

FIELD SELECTABLE
Loop Powered
ISOLATED
Thermocouple to DC Trans-
mitter
LP 300



Specifications

Input Type

Thermocouple types J, K, T, or E

Input Ranges

See Table on reverse side

Output Range (fixed)

4-20mA DC

Reverse polarity protected to 60VDC

Loop Power

10VDC min. to 60VDC max @ output terminals.

Cold Junction Compensation

Automatic for selected thermocouple

Accuracy: +/- 1 °C above Ta = 0°C

+/- 3 °C below Ta = 0°C

Voltage Supply Dependency

Negligible; less than 8uA from 10 to 60VDC

Output Over/Underrange

24mA/3.6mA

Isolation

1000V RMS

Linearity

0.2% of span

(output linear to mV input—not linearized to temperature)

Overall Accuracy

0.3% of span

Response Time

100msec

Common Mode Rejection

85dB @ 60Hz; 120dB DC

Temperature Stability

Zero: 100ppm per °C (spans greater than 150°C)

150ppm per °C (spans less than 150°C)

Span: 150ppm per °C (spans greater than 150°C)

200ppm per °C (spans less than 150°C)

Fine Zero/Span Control Range

+/-15% of span (*NON-INTERACTIVE*)

Functional Test Pushbutton

Adjustable from 0 to 100% of span

Output Ripple and Noise

Less than 10uA RMS

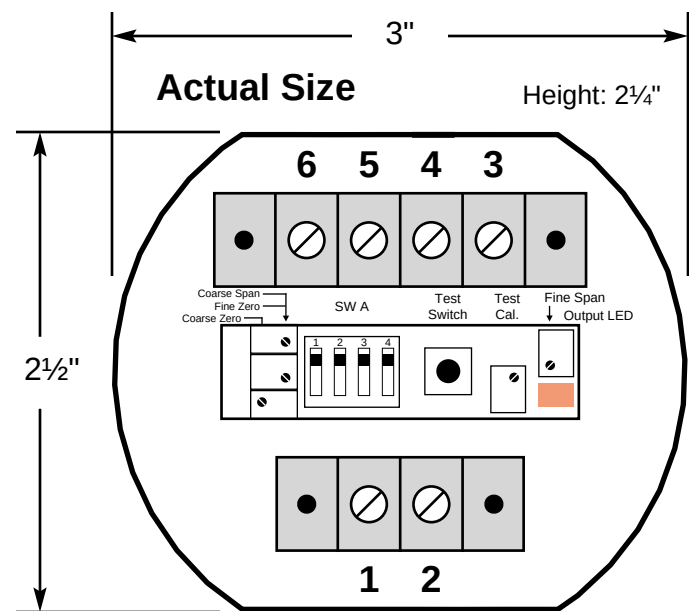
Environmental (Operating)

40 to +70 °C

0 to 90% RH, non-condensing

FEATURES

- J, K, T, or E Thermocouples
- 4-20mA output
- Automatic cold junction compensation
- Selectable upscale/downscale burnout protection
- Non-interactive fine zero/span
- Full input/output isolation
- Functional Test Pushbutton
- Output Loop Tracker™ LED
- LIFETIME WARRANTY



Unless otherwise specified,
all specifications are typical at 25°C, Vsupply = 24V

Terminal Connection	
Term.	Signal
1	Output (-)
2	Output (+)
3	None
4	TC (+)
5	TC (-)
6	Case Gnd

DIP Switch SWA

Pos. 1-3 = Thermocouple type:

Type "E" Set Pos. 1 to ON,
Set Pos. 2 & 3 to OFF

Type "J" Set Pos. 2 to ON,
Set Pos. 1 & 3 to OFF

Types "K" or "T"
Set Pos. 3 to ON,
Set Pos. 1 & 2 to OFF

Pos. 4 = burnout protection.
OFF, ("Open") for UPSCALE burnout.
ON, for DOWNSCALE burnout.

FUNCTIONAL DESCRIPTION

The Api LP 300 accepts a Thermocouple Input (Types J, K, T or E) and provides an isolated 4-20mADC current output that is linear to the millivolt signal from the T/C. All operating power for the LP 300 is derived from the 4-20mADC output loop, eliminating the need for extra power wiring in the application. The Isolation between Input and Output makes this module useful for Ground Loop Elimination, Common Mode Signal Rejection or Noise Pickup Reduction.

The LP 300 can be configured by coarse and fine zero and span potentiometers for any temperature span (Deg C or F) within the range of the selected sensor. The fine zero and span controls, with their range of $\pm 15\%$, allow exact calibration. One model can be configured for J, K, T or E thermocouple types as well as upscale or downscale burnout protection via easy to use DIP switches. Automatic cold junction compensation is standard. API Exclusive Features include an Output **LoopTracker™ LED** and a **Functional Test Pushbutton**, both of which are described in more detail below.

The LP 300 is specifically designed to resist the effects of harsh environments. Input noise filtering is standard to protect against unwanted EMI/RFI interference. The internal electronics are conformally coated and housed in an extruded aluminum case. All user accessible components are protected by a gasketed cover with thumb screws for a secure seal. An adaptor plate is available to allow for either DIN rail or panel mounting. In addition, the case dimensions are compatible with similar designs allowing the LP 300 to be installed inside industry standard explosion-proof housings.

OPERATION

A constant 3.6mADC current source, derived from the output loop, provides the power necessary to operate the input and output circuitry of the LP 300. A solid-state temperature sensor, located in the thermocouple connector block, senses the "cold" or non-measuring junction and automatically corrects for variations in the ambient temperature of the block. The small amount of correction is matched to the T/C type by the setting of a DIP switch. In addition, a DIP switch determines upscale or downscale burnout protection. The resulting input signal is filtered for noise immunity and passed through a precision amplifier to a coupling transformer for isolation. The field adjustable "coarse" zero & span potentiometers are used to adjust the module close to the minimum and maximum desired range. The NON-Interactive "fine" zero & span potentiometers are then used for precise calibration. Using a proprietary technique to avoid linearity and drift errors, the isolated signal is converted to the 4-20mADC Output Current Loop signal. The output circuitry is designed to accept Loop Power Supplies from 10VDC to 60VDC with virtually no variation in output current with changes in supply voltage. In addition, accepting loop supplies up to 60VDC allows for greater output drive capability.

UNIQUE FEATURES

API Exclusive Features include a high-brightness **LoopTracker™ LED** and a **Functional Test Pushbutton**.

The red LoopTracker™ LED varies in intensity with changes in the process signal. At minimum output the LED will be nearly extinguished and at maximum output it will be at maximum brightness. Monitoring the state of this LED can provide a quick visual picture of your process loop at all times.

The Functional Test Pushbutton removes the input signal and provides a fixed output when held depressed. The Test Output level can be field-adjusted via the "Test Cal" potentiometer to any level from 4-20mADC. Both the LoopTracker™ LEDs and Functional Test Pushbutton greatly aid in the

reduction of time during initial startup and/or troubleshooting.

OPERATION PARAMETERS

For detailed, step-by-step instructions on calibrating your LP 300 refer to the "Installation & Calibration Guide" that is included with the product.

Using proprietary engineering techniques, the LP 300 was skillfully designed for wide adjustability within the usable temperature range of the thermocouple type selected. In order to provide optimum operation within our stringent specs, the LP 300 requires a minimum input span of 4mV. To determine if your desired range is possible on the LP 300, refer to the chart on this page and proceed as follows:

- Determine the thermocouple type desired.
- Determine the minimum input temperature desired in your application to produce the 4mADC output and the maximum input temperature desired to produce the 20mA output. (i.e., for 50 to 250 Deg C, 50 Deg C will equal 4mA and 250 Deg C will equal 20mA).
- Ensure the minimum input temperature is within the "Minimum Input" range shown for your specific thermocouple type.
- Ensure the maximum input temperature does not exceed the maximum temperature shown in the "Overall Range" column for your specific thermocouple type.
- If the minimum input temperature is greater than minus 50 degrees C, find the difference between your maximum and minimum temperatures and ensure the result is within the "Usable Span" shown for your specific thermocouple type.
- If the minimum input temperature is less than minus 50 degrees C, it will be necessary to consult the published millivolt tables for your thermocouple type to ensure the millivolt equivalent of the total temperature span ($mV_{max} - mV_{min}$) is greater than or equal to the 4mV minimum span required by the LP 300.
- If you do not have access to the T/C tables or your application does not meet the above requirements, contact the factory at 800-942-0315.

Input Range Table			
Type	Overall Range	Min. Input	Usable "Span"
"J"	-210 to 760°C	-210 to 300°C	75 to 900°C
"K"	-270 to 1300°C	-270 to 500°C	100 to 1200°C
"T"	-200 to 400°C	-200 to 300°C	95 to 600°C
"E"	-270 to 880°C	-270 to 250°C	65 to 660°C

API maintains a constant effort to upgrade and improve its products; therefore; specifications are subject to change without notice.

Consult factory for your specific Range needs.

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