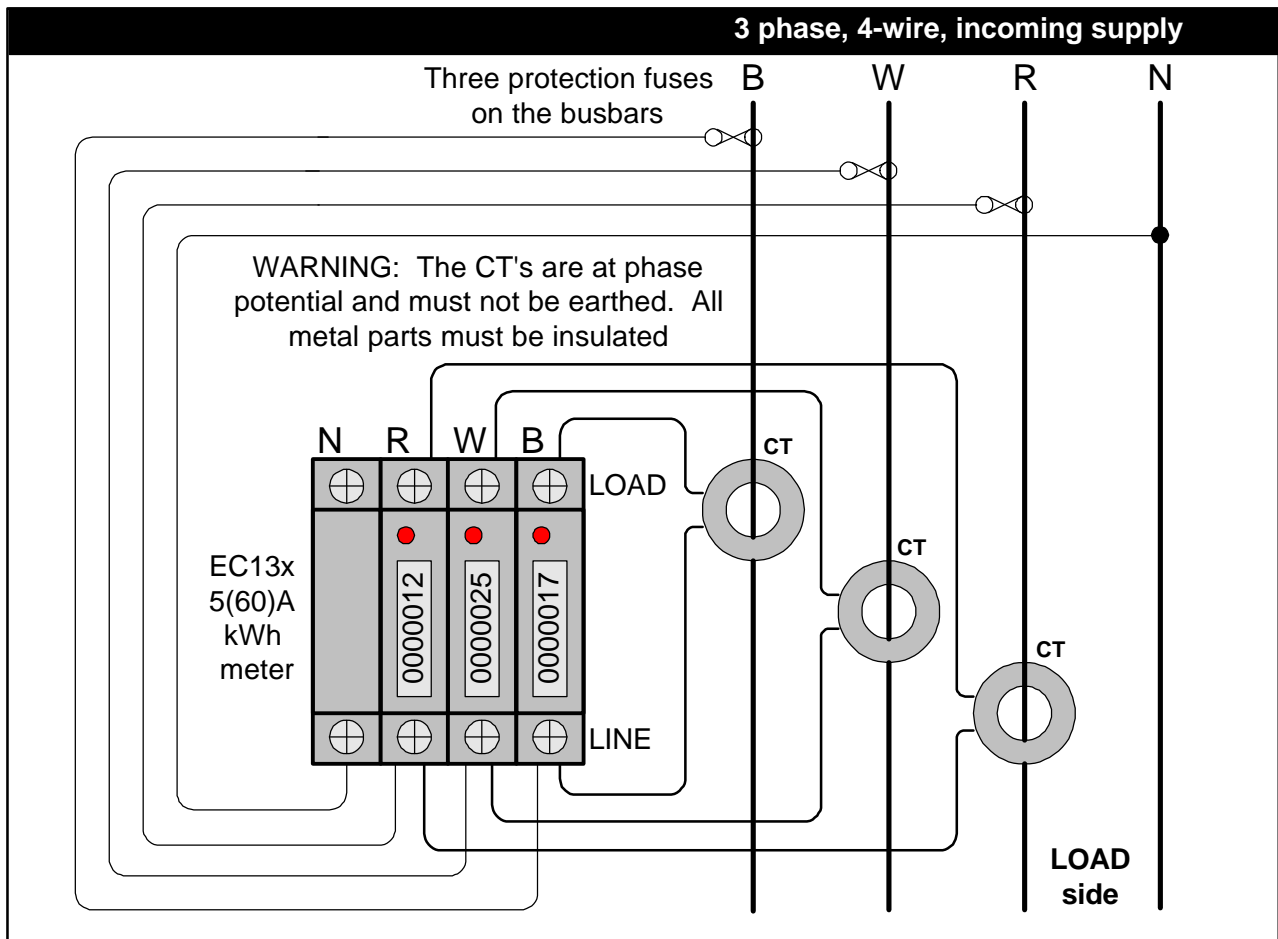
## Using the ECOLEC Series 100 Meters as a CT operated meter

### Introduction

The ECOLEC Series 100 meters are specified as direct connected meters. They can however, in conjunction with external Current Transformers (CT's), be used as CT operated meters. The use of external CT's enables the meter to measure load currents well in excess of the meter's maximum current rating of 60 Amps. The actual kWh consumption per phase must then be calculated by multiplying the difference between the current and previous readings (compensated for roll over) by the CT ratio used. This must be done for each phase separately when the dual phase EC12x and three-phase EC13x meters are used. The total consumption for the period is then the sum of the calculated kWh values from each phase.

### Connection scheme

**Figure 1** shows how to connect the ECOLEC EC13x meter. This works for three phase four wire and dual phase three wires systems. It is not appropriate for three phase, three wire systems as a Neutral connection must be provided to prevent measurement inaccuracies. A similar scheme applies to dual and single-phase supplies. It is necessary to fit protection fuses in the voltage circuits for safety and isolation purposes.



**Figure 1. Wiring diagram for using external CT's with ECOLEC Series 100 meters**

# Using the ECOLEC Series 100 Meters as a CT operated meter

---

## Wiring abnormalities

Care must be taken that the meters are correctly wired according to the diagram of Figure 1. Illegal access to the installation often results in a variety of wiring "alterations" being made in order to tamper with the correct operation of the meter. Consequences of typical wiring abnormalities are given below to help with fault finding during installation and operation;

- **Connection of phase voltages to incorrect meters**  
When the incoming supply voltages are incorrectly sequenced, the resulting large phase shifts between the voltage and current waveforms will result in the meter under reading substantially. The meter is unable to indicate this as an abnormality and appears to function normally. Trace the routing of the voltage wires thoroughly.
- **Disconnection of a phase voltage**  
Removing one of the fuses or cutting one of the phase voltage wires will remove the phase voltage from that phase of the meter and only that phase of the meter will power down. The LED indicator of that phase will remain OFF instead of indicating red pulses (consumption) or green continuous (standby). Check that all of the LED indicators are operating properly.
- **Disconnection of the Neutral wire**  
The Neutral wire must be connected to the Neutral pole of the meter for accurate measurement of the phase potentials. Disconnection of the Neutral wire therefore results in consumption measurement inaccuracies. The meter does not detect this condition and it appears to operate normally as the internal impedance of the meter power supplies will establish a pseudo neutral potential. Trace the routing of the neutral wire thoroughly.
- **Connection of a phase voltage to the Neutral pole of the meter**  
The phase with the swapped connection will operate normally, however the remaining phases will see the application of the full phase-to-phase voltage. This will not damage those phases of the meter, which will continue to measure consumption but they will flash a red then green signal repetitively on the LED indicator. This red/green indication may also be given if over current conditions exist (unlikely with a CT operated meter) or if an internal failure is detected by the meter. Ensure that all of the LED indicators are not flashing a red/green signal.
- **Reversal of CT secondary connections**  
The polarity of the CT connections is not important since the meter can be reverse fed, however the CT studs must be insulated since they are at a LIVE potential. The meter will detect if it is reverse fed, and will automatically compensate for this condition.
- **Connection of phase potentials to the LOAD side of the meter**  
It is important that the supply voltages should be connected to the LINE side of the meter to avoid measuring the power consumed by the meter itself. This is not normally an issue as the power consumption of the meter is very low (< 0.2 watts). When small loads are in use and a large CT ratio is used, the measurement error can become significant.

## Current Transformer considerations

- **Nominal current rating (In)**  
The nominal current rating of the external CT must be 5 Amps. Lower values will result in inaccuracies with small loads. CT operated meters are required to operate down to 0.1 Amps (2% of In). Although the ECOLEC meters (specified as direct connected meters) are certified down to 0.25 Amps (5% of Ib), their typical measurement performance at 0.1 Amps is acceptable for most applications.
- **Selection of the CT ratio, VA rating and Accuracy class**  
These are a function of the intended application. Care should be taken to keep the CT ratio as low as possible without saturating the external CT under maximum load conditions. NRS 057 deals with a code of practice for metering installations and describes the calculation process for establishing the total measurement uncertainty of an installation. This then determines the CT accuracy class required.