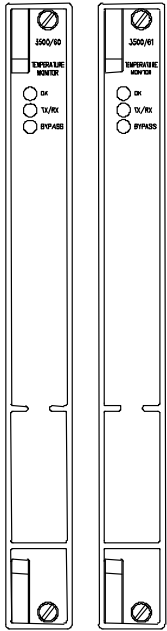


3500/60 & /61 Temperature Monitors

Bently Nevada* Asset Condition Monitoring



Description

The 3500/60 & 61 modules provide six channels of temperature monitoring and accept both Resistance Temperature Detector (RTD) and Thermocouple (TC) temperature inputs. The modules condition these inputs and compare them against user-programmable alarm setpoints. The 3500/60 and 3500/61 provide identical functionality except that the 3500/61 provides recorder outputs for each of its six channels while the 3500/60 does not.

The user programs the modules to perform either RTD or TC temperature measurements using the 3500 Rack Configuration Software. Different I/O modules are available in RTD/TC non-isolated or TC isolated versions. The user can configure the RTD/TC non-isolated version to accept either TC or RTD, or a mixture of TC and RTD inputs. The TC isolated version provides 250 Vdc of channel-to-channel isolation to protect against external interference.

When used in a Triple Modular Redundant (TMR) configuration, temperature monitors must be installed adjacent to each other in groups of three. When used in this configuration, the system employs two types of voting to ensure accurate operation and to avoid single-point failures.



Specifications and Ordering Information
Part Number 141540-01
Rev. F (06/13)



Specifications

Inputs

Signal

Accepts from 1 to 6 RTD or TC transducer signals.

Input Impedance

Greater than 10 M Ω for each lead input.

Power Consumption

3500/60: Nominal consumption of 7 watts.

3500/61: Nominal consumption of 9 watts.

Transducers

TCs

Type E: -100 °C to +1000 °C,
(-148 °F to +1832 °F).

Type J: 0 °C to +760 °C,
(+32 °F to +1400 °F).

Type K: 0 °C to +1370 °C,
(+32 °F to +2498 °F).

Type T: -160 °C to +400 °C,
(-256 °F to +752 °F).

RTDs

100 Ω 3-wire & 4-wire platinum RTD (alpha = 0.00385):

** -200° C to +850° C
(-328 °F to +1562 °F).

With external barriers:

-50 °C to +850 °C

(-122 °F to +1562 °F).

100 Ω 3-wire & 4-wire platinum RTD (alpha = 0.00392):

** -200 °C to +700 °C

(-328 °F to +1292 °F).

With external barriers:

-50 °C to +850 °C

(-122 °F to +1562 °F).

120 Ω 3-wire & 4-wire nickel RTD:

-80 °C to +260 °C

(-112 °F to +500 °F).

10 Ω 3-wire & 4-wire copper RTD:

** -100 °C to +260 °C,

(-148 °F to +500 °F).

With external barriers:

-50 °C to +850 °C

(-122 °F to +1562 °F).

Note: Platinum RTD's with 0.00385 alphas are the worldwide industrial standard and are recommended for all applications.

** Lower OK limit with external barriers is -50°C.

I/O Modules

Isolated TC I/O modules have 250 Vdc of isolation between channels.

Outputs

Front Panel LEDs

OK LED

Indicates when the Temperature Monitor is operating properly.

TX/RX LED

Indicates when the Temperature Monitor is communicating with other modules in the 3500 rack.

Bypass LED

Specifications and Ordering Information
Part Number 141540-01
Rev. F (06/13)

RTD Current Source Value	Indicates when the Temperature Monitor is in Bypass Mode.	Standard Rack: ± 3 °C at 25 °C (± 5.4 °F at 77 °F).
	925 \pm 15 μ A @ 25° C per transducer (single supply for the 4-wire RTD and two supplies for the 3-wire).	<i>External Termination Non-Isolated:</i>
		Bulkhead Rack: ± 3 °C at 25 °C (± 5.4 °F at 77 °F).
Recorder	+4 to +20 mA. Values are proportional to monitor full-scale. Individual recorder values are provided for each channel. Monitor operation is unaffected by short circuits on recorder outputs.	Standard Rack: ± 1 °C at 25 °C (± 1.8 °F at 77 °F).
		<i>Internal Termination Isolated:</i>
		Bulkhead Rack: ± 2 °C at 25 °C (± 3.6 °F at 77 °F).
Voltage Compliance (current output)	0 to +12 Vdc range across load. Load resistance is 0 to 600 Ω .	Standard Rack: ± 3 °C at 25 °C ± 5.4 °F at 77 °F).
		<i>External Termination Isolated:</i>
Resolution	0.3662 μ A per bit $\pm 0.15\%$ error at room temperature $\pm 0.4\%$ error over temperature range.	Bulkhead Rack: ± 1 °C at 25 °C (± 1.8 °F at 77 °F).
Signal Conditioning		Standard Rack: ± 1 °C at 25 °C (± 1.8 °F at 77 °F).
	Note: Specified at +25 °C (+77 °F) unless otherwise noted.	
	Full-scale range for each channel is set in the field via 3500 Configuration Software. No calibration is required.	10Ω Copper RTDs
RTDs and TCs (except for 10Ω Copper RTDs)		Resolution
Resolution	1 °C or 1 °F	1°C or 1 °F
Accuracy		Accuracy
		± 3 °C at 25 °C (± 5.4 °F at 77 °F).
	<i>Internal Termination Non-Isolated</i>	Cold Junction Compensation Sensor (used for TC measurements)
	Bulkhead Rack ± 3 °C at 25 °C (± 5.4 °F at 77 °F).	Accuracy
		± 1 °C at 25 °C

(±1.8 °F at 77 °F).

indicate the minimum alarm time delay based on the channel loading.

Alarms

Alarm Setpoints

The user can set Alert and Danger setpoints for the value measured by the monitor using software configuration. Alarms are adjustable from 0 to 100% of full-scale for each measured value. The exception is when the full-scale range exceeds the range of the sensor. In this case, the range of the sensor will limit the setpoint. Accuracy of alarms are to within 0.13% of the desired value. The Temperature Monitors have both under and over alarm setpoints.

Alarm Time Delays

The user can program alarm delays using software as follows:

Alert

From 1 to 60 seconds in 1 second intervals.

Danger

From 1 to 60 seconds in 0.5 second intervals or can be set to the minimum alarm delay.

Number of actual channel(s)	Minimum time delay (mS)
1	225
2	300
3	375
4	450
5	525
6	600

Note: 225 ms alarm time delays will not be available for all channels. As more channels are used the alarm time delay increases. The configuration software will

Proportional Values

Proportional values are temperature measurements used to monitor the machine. The Temperature Monitors return temperature proportional values.

Environmental Limits

Operating Temperature

-30 °C to +65 °C (-22 °F to +150 °F) when used with Internal/External Termination I/O Modules

0 °C to +65 °C (32 °F to +150 °F) when used with Internal Barrier I/O Modules (Internal Termination).

Storage Temperature

-40 °C to +85 °C (-40 °F to +185 °F).

Compliance and Certifications

EMC

Standards:
EN 61000-6-2 Immunity for Industrial Environments
EN 55011/CISPR 11 ISM Equipment
EN 61000-6-4 Emissions for Industrial Environments

European Community Directives:
EMC Directive 2004/108/EC

Electrical Safety

Standards:
EN 61010-1

European Community Directives:
2006/95/EC Low Voltage