Frequency to DC Transmitters, Isolated, Field Rangeable

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 mADC

Quick Link: api-usa.com/7580

- *1 Minute Setup for 30 Input & 18 Output Ranges*
- *External Switches & Tables for Range Selection*
- *Removable Plugs for Faster Installation*
- *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 kΩ nominal (maximum sensitivity)
100 kΩ nominal (minimum sensitivity)

Input Sensitivity/Hysteresis
Multi-turn potentiometer for sensitivity adjustment
Maximum sensitivity: ±25 mV typical
Minimum sensitivity: ±2.5 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 mADC
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 rangeable

Voltage:	0-1 VDC	to	0-10 VDC, 10 mA max
Bipolar voltage:	±1 VDC	to	±10 VDC
Current:	0-2 mADC	to	0-20 mADC
	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 mADC
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
Potentiometer 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

Response Time
Low ranges: 600 milliseconds typical
High ranges: 110 milliseconds typical

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

File E145968
85-265 VAC, 60-300 VDC
UL version available on request

LIFETIME WARRANTY

MADE IN USA

Quick Link
api-usa.com/apps

Free Factory I/O Setup!

1 Minute Setup!

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

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.

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.

How to Order

All models are field rangeable
For APD 7580, specify if UL version is required
Order options and accessories as required
Order D versions for operation on low voltage power

Free factory setup. Please specify on your order
Input range
Output range

Model	Input	Output	Power
APD 7580	Field configurable	Field configurable	85-265 VAC or 60-300 VDC
APD 7580 D	0-100 Hz to 0-30 kHz	voltage or milliamp ranges	9-30 VDC or 10-32 VAC

Option—add to end of model number
U Conformal coating for moisture resistance

Accessory—order as separate line item
API BP4 Spare removable 4 terminal plug, black

ABSOLUTE PROCESS INSTRUMENTS
1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502
api-usa.com

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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.

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 are 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.

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 setting and trim the output signal with the zero and span potentiometers.

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 **A** 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.

Output Switch Settings

1. Set output range **C** and output offset **D** to match your output range.
2. Set the output slide switch **E** to current "I" or voltage "V" depending on output type.

Output	0-1 V	0-2 V	0-4 V	1-5 V	0-5 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
Switches Input	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE	ABCDE
0-100 Hz	L180V	L181V	L182V	L162V	L183V	L185V	L165V	L186V	L1B6V	L1B8V	L180I	L181I	L182I	L162I	L183I	L185I	L165I	L186I
0-200 Hz	L280V	L281V	L282V	L262V	L283V	L285V	L265V	L286V	L2B6V	L2B8V	L280I	L281I	L282I	L262I	L283I	L285I	L265I	L286I
0-300 Hz	L380V	L381V	L382V	L362V	L383V	L385V	L365V	L386V	L3B6V	L3B8V	L380I	L381I	L382I	L362I	L383I	L385I	L365I	L386I
0-400 Hz	L480V	L481V	L482V	L462V	L483V	L485V	L465V	L486V	L4B6V	L4B8V	L480I	L481I	L482I	L462I	L483I	L485I	L465I	L486I
0-500 Hz	L580V	L581V	L582V	L562V	L583V	L585V	L565V	L586V	L5B6V	L5B8V	L580I	L581I	L582I	L562I	L583I	L585I	L565I	L586I
0-600 Hz	L680V	L681V	L682V	L662V	L683V	L685V	L665V	L686V	L6B6V	L6B8V	L680I	L681I	L682I	L662I	L683I	L685I	L665I	L686I
0-700 Hz	L780V	L781V	L782V	L762V	L783V	L785V	L765V	L786V	L7B6V	L7B8V	L780I	L781I	L782I	L762I	L783I	L785I	L765I	L786I
0-800 Hz	L880V	L881V	L882V	L862V	L883V	L885V	L865V	L886V	L8B6V	L8B8V	L880I	L881I	L882I	L862I	L883I	L885I	L865I	L886I
0-900 Hz	L980V	L981V	L982V	L962V	L983V	L985V	L965V	L986V	L9B6V	L9B8V	L980I	L981I	L982I	L962I	L983I	L985I	L965I	L986I
0-1 kHz	LA80V	LA81V	LA82V	LA62V	LA83V	LA85V	LA65V	LA86V	LAB6V	LAB8V	LA80I	LA81I	LA82I	LA62I	LA83I	LA85I	LA65I	LA86I
0-1.1 kHz	LB80V	LB81V	LB82V	LB62V	LB83V	LB85V	LB65V	LB86V	LBB6V	LBB8V	LB80I	LB81I	LB82I	LB62I	LB83I	LB85I	LB65I	LB86I
0-1.2 kHz	LC80V	LC81V	LC82V	LC62V	LC83V	LC85V	LC65V	LC86V	LCB6V	LCB8V	LC80I	LC81I	LC82I	LC62I	LC83I	LC85I	LC65I	LC86I
0-1.3 kHz	L7D0V	LD81V	LD82V	LD62V	LD83V	LD85V	LD65V	LD86V	LDB6V	LDB8V	LD80I	LD81I	LD82I	LD62I	LD83I	LD85I	LD65I	LD86I
0-1.4 kHz	LE80V	LE81V	LE82V	LE62V	LE83V	LE85V	LE65V	LE86V	LEB6V	LEB8V	LE80I	LE81I	LE82I	LE62I	LE83I	LE85I	LE65I	LE86I
0-1.5 kHz	LF80V	LF81V	LF82V	LF62V	LF83V	LF85V	LF65V	LF86V	LFB6V	LFB8V	LF80I	LF81I	LF82I	LF62I	LF83I	LF85I	LF65I	LF86I
0-2 kHz	H180V	H181V	H182V	H162V	H183V	H185V	H165V	H186V	H1B6V	H1B8V	H180I	H181I	H182I	H162I	H183I	H185I	H165I	H186I
0-4 kHz	H280V	H281V	H282V	H262V	H283V	H285V	H265V	H286V	H2B6V	H2B8V	H280I	H281I	H282I	H262I	H283I	H285I	H265I	H286I
0-6 kHz	H380V	H381V	H382V	H362V	H383V	H385V	H365V	H386V	H3B6V	H3B8V	H380I	H381I	H382I	H362I	H383I	H385I	H365I	H386I
0-8 kHz	H480V	H481V	H482V	H462V	H483V	H485V	H465V	H486V	H4B6V	H4B8V	H480I	H481I	H482I	H462I	H483I	H485I	H465I	H486I
0-10 kHz	H580V	H581V	H582V	H562V	H583V	H585V	H565V	H586V	H5B6V	H5B8V	H580I	H581I	H582I	H562I	H583I	H585I	H565I	H586I
0-12 kHz	H680V	H681V	H682V	H662V	H683V	H685V	H665V	H686V	H6B6V	H6B8V	H680I	H681I	H682I	H662I	H683I	H685I	H665I	H686I
0-14 kHz	H780V	H781V	H782V	H762V	H783V	H785V	H765V	H786V	H7B6V	H7B8V	H780I	H781I	H782I	H762I	H783I	H785I	H765I	H786I
0-16 kHz	H880V	H881V	H882V	H862V	H883V	H885V	H865V	H886V	H8B6V	H8B8V	H880I	H881I	H882I	H862I	H883I	H885I	H865I	H886I
0-18 kHz	H980V	H981V	H982V	H962V	H983V	H985V	H965V	H986V	H9B6V	H9B8V	H980I	H981I	H982I	H962I	H983I	H985I	H965I	H986I
0-20 kHz	HA80V	HA81V	HA82V	HA62V	HA83V	HA85V	HA65V	HA86V	HAB6V	HAB8V	HA80I	HA81I	HA82I	HA62I	HA83I	HA85I	HA65I	HA86I
0-22 kHz	HB80V	HB81V	HB82V	HB62V	HB83V	HB85V	HB65V	HB86V	HBB6V	HBB8V	HB80I	HB81I	HB82I	HB62I	HB83I	HB85I	HB65I	HB86I
0-24 kHz	HC80V	HC81V	HC82V	HC62V	HC83V	HC85V	HC65V	HC86V	HCB6V	HCB8V	HC80I	HC81I	HC82I	HC62I	HC83I	HC85I	HC65I	HC86I
0-26 kHz	H7D0V	HD81V	HD82V	HD62V	HD83V	HD85V	HD65V	HD86V	HDB6V	HDB8V	HD80I	HD81I	HD82I	HD62I	HD83I	HD85I	HD65I	HD86I
0-28 kHz	HE80V	HE81V	HE82V	HE62V	HE83V	HE85V	HE65V	HE86V	HEB6V	HEB8V	HE80I	HE81I	HE82I	HE62I	HE83I	HE85I	HE65I	HE86I
0-30 kHz	HF80V	HF81V	HF82V	HF62V	HF83V	HF85V	HF65V	HF86V	HFB6V	HFB8V	HF80I	HF81I	HF82I	HF62I	HF83I	HF85I	HF65I	HF86I

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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.

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.

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

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 a current loop. Determine if your receiving device provides power to the current loop or if the loop must be powered by the APD module.

Use a multi-meter to check for voltage at your device's input terminals. Typical voltage may be 9-24 VDC if it provides power to the loop.

Type of Device for Output	– Terminal	+ Terminal
Measuring/recording device accepts a voltage input.	10 (–)	9 (+) switch E set to "V"
Measuring/recording device accepts a mA (current) input and the input is unpowered or passive. APD module provides the loop power.	10 (–)	9 (+20 V) switch E set to "I"
Measuring/recording device accepts a mA (current) input and provides power to the current loop.	11 (–)	10 (+) switch E set to "I"

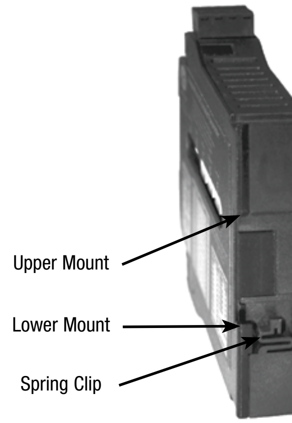
Module Power

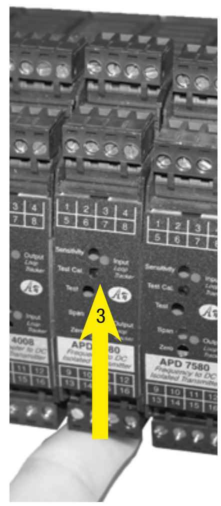
Check model/serial number label for module operating voltage to make sure it matches available power.

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.



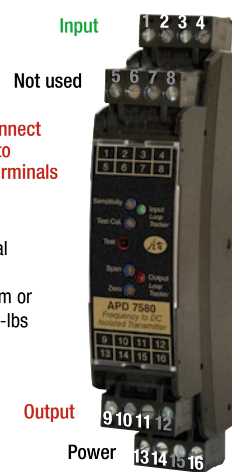


1. Tilt front of module downward and position against DIN rail.
2. Clip Lower Mount to bottom edge of DIN rail.
3. Push front of module upward until Upper Mount snaps into place.

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.

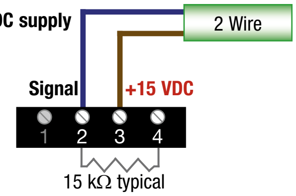


Do not connect anything to unused terminals

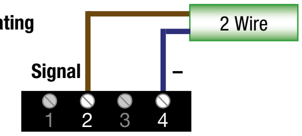
Wire terminal torque
0.5 to 0.6 Nm or
4.4 to 5.3 in-lbs

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

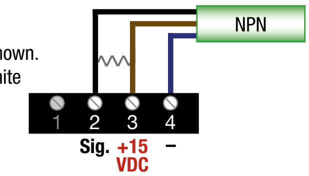
Some sensors may require a bleed resistor. See sensor mfr. specs.



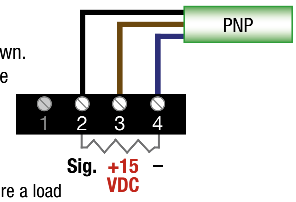
Two wire self-generating
2 Signal (+)
4 Common (–)



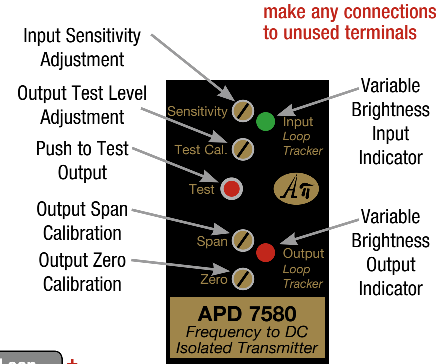
Three wire NPN
Typical wire colors shown.
2 Signal, Black or White
3 Power (+15 VDC) Brown or Red
4 Common (–) Blue or Black
Some sensors may require a load resistor. See sensor mfr. specs. and Sensor Load section at left.

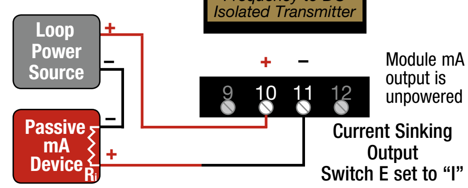


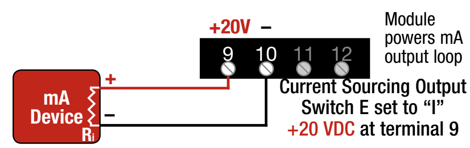
Three wire PNP
Typical wire colors shown.
2 Signal, Black or White
3 Power (+15 VDC) Brown or Red
4 Common (–) Blue or Black
Some sensors may require a load resistor. See sensor mfr. specs. and Sensor Load section at left.

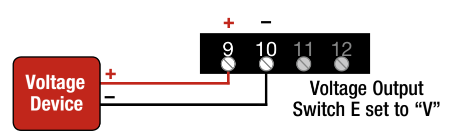


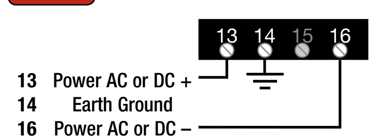
To avoid damage to the module, do not make any connections to unused terminals











Cu 60/75°C conductors 14 AWG max.

To maintain full isolation avoid combining power supplies in common with input, output, or unit power.

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Output Calibration

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 the 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.

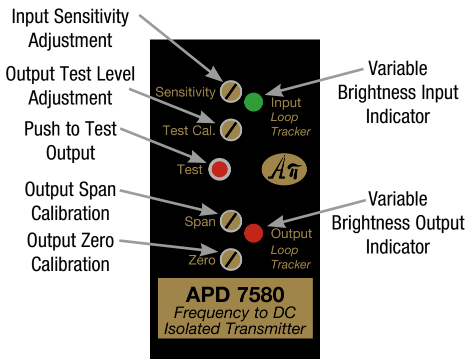
When fully clockwise (maximum sensitivity), the input threshold is typically ±25 mV.

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.