Frequency to DC Transmitter, Isolated

API 7580 G

Input: ***0-100 Hz to 0-30 kHz***
Output: ***0-1 V to ±10 VDC, 0-2 mA to 4-20 mADC***

Wide Ranging I/O
One Minute Setup!

- ***30 Selectable Inputs & 16 Selectable Outputs***
- ***Setup via Rotary Switches & Easy-to-Use Tables***
- ***2000 V Full Isolation Input/Output/Power***
- ***Adjustable Input Sensitivity (Hysteresis)***
- ***Input and Output Looptracker® LEDs***
- ***Functional Test Pushbutton***

Applications

- **Monitor and Control Motor or Line Speed**
- **Convert a Square Wave Output to 4-20 mA**

Specifications

Input Ranges

	Minimum	Maximum	Range Increments
Low range:	0-100 Hz	0-1500 Hz	100 Hz
High range:	0-2 kHz	0-30 kHz	2 kHz

Input Impedance

10 kΩ nominal (maximum sensitivity)
100 kΩ nominal (minimum sensitivity)

Input Sensitivity/Hysteresis

Single turn potentiometer for sensitivity adjustment

Maximum sensitivity:	±25 mV typical
Minimum sensitivity:	±2.5 V typical

Input Amplitude Range

100 mV to 150 V_{RMS} *System voltages must not exceed socket voltage rating*

Input Waveform

Sine wave Sawtooth Square wave
Most other waveforms with greater than 100 mV amplitude change

Input Loop Power Supply

18 VDC nominal, unregulated, 25 mADC, max. ripple, less than 1.5 V_{p-p}

LoopTracker

Variable brightness LEDs indicate input/output loop level and status

Output Ranges

	Minimum	Maximum	Load Factor
Voltage:	0-1 VDC	0-10 VDC	
Bipolar Voltage:	±1 VDC	±10 VDC	
Current (20 V compliance):	0-2 mADC	0-20 mADC	1000 Ω at 20 mA

Consult factory for other ranges

Output Zero and Span

Multiturn potentiometers to compensate for load and lead variations

Zero:	±15% of span adjustment range typical
Span:	±10% of span adjustment range typical

Functional Test Button

Sets output to test level when pressed. Adjustable 0-100% of span.
Potentiometer factory set to approx. 50% of span

Response Time

Low ranges: 600 milliseconds. typical
High ranges: 110 milliseconds. typical

Accuracy

Better than ±0.2% of span including hysteresis, linearity and adjustment resolution. Better than ±0.8% repeatability

Isolation

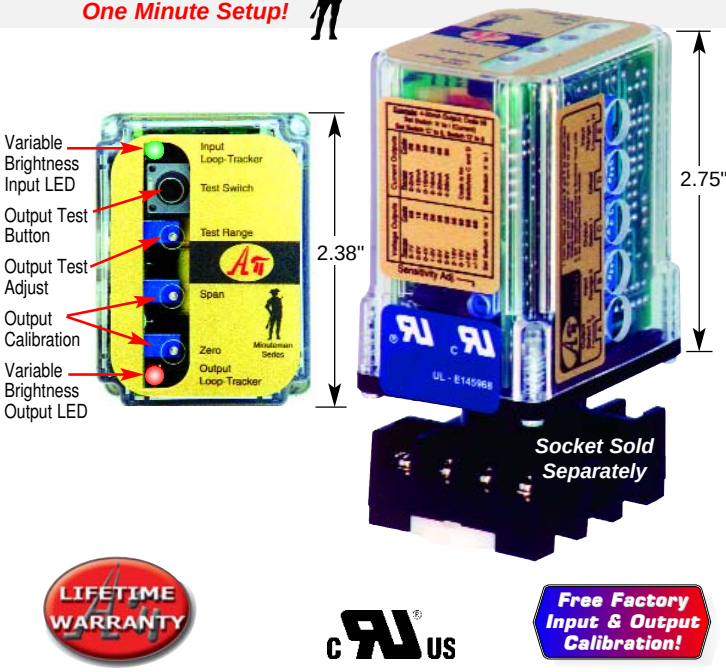
2000 V_{RMS} min. Full isolation: power to input, power to output, input to output

Ambient Temperature Range and Stability

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

Power

Standard:	115 VAC ±10%, 50/60 Hz, 2.5 W max.
P option:	80-265 VAC or 48-300 VDC, 50/60 Hz, 2.5 W typical
A230 option:	230 VAC ±10%, 50/60 Hz, 2.5 W max.
D option:	9-30 VDC, 2.5 W typical



LIFETIME WARRANTY

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Free Factory Input & Output Calibration!

Description and Features

The **API 7580 G** accepts a frequency Input and provides an optically isolated DC voltage or current analog output that is linearly proportional to the input. Common applications include frequency to DC conversions from frequency output type devices such as rotary encoders, magnetic pick-ups, 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 **API 7580 G** to this output, a proportional analog signal can be generated.

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

The **API 7580 G** input and output can be field-configured via external rotary and slide switches. The more common ranges (30 input & 16 output) can be selected from the table on the module. Many additional combinations are possible. Consult the factory for assistance with special ranges.

API exclusive features include two ***LoopTracker*** LEDs and a **Functional Test Pushbutton**. The LoopTracker LEDs (Green for input, Red for output) vary in intensity with changes in the process input and output signals. Monitoring the state of these LEDs can provide a quick visual picture of your process loop at all times. The functional test pushbutton provides a fixed output (independent of the input) when held depressed. The test output level can be field-adjusted via a multiturn potentiometer.

Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting. The built-in 18 VDC unregulated loop excitation power supply can be used to power passive input devices.

API 7580 G	Field rangeable frequency to DC transmitter, isolated, with loop power supply, 115 VAC

Options—Add to end of model number

P	Powered by 80-265 VAC or 48-300 VDC, 50/60 Hz
A230	Powered by 230 VAC, 50/60 Hz
D	Powered by 9-30 VDC
U	Conformal coating for moisture resistance

Accessories—Order as separate line item

API 008	8-pin socket
API 008 FS	8-pin finger-safe socket
API TK36	DIN rail, 35 mm W x 39" L, aluminum

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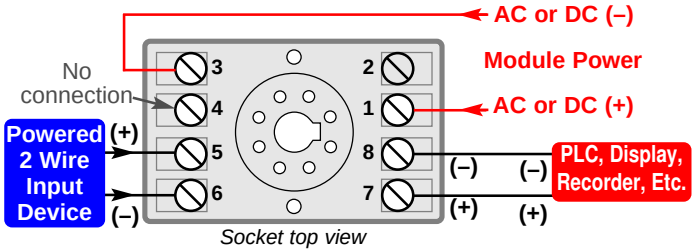
ELECTRICAL CONNECTIONS

WARNING! All wiring must be performed by qualified personnel only. This module requires an industry-standard 8-pin socket. Order API 008 or finger-safe API 008 FS socket separately.

Power Input Terminals – The white label on the side of the API module will indicate the power requirements. AC power is connected to terminals 1 and 3. For DC powered modules, polarity **MUST** be observed. Positive (+) is wired to terminal 1 and negative (–) is wired to terminal 3.

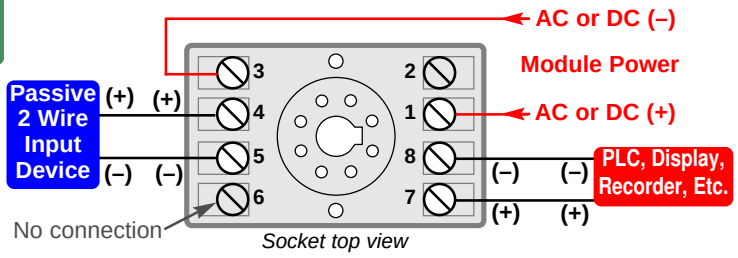
Powered Signal Input – Observe polarity when connecting the signal input. The positive signal (+) is wired to terminal 5 and negative (–) to terminal 6.



API 7580 G typical wiring with powered input and standard output

Passive Signal Input Using the 18 V Supply – Polarity must be observed when connecting the signal input. A passive input device can be powered by the 18 volt DC power supply at terminal 4 (+) and terminal 5 (–). This may save the expense of purchasing a separate power supply for the input device. A typical example is shown, however consult the manufacturer of your specific sensor to determine its compatibility and proper wiring.

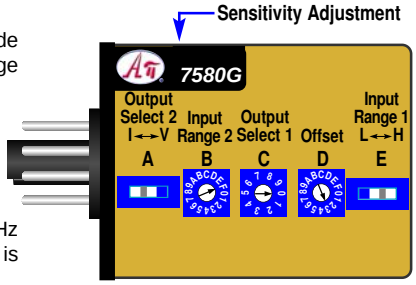
Signal Output Terminals – Polarity must be observed when connecting the signal output to the load. The positive connection (+) is connected to terminal 7 and the negative (–) is connected to terminal 8. The API 7580 G provides a powered output to drive the output loop.



Using the built-in 18 VDC loop supply to power a passive input device

RANGE SELECTION

Three rotary switches and two slide switches located on the side of the module are used to select input and output ranges. Most popular ranges are listed on the module labels and the table at right. See www.api-usa.com or contact factory for special ranges.



1. Set the **Output Select 2** slide switch "**A**" to current (**I**) or voltage (**V**) depending on output type.
2. Set the **Input Range 1** slide switch "**E**" to either **L** or **H** depending on input frequency range.

   For frequencies from 0-100 Hz thru 0-1500 Hz, switch "**E**" is placed in the **L** position.

   For frequencies from 0-2000 Hz thru 0-30 kHz, switch "**E**" is placed in the **H** position.
3. Find your input frequency range and set **Input Range 2** rotary switch **"B"**.
4. Find your output range and set **Output Range "C"** and **Output Offset "D"**.
5. The Zero, Span, Sensitivity, and Test Range potentiometers can now be adjusted.

Depending on the rotary switch settings, the input is filtered, either amplified or attenuated as required, then passed through an optical isolation circuit to the output stage.

CALIBRATION

Input & Output Ranges – Range are pre-set at the factory as specified on your order. Top-mounted, Zero and Span potentiometers can be used should fine-tuning be necessary. Custom ranges may require factory modification.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Using an accurate frequency 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 of 0 Hz.
4. Set the input at maximum, and 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.
5. Repeat adjustments for maximum accuracy.

Sensitivity Adjust – This single turn potentiometer located on the side of the module 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.

Test Range Adjust – Turn the multi-turn Test Range potentiometer while holding the Test button depressed until the desired output test level is reached. It can be adjusted to vary the output signal from 0 to 100% of the output range.

OPERATION

The frequency input to the API 7580 G 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.

Test Button – Drives a device on the output side of the loop (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 released, the output will return to normal.

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.

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.

Frequency Inputs 50 VDC or 150 VAC Maximum				VOLTAGE Outputs Switch A To "V"		CURRENT Outputs Switch A To "I"	
Range	B E	Range	B E	Range	C D	Range	C D
0-100 Hz	1 LO	0-2 kHz	1 HI	0-1 V	0 8	0-2 mA	0 8
0-200 Hz	2 LO	0-4 kHz	2 HI	0-2 V	1 8	2-10 mA	2 6
0-300 Hz	3 LO	0-6 kHz	3 HI	0-4 V	2 8	0-10 mA	3 8
0-400 Hz	4 LO	0-8 kHz	4 HI	1-5 V	2 6	0-16 mA	5 8
0-500 Hz	5 LO	0-10 kHz	5 HI	0-5 V	3 8	0-20 mA	6 8
0-600 Hz	6 LO	0-12 kHz	6 HI	0-8 V	5 8	4-20 mA	5 6
0-700 Hz	7 LO	0-14 kHz	7 HI	2-10 V	5 6		
0-800 Hz	8 LO	0-16 kHz	8 HI	0-10 V	6 8		
0-900 Hz	9 LO	0-18 kHz	9 HI	±5 V	6 B		
0-1000 Hz	A LO	0-20 kHz	A HI	±10 V	8 B		
0-1100 Hz	B LO	0-22 kHz	B HI				
0-1200 Hz	C LO	0-24 kHz	C HI				
0-1300 Hz	D LO	0-26 kHz	D HI				
0-1400 Hz	E LO	0-28 kHz	E HI				
0-1500 Hz	F LO	0-30 kHz	F HI				

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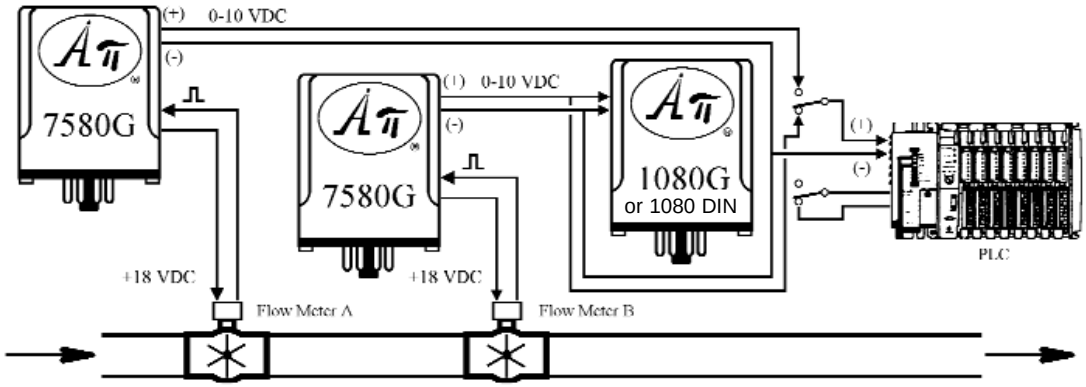
Auto-Ranging Flow Meter

PROBLEM
A flow in a process must be accurately measured throughout a wide range. The flow rate is used by a PLC to control the process. Two flow meters are utilized, one very accurate at low flow and one very accurate at high flow. A means for automatic selection of the appropriate flow meter is required.

SOLUTION
An **API 7580 G** Field Selectable Isolated Frequency to DC Transmitter module is used with each flow meter to convert the frequency output to a 0-10 VDC signal proportional to flow. An **API 1080 DIN** DC Input, Wide Ranging, Field Selectable Single Alarm Trip module monitors the flow rate and transfers the PLC analog input to the flow meter appropriate for that range.

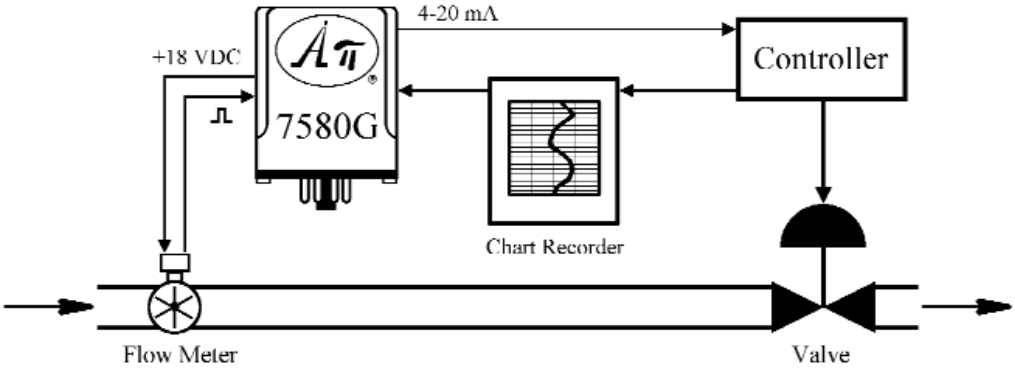


The second set of relay contacts of the **API 1080 DIN** provides a PLC binary input with a closure to indicate which flow meter is selected.

Controlling and Recording Water Flow

PROBLEM
A process requires a controlled water flow which must also be recorded.

SOLUTION
A linear flow meter and a control valve are installed in the water line. Power for the flow meter is provided by the +18 VDC loop excitation supply available as standard on an **API 7580 G** Field Selectable Isolated Frequency to DC Transmitter module. The **API 7580 G** converts the frequency output of the flow meter to a 4-20 mA signal which is used to control and monitor the flow to the process.



The **API 7580 G** features 30 selectable input ranges from 0-100 Hz to 0-30 KHz, and 16 selectable output ranges. In addition, the optical isolation protects against unwanted ground loops and electrical noise.

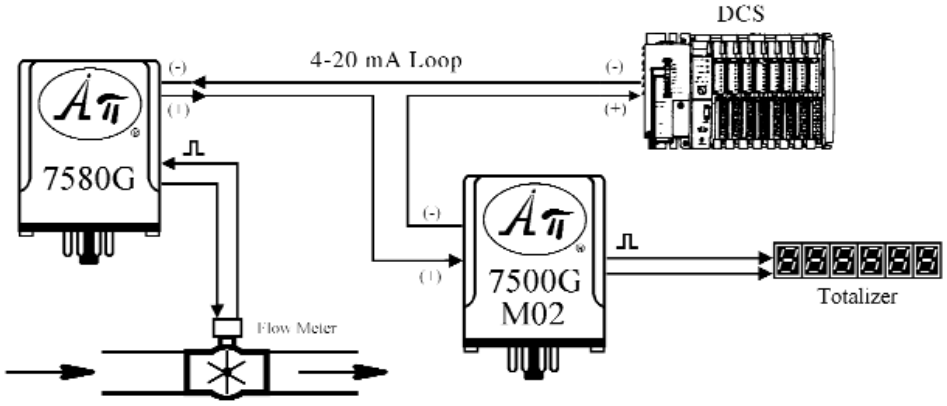
Monitoring and Totalizing Flow Meter Output

PROBLEM

The frequency output signal of a flow meter must be monitored by a DCS as well as a remotely located counter/totalizer. The counter/totalizer accepts a TTL frequency input.

SOLUTION

An **API 7580 G** Isolated Frequency to DC Transmitter module is connected to the frequency output of the flow meter. The **API 7580 G** has a built-in loop power supply to power the current loop.



The **7580 G** converts the frequency to a 4-20 mA output which is sent to the DCS and an **API 7500G M02** mounted near the remote counter/totalizer. The **API 7500 G M02** converts the 4-20 mA signal to a TTL frequency signal for the counter/totalizer.

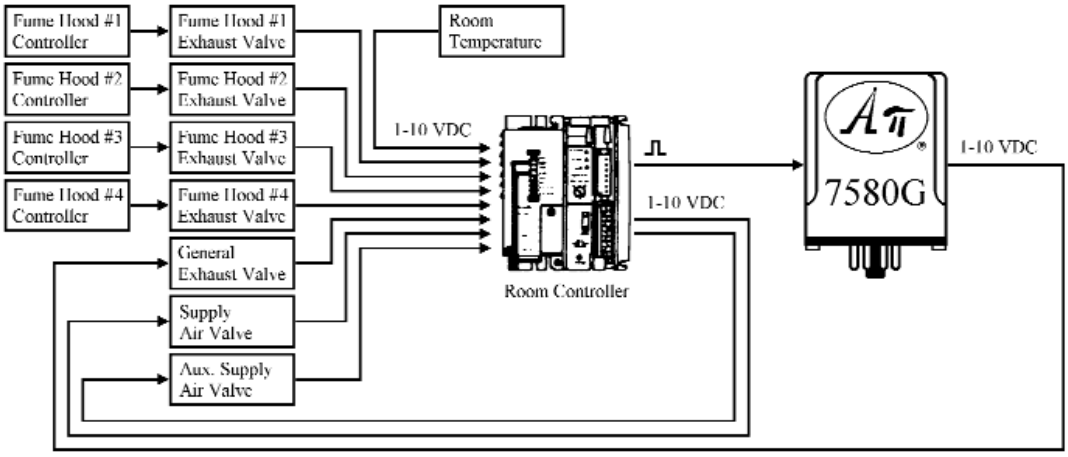
HVAC Variable Air Volume Control

PROBLEM

The constant volume heating, ventilating and air conditioning (HVAC) system for a wet chemistry laboratory is being converted to variable air volume (VAV) to save energy. The amount of air exhausted by four fume hoods in the lab will vary depending upon their sash positions. A room controller must monitor the room temperature, the quantity of air exhausted and the quantity of air supplied, and operate supply air, auxiliary supply air, and general exhaust air valves to maintain room temperature, room pressure and a minimum number of air changes per hour for comfort and safety. The room controller has 8 analog inputs, 2 analog outputs and 1 frequency output, but 3 analog outputs are required.

SOLUTION

The room temperature sensor and valve position feedback potentiometers are monitored by the eight room controller analog inputs, and the supply air and the auxiliary supply air valves are controlled by the two 1-10 VDC analog outputs.



Frequently Asked Questions

We have a PNP proximity sensor powered by the 18 VDC API 7580 G loop supply. It reads the flywheel gear teeth and a sends a frequency signal to the API 7580 G and works fine throughout the range. However, if the wheel is stopped with a tooth in-line with the sensor, the output will stay high (PNP output) and the API 7580 G output will go high to the maximum of the range. How can we prevent this?

The +18 volt loop supply from the **API 7580 G** has a maximum ripple of 1.5 V_{p-p} so the high output from the prox sensor will have this ripple. The signal input to the **7580 G** has a capacitor in series so any DC input charges and then opens the circuit. However, with the ripple, there will be a 50/60 Hertz signal present.

You must use a magnetic pick-up in place of the proximity sensor since the amplitude signal from the magnetic pick-up will decrease as the flywheel slows down and when stopped, there will be no amplitude even with a tooth in-line with the sensor head. The magnetic pick-up generates its own signal as the field changes. When the field stops changing, the signal goes to zero.

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