# High Voltage ±DC to DC Transmitters, Isolated, Field Rangeable

# APD HV-DC BPI

**Input:** ±50 VDC to ±1000 VDC Bipolar Input
**Output:** 0-1 V to ±10 VDC or 0-2 mA to 4-20 mA

Quick Link: api-usa.com/HVDC

- *Field Selectable I/O Ranges*
- *Zero and Span Output Calibration Potentiometers*
- *Full 1200 V Input/Output/Power Isolation*
- *Input and Output LoopTracker® LEDs*
- *Output Test Button*
- *Selectable Sink/Source for Current Output*

## Applications

- *High Voltage Battery Systems*
- *DC Motor and Variable Speed Drives*
- *Electric Railway Voltages*
- *Power Supply and Voltage Converters*

6 YEAR WARRANTY

MADE IN USA

Applications Link
api-usa.com/apps

Free Factory I/O Setup!

1 Minute Setup!


See Wiring Diagrams on Next Page

### Input Ranges
8 field selectable ranges
±50 VDC
±100 VDC
±150 VDC
±200 VDC
±250 VDC
±500 VDC
±600 VDC
±1000 VDC (or custom)

### Input Impedance (Voltage)
2.5 MΩ

### Common Mode Rejection
120 dB minimum

### LoopTracker
Variable brightness LEDs indicate I/O loop level and status

### Output Ranges
18 field selectable ranges

| | |
|---|---|
| Voltage: | 0-1 V, 0-2 V, 0-4 V, 0-5 V, 1-5 V, 0-8 V, 0-10 V, 2-10 V |
| Bipolar voltage: | ±5 V, ±10 V (recommended output) |
| Current: | 0-2 mA, 0-4 mA, 0-8 mA, 0-10 mA, 2-10 mA, 0-16 mA, 0-20 mA, 4-20 mA 20 V compliance, 1000 Ω at 20 mA |

Consult factory for special ranges

### Output Calibration
Multi-turn zero and span potentiometers to compensate for load and lead variations
±15% of span adjustment range typical

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

### Output Test
Front button sets output to test level when pressed
Potentiometer adjustable 0-100% of span

### Output Ripple and Noise
Less than 10 mVRMS ripple and noise

### 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
100 milliseconds nominal

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

### 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

### Housing and Connectors
IP 40, requires installation in panel or enclosure
Mount vertically to a 35 mm DIN rail
Four 4-terminal removable connectors, 14 AWG max wire size

### 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

### Function
The APD HV-DC BPI accepts a bipolar DC voltage input and provides an optically isolated DC voltage or current output that is linearly related to the input. This module is unique because it is field rangeable for voltage inputs from ±50 VDC to ±1000 VDC. Typical applications include signal isolation and signal conversion for a bipolar high voltage DC input.

### Isolation
The optical isolation between input and output makes this module useful for ground loop elimination, common mode signal rejection or noise pickup reduction. The module power supply is isolated, resulting in full 3-way (input, output, power) isolation.

### Fast Field Setup
The APD HV-DC BPI input and output range settings can be reconfigured in the field via external switches. See table on other side for range settings. Consult the factory for assistance with special ranges.

### Sink/Source Output
For maximum versatility the output can be selectively wired for sinking or sourcing. The built-in 20 VDC loop excitation supply may be used to power passive mA devices. This allows the APD HV-DC BPI to work with powered or unpowered mA devices.

### LoopTracker
API exclusive features include two LoopTracker LEDs (green for input, red for 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/or troubleshooting.

### Output Test
An API exclusive feature includes a test button to provide a fixed output (independent of the input) when held depressed. The test output level is potentiometer adjustable from 0 to 100% of output span.

The output test button greatly aids in saving time during initial startup and/or troubleshooting.

## How to Order

### All models are field rangeable
Free factory setup and calibration

### Please specify
Model
Input range (if you would like us to set the switches)
Output range (if you would like us to set the switches)
Option as required

| Model | Input | Output | Power |
|---|---|---|---|
| **APD HV-DC BPI** | 8 field selectable ± VDC input ranges | 18 field selectable ranges | 85-265 VAC or 60-300 VDC |
| **APD HV-DC BPI D** | | | 9-30 VDC or 10-32 VAC |

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

**C** Custom range (consult factory)
**U** Conformal coating for moisture resistance

**Accessory—order as separate line item**

**API PB4** Spare removable plug, black 4 terminal


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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

### Range Selection
See table below to select I/O ranges for your application. It is generally easier to select ranges before installation. See model/serial number label for custom range settings if specified.

For a ± (bipolar) input the ±10 V output is recommended for best output resolution.

### Electrical Connections
Polarity must be observed for input and output wiring connections. If the input and/or output do not function, check switch settings and wiring 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!

### Signal Output Terminals
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

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

### Signal Input Terminals
The APD HV-DC BPI accepts a ±DC voltage input. Polarity must be observed when connecting the signal input.

Note the side label indicates the total span of the bipolar input.

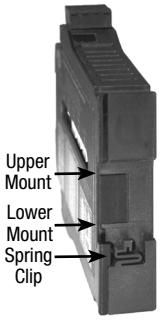
| DC Voltage Input | Terminal |
|---|---|
| DC voltage negative | 5 (–) |
| DC voltage positive | 11 (+) |

### 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.

### 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 up 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, if specified on your order, are factory pre-configured (at 24°C ±1°C). Use the front-mounted Zero and Span potentiometers to calibrate the output.

Note: Perform the following calibration procedure any time switch settings are changed.

1. Apply power to the module and allow a minimum 30 minute warm-up time.
2. Using an accurate calibration source, provide an input to the module equal to the min. 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.

### 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.

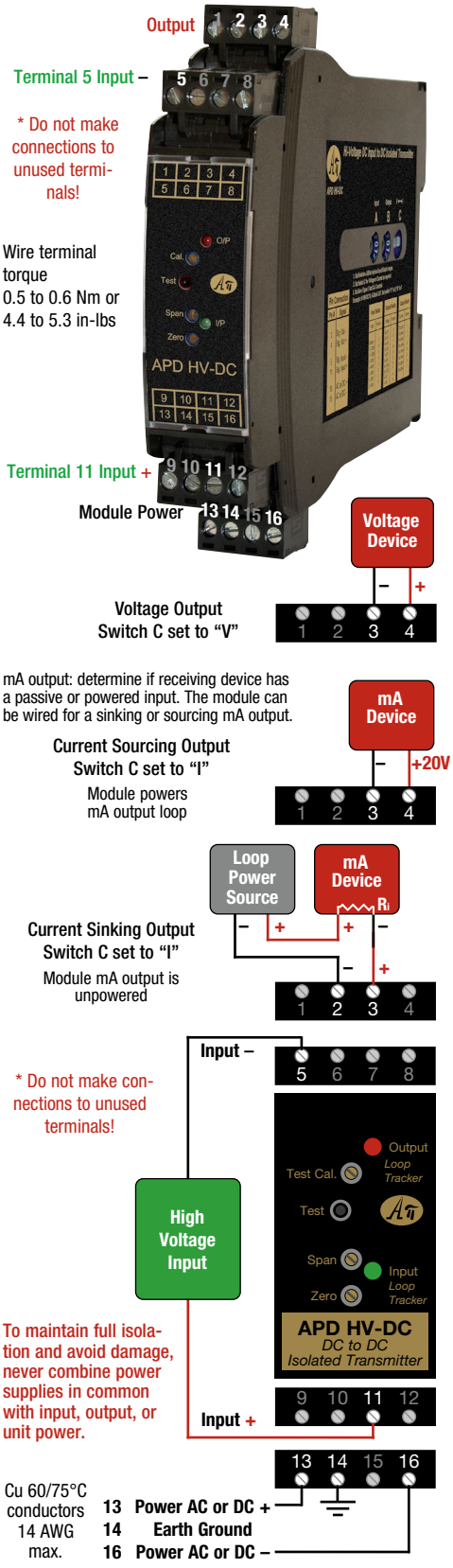
### Operation
The APD HV-DC BPI accepts a high-voltage ±DC voltage input and provides an optically isolated DC voltage or current output that is linearly related to the input. The input is filtered and attenuated as required, then passed through to the output stage.

#### 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, this may indicate a problem with module power or signal input wiring.

#### 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.




| Side Label | Output Switches / Input | 0-1 V ABC | 0-2 V ABC | 0-4 V ABC | 1-5 V ABC | 0-5 V ABC | 0-8 V ABC | 2-10 V ABC | 0-10 V ABC | ±5 V ABC | ±10 V* ABC | 0-2 mA ABC | 0-4 mA ABC | 0-8 mA ABC | 2-10 mA ABC | 0-10 mA ABC | 0-16 mA ABC | 4-20 mA ABC | 0-20 mA ABC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-100 V | ±50 V | 00V | 08V | 01V | 06V | 09V | 02V | 07V | 03V | 04V | **05V** | 00I | 08I | 01I | 06I | 09I | 02I | 07I | 03I |
| 0-200V | ±100 V | 10V | 18V | 11V | 16V | 19V | 12V | 17V | 13V | 14V | **15V** | 10I | 18I | 11I | 16I | 19I | 12I | 17I | 13I |
| 0-300V | ±150 V | 20V | 28V | 21V | 26V | 29V | 22V | 27V | 23V | 24V | **25V** | 20I | 28I | 21I | 26I | 29I | 22I | 27I | 23I |
| 0-400V | ±200 V | 30V | 38V | 31V | 36V | 39V | 32V | 37V | 33V | 34V | **35V** | 30I | 38I | 31I | 36I | 39I | 32I | 37I | 33I |
| 0-500V | ±250 V | 40V | 48V | 41V | 46V | 49V | 42V | 47V | 43V | 44V | **45V** | 40I | 48I | 41I | 46I | 49I | 42I | 47I | 43I |
| 0-1000V | ±500 V | 50V | 58V | 51V | 56V | 59V | 52V | 57V | 53V | 54V | **55V** | 50I | 58I | 51I | 56I | 59I | 52I | 57I | 53I |
| 0-1200V | ±600 V | 60V | 68V | 61V | 66V | 69V | 62V | 67V | 63V | 64V | **65V** | 60I | 68I | 61I | 66I | 69I | 62I | 67I | 63I |
| Custom | ±1000 V | 70V | 78V | 71V | 76V | 79V | 72V | 77V | 73V | 74V | **75V** | 70I | 78I | 71I | 76I | 79I | 72I | 77I | 73I |

*Use ±10V output range for highest output resolution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