

Input: 100 Ω to 1 MΩ Potentiometer
Output: 0-1 V to ±10 VDC, or 0-2 mA to 20 mADC

Quick Link: api-usa.com/4003

- Accepts Most Full-Range Potentiometers
- Factory Ranged Voltage or Current Output
- Removable Plugs for Faster Installation
- Full 1200 V Input/Output/Power Isolation
- Input and Output LoopTracker® LEDs
- Functional Output Test Button
- Selectable Sink/Source for Current Output

Applications

- Over, Under, Out-of-Range Position Monitoring
- Remote Control of Positioning Devices
- Simplify Control of Potentiometer Outputs

Potentiometer Input

3 wire connection and full potentiometer travel is required
 Consult factory for other ranges and configurations
 1 VDC excitation provided to potentiometer

Minimum range: 0-100 Ω
 Maximum range: 0-1 MΩ

Input Impedance

100 Ω to 1 MΩ minimum

Common Mode Rejection

100 dB minimum

LoopTracker

Variable brightness LEDs indicate I/O level and status

DC Output Range

Factory ranged, please specify output range and type

Voltage: 0-1 VDC to 0-10 VDC, 10 mA max including offset ranges such as 1-5 V

Voltage M09 option: 0-10 VDC to 0-20 VDC

Bipolar voltage: ±50 mVDC to ±10 VDC, including offset ranges such as -1 to 4 V

Current: 0-2 mADC to 0-20 mADC, including offset ranges such as 4-20 mA
 20 V compliance, 1000 Ω at 20 mA

Output Logic

Normal (standard) or reverse acting with R option

Output Calibration

Multi-turn zero and span potentiometers
 ±15% of span adjustment range typical

Output Loop Power Supply

20 VDC nominal, regulated, 25 mADC, <10 mVRMS max. ripple
 May be selectively wired for sinking or sourcing mA output

Output Test/Override

Front button sets output to test level when pressed or via external contact closure

Potentiometer adjustable 0-100% of span

Output Ripple and Noise

Less than 10 mVRMS

Linearity

Better than ±0.1% of span

Ambient Temperature Range and Stability

-10°C to +60°C operating ambient
 Better than ±0.02% of span per °C stability

Response Time

Standard: 70 milliseconds nominal
 DF option: 1 millisecond nominal. Output noise levels will be greater than standard specifications. Consult factory.

Isolation

1200 VRMS minimum
 Full isolation: power to input, power to output, input to output

Housing and Connectors

IP 40, requires installation in panel or enclosure
 For use in Pollution Degree 2 Environment
 Mount vertically to a 35 mm DIN rail
 Four 4-terminal removable connectors, 14 AWG max wire size

Power

85-265 VAC, 50/60 Hz or 60-300 VDC, 2 W maximum
 D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 2 W maximum



Applications Link
api-usa.com/apps

Free Factory I/O Setup!

Dimensions
 0.89" W x 4.62" H x 4.81" D
 22.5 mm W x 117 mm H x 122 mm D
 Height includes connectors

Description

The APD 4003 accepts a resistance input from potentiometer, slidewire, linear position, displacement, or rotational devices and provides an optically isolated DC voltage or current output that is linearly related to the potentiometer position.

The APD 4003 will accept any potentiometer with a value of 0-100 Ω through 0-1 MΩ without recalibration and without affecting accuracy. The APD 4003 output is factory ranged. Consult factory for offsets and/or input ranges other than 0 to 100% of the potentiometer range or see the APD 4008.

The full 3-way (input, output, power) isolation makes this module useful for ground loop elimination, common mode signal rejection, and noise pickup reduction.

Sink/Source Output

The APD 4003 has a 20 VDC loop excitation supply for the output. This power supply can be used to power a passive mA device. If not required, the APD 4003 output can be wired as

How to Order

All models are factory ranged

No need to specify input range if using full-range of potentiometer. Consult factory for special or partial input ranges. Order APD 4003 D for operation on low voltage power.

Please specify

Model
 Output range in volts or mA
 Options as required

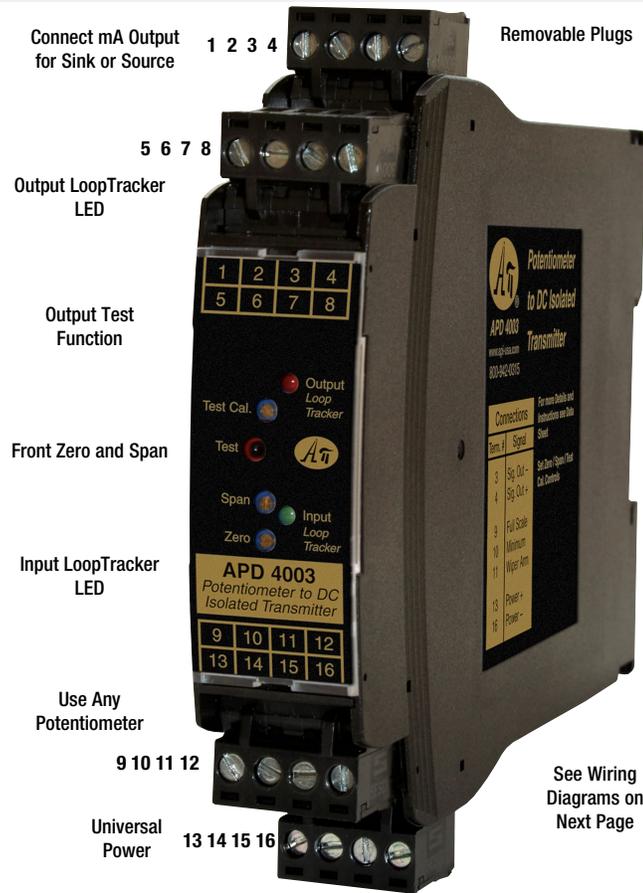
Model	Input	Output	Power
APD 4003	Any full-range potentiometer from 0-100 Ohm to 0-1 Mega Ohm	Factory ranged specify range and type	85-265 VAC, 50/60 Hz or 60-300 VDC
APD 4003 D			9-30 VDC or 10-32 VAC

Options—add to end of model number

- R** Input/output reversal, such as 4-20 mA input to 20-4 mA output
- DF** Fast response time, consult factory
- M09** High voltage output up to 20 V (specify range)
- U** Conformal coating for moisture resistance

Accessory—order as separate line item

API BP4 Spare 4-terminal plug, black



Connect mA Output for Sink or Source

1 2 3 4

Removable Plugs

5 6 7 8

Output LoopTracker LED

Output Test Function

Front Zero and Span

Input LoopTracker LED

Use Any Potentiometer

9 10 11 12

Universal Power

13 14 15 16

See Wiring Diagrams on Next Page

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

See model/serial number label for module power requirements, and any applicable options or custom ranges.

Input

The potentiometer must be connected to all three signal input terminals as shown. 0-100% of the potentiometer range must be used. The APD 4003 utilizes a stable 1 VDC source to excite the potentiometer.

Potentiometer Input	Terminal
Full scale or high side of potentiometer	9 (+1 VDC)
Zero or low end of potentiometer	10 (-)
Potentiometer wiper arm	11

Output

If your device requires a current input, determine if it provides power to the current loop or if it must be powered by the APD module.

Use a multi-meter to check for voltage at the input terminals. Typical voltage may be in the range of 9 to 24 VDC. In this case, wire the device to terminals 2 and 4. Polarity must be observed for output wiring connections. If the output does not function, power supply and wiring polarity.

Type of Device for Output	- Terminal	+ Terminal
Measuring/recording device accepts a voltage input.	3 (-)	4 (+)
Measuring/recording device accepts a mA (current) input and the input is unpowered or passive. APD module provides the loop power.	3 (-)	4 (+20 V)
Measuring/recording device accepts a mA (current) input and provides power to the current loop.	2 (-)	3 (+)

Module Power

Check model/serial number label for module operating voltage to make sure it matches available power.

When using DC power, either polarity is acceptable, but for consistency with similar API products, positive (+) can be wired to terminal 13 and negative (-) can be wired to terminal 16.

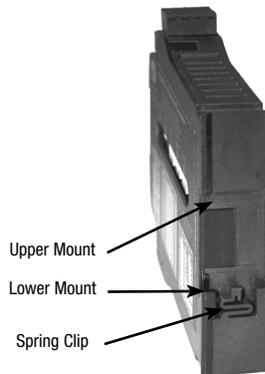
Mounting to a DIN Rail

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 and position against DIN rail.
2. Clip lower mount to bottom edge of DIN rail.
3. Push front of module upward until upper mount snaps into place.

Removal

1. Push up on the bottom back of the 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 are used to calibrate the output to compensate for load and lead variations.

Input and output ranges are factory pre-configured (at 24°C ±1°C).

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Set the input potentiometer to its minimum value to provide a minimum input to the module.
3. Connect an accurate measurement device to the module output. Adjust the module's Zero potentiometer for the exact minimum output desired. The Zero control should only be adjusted when the input signal is at its minimum to produce the corresponding minimum output signal. For example: 4 mA for a 4-20 mA output or -10 V for a ±10V output.
4. Set the input potentiometer at its maximum, and then adjust the module's 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 signal, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. Repeat adjustments for maximum accuracy.

Output Test Function

The output test potentiometer is factory set to provide approximately 50% output. When the test button is depressed it will drive the output side of the loop 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.

The Test Cal. potentiometer can be used to set the test output to the desired level. It is adjustable from 0 to 100% of the output span.

Press and hold the Test button and adjust the Test Cal. potentiometer for the desired output level.

Operation

The APD 4003 utilizes a stable 1 VDC source to excite the potentiometer. This voltage is stabilized against the potentiometer resistance value variations over the entire operating range.

The resulting potentiometer wiper voltage is amplified and passed through an optical coupler to the output stage where it is scaled to the desired output range.

The green LoopTracker® input LED provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum.

If the LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

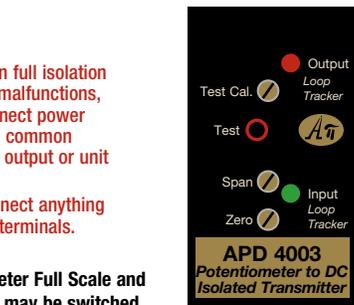
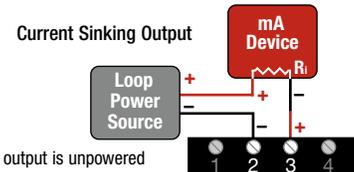
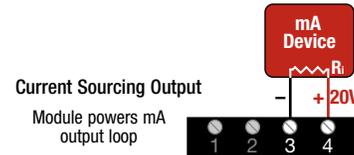
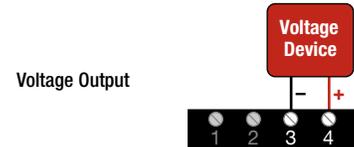
The red LoopTracker output LED provides a visual indication that the output signal is functioning. It becomes brighter as the input and the corresponding output change from minimum to maximum.

For current outputs, the red LED will only light if the output loop current path is complete. For either current or voltage outputs, failure to illuminate or a failure to change in intensity as the process changes may indicate a problem with the module power or signal output wiring.

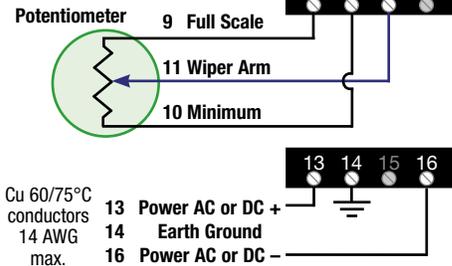


Wire terminal torque
0.5 to 0.6 Nm or
4.4 to 5.3 in-lbs

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



Potentiometer Full Scale and Minimum may be switched for reverse output



Cu 60/75°C conductors
14 AWG max.