# Dual Channel DC and Potentiometer to DC Transmitters/Splitters, Isolated — APD 2208

**2 Inputs:** 0-100 mV to 0-300 VDC, Bipolar Voltages, 0-1 mA to 0-900 mADC or 100 Ω to 1 MΩ Potentiometers
**2 Outputs:** 0-1 V to ±10 VDC or 0-1 mA to 4-20 mA

Quick Link: api-usa.com/2208

- *Removable Plugs for Faster Installation*
- *Full 1200 V Input/Output/Power Isolation*
- *Output LoopTracker® LEDs*
- *Switch Selectable Potentiometer or DC Inputs*
- *Built-In Loop Power Supplies for Output*

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

6 YEAR WARRANTY

MADE IN USA

Free Factory I/O Setup!


## Applications

- *Convert, Boost, Rescale Process Signals*
- *Isolate or Split Inputs*
- *Interface Process Signals with Panel Meters, Recorders, Data Acquisition, DCS, SCADA Systems*

### Functions
Two DC or potentiometer input channels, switch selectable
Two DC voltage or mA output channels
May be wired to split one input into two independent outputs
Factory configured—specify I/O ranges for each channel
Consult factory for other ranges and configurations

### Voltage or mA Input Range

| | | | |
|---|---|---|---|
| Voltage: | 0-100 mVDC | to | 0-300 VDC |
| Bipolar voltage: | ±100 mVDC | to | ±10 VDC |
| Current (sinking): | 0-1 mADC | to | 0-900 mADC |

### Potentiometer Input Range
3 wire connection and full potentiometer travel is required

| | | | |
|---|---|---|---|
| Resistance: | 0-100 Ω | to | 0-1 MΩ |

1 VDC excitation provided to potentiometer

### Input Impedance
200 kΩ minimum for voltage inputs
1 MΩ minimum for potentiometer inputs

### Input Voltage Burden (Current)
1.25 VDC maximum

### Common Mode Rejection
100 dB minimum

### LoopTracker
Variable brightness LEDs indicate output loop level and status

### Output Ranges and Options

| | | | |
|---|---|---|---|
| Voltage, 10 mA max.: | 0-1 VDC | to | 0-10 VDC |
| Bipolar voltage: | ±1 VDC | to | ±10 VDC |
| Current (sourcing): | 0-1 mADC | to | 0-20 mADC |
| | 20 V compliance, 1000 Ω at 20 mA | | |
| High voltage output option: | 0-10 VDC | to | 0-20 VDC |
| M19: | Channel 1 | | |
| M29: | Channel 2 | | |
| M39: | Channel 1 and Channel 2 | | |
| Current sinking output option: | 0-1 mADC | to | 0-20 mADC |
| EXT1: | Channel 1 | | |
| EXT2: | Channel 2 | | |
| EXT3: | Channel 1 and Channel 2 | | |

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

### Output Loop Power Supplies
One for each output channel
20 VDC nominal, regulated, 25 mADC, <10 $mV_{RMS}$ max. ripple

### Output Ripple and Noise
Less than 10 $mV_{RMS}$

### Linearity
Better than ±0.1% of span

### Ambient Temperature Range and Stability
–10°C to +60°C operating ambient
Better than ±0.04% of span per °C stability

### Response Time
70 milliseconds nominal

### Isolation
1200 $V_{RMS}$ minimum. Full isolation: power to input, power to output, input to output, output 1 to output 2

### Installation Environment
IP 40, requires installation in panel or enclosure with adequate ventilation. For use in Pollution Degree 2 Environment
Mount vertically (as shown in picture) to a 35 mm DIN rail allowing minimum 1" (25 mm) above and below housing vents for air circulation.

### Dimensions and Connectors
0.89" W x 4.62" H x 4.81" D
22.5 mm W x 117 mm H x 122 mm D
Four 4-terminal removable connectors, 14 AWG max wire size

### Power

| | |
|---|---|
| Standard: | 85-265 VAC, 50/60 Hz or 60-300 VDC |
| D option: | 9-30 VDC (either polarity) or 10-32 VAC |

### Description
The APD 2208 features 2 input channels and 2 output channels in a compact housing. Each input channel is switch selectable for either a DC input or a potentiometer input.

Each DC input is factory ranged to your specifications. mA inputs are sinking. When a potentiometer input is selected almost any full-range potentiometer with a value of 0-100 Ω through 0-1 MΩ can be used without recalibration and without affecting accuracy. Consult factory for offsets or input ranges other than 0 to 100% of the potentiometer range.

The APD 2208 can also be configured as a DC signal splitter or a potentiometer signal splitter. For this application each DC input should be ordered with the same range.

Each output channel is factory ranged to your specifications and provides an optically isolated DC voltage or current output that is linearly related to the input. Sourcing mA outputs are standard. Sinking milliamp or high voltage outputs are optional.

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

### LoopTracker
API exclusive features include two LoopTracker LEDs (one for each output channel) that vary in intensity with changes in the process 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/or troubleshooting.

| Model | Input | Output | Power |
|---|---|---|---|
| APD 2208 | Factory configured specify input ranges and type for channel 1 and channel 2 | Factory configured specify output ranges and type for channel 1 and channel 2 | 85-265 VAC or 60-300 VDC |
| APD 2208 D | | | 9-30 VDC or 10-32 VAC |

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

| | |
|---|---|
| **SP** | Internal jumper factory set for mADC input signal splitter |
| **M19** | Channel 1 high voltage output |
| **M29** | Channel 2 high voltage output |
| **M39** | Channel 1 and channel 2 high voltage output |
| **EXT1** | Sinking mA output channel 1 |
| **EXT2** | Sinking mA output channel 2 |
| **EXT3** | Sinking mA output channel 1 and 2 |
| **U** | Conformal coating for moisture resistance |

**Accessory—order as separate line item**

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


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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
See wiring diagrams at right. Observe polarity.

* 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!

### Ranges
See the model/serial number label for information, options, and I/O range information. The voltage and/or milliamp I/O ranges are factory set for each channel to your exact specifications (at 24°C ±1°C). Use the front-mounted Zero and Span potentiometers to calibrate the output.

Use a small screwdriver to set each front panel input selection switch to the type of input required.

### Signal Input Terminals
Polarity must be observed when connecting the signal inputs.

If a milliamp input was specified, it is passive or "sinking". Your mA transmitter must provide power to the APD 2208 mA input.

A potentiometer input must be connected to all three signal input terminals as shown. A stable 1 VDC source is used to excite the potentiometer. Almost any potentiometer input can be used as long as 0-100% of the range is used, and the potentiometer has a full scale value from 100 ohms to 1 mega ohms.

**Tip:** If not using input 1 set it for DC input and jumper terminals 3 and 4 together. If not using input 2 set it for DC input and jumper terminals 7 and 8 together. The module will consume less power this way.

The APD 2208 may also be wired to split and convert a single input signal into two outputs. See the wiring diagrams at right. For this application each DC input should be ordered with the same range.

### Signal Output Terminals
Polarity must be observed when connecting the signal outputs.

See the module label for the voltage or milliamp output range for each channel. The standard milliamp output is sourcing. It provides 20 VDC power to your device.

Optional sinking mA output(s) will be indicated on the module label as EXT1 for channel 1, EXT2 for channel 2, or EXT3 for both channel 1 and channel 2.

If the output does not function, check wiring and polarity for both inputs and outputs.

### Module Power Terminals
Check model/serial number label for module operating voltage to make sure it matches available power. The power supply is fuse protected and the unit may be returned to API for fuse replacement.

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

Note: Perform the following calibration procedure jumper configuration settings are changed.

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 the module 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 ±10 V output.
4. Next, set the input 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.

### Operation
The APD 2208 is factory configured to your exact input and output requirements. Voltage or milliamp inputs are filtered, either amplified or attenuated as required, then passed through an optical coupler to the output stage.

When an input switch is set for a potentiometer input a stable 1 VDC source is used 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.

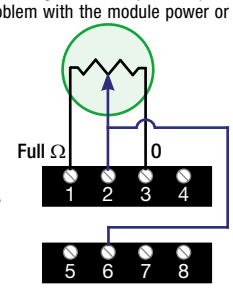
A red LoopTracker output LED provides a visual indication that the output signal is functioning for each channel. It becomes brighter as the input and the corresponding output change from minimum to maximum.

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.

### Potentiometer Splitter Setup

1 = Full scale
2 and 6 = Wiper arm
3 = Zero or min.

Both input switches set to Pot.




### DC Splitter Setup

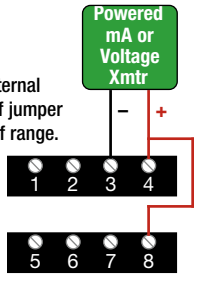
Remove all plugs. Remove front cover with flat-blade screwdriver

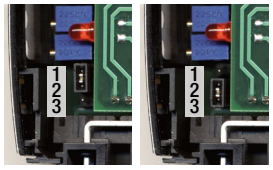
Release 7 plastic tabs to remove side cover.


DC Splitter
3 = Negative, 4 and 8 = Positive

Both input switches set to DC

When splitting a mA input move internal jumper from pins 1-2 to pins 2-3. If jumper is not moved, output will be 50% of range.

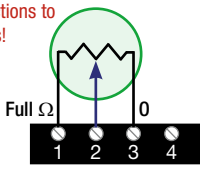


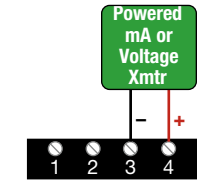

Normal DC Splitter

* Do not make connections to unused terminals!

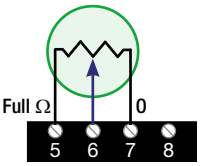
**Input 1:** Potentiometer
1 = Full scale
2 = Wiper arm
3 = Zero or min.
Input selector switch 1 set to **Pot. 1**



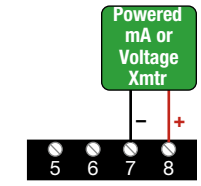

**Input 1:** Voltage or mA
Input selector switch 1 set to **DC 1**




**Input 2:** Potentiometer
5 = Full scale
6 = Wiper arm
7 = Zero or min.
Input selector switch 2 set to **Pot. 2**

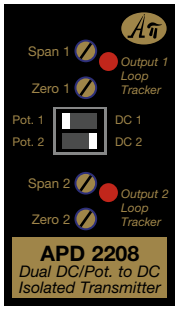



**Input 2:** Voltage or mA
Input selector switch 2 set to **DC 2**



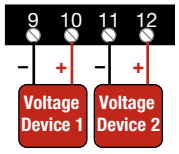

Module mA input is unpowered

Output 1 Span
Output 1 Zero
Input 1 Selector Switch
Input 2 Selector Switch
Output 2 Span
Output 2 Zero

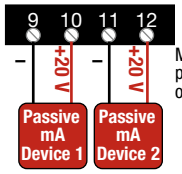



Wire terminal torque 0.5 to 0.6 Nm or 4.4 to 5.3 in-lbs

**Output 1**
Voltage output
**Output 2**
Voltage output

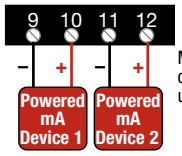



***Output 1**
Sourcing mA output
+20 V at terminal 10
***Output 2**
Sourcing mA output
+20 V at terminal 12

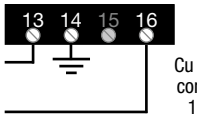



Module powers mA output loop

***Output 1**
Sinking mA output
with EXT1 or EXT3 option
***Output 2**
Sinking mA output
with EXT2 or EXT3 option




Module mA output is unpowered




**13** Power AC or DC +
**14** Earth Ground
**16** Power AC or DC –

Cu 60/75°C conductors 14 AWG max.

* Do not make connections to unused terminals!

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