DC to DC Isolator and Transmitter

API 4300 G

DC Input

Input: ***0-100 mV to 0-500 VDC, Bipolar Voltages, 0-1 mA to 0-900 mADC***

Output: ***0-1 V to ±10 VDC or 0-1 mA to 4-20 mA Fully-Isolated***

- ***Full 2000 V Input/Output/Power Isolation***
- ***Factory Set Custom Input and Output Ranges***
- ***Input and Output LoopTracker® LEDs***
- ***Functional Test Pushbutton***
- ***Built-In Loop Power Supply***

Applications

- **Convert, Boost, Rescale Process Signals**
- **Interface Process Signals with Panel Meters, Recorders, Data Acquisition Cards, PLCs, DCS Systems, SCADA Systems**

Specifications

Input Ranges

Factory Configured—Please specify output range or consult factory
See table on other side for common ranges

	Minimum	Maximum
Voltage:	0-100 mVDC	0-500 VDC with API 008 socket only
Bipolar Voltage:	±100 mVDC	±10 VDC
Current:	0-1 mADC	0-900 mADC

System voltages must not exceed socket voltage rating

Input Impedance (Voltage)

200 kΩ minimum

Input Voltage Burden (Current)

1.25 VDC maximum

Output Zero and Span

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

Input Loop Power Supply

18 VDC nom., 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

Factory Configured—Please specify output range or consult factory

	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

Output Linearity

Better than ±0.1% of span

Output Ripple and Noise

Less than 10 mV_{RMS}

Functional Test Button

Sets output to test level when pressed. Factory set to approx. 50% of span.

Response Time

70 milliseconds typical

Common Mode Rejection

120 dB minimum

Isolation

2000 V_{RMS} 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:	115 VAC ±10%, 50/60 Hz, 2.5 W max.
A230 option:	230 VAC ±10%, 50/60 Hz, 2.5 W max.
D option:	9-30 VDC, 2.5 W typical

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LIFETIME WARRANTY

Free Factory Input & Output Calibration!

Description and Features

The **API 4300 G** accepts a DC voltage or current input and provides an optically isolated DC voltage or current output that is linearly related to the input. Typical applications include signal isolation, conversion, boosting or a combination of the three. Full 3-way isolation (input, output, power) makes this module useful for ground loop elimination, common mode signal rejection or noise pick-up reduction.

The **API 4300 G** is factory configured to customer requirements. Common ranges as well as custom ranges 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 is fixed at 50% of output span. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting.

Also standard on the **API 4300 G** is an 18 VDC unregulated loop excitation supply. This supply can be used to power passive input devices, often eliminating the need for an additional external power supply.

The **API 4300 G** plugs 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 input/output ranges and options

API 4300 G	DC to DC isolated transmitter, w. loop power supply, 115 VAC

Options—Add to end of model number

A230	Powered by 230 VAC, 50/60 Hz
D	Powered by 9-30 VDC
5A	Up to 5 amp DC input with socket and 25 W shunt
DF	Fast response, 1 millisecond nominal response time
HC	High current output, >20 mA to 50 mADC
BP	±1 mA bipolar output current
M01	Input/output reversal, such as 4-20 mA in to 20-4 mA out
M09	High voltage output to 24 VDC
EXTSUP	Open collector output when a “sinking” output is required
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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RANGES

Listed below are commonly ordered input and output ranges. Consult factory for other available ranges. Contact factory for special ranges.

When a current output is ordered, it provides power to the output current loop (sourcing). If an unpowered (sinking) current output is required, order the API 4300 G EXTSUP with open collector output.

Common Voltage Inputs	
0 to 100 mV	0 to 50 V
0 to 200 mV	0 to 100 V
0 to 500 mV	±100 mV
0 to 1 V	±200 mV
0 to 2 V	±500 mV
0 to 5 V	±1 V
1 to 5 V	±2 V
0 to 10 V	±5 V
0 to 20 V	±10 V
Common Current Inputs	
0 to 1 mA	0 to 100 mA
0 to 10 mA	0 to 200 mA
0 to 20 mA	0 to 500 mA
4 to 20 mA	
10 to 50 mA	

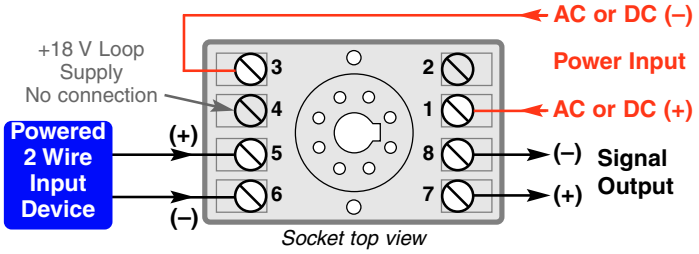
Common Voltage Outputs
0 to 1 V
0 to 5 V
1 to 5 V
0 to 10 V
±5 V
±10 V
Common Current Outputs
0 to 20 mA
4 to 20 mA

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.

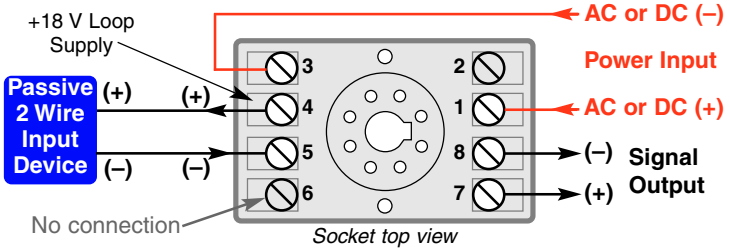
Power Input Terminals – The white label on the side of the API module will indicate the power requirements. AC power is connected to terminals 1 and 3. For DC powered modules, polarity **MUST** be observed. Positive (+) is wired to terminal 1 and negative (–) is wired to terminal 3.

Powered Signal Input – Polarity must be observed when connecting the signal input. The positive connection (+) is applied to terminal 5 and the negative (–) is applied to terminal 6.



Connecting an input device which provides power to the input circuit

Passive Signal Input – 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. This may save the expense of purchasing a separate power supply for the input device. A typical example is shown, however it is very important to consult the manufacturer of your specific sensor to determine its compatibility and proper wiring.



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

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. Output is powered unless option EXTSUP was ordered for a sinking output requirement.

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

CALIBRATION

Input and output ranges are pre-configured 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 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. Example: for 4-20 mA output signal, the Zero control will provide adjustment for 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

The Test pushbutton may be used to 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. This test signal is factory set to approximately 50% of the calibrated output range. When the button is released, the output will return to normal.

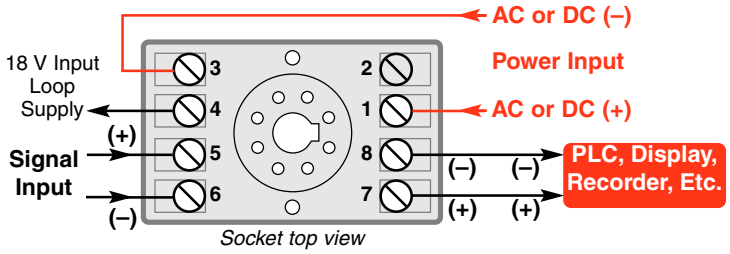
Example: If you are checking a 4-20 mA current loop, when the pushbutton is held depressed, the output from the module will be approximately 12 mA.

OPERATION

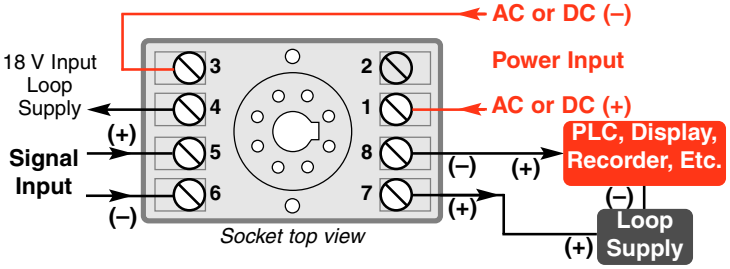
The API 4300 G is factory configured to your exact input and output requirements. The input is filtered, either amplified or attenuated as required, then passed through to the output stage.

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.



API 4300 G typical output wiring



API 4300 G EXTSUP typical output wiring

Frequently Asked Questions

Do you have a 4-20 mA DC transmitter that can operate a load of 1800 to 2000 ohms?

The **API 4300 G** with a 4-20 mA output can operate a maximum load of 1000 ohms maximum with its 20 Volt compliance. To control a load of 1800-2000 ohms, you can use the **API 4300 G EXTSUP**. A 42 Volt power supply is required for the 1800 ohm load, and a 48 Volt power supply is required for the 2000 ohm load. The power supply voltage can not be less than these requirements or there will not be enough power to reach 20 mA. Also, the power supply can not be more than these requirements or the **API 4300 G EXTSUP** will be damaged.

We need a 0-10 VDC input with a 0-10 VDC output and be able to adjust the output down to any lower value from the linearized output, for example, if the input is 8 V, then the output can be 8 V or less. Is this possible?

Yes. Use the **API 4300 G** set up for 0-10 VDC in and 0-10 VDC output with a 10K ohm potentiometer at the signal input. One side of the pot would wire to the (+) signal, the other side of the pot. would wire to the (–) signal and terminal 6, then wire the wiper from the pot to terminal 5 of the module.

Do you have a signal conditioner that will accept a 0-5 VDC input and provide an output of 0-500 mVDC?

Yes, the **API 4300 G** with these ranges specified at the time of ordering.

Can we use the API 4300 G for an input signal of 500 VDC with the negative side of the signal floating and not at true ground?

It depends. The socket is rated to 600 VDC maximum. So with true ground on the socket at the output side, no other point on that socket can be above 600 VDC. Even though the **API 4300 G** is isolated and the input will accept the 500 VDC differential between terminals 5 and 6, the socket rating is between two points anywhere on the surface.

We would like to use the API 4380 G DF for the 100 microsecond response time but need an input range of 0 to 25 mV. Can you do this?

Yes, however the unit will be fixed for that input and the specified output. It will not be field selectable. The new part number will be **API 4300 G M80**. The **API 4300 G** does not offer a response time as fast as the **API 4380** product.

What is the maximum current allowed for the 18 VDC unregulated loop power supply and what does the waveform look like?

The maximum current is 25 mA and the waveform is a filtered full wave rectified +18 V with a maximum ripple of 1.5 $V_{p\text{-}p}$.

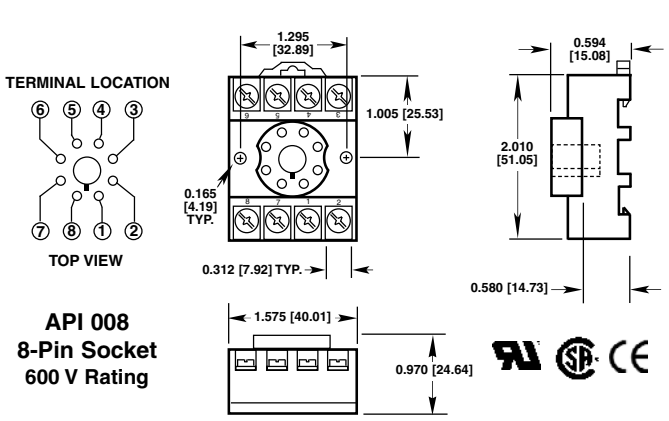
We are using a DCS system that requires a 4-20 mA isolated input that also provides 24 VDC to power the loop. Do you have an isolated signal conditioner that will sink the output loop?

Yes, the **API 4300 G EXTSUP**. This module controls the 4-20 mA output loop but derives the power from an external source. The connection from the output of the **API 4300 G EXTSUP** to the input of the DCS requires no additional components (resistors) other than the connecting wires.

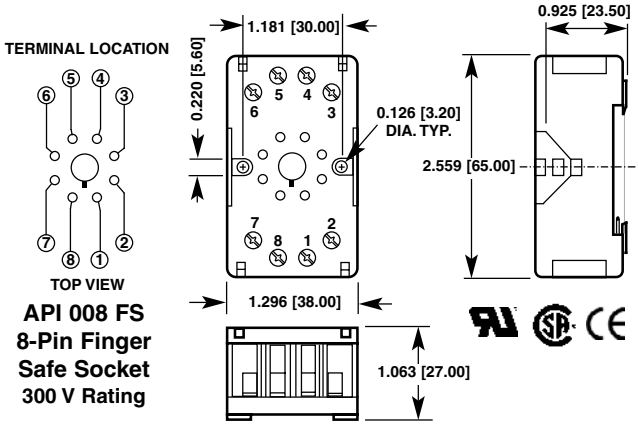
Do you have a DC-DC transmitter that will accept an input of ±5 VDC and provide an output of ±40 mA, ideally a ±20 mA minimum?

No, the maximum bipolar output we can provide is ±6 mA and possibly ±10 mA on the **API 4300 G BP**.

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



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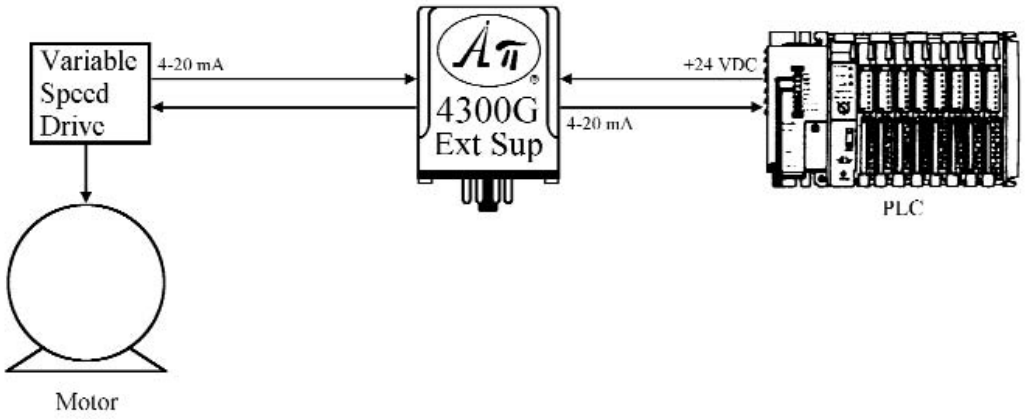
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Monitoring Motor Speed with a PLC

PROBLEM
A variable speed drive has an internally powered 4-20 mA output proportional to the speed of the motor it is driving. The motor speed must be monitored by a programmable logic controller (PLC) for use in control of a process, but the 4-20 mA input of the PLC is also powered from the PLC's built-in power supply. The standard **API 4300 G** Isolated DC to DC Transmitter generates a 4-20 mA output at a 20 V compliance voltage. The output of the module would conflict with the power generated by the PLC input channel.

SOLUTION
An **API 4300 G EXTSUP** Isolated DC to DC Transmitter module with External Supply modification will allow the drive's powered output to be transmitted to the PLC's powered input.

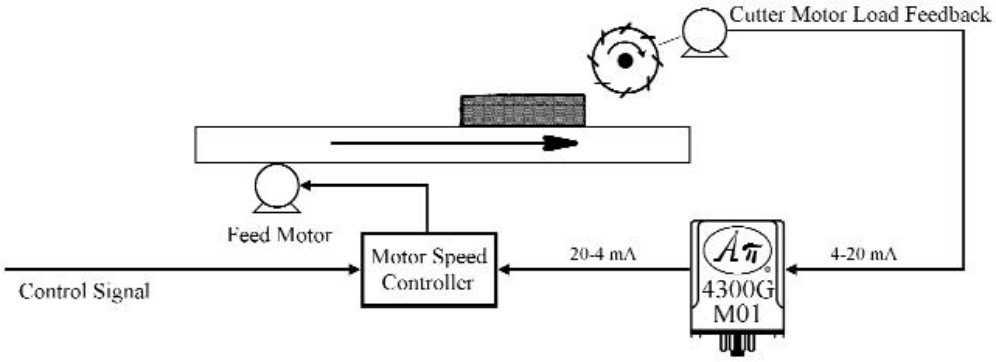


The external supply modification uses the +24 VDC power supplied by the PLC and regulates the 4-20 mA output signal in proportion to the input signal it receives from the variable speed drive. The 2000 V isolation of the module protects against unexpected ground loops and electrical noise.

Motor Load Controller

PROBLEM
A DC motor driving a cutter may become overheated and damaged if stock is fed into the cutter too rapidly, but production requirements dictate maximum machine output.

SOLUTION
A 4-20 mADC signal proportional to the cutter motor load is available to provide feedback for the feed motor controller. An **API 4300 G M01** isolated DC to DC transmitter module reverses the feedback signal so that increasing load on the cutter will decrease the speed of the feed motor.



Conversely, decreasing load on the cutter increases the speed of the feed motor. The feed rate is controlled to maintain the optimum load on the cutter at all times. In addition, the 2000 VRMS isolation protects against unwanted ground loops and electrical noise commonly found in industrial environments.


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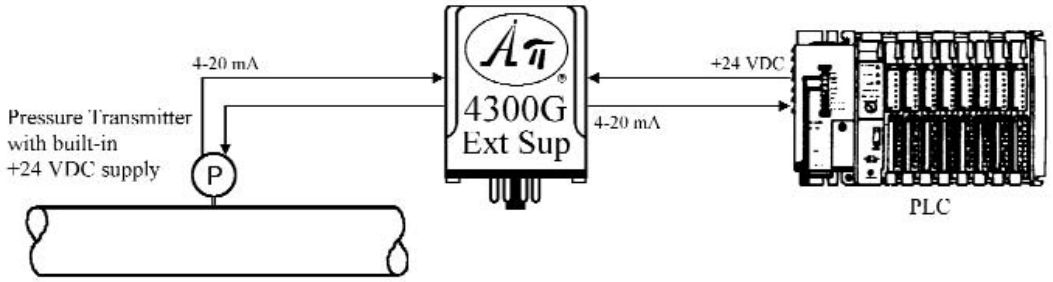
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For Your Local Area Representative See www.api-usa.com

Monitoring Pressure with a PLC

PROBLEM
A pressure transmitter with an internally powered 4-20 mA output must be monitored by a programmable logic controller (PLC) for use in control of a process, but the 4-20 mA input of the PLC is also powered from the PLC's built-in power supply. The standard **API 4300 G** Isolated DC to DC Transmitter generates a 4-20 mA output at a 20 V compliance voltage. The output of the module would conflict with the power generated by the PLC input channel.

SOLUTION
An **API 4300 G EXTSUP** Isolated DC to DC Transmitter module with External Supply modification will allow the pressure signal to be transmitted to the PLC's powered input.

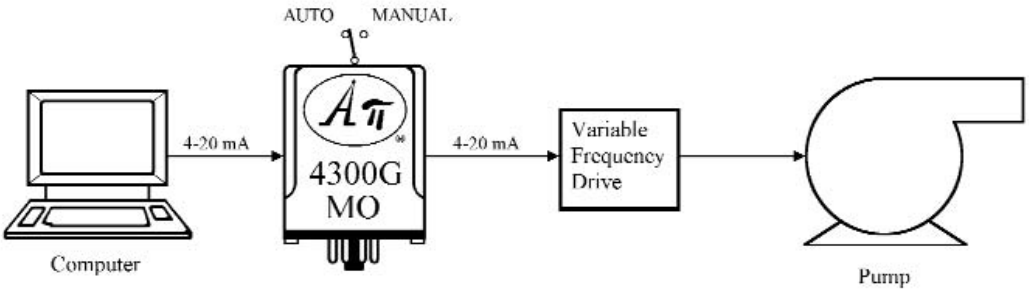


The external supply modification uses the +24 VDC power supplied by the PLC and regulates the 4-20 mA output signal in proportion to the input signal it receives from the pressure transmitter. The 2000 VRMS isolation of the module protects against unexpected ground loops and electrical noise.

Manual Override of Computer Control

PROBLEM
The speed of a pump is controlled by a computer. A means to operate the pump at a fixed speed is necessary when the computer fails or is shut down for maintenance.

SOLUTION
An **API 4300 G MO** Isolated DC to DC Transmitter module is installed between the computer and the pump's speed controller.



When the switch is in the AUTO position, the speed control signal from the computer is replicated by the output of the **API 4300 G MO** and sent to the variable frequency drive for the pump. When the switch is in the MANUAL position, the output of the **API 4300 G MO** holds a constant preset value regardless of the signal from the computer. This manual output is field adjustable via a potentiometer on top of the module.



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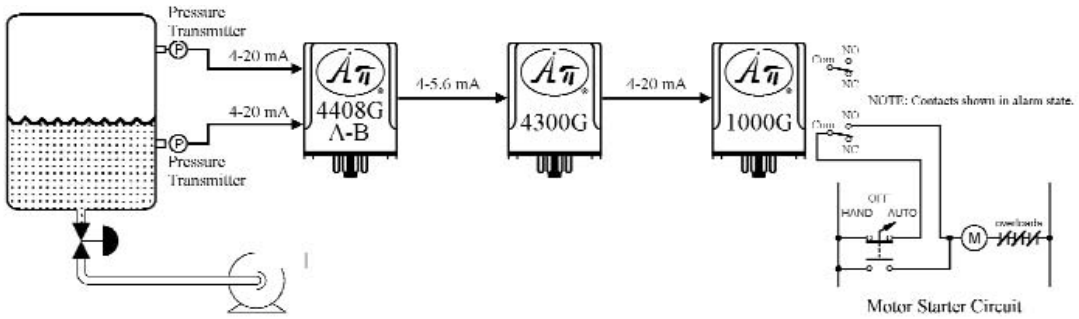
Phase Separator Water Level Control

PROBLEM

A phase separator is equipped with 2 pressure sensors, one located above the water level and one below. During operation the maximum pressure differential is 10%. It is necessary to maintain the water level so that there is a 1% pressure differential between the sensors.

SOLUTION

Use an **API 4408 G** A-B Math Function module to obtain the pressure differential between the transmitters. With a pressure differential of 0-10%, the output of the **API 4408 G** will be 4-5.6 mA. Expand the 4-5.6 mA signal to 4-20 mA with an **API 4300 G** Isolated DC to DC Transmitter module for better resolution and control.



Use the output of the **API 4300G** to drive an **API 1000 G** DC Input Single Alarm Trip module to provide a relay contact closure to operate a water removal pump. Adjust the setpoint of the **API 1000 G** to maintain the differential pressure at 1%. The second set of isolated relay output contacts can be wired to an annunciator panel or other monitoring system as desired. The standard heavy-duty relay contacts are rated 7A @ 240VAC (resistive) and can directly control most devices.

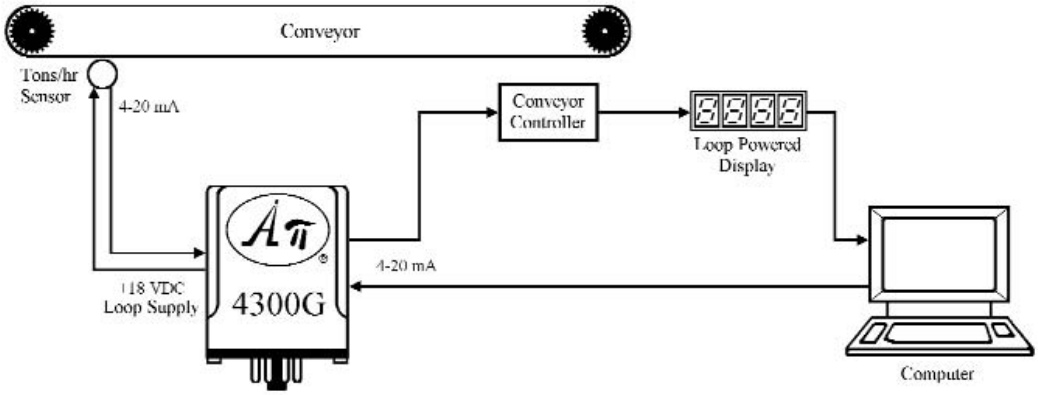
Monitoring Product Moved by a Conveyor

PROBLEM

The amount of product in tons per hour moved by a conveyor is required for the conveyor controller, for a local display, and for computer monitoring. The total loop impedance is 875 ohms.

SOLUTION

A sensor which produces an output proportional to the rate of movement of product is installed on the conveyor.



An **API 4300 G** Isolated DC to DC Transmitter module provides power for the sensor from its built-in +18 VDC loop excitation supply. The 4-20 mADC output of the sensor is replicated by the **API 4300 G** and its 4-20 mADC output loop drives the conveyor controller, a loop powered display and the computer input. The output of the **API 4300 G** is capable of driving up to 1000 ohms.



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