Thermocouple Input to Dual Thermocouple Output Splitter/Converter, Factory Ranged

**APD 41390**

**1 Input:** Any Thermocouple

**2 Outputs:** Any 2 Thermocouples, Alarm Relay Options

- Split or Convert a T/C to Any Two T/C Types
- Add Additional Isolated Output to Existing T/C
- Zero and Span Output Calibration
- Input LoopTracker®

**Applications**

- Split/Convert Thermocouples for PLC Input, Control or Validation
- Interface Thermocouples with Panel Meters, PLCs, Recorders, Data Acq., DCS, & SCADA Systems

**Thermocouple Input, Factory Set**

- **T/C types:** J, K, T, E, M, N, P, R, S, B, C, D, G
- **Temperature range:** Full ANSI range, or specify °F or °C range
- **Linearity:** ±0.1°C and 0.001°C resolution
- **Linearization:** Polynomials, 1°C segments for types M and P
- **T/C CJC:** Automatic
- **T/C current:** Less than 10 µA, including burnout sense
- **Burnout:** Upscale (standard), Downscale (optional), None
- **Custom:** Provide T/C millivolt data, °F or °C range

**Status LEDs**

- **LoopTracker:** Variable brightness green for input level
- **Yellow LED:** Error status
- **Red/green LED:** Alarm state (with alarm option only)

**Thermocouple Output, Channel 1, Factory Set**

- **T/C types:** J, K, T, E, M, N, P, R, S, B, C, D, G
- **Temperature range:** Limited by smallest ANSI T/C range
- **Linearity:** To temperature
- **Linearization:** Polynomials, 1°C segments for types M and P
- **T/C CJC:** Automatic, can be factory disabled

**Thermocouple Output, Channel 2, Factory Set**

- **T/C types:** J, K, T, E, M, N, P, R, S, B, C, D, G
- **Temperature range:** Limited by smallest ANSI T/C range
- **Linearity:** To temperature
- **Linearization:** Polynomials, 1°C segments for types M and P
- **T/C CJC:** Automatic, can be factory disabled

**Output Calibration**

- Zero and span potentiometers for each output, ±15% range
- **Output Resolution:** 16 bit
- **Output Ripple and Noise:** Less than ±0.2% of span

**Optional Alarm Relay**

- Single point dual DPST contact sets, factory configured
- **Models:** 1 Form A (NO) and 1 Form B (NC) contact sets (4 terminals)
- **Power:** 85-265 VAC, 50/60 Hz or 60-300 VDC
- **Inputs:** Eight 4-terminal removable connectors, 14 AWG max. wire size
- **Outputs:** 0-100% of span
- **Relay:** 1 Form A (NO) and 1 Form B (NC) contact sets (4 terminals)
- **Max. Load:** 8 A max @ 240 VAC
- **Max. Resistance:** Use external contact protection (RC snubbers) for inductive loads
- **Signaling Current:** 8 A max @ 240 VAC
- **Resistance:** 0-100% of span
- **Temperature:** Ambient
- **Power:** Universal Power
- **Dimensions:** 1.78” W x 4.62” H x 4.81” D
- **Temperature Range:** Full ANSI range, or specify °F or °C range

**Housing and Connectors**

- **IP 40:** Requires vertical installation on a 35 mm DIN rail inside a panel or enclosure
- **Power:** 85-265 VAC, 50/60 Hz or 60-300 VDC, 6 W maximum
- **Dimensions:** 1.78” W x 4.62” H x 4.81” D
- **Weight:** 2.8 oz.
- **Certification:** RoHS Lead Free

**Overview**

- The APD 41390 accepts a thermocouple temperature input and provides two independent thermocouple outputs. This makes it useful to match up the available thermocouple type with an instrument T/C input, for data recording, or when isolating inputs and outputs.

**Applications**

- **Split/Convert Thermocouples:** Useful for PLC input, control or validation.
- **Interface Thermocouples:** Suitable for panel meters, PLCs, recorders, data acquisition, DCS, and SCADA systems.

**Wiring Diagrams on Next Page**

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**Thermocouple Types:**


**Temperature Ranges:**

- J: -50°C to 1200°C
- K: -200°C to 1372°C
- T: -40°C to 538°C
- E: -200°C to 1038°C
- M: -100°C to 1650°C
- N: -50°C to 1038°C
- P: -100°C to 1372°C
- R: -200°C to 1201°C
- S: -100°C to 1650°C
- B: 0°C to 2372°C
- C: 0°C to 1200°C
- D: 0°C to 1260°C
- G: 0°C to 1372°C

**Specifications:**

- **Ambient Temperature Range:** -10°C to +60°C operating ambient
- **Better than ±0.02% of span per °C stability**
- **Response Time:** 500 milliseconds minimum
- **Isolation:** Full 4-way galvanic: input, output 1, output 2, power 1200 Vrms minimum.
- **600 VAC or 600 VDC common mode protection**
- **75 dB minimum common mode rejection**
- **Simultaneous 50 Hz and 60 Hz rejection**

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**How to Order—Factory Ranged and Configured**

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
<th>Input</th>
<th>Outputs</th>
<th>Alarm</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APD 41390</td>
<td>85-265 VAC, 60-300 VDC</td>
<td>Specified by user</td>
<td>Specified by user</td>
<td>none</td>
<td>B</td>
<td>Upscale burnout (standard)</td>
</tr>
<tr>
<td>APD 41390 D</td>
<td>9-30 VDC, 10-32 VAC</td>
<td>Specified by user</td>
<td>Specified by user</td>
<td>HI alarm (failsafe std.)</td>
<td>N</td>
<td>Downscale burnout</td>
</tr>
<tr>
<td>APD 41390 H</td>
<td>85-265 VAC, 60-300 VDC</td>
<td>Specified by user</td>
<td>Specified by user</td>
<td>none</td>
<td>RA</td>
<td>No burnout, last valid value</td>
</tr>
<tr>
<td>APD 41390 DH</td>
<td>9-30 VDC, 10-32 VAC</td>
<td>Specified by user</td>
<td>Specified by user</td>
<td>Latching relay off, push button reset</td>
<td>HP</td>
<td>Reverse-acting alarm</td>
</tr>
<tr>
<td>APD 41390 L</td>
<td>85-265 VAC, 60-300 VDC</td>
<td>Specified by user</td>
<td>Specified by user</td>
<td>LO alarm (failsafe std.)</td>
<td>HT</td>
<td>Latching relay, push button reset</td>
</tr>
<tr>
<td>APD 41390 DL</td>
<td>9-30 VDC, 10-32 VAC</td>
<td>Specified by user</td>
<td>Specified by user</td>
<td>LB alarm (failsafe std.)</td>
<td>U</td>
<td>Conformal coating for moisture resistance</td>
</tr>
</tbody>
</table>

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### Instructions

**Precautions**

WARNING: All wiring must be performed by a qualified electrician or instrumentation engineer. See diagram for terminal designations and wiring examples. Consult factory for assistance.

WARNING: Avoid shock hazards! Turn signal input, output, and power off before connecting or disconnecting wiring, or removing or installing module.

**Precautions**

ATTENTION! Tout le câblage doit être effectué par un électricien ou ingénieur en instrumentation qualifié. Voir le diagramme pour désignations des bornes et des exemples de câblage. Consulter l’usine pour assistance.

ATTENTION! Eviter les risques de choc! Fermez le signal d’entrée, le signal de sortie et l’alimentation électrique avant de connecter ou de déconnecter le câblage, ou de retirer ou d’installer le module.

APL maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. See api-usa.com for latest product information. Consult factory for your specific requirements.

**Electrical Connections**

This module is factory configured. See the model/serial number label for thermocouple types, range, and options.

* Do not make any connections to unused terminals or use them as wiring junctions for external devices. This may cause permanent damage to the module!

See wiring diagram at right. Thermocouples must match the types indicated on the model/serial number label. Use thermocouple extension wire that matches your T/C types as needed.

The T/C outputs are generally connected to temperature measurement devices that accept the same T/C types. Note that red is negative for most thermocouples.

**Module Power**

See model/serial number label to make sure available power matches module operating voltage. The power supply is fuse protected and the unit may be returned to us for fuse replacement.

For DC power, either polarity is acceptable, but for consistency, wire positive (+) to terminal 25 and negative (–) to terminal 26.

**Mounting to a DIN Rail**

Install module vertically on a 35 mm DIN rail in a protective enclosure away from heat sources. Do not block air flow. Allow 1” (25 mm) above and below housing vents for air circulation.

1. Tilt front of module downward to release upper mount from top edge of DIN rail.
2. Tilt front of module upward until upper mount snaps into place.

**Removal**

Avoid shock hazards! Turn signal input, outputs, and power off.

1. Push up on bottom back of module.
2. Tilt front of module downward to release upper mount from top edge of DIN rail.
3. Remove module from the DIN rail.

**Calibration**

Input and output ranges are factory pre-configured. Zero and Span potentiometers can be used to calibrate each output channel as required.

1. It will be necessary to simulate or create a low and a high temperature input to the module and use an accurate measurement device to calibrate each output.
2. Apply power to the module. Allow 20 minutes for warm up time and ensure the module is at a stable temperature during calibration.
3. Set the input to your minimum value for the Zero calibration.
4. Using an accurate measurement device for each output, adjust the Zero potentiometers for the exact minimum output readings desired. The Zero controls should only be adjusted when the input signal is at its minimum.
5. Next, set the input at maximum, then adjust the Span pots for the exact maximum output readings desired. The Span controls should only be adjusted when the input signal is at its maximum.
6. Repeat adjustments for maximum accuracy. You may also be able to fine-tune the outputs by adjusting the calibration of the devices you have connected to the module outputs.

### Optional Alarm Relay

See model/serial number label for the factory configured relay options code, if equipped. A red/green bi-color LED is provided to indication alarm state. It will be green during a non-alarm condition and red during an alarm condition.

**High Alarm (H):**

The alarm relay changes state when the temperature exceeds the trip point. The relay resets when the temperature drops below the reset point. For a high alarm, the trip point is above the reset point. Low Alarm (L): The alarm relay changes state when the temperature goes below the trip point. The relay resets when the temperature exceeds the reset point. For a low alarm the trip point is below the reset point.

HT: Latching alarm with push button reset.

HP: Latching alarm with power-off reset. Module power must be turned off to reset alarm.


No alarm condition with module power off.

**Relay Terminals**

See diagram for alarm contact wiring. The module does not provide power to the relay contacts. Use an appropriate RC snubber for inductive loads (motors, solenoids, contactors, etc.) to ensure good relay contact life.

The dual DPST contact sets are in a Form A (NO) and a Form B (NC) configuration and operate in unison with a single setpoint. They may be field wired for Form C operation as required.

**Set Point Adjustment**

This multi-turn potentiometer allows adjustment of the alarm trip point. This control is adjustable from 0 to 100% of the input range.

**Reset Point Adjustment**

This multi-turn potentiometer allows adjustment of the alarm reset point. This control is adjustable from 0 to 100% of the input range.

Sufficient deadband (difference between trip and reset point) should be used to prevent chattering of the relays or false trips when the process signal is unstable or changes rapidly.

**Alarm Adjustments**

Set the input signal to a level that represents the desired set point. Adjust the Set Point potentiometer to the point at which the relay changes state from a non-alarm to an alarm condition.

Set the input signal to a level that represents the desired reset point. Adjust the Reset Point potentiometer to the point at which the relay changes state from an alarm to a non-alarm condition.

Operate the signal source through the set and reset points to confirm desired operation and adjust if necessary.

**Relay Test Function**

This can be used as a diagnostic aid during initial start-up or troubleshooting, or as a manual over-ride function. When the front relay Test button is depressed or terminals 11 and 12 closed, it will drive the relay and the bi-color alarm LED to their opposite states. When released, the relay and LED will return to their prior states. The Relay Test button also resets the relay on models with the HT option.

**Operation**

The APD 41390 accepts a thermocouple input and provides two thermocouple outputs that are linearized to T/C input temperature. The green LoopTracker® input LED provides a visual indication that the input signal is common with inputs, outputs, or unit power.

The Dual DPST output relay contacts are Form A (NO) and Form B (NC). Use thermocouple extension wire that matches your T/C types as needed.

Thermocouple outputs do not feature Output LoopTracker LEDs or Output Test 1 or Test 2 buttons.

**Optional Alarm Contacts**

See model/serial number label for the factory configured relay options code, if equipped. A red/green bi-color LED is provided to indication alarm state. It will be green during a non-alarm condition and red during an alarm condition.

<table>
<thead>
<tr>
<th>Alarm No.</th>
<th>Form A</th>
<th>Form B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>NC</td>
<td>NC</td>
</tr>
</tbody>
</table>

**Contact for optional alarm test/reset**

**Power**

<table>
<thead>
<tr>
<th>Power AC or DC</th>
<th>AC or DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>–</td>
</tr>
</tbody>
</table>

**Thermocouple Input**

<table>
<thead>
<tr>
<th>ANS/ASGT/T/C Use</th>
<th>red for negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 7</td>
<td></td>
</tr>
</tbody>
</table>

**To maintain full isolation avoid combining power supplies in common with inputs, outputs, or unit power.**

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### Thermocouple Input

<table>
<thead>
<tr>
<th>T/C Input</th>
<th>T/C Output 1</th>
<th>T/C Output 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu 60/75°C</td>
<td>14 AWG max.</td>
<td>14 AWG max.</td>
</tr>
</tbody>
</table>