

**Input:** 0-50 mV to 0-10 VDC,  $\pm 25$ mV to  $\pm 10$ VDC, 0-1 mA to 0-20 mADC,  $\pm 0.5$  to  $\pm 20$  mA  
**Output:** 0-1 V to  $\pm 10$  VDC or 0-2 mA to 0-20 mA, 4-20 mA

**Quick Link**  
[api-usa.com/math](http://api-usa.com/math)

- Versions to Follow the Highest or the Lowest Input
- 1200 V Input/Output/Power Isolation
- Input LoopTracker® LED
- Functional Test Button
- Built-In Loop Power Supply for Output



Sink or Source mA Output  
1 2 3 4

Mixed Voltage or mA Inputs  
5 6 7 8

### Applications

- Track Highest or Lowest of Multiple Input Signals
- Monitor Maximum Flow From Multiple Pumps
- Sensor Redundancy

### DC Input Range

Factory configured, please specify each input range or consult factory for special ranges. Each input can have different ranges and/or units. mA inputs are sinking.

Voltage: 0-50 mVDC to 0-10 VDC  
 Bipolar voltage:  $\pm 25$  mVDC to  $\pm 10$  VDC  
 Current: 0-1 mADC to 0-20 mADC  
 Bipolar current:  $\pm 0.5$  mADC to  $\pm 20$  mADC

### Input Impedance

Voltage: 50 k $\Omega$  minimum  
 Current: 50  $\Omega$  nominal

### Balance Between Inputs

Better than  $\pm 0.5\%$  of span

### LoopTracker

Variable brightness LED indicates input loop level and status

### DC Output Range

Factory configured, please specify output range

Voltage, 10 mA max.: 0-1 VDC to 0-10 VDC  
 Bipolar voltage:  $\pm 1$  VDC to  $\pm 10$  VDC  
 Current: 0-2 mADC to 0-20 mADC  
 20 V compliance, 1000  $\Omega$  at 20 mA

Milliamp output can be field wired for sink or source.

### Output Calibration

Multi-turn zero and span potentiometers  
 $\pm 15\%$  of output span 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

Front button sets output to test level. Enabled via pushbutton.  
 Default setting approximately 50% of span  
 Potentiometer adjustable 0-100% of span

### Output Ripple and Noise

Less than  $\pm 0.2\%$  of span

### Linearity

Better than  $\pm 0.25\%$  of span

### Ambient Temperature Range and Stability

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

### Response Time

50 milliseconds, typical per channel used

### Isolation

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

Non-isolated: input to input

### 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, 50/60HZ or 60-300 VDC, 4W maximum  
 D versions: 9-30 VDC or 10-32 VAC 50/60 Hz, 4 W maximum



File E145968  
 85-265 VAC, 60-300 VDC  
 model only



Free Factory I/O Setup!

Adjustable Output Test/Override Function

Zero and Span for Output

Input LoopTracker LED

Custom I/O Ranges

Removable Plugs

9 10 11 12

Universal Power

13 14 15 16



See Wiring Diagrams on Next Page

### 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 44xx series accepts 2, 3 or, 4 DC voltage or current inputs, depending on the model. They provide an optically isolated DC voltage or current output that is linearly related to the highest or lowest of the inputs, depending on the model.

They are used where the highest or lowest of multiple inputs are required to drive the output, or where sensor redundancy is needed. Full 3-way isolation (input, output, power) makes this module useful for ground loop elimination, common mode signal rejection or noise pickup reduction. The inputs are not isolated from each other.

The APD 44xx series can be wired to allow a mA output to be either sinking (passive) or sourcing (active).

### How to Order

#### All models are factory ranged

The APD 44Lx or APD 44Hx series is configured to your specifications  
 Each input can have different ranges and/or units

#### With the model number, please specify

2, 3, or 4 input ranges depending on the model  
 Output range  
 Options as required

Model	Inputs: Factory Configured	Output: Factory Configured	Power
APD 44H2	High select from 2 inputs	Specify VDC or mADC range	85-265 VAC or 60-300 VDC
APD 44H2 D	Specify 2 input ranges		9-30 VDC or 10-32 VAC
APD 44H3	High select from 3 inputs	Specify VDC or mADC range	85-265 VAC or 60-300 VDC
APD 44H3 D	Specify 3 input ranges		9-30 VDC or 10-32 VAC
APD 44H4	High select from 4 inputs	Specify VDC or mADC range	85-265 VAC or 60-300 VDC
APD 44H4 D	Specify 4 input ranges		9-30 VDC or 10-32 VAC
APD 44L2	Low select from 2 inputs	Specify VDC or mADC range	85-265 VAC or 60-300 VDC
APD 44L2 D	Specify 2 input ranges		9-30 VDC or 10-32 VAC
APD 44L3	Low select from 3 inputs	Specify VDC or mADC range	85-265 VAC or 60-300 VDC
APD 44L3 D	Specify 3 input ranges		9-30 VDC or 10-32 VAC
APD 44L4	Low select from 4 inputs	Specify VDC or mADC range	85-265 VAC or 60-300 VDC
APD 44L4 D	Specify 4 input ranges		9-30 VDC or 10-32 VAC

#### Options—add to end of model number

- M01** Input/output reversal, such as 4-20 mA input to 20-4 mA output
- U** Conformal coating for moisture resistance

#### Accessory—order as separate line item

- API BP4** Spare 4-terminal plug, black

## 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](http://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](http://www.P65Warnings.ca.gov)

## Ranges

APD 44xx I/O ranges are set at the factory and must be specified when ordering. Consult factory for special ranges.

See the model/serial number label for module information, options, and I/O range information.

## Inputs

Polarity must be observed when connecting the signal inputs.

Inputs may each be different ranges and types.

For a transmitter with a current output, it must provide power to the current loop. This is typically a 3- or 4-wire device, or a passive transmitter with a loop power supply. Use a multi-meter to check for voltage at the transmitter output terminals. Typical voltage may be in the range of 9 to 24 VDC.

Version	Channels	+ Terminal	- Terminal
All	Channel 1 (A)	5 (+)	6 (-)
All	Channel 2 (B)	7 (+)	8 (-)
3 and 4 Input	Channel 3 (C)	9 (+)	10 (-)
4 Input	Channel 4 (D)	11 (+)	12 (-)

## Output

Polarity must be observed when connecting the signal 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.

Device Connected to Output	- Terminal	+ Terminal
Measuring or 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 or recording device accepts a mA (current) input and provides power to the current loop.	2 (-)	3 (+)

## Module Power Terminals

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.

The power supplies are fuse protected and the unit may be returned to API for fuse replacement.

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. Consult factory for your specific requirements.

## 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

Input and output ranges are pre-configured at the factory as specified on your order. Front-mounted, Zero and Span potentiometers can be used to calibrate the output to compensate for load and lead variations.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Using an accurate calibration source, provide an input to to one of the channels equal to the minimum input required for the application.
3. 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 or -10 V for a  $\pm 10$  V output.
4. Next, set one of the inputs at maximum, 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.
5. Repeat adjustments for maximum accuracy.

## Output Test Function

The test button may be used to drive the device on the output (a panel meter, chart recorder, etc.) with a known good signal that can be used as a system diagnostic aid during initial start-up or during troubleshooting.

When pressed it will drive the output with a known good signal. When pressed again, the output will return to normal.

The Test Cal. potentiometer can be used to set the test output to the desired level. It is factory set to provide approximately 50% output. It is adjustable from 0 to 100% of the output span.

Push the Test button to enable the output test and adjust the Test Cal. potentiometer for the desired output level. Press the button again and the output will return to normal.

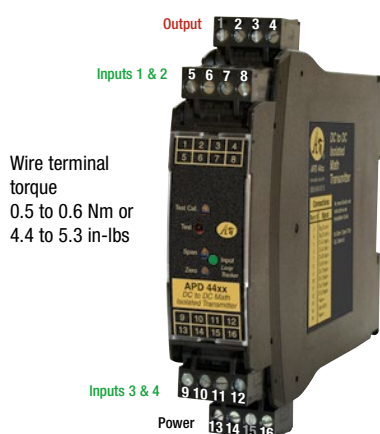
## Operation

The APD 44xx is factory configured to your exact input and output requirements. Each input is filtered, either amplified or attenuated as required, then passed through to the output stage.

The output level is determined by the highest or lowest of the inputs depending on the model.

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.

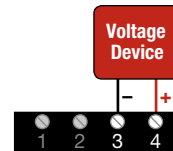
If the LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal input wiring. Note that it may be difficult to see the LED under bright lighting conditions.



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

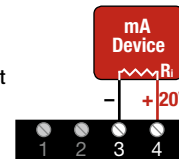
## Voltage Output



mA output: determine if receiving device has a passive or powered input. The module can be wired for a sinking or sourcing mA output.

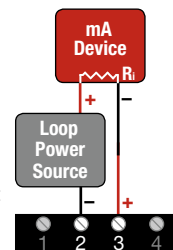
## Current Sourcing Output

Module powers mA output loop



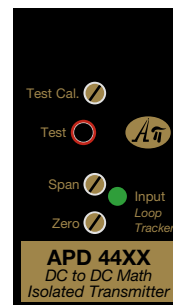
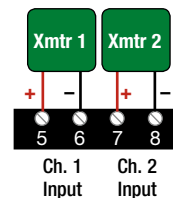
## Current Sinking Output

Module mA output is unpowered



## Voltage or mA inputs.

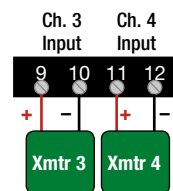
Milliamp inputs are sinking and mA transmitters must provide power to the loop.



## 3 and 4 input models

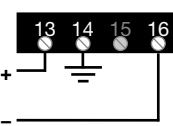
Voltage or mA inputs.

Milliamp inputs are sinking and mA transmitters must provide power to the loop.



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

13 Power AC or DC +  
14 Earth Ground  
16 Power AC or DC -



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