Chapter 1

Overview

This chapter describes the six-channel 1769-IR6 RTD/resistance Input module and explains how the controller reads resistance temperature detector (RTD) or direct resistance-initiated analog input data from the module. Included is:

- a general description of hardware features
- an overview of module and system operation
- compatibility

General Description

The 1769-IR6 module supports RTD and direct resistance signal measurement applications that require up to six channels. The module digitally converts analog data and then stores the converted data in its image table.

The module supports connections from any combination of up to six input devices. Each channel is individually configurable via software for 2- or 3-wire RTD or direct resistance input devices. Channels are compatible with 4-wire sensors, but the fourth sense wire is not used. Two programmable excitation current values (0.5mA and 1.0mA) are provided, to limit RTD self-heating. When configured for RTD inputs, the module can convert the RTD readings into linearized digital temperature readings in °C or °F. When configured for resistance analog inputs, the module can convert voltages into linearized resistance values in ohms. The module assumes that the direct resistance input signal is linear prior to input to the module.

Each channel provides open-circuit (all wires), short-circuit (excitation and return wires only), and over- and under-range detection and indication.

IMPORTANT The module accepts input from RTDs with up to 3 wires. If your application requires a 4-wire RTD, one of the two lead compensation wires is not used, and the RTD is treated like a 3-wire sensor. The third wire provides lead wire compensation. See Chapter 3, *Installation and Wiring*, for more information.

Table 1 - RTD Specifications

RTD Type[1]		Temperature Range Using 0.5 mA Excitation	Temperature Range Using 1.0 mA Excitation	Maximum Scaled Resolution	Maximum Scaled Repeatability
Copper 426	10 Ω	Not allowed	-100…260 °C (-148…500 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
Nickel 618[2]	120 Ω	-100…260 °C (-148…500 °F)	-100…260 °C (-148…500 °F)	0.1 °C (0.1 °F)	±0.1 °C (±0.2 °F)
Nickel 672	120 Ω	-80…260 °C (-112…500 °F)	-80…260 °C (-112…500 °F)	0.1 °C (0.1 °F)	±0.1 °C (±0.2 °F)
Nickel-Iron 518	604 Ω	-200…180 °C (-328…338 °F)	-100…200 °C (-148…392 °F)	0.1 °C (0.1 °F)	±0.1 °C (±0.2 °F)
Platinum 385	100 Ω	-200…850 °C (-328…1562 °F)	-200…850 °C (-328…1562 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
	200 Ω	-200…850 °C (-328…1562 °F)	-200…850 °C (-328…1562 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
	500 Ω	-200…850 °C (-328…1562 °F)	-200…850 °C (-328…1562 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
	1000 Ω	-200…850 °C (-328…1562 °F)	Not Allowed	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
Platinum 3916	100 Ω	-200C…630 °C (-328…1166 °F)	-200…630 °C (-328…1166 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
	200 Ω	-200…630 °C (-328…1166 °F)	-200…630 °C (-328…1166 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
	500 Ω	-200…630 °C (-328…1166 °F)	-200…630 °C (-328…1166 °F)	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)
	1000 Ω	-200…630 °C (-328…1166 °F)	Not Allowed	0.1 °C (0.1 °F)	±0.2 °C (±0.4 °F)

(1) Digits following the RTD type represent the temperature coefficient of resistance (α), which is defined as the resistance change per ohm per °C. For instance, platinum 385 refers to a platinum RTD with α = 0.00385 ohm/ohm - °C, or simply 0.00385/°C.

(2) Actual value at 0 °C is 100 Ω per DIN standard.

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Resistance Device Compatibility

The following table lists the specifications for the resistance devices that you can use with the module.

Table 3 - Resistance Device Specifications

Resistance Device Type	Resistance Range (0.5 mA Excitation)	Resistance Range (1.0 mA Excitation)	Accuracy(1)	Temperature Drift	Resolution	Repeatability
150 Ω	0…150 Ω	0…150 Ω	±0.15 Ω	±0.007 Ω/°C (±0.013 Ω/°F)	0.01 Ω	±0.04 Ω
500 Ω	0…500 Ω	0…500 Ω	±0.5 Ω	±0.023 Ω/°C (±0.041 Ω/°F)	0.1 Ω	±0.2 Ω
1000 Ω	0…1000 Ω	0…1000 Ω	±1.0 Ω	±0.043 Ω/°C (±0.077 Ω/°F)	0.1 Ω	±0.2 Ω
3000 Ω	0…3000 Ω	Not allowed	±1.5 Ω	±0.072 Ω/°C (±0.130 Ω/°F)	0.1 Ω	±0.2 Ω

(1) Accuracy values are based on the assumption that the module has been calibrated to the temperature range of 0…60 °C (32…140 °F).

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