

ENHANCING THERMOCOUPLE TEMPERATURE MEASUREMENT ACCURACY WITH LOCAL RTDS TO COMPENSATE TERMINAL TEMPERATURE DIFFERENCE

ABSTRACT

An I/O circuit for measuring temperatures uses multiple cold-junction compensation sensors permanently affixed near the terminals of the terminal block in order to compensate significant temperature variation across the terminals of the I/O module (up to 3°C) that can substantially affect the accuracy of thermocouple measurements. The use of these multiple sensors is enabled by a compensation system that corrects for the distance between the built-in sensors and the terminals, a multiplexer that accommodates the additional signal burden produced by the sensors, and a compensation system that allows low-cost sensors to be used and calibrated to as little as a single high accuracy sensor. In one embodiment, a third temperature sensor with relatively higher accuracy is used to compensate for lower accuracy of permanently affixed sensors.

Figure 1