

## 4-20 mA Transmitter, Isolated

API 4300 PLC, API 4300 D PLC



**Input:** 4-20 mA DC Sink or Source

**Output:** 4-20 mA DC Sink or Source

- Input and Output Configurable for Sink or Source
- Built-In Loop Power Supplies for Input and Output
- Full 2000 V Input/Output/Power Isolation
- Input and Output LoopTracker® LEDs
- Local or Remote Functional Output Test

### Applications

- Isolate Single-Ended Inputs, Eliminate PLC/DCS Ground Loops
- Isolate and Correct Sink-Sink or Source-Source Mismatches
- Use with Allen Bradley, GE/Fanuc, IDEC, Omron, Mistubishi, Modicon, Siemens, Panasonic, Honeywell Analog Inputs

Solve isolation and ground loop problems when using PLCs that have single-ended (common ground) 4-20 mA inputs. This often results in erroneous and unpredictable input signals to the PLC due to varying ground potentials in the system. Full 3-way (power/input/output) isolation can eliminate ground loop problems and restore proper PLC function. Use with either passive or powered 4-20 mA signal sources and be connected to PLC 4-20 mA inputs that are either powered or passive.

### Specifications

#### Input Range

4-20 mA DC  
Configurable for sinking (unpowered) or sourcing (powered) input depending on input terminal connections  
Maximum range approximately 3 mA to 23 mA

#### Input Voltage Burden

1.25 VDC maximum

#### Input Impedance

50 Ω typical

#### Output Zero and Span

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

#### Input Loop Power Supply

15 VDC nominal, regulated, 25 mA DC, max. ripple, less than 1.5 V<sub>p-p</sub>

#### LoopTracker

Variable brightness LEDs indicate input/output loop level and status

#### Output Range

4-20 mA DC  
20 V compliance, 1000 Ω at 20 mA  
Configurable for sinking (unpowered) or sourcing (powered) output depending on output terminal connections  
Maximum range approximately 3 mA to 23 mA

#### Output Linearity

Better than ±0.1% of span

#### Output Ripple and Noise

Less than 10 mV<sub>RMS</sub>

#### Functional Output Test

Output is set to test level when activated  
Factory set to approximately 50% of span  
Output test level adjustable 0-100% of span via Cal. potentiometer  
Momentary contact front Test button or customer-supplied external switch via terminals 4 and 6

#### Response Time

70 milliseconds typical

#### Common Mode Rejection

120 dB minimum

#### Isolation

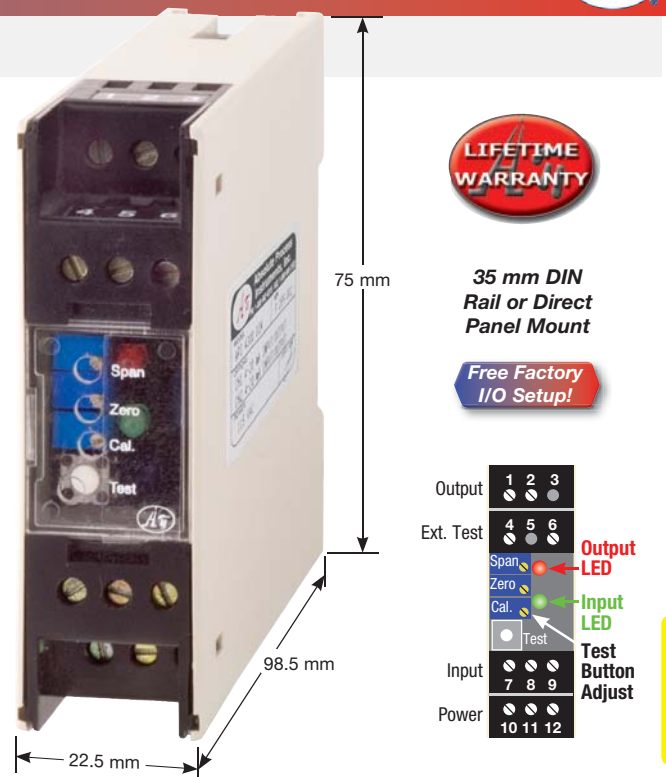
2000 V<sub>RMS</sub> minimum  
Full isolation: power to input, power to output, input to output

#### Ambient Temperature Range and Stability

-10°C to +60°C operating ambient  
Better than ±0.04% of span per °C stability

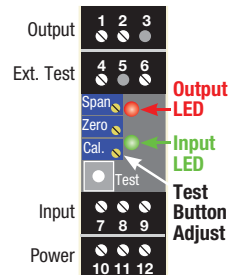
#### Power

Standard: 85-265 VAC/VDC  
D option: 9-30 VAC/VDC



35 mm DIN Rail or Direct Panel Mount

Free Factory I/O Setup!



DC Input

### Description and Features

The API 4300 PLC and API 4300 D PLC accept a 4-20 mA DC current input and provide an optically isolated 4-20 mA DC current output that is linearly related to the input. Typical applications include signal isolation and ground loop elimination when using PLCs with single-ended (common ground) inputs. Full 3-way isolation (input, output, power) also makes this module useful for common mode signal rejection and noise pickup reduction.

The API 4300 PLC and API 4300 D PLC have built-in 15 VDC loop excitation supplies for both the input and the output. Use of these loop power supplies is optional depending on how the unit is connected.

The unit's input power supply can be used to power passive 4-20 mA input devices. If the input device provides its own power to the input loop, the non-powered input wiring terminals can be used.

The unit's output power supply can be used to power a passive 4-20 mA PLC input loop. If the PLC already provides power to the loop, the non-powered output terminals can be used.

This often eliminates the need for an additional external power supply and additionally can provide a simple isolated solution for incompatible sink-sink and source-source I/O configurations.

API exclusive features include two LoopTracker LEDs and a Functional Output Test. 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 Output Test provides a fixed output (independent of the input) when activated. The test output level can be set to the desired level via the Cal. potentiometer. It operates using either the front Test push button or an external contact closure across terminals 4 and 6. This makes it useful as a manual override controllable from a remote location or by the PLC.

Both the LoopTracker LEDs and Functional Output Test greatly aid in saving time during initial startup and/or troubleshooting.

### Models, Options & Accessories

Factory Configured—Please specify model and options

**API 4300 PLC** 4-20 mA isolated transmitter, 85-265 VAC/VDC powered

**API 4300 D PLC** 4-20 mA isolated transmitter, 9-30 VAC/VDC powered

Options—Add to end of model number, see price list for adder

- DF** Fast response, 1 millisecond nominal response time
- M01** Input/output reversal, 4-20 mA in to 20-4 mA out
- U** Conformal coating for moisture resistance

Accessories—Order as separate line item

**API TK36** DIN rail, 35 mm W x 39" L, aluminum



## RANGE

The API 4300 PLC and API 4300 D PLC accept a 4-20 mA DC current input and provide an optically isolated 4-20 mA DC current output that is linearly related to the input. The versatility of the API 4300 PLC and API 4300 D PLC allows connection to active and passive 4-20 mA sources.

## ELECTRICAL CONNECTIONS

**WARNING!** All wiring must be performed by qualified personnel only. This module uses an industry-standard DIN rail mount. Order API TK36 DIN rail separately.

### Power Input Terminals

The label on the side of the API module will indicate the power requirements. Power is connected to terminals 10 and 12. When using DC power, either polarity is acceptable, but for consistency with similar API products, negative (-) can be wired to terminal 10 and positive (+) can be wired to terminal 12.

### Sink vs. Source

When connecting 4-20 mA devices it is important to keep in mind which device will provide power the current loop. A transmitter that has a powered current output (typically a 4-wire transmitter) sources current and is connected to a receiving device that sinks current. A passive transmitter (typically a 2-wire transmitter) sinks current and is connected to a receiving device that sources current.

Similarly, a PLC input that is passive or unpowered must be connected to a transmitter that provides power to the loop. A PLC input that provides power to the loop must be connected to a transmitter that has a passive output.

In the following wiring instructions sink/source is from the reference point of the API 4300.

### Current Sinking Input (7-, 8+)

Your transmitter or sensor provides power to the API 4300 input loop. Polarity must be observed when connecting the signal input. The negative (-) connection is made to terminal 7 and the positive connection (+) is made to terminal 8.

### Current Sourcing Input (8-, 9+)

Your transmitter or sensor is a passive device and the API 4300 input loop provides the power to it. Polarity must be observed when connecting the signal input. Your passive input device is powered by the 15 volt DC power supply at terminal 9. The negative (-) connection is made to terminal 8 and the positive connection (+) is made to terminal 9.

### Current Sinking Output (2+, 3-)

Your PLC or receiving device provides power to the loop and the API 4300 output acts as a passive device. Polarity must be observed when connecting the signal output. The negative (-) connection is made to terminal 3 and the positive connection (+) is made to terminal 2.

### Current Sourcing Output (1+, 2-)

Your PLC or receiving device has a passive input and the API 4300 output provides power to the loop. Polarity must be observed when connecting the signal input. Your passive input device is powered by the 15 volt DC power supply at terminal 1. The negative (-) connection is made to terminal 2 and the positive connection (+) is made to terminal 1.

### External Test Switch (4, 6)

A customer-supplied external switch can be used across terminals 4 and 6 to remotely operate the Functional Output Test. Do not apply power to these terminals.

## CALIBRATION

Input and output ranges are pre-configured at the factory for 4-20 mA. Front-mounted Zero and Span potentiometers can be used should fine-tuning be necessary.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Using an accurate 4-20 mA calibration source, provide a 4 mA input to the module.
3. Using an accurate milliamp meter for the output, adjust the Zero potentiometer for 4 mA output. The Zero control should only be adjusted when the input signal is at its minimum.
4. Set the input to 20 mA
5. Using an accurate milliamp meter for the output, adjust the Span potentiometer for 20 mA output. The Span control should only be adjusted when the input signal is at its maximum.
6. Repeat adjustments for maximum accuracy.

## FUNCTIONAL OUTPUT TEST

The Functional Output Test may be used to drive the device on the output side of the loop (a PLC, panel meter, chart recorder, etc.) with a known good signal. This can be used as a system diagnostic aid during initial start-up or during troubleshooting.

Press the Test button to set the output to the test level. When the button is released, the output will return to normal. It can also operate using an external contact closure across terminals 4 and 6.

The test signal level is factory set to approximately 12 mA. The front-mounted Cal. potentiometer can be used to adjust the test level from approximately 4 to 20 mA. Connect a mA meter to the output, hold the test button and turn the Cal. potentiometer to set the test level to the desired value.

## OPERATION

The API 4300 PLC and API 4300 D PLC accept a 4-20 mA DC current input and provide an optically isolated 4-20 mA DC current output that is linearly related to the input. The input is filtered, isolated, and passed to the output stage.

### GREEN LoopTracker® Input LED

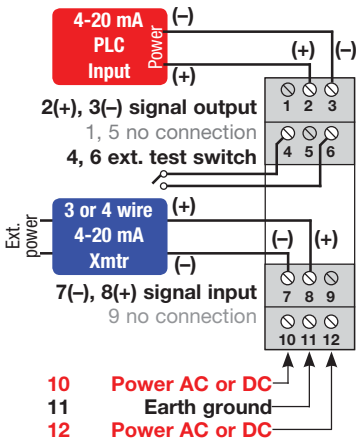
Provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum. If the LED fails to illuminate, or fails to change in intensity as the process changes, 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.

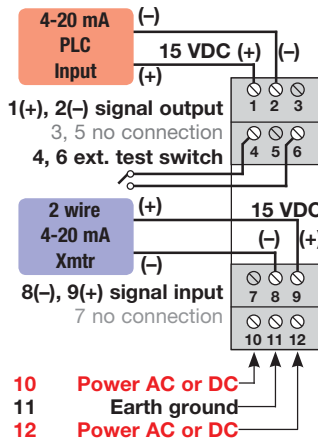
DC Input

API 4300 PLC, API 4300 D PLC  
current sinking output  
current sinking input



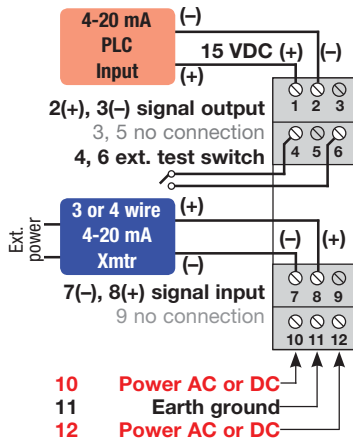
API 4300 PLC: Powered by 85-265 VAC/VDC

API 4300 PLC, API 4300 D PLC  
current sourcing output  
current sourcing input



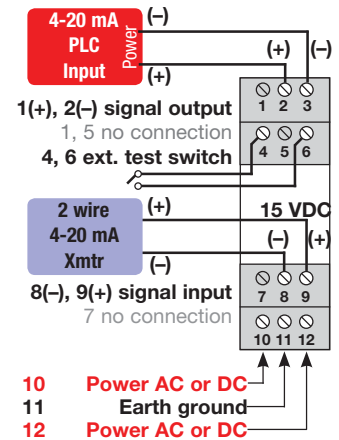
API 4300 D PLC: Powered by 9-30 VAC/VDC

API 4300 PLC, API 4300 D PLC  
current sourcing output  
current sinking input



API 4300 PLC: Powered by 85-265 VAC/VDC

API 4300 PLC, API 4300 D PLC  
current sinking output  
current sourcing input



API 4300 D PLC: Powered by 9-30 VAC/VDC

API maintains a constant effort to upgrade and improve its products. Specifications are subject to change without notice. Consult factory for your specific requirements.