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

**APD 41393**

1 Input: Any Thermocouple

2 Outputs: Two Independent Process Voltage or mA Signals, Alarm Relay Options

- Split or Convert a T/C Into 2 Independent DC Outputs
- Add Additional Isolated Output to Existing T/C
- Zero and Span Output Calibration
- Input LoopTracker® LED
- Sink/Source for DC Outputs

**Applications**

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

**Thermocouple Input, Factory Set**


Temp. 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

T/C burnout: Up/upscale (standard), B: downscale, N: none

Custom: Provide T/C millivolt data, °F or °C range

**Status LEDs**

LoopTracker: Variable brightness green for input level

Yellow LED: Output Push-to-Test status, error status

Red/green LED: Alarm state (with alarm option only)

**DC Output, Channel 1, Factory Set**

- Linearized to temperature

Voltage: 0-1 V to 0-10 V (10 mA max.), ±1 V to ±10 V

Current: 0-1 mA to 0-20 mA

20 V compliance, 1000 Ω at 20 mA

Sinking or sourcing output

Loop power: 20 VDC nom., regulated, 25 mA

<1 mW/mA max. ripple

**DC Output, Channel 2, Factory Set**

- Linearized to temperature

Voltage: 0-1 V to 0-10 V (10 mA max.), ±1 V to ±10 V

Current: 0-1 mA to 0-20 mA

20 V compliance, 1000 Ω at 20 mA

Sinking or sourcing output

Loop power: 20 VDC nom., regulated, 25 mA

<1 mW/mA max. ripple

**Output Calibration**

Zero and span potentiometers for each output, ±15% range

**Output Push-to-Test (Output 1 & Output 2)**

Front push buttons and terminals enable/disable test level outputs. Each set to 75% of output span. Specify custom setting.

**Output Resolution**

16 bit

**Output Ripple and Noise**

Less than ±0.2% of span

**Optional Alarm Relay**

Single setpoint dual DPST contact sets, factory configured

1 Form A (NO) and 1 Form B (NC) contact sets (4 terminals)

May be field wired for Form C operation

8 A max @ 240 VAC resistive load

Use external contact protection (RC snubber) for inductive loads

Red/Green bi-color LED indicates alarm status

One set point, 12 turn potentiometer, 0-100% of span

One reset point, 12 turn potentiometer, 0-100% of span

Default: HI alarm, non-latching, normal acting (failsafe)

Relay Test button toggles relay to opposite state or resets relay with HT option

**Ambient Temperature Range and Stability**

−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 isolation

**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>
</tr>
</thead>
<tbody>
<tr>
<td>APD 41393</td>
<td>85-265 VAC, 60-300 VDC</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>APD 41393 D</td>
<td>9-30 VDC, 10-32 VAC</td>
<td>Specify T/C type, temperature range in °F or °C</td>
<td>Ch. 1 specify VDC or mADC range</td>
<td>Ch. 2 specify VDC or mADC range</td>
</tr>
<tr>
<td>APD 41393 H</td>
<td>85-265 VAC, 60-300 VDC</td>
<td>Specified</td>
<td>Custom Push-to-Test % span</td>
<td>Hi alarm (failsafe std.)</td>
</tr>
<tr>
<td>APD 41393 DH</td>
<td>9-30 VDC, 10-32 VAC</td>
<td>Custom</td>
<td>Custom Push-to-Test % span</td>
<td>LO alarm (failsafe std.)</td>
</tr>
<tr>
<td>APD 41393 L</td>
<td>85-265 VAC, 60-300 VDC</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>APD 41393 DL</td>
<td>9-30 VDC, 10-32 VAC</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

**Options**

- Up/upscale burnout (standard)
- Downscale burnout
- No burnout, last valid value
- Reverse-acting alarm
- HI alarm (failsafe std.)
- LO alarm (failsafe std.)
- Latching relay, power-off reset
- Latching relay, push button reset
- Conformal coating for moisture resistance

**APD 41393X**

Full 4-way galvanic isolation (input, output 1, output 2, power) make this module useful for ground loop elimination, common mode signal rejection, and noise pickup reduction.

**LoopTrackers**

An API exclusive feature includes a green LoopTracker LED that varies in intensity with changes in the input signal and a red LoopTracker LED that varies in intensity with changes in the DC output signals. It provides a quick visual picture of your process at all times and can greatly aid in saving time during initial startup and troubleshooting.

**Output Push-to-Test**

An API exclusive feature includes output test switches for each DC output to provide a fixed output (independent of the input) when pressed. The output test greatly aids in saving time during initial startup and troubleshooting.

The output test level is factory set to approximately 75% of span but a custom test level may be ordered.

**Dimensions**

1.78” W x 4.62” H x 4.81” D

148.88 mm W x 118.11 mm H x 122.24 mm D

**Power**

85-265 VAC, 50/60 Hz or 60-300 VDC, 3 W maximum

D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 3 W maximum

**Description**

The APD 41393 accepts a thermocouple temperature input and provides two independent DC process outputs. This makes it useful to split, isolate, and transmit a thermocouple signal for measurement, data recording, or validation.

The thermocouple input type and temperature range are factory-set. The two DC output types and ranges are factory-set. The DC outputs can be different and both correspond to the input temperature range specified. Use appropriate thermocouple extension wire for the input as needed.

The input is sampled, CJC compensated, digitally converted to a linearized temperature signal, and then passed to the output stages where it is converted to the two DC outputs.

**Output Sink/Source Versatility**

The APD 41393 includes a 20 VDC loop excitation supply for any channel ordered with a mA output. A mA output can be selectively wired for sourcing or sinking allowing use with a powered or unpowered milliamp device.

**Interface Diagrams**

For more information, please visit api-usa.com or call 1-800-442-6397.
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.

Précautions
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 Évitez 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.

API 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 the factory configured relay options codes, if equipped. A red/green bi-color LED indicates the alarm state. It will be green during a non-alarm condition and red during an alarm condition.

- 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. The T/C input must match the type indicated on the model/serial number label. Use thermocouple extension wire that matches your T/C type as needed.
- Channel 1 and 2 output types and ranges are indicated on the model/serial number label. Milliamp outputs may be wired for sinking or sourcing. sourcing. Provide 20 VDC power to your device.
- 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 snaps into place.
2. Push front of module upward until upper mount snaps into place.

Upper Mount

Removal
Avoid shock hazards! Turn signal input, output, 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 (at 24°C ±1°C). 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 outputs desired. This will produce the corresponding minimum output signals.
5. Next, set the input at maximum, then adjust the Span pots for the exact maximum outputs desired. This will produce the corresponding maximum output signals.
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 option codes, if equipped. A red/green bi-color LED indicates the alarm status. 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.
RA: Reverse-acting alarm. Relay coils energized in an energized relay condition. 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) to ensure good relay contact life.

- Zero potentiometers for the exact minimum outputs desired.
- HT: Latching alarm with push button reset.

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

Alarms
- Operational error: Blinking 2 digit code
- Output Test 1, Output Test 2
- Device 1, Device 2
- Voltage Device 1, Voltage Device 2
- Current Sourcing Output 1
- Loop Power Source 1, Loop Power Source 2

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 an alarm to a non-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 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 re-sets the relay on models with the HT option.

Output Test 1, Output Test 2
This can be used as a diagnostic aid during initial start-up or troubleshooting, or as a manual over-ride function. When the Test 1 or Test 2 buttons are depressed or terminals 9 & 12 or 10 & 12 are closed, it will drive the DC output for that channel to 75% of span or the HT option.

Operation
The module accepts a thermocouple input and provides two DC outputs that are linearized to thermocouple input temperature.

Yellow LED Functions
The yellow status LED provides a visual indication of operational modes.

- Analog-digital converter out-of-range
- Alarm under range
- Sensor over range
- CJC sensor abnormal range
- CJC failure
- Hard ADC out-of-range
- Sensor hard fault, open circuit, hard ADC fault, or hard CJC fault

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

△ * Do not make connections to unused terminals!

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