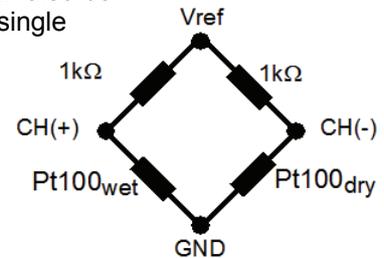


Measuring temperature differences using a GP1 and Pt100s

The precision bridge adapter board (GP1-PBA-1) enables the GP1 to record readings from bridge sensors, and from water-filled tensiometers in particular. This note explains how it can also be used to record temperature difference from a pair of Pt100 sensors using a single GP1 channel. One of the attractions of this approach is that it enables a temperature difference to be used to control the GP1 output relay.

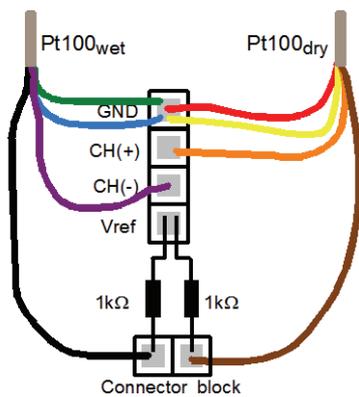
The bridge is configured like this:



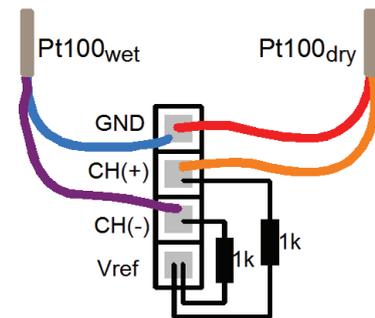
Step 1: Install the GP1-PBA1 and connect the Pt100s.

- ▶ Follow the installation instructions in the Quick Start Guide.
- ▶ The actual connections to the Pt100s will depend on whether they are supplied with 4-wire or 2-wire connections as illustrated below. The colours are likely to be different from the illustrations, which label the arrangement for the “wet” and “dry” temperatures of a psychrometer.
- ▶ The 1k resistors should be high precision 0.1% 15ppm or better. The following parts are readily available from RS or Digikey (rswww.com or www.digikey.com). RS “487-6075” (1k 0.1% 15ppm/degC). Digikey “MR102-1K-.1-ND” (1k 0.1% 10ppm/degC), or “MR102-1K-.01-ND” (1k 0.01% 10ppm/degC)”.

4-wire:



2-wire:



Step 2: Measure the zero offset.

- ▶ Place the two Pt100 sensors as close together as possible, wrap them around with insulation, place inside a polythene bag and allow them to thermally equilibrate for 15 minutes. Follow the instructions on page 3 of the GP1 Quick Start Guide: “Cold reset the GP1...” to measure the *zero offset* value.

Step 3: Program the GP1.

- ▶ Follow the further instructions on page 3 of the Quick Start Guide, entering Voltage Channel Properties as shown in this table:

Sensor Type	<custom>
Warmup	1s
Units	deg C
Linearisation table	no
Minimum	-10
Maximum	10
Resolution	0.01
a0	-a1 x <i>zero offset</i>
a1	0.020638

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