APD 2035 DuoPak® Two Channel Signal Converter/Isolator/Transmitter

Channel 1: Potentiometer to DC

- Two Independent Channels with Full Isolation
- Zero and Span for Each Output
- Input and Output LoopTracker™ LEDs
- Input Test/Manual Override for Each Channel
- Built-in I/O Power Supplies

Applications
- Monitor Position and Weight or Pressure
- Convert/Isolate Dual Output Transmitters

Channel 1 Potentiometer Input Range
Use any 3 wire full-travel potentiometer
1 VDC excitation provided to potentiometer
Consult factory for other ranges and configurations
Minimum range: 0-100 Ω
Maximum range: 0-1 MΩ
Input impedance: 100 Ω to 1 MΩ minimum
Input comm. mode rejection: 100 dB minimum

Channel 2 Bridge Input Range
Factory configured, please specify sensor mV/V and mV range
Sensor range: 0-1 mV to 0-2000 mV
Millivolt output range is determined by the sensitivity of the sensor (mV/V) and the excitation voltage applied.
- mV/V sensitivity X excitation voltage = total mV range
Input impedance: 1 MΩ minimum
Input comm. mode rejection: 100 dB minimum

Channel 2 Excitation Voltage
Range: 4 to 10 VDC factory set, please specify
Adjustment: ±10% via front potentiometer
Maximum output: 10 VDC maximum at 30 mA
Stability: ±0.01% per °C
Designed for one 350 Ω (or greater) sensor

LoopTracker
Variable brightness LEDs indicate I/O levels for each channel

Channel 1 and Channel 2 Output Ranges
Factory configured, please specify for each output channel
Voltage: 0-1 VDC to 0-10 VDC, 10 mA max
up to 20 VDC with M91, M29, M39
Bipolar voltage: ±1 VDC to ±10 VDC
Current: 0-1 mADC to 0-25 mADC, 4-20 mADC
20 V compliance, 1000 Ω at 20 mA

Output Calibration
Multi-turn zero and span potentiometers for each output channel
±15% of span adjustment range typical

Output Characteristics
Linearity: ±0.1% of span
Temperature stability: Better than 0.04% span/°C
Output ripple and noise: Less than 10 mVrms

Isolation
Full 5-way, 1200 Vrms minimum

Response Time
70 milliseconds typical

Output Loop Power Supplies
20 VDC nominal, regulated, 25 mADC for each output channel
May be selectively wired for sinking or sourcing mA output

Output Test
Front buttons set each output to test level when pressed
Each test level potentiometer adjustable 0-100% of span

Installation Environment
Mount vertically to a 35 mm DIN rail
For use in Pollution Degree 2 Environment
IP 40 housing, requires installation inside an enclosure
-10°C to +60°C operating ambient

Connectors
Eight 4-terminal removable connectors, 14 AWG max wire size
Power
85-265 VAC, 50/60 Hz or 60-300 VDC, 6 W maximum
D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 6 W maximum

LoopTracker
API exclusive features include four LoopTracker LEDs (green for each input, red for each output) that vary in intensity with changes in the process input and output signals.
These provide a quick visual picture of your process loop at all times and can greatly aid in saving time during initial startup and troubleshooting.

Output Test
An API exclusive feature includes output test buttons for each channel to provide a fixed output (independent of the input) when held depressed.
Terminals are also provided to operate the test functions remotely for each channel. This also allows use as a remote manual override to provide a temporary fixed output if desired.
The test output level for each channel is potentiometer adjustable from 0 to 100% of the output span. The test output greatly aids in saving time during initial startup and/or troubleshooting.

How to Order
Models are factory ranged. See I/O ranges above left.
Ranges and options for each channel must be specified on order
Channel 1 input range
Channel 1 output range
Channel 1 input, output voltage
Channel 2 output range

Model | Description | Power
--- | --- | ---
APD 2035 | DuoPak 2 channel Pot.-DC, Strain-DC converter/isolator/ transmitter | 85-265 VAC, 50/60 Hz or 60-300 VDC
APD 2035 D | | 9-30 VDC or 10-32 VAC

Options and Accessories
Options—add to end of model number
R1 Channel 1 I/O reversal (i.e. 20-4 mA out)
R2 Channel 2 I/O reversal (i.e. 20-4 mA out)
R3 Channel 1 and channel 2 I/O reversal
M19 Channel 1 high voltage output >10 V up to 20 V
M29 Channel 2 high voltage output >10 V up to 20 V
M39 Channel 1 and channel 2 high voltage output
U Conformal coating for moisture resistance

Accessory—order as separate line item
API BP4 Spare removable 4 terminal plug, black

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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 www.API-usa.com for latest product information. Consult factory for your specific requirements.

WARNING: This product can expose you to chemicals including nickel, which are 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
Polarity must be observed for signal wiring connections. If the input and/or output do not function, check wiring and polarity. Each product is factory configured to your exact input and output ranges as indicated on the serial number label.

Outputs
For milliamp ranges determine if your devices provide power to the current loop or if the loop must be powered by the APD module. Typical voltage may be 9-24 VDC at your device’s terminals if it provides power to the loop.

Device for Output Channel 1 Terminal Terminal
Measuring/recording device accepts a voltage input. 3 (+) 4 (+)
Measuring/recording device has an unpowered or passive mA input. APD module provides the loop power. 3 (+) 4 (+20 V)
Measuring/recording device has a mA input and powers the current loop. 2 (+) 3 (+)

Device for Output Channel 2 Terminal Terminal
Measuring/recording device accepts a voltage input. 7 (+) 8 (+)
Measuring/recording device has an unpowered or passive mA input. APD module provides the loop power. 7 (+) 8 (+20 V)
Measuring/recording device has a mA input and powers the current loop. 6 (+) 7 (+)

Input 1, Potentiometer
The potentiometer must be connected to all three signal input terminals as shown. 0-100% of the potentiometer range must be used. A stable 1 VDC source to excite the potentiometer. Voltage drop is measured across the potentiometer, thus allowing any full-range potentiometer to be used.

Potentiometer Input Channel 1 Terminal
Full scale or high side of potentiometer 17 (+1 VDC)
Zero or low end of potentiometer 18 (–)
Potentiometer wiper arm 19

Input 2, Bridge, Strain Gauge, Load Cell
Refer to wiring diagram at right and strain gauge manufacturer’s data sheet for wiring and color-coding. Polarity must be observed when connecting input. Sensor shield wire (if equipped) should be grounded at one end only.

The excitation voltage is factory set and should match the sensor manufacturer’s recommendations. A front potentiometer allows approximately ±10% the adjustment of the excitation voltage. CAUTION: Never short the excitation leads together. This will cause internal damage to the module.

Bridge Input Channel 2 – Terminal + Terminal
Strain gauge signal input 21 (+) 23 (–)
Excitation voltage 22 (–) 24 (+)

Module Power Terminals
Check label for module operating voltage to make sure it matches available power. The power supplies are fuse protected and the unit may be returned to API for fuse replacement. When using 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, 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. The module can now be removed from the DIN rail.

Calibration
Front-mounted Zero and Span potentiometers for each channel can be used to compensate for load and lead variations.
1. Apply power to the module and allow a minimum 30 minute warm up time.
2. Using an accurate voltmeter on terminals 22 and 24 adjust the excitation voltage fine adjustment potentiometer to the strain gauge manufacturer’s recommended value.
3. Using an accurate calibration source, provide an input to the module equal to the minimum input required for the application.
4. Using an accurate measurement device for the output, adjust the Zero potentiometer for the exact minimum output desired. The Zero control should only be adjusted when the input signal is at its minimum. This will produce the corresponding minimum output signal. For example: 4 mA for a 4-20 mA output.
5. Set the input at maximum, and then adjust the Span pot for the exact maximum output desired. The Span control should only be adjusted when the input signal is at its maximum. This will produce the corresponding maximum output signal. Example: for 4-20 mA output, the Span control will provide adjustment for the 20 mA or high end of the signal.
6. Repeat adjustments for both channels for maximum accuracy.

Output Test Function
When the Test button is depressed it will drive the output with a known good signal that can be used as a diagnostic aid during initial start-up or troubleshooting. When released, the output will return to normal.

Each Test Cal. potentiometer is factory set to approximately 50% output. Each can be adjusted to set the test output from 0 to 100% of the output span. Press and hold the Test button and adjust the corresponding Test Cal. potentiometer for the desired output level.
They may optionally be externally wired for remote test operation or a manual override. See wiring diagram at right.

Operation
The APD 2035 accepts one potentiometer input and one strain gauge input and provides two optically isolated DC voltage or current outputs that are linearly related to the inputs.
Green LoopTracker® input LEDs provide a visual indication that each signal is being sensed by the input circuitry of the module. They also indicate the input signal strength by changing in intensity as the process changes from minimum to maximum.
An LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal input wiring.
Two red LoopTracker output LEDs provide a visual indication that each signal is being sensed by the input circuitry of the module.

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

Instructions APD 2035

Specifications are subject to change without notice. See api-usa.com for information go to www.P65Warnings.ca.gov

To avoid damage to the module, do not make any connections to unused terminals

Wire terminal torque
0.5 to 0.6 Nm or 4.4 to 5.3 in-lbs

See manufacturer’s specifications for wiring designations.
Shield wires should be grounded at one end only.
Cu 60/75°C conductors
14 AWG max.

17 18 19 20
17 Full Scale* 18 Minimum 19 Wiper Arm
*May be switched for reverse output

21 22 23 24
Signal +
Excitation +

25 26 27 28
25 Power AC or DC – 26 Earth Ground
27 Power AC or DC +