Potentiometer to DC Transmitters

API 4003 G
API 4003 G I

Input: ***100 Ω to 1 MΩ Potentiometers***
Output: ***0-1 V to ±10 VDC or 0-1 mA to 4-20 mA***

API 4003 G: ***Non-Isolated***
API 4003 G I: ***Full Isolation***

- ***Accepts Wide Range of Potentiometer Types***
- ***Voltage or Currents Outputs***
- ***Input and Output LoopTracker® LEDs***
- ***Functional Test Pushbutton***



LIFETIME WARRANTY

Free Factory Input & Output Calibration!

Applications

- **Over, Under, Out-of-Range Position Monitoring**
- **Remote Control of Positioning Devices**
- **Simplify Control of Potentiometer Outputs**

Specifications

Potentiometer Range
Minimum: 0-100 Ω
Maximum: 0-1.0 MΩ
Full travel of the potentiometer is required
Consult factory for other ranges and configurations
System voltages must not exceed socket voltage rating

Input Impedance
100 Ω thru 1.0 MΩ

LoopTracker
Variable brightness LEDs indicate input/output loop level and status

Output Range
Factory Configured—Please specify output range

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

Consult factory for special ranges

Output Zero and Span
Multiturn potentiometers to compensate for load and lead variations
±15% of span adjustment range typical

Output Linearity
Better than ±0.1% of span

Common Mode Rejection
100 dB minimum

Output Ripple and Noise
Less than 10 mV_{RMS}

Functional Test Button
Sets output to test level when pressed
Potentiometer factory set to approximately 50% of span
Adjustable 0-100% of span

Response Time
70 milliseconds typical

Isolation
API 4003 G Isolation to 2000 V_{RMS} min., power to input, power to output
API 4003 G I Full isolation to 2000 V_{RMS} min., power to input, power to output, input to output

Ambient Temperature Range
–10°C to +60°C operating

Temperature Stability
Better than ±0.02% of span per °C

Power
Standard: 115 VAC ±10%, 50/60 Hz, 2.5 W max. (std.)
A230 option: 230 VAC ±10%, 50/60 Hz, 2.5 W max.
D option: 9-30 VDC, 2.5 W typical

Description and Features

The **API 4003 G** and **API 4003 G I** accept a potentiometer (slidewire) input and provide a DC voltage or current output that is linearly related to the potentiometer position. These modules accept resistance inputs from position, displacement or rotational devices and convert them to conventional output signals.

The **API 4003 G** is not isolated from the potentiometer input to the output and is used primarily to convert and/or boost the potentiometer signal. The **API 4003 G I** is optically isolated from input to output making it the preferred choice in applications requiring ground loop elimination, common mode signal rejection or noise pickup reduction.

Both the **API 4003 G** and **API 4003 G I** require factory configuration to a specific DC voltage or current output and power. Inputs from any potentiometer with a value of 0 to 100 Ω through 0 to 1 MΩ are accepted without requiring recalibration and without affecting accuracy as long as 100% of the potentiometer range is used. Models with offsets and/or input ranges other than 0 to 100% of the potentiometer are available. Consult factory for assistance.

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 output test level is adjustable 0-100% of span. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting.

The **API 4003 G** and **API 4003 G I** plug into an industry standard 8-pin octal socket sold separately. Sockets **API 008** and finger-safe **API 008 FS** allow either DIN rail or panel mounting.

Models & Options

Factory Configured—Please specify output range, and options.
Consult factory for offset inputs using <100% of the potentiometer range.

API 4003 G	Potentiometer to DC transmitter, non-isolated, 115 VAC
API 4003 G I	Potentiometer to DC transmitter, isolated, 115 VAC

Options—Add to end of model number

A230	Powered by 230 VAC, 50/60 Hz
D	Powered by 9-30 VDC
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 TK36	DIN rail, 35 mm W x 39" L, aluminum

© Absolute Process Instruments, Inc. 11/04 LoopTracker–Reg TM Absolute Process Instruments, Inc.

MOD-TRONIC INSTRUMENTS LIMITED
1 Delta Park Blvd #12
Brampton, ON L6T 5G1
905-457-6322 or 800-794-5883
www.mod-tronic.com

Potentiometer

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.

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.

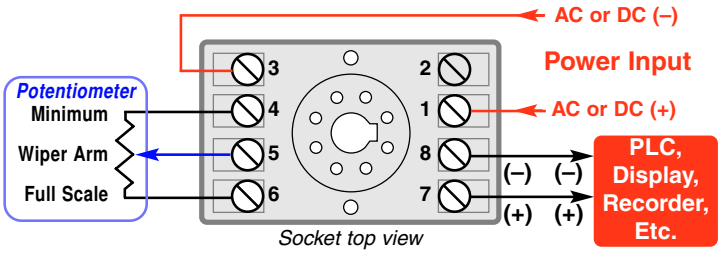
For DC powered modules, polarity **MUST** be observed. Positive (+) is wired to terminal 1 and negative (–) is wired to terminal 3.

Potentiometer Input – The connections are made to the 8-pin socket. You may wish to check the potentiometer with an ohmmeter before connecting since device wiring may vary.

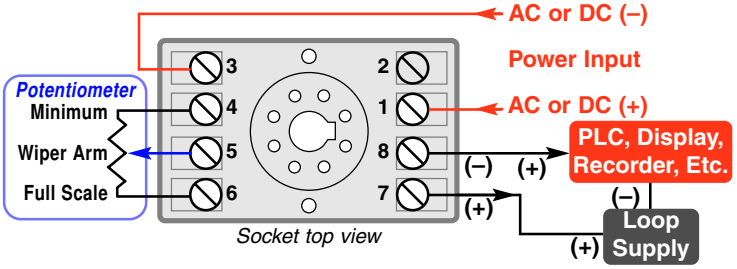
The 0 Ohm side of the potentiometer is connected to terminal 4. The potentiometer wiper arm is connected to terminal 5. The full-scale side of the potentiometer is connected to terminal 6.

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.

Note that with current outputs the module provides power to the output loop unless option **EXTSUP** was ordered for a sinking output requirement.



API 4003 G and API 4003 G I typical output wiring



API 4003 G EXTSUP and API 4003 G I EXTSUP typical output wiring

CALIBRATION

The API 4003 G and API 4003 G I come from the factory calibrated to your specifications. Field calibration is typically not required, however, Zero and Span potentiometers are available to fine-tune the module output to compensate for applications where, for mechanical reasons, the potentiometer cannot be set exactly to 0 Ω and/or 100% of travel. Input ranges that use only a part of the potentiometer range may require factory modification. Consult the factory for assistance with your specific application.

The API 4003 G and API 4003 G I outputs are factory configured to your exact requirements. The output range is listed on module label. The top-mounted, Zero and Span potentiometers can be used to fine-tune the output if necessary.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Using an accurate resistance calibration device, provide an input to the module equal to the minimum input required for the application.
3. Connect an accurate measurement device to 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 to produce the corresponding minimum output signal. Example: for a 4-20 mA output signal, the Zero control will allow adjustment of the 4 mA or low end of the signal.
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. Example: for 4-20 mA output signal, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. Repeat adjustments for maximum accuracy.

TEST BUTTON & TEST RANGE

The Test pushbutton may be set to provide the desired output when depressed. This will drive the 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. It can be adjusted to vary the output signal from 0 to 100% of the calibrated output range. When released, the output will return to normal.

Turn the multi-turn Test Range potentiometer while holding the Test Switch depressed until the desired output test level is reached.

Example: If you are isolating a 4-20 mA current loop, when the pushbutton is held depressed, the output from the module will be a constant signal between 4 and 20 mA depending on the setting of the Test Range adjustment pot.

OPERATION

The API 4003 G and API 4003 G I are factory configured to your exact requirements. The input circuitry in both models provides a constant-voltage excitation source to the potentiometer. This excitation voltage is stabilized against potentiometer value variations over the entire operating range.

In the API 4003 G I, the potentiometer signal first passes through an optical isolator, then is passed to the output stage where it is scaled to the desired output range.

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.

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.

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

MOD-TRONIC INSTRUMENTS LIMITED
1 Delta Park Blvd #12
Brampton, ON L6T 5G1
905-457-6322 or 800-794-5883
www.mod-tronic.com

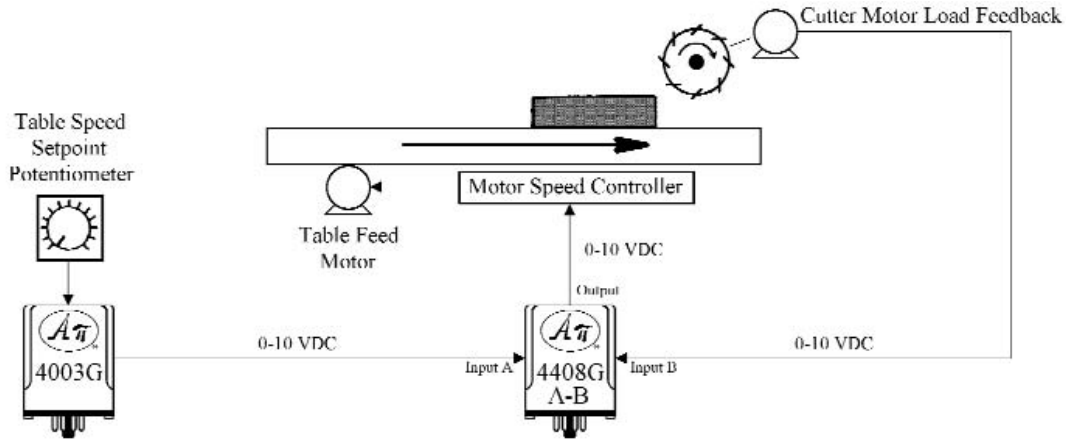
Automation of a Milling Machine Operation

PROBLEM

The optimum speed at which material is fed into a mill cutter is dependent on several factors. Included among these factors is the amount of material to be removed, the density and hardness of the material and the sharpness of the cutter. Ideally, these remain constant and the feed rate can be set and maintained throughout the operation. In the real world, however, material size, shape, density and hardness can vary greatly, and cutters become dull with use. These changes affect the load on the motor driving the mill cutter and a feedback signal of this load can be used to adjust the feed rate to compensate.

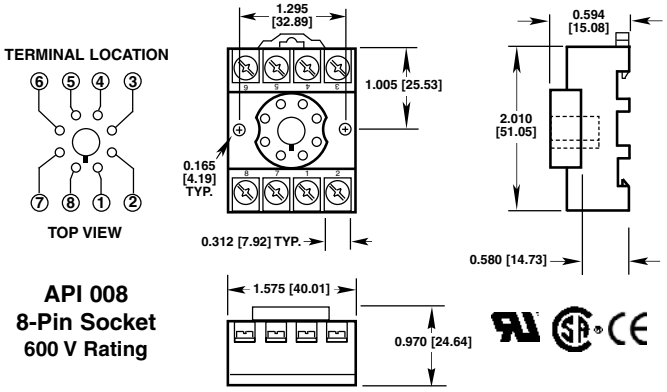
SOLUTION

On a milling machine equipped with load feedback on the cutter, an effective automatic table feed control system can be implemented using an **API 4003 G** Potentiometer to DC Transmitter module for a speed reference signal. An **API 4408 G** A-B Math Function with Isolated DC Output module is used to reduce the speed command to the table motor controller as cutter load increases.

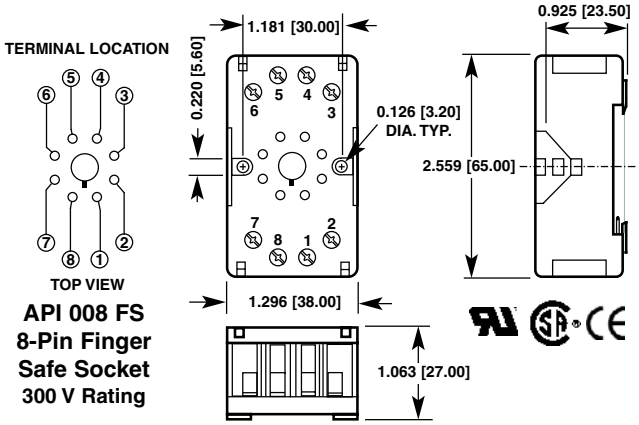


Here, the milling machine is equipped with a controller that accepts a 0-10 VDC input to vary the speed of the moving table. It is also equipped with a 0-10 VDC output signal which is directly proportional to the load on the cutter. The **API 4003 G** sets the maximum speed of the table with no load on the cutter. The **API 4408 G** subtracts the load feedback signal from the maximum table speed signal and sends the resulting signal to the table motor speed controller. Thus, the speed of the table is reduced as the load on the cutter increases, compensating for variations in material shape, density and hardness, as well as cutter sharpness.

API Sockets API 008 and API 008 FS



API 008
8-Pin Socket
600 V Rating



API 008 FS
8-Pin Finger Safe Socket
300 V Rating



FREE APPLICATION ASSISTANCE
Call Customer Service
800-794-5883

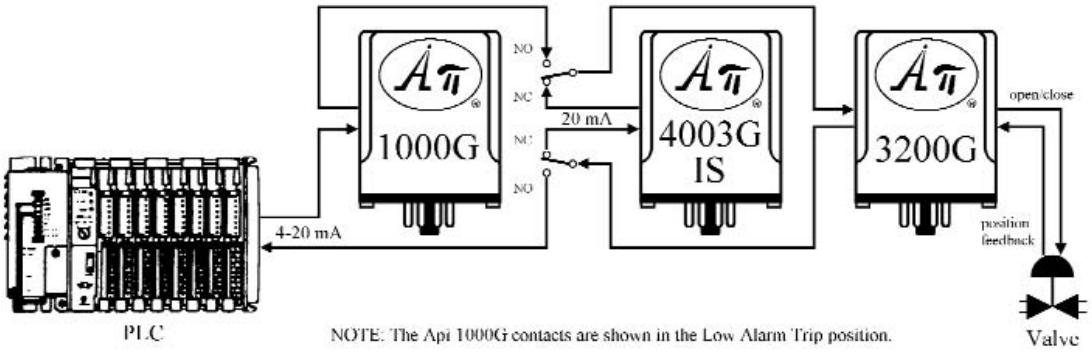
MOD-TRONIC INSTRUMENTS LIMITED
1 Delta Park Blvd #12
Brampton, ON L6T 5G1
905-457-6322 or 800-794-5883
www.mod-tronic.com

© Absolute Process Instruments, Inc. 11/04 LoopTracker–Reg TM Absolute Process Instruments, Inc.

Fail Safe Valve Control

PROBLEM
For safety reasons an automated normally closed valve used in a coal mining operation must go to the full open position if the control signal from the programmable logic controller (PLC) is lost.

SOLUTION
The valve is controlled by an **API 3200 G** Valve/Actuator Positioner/Controller module. The input to the **API 3200 G** comes through an **API 1000 G** DC Input Single Alarm Trip module, which selects either the PLC output or a constant 20 mA output from an **API 4003 GIS** DC Special Transmitter module.

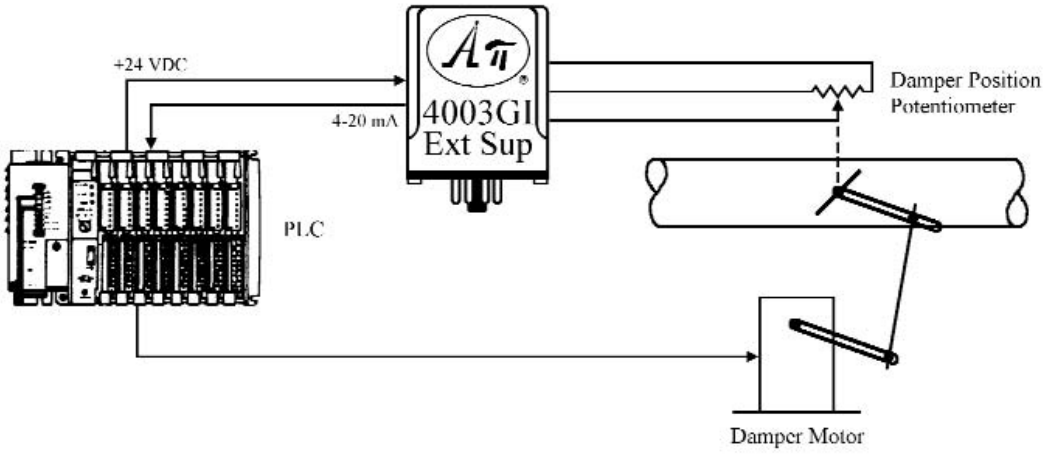


If the signal from the PLC drops below 4 mA, the **API 1000 G** will trip to a low alarm state, and select the 20 mA signal for the **API 3200 G**, thus commanding the valve to open fully. When the signal from the PLC is 4 mA or greater, the **API 1000 G** selects the PLC output signal for the **API 3200 G**, thus controlling valve position as normal.

Controlling Damper Position

PROBLEM
A programmable logic controller (PLC) is controlling a damper motor as part of a process. The damper is equipped with a linear potentiometer for position feedback, and the PLC has a single-ended 4-20 mA input and generates its own 24 VDC power for the loop.

SOLUTION
An **API 4003 G I EXTSUP** Isolated Potentiometer to DC Transmitter module with External Supply modification measures the resistance of the damper position feedback potentiometer and transmits it to the PLC's powered input as a 4-20 mA signal.



The external supply modification uses the +24 VDC power supplied by the PLC and regulates the 4-20 mA signal. The 2000 VRMS isolation protects against unexpected ground loops and electrical noise.



FREE APPLICATION ASSISTANCE
Call Customer Service
800-794-5883

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

MOD-TRONIC INSTRUMENTS LIMITED
1 Delta Park Blvd #12
Brampton, ON L6T 5G1
905-457-6322 or 800-794-5883
www.mod-tronic.com