**Frequency to DC Transmitters, Isolated, Field Rangable APD 7580**

**Input:** 0-100 Hz to 0-30 kHZ

**Output:** 0-1 V to 0-10 VDC, ±5 VDC, ±10 VDC, 0-2 mA to 20 mA

- 1 Minute Setup for 30 Input & 18 Output Ranges
- External Switches & Tables for Range Selection
- Zero and Span Output Calibration Potentiometers
- Full 1200 V Input/Output/Power Isolation
- Input and Output LoopTracker® LEDs
- Output Test Button
- Built-In Loop Power Supply for Sink/Source Output

**Applications**

- Monitor and Control Motor or Line Speed
- Convert Speed and Frequency Signals

**Frequency Input Ranges**

- 0-100 Hz to 0-30 kHz, 30 switch selectable input ranges
- Minimum pulse width 5 μsec

**Input Impedance**

- 10 kHz nominal (maximum sensitivity)
- 100 kHz nominal (minimum sensitivity)

**Input Sensitivity/Hysteresis**

- Multi-turn potentiometer for sensitivity adjustment
- Maximum sensitivity: ±25 mV typical
- Minimum sensitivity: ±4.2 V typical

**Input Amplitude Range**

- 100 mV to 150 Vrms
- Any waveform with minimum 100 mV amplitude change

**Input Power Supply**

- 15 VDC ±10%, regulated, 25 mA max
- Max. ripple, less than 10 mVrms
- May be used to power sensor

**LoopTracker**

- Variable brightness LEDs indicate I/O loop level and status

**DC Output Ranges**

- Switch selectable, field rangable
- Voltage: 0-1 VDC to 0-10 VDC, 10 mA max
- Bipolar voltage: ±1 VDC to ±10 VDC
- Current: 0-2 mA to 0-20 mA
- 20 V compliance, 1000 Ω at 20 mA

**Output Calibration**

- Multi-turn zero and span potentiometers
- ±15% of zero adjustment, ±10% of span adjustment typical

**Output Loop Power Supply**

- 20 VDC nominal, regulated, 25 mA max
- Max. ripple, less than 10 mVrms
- May be selectively wired for sinking or sourcing mA output

**Output Test**

- Front momentary button sets output to test level
- Potentialmeter adjustable 0-100% of span

**Output Ripple and Noise**

- Less than 10 mVrms ripple and noise

**Linearity**

- Better than ±0.8% of span

**Ambient Temperature Range and Stability**

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

**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
- 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

**Applications Link**

[api-usa.com/apps](http://api-usa.com/apps)

**Frequency to DC Transmitters, Isolated, Field Rangable APD 7580**

[![Image](https://via.placeholder.com/150)](http://api-usa.com/apps)

**Description**

The APD 7580 accepts a frequency input and provides an optically isolated DC voltage or current output that is linearly related to the input.

Common applications include frequency to DC conversions from frequency output type devices such as rotary encoders, magnetic pick-ups, proximity sensors, variable speed drives, and flow meters. For PLCs that do not have analog outputs, often the pulse rate of a discreet output can be programmed to vary. By connecting the APD 7580 to this output, a proportional analog signal can be generated. A 15 VDC power supply is provided to power the sensor input, if required.

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

The APD 7580 input and output can be field-configured via external rotary and slide switches. Common ranges are on the module label. Many additional combinations are possible. Consult the factory for assistance with special ranges.

**How to Order**

All models are field rangable

- For APD 7580, specify if UL version is required
- Order options and accessories as required
- Order D versions for operation on low voltage power

<table>
<thead>
<tr>
<th>Model</th>
<th>Input</th>
<th>Output</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>APD 7580</td>
<td>Field configurable</td>
<td>Field configurable</td>
<td>85-265 VAC or 60-300 VDC</td>
</tr>
<tr>
<td>APD 7580 D</td>
<td>0-100 Hz to 0-30 kHz</td>
<td>voltage or milliamp ranges</td>
<td>9-30 VDC or 10-32 VAC</td>
</tr>
</tbody>
</table>

**Option—add to end of model number**

- U Conformal coating for moisture resistance

**Sink/Source Versatility**

For maximum versatility the output can be selectively wired for sinking (unpowered) or sourcing (powered) milliamp output. The 20 VDC loop excitation supply can be used to power a milliamp current loop if required. The output can also be wired for an externally powered loop.

**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 the 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.
**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.

**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. Consultez l’usine pour assistance.

**ATTENTION!** Évitez 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.

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**Input Switch Settings**

- **Rotary and slide switches on the side of the module are used to select input and output ranges.** See table below.
- **1. Set the input range slide switch to either “H” or “L” depending on input frequency range.**
  - For frequencies from 0-100 Hz thru 0-1500 Hz, switch A is placed in the “L” position.
  - For frequencies from 0-2000 Hz thru 0-30 kHz, switch A is placed in the “H” position.
- **2. Set input range rotary switch B to match your input frequency range.**
- **3. Set the output slide switch E to current “I” or voltage “V” depending on output type.**

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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.

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**Range Selection**

See table below to select I/O ranges for your application. It is generally easier to select ranges before installation.

- The module side label lists common ranges.
- See the model/serial number label for module information, options, or if a custom range was specified.
- For ranges that fall between the listed ranges use the next highest heat gain and trim the output signal with the zero and span potentiometers.

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**Output**

- **0-1 V**
- **0-2 V**
- **0-4 V**
- **1-5 V**
- **0-8 V**
- **2-10 V**
- **0-10 V**
- **±5 V**
- **±10 V**
- **0-2 mA**
- **0-4 mA**
- **0-8 mA**
- **2-10 mA**
- **0-10 mA**
- **0-16 mA**
- **4-20 mA**
- **0-20 mA**

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**Tables with additional information on ranges and settings are not provided in the image.**

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**Absolute Process Instruments**

1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502

api-usa.com
Electrical Wiring Connections
Polarity must be observed for input and output wiring connections. If the input/output 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!

Input
The APD 7580 is compatible with most types of sensors as long as the waveform produces a minimum 100 mV amplitude change and a minimum 5 microsecond pulse width.

A 15 VDC supply is available to power the sensor if required. Always refer to the sensor manufacturer’s data sheet to determine supply voltage compatibility and proper wiring.

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Signal + Terminal</th>
<th>Sensor Power</th>
<th>Signal – Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 wire or Namur requiring external power</td>
<td>2</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>2 wire self generating (VR)</td>
<td>2</td>
<td>n/a</td>
<td>4</td>
</tr>
<tr>
<td>3 wire PNP current sourcing output</td>
<td>2</td>
<td>3 (+15 V)</td>
<td>4</td>
</tr>
<tr>
<td>3 wire NPN current sinking output</td>
<td>2</td>
<td>3 (+15 V)</td>
<td>4</td>
</tr>
</tbody>
</table>

Sensor Load
The signal input of the APD 7580 is capacitively coupled to prevent any DC in the input. Some sensors, typically those without an internal load resistor, require a resistive load in order to function.

The resistor value may be specified by the sensor manufacturer as the “minimum resistive load” or calculated from the sensor manufacturer’s specified “load current range”.

The 15 VDC power supply is capable of providing 25 mA. A load current range of 3 mA to 25 mA would typically use a 5 kΩ to 500 Ω resistor. For NPN sensors use an external resistor across terminals 2 and 3 if required. For PNP sensors use an external resistor across terminals 2 and 4 if required.

Output
Polarity must be observed when connecting the signal output to the load. See the table below and the wiring diagrams at right.

The APD 7580 output can be wired to provide power to drive the load. Determine if your receiving device provides power to the current loop or if the loop must be powered by a current loop. See the table below and the wiring diagrams at right.

Polarity must be observed when connecting the signal output to the loop. Typical voltage may be 9-24 VDC if it provides power to the current loop or if the loop must be powered by a current loop. Determine if your receiving device provides power to drive the load. See the table below and the wiring diagrams at right.

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.

Two wire using 15 VDC supply
2 Signal
3 Power (+15 VDC)

Some sensors may require a bleed resistor. See sensor mfr. specs.

Two wire self-generating
2 Signal (+)
4 Common (–)

Three wire NPN
Typical wire colors shown.
2 Signal, Black or White
3 Power (+15 VDC)
Brown or Red
4 Common (–)
Blue or Black

Some sensors may require a load resistor. See sensor mfr. specs.

Three wire PNP
Typical wire colors shown.
2 Signal, Black or White
3 Power (+15 VDC)
Brown or Red
4 Common (–)
Blue or Black

Some sensors may require a load resistor. See sensor mfr. specs.

Sensor Load section at left.

Removal
Avoid shock hazards! Turn signal input, output, and power off before removing module.
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.

Above Process Instruments
1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com
Output Calibration

Input and output ranges, if specified on your order, are factory pre-configured (at 24°C ±1°C).

Front-mounted Zero and Span potentiometers are used to calibrate the output to compensate for load and lead variations.

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

1. Apply power to the module and allow a minimum 20 minute warm up time.

2. Using an accurate frequency calibration source such as a signal generator, provide an input to the module equal to the minimum input required for the application.

In most cases the minimum input signal will be 0 Hz.

3. Set the frequency calibration source equal to the maximum input required for the application. This will typically be within 10% of the range selected with switches A and B.

4. 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.

For example: 4 mA for a 4-20 mA output or –10 V for a ±10V output.

5. Repeat adjustments for maximum accuracy.

Sensitivity Adjustment

This multi-turn potentiometer provides an adjustable threshold level that the incoming signal must overcome before an output can be produced.

This is used to limit noise and minimize false input signals that may cause erroneous readings.

When fully clockwise (maximum sensitivity), the input threshold is typically ±25 mV.

In the fully counterclockwise position (minimum sensitivity), the input threshold is typically ±2.5 volts.

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.

The Test Cal. potentiometer is factory set to approximately 50% output. It 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 Test Cal. potentiometer for the desired output level.

Operation

The APD 7580 accepts a frequency input and provides an optically isolated DC voltage or current output that is linearly related to the input.

The frequency input to the APD 7580 is capacitively coupled (to remove any DC component at the input) to a comparator whose threshold is determined by the setting of the sensitivity control. The output from the comparator passes through an opto-coupler to the output stage.

The green LoopTracker® input LED provides a visual indication that a signal is being sensed by the input circuitry of the module. The LED illuminates when the input is sufficiently large to trigger the input comparator depending on the input sensitivity adjustment.

It also indicates the input signal range by changing in intensity as the frequency changes from minimum to maximum. If the LED fails to illuminate, or change in intensity as the frequency changes, it may indicate a problem with 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.