Thermocouple Input to DC & Thermocouple Dual Output Splitter/Converter, Factory Ranged  APD 41391

1 Input: Any Thermocouple
2 Outputs: Process Voltage or mA + Any Thermocouple, Alarm Relay Options

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

**Applications**

- Convert/Isolate Thermocouples for PLC Input, Control and/or Validation
- Interface Thermocouples with Panel Meters, PLCs, Convert/Isolate Thermocouples for PLC Input, 85-265 VAC, 60-300 VDC
- Split or Convert a T/C to DC Output & Any T/C Output
- Sink/Source for DC Output

**Status LEDs**

LoopTracker: Variable brightness green for input level
Yellow LED: Output 1 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
<10 mV±max. ripple

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

Linearization: Polynomials, 1°C segments for types M and P
T/C CJC: Automatic
Output limited by smallest ANSI T/C range
Output Calibration
Zero and span potentiometers for each output, ±15% range

**Output Push-to-Test (DC Output 1)**
Front push button and terminals enables/disables test level output. 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 DPT 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

**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 41391 accepts a thermocouple temperature input and provides one DC process output and one thermocouple output. This makes it useful to match up the available thermocouple type with an instrument input type, for data recording, or when isolating the input. The thermocouple input type and temperature range are factory set. The DC output type and range, and the thermocouple output type and range are factory set. The DC output and the thermocouple output correspond to the input temperature range specified. Mixed T/C types are limited by the ANSI temperature range. Use appropriate thermocouple extension wire 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 a DC output and a simulated thermocouple output with CJC compensation. Contact factory if the CJC compensation is to be disabled.

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

- **Model**
- **Power**
- **Input**
- **Outputs**
- **Alarm**
- **Code**
- **Description**

APD 41391 85-265 VAC, 60-300 VDC
APD 41391 D 9-30 VDC, 10-32 VAC
APD 41391 H 85-265 VAC, 60-300 VDC
APD 41391 DH 9-30 VDC, 10-32 VAC
APD 41391 L 85-265 VAC, 60-300 VDC
APD 41391 DL 9-30 VDC, 10-32 VAC

**Options**

- **Specify T/C type, temperature range in °F or °C**
- **Ch. 1 specify VDC or mADC range**
- **Ch. 2 specify T/C type**
- **Specify T/C type, temperature range in °F or °C**
- **Specify T/C type, temperature range in °F or °C**

- **Latching relay, power-off reset**
- **Latching relay, push button reset**
- **Conformal coating for moisture resistance**
- **Latching relay, push button reset**
- **Conformal coating for moisture resistance**
- **Latching relay, power-off reset**

**Notes:**
Temperature range is limited by the smallest ANSI range of the two T/C types selected.

Full 4-way galvanic isolation (input 1, output 1, output 2, power), 1200 Vrms min.
600 VACs 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

**Output Test for DC Channel**
Sink or Source Output for mADC Channel
Optional Alarm Relay
Zero and Span for Each Output
Status LED
Input LoopTracker LED
Universal Power

**IsoSplitter®**
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 channel 1 DC output signal. It provides a quick visual picture of your process at all times and can greatly aid in saving time during initial startup and troubleshooting.

**LoopTracker**
An API exclusive feature includes an output test switch to provide a fixed output for the DC output channel (independent of the input) when pressed. The output test greatly aids in saving time during initial startup and/or troubleshooting.

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

**Electrical Connections**

This module is factory configured. See the model/serial number label for T/C type, 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 output and range are indicated on the model/serial number label. A milliamper output may be wired for sinking or sourcing. Sourcing provides 20 VDC power to your device.

Channel 2 T/C output must use matching thermocouple extension wire. This output is generally connected to a temperature measurement device. 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 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.
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 separately.

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. For example with a Ch. 1 DC output: 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 output readings desired. For example with a Ch. 1 DC output: 20 mA for a 4-20 mA output. 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 is provided to indicate alarm state. It will be green during a non-alarm condition and red during an alarm condition.

High Alarm (Hi): 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 (Lo): The alarm relay changes state when the temperature drops 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.


**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.

**Alarm Adjustments**

Set the input signal to a level that represents the desired reset 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 reverts the relay on models with the HT option.

**Output Test 1**

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 button is depressed or terminals 9 and 10 closed, it will drive the channel 1 DC output to 75% of span or a customer-specified value set at the factory. When released or the contact opened, the channel 1 output will return to its normal level.

**Operation**

The APD 41391 accepts a thermocouple input and provides a DC output and a T/C output that are linearized to T/C input temperature.

The green LoopTracker® LED varies in intensity with the input sensed by the module. The red LoopTracker LED varies in intensity with changes in the DC output signal. If either LED fails to illuminate, check module wiring and connections to inputs, outputs, or unit power.

**Yellow LED Functions**

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

Normal operation

Output: Push-to-Test: On Test 1

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