

# Phaser® Application Notes

## Analog Outputs: 8A1



### General Description

The factory installed 8A1 Analog Output option board creates 8 independent high side current sources. Using Second Wind Inc. supplied software, any of Phaser®'s measured or calculated variables can be mapped to any of the 8 current sources.

Each current source can generate  $\pm 2$  milliamps with 0.2% accuracy (12 bits). The bipolar high side current outputs are designed to either source or sink current. Each current source can drive from 0 to 5000 ohms, i.e. the compliance voltage is  $\pm 10$  volts. A major benefit of a high side current source is that a single return wire can be used for many outputs. A second benefit is that they can drive a short circuit so the user does not need to be concerned about the minimal input impedance of connected instruments.

### Hardware Connections

Figure 1 depicts a Phaser's analog outputs connected to two PLCs and an RTU. Each of the three outputs would have been selected, using PhaserConfig™ software, to represent an electrical parameter calculated by the Phaser. The three Phaser outputs are independent of each other and can be a positive or negative current.

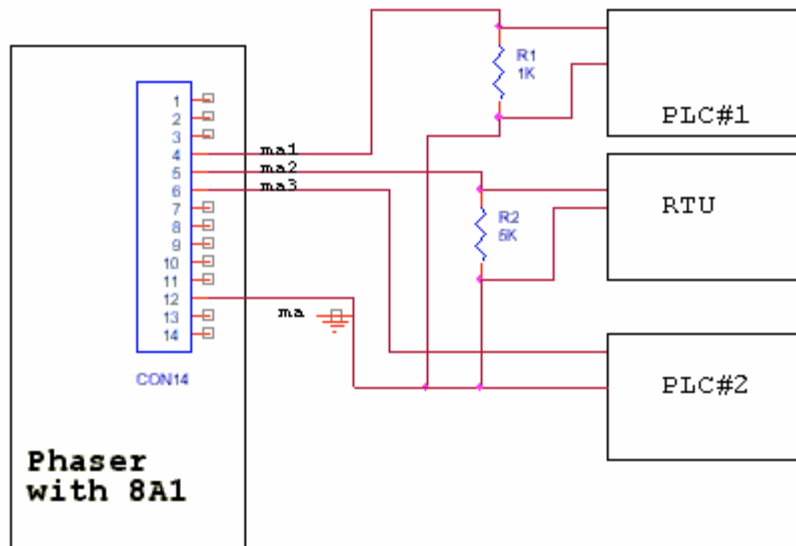


Figure 1. Phaser current outputs connected to PLCs.

Two of the external devices in Figure 1, PLC #1 and the RTU, require voltages for their analog inputs. The voltage that their inputs require is developed across a sense or load resistor. This resistor should be located very close to the PLC. Since the Phaser's output is a current source, the sense resistor can be located at the end of a long wire. The wire has no effect if the voltage measurement is made across the sense resistor, i.e. using a Kelvin connection.

The external device labeled PLC #2 is set up with a current input. Since the PLC can sense current, the Phaser output pin can be connected directly to the PLC #2 input.

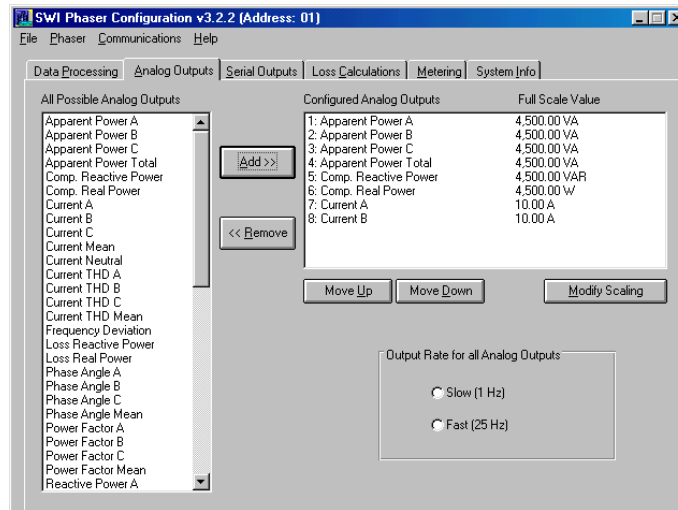


Figure 2. PhaserConfig’s Analog Output Configuration Screen.

The Phaser pin labeled mA (*ground*) can be connected in a daisy chain fashion. Only one wire is needed to return the mA (*ground*) to the Phaser. The Phaser high side current sources allow the return wire, mA (*ground*), to be connected to the sense resistors or the PLCs in any order before returning to the Phaser. Please note that the mA (*ground*) wire is isolated from earth ground and should not be connected to earth ground.

## Configuring the Analog Outputs

The Analog Outputs configuration screen (Figure 2), part of Second Wind Inc. supplied software PhaserConfig, will appear if an Analog Output option board has been factory installed in the Phaser. The screen displays the many variables that can be mapped to an Analog Output. There is a one to one correspondence between the enumeration of the “Configured Analog Outputs” and the output number. For example, the screen capture in Figure 2 shows “Apparent Power C” mapped to the pin labeled “mA3” because it is output #3 of the Phaser output connector.

## Scaling

By clicking the “Modify Scaling” button, the full scale value can be changed. For example, you could make the “Apparent Power A” output equal to 1000V A. It is important to remember that whatever the “Full Scale Value” is set to corresponds to 2mA.

### Scaling Example:

A Phaser’s Va Input is connected to 120 VAC and a 100W light bulb is used as a load. The light bulb must be powered through the Ia input of the Phaser. If the scaling for “Apparent Power A” is set to 200.00V A, the “mA1” output will drive approximately 1 mA (representing 100V A or 100 Watts) into a load resistor connected between “mA1” and “mA (*ground*).” If the scaling is changed so that the “Full Scale Value” is set to 100.00V A, the “mA1” current will increase to 2 mA.