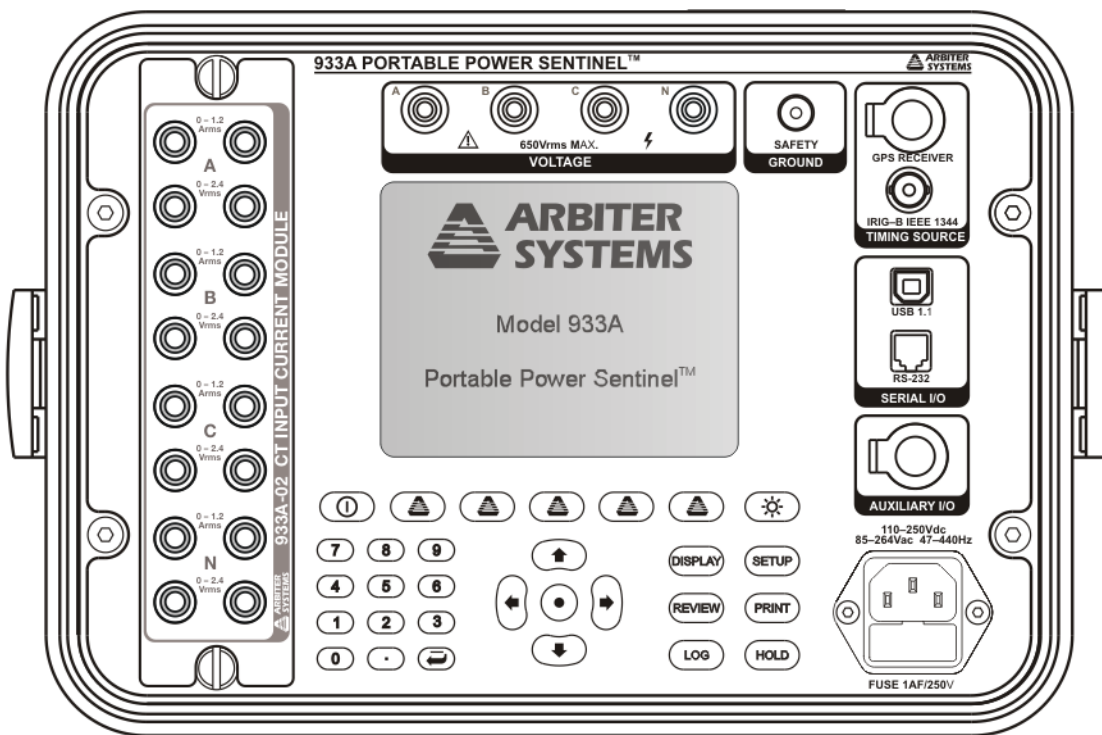


USING SENSORLINK® LITEWIRES WITH THE ARBITER SYSTEMS 933A PORTABLE POWER SENTINEL



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1 Introduction

Arbiter Systems manufactures the Model 933A Portable Power Sentinel, multi-phase measurement tool. It has Floating-Point DSP Digital Signal Analysis and is an AC Power measurement instrument, providing outstanding performance and flexibility in a portable package. Not only does the Model 933A measure basic data and power quantities, but it also measures power quality including harmonics, flicker, sags, swells and interruptions. Incorporating a graphic LCD display, USB port, real time clock and an unprecedented combination of features makes the Model 933A the ideal instrument for the power professional.

While the Model 933A is designed for use on low voltages, it also can measure higher voltages by using PTs and CTs. The SensorLink® LiteWires provide a portable PT and CT that easily adapt to the 933A and have been evaluated in Arbiters Laboratories. LiteWires are designed to measure primary voltage and current, and as such are not to be left unattended. However, they are an excellent way to capture primary waveforms.

The following information describes how to connect the Amp LiteWire and Volt LiteWire and configure the 933A for their use. *For measuring currents, use the 933A-02 Low Current Module.*

2 SensorLink® Volt LiteWire – Arbiter 933A Setup

For multi-phase configurations, you will need sufficient quantity of SensorLink® LiteWires, connector adapters and cables to suit electrical configuration. For example, with a three-phase, four-wire, three-element configuration, you will need three Volt LiteWire PTs and three sets of accessories. For all configurations see Section 5 configuration drawings and notes.

2.1 Required Parts

- 20kV Volt LiteWire SensorLink® Part# 8-012-60 Hz
- Dual Banana Plug-to-BNC Connector: Pomona Part# 72909, quantity depends on electrical configuration.

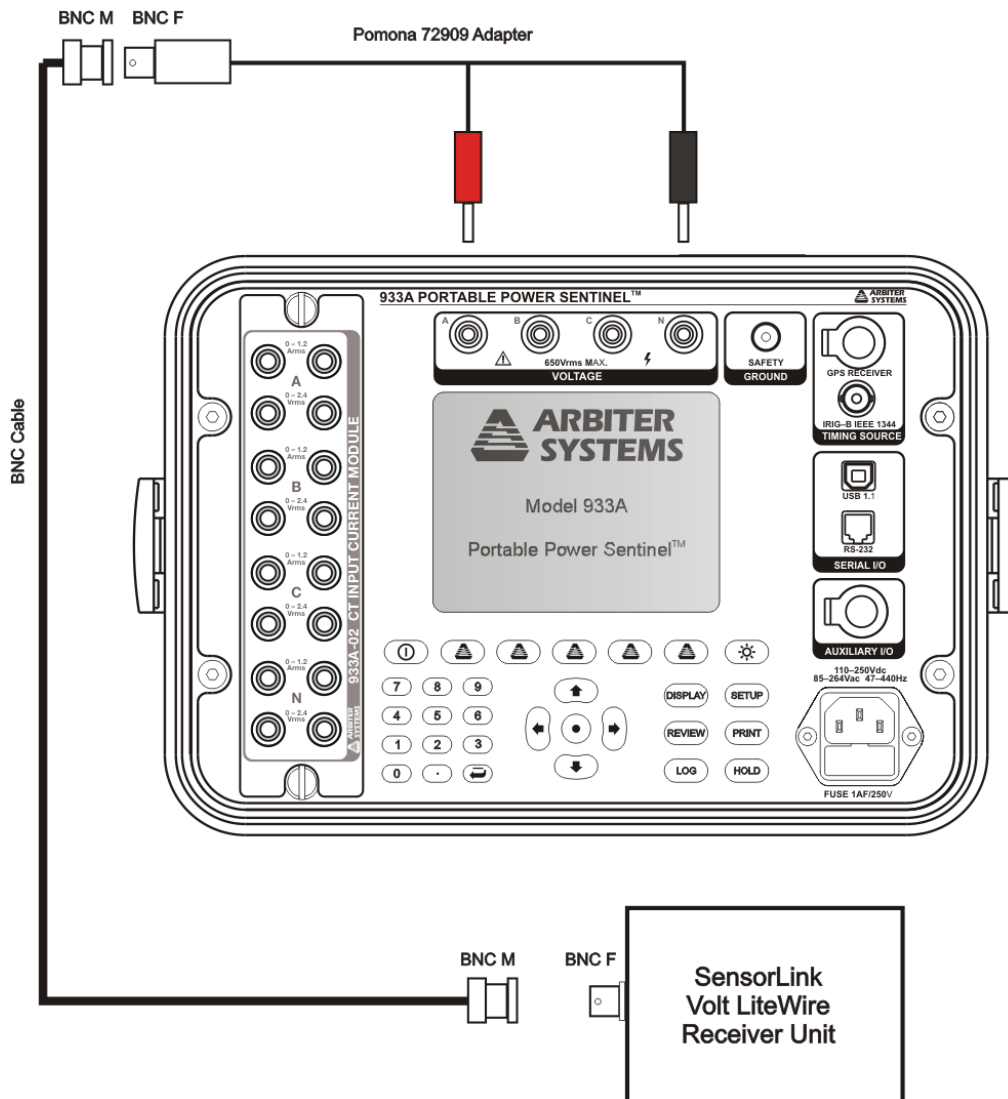


- Coax Cable(s) with male BNC Connectors on each end, quantity depends on configuration
- Arbiter 933A Portable Power Sentinel
- Arbiter 933A-02 Low Current Module with voltage inputs

2.2 Connecting the Volt LiteWire to the 933A

1. Connect the red banana plug of the Pomona 72909 to the red A-phase voltage terminal on the Arbiter 933A. The B-phase terminal is yellow and the C-phase terminal is blue.

2. Connect the black banana plug of the Pomona 72909 to the black N terminal on the Arbiter 933A.
3. Connect the other required Pomona 72909 adapters to the required voltage terminals on the the 933A – phase A, phase B and phase C as required. Refer to Section 5 to determine the number and hook up configuration.
4. If necessary to plug multiple black 4 mm banana plugs into the N terminal on the 933A, stack them on the N terminal of the 933A. *Always check the electrical configuration diagrams in Section 5 to verify connections.*
5. Note that some configurations require an extra jumper to connect between voltage terminals, or Neutral terminal. These are shown in configuration diagrams in Section 5.
6. Connect the BNC connector of the Pomona 72909 adapter to the BNC cable that connects to the LiteWire.
7. Connect the other end of the BNC Cable to the Analog output from the Volt LiteWire receiver unit.



3 SensorLink® Amp LiteWire – Arbiter 933A Setup

For multi-phase configurations, you will need sufficient quantity of SensorLink® LiteWires, connector adapters and cables to suit electrical configuration. For example, with a three-phase, four-wire, three-element configuration, you will need three Amp LiteWire CTs and three sets of accessories. For all configurations see Section 5 configuration drawings and notes.

3.1 Required Parts

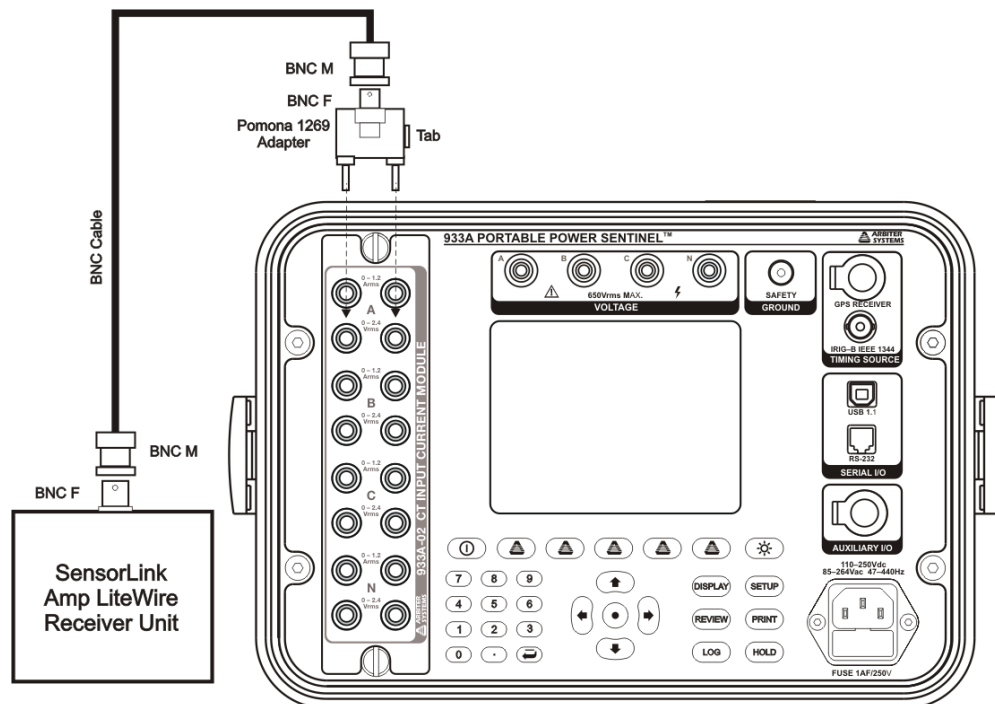
- Amp LiteWire SensorLink® Part# 8-015-60Hz or 8-016 60Hz
- Pomona Banana-to-BNC(m) adapter, Pomona Part# 1269; quantity depends on electrical configuration.



- BNC Cable(s), quantity depends on electrical configuration
- Arbiter 933A Portable Power Sentinel and 933A-02 Current Module

3.2 Connecting the Amp LiteWire to the 933A

1. **NOTE: When using the Amp LiteWire, always use the Vrms inputs on the 933A. Do not use the Arms inputs.** Connect the Pomona #1269 adapter into the appropriate current input terminals on the 933A. For example, A-phase Vrms terminals are red and black, located below the Arms inputs on the upper left of the 933A. **Point the tab on the Pomona 1269 adapter towards the black terminal on the 933A.**
2. Connect the BNC cable between the BNC connector of the Pomona adapter and the Amp LiteWire receiver unit BNC connector.



4 Configure the 933A for Volt and Amp LiteWire Outputs

4.1 Configure the Voltage and Current Ratios

1. Press the power key (at the upper left of the keypad) to power on the Model 933A.

```

      SETUP SELECTION
      0- Input Setup Menu
      1- Clock Time Set
      2- Serial Setup
      3- AutoLog Setup
      4- CT/PT Setup
      5- Custom DST Setup
      6- Current Setup
      7- Trigger Setup

      Use ENTER or # keys to select
      ARROW keys move cursor to selection

```

2. Press the Setup key, then press the 4-CT/PT Setup key (shown above). You should see the following screen.

```

      CT/PT RATIO & PHASE

      A PHASE  B PHASE  C PHASE  N PHASE
CT [ 1.0000k  1.0000k  1.0000k  1.0000kRATIO
    0.00      0.00      0.00      0.00 PHASE

PT [ 10.0000k 10.0000k 10.0000k ----- RATIO
    0.00      0.00      0.00 ----- PHASE

      Use Arrow Keys to make selections
      Use Number or Enter Keys to enable adjust

```

```

      A-PHASE CT RATIO

      1000.00

      SET TO  APPLY TO  SAVE
      DEFAULT  A,B & C  ALL

```

3. Make sure that the cursor is surrounding A Phase CT value (default value is 1.0).
4. Using the numeric keys, type in the number 1000 and the Enter key (Enter is in the middle of the four cursor keys with a dot).
5. If you want this ratio to apply to all phases, press the APPLY TO A, B & C soft key (just below the display). Otherwise, press the Enter key to apply it to just A Phase.
6. Using the cursor key, move the cursor down to A-phase PT.
7. Using the numeric keys, type in the number 10000 and press the Enter key.
8. If you want this ratio to apply to all phases, press the APPLY TO A, B & C soft key (just below the display). Otherwise, press the Enter key to apply it to just A Phase.
9. Press the SAVE ALL soft key (just below the display).
10. Press the DISPLAY key, and any of the keys to view data (number keys 0 – 8).

5 Volt LiteWire and Amp LiteWire Connection Notes

Depending on the specific electrical configuration, you will use up to three of the Pomona 72909 connector adapters and up to three of the Pomona 1269 adapters.

5.1 Single-Phase, 2-Wire, 1-Element Connections

Single-phase, two-wire, one-element configurations would require one Pomona 72909 adapter to connect a single Volt LiteWire to the Model 933A. The Amp LiteWire requires one Pomona 1269 adapter. Figure 1 shows this configuration on the Model 933A.

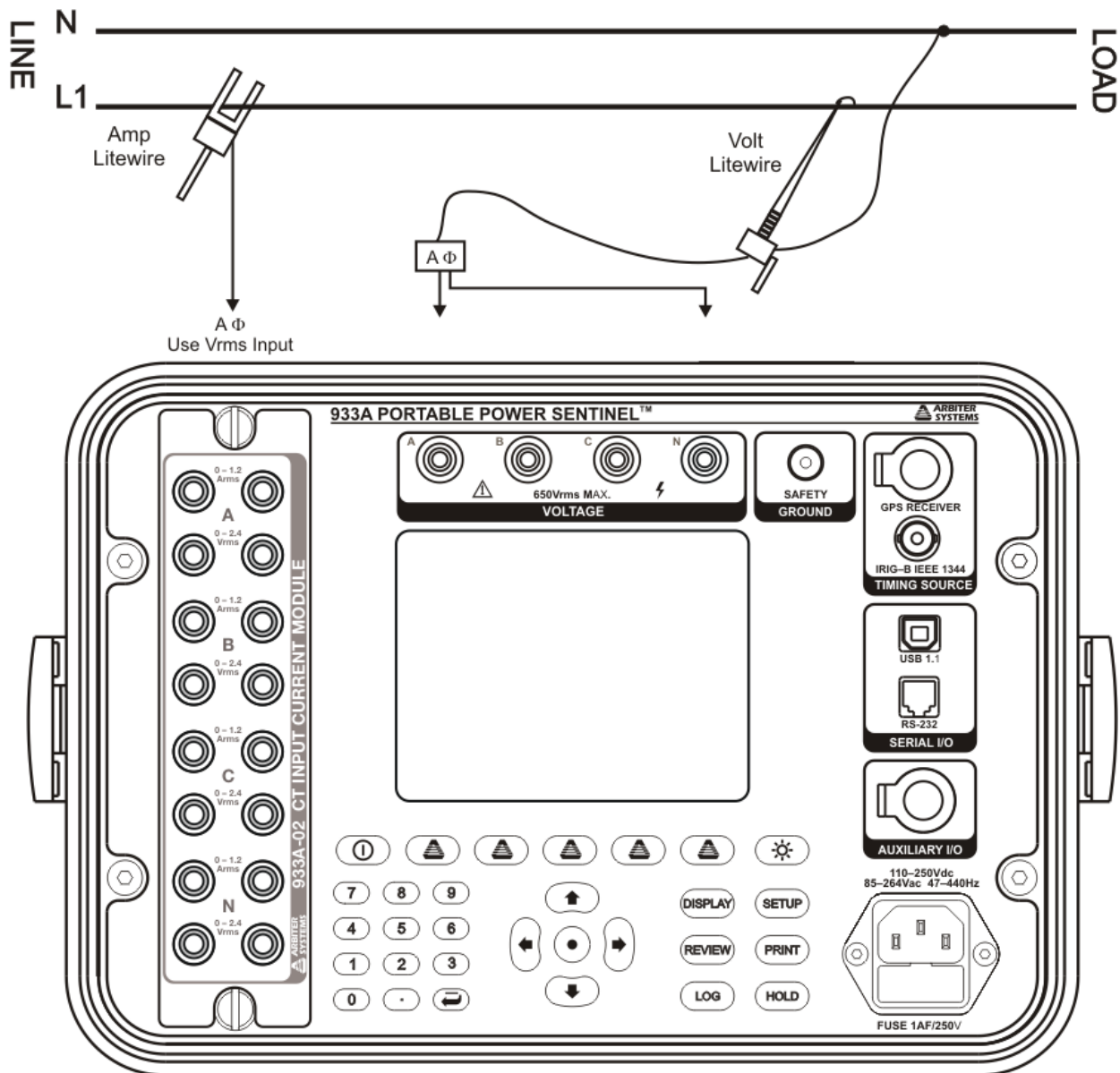


Figure 1: Single-Phase, 2-Wire, 1-Element Configuration

5.2 Single-Phase, 2-Wire, 1 1/2-Element Connections

Single-phase, two-wire, one and one half-element configuration requires one Pomona 72909 adapter to connect a single Volt LiteWire to the Model 933A. This configuration also requires two Pomona 1269 adapters to connect the two Amp LiteWires to the 933A. Figure 2 shows this configuration on the Model 933A.

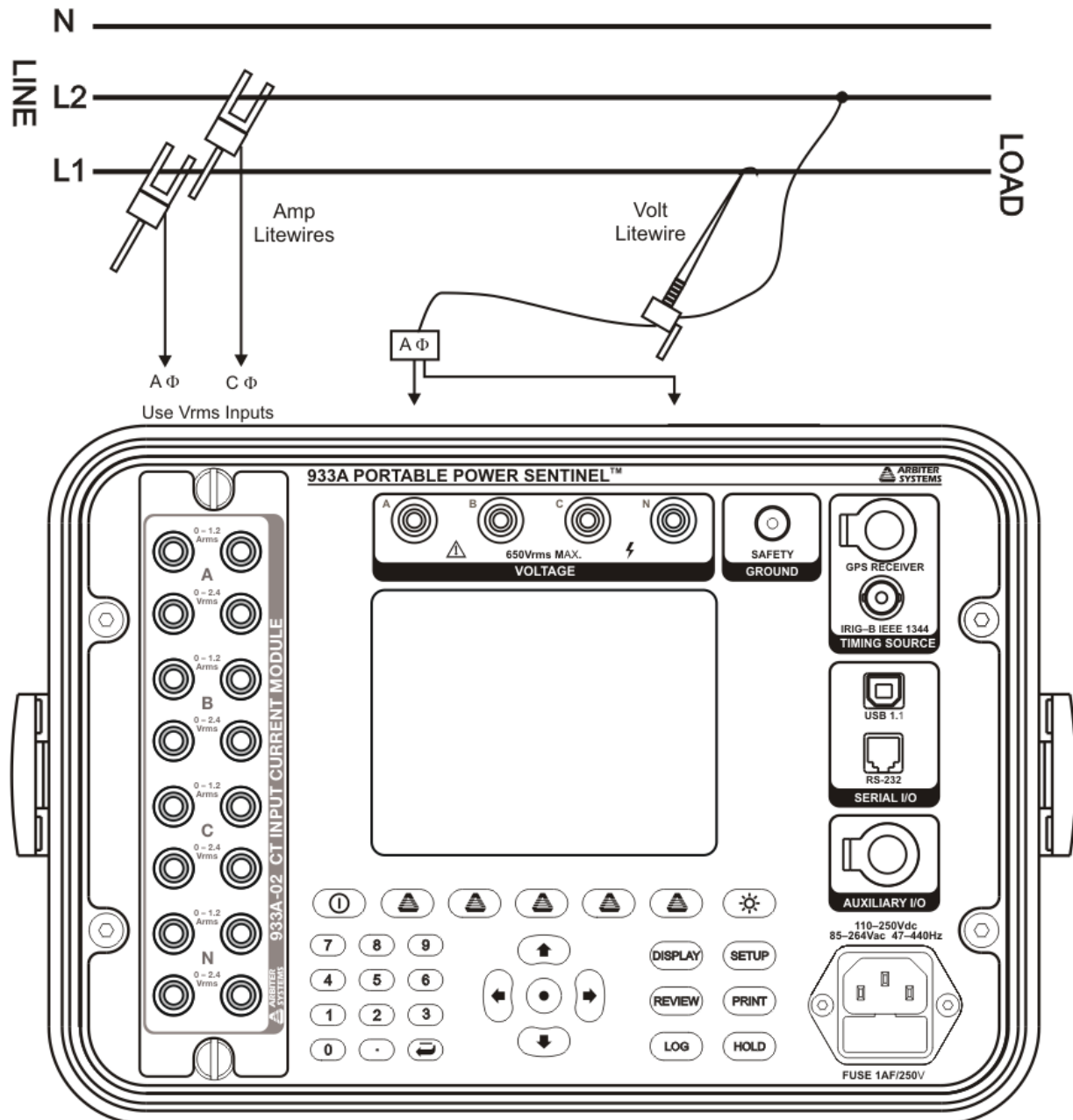


Figure 2: Single-Phase, 2-Wire, 1 1/2-Element Configuration

5.3 Single-Phase, 3-Wire, 2-Element Connections

Single-phase, three-wire, two-element configuration requires one Pomona 72909 adapter to connect a single Volt LiteWire to the Model 933A. This configuration also requires two Pomona 1269 adapters to connect the two Amp LiteWires to the 933A. An extra ground wire is required directly between the neutral and the N terminal on the 933A. Figure 3 shows this configuration on the Model 933A.

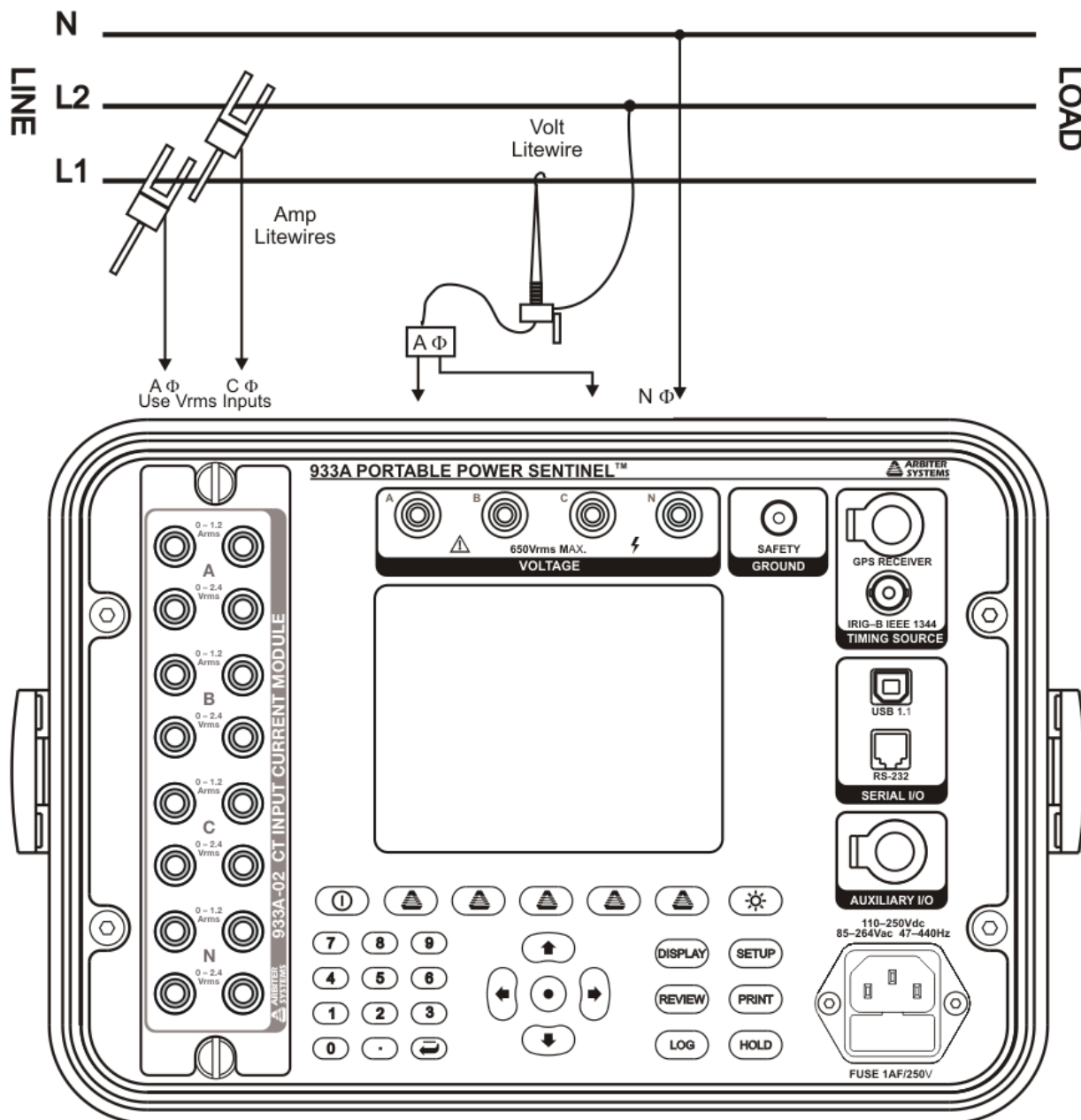


Figure 3: Single-Phase, 3-Wire, 2-Element Configuration

5.4 3-Phase, 3-Wire, 2-Element Delta Connections

Three-phase, three-wire, two-element delta configuration requires two Pomona 72909 adapters to connect two Volt LiteWires to the Model 933A. This configuration also requires two Amp LiteWires and two Pomona 1269 adapters. Figure 4 shows this configuration on the Model 933A.

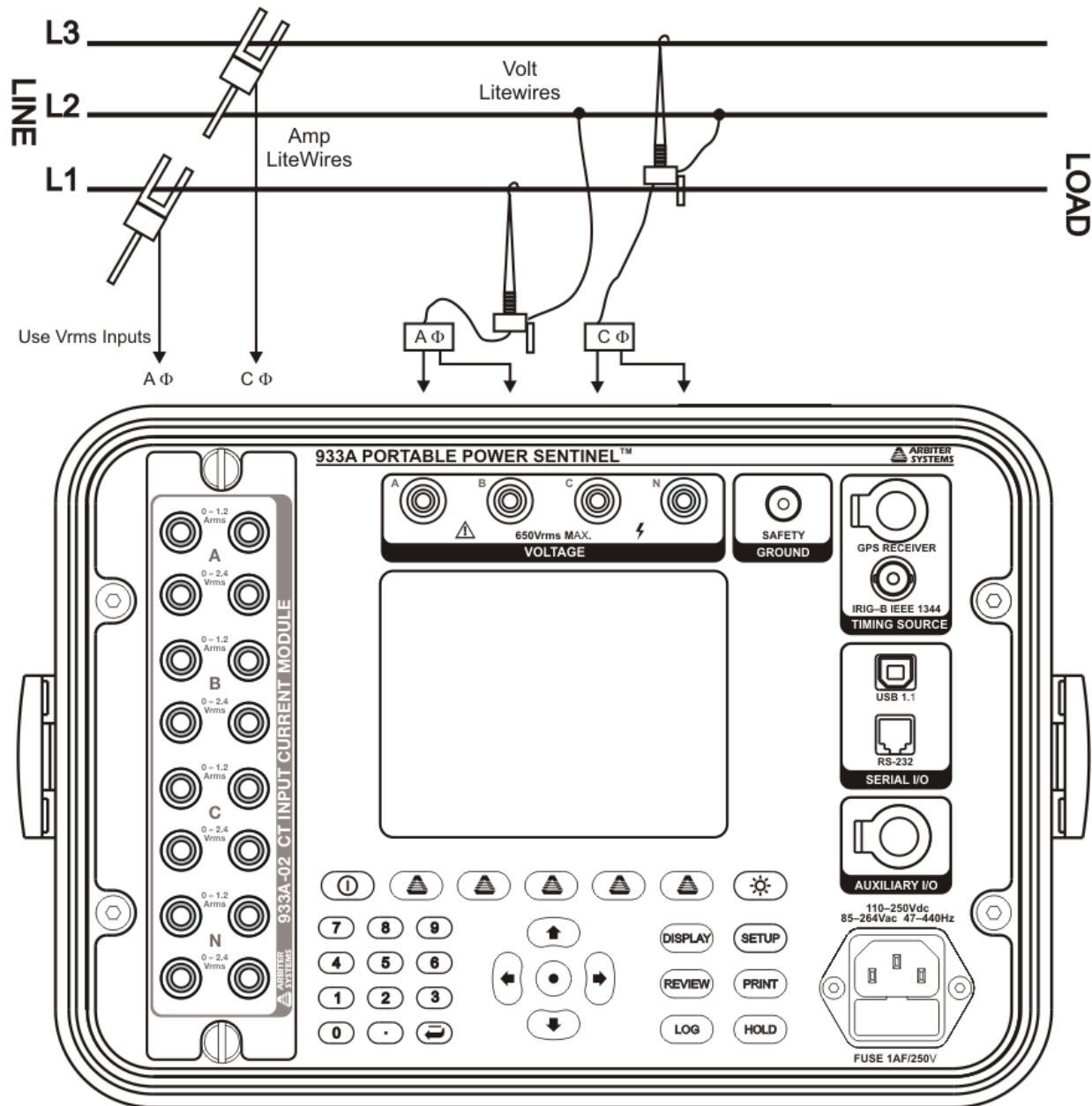


Figure 4: 3-Phase, 3-Wire, 2-Element Delta Configuration

5.5 3-Phase, 4-Wire, 2 1/2-Element Connections

Three-phase, four-wire, two and one half-element configurations would require two Pomona 72909 adapters to connect two Volt LiteWires to the Model 933A. It also requires three Amp LiteWires and three Pomona 1269 adapters to measure three currents in this configuration. This configuration also requires a separate jumper between the B-phase voltage terminal and the N terminal. Figure 5 shows this configuration on the Model 933A.

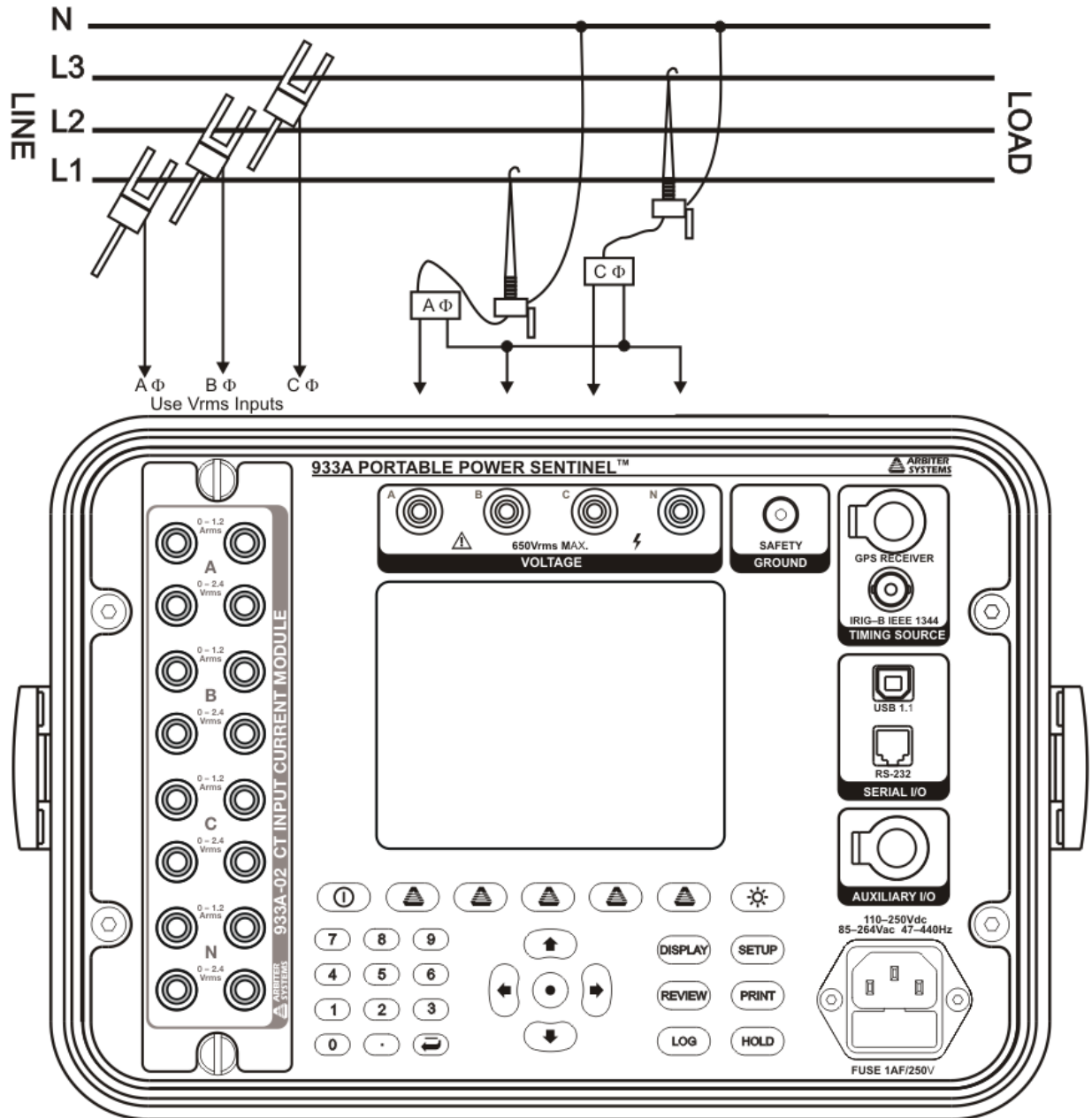


Figure 5: Connecting the 933A for 3-Phase, 4-Wire, 2 1/2-Element Configuration

5.6 Three-Phase, Four-Wire, Three-Element Connections

Three-phase, four-wire, three-element configurations would require three Pomona 72909 adapters to connect three Volt LiteWires to the Model 933A. Stack the three black 4-mm banana plugs into the Neutral connector on the 933A. The Amp LiteWire requires three Pomona 1269 adapters to measure three currents in this configuration. Figure 6 shows this configuration on the Model 933A.

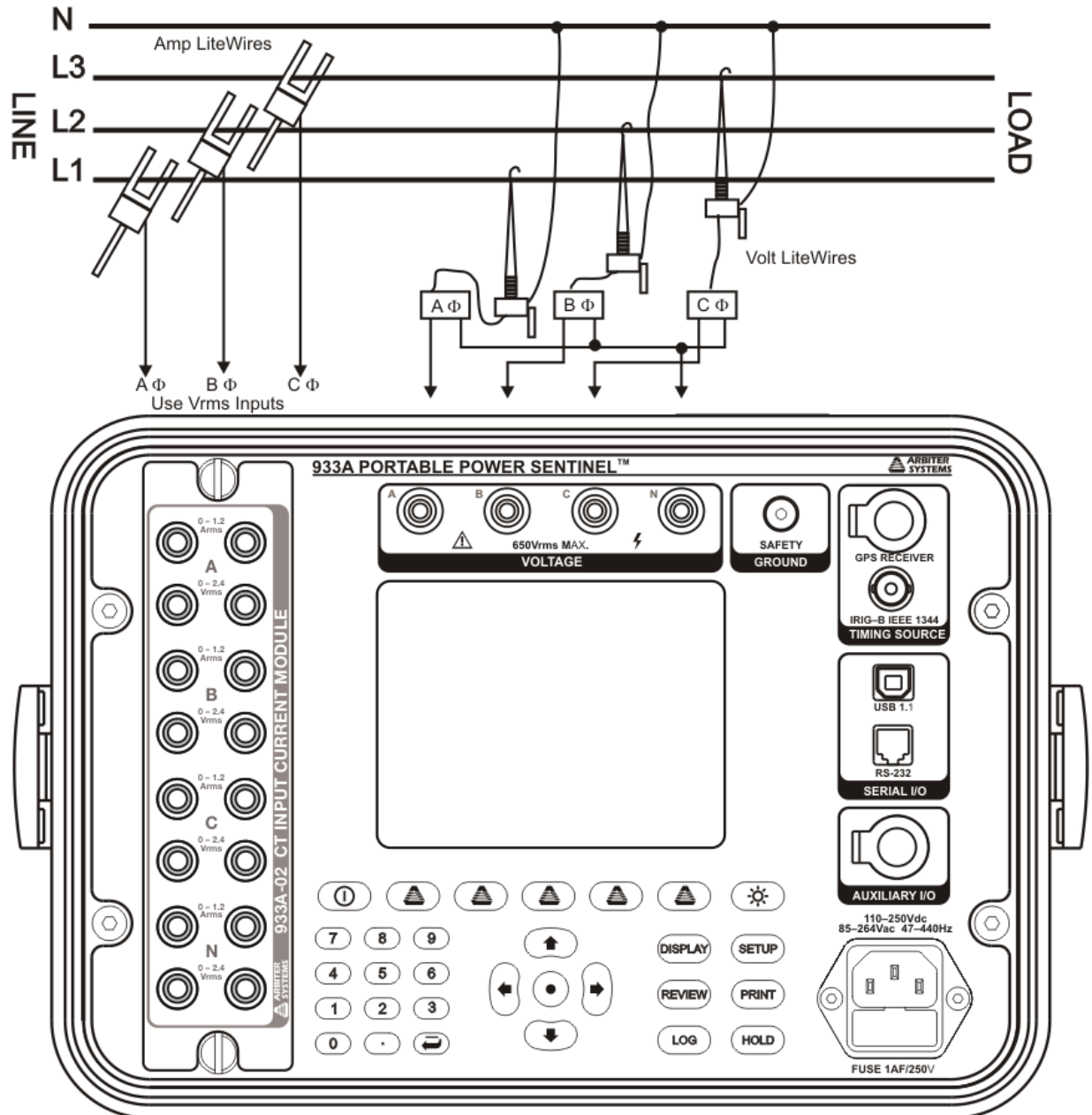


Figure 6: Connecting the 933A for 3-Phase, 4-Wire, 3-Element Configuration