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

Quick Link: api-usa.com/tc

- *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

T/C types: J, K, T, E, M, N, P, R, S, B, C, D, G
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: 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 mADC
<10 mVRMS 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 mADC
<10 mVRMS 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

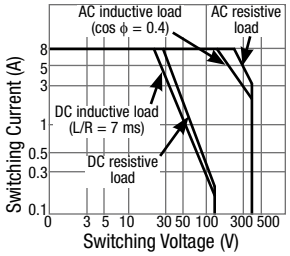
Output Ripple and Noise

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

6 YEAR WARRANTY

MADE IN USA

Applications Link api-usa.com/apps

Free Factory I/O Setup!

Removable Plugs

Output Test for DC Channels

Sink or Source Output for mADC Channels

Optional Alarm Relay

Zero and Span for Each Output

Status LED

Input LoopTracker LED

Universal Power

See Wiring Diagrams on Next Page

Isolation

Full 4-way galvanic: input, output 1, output 2, power, 1200 VRMS min.
600 VACp or 600 VDC common mode protection
75 dB minimum common mode rejection
Simultaneous 50 Hz and 60 Hz rejection

Housing and Connectors

IP 40, requires vertical installation on a 35 mm DIN rail inside a panel or enclosure. Allow room for air flow. For use in Pollution Degree 2 Environment.
Eight 4-terminal removable connectors, 14 AWG max. wire size

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

Dimensions

1.78" W x 4.62" H x 4.81" D
(45 mm W x 117 mm H x 122 mm D)

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 sinking or sourcing allowing use with a powered or unpowered milliamp device.

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 red LoopTracker LEDs that vary 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/or troubleshooting.

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

How to Order—Factory Ranged and Configured

Model	Power	Input	Outputs	Alarm	Options Code	Options Description
APD 41393	85-265 VAC, 60-300 VDC	Specify T/C type, temperature range in °F or °C	**Ch. 1** specify VDC or mADC range Custom Push-to-Test ___% span **Ch. 2** specify VDC or mADC range Custom Push-to-Test ___% span	none	**-**	Upscale burnout (standard)
					B	Downscale burnout
					N	No burnout, last valid value
APD 41393 D	9-30 VDC, 10-32 VAC					
APD 41393 H	85-265 VAC, 60-300 VDC			HI alarm (failsafe std.)	**RA**	Reverse-acting alarm
APD 41393 DH	9-30 VDC, 10-32 VAC				**HP**	Latching relay, power-off reset
					HT	Latching relay, push button reset
APD 41393 L	85-265 VAC, 60-300 VDC			LO alarm (failsafe std.)	**U**	Conformal coating for moisture resistance
APD 41393 DL	9-30 VDC, 10-32 VAC					

ABSOLUTE PROCESS INSTRUMENTS
1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com

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! Éviter 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.

WARNING: This product can expose you to chemicals including nickel, which is known to the State of California to cause cancer or birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Electrical Connections

This module is factory configured. See the model/serial number label for T/C input type, range, output types & ranges, 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. 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 provides 20 VDC power to your device.

Module Power

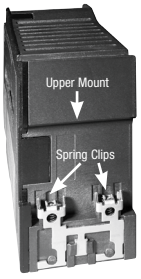
See model/serial number label to make sure available power matches module operating voltage. The power supply is fuse protected and the unit may be returned to us for fuse replacement.

For DC power, either polarity is acceptable, but for consistency, wire positive (+) to terminal 25 and negative (–) to terminal 28.

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 down and position the lower spring clips against the bottom edge of DIN rail.
2. Push 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 (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. For example: 4 mA for a 4-20 mA output or –10 V for a ±10 V output. 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 outputs desired. This will produce the corresponding maximum output signals. Example: for 4-20 mA output, the Span control will provide adjustment for the 20 mA or high end of the signal. 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 option 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.

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.

RA: Reverse-acting alarm. Relay coils energized in an alarm 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.

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 input 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 an 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.

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 a customer-specified value set at the factory. When released or the contact(s) opened, the output(s) will return to their normal levels.

Operation

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

The green LoopTracker® LED varies in intensity as the input is sensed by the module. The red LoopTracker LEDs vary in intensity with changes in the DC output signals. If any LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

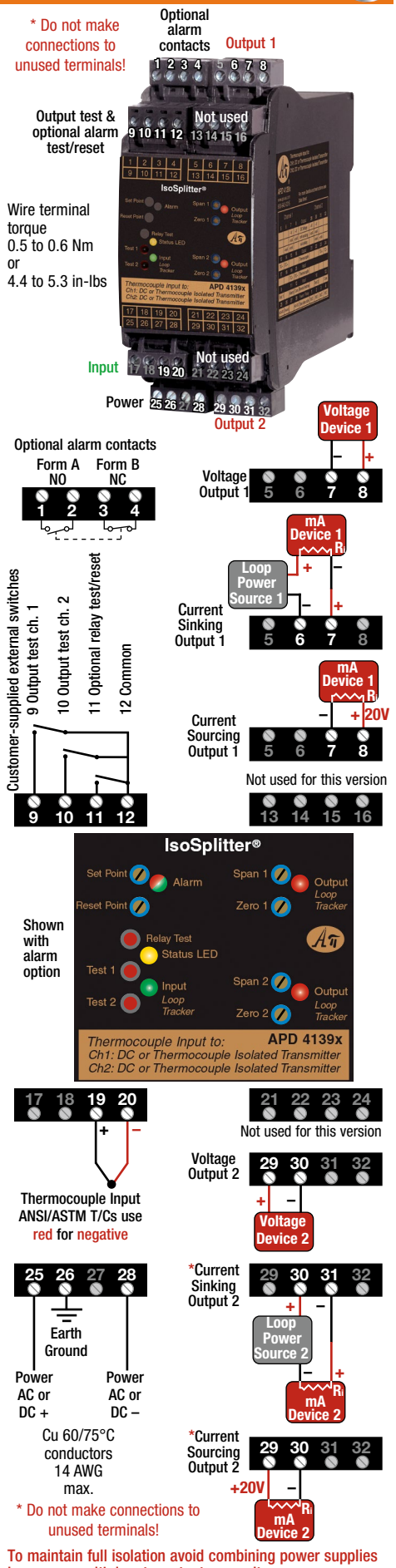
Yellow LED Functions

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

Normal operation: Off
Output Push-to-Test: On for Test 1 or Test 2
Operational error: Blinking 2 digit code

If an error occurs during operation, the yellow Status LED blinks an error code. Check sensor, wiring, or consult factory.

1 1	Analog-digital converter out-of-range	●—●
1 2	Sensor under range	●—●●
1 3	Sensor over range	●—●●●
1 4	CJC sensor abnormal range	●—●●●●
1 5	CJC failure	●—●●●●●
1 6	Hard ADC out-of-range	●—●●●●●●
1 7	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.

1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com