

**You have several choices while using PowerSight to measure power on 4160V circuits.** You may connect directly to it (using the correct probes), you may connect to pre-existing metering CTs and PTs, or you can do a combination of the two.

### Direct Connection to 4160V Circuits

PowerSight is rated for a maximum steady-state input of 600V between phases and from phase to neutral. Medium voltages of 4160V phase-phase (2400V phase-neutral) clearly exceed this limit. The solution for direct connection to voltage is our 5KVP voltage probe accessory. This device is rated for steady-state inputs of up to 5000V. It has a small hook (0.25 inch inside diameter) to make electrical connection. You can order part number 5KVP, which is a set of three probes, for \$1400.



These are the steps to follow to connect three 5 KVP probes to a 4160V circuit:

1. For safety, we recommend that you de-energize the circuit before hooking the probe onto the exposed metal of the circuit. Wear all standard higher voltage protective gear (such as high voltage gloves and a face guard)
2. Set an input ratio of 100:1 for all voltage inputs of the PowerSight. You can review the directions written in the “Setting Input Ratios” section of the manual. This involves pressing the “Calibra” key of PowerSight and answering the questions with “yes” or “no” and entering the numbers “100” and “1” at the correct times for  $V_a$ ,  $V_b$ , and  $V_c$ . This ratio will stay in effect until PowerSight is turned off or a new ratio is entered from the keyboard or via the communications port.
3. Connect the black ground clamp lead of each 5KVP to a secure ground. This is essential for safety.
4. Plug the black banana plug of one of the probes into the  $V_n$  input of PowerSight. Plug the black banana plug of another probe into the back of the black plug of the first one, then plug the black banana plug of the third probe into the back of the second one. In this way, the

**PowerSight® connects easily to 4160V**

- black plugs are “stacked” one into the other, all connected into the Vn input of PowerSight.
5. Plug the red Va banana plug into the Va input of PowerSight.
  6. Repeat step 5, plugging the red Vb banana plug into the Vb input.
  7. Repeat step 5, plugging the red Vc banana plug into the Vc input.
  8. Securely connect the hook of the Va probe onto a metallic spot of the A phase circuit.
  9. Repeat step 8, connecting the hook of the Vb probe onto the B phase circuit.
  10. Repeat step 8, connecting the hook of the Vc probe onto the C phase circuit.
  11. For safety, we recommend that you start monitoring or pressing any buttons on PowerSight you wish to prior to energizing the circuit. Although it would take multiple faults for you to be at risk, we recommend that you not hold PowerSight while it is connected to an energized 4160V circuit.
  12. When you are done with the measurements, de-energize the circuit and disconnect the probes, wearing appropriate safety gear. Then transfer the data to a computer. Although it would take multiple faults for there to be danger from having a serial cable plugged in to our optically isolated communications port, we do not recommend having it connected while connected to an energized 4160V circuit.

The current probes sold by Summit Technology are insulation rated for use with up to 600 V. This means that we do not recommend their use for direct connection to 4160V. However, there are instances where customers feel assured that the probe will absolutely not come into contact with a voltage in excess of 600 V and they choose to use our probes for measuring current on a 4160V line. Strategies that have been followed include maintaining a sizeable air gap between the current probe and the 4160V conductor, addition of new layers of insulation on top of existing insulation to be certain that no pin hole or abrasion or film on the surface of the existing insulation will allow exposure to the current probe of a voltage in excess of 600V. Although we do not recommend these steps, if followed safely, correct measurements will be obtained.

### **Indirect Measurement of 4160V Circuits (using PTs and CTs)**

A simpler and safer method of measuring 4160V circuits is to connect PowerSight to previously installed metering instrument transformers. CTs (Current transformers) provide outputs proportional to the actual current of the 4160V line. PTs (Potential transformers) provide outputs proportional to the actual voltage of the 4160V line. The ratio between the primary (the line) value and the secondary (the CT or PT output) value is usually printed on the CT or PT.



## Measure 4160V Service Using PowerSight



This approach has three advantages over direct connection. First, it is inherently safer since access to the primary voltage is not required. Second, there is no need to de-energize the circuit when making the connections and when removing them. Third, it is less expensive since the regular DXV voltage clamps are adequate for the connection.

Please note: Care must be taken when selecting current probes for these measurements. Normal secondary outputs of CTs are a maximum of 5 amps. Therefore, flexible current probes such as the FX3000 should not be used in this application. Generally the HA10 is the best choice, although an HA1000 can give good results.

These are the steps to follow to connect PowerSight to CTs and PTs:

1. Connect the voltage probes and current probes as shown in the manual in the section "Connections to a 3 CT / 3 PT Metering Circuit" or the section "Connections to a 2 CT / 2 PT Metering Circuit", depending on what you have available. If you have only 2 CTs available, make sure you have PowerSight operating in the "2 Current Mode". Review the "Phase-Neutral vs Phase-Phase vs 2 Current Mode" and "Connections Using 2 Current Approach" sections of the manual .
2. Set an input ratio of whatever the ratio is for the PTs for all voltage inputs of the PowerSight. You can review the directions written in the "Setting Input Ratios" section of the manual. Similarly, set an input ratio of whatever the ratio is for the CTs for all current inputs to PowerSight. These ratios will stay in effect until PowerSight is turned off or a new ratio is entered from the keyboard or via the communications port.
3. We recommend that you follow the "checkout connections" feature or view a waveform set on your computer to verify that all connections and ratios are correct before proceeding with taking measurements.

### **Combination of Direct and Indirect Measurement of 4160V Circuits**

This approach involves using 5KVP voltage probes for direct connection to the voltage lines and using previously installed CTs for indirect connection to the currents. The advantage is that current probes are not used around voltages that exceed their insulation rating. The disadvantage is that there may be phase shifts introduced that can affect the accuracy of the power and power factor measurements.

Follow the appropriate steps of the first section for connecting the 5KVP probes and follow the appropriate steps of the previous section for connection to the previously installed CTs. Obtain wavesets or power factor readings for each phase to determine if there is an appreciable phase error. If not, you may proceed.



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PowerSight® Energy Analyzers are designed and manufactured in the USA by Summit Technology, Inc.

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