

WattNode® Pulse Output kWh Transducer Connection Instructions

For use with HOBO® H21, H22, U30, UX90, and UX120 series data loggers, and HOBO data nodes

Applies to these WattNode Pulse Output kWh Transducers:

Onset Part No.	Configuration / VAC	Output	Maximum Pulse Output	WattNode Part No.
T-WNB-3Y-208	Single-phase 120 or Wye 208-240	Pulses representing kWh	4 Hz	WNB-3Y-208-P
T-WNB-3Y-208-P	Single-phase 120 or Wye 208-240	Pulses representing kWh	4 Hz	WNB-3Y-208-P option P3
T-WNB-3D-240	Delta 208-240	Pulses representing kWh	4 Hz	WNB-3D-240-P
T-WNB-3D-480	Delta (or Wye) 480	Pulses representing kWh	4 Hz	WNB-3D-480-P

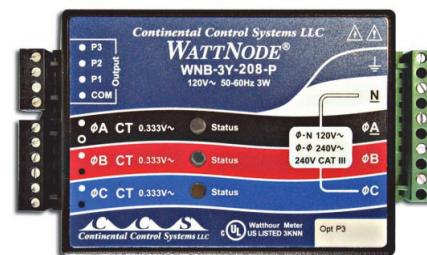


DANGER!—HIGH VOLTAGE HAZARD



Installing transducers in an energized electrical enclosure or on any energized conductor can result in severe injury or death. These transducers are for installation by qualified personnel only. To avoid electrical shock, do not perform any installation or servicing of these transducers unless you are qualified to do so. Disconnect and lock-out all power sources during installation and servicing. Please read transducer user manuals for instructions and use.

This document provides instructions on connecting the WattNode Pulse Output kWh Transducers listed above to HOBO H21, H22, U30, UX90, and UX120 series data loggers and to ZW series data nodes. **Note:** For information on connecting the kWh transducer to the power source and other transducer details, refer to the WattNode documentation provided by Continental Control Systems.



WattNode Pulse Output kWh Transducer
(Onset Part No. T-WNB-3Y-208-P shown)

Required

- Selected WattNode Pulse Output kWh Transducer
- Appropriately rated Current Transducer(s)
- Smart Sensor-compatible HOBO data logger (H21, H22, or U30 series) with:
 - Pulse Input Adapter(s), Onset Part No: S-UCC-M00x*
 - HOBOWare® Pro Software, version 2.2 or higher (2.4 or higher for U30)
- 22 AWG twisted pair wire (customer supplied) for UX120 series with HOBO Pro Software, version 3.2.0 or higher
- Pulse input-compatible HOBO data node (ZW series) and HOBO data logger (UX90 series) with:
 - Onset Part No: CABLE-2.5-STEREO*
 - HOBOWare Pro Software, version 3.0 or higher for ZW series and version 3.3 or higher for UX90 series

* For monitoring power demand as well as generated power, a second S-UCC-M00x pulse input adapter (for H21, H22, or U30 series) or CABLE-2.5-STEREO (for pulse input-compatible ZW series) is required (at output terminal P2).

WattNode Pulse Output kWh Transducer Features

- The WattNode transducer includes three LEDs—one per phase—for diagnostics and indication of power direction, low power factor, and correctly installed CTs.
- The WattNode transducer provides bidirectional power measurements (positive and negative power). It can be used for conventional power and energy measurement as well as for net metering and PV applications. For monitoring power demand as well as generated power, a second S-UCC-M00x pulse input adapter (for H21, H22, or U30 series) or CABLE-2.5-STEREO (for pulse input-compatible ZW series) is required (at output terminal P2).

WattNode Pulse Output kWh Transducer Connection Instructions

- The T-WNB-3Y-208-P can measure two or three separate branch circuits simultaneously. Note that an S-UCC-M00x pulse input adapter (for H21, H22, or U30 series) or a CABLE-2.5-STEREO (for pulse input-compatible ZW series) is required for each circuit monitored.

Note: Refer to the *WattNode WNB Series Installation and Operation Manual* for details of these features.

Configuring the System

To configure the system, refer to the applicable connection diagram that corresponds to your electrical power configuration. Also refer to the WattNode manual for additional configurations.

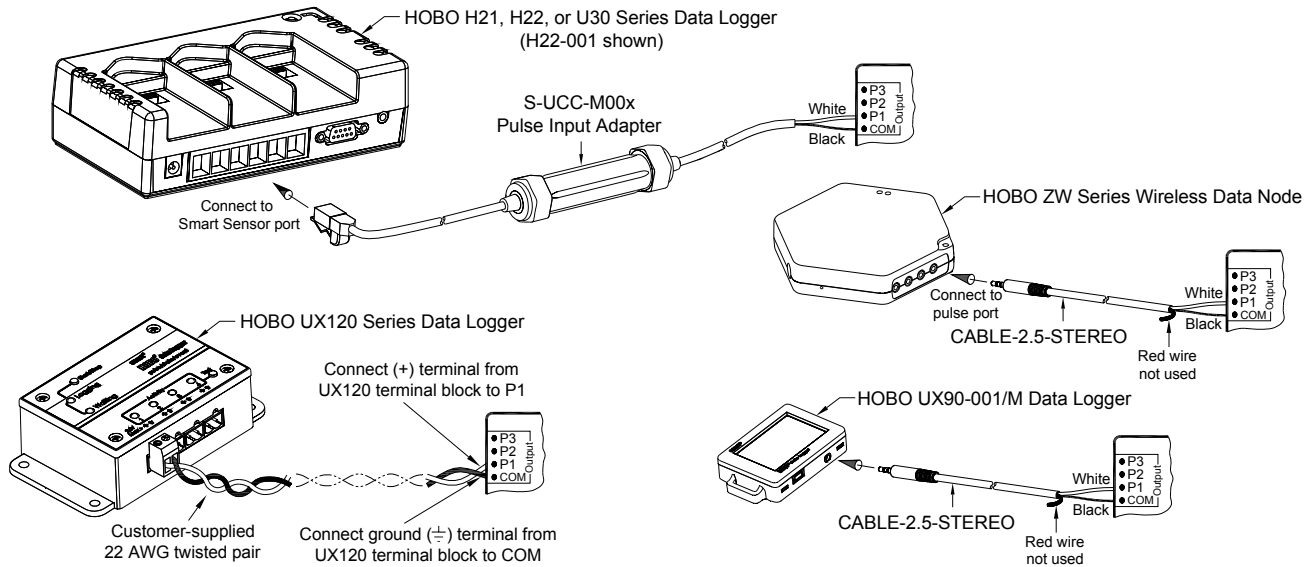


Figure 1: Connecting HOBO Data Logger or Data Node to WattNode

Electrical Service Types

Below is a list of service types, with connections and recommended WattNode models. Note: the WattNode ground connection improves measurement accuracy, but is not required for safety.

Model	Type	Phase to Neutral	Phase to Phase	Electrical Service Types*
WNB-3Y-208-P	Wye	120 VAC	208–240 VAC	1 Phase 2 Wire 120V with neutral 1 Phase 3 Wire 120V/240V with neutral 3 Phase 4 Wire Wye 120V/208V with neutral
WNB-3D-240-P	Delta or Wye	120–140 VAC	208–240 VAC	1 Phase 2 Wire 208V (No neutral) 1 Phase 2 Wire 240V (No neutral) 1 Phase 3 Wire 120V/240V with neutral 3 Phase 3 Wire Delta 208V (No neutral) 3 Phase 4 Wire Wye 120V/208V with neutral 3 Phase 4 Wire Delta 120/208/240V with neutral
WNB-3D-480-P	Delta or Wye	277 VAC	480 VAC	3 Phase 3 Wire Delta 480V (No neutral) 3 Phase 4 Wire Wye 277V/480V with neutral 3 Phase 4 Wire Delta 240/415/480V with neutral

*The wire count does NOT include ground. It only includes neutral (if present) and phase wires.

WattNode Pulse Output kWh Transducer Connection Instructions

Single-Phase Two-Wire with Neutral

This configuration is most often seen in homes and offices. The two wires are neutral and line. For these models, the WattNode is powered from the N and ϕA terminals.

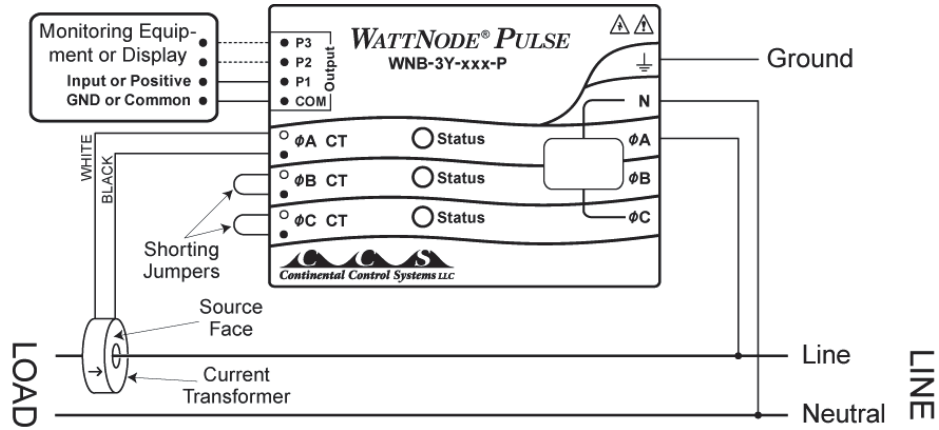


Figure 2: Single-Phase Two-Wire Connection

Recommended WattNode Model

The following table shows the WattNode model that should be used, depending on the line to neutral voltage.

Line to Neutral Voltage	WattNode Model
120 VAC	WNB-3Y-208-P

Single-Phase Three-Wire

This configuration is seen in North American residential and commercial service with 240 VAC for large appliances. The three wires are neutral and two line voltage wires with AC waveforms 180° out of phase; this results in 120 VAC between either line wire (phase) and neutral, and 240 VAC (or sometimes 208 VAC) between the two line wires (phases).

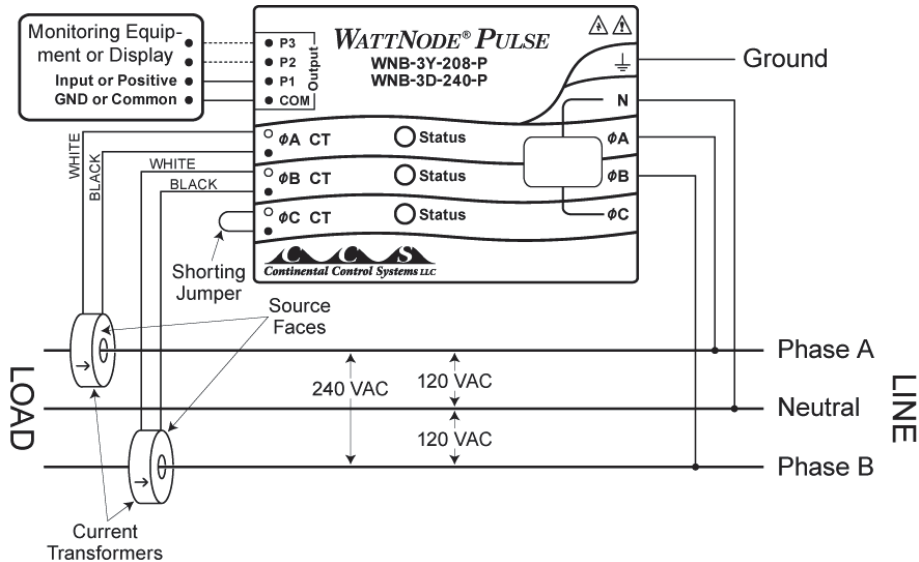


Figure 3: Single-Phase Three-Wire Connection

Recommended WattNode Models

The following table shows the WattNode models that can be used. If neutral may or may not be present, you should use the WNB-3D-240-P (see *Single-Phase Two-Wire without Neutral* below). If neutral is present, it must be connected for accurate

WattNode Pulse Output kWh Transducer Connection Instructions

measurements. If phase B may not be present, you should use the WNB-3Y-208-P (see *Single-Phase Two-Wire with Neutral* above).

WattNode Power Source	WattNode Model
N and ØA (Neutral and Phase A)	WNB-3Y-208-P
ØA and ØB (Phase A and Phase B)	WNB-3D-240-P

Single-Phase Two-Wire without Neutral

This is seen in residential and commercial service with 208 to 240 VAC for large appliances. The two wires are two line voltage wires with AC waveforms 120° or 180° out of phase. Neutral is not used. This results in 240 VAC (or 208 VAC) between the two line wires (phases). For this configuration, the WattNode is powered from the ØA and ØB (phase A and phase B) terminals.

For best accuracy, we recommend connecting the WattNode N (neutral) terminal to earth ground. This will not cause ground current to flow because the neutral terminal is not used to power the WattNode.

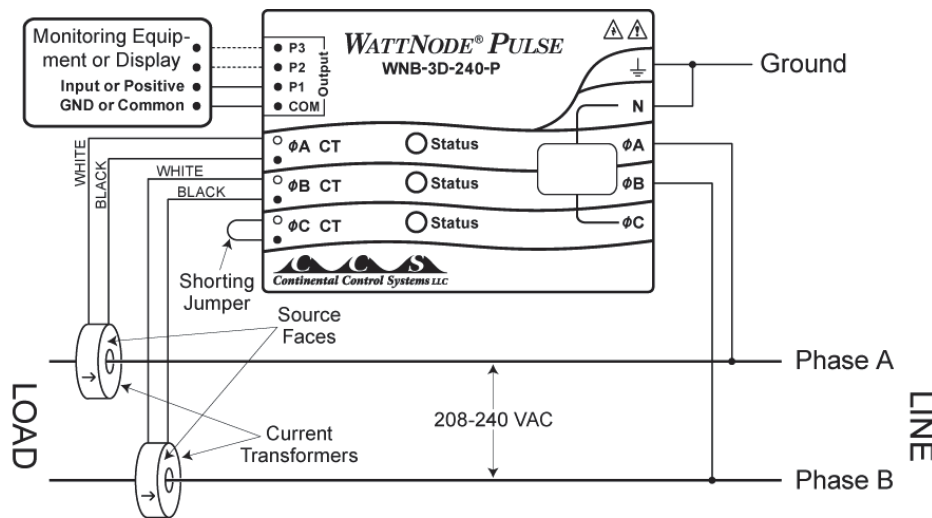


Figure 4: Single-Phase Two-Wire without Neutral Connection

Recommended WattNode Model

This configuration is normally measured with one WattNode model.

Phase-to-Phase Voltage	WattNode Model
208 - 240 VAC	WNB-3D-240-P

However, if neutral is available, then you may also use the WNB-3Y-208-P model. If you use the WNB-3Y-208-P, you will need to hook up the WattNode as shown in section *Single-Phase Three Wire* and connect neutral. You will need two CTs.

Grounded Leg

In rare cases (non-residential), one of the lines (phase A or phase B) may be grounded. You can check for this by using a multimeter (DMM) to measure the voltage between each phase and ground. If you see a reading between 0 and 5 VAC, that leg (phase) is probably grounded.

The WattNode will correctly measure circuits with a grounded leg, but the measured voltage and power for the phase will be zero and the status LED will not light for whichever phase is grounded, because the voltage is near zero. If you have a grounded leg configuration, you can save money by removing the CT for the grounded phase, since all the power will be measured on the non-grounded phase. We recommend putting the grounded leg (phase) on the ØB input and attaching a note to the WattNode indicating this configuration for future reference.

WattNode Pulse Output kWh Transducer Connection Instructions

Three-Phase Four-Wire Wye

This is typically seen in commercial and industrial environments. The wires are neutral and three power lines with AC waveforms shifted 120° between the successive phases. With this configuration, the line voltage wires may be connected to the ϕA , ϕB , and ϕC terminals in any order, so long as the CTs are connected to matching phases. It is important that you connect **N** (neutral). For these models, the WattNode is powered from the **N** and ϕA terminals.

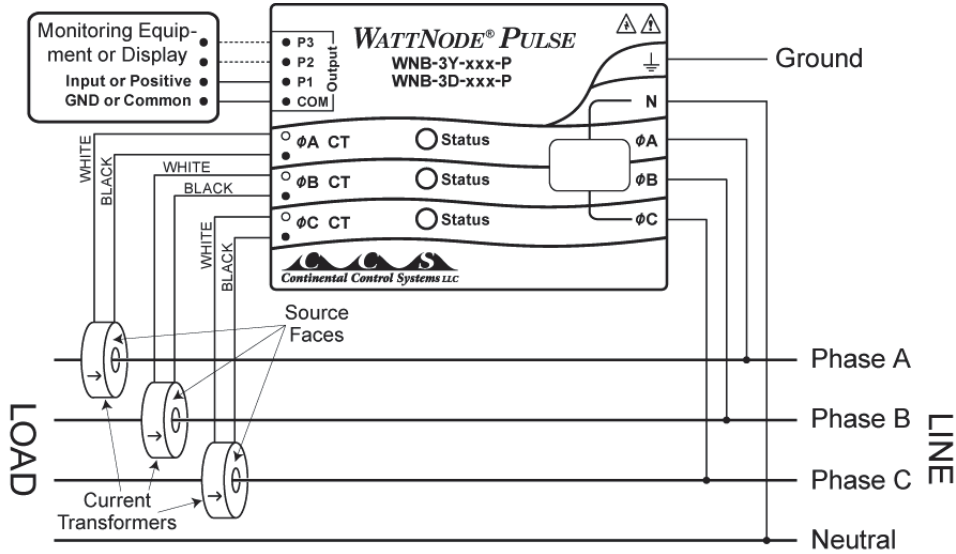


Figure 5: Three-Phase Four-Wire Wye Connection

Recommended WattNode Models

The following table shows the WattNode model that should be used, depending on the line to neutral voltage and line to line voltage (also called phase to phase voltage).

Line to Neutral Voltage	Line to Line Voltage	WattNode Model
120 VAC	208 VAC	WNB-3Y-208-P

Note: you may also use the following delta WattNode models to measure three-phase four-wire wye circuits. The only difference is that delta WattNode models are powered from ϕA and ϕB , rather than **N** and ϕA . If neutral is present, it must be connected for accurate measurements.

Line to Neutral Voltage	Line to Line Voltage	WattNode Model
120 - 140 VAC	208 - 240 VAC	WNB-3D-240-P
277 VAC	480 VAC	WNB-3D-480-P

Three-Phase Three-Wire Delta (No Neutral)

This is typically seen in manufacturing and industrial environments. There is no neutral wire, just three power lines with AC waveforms shifted 120° between the successive phases. With this configuration, the line voltage wires may be connected to the ϕA , ϕB , and ϕC terminals in any order, so long as the CTs are connected to matching phases. For these models, the WattNode is powered from the ϕA and ϕB (phase A and phase B) terminals. Note: all delta WattNode models provide a neutral connection **N**, which allows delta WattNode models to measure both wye and delta configurations.

For best accuracy, we recommend connecting the **N** (neutral) terminal to earth ground. This is not necessary on balanced three-phase circuits, where the ground-to-phase A, ground-to-phase B, and ground-to-phase C voltages are all roughly the same. This will not cause ground current to flow because the neutral terminal is not used to power the WattNode.

WattNode Pulse Output kWh Transducer Connection Instructions

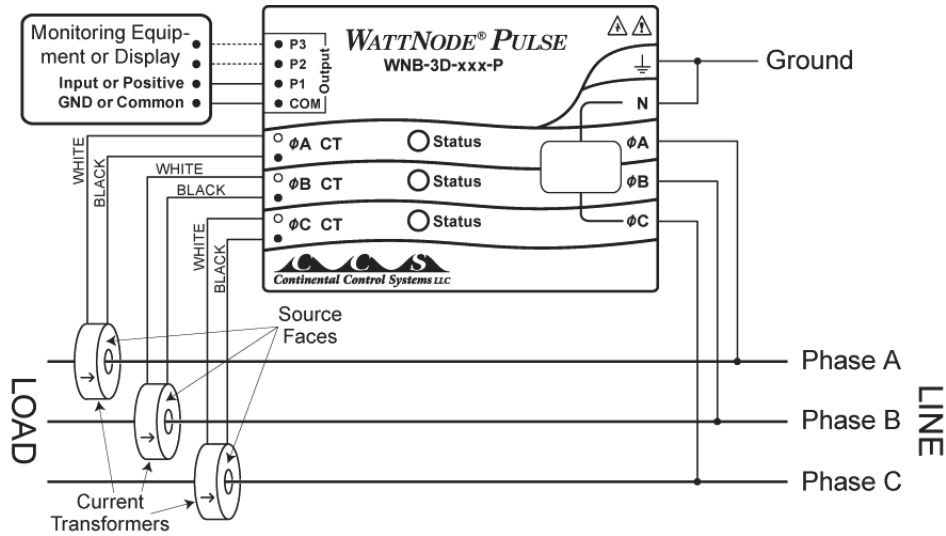


Figure 6: Three-Phase Three-Wire Delta (No Neutral) Connection

Recommended WattNode Models

The following table shows the WattNode model that should be used, depending on the line to neutral voltage and line to line voltage (also called phase to phase voltage).

Line to Line Voltage	WattNode Model
208 - 240 VAC	WNB-3D-240-P
480 VAC	WNB-3D-480-P

Grounded Leg

In rare cases, one of the phases may be grounded. You can check for this by using a multimeter (DMM) to measure the voltage between each phase and ground. If you see a reading between 0 and 5 VAC, that leg is probably grounded.

The WattNode will correctly measure circuits with a grounded leg, but the measured voltage and power for the phase will be zero and the status LED will not light for whichever phase is grounded, because the voltage is near zero. Also, one or both of the active (non-grounded) phases may show yellow or red/yellow LED flashing because the grounded leg configuration results in unusual power factors.

For optimum accuracy with a grounded leg, you should also connect the N (neutral) terminal on the WattNode to the ground terminal; this will not cause any ground current to flow because the neutral terminal is not used to power the WattNode. If you have a grounded leg configuration, you can save money by removing the CT for the grounded phase, since all the power will be measured on the non-grounded phases. We recommend putting the grounded leg on the ØC (Phase C) input and attaching a note to the WattNode indicating this configuration for future reference.

WattNode Pulse Output kWh Transducer Connection Instructions

Separate Branch Circuits Connection (T-WNB-3Y-208-P** only)

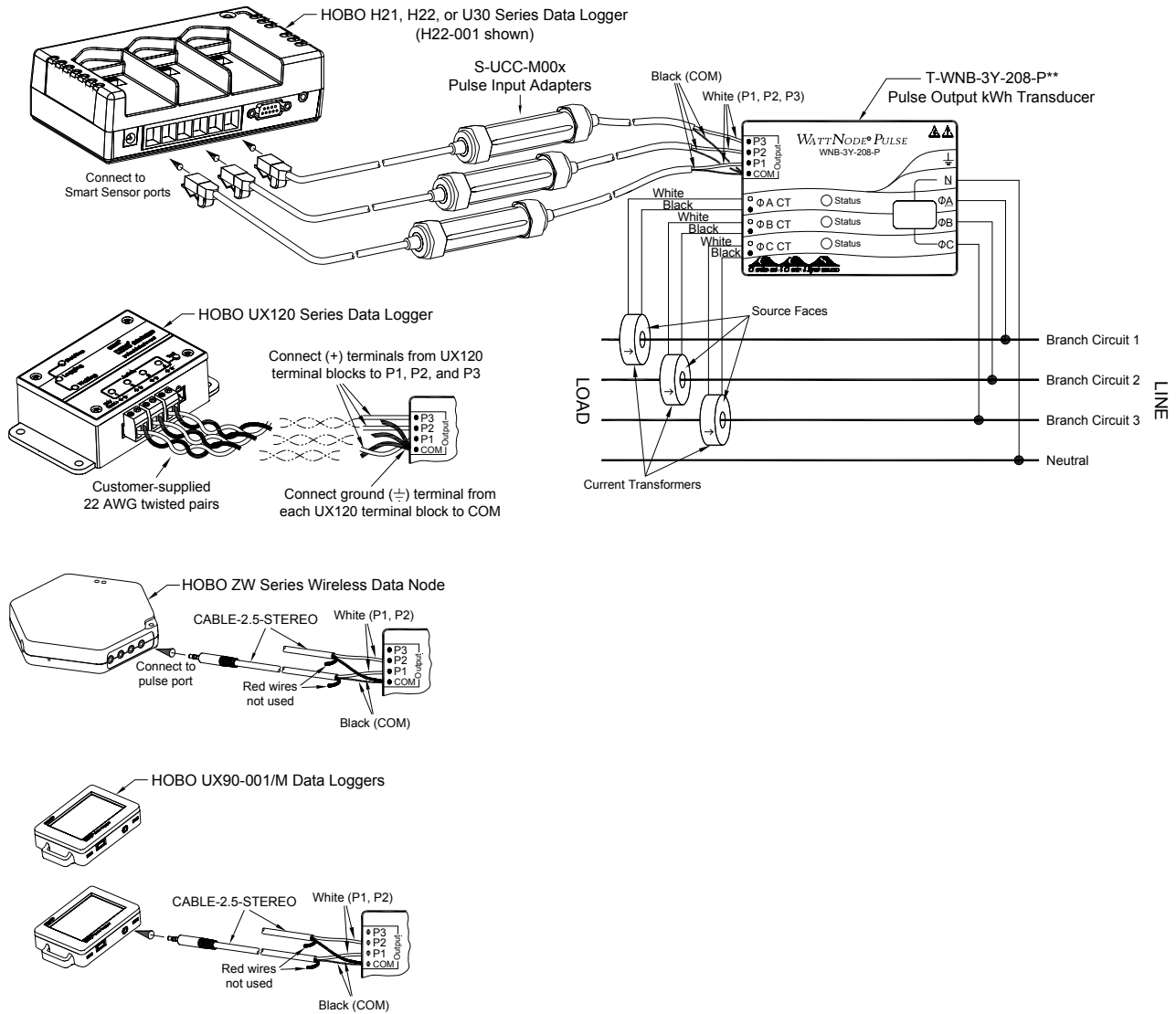


Figure 7: Separate Branch Circuits Connection

** The T-WNB-3Y-208-P can measure two or three separate branch circuits simultaneously. Note that a S-UCC-M00x pulse input adapter (if used with H21, H22, or U30 data loggers) or a CABLE-2.5-STEREO (if used with ZW data node or UX90 logger pulse ports) is required for each circuit monitored. A three-branch circuit arrangement is shown for H21, H22, U30, and UX120 data loggers.