Frequency to DC Transmitters, Isolated, Factory Ranged

**Model:** API 7010 G

**Input:**
- Precision Frequency to DC Converter
- Plug In Design for Faster Installation
- Full 2000 V Input/Output/Power Isolation
- Input and Output LoopTracker® LEDs
- Functional Test Button
- Built-In Loop Power Supply for Output

**Applications:**
- Monitor and Control Motor or Line Speed
- Convert Speed and Frequency Signals
- Simplify Interfacing of Frequency Sensors

**Frequency Input Range**
Factory configured, please specify input range
Frequency: 0-25 Hz to 0-20 kHz
5 mV ac minimum pulse, 100 mV minimum amplitude change

**Input Amplitude Range**
100 mV to 150 Vrms

**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 Protection**
Normal mode: 200% of input rating
Common mode: 600 VDC or 600 VAC input to ground
System voltages must not exceed socket voltage rating

**Input Power Supply**
18 VDC ±10%, unregulated, 25 mADC, max. ripple, <1.5 V
May be used to power sensor

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

**DC Output Range**
Factory configured, please specify output range
Voltage: 0-1 VDC to 0-10 VDC
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 adjustment range typical

**Output Loop Power Supply**
20 VDC nominal, regulated, 25 mADC, max. ripple <10 mVrms
Order EXTSUP for an unpowered mA output

**Output Test**
Button sets output to test level when pressed
Factory set to approximately 50% of span

**Output Ripple and Noise**
Less than 10 mVrms

**Linearity**
Better than ±0.3% of span

**Ambient Temperature Range and Stability**
−10°C to +60°C operating ambient
Better than ±0.02% of span per °C stability

**Isolation**
2000 Vrms minimum
Full isolation: power to input, power to output, input to output

**Installation Environment**
IP 40, requires installation in panel or enclosure
Use with API 008 or API 008 FS socket
Socket mounts to 35 mm DIN rail or can be surface mounted
UL 508C pollution degree 2 environments or better

**Power**
Standard: 115 VAC ±10%, 50/60 Hz, 2.5 W max.
A230 option: 230 VAC ±10%, 50/60 Hz, 2.5 W max.
P option: 85-265 VAC 50/60 Hz, 60-300 VDC 2.5 W typ.
D option: 9-30 VDC, 2.5 W typical

**Description**
The API 7010 G accepts a frequency input and provides an optically isolated DC voltage or current analog output that is linearly proportional to the input.
The full 3-way (input, output, power) isolation between input and output makes this module useful for ground loop elimination, common mode signal rejection or noise pickup reduction.
Also standard on the API 7010 G is an 18 VDC input excitation supply. If needed, this supply can be used to power a passive sensor, eliminating the need for an additional external power supply.
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.
The API 7010 G can also be used to convert a PLC pulse rate output to a proportional analog signal.

**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 100% of the output span.
The output test button greatly aids in saving time during initial startup and/or troubleshooting.

**Options—add to end of model number**
- EXTSUP: Open collector output when a “sinking” output is required for an external loop supply
- 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 CLP1: Module hold-down spring for high vibration or mobile applications

**Specifications**

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**Order EXTSUP for an unpowered mA output.**
### Module Power
Check model/serial number label for module operating voltage to make sure it matches available power. When using DC power, polarity must be observed. See wiring diagram.

#### Three wire NPN
- Typical wire colors:
  - Signal: Black or White
  - Power (+18 VDC): Brown or Red
  - Common: Blue or Black

See sensor specs for load resistor value, if required

#### Three wire PNP
- Typical wire colors:
  - Signal: Black or White
  - Power (+18 VDC): Brown or Red
  - Common: Blue or Black

See sensor specs for load resistor value, if required

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### Output Calibration
The output range is pre-configured at the factory as specified on your order (at 24°C ±1°C). Top-mounted Zero and Span potentiometers are 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. An accurate frequency calibration source such as a signal generator may be required for calibration.
2. Provide an input to the module equal to the minimum input required for the application. In the most cases the minimum input signal will be 0 Hz.
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. Example: for 4-20 mA output signal, the span control will provide adjustment for the 20 mA or high end of the signal.
4. Set the frequency to the maximum input required for the application. This is generally done using a signal generator.
5. Using an accurate measurement device for the output, adjust the Spn 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 signal, the span control will provide adjustment for the 20 mA or high end of the signal.
6. 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.

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

#### Output Test Function
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. value is factory set to approximately 50% output.

#### Operation
The API 7010 G accepts a frequency input and provides an optically isolated DC voltage or current output that is linearly related to the input. The frequency input can be virtually any type of signal (sine wave, sawtooth, square wave, etc.) as long as there is a sufficient change in amplitude (greater than 100 mV).

The frequency input to the API 7010 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 optocoupler 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.

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### Socket and Mounting
Install in a protective panel or enclosure. Allow space around module for air flow. Use API 008 or API 008 FS socket. See specifications for maximum allowable socket voltages. The socket clips to a standard 35 mm DIN rail or can be mounted to a flat surface.

### Input Wiring
The input range is pre-configured at the factory as specified on your order. Polarity must be observed when connecting the signal output to the load. See the table below and the wiring diagrams at right.

If ordered with a mA output, the API 7010 G provides power to drive the current loop.

If ordered with a mA output and the EXTSUP option, your current loop must provide power to the API 7010 G output.

#### Type of Device for Output
- Measuring/recording device accepts a voltage input.
- Measuring/recording device accepts a mA (current) input and the input is unpowered or passive. API module provides the loop power.
- EXTSUP option. Measuring or recording device accepts a mA (current) input and provides power to the current loop.

#### Input Voltage
- 3 wire NPN current sinking output
- 3 wire PNP current sourcing output
- 2 wire self-generating
- 2 wire or Namur with external power

### Sensor Load
The signal input of the API 7010 G 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 18 VDC power supply is capable of providing 25 mA. A load current range of 3 mA to 25 mA would typically use a 6 kΩ to 720 Ω resistor.

NPN sensors may require an external resistor across sensor signal and sensor power. See sensor manufacturer’s specifications.

PNP sensors may require an external resistor across sensor signal and sensor ground. See sensor manufacturer’s specifications.

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**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. ATTENTION! Eviter 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.

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.

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