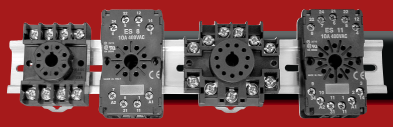
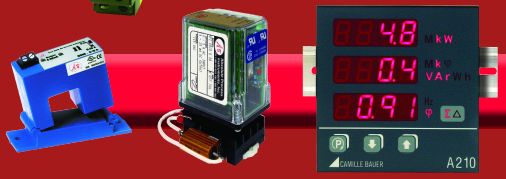
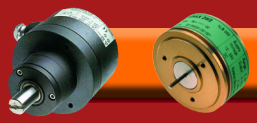


Tech Info, Accessories

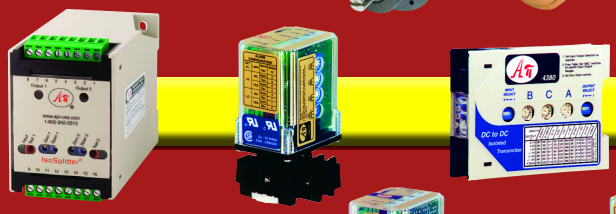
Selectable I/O, Universal, Specialty



AC Input & Power



Angular Position



DC Input

Frequency

Potentiometer

NEW PRODUCT PREVIEW

Phone
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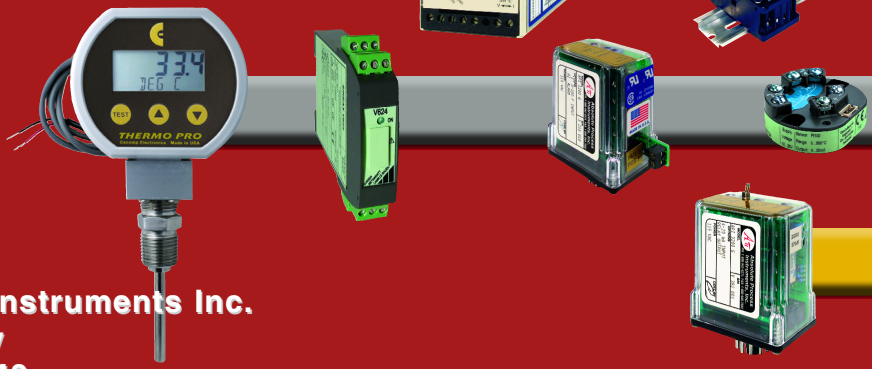
Cecomp Digital Pressure Gauges

Speed

Strain Gauge



Temperature

Valve Position

Absolute Process Instruments Inc.
1220 American Way
Libertyville, IL 60048

07-08

OUR MISSION

- Proactively provide our customers with cost-effective solutions to their industrial process measurement challenges.
- Be a leading manufacturer and global supplier of the highest quality industrial process measurement and custom engineered products.
- Offer value-added services and engineered solutions to meet the ongoing needs and requirements of our customers.
- Design our products to provide our customers with excellent performance and many years of reliable service in industrial environments.
- Continuously maintain the highest standards of quality and reliability for all products we manufacture.
- Provide long-term jobs and security for our employees while maintaining adequate profit margins for growing the business each year with little or no debt.
- Maintain a long-term harmonious and mutually beneficial relationship with our representatives, customers, suppliers, employees, and shareholders.

ABSOLUTE PROCESS INSTRUMENTS, Inc.

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Business Hours
Monday through Friday
8am to 5pm
Central Time

For your local representative or distributor, call us or see our web site

Two Inputs: ***DC Volts/mA, AC Volts/mA, Frequency, RTD Temperature, or Potentiometer***
Two Outputs: ***Fully-Isolated 0-1 V to ±10 VDC or 0-1 mA to 4-20 mA***

- ***Select Two I/O Configurations to Fit Your Application***
- ***Removable Plugs for Easy Installation***
- ***Full 2000 V Input/Output/Power Isolation***
- ***Input and Output LoopTracker® LEDs***
- ***Functional Test Pushbutton***

Description and Features

The **DuoPak** converter/isolator provides two independent channels of signal conversion, isolation, and retransmission in one compact package. Order any combination of DC voltage, AC voltage, RTD, frequency or potentiometer inputs. Each channel provides a proportional isolated DC voltage or current output. Full 3-way (input, output, power) isolation provides ground loop elimination, common mode signal rejection and signal noise reduction.

The **DuoPak** converter/isolator allows one device to provide two channels of isolation and conversion. Examples include two DC inputs, two temperature inputs, or different inputs such as voltage and current, or temperature and current, or position and speed. This flexibility along with custom ranges allows you match the DuoPak to your exact application.

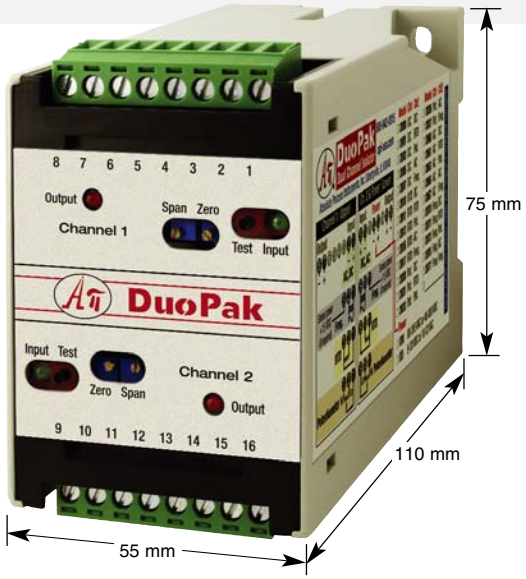
API exclusive features include two **LoopTracker** LEDs and a **Test Pushbutton** for each channel. The LoopTracker LEDs vary in intensity with changes in the process input and output signals. Monitoring the state of these LEDs can provide a quick visual picture of your process loop at all times. The functional test pushbutton provides a fixed output (independent of the input) when held depressed. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting.

Removable Plugs

LIFETIME WARRANTY

DIN Rail Mount

Free Factory Input & Output Calibration!



Selectable I/O

Input Ranges
Voltage: 0-100 mVDC min.
0-500 VDC max.
200 kΩ min. impedance

Bipolar: ±100 mVDC min.
±10 VDC max.
200 kΩ min. impedance

Current: Sinking inputs,external power supply(s) required
0-1 mADC min.
0-900 mADC max.
1.25 VDC max. burden

Typical Input Ranges
Voltage: 0-1 V, 0-2 V, 0-5 V, 1-5 V, 0-10 V, ±1 V, ±5 V, ±10 V

Current: 0-1 mA, 0-20 mA, 4-20 mA

Response Time
70 milliseconds typical

Input Ranges
Voltage: 0-50 mVAC min.
0-300 VAC
200 kΩ min. impedance

Current: 0-1 mAAC min.
0-900 mAAC max.
1.0 VRMS max. burden

Typical Input Ranges
Voltage: 0-50 mVAC, 0-100 mVAC, 0-150 VAC, 0-250 VAC

Current: 0-10 mAAC, 0-100 mAAC

Input Protection
750 VDC or 750 VAC_p common mode

Output Ripple and Noise
<10 mVRMS at 40 Hz and above

Response Time
150 milliseconds typical

Input Ranges & Types
Specify type, curve, range (°F or °C)
Most 9 Ω to 2000 Ω available
Min. span is 100°F or 55°C. Consult factory if a smaller span is required

Resist.	Type	Excitation
10 Ω	Copper	10 mA
100 Ω	Pt 0.00385	5 mA
100 Ω	Pt 0.00392	5 mA
100 Ω	Copper	5 mA
120 Ω	Nickel	5 mA
1000 Ω	Pt 0.00385	0.5 mA
1000 Ω	Balco Ni-Fe	0.5 mA
2000 Ω	Pt 0.00385	0.2 mA

Linearization
Better than ±0.1% of span

Leadwire Compensation
Less than ±0.05% of span per 1 Ω change in leadwire resistance

Input Ranges
0-25 Hz minimum
0-20 kHz maximum
100 kΩ minimum impedance

Amplitude
100 mVRMS min.
150 VRMS max.

Input Waveforms
Sine wave, sawtooth, square wave
Most other waveforms with greater than 100 mV amplitude change

Input Protection
Normal mode: 200% of input rating
Common mode: 600 VDC or 600 VAC_p input to ground

Sensor Power Supply
15 VDC regulated
25 mADC, max. ripple <0.25V_{p-p}

Input Ranges
Minimum: 0-100 Ω
Maximum: 0-1.0 MΩ
Full travel of the potentiometer is required.
Consult factory for other ranges.

Response Time
70 milliseconds typical

Common Specifications

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

LoopTracker LEDs
Input LoopTracker — Variable brightness green LED for input level and status
Output LoopTracker — Variable brightness red LED for output level and status

Output Ranges

	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 mVRMS

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

Common Mode Rejection
120 dB minimum

Isolation
2000 VRMS 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
DIN (Standard) — 80-265 VAC or 48-300 VDC, 6 W max.
DD — 9-30 VDC or 10-32 VAC, 6 W max.

Models & Options

Factory Configured—Specify input/output ranges and options for each channel

Model	Ch. 1	Ch. 2	Model	Ch. 1	Ch. 2
API 2000	DC	DC	**API 2036**	Pot.	AC
API 2001	DC	RTD	**API 2037**	Pot.	Freq.
API 2003	DC	Pot.	**API 2060**	AC	DC
API 2006	DC	AC	**API 2061**	AC	RTD
API 2007	DC	Freq.	**API 2063**	AC	Pot.
API 2010	RTD	DC	**API 2066**	AC	AC
API 2011	RTD	RTD	**API 2067**	AC	Freq.
API 2013	RTD	Pot.	**API 2070**	Freq.	DC
API 2016	RTD	AC	**API 2071**	Freq.	RTD
API 2017	RTD	Freq.	**API 2073**	Freq.	Pot.
API 2030	Pot.	DC	**API 2076**	Freq.	AC
API 2031	Pot.	RTD	**API 2077**	Freq.	Freq.
API 2033	Pot.	Pot.			

Options—Add to end of model number

DIN	Powered by 80-265 VAC or 48-300 VDC (standard)
DD	Powered by 9-30 VDC or 10-32 VAC
U	Conformal coating for moisture resistance
R1	Ch. 1 I/O reversal, such as 20-4 mA output
R2	Ch. 2 I/O reversal, such as 20-4 mA output
R3	Ch. 1 & Ch. 2 I/O reversal, such as 20-4 mA outputs
EX1	Ch. 1 open collector "sinking" output (unpowered mA output)
EX2	Ch. 2 open collector "sinking" output (unpowered mA output)
EX3	Ch. 1 & Ch. 2 open collector "sinking" outputs (unpowered mA output)

Accessories—Order as a separate item

API GP8	Spare green 8-terminal connectors (2)
API TK36	Aluminum DIN rail, 39" long

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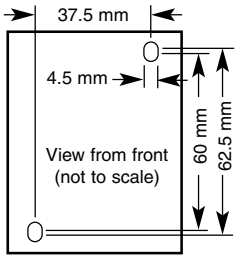
INSTALLATION

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. The housing can be clipped to a standard 35 mm DIN rail (part number API TK36) or surface mounted.

The large product side label identifies model number, the power requirements, and the input and output types. The smaller serial number label identifies the input and output ranges for each channel. The input and output ranges are factory set. Use the wiring diagrams appropriate for your model version.



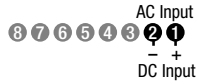
Surface mounting

CHANNEL 1 ELECTRICAL CONNECTIONS

DC or AC Input Channel 1

Refer to the sensor or transmitter manufacturer's data sheet for wiring requirements. Polarity must be observed when connecting DC input signal. DC milliamp inputs require either a powered sensor or a loop power supply.

Terminal 1 DC input positive (+) or AC
Terminal 2 DC input negative (–) or AC



Frequency Input Channel 1

Refer to the sensor or transmitter manufacturer's data sheet for wiring requirements.

Terminal 1 Frequency input
Terminal 2 Frequency input
Terminal 3 Sensor +15 VDC power (if needed)

RTD Input Channel 1

Refer to the sensor manufacturer's data sheet for wiring requirements. For a 2-wire RTD connect a jumper from terminal 1 to terminal 3.

Terminal 1 RTD sense lead (if used)
Terminal 2 RTD element
Terminal 3 RTD element

Potentiometer Input Channel 1

Refer to the sensor or transmitter manufacturer's data sheet for wiring requirements.

Terminal 1 Potentiometer wiper arm
Terminal 2 Potentiometer low resistance
Terminal 3 Potentiometer high resistance

Signal Output Channel 1

Polarity must be observed when connecting the signal output to the load. For current outputs, power is provided for the current loop. See other side for drive specifications.

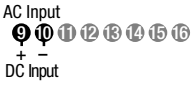
Terminal 7 Signal output positive (+)
Terminal 8 Signal output negative (–)

CHANNEL 2 ELECTRICAL CONNECTIONS

DC or AC Input Channel 2

Refer to the sensor or transmitter manufacturer's data sheet for wiring requirements. Polarity must be observed when connecting a DC input signal. DC milliamp inputs require either a powered sensor or a loop power supply.

Terminal 9 DC input positive (+) or AC
Terminal 10 DC input negative (–) or AC



Frequency Input Channel 2

Refer to the sensor or transmitter manufacturer's data sheet for wiring requirements.

Terminal 9 Frequency input
Terminal 10 Frequency input
Terminal 11 Sensor +15 VDC power (if needed)

RTD Input Channel 2

Refer to the sensor manufacturer's data sheet for wiring requirements. For a 2-wire RTD connect a jumper from terminal 1 to terminal 3.

Terminal 9 RTD sense lead (if used)
Terminal 10 RTD element
Terminal 11 RTD element

Potentiometer Input Channel 2

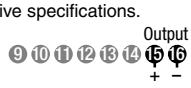
Refer to the sensor manufacturer's data sheet for wiring requirements.

Terminal 9 Potentiometer wiper arm
Terminal 10 Potentiometer low resistance
Terminal 11 Potentiometer high resistance

Signal Output Channel 2

Polarity must be observed when connecting the signal output to the load. For current outputs, power is provided for the current loop. See other side for drive specifications.

Terminal 15 Signal output positive (+)
Terminal 16 Signal output negative (–)



POWER CONNECTIONS

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. The input power is fully rectified internally, so reversing power connection polarity will not damage the product.

Power Input Terminals DIN Models

The label on the side of the module will indicate the power requirements. The standard **DIN** models are powered by 80-265 VAC or 48-300 VDC.

DIN model terminal 12 80-265 VAC or 48-300 VDC negative (–)
DIN model terminal 13 80-265 VAC or 48-300 VDC positive (+)

Power Input Terminals DD Models

The label on the side of the module will indicate the power requirements. Low voltage models with **DD** in the part number are powered by 9-30 VDC or 10-32 VAC.

DD model terminal 12 9-30 VDC negative (–) or 10-32 VAC
DD model terminal 13 9-30 VDC positive (+) or 10-32 VAC

CALIBRATION & TEST

Zero and Span

The calibration potentiometers are used to fine-tune the output if necessary.

1. Apply power to the module and allow a minimum 20 minute warm up time.
2. Provide an input to the module equal to zero or the minimum input required for the application.
3. Using an accurate measurement device for the module 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.
4. Set the input at maximum, and then adjust the Span potentiometer 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.
5. Repeat steps 1 through 4 for channel 2.

Test Buttons

The Test pushbuttons are factory set to provide approximately 50% full scale output when depressed. They will drive the device on the output side of the loop (panel meter, chart recorder, etc.) with a known good signal that can be used as a diagnostic aid during initial start-up or during troubleshooting. When released, the output will return to normal.

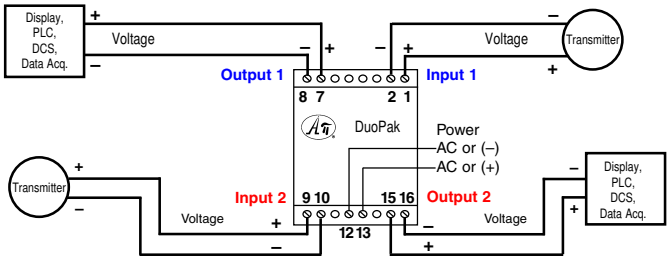
OPERATION

GREEN *LoopTracker*® Input LED

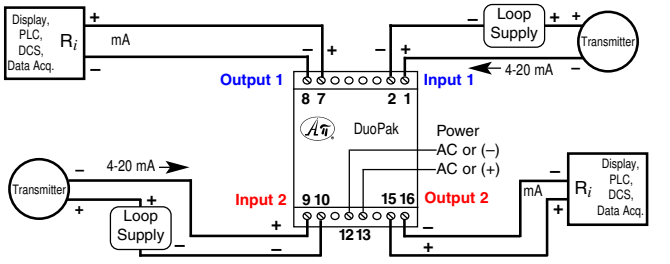
Provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal level by changing in intensity as the process changes from minimum to maximum. If the LED fails to illuminate, or fails to change in intensity as the process changes, this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



Typical Wiring for Voltage Inputs and Outputs



Typical Wiring for Current Inputs and Outputs

Both inputs sink current, thus an external loop power supply or a powered transmitter must be used. Consult factory if a powered input loop is required.

Both outputs source current and thus provide power to the output current loop. If the device you are connecting to provides loop power (such as a PLC input), order **EX1**, **EX2** or **EX3** options for an unpowered mA output.

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APCS (Analog Process Control Services) is Australia's leading manufacturer of high quality electronics for process measurement. These highly versatile products can be custom configured for specialized applications including custom linearization, thermocouple conversion, range splitting, LVDT, vibration, pH, ramping, A/D, ΔP, and more.

Absolute Process Instruments now provides the widest range of signal conditioning products available anywhere! For product data sheets and ordering options, see www.apcs.com or call us at 800-942-0315 for a quotation.

USC 701 UNIVERSAL SIGNAL CONDITIONER

Measurement and control functions in a single instrument
User programmable for most signal conditioning applications including PID control

Programmable I/O
Inputs: 2 analog, 2 pulse, sensor excitation
Outputs: 1 analog or pulse, 2 relays, MODBUS
Adjustable dead band & time delays
Math, logic, custom linearization, four 101 point tables

BSC 133 BIPOLAR SIGNAL CONVERTER

Converts uni- & bipolar input signals to a bi-polar DC signal. Load independent bi-polar output.

Input: AC/DC current & volts, resistance, RTD, thermocouple, pH/ORP, frequency, pulse, LVDT and millivolts. Sensor excitation.
High power output & dither options for hydraulic applications
Adder or subtracter options
Optional output ramp, external ratio peak hold, track & hold
Front adjustments for span and zero

ADC 182 ANALOG TO DIGITAL CONVERTER

Convert analog process signals to 8-bit digital signals. Common applications include interfaces to PLCs and PCs.

Input: AC or DC current and voltage, RTDs, thermocouples, resistance, potentiometer and frequency signals
Output: 8-bit PNP or NPN open collector, TTL or CMOS
Power isolation 2 kV RMS, no Input/Output isolation
Front-mounted 9-pin female 'D' connector for output
Front adjustments for span and zero

SSP 235 SIGNAL SPLITTER

Produces two DC output signals from one input signal. Output signals can be different from each other and from input.

Input: 4-20 mA, mV, bipolar, thermocouple, RTD, pulse, resistance, AC current or AC voltage. Sensor excitation.
2000 Vrms isolation
Field configurable by internal links with selectable response time
Front adjustments for span and zero
Range splitting versions

MPA 166 MULTIPOINT DIGITAL-ANALOG CONV.

Sums up to 16 digital inputs and converts the result to a DC signal. All inputs have an equal weighting, option for alternate input weighting.

DC input signals can be either voltage or current
Auxiliary available on input connector to drive open collector transistors or any contact type device
Options for non-standard trigger levels, hysteresis and bandwidth

RAF 185 RAMP FUNCTION MODULE

Convert period ramp, pulse accumulation or quadrature to DC signal. Microprocessor-based. Use for motor start-up, speed control, process signal ramping, pulse accumulation, quadrature.

Contact or external source pulse input. Sensor excitation.
Time base (period) adjustments. Master reset.
Output up to 18 VDC or 50 mADC
2000 Vrms isolation

APC 153 ANALOG TO PULSE CONVERTER

Converts an analog input signal to a pulse signal. Signal conversion for use with PLC & SCADA systems

Input includes AC/DC current & volts, resistance, RTD (Pt100), thermocouple, pH/ORP and pulse
Transistor (pulse) output up to 10k Hz
2000 Vrms isolation
Front adjustments for span and zero

DI 739 ISOLATOR, DUAL CHANNEL

Two fully independent isolator channels. Factory configured input to customer requirements.

Jumper configurable outputs for common process signals
Front adjustments for span and zero for each channel
Optional alarm on channel 2
Isolation is 2 kVrms between all 6 ports
Can be configured for signal splitting or range splitting

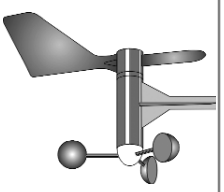
APC 253 ANALOG TO PULSE CONVERTER

Converts an analog input signal to a pulse signal. Signal conversion for use with PLC & SCADA systems

Input include AC/DC current & volts, resistance, RTD (Pt100), thermocouple, pH/ORP and pulse
Transistor (pulse) output up to 10k Hz
2000Vrms isolation
Front adjustments for span and zero
Power supply up to 63 VDC

MU 7911 WIND SPEED/DIRECTION SENSOR

Measure wind speed and direction. Robust low cost design for industrial applications. Use for low cost weather stations and weather related control such as building/greenhouse blinds.



Horizontal arm with pipe mounting bracket and 12m cable
Low friction ball bearings for long life

ATP 168 ANALOG TO POTENTIOMETER CONVERTER

Convert most process signals to a potentiometer output. Replace mechanical pots used for control of existing machinery or for automatic control of gain or offset in instrumentation.

Switched resistors with 1 in 255 (8 bit) resolution
3-way isolation up to 2000 Vrms
Connect as a 3-wire pot or 2-wire variable resistor

QLPI 731 ISOLATOR, QUAD LOOP POWERED

Four channel loop powered isolator. Standard output is 4-20 mA.

Double surge protection to prevent failure due to DC switched inductive load spikes
Selectable process inputs, range changing via internal solder pads
Wide supply range of 7.5 to 38 VDC
Internal zero and span trim adjustments
Front mounted LEDs verify the function of each channel

ATR 167 ANALOG TO RESISTANCE CONVERTER

Converts process signals into a simulated resistance output. Convert a thermocouple to RTD signal to match dissimilar existing equipment. Use for automatic gain control.

True analog conversion providing extremely high resolution
Front adjustments for span and zero
3-way isolation up to 2000 Vrms between input signal, resistance output and power supply

HVI 237 ISOLATOR, 5 KV

Fast response high voltage signal isolator. Used for high voltage electric machinery such as trains and mining equipment.

Input: selectable mV ranges, optional ranges to 1000 VDC, DC current inputs via shunt
Optional 250 µsec response time to capture spikes and fast surges
Dual outputs

APCS Specialty Signal Conditioners

APCS (Analog Process Control Services) is Australia's leading manufacturer of high quality electronics for process measurement. These highly versatile products can be custom configured for specialized applications including custom linearization, thermocouple conversion, range splitting, LVDT, vibration, pH, ramping, A/D, ΔP, and more.

Absolute Process Instruments now provides the widest range of signal conditioning products available anywhere! For product data sheets and ordering options, see www.apcs.com or call us at 800-942-0315 for a quotation.

APCS

VPR 271 VOLTAGE PRESENCE RELAY

Directly monitor 3-phase voltage up to 700 V phase to phase. Neutral must be connected for proper operation. Signal powered by incoming AC-voltage. LED indication of each phase.

- 2 relay outputs indicating loss of 3 phases loss of 1 phase
- Relay 1 energized with any phase present
- Relay 1 and 2 are energized with all three phases present
- Relay 2 de-energizes if any one of the three phases fail
- Relay 1 and 2 are de-energized if all three phases fail

HVR 272 ALARM RELAY, HIGH VOLTAGE

High voltage input alarm relay. Use for over/under voltage monitoring.

- Directly monitor voltage up to 700 V, 40 to 1000 Hz
- Powered from the incoming AC voltage
- 2.5 Kv Isolation
- Two 8A rated relay contact outputs with one trip point adjustment.

QAU 775 FOUR RELAY QUAD ALARM

Four relay output alarm with adjustable set-points.

- Input: AC & DC current/voltage, pulse, potentiometer, temperature, chemical sensors and strain-gauge. Sensor excitation.
- Optional min/max selector or 4-20mA adder/subtracter, retransmission
- Contacts rated at 10A/250 VAC resistive, optional TTL
- Front setpoint and deadband adjustments
- Window alarm option. Reverse action option. LED alarm indicators

TRA 173 ALARM, TRIPLE

Triple relay output alarm with adjustable set-points. Common applications include process alarms.

- Input up to 2 kVDC and 10 ADC
- Sensor excitation
- Contacts rated at 10A/250VAC
- Front setpoint adjustments
- Trip status is indicated by LED

PHT 129 PH / REDOX TRANSMITTER

Converts pH/ORP to DC signal. Wide range of pH and ORP probe input. Wastewater and water treatment monitoring, contamination detection, salinity monitoring.

- High input impedance
- Output up to 18 VDC or 50 mADC
- 2000 Vrms isolation
- Temperature compensation optional
- Front adjustments for span and zero

CDT 128 CONDUCTIVITY TRANSMITTER

Convert conductivity to a DC signal. Any type of conductivity input. Interface to conductivity cells, detect contamination, salinity monitoring.

- Sensor excitation
- Temperature compensation option
- Output up to 18 VDC or 50 mADC
- 2000Vrms isolation
- Front adjustments for span and zero

VBT144 VIBRATION TRANSMITTER

Converts vibration to a DC signal. Monitoring of vibrating feeders, protection of vibrating machinery.

- Input: field configurable for mV input for swing-coil velocity transducers, piezoelectric accelerometer or eddy current displacement probe
- Zero to peak, peak to peak or RMS average normalized
- Output up to 18Vdc or 50mAdc
- Raw sensor signal output on front BNC connection
- Front adjustments for span and zero

PLR 255, PLR 555 (IP65) PULSE REPEATER
PLR 257 PULSE SPLITTER

Rescales or repeats pulse signals, optional frequency division. Pulse conditioning and stretching, pulse conversion.

- Input: external pulse or any type of speed sensor up to 10 kHz. Sensor excitation
- Voltage/PNP/NPN outputs
- 2000 Vrms isolation
- Front adjustments for pulse width and trigger level
- Powered by 8-60 VDC

PM 277 DIFFERENTIAL PRESSURE MONITOR

Converts differential air pressure to an analog output and provides a relay contact. Robust piezoresistive silicon pressure sensor for high accuracy and long life. Ventilation system monitoring, pressure monitoring & control in clean rooms, control of process air systems.

- Pressure ranges from 0.3 psi to 30 psi (2 kPa to 200 kPa)
- Optional open collector output instead of relay contact
- Low range AC or DC voltage power supplies

RTDT 225 TEMPERATURE TRANSMITTER, RTD

Converts RTD (Pt100) temperature sensors to a Linearized DC signal.

- Lead resistance compensation
- Front adjustments for span and zero
- 2000 Vrms isolation
- 2-wire or 3-wire output loop power supplies
- Options for downscale burnout, differential input, and 2 input average

TCT 226 TEMPERATURE TRANSMITTER, THERMOCOUPLE

Converts a thermocouple temperature input to a DC signal

- Input: J, K, T, E, R, S, N thermocouples
- 2-wire or 3-wire output loop power supplies
- 2000 Vrms isolation
- Cold junction compensation
- Front adjustments for span and zero
- Optional upscale or downscale burn-out

LVDT 149 LVDT TRANSMITTER

Converts LVDT output to DC a signal. Interface to LVDT (Linearly Variable Differential Transformer) for position monitoring or measuring applications.

- Any type of LVDT input
- Output up to 18 VDC or 50 mADC
- Output ramp option
- Front adjustments for span and zero

STM 156 STALL MONITOR

Frequency alarm with an adjustable trip point. Stall or under speed monitor of conveyor belt or slowly rotating shaft.

- Input: external pulse and any type of speed sensor
- Front adjustments for trip speed and start-up delay
- Relay contact output
- Under speed alarm

VBT 244 VIBRATION TRANSMITTER

Converts vibration to a DC signal. Monitoring of vibrating feeders, protection of vibrating machinery, measuring building movement.

- Input: field configurable links for mV input from swing-coil velocity transducers, quartz shear transducers or eddy current displacement probe
- Transducer excitation,2-wire or 3-wire output loop power supplies
- Zero to peak, peak to peak or RMS average normalized
- Option for integration for velocity measurement
- Front adjustments for span and zero

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1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502

For latest product information or to contact your local representative visit api-usa.com

Input: *57-400 VAC (L-N) or 100-693 VAC (L-L), 0-5 Amps AC, Two 4-20 mA, Digital I/O*
Output: *MODBUS, USB 2.0, Relay, Two 4-20 mA, Digital I/O*

- ***Fast Sampling Rate***
- ***Programmable Sampling Intervals and Ranges***
- ***Measure Distorted or Out of Phase Waveforms***
- ***Configure and Measure via USB and MODBUS Interface***

ISO 9001 : 2000

Specifications

Inputs

Voltage: 57-400 VAC (L-N) or 100-693 VAC (L-L)
Current: 0-1 amps AC to 0-5 amps AC
Frequency: 50-60 Hz, ±5 Hz

System Types

Single-phase	1L
Split Phase	2L
3-wire system	3Lbal, 3Lunb, 3LunbAron
4-wire system, balanced load	4Lbal, 4Lunb, 4LunbOpen-Y

Measurements

True RMS measurements for distorted waveforms in all 4 quadrants
Minimum and maximum values with time stamp
Internal energy meters for the measured network or external variables
Voltage: U, U1N, U2N, U3N, U12, U23, U31, UNE, averages, unbalance
Current: I, I1, I2, I3, IN, averages, Bimetal: IB, IB1, IB2, IB3
Active Power (Watt): P1, P2, P3, ΣP
Reactive Power (VAR): Q1, Q2, Q3, ΣQ
Apparent Power (VA): S1, S2, S3, ΣS
Frequency: 50 to 60 Hz, ±5%
Active Power Factor: PF1, PF2, PF3, ΣPF
Power Factor Σ: Incoming ind., Incoming cap., Outgoing ind., Outgoing cap.
Reactive Power Factor: QF1, QF2, QF3, ΣQF
LF Power Factor: LF1, LF2, LF3, ΣLF
THD 1st-63rd Harmonic, Voltage: U1N, U2N, U3N, U12, U23, U31
TDD 1st-63rd Harmonic, Current: I1, I2, I3
Active Energy: Incoming and Outgoing
Reactive Energy: Incoming, Outgoing, Inductive, Capacitive

Accuracy

Voltage:	±0.1% FS
Current:	±0.1% FS
Power:	±0.2% FS
Power factor:	±0.1°
Frequency:	±0.01 Hz
Voltage unbalance:	±0.2%
Harmonics:	±0.5%
THD Voltage:	±0.5%
TDD Current:	±0.5%
Energy:	±0.2% FS

See data sheet at www.apicb.com for detailed accuracy specifications

I/O Configurations

Relays: 2 SPDT, 250 VAC, 2 A (500 VA) or 30 VDC, 2 A, (60 W)
Optional I/O module: Up to 4 different groups of isolated terminals with defined I/O functions are available depending on the selected options.
2 analog active current outputs per group of terminals, 0/4-20 mA or ±20 mA
2 current inputs per group of terminals, 0/4-20 mA
3 digital I/O per group of terminals used as state or pulse counting
1 115/230 VAC input for clock sync or state recognition.
MODBUS RTU, RS-485
USB 2.0 for configuration, and data acquisition

Measurement Times

Measurement interval:	Programmable for 1 cycle to 999 cycles, averaging
Basic measurements:	t = 2 x interval + 17 ms
System analysis:	t = 2 x 18 cycles
Analog input:	25 ms to 30 sec, programmable
Digital input:	<25 ms
115/230 input:	2 to 255 cycles
Analog output:	t + 10 ms to 60 sec, programmable
MODBUS/USB:	t
Logic module:	0 to 65 sec, programmable
Digital output:	t + 8 ms + logic module
Relay:	t + 30 ms + logic module

Power

85-265 VAC (45-400 Hz) or 110-265 VDC, Optional; 19-70 VDC models
Less than 4-20 VA (depending on I/O interface)
Green LED for power on indication

Description and Features

The high-performance CAM is designed for measurements in electric distribution systems or in industrial facilities. Its modular design allows it to be configured for individual applications and information requirements.

The CAM measuring system is capable of determining the current network state, additional load by non-linear users as well as the overall load of the supply system. Consistent measurement also guarantees that every network change is reliably acquired and included in measured data and extreme value storage. The basic accuracy amounts to ±0.1% (U, I) or ±0.2% for other variables.

The programmable acquisition period and the high sampling rate make the CAM suitable for acquisition of special input signals with variable sampling intervals (full-wave controls), altered sine shapes (phase-angle controls), or strong distortions. Additionally, limits and logic states can be programmed to alert users to out of range values.

The optional I/O interface may be individually configured to all requirements. Up to 4 groups of terminals are available. One of 5 possible functions may be assigned to each of them respectively.

Models & Options

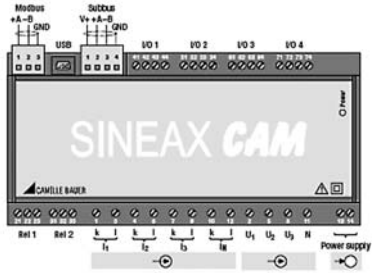
USB programming cable and CB-Manager software included.

Models	I/O Interface	Power
CAM 158 726	MODBUS, USB	85-265 VAC/110-265 VDC
CAM 158 734	MODBUS, USB, 4 analog outputs	85-265 VAC/110-265 VDC

See www.apicb.com for technical data sheet with ordering codes or consult factory.

Special Order Versions

Options		I/O 1	I/O 2	I/O 3	I/O 4	Cert.
None		**0**	**0**	**0**	**0**	
2 analog outputs, unipolar 0-20 mA		**1**	**1**	**1**	**1**	
2 analog inputs, 0-20 mA		**2**	**2**	**2**	**2**	
3 digital outputs or 3 digital inputs		**3**	**3**	**3**	**3**	
HV-Input 110/230 VAC		**-**	**-**	**-**	**4**	
2 analog outputs, bipolar ± 20 mA		**5**	**5**	**5**	**5**	
No test certificate						**0**
Test certificate in English						**E**
85-265 VAC/110-265 VDC	**CAM 111**	_	_	_	_	_
17-90 VDC	**CAM 112**	_	_	_	_	_



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M 561 Programmable Power Transducer with 1 Analog Output

- *Monitor Any Power System Variable*
- *3- or 4-Wire Balanced/Unbalanced or Single Phase*
- *1A/5A Input at 58-400 VAC$_{ph-n}$ or 100-690 VAC$_{ph-ph}$*
- *PC Programmable mA or Voltage Output Models*

Specifications

Input	57.7-400 VAC phase to neutral 100-693 VAC phase to phase
Measurement	P, Q or S, I ~, U ~ (RMS), cos φ, sin φ, LF, PF, QF, f
Input Waveform	Sinusoidal
Output	Voltage and current output are separate models 0-1 mA, to ±20 mA, 4-20 mA or 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	60 Hz standard, 50 Hz optional
Overload	120% of full scale rating
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Models & Options

Model*	Hz	Output	Power Supply
M 561-158 411	60	mA	24-60 VAC/VDC external
M 561-158 429	60	mA	85-230 VAC/VDC external
M 561-424_____	60	specify	85-230 VAC/VDC system powered

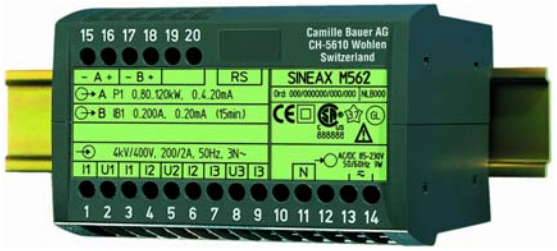
*For factory programming specify output final value, power system type, input voltage, input current, CT or VT rating, measured variable with range, start value, end value, output characteristics, linearity, and limit.

See www.apicb.com for technical data sheet with ordering codes or consult factory.

PRKAB 560 Programming Cables and Software

M 562 Programmable Power Transducer with 2 Analog Outputs

- *Monitor Any Two Power System Variables*
- *3- or 4-Wire Balanced/Unbalanced or Single Phase*
- *1A/5A Input at 58-400 VAC$_{ph-n}$ or 100-690 VAC$_{ph-ph}$*
- *PC Programmable mA or Voltage Output Models*



Specifications

Input	57.7-400 VAC phase to neutral 100-693 VAC phase to phase
Measurement	Any two power system parameters P, Q or S, I ~, U ~ (RMS), cos φ, sin φ, LF, PF, QF, f
Input Waveform	Sinusoidal
Outputs	Voltage and current output are separate models 0-1 mA, to ±20 mA, 4-20 mA or 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	60 Hz standard, 50 Hz optional
Overload	120% of full scale rating
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Models & Options

Model*	Hz	Outputs	Power Supply
M 562-158 437	60	mA	24-60 VAC/VDC external
M 562-158 445	60	mA	85-230 VAC/VDC external
M 562-424_____	60	specify	85-230 VAC/VDC system powered

*For factory programming specify output A, B final values, power system type, input voltage, input current, CT or VT rating, measured variable for each output with range, start value, end value, output characteristics, linearity, and limit.

See www.apicb.com for technical data sheet with ordering codes or consult factory.

PRKAB 560 Programming Cables and Software

M 563 Programmable Power Transducer with 3 Analog Outputs

- *Monitor Any Three Power System Variables*
- *3- or 4-Wire Balanced/Unbalanced or Single Phase*
- *1A/5A Input at 58-400 VAC$_{ph-n}$ or 100-690 VAC$_{ph-ph}$*
- *PC Programmable mA or Voltage Output Models*

Specifications

Input	57.7-400 VAC phase to neutral 100-693 VAC phase to phase
Measurement	Any three power system parameters P, Q or S, I ~, U ~ (RMS), cos φ, sin φ, LF, PF, QF, f
Input Waveform	Sinusoidal
Outputs	Voltage and current output are separate models 0-1 mA, to ±20 mA, 4-20 mA or 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	60 Hz standard, 50 Hz optional
Overload	120% of full scale rating
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Model*	Hz	Outputs	Power Supply
M 563-146 458	60	mA	24-60 VAC/VDC external
M 563-146 440	60	mA	85-230 VAC/VDC external
M 563-424_____	60	specify	85-230 VAC/VDC system powered

*For factory programming specify output A, B, C final value, power system type, input voltage, input current, CT or VT rating, measured variable for each output with range, start value, end value, output characteristics, linearity, and limit.

See www.apicb.com for technical data sheet with ordering codes or consult factory.

PRKAB 560 Programming Cables and Software

DC to DC Transmitter, Isolated — API 4300 DIN, API 4300 DD

Input: ***0-100 mV to 0-100 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***

- ***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**
- **One Model to 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	0-100 VDC
Bipolar Voltage:	±100 mVDC	±10 VDC
Current:	0-1 mADC	0-900 mADC

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

12 VDC nominal, regulated, 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

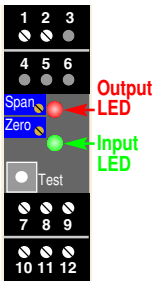
Power

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

LIFETIME WARRANTY

35 mm DIN Rail Mount

Free Factory Input & Output Calibration!



DC Input

Description and Features

The **API 4300 DIN** and **API 4300 DD** accept 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 pickup reduction.

The **API 4300 DIN** and **API 4300 DD** are 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 DIN** and **API 4300 DD** is a 12 VDC 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 4300DIN** can be either DIN rail or panel mounted

Factory Configured—Please specify input/output ranges and options

API 4300 DIN	DC to DC isolated transmitter, w. loop power supply, 85-265 V
API 4300 DD	DC to DC isolated transmitter, w. loop power supply, 9-30 V

Options—Add to end of model number

DF	Fast response, 1 millisecond nominal response time
M01	Input/output reversal, such as 4-20 mA in to 20-4 mA out
EXTSUP	Open collector output when a “sinking” output is required
U	Conformal coating for moisture resistance

Accessories—Order as separate line item

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

RANGES

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

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

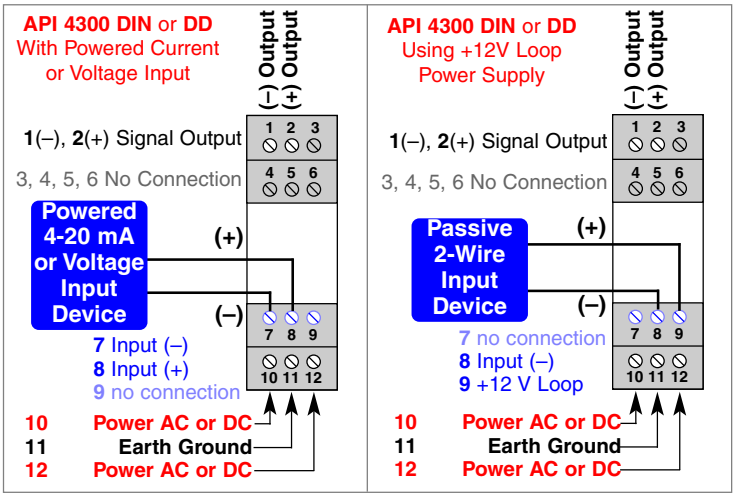
WARNING! All wiring must be performed by qualified personnel only. This module requires an industry-standard DIN rail mount. Order API TK36 DIN rail separately.

Power Input Terminals – The white 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.

Powered Signal Input – Polarity must be observed when connecting the signal input. The negative (–) connection is applied to terminal 7 and the positive connection (+) is applied to terminal 8.

Passive Signal Input – Polarity must be observed when connecting the signal input. A passive input device can be powered by the 12 volt DC power supply at terminal 9. 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.

Signal Output Terminals – Polarity must be observed when connecting the signal output to the load. The negative (–) is connected to terminal 1 and the positive connection (+) is connected to terminal 2. Output is powered unless option EXTSUP was ordered for a sinking output requirement.



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 DIN and API 4300 DD are 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.

DuoPak® NEED 2 I/O CHANNELS? SEE PAGE 19

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

2 Channel DC-DC Transmitter, Isolated API 4390, 4391, 4392 DIN

2 Inputs: ***mVDC, ±10 to 0-10 VDC, 0-1 mA to 4-20 mA***
2 Outputs: ***0-5 V, 0-10 V, ±5 V, ±10 V, 0-20 mA, 4-20 mA***

- ***2 Independent Channels in a 55 mm Package***
- ***2000 V Power/Input/Output/Channel Isolation***
- ***Full Isolation Eliminates Ground Loops***
- ***Input and Output LoopTracker® LEDs***
- ***Functional Test Pushbutton for Each Channel***
- ***Independent Zero and Span for Each Channel***

Removable Plugs for Easy Hookup

LIFETIME WARRANTY

Applications

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

Specifications

Input Ranges
Factory Configured—Specify an input for each channel
Voltage: ±5 VDC, ±10 VDC, 0-100 mVDC, 0-5 VDC, 0-10 VDC, 0-100 VDC
Current: 0-1 mADC, 0-20 mA, 4-20 mA; see sinking or sourcing options
Consult factory for special ranges

Input Characteristics
Voltage: 200 kΩ minimum input impedance per channel
Current: 1.25 VDC maximum voltage burden per channel

Input Loop Supply for L1 Versions
15 VDC nominal, regulated, 25 mADC

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

Output Ranges
Factory Configured—Please specify an output for each channel
Voltage: 0-100 mV, 0-5 VDC, 0-10 VDC, ±5 VDC, ±10 VDC
Current: 0-20 mA, 4-20 mA; both output channels are sourced
Consult factory for special ranges

Output Drive for Sourcing Output
1000 Ω at 20 VDC typical

Output Zero and Span
Multi-turn zero and span potentiometers for each channel to compensate for load and lead variations. ±15% of span adjustment range typical
Ultra-low interaction zero and span, <0.001 ppt

Output Linearity
Better than ±0.1% of span

Output Ripple and Noise
Less than 10 mV_{RMS}

Functional Test Buttons
Sets output to approx. 50% of span when pressed. One button per channel

Response Time
70 milliseconds typical. Consult factory for optional response times.

Isolation
2000 V_{RMS} minimum
Full isolation: power to channel, input to output, channel to channel

Common Mode Rejection
120 dB minimum

Ambient Temperature Range and Temperature Stability
–10°C to +60°C operating ambient, better than ±0.04% of span per °C stability

Case Material
Polycarbonate: gray UL #94V-1 housing and black UL #94V-2 terminals

Power
Both input power supplies are fuse protected and all are fully isolated
Standard: 115 VAC ±10%, 50/60 Hz, 5 W max., four linear type
A230 option: 230 VAC ±10%, 50/60 Hz, 5 W max., four linear type
D option: 9-30 VAC/VDC, 5 W max., four switching type

Description and Features

The **API 4390 DIN**, **API 4391 DIN** and **API 4392 DIN** accept two analog DC voltage or current inputs and provide two optically isolated analog DC voltage or current outputs that are linearly related to the inputs. The two independent channels provide an economical signal conversion solution where space is limited.

For each channel the input signal is filtered, either amplified or attenuated as required, then passed through an opto-coupler to the output stage. The optical isolation between the inputs and outputs make this module useful for ground loop elimination, common mode signal rejection or noise pickup reduction.

Applications include signal isolation, signal scaling, signal conversion, signal boosting or a combination of the four. This product is designed to function effectively in electrically noisy industrial environments.

API exclusive features include two ***LoopTracker*** LEDs and **Functional Test Pushbuttons** for each channel. The LoopTracker LEDs (Green for input, Red for output) vary in intensity with changes in the process input and output signals and 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. This output is factory set to approximately 50% of the output span. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting. The modules clip to an industry standard 35 mm DIN rail or they can be surface mounted.

Models & Options

Specify input and output ranges for each channel and options

Model	Power	Inputs	Outputs
API 4390 DIN	115 VAC	VDC, mADC	VDC, mADC
API 4391 DIN	115 VAC	VDC, mADC	±5, ±10 VDC
API 4392 DIN	115 VAC	±VDC, ±mADC	±VDC, mADC

API 4390 DIN *4-20 mA version sink and source options.*
L *and* ***EX*** *options can be combined. Add to end of model number.*

Loop Supply Options	Input 1	Input 2
std (4390 inputs are passive)	Sink	Sink
L1	Source	Sink
L2	Sink	Source
L3 (4390 powers both input loops)	Source	Source
Output External Supply Options	**Output 1**	**Output 2**
std (4390 powers both output loops)	Source	Source
EX1	Sink	Source
EX2	Source	Sink
EX3 (4390 outputs are passive)	Sink	Sink

Options–Add to end of model number

A230	Powered by 230 VAC, 50/60 Hz
DD	Powered by 9-30 VAC/VDC (DD instead of DIN in model no.)
DF	Fast response time, consult factory
U	Conformal coating for moisture resistance

Accessories—Order as separate line item

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

DC Input

ELECTRICAL CONNECTIONS

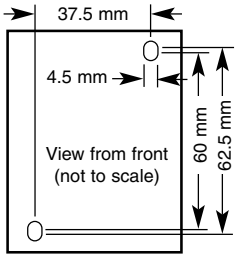
WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. See wiring examples at right or consult factory for assistance.

The housing can be clipped to a standard 35 mm DIN rail or surface mounted. Each product is factory configured to your exact input and output requirements as indicated on the product label. The power supplies are fuse protected and the unit may be returned to API for fuse replacement.

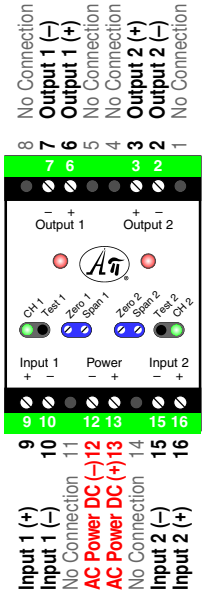
Power Input Terminals – The white label on the side of the API module will indicate the power requirements. AC power is connected to terminals 12 and 13.

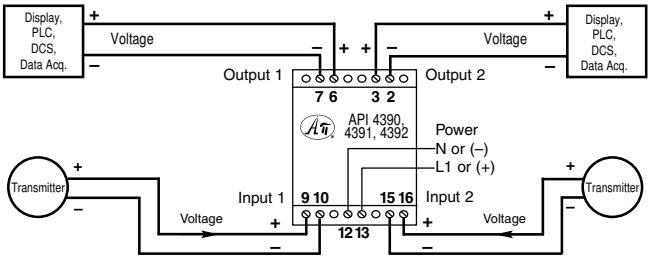
Signal Input Terminals – Polarity must be observed when connecting the signal input. The positive connection (+) for channel 1 is applied to terminal 9 and the negative (–) is applied to terminal 10. The positive connection (+) for channel 2 is applied to terminal 16 and the negative (–) is applied to terminal 15.

Signal Output Terminals – Polarity must be observed when connecting the signal output to the load. The positive connection (+) for channel 1 is connected to terminal 6 and the negative (–) is connected to terminal 7. The positive connection (+) for channel 2 is connected to terminal 3 and the negative (–) is connected to terminal 2.

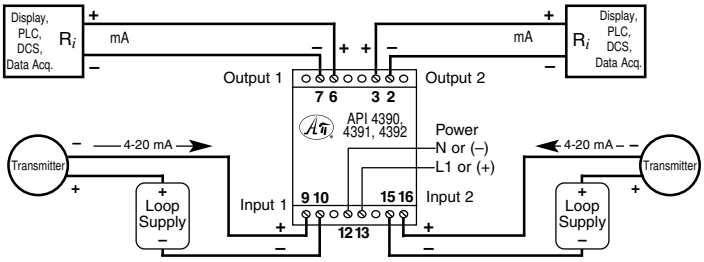


Surface mounting dimensions





Voltage Inputs and Outputs



Current Inputs and Outputs
Both API inputs sink current. Both API outputs source current.

CALIBRATION

Front-mounted Zero and Span potentiometers for each channel can be used to compensate for load and lead variations.

1. Apply power to the module and allow a minimum 30 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, the Zero control will provide adjustment for the 4 mA or low end of the signal.
4. Next, set the input at maximum, 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, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. Repeat adjustments for maximum accuracy.
6. Repeat adjustments for second channel.

TEST BUTTONS

The Test pushbuttons are factory set to provide approximately 50% output. When depressed they will drive the output side of the loop 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.

OPERATION

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, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

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

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

DC to DC Signal Splitter, Isolated

API 4393 DIN IsoSplitter®

Input: ***mVDC, ±10 to 0-10 VDC, 0-1 mA to 4-20 mA***
2 Outputs: ***mVDC, ±10 to 0-10 VDC, 0-1 mA to 4-20 mA***

- ***One Input Dual Output Signal Splitter***
- ***2000 V Power/Input/Output/Channel Isolation***
- ***Full Isolation Eliminates Ground Loops***
- ***Input and Output LoopTracker® LEDs***
- ***Functional Test Pushbutton for Each Channel***
- ***Independent Zero and Span for Each Channel***

LIFETIME WARRANTY

Removable Plugs for Easy Hookup

Free Factory Input & Output Calibration!

Applications

- **Isolate, Split, Rescale Process Signals**
- **Send One Process Signal to Two Locations**
- **Interface Panel Meters, Recorders, Data Acquisition, PLCs, DCS Systems, SCADA Systems**

Specifications

Input and Output Ranges

Factory Configured—Please specify range
Consult factory for special ranges

Voltage:	0-50 mVDC, 0-100 mVDC, 0-5 VDC, 0-10 VDC
Bipolar Voltage:	±5 VDC, ±10 VDC
Current:	0-1 mA, 0-20 mA, 4-20 mA (1000 Ω maximum per channel) Sinking input and sourced outputs for current

Input Voltage Burden (Current)

1.25 VDC maximum

Output Linearity

Better than ±0.1% of span

Output Ripple and Noise

Less than 10 mV_{RMS}

Output Zero and Span

multi-turn zero and span potentiometers to compensate for load and lead variations
Independent zero and span potentiometers for each output channel
±15% of span adjustment range typical
Low interaction zero/span; <0.001 ppt

LoopTracker

Variable brightness LEDs indicate input/output loop level and status

Functional Test Buttons

Sets output to test level when pressed. One per output channel.
Factory set to drive output to approximately 50% of span

Response Time

70 milliseconds typical. Consult factory for other response times.

Isolation

2000 V_{RMS} minimum
Full isolation: power to channel, input to output, channel to channel

Common Mode Rejection

120 dB minimum

Ambient Temperature Range

–10°C to +60°C operating ambient

Temperature Stability

Better than ±0.04% of span per °C

Case Material

Polycarbonate: gray UL #94V-1 housing and black UL #94V-2 terminals

Power Supplies

Input power supply fuse protected and fully isolated

Standard:	115 VAC ±10%, 50/60 Hz, 5 W max., linear type
A230 option:	230 VAC ±10%, 50/60 Hz, 5 W max., linear type
D option:	9-30 VAC/VDC, 5 W typical, switching type

Description and Features

The **API 4393 DIN *IsoSplitter*** accepts one analog DC voltage or current input and provides two optically isolated analog DC outputs that are linearly related to the inputs. The input signal is filtered, amplified, split, and then passed through an opto-coupler to the output stage. The two isolated output channels provide an economical solution where more than one output device is connected to the same input signal.

Typical applications include isolation, output splitting, output device separation and redundancy (i.e. to prevent failure of the entire loop if one device fails), or a combination of the three. The optical isolation between the input and outputs make this module useful for ground loop elimination, common mode signal rejection or noise pickup reduction.

This product is designed to function effectively in electrically noisy industrial environments. It is designed to interface with and provide signal compatibility with recorders, data loggers, computers programmable logic controllers, and process transmitters.

API exclusive features include two ***LoopTracker*** LEDs and **Functional Test Pushbuttons** for each channel. The LoopTracker LEDs (Green for input, Red for output) vary in intensity with changes in the process input and output signals and 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. This output is factory set to approximately 50% of the output span. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting. The modules clip to an industry standard 35 mm DIN rail or they can be surface mounted.

Factory Configured—Please specify input/output ranges and options

API 4393 DIN	IsoSplitter, 115 VAC powered
API 4393 DIN A230	IsoSplitter, 230 VAC powered
API 4393 DD	IsoSplitter, 9-30 VAC/VDC powered

See API 4393 L1 data sheet for more sink/source versions

Options—Add to end of model number

DF	Fast response time, consult factory
U	Conformal coating for moisture resistance

Accessories—Order as separate line item

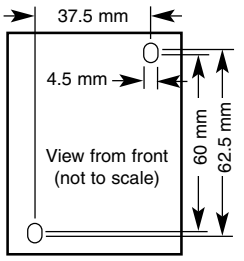
API TK36	DIN rail, 35 mm W x 39" L, aluminum

DC Input

ELECTRICAL CONNECTIONS

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. See wiring examples at right or consult factory for assistance.

The housing can be clipped to a standard 35 mm DIN rail or surface mounted. Each product is factory configured to your exact input and output requirements as indicated on the product label. The power supplies are fuse protected and the unit may be returned to API for fuse replacement.

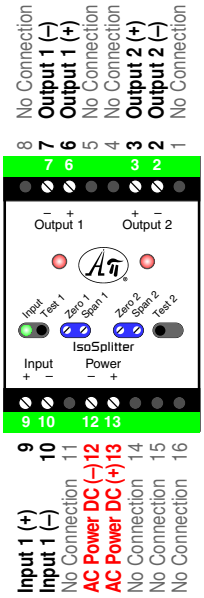


Surface mounting dimensions

Power Input Terminals – The white label on the side of the API module will indicate the power requirements. AC power is connected to terminals 12 and 13. For DC-powered versions positive (+) is connected to terminal 13 and negative (–) is connected to terminal 12.

Signal Input Terminals – Polarity must be observed when connecting the signal input. The positive connection (+) is applied to terminal 9 and the negative (–) is applied to terminal 10.

Signal Output Terminals – Polarity must be observed when connecting the signal output to the load. The positive connection (+) for channel 1 is connected to terminal 6 and the negative (–) is connected to terminal 7. The positive connection (+) for channel 2 is connected to terminal 3 and the negative (–) is connected to terminal 2.



CALIBRATION

Front-mounted Zero and Span potentiometers for each channel can be used to compensate for load and lead variations.

1. Apply power to the module and allow a minimum 30 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, 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, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. Repeat adjustments for maximum accuracy.
6. Repeat adjustments for second channel.

TEST BUTTONS

The Test pushbuttons are factory set to provide approximately 50% output. When depressed they will drive the output side of the loop 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.

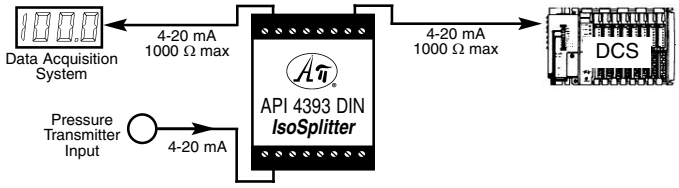
OPERATION

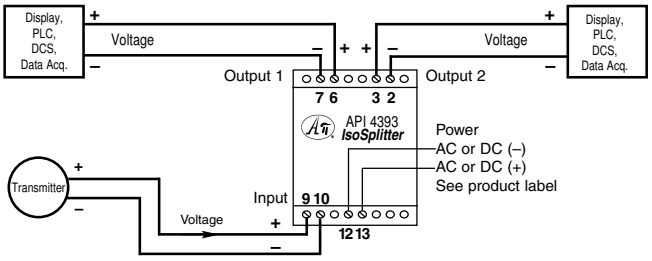
GREEN *LoopTracker*® Input LED – Provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum. If the LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

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.

TYPICAL APPLICATION

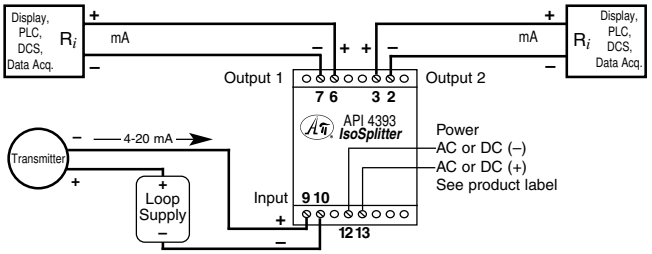
The API 4393 DIN IsoSplitter is useful where a 4-20 mA signal must be independently output to two devices. The output from a pressure transmitter needs to be monitored in two separate locations. The DCS is used for the control system and another device is used for data acquisition. The API 4393 DIN IsoSplitter provides two independent 4-20 mA loops from one input and provides isolation for each loop.





4393 DIN WITH VOLTAGE INPUT & OUTPUT

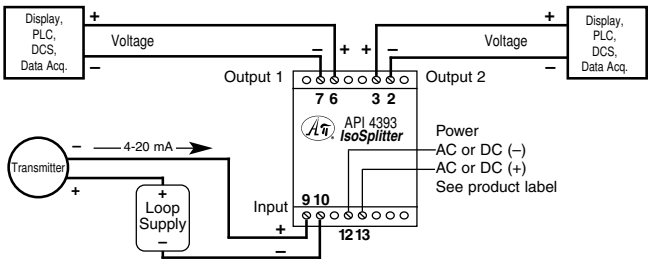
Voltage Inputs and Outputs



4393 DIN WITH CURRENT INPUT & OUTPUT

Current Input and Outputs

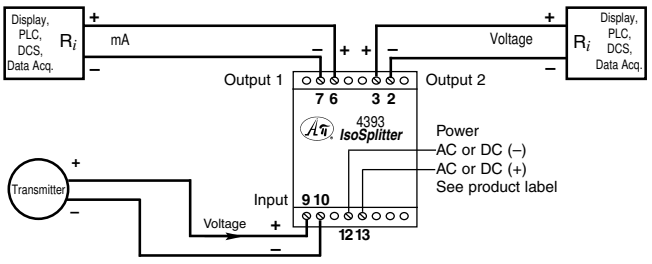
API 4393 input sources current. Both API 4393 outputs source current.



4393 DIN WITH CURRENT INPUT & VOLTAGE OUTPUT

Current Input and Voltage Outputs

API 4393 input sources current.



4393 DIN WITH VOLTAGE IN & CURRENT & VOLTAGE OUT

Voltage Input and Output 1 Current and Output 2 Voltage

API 4393 output 1 sources current.

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

DC to DC Signal Splitter, Isolated — API 4393 DIN L1 IsoSplitter®

1 Input: ***4-20 mA***
2 Outputs: ***4-20 mA Source or Sink***

- ***Single 4-20 mA Input & Dual 4-20 mA Outputs***
- ***2000 V Power/Input/Output/Channel Isolation***
- ***Full Isolation Eliminates Ground Loops***
- ***Input and Output LoopTracker® LEDs***
- ***Functional Test Pushbutton for Each Channel***
- ***Independent Zero and Span for Each Channel***

Removable Plugs for Easy Hookup

LIFETIME WARRANTY

Applications

- **Isolate, Split, Rescale Process Signals**
- **Send One Process Signal to Two Locations**
- **Provides Optimal Isolation Between These and Others**
  - **DCS: TBI-Bailey (ABB), Fisher-Rosemount (DeltaV™)**
  - **PLC: ABB, Allen Bradley (Micrologix™, Flex I/O™)**
  - **BAS: ABB, Siemens, Johnson Controls, Invensys**

Specifications

Input Range
4 to 20 mA, see table below right
Sinking inputs do not provide power and require an external loop supply or a powered transmitter

Input Voltage Burden
2 VDC maximum, 100 Ω nominal at 20 mA

Input Loop Supply for L1 Versions
15 VDC nominal, regulated, 25 mADC

Output Range and Type
4 to 20 mA, see table below right
Sinking outputs do not provide power and require an external loop supply or a powered transmitter

Output Drive for Sourced Outputs
1000 Ω at 20 VDC typical

Output Linearity
Better than ±0.1% of span

Output Ripple and Noise
Less than 10 mV_{RMS}

Output Zero and Span
Independent multi-turn zero and span potentiometers for each output channel to compensate for load and lead variations
±15% of span adjustment range typical, low interaction: <0.001 ppt

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

Functional Test Buttons
Sets output to test level when pressed. One per output channel.
Factory set to drive output to approximately 50% of span

Response Time
70 milliseconds typical

Isolation
2000 V_{RMS} minimum
Full isolation: power to channel, input to output, channel to channel

Common Mode Rejection
120 dB minimum

Ambient Temperature Range and Stability
–10°C to +60°C operating ambient. Better than ±0.04% of span/°C stability.

Power Supplies
Input power supply fuse protected and fully isolated
Standard: 115 VAC ±10%, 50/60 Hz, 5 W max., linear type
A230 option: 230 VAC ±10%, 50/60 Hz, 5 W max., linear type
D option: 9-30 VDC, 5 W typical, switching type

Description and Features

The **API 4393 L1** and **EX** series ***IsoSplitters*** are used for splitting a single 2-wire 4-20 mA transmitter signal into two isolated 4-20 mA outputs. Typical applications include isolation, output splitting, output device separation and redundancy (to prevent control loop failure if one loop fails), or a combination of these. The optical isolation between the input and outputs make this module useful for ground loop elimination, common mode signal rejection or noise pickup reduction.

This product is designed to function effectively in electrically noisy industrial environments. It is designed to provide signal compatibility with recorders, data loggers, computers programmable logic controllers, and process transmitters.

The **API 4393 L1** series features an internal 15 VDC isolated loop power supply for the input loop. Versions are available with sourcing and/or sinking I/O. Sourcing furnishes power (current) to the circuit. Sinking requires an external power supply in the circuit or a powered transmitter.

API exclusive features include two ***LoopTracker*** LEDs and **Functional Test Pushbuttons** for each channel. The LoopTracker LEDs (Green for input, Red for output) vary in intensity with changes in the process input and output signals and 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. This output is factory set to approximately 50% of the output span. Both the LoopTracker LEDs and functional test pushbutton greatly aid in saving time during initial startup and/or troubleshooting. The modules clip to an industry standard 35 mm DIN rail or they can be surface mounted.

Models & Options

Factory Configured—Please specify model, power, and options

Model	Input	Ch. 1 Output	Ch. 2 Output
API 4393 DIN L1	Source	Source	Source
API 4393 DIN L1 EX1	Source	Sink	Source
API 4393 DIN L1 EX2	Source	Source	Sink
API 4393 DIN L1 EX3	Source	Sink	Sink
API 4393 DIN*	Sink	Source	Source
API 4393 DIN EX1	Sink	Sink	Source
API 4393 DIN EX2	Sink	Source	Sink
API 4393 DIN EX3	Sink	Sink	Sink

**See API 4393 data sheet*

Options—Add to end of model number

A230	Powered by 230 VAC, 50/60 Hz
D	Powered by 9-30 VDC (DD instead of DIN in model no.)
U	Conformal coating for moisture resistance

Accessory—Order as separate line item

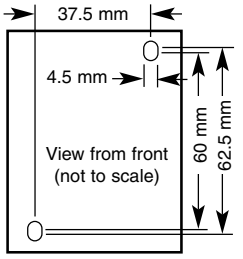
API TK36	DIN rail, 35 mm W x 39" L, aluminum

DC Input

ELECTRICAL CONNECTIONS

WARNING! All wiring must be performed by a qualified electrician or instrumentation engineer. See wiring examples at right or consult factory for assistance.

The housing can be clipped to a standard 35 mm DIN rail or surface mounted. Each product is factory configured to your exact input and output requirements as indicated on the product label. The power supplies are fuse protected and the unit may be returned to API for fuse replacement.

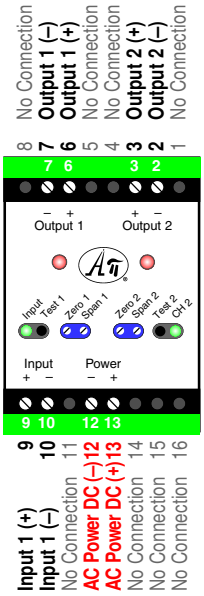


Surface mounting dimensions

Power Input Terminals – The white label on the side of the API module will indicate the power requirements. AC power is connected to terminals 12 and 13. For DC-powered versions positive (+) is connected to terminal 13 and negative (–) is connected to terminal 12.

Signal Input Terminals – Polarity must be observed when connecting the signal input. The positive connection (+) is applied to terminal 9 and the negative (–) is applied to terminal 10.

Signal Output Terminals – Polarity must be observed when connecting the signal output to the load. The positive connection (+) for channel 1 is connected to terminal 6 and the negative (–) is connected to terminal 7. The positive connection (+) for channel 2 is connected to terminal 3 and the negative (–) is connected to terminal 2.



CALIBRATION

Front-mounted Zero and Span potentiometers for each channel can be used to compensate for load and lead variations.

1. Apply power to the module and allow a minimum 30 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, 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, the Span control will provide adjustment for the 20 mA or high end of the signal.
5. Repeat adjustments for maximum accuracy.
6. Repeat adjustments for second channel.

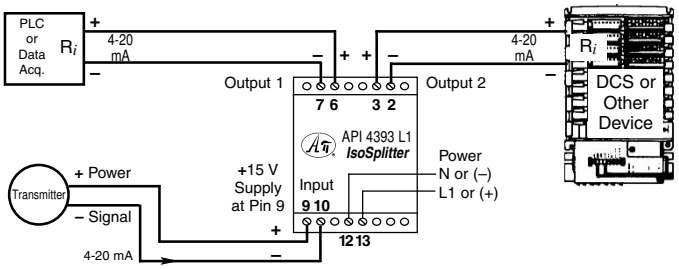
TEST BUTTONS

The Test pushbuttons are factory set to provide approximately 50% output. When depressed they will drive the output side of the loop 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.

OPERATION

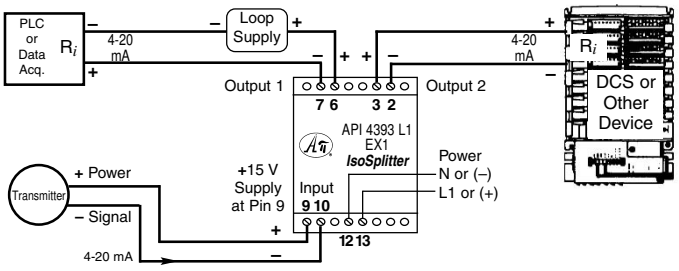
GREEN *LoopTracker*® Input LED – Provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal strength by changing in intensity as the process changes from minimum to maximum. If the LED fails to illuminate, or fails to change in intensity as the process changes, check the module power or signal input wiring. Note that it may be difficult to see the LEDs under bright lighting conditions.

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.



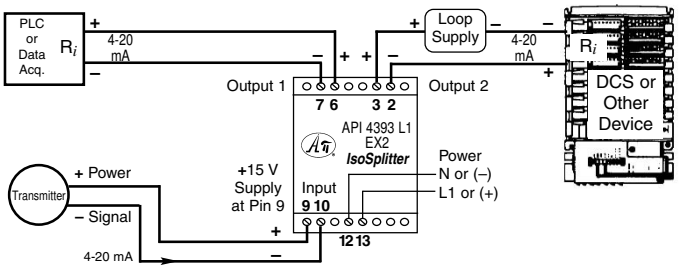
TYPICAL WIRING API 4393 L1

Use the API 4393 L1 IsoSplitter when a 2-wire loop-powered (passive) transmitter signal must be output to two passive devices. The API 4393 L1 output loop power supplies drive each output channel.



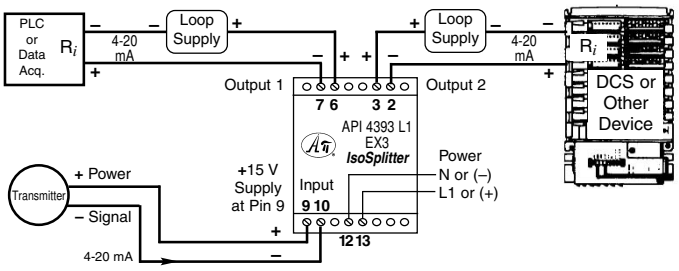
TYPICAL WIRING API 4393 L1 EX1

Use the API 4393 L1 EX1 IsoSplitter when a 2-wire loop-powered (passive) transmitter signal is output to two loops where the device on Output 1 uses an external loop power supply or provides its own power to the loop, and the loop on Output 2 is powered by the API 4393 L1 EX1.



TYPICAL WIRING API 4393 L1 EX2

Use the API 4393 L1 EX2 IsoSplitter when a 2-wire loop-powered transmitter signal is output to two loops where the loop on Output 1 is powered by the API 4393 L1 EX2 and the device on Output 2 uses an external loop power supply or provides its own power to the loop.



TYPICAL WIRING API 4393 L1 EX3

Use the API 4393 L1 EX3 IsoSplitter when a 2-wire loop-powered transmitter signal is output to two loops where each device has an integral loop supply or uses an external loop power supply as a drive source.

DC Input

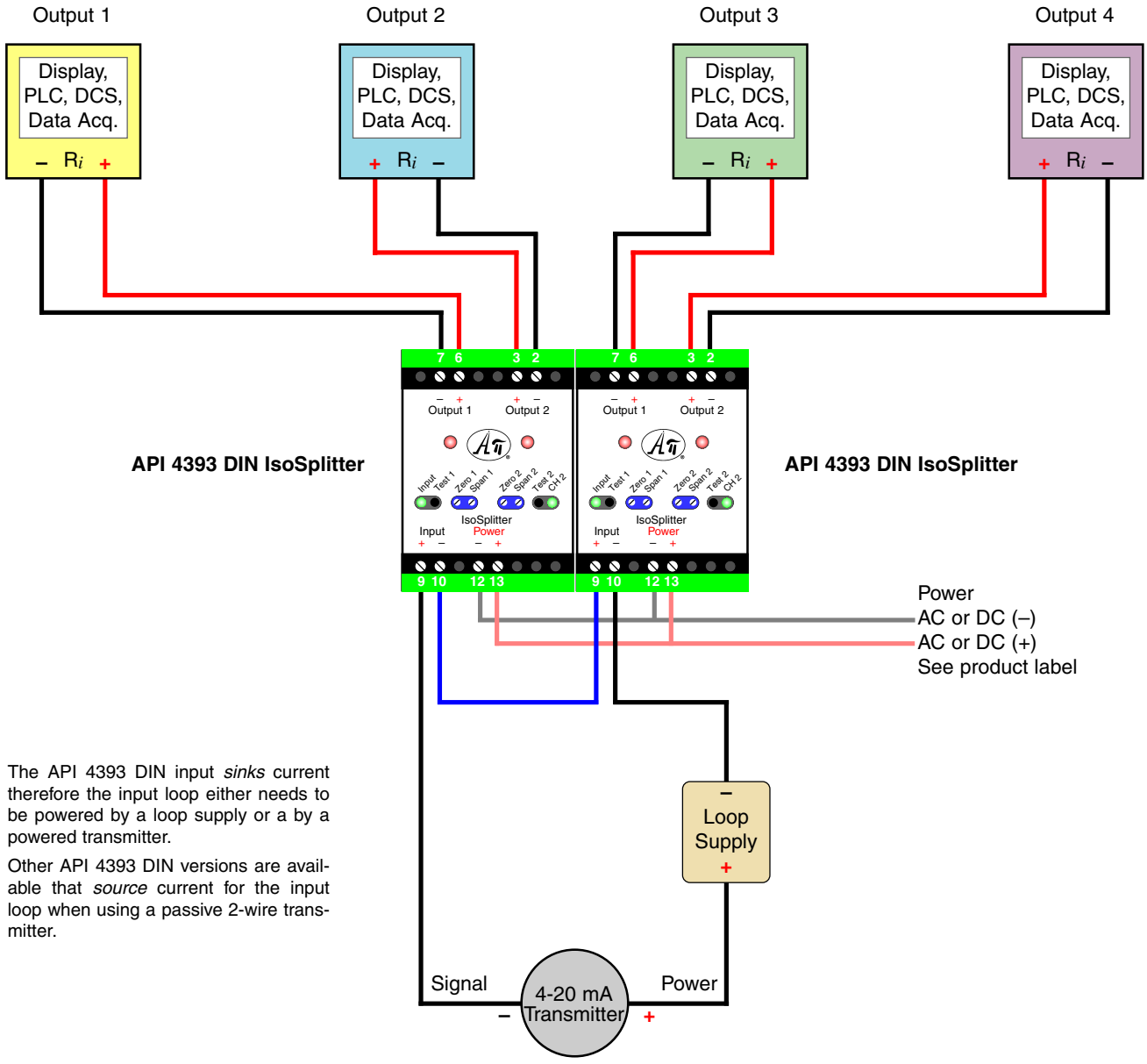
1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502

4-Way Signal Splitting

In a process control loop it may be necessary to send the output signal to more than two devices. Two API 4393 DIN IsoSplitter signal splitters may used to accomplish this. Each of the output loops will be isolated from each other in addition to the input loop and the power sources.

The API 4393 has a sinking input, therefore the transmitter providing the input signal must provide the power to the input loop. The transmitter must also be able to drive 500 ohms. Both API 4393 IsoSplitter signal splitters need to be wired to the appropriate supply voltage.

The API 4393 DIN outputs *source* or provide current for the output loops. Other API 4393 DIN versions are available that *sink* current for one or both output loops when using receiving devices that provide loop power or have passive inputs.



The API 4393 DIN input *sinks* current therefore the input loop either needs to be powered by a loop supply or a by a powered transmitter.

Other API 4393 DIN versions are available that *source* current for the input loop when using a passive 2-wire transmitter.

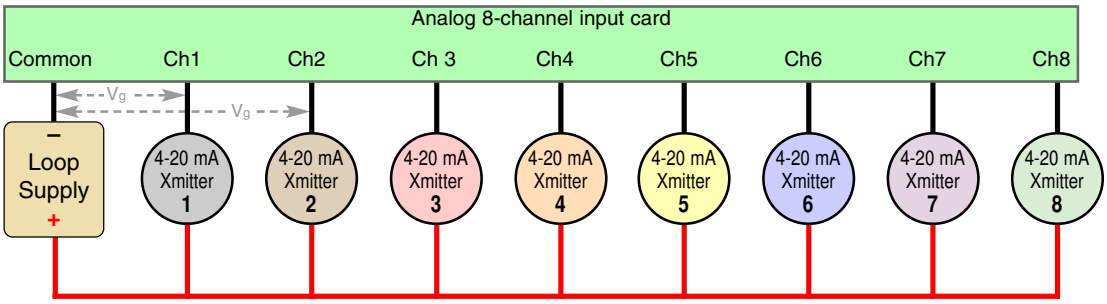
Splitting one input signal into four independent output signals.

Isolating an 8 Channel Analog Input Card

Problem

A customer has a DCS system and is using an 8 channel analog input card for the 4-20 mA inputs. The system provides 24 VDC power to the loops from a panel-mounted 24 VDC power supply.

When final two loops (channels 1 and 2) are connected, all the inputs start to drift and give incorrect readings. A ground loop is occurring through the transmitters on channels one and two. Since there is a shared common power supply, all channels are affected.

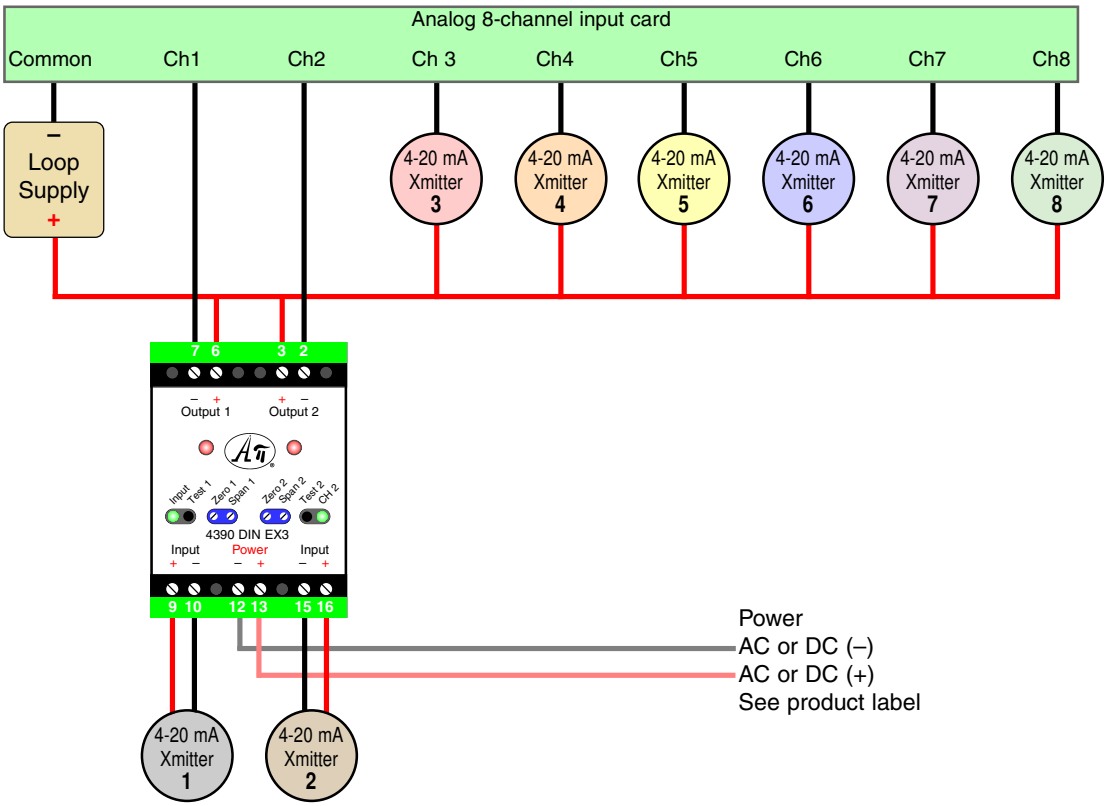


DC Input

Solution

An API 4390 DIN EX3 is added to the circuit. It will isolate the two problem channels while providing power to both input loops. This is faster and more economical than trying to track down and correct the source of the ground loops.

It has a sinking output on both output channels and thus can tie into the existing loop supply. No additional components are needed.



FREE APPLICATION ASSISTANCE
Call API Customer Service
800-942-0315

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

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

F16L *Loop Powered*
F16LN *Loop Powered, NEMA 4X*

- *±0.25% Test Gauge Accuracy*
- *Pressure, Vacuum, Compound, or Absolute*
- *316 Stainless Steel Wetted Parts*
- *4-20 mA Output*
- *Output Test Function*

F16L100PSIG
100.0 psig range

F16LN100PSIG
100 psig range

Electrical Specifications

Ranges and Resolution

Bold: standard ranges, price adder for all others
abs: absolute reference (atmospheric pressure to zero at full vacuum)
vac: vacuum gauge, minus sign not used unless specified
Resolution is fixed as indicated in table below

–30.0 inHg/15.0 psig	**120.0 inHg**	1600 mmHg	35.00 bar	1.000 kg/cm² abs
–30.0 inHg/100.0 psig	200.0 inHg abs	760.0 torr abs	70.00 bar	1.000 kg/cm² vac
–30.0 inHg/200.0 psig	**200.0 inHg**	1600 torr abs	140.0 bar	±1.000 kg/cm²
3.000 psig	50.00 oz/in²	2100 mmH$_2$O	200.0 bar	1.000 kg/cm²
5.000 psig	80.0 oz/in²	3500 mmH$_2$O	350.0 bar	2.000 kg/cm² abs
15.00 psi abs	240.0 oz/in² abs	210.0 cmH$_2$O	20.00 kPa	2.000 kg/cm²
15.00 psig vac	240.0 oz/in² vac	350.0 cmH$_2$O	35.00 kPa	4.000 kg/cm²
±15.00 psig	±240.0 oz/in²	1000 cmH$_2$O	100.0 kPa abs	7.000 kg/cm² abs
15.00 psig	240.0 oz/in²	2100 cmH$_2$O	100.0 kPa vac	7.000 kg/cm²
30.00 psi abs	85.0 inH$_2$O	200.0 mbar	±100.0 kPa	14.00 kg/cm²
30.00 psig	140.0 inH$_2$O	350.0 mbar	100.0 kPa	20.00 kg/cm²
60.00 psig	400.0 inH$_2$O abs	1000 mbar abs	200.0 kPa abs	35.00 kg/cm²
100.0 psi abs	400.0 inH$_2$O vac	1000 mbar vac	200.0 kPa	70.00 kg/cm²
100.0 psig	±400 inH$_2$O	±1000 mbar	400.0 kPa	140.0 kg/cm²
200.0 psig	400.0 inH$_2$O	1000 mbar	700.0 kPa abs	200.0 kg/cm²
300.0 psig	850 inH$_2$O	2000 mbar abs	700.0 kPa	350.0 kg/cm²
500.0 psig	7.000 ftH$_2$O	2000 mbar	1500 kPa	1.000 atm abs
1000 psig	12.00 ftH$_2$O	4000 mbar	2000 kPa	±1.000 atm
2000 psig	35.00 ftH$_2$O	1.000 bar abs	3500 kPa	1.000 atm
3000 psig	70.00 ftH$_2$O	1.000 bar vac	5000 kPa	4.000 atm
5000 psig	140.0 ftH$_2$O	±1.000 bar	3.500 MPa	7.000 atm
6.000 inHg	230.0 ftH$_2$O	1.000 bar	7.000 MPa	14.00 atm
10.00 inHg	480.0 ftH$_2$O	2.000 bar abs	14.00 MPa	20.00 atm
30.00 inHg abs	150.0 mmHg	2.000 bar	20.00 MPa	35.00 atm
30.00 inHg vac	260.0 mmHg	4.000 bar	35.00 MPa	70.00 atm
±30.00 inHg	760.0 mmHg abs	7.000 bar abs	1000 g/cm² abs	135.0 atm
30.00 inHg	760.0 mmHg vac	7.000 bar	1000 g/cm²	200.0 atm
60.00 inHg abs	760.0 mmHg	14.00 bar	2100 g/cm² abs	340.0 atm
60.00 inHg	1600 mmHg abs	20.00 bar	2100 g/cm²	

Accuracy (linearity, hysteresis, repeatability)

Standard: ±0.25% of full scale ±1 least significant digit
Optional: **-HA** ±0.1% FS ±1LSD (most ranges)
-4A ±0.4% FS ±1LSD
CD Factory calibration data
NC NIST traceable test report and calibration data

Display

4 readings per second nominal display update rate
4½ digit LCD, 0.5" H main display
5 character 0.25" H alphanumeric lower display for units, functions, and setup

Controls & Functions

TEST When held sets loop current and display to test level, independent of pressure, to allow testing of system operation
▲ Up: set test, passcode, and calibration values
▼ Down: set test, passcode, and calibration values

Calibration

User settable passcode required to enter calibration mode
All pressure and absolute models: zero, midpoint, span
All vacuum models: –span, –midpoint, zero
Vacuum/pressure models: –span, zero, +midpoint, +span
±15 psi models: –span, –midpoint, zero, +midpoint, +span

Loop Supply Voltage

Any DC supply/loop resistance that maintains 8 to 32 VDC at gauge terminals
Gauge is reverse polarity protected
3 ft long, 2-conductor 22 AWG cable
Order optional **9046-24-008** loop power supply

Loop Output Characteristics

12,000 counts over sensor range for 4-20 mA output
Updated approximately 16 times per second
Factory configurable pressure range to correspond to 4-20 mA output
Indication on display for low loop power

Mechanical Specifications

Size

F16L: 3.38" W x 2.88" H x 1.65" D housing
F16LN: 3.5" W x 3.0" H x 2.0" D housing
Add approximately 0.75" to height for pressure fitting
Add approximately 1" to depth for strain relief and wire clearance

Weight

Gauge: 9 ounces (approx)
Shipping weight: 1 pound (approx)

Material and Color

F16L: Extruded aluminum case, light gray epoxy powder coated, black ABS/ polycarbonate bezel (aluminum bezel optional), front and rear gaskets, black/gold label
F16LN: Light gray ABS/polycarbonate NEMA 4X case, rear gasket, black/gold label

Pressure/Vacuum Connection Size, Material, Media Compatibility

¼" NPT male, all wetted parts are 316 SS, compatible with most liquids and gases

Overpressure

3000 psig range and metric equivalents: 5000 psig
5000 psig range and metric equivalents: 7500 psig
All others: 2 x sensor pressure
112.5% out-of-range display: **I** – – – or **I** –.–.–.– depending on model

Burst Pressure

4 times sensor pressure rating, or 10,000 psi, whichever is less

Environmental

Storage Temperature –40 to 203°F (–40 to 95°C)
Operating Temperature –4 to 185°F (–20 to 85°C)
Compensated Temperature 32 to 158°F (0 to 70°C)

Pressure

Cecomp Electronics cecomp.com

F16L, F16LN Instructions

DESCRIPTION

All operating power for the **F16L** series is supplied by the 4-20 mA current loop. The 2-wire connection allows the **F16L** to be used as a digital indicating transmitter in any 4-20 mA current loop application. The output is a 12,000 count analog 4-20 mA signal. The output is filtered to improve noise immunity and is updated approximately 16 times per second. The temperature compensated piezoresistive transducer features 316 stainless steel wetted parts.

The TEST pushbutton, when depressed, switches the display and output loop to a preset level determined by the keypad setting of the test value.

INSTALLATION AND PRECAUTIONS

Install or remove gauge using wrench on hex fitting only. Do not attempt to tighten by turning housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

NEVER insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

ELECTRICAL CONNECTION

Connection to the **F16L** is made with the 2-wire cable at the gauge rear. Connect the loop (+) supply to the RED lead and the loop (–) supply to the BLACK lead. Reversing the connections will not harm the gauge but the **F16L** will not operate with incorrect polarity.

LOOP VOLTAGE

Select a loop power supply voltage and total loop resistance so that when the loop current is 20 mA, the gauge will have at least 8 VDC at its terminals. For correct operation and to avoid erratic or erroneous readings, the gauge terminal voltage must not fall below 8 VDC. Too large a loop resistance will cause the gauge output to "limit" or saturate before reaching its full 20 mA output.

The **minimum** loop supply voltage may be calculated from the formula:

$$V_{min} = 8V + (20mA \times \text{Total loop resistance})$$

If the terminal voltage of the gauge falls below about 7.8 VDC, erratic operation may occur. This is an indication that the loop supply/resistance may not allow adequate headroom for reliable operation. This should never occur in normal use. If it does, examine the loop supply/resistance.

OPERATION

The **F16L** is designed for continuous operation. Warm-up time is negligible. When power is first applied, the **F16L** will set the loop current to maximum and check the voltage available. If there is sufficient voltage available to power the unit, all active segments will be displayed briefly.

Then the full scale pressure range and engineering units are displayed. All active segments will again displayed briefly. Then the display will show the system pressure, and the loop current will also be proportional to the pressure/vacuum. The output is linearly proportional to the pressure.

Pressure, vacuum, or absolute ranges:	4 mA = Zero or low end 20 mA = Span, full-scale or high end
Bipolar ranges:	4 mA = negative or low end 12 mA = Zero 20 mA = Span, full-scale or high end
Compound ranges: (can be custom scaled by factory)	4 mA = negative or low end 12 mA = midscale over entire range 20 mA = Span, full-scale or high end

At power-up, if the voltage available is not sufficient, only the low power segment will be displayed. This is an indication that the loop impedance is too high or the loop power supply voltage is too low. After successful power-up, if the loop voltage falls below the minimum required for reliable operation, the **F16L** will continue to indicate pressure with the low power segment blinking at a slow rate.

TEST BUTTON

When the front-panel TEST button is held depressed, the display and loop current are switched, independent of the system pressure, to a test level determined by the test setting. This test mode will allow setup and testing of the current loop by switching to this test level whenever desired without having to alter the system pressure.

To set the test output level, press and hold the front-panel TEST button and press the up or down arrow buttons to adjust the test output to the desired pressure setting. This setting is stored in non-volatile memory.

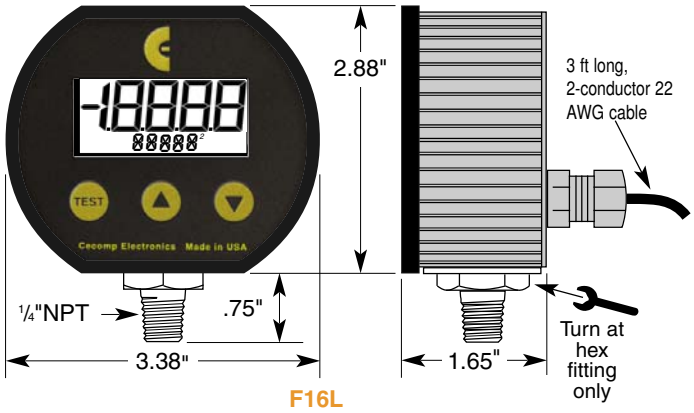
When the TEST button is held depressed, the display and loop current are switched, independent of the actual pressure, to a level determined by the test setting. When the button is released, normal operation is resumed.

CALIBRATION

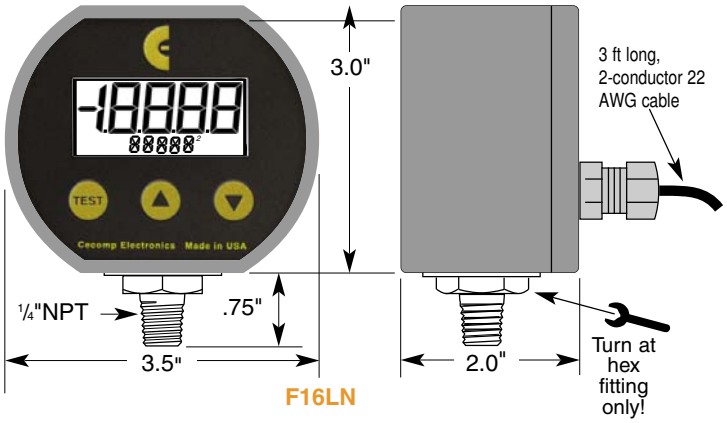
Calibration should only be attempted if the user has access to a pressure reference of known accuracy. The quality of the calibration is only as good as the accuracy of the calibration equipment and ideally should be at least four times the gauge accuracy.

If recalibration is necessary, consult factory, or refer to **cecomp.com** for calibration information. Gauges may be returned to Cecomp Electronics for factory certified recalibration. NIST traceability is available.

DIMENSIONS



F16L



F16LN

PART NUMBERS

F16L,F16LN **range units ref**

Pressure/Vacuum Range (see table)

Units (see table)

G=Gauge, **A**=Absolute, **VAC**=Vacuum

Example: F16L15PSIA = DPG1000, Loop powered, 15.00 PSI Absolute

Unit Abbreviations			
psi = PSI	ftH_2O = FTH2O	kg/cm^2 = KGCM	mbar = MBAR
inHg = INHG	mmHg = MMHG	g/cm^2 = GCM	bar = BAR
oz/in^2 = ZIN	torr = TORR	kPa = KPA	cmH_2O = CMH2O
inH_2O = INH2O	mmH_2O = MMH2O	MPa = MPA	atm = ATM

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

1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502

Electrical Specifications

Ranges and Resolution

Bold: Standard ranges, price adder for all others
abs: Absolute reference (atmospheric pressure to zero at full vacuum)
vac: Vacuum gauge, minus sign not used unless specified
Resolution is fixed as indicated in table

–30.0 inHg/15.0 psig	**120.0 inHg**	1600 mmHg	35.00 bar	1.000 kg/cm² abs
–30.0 inHg/100.0 psig	200.0 inHg abs	760.0 torr abs	70.00 bar	1.000 kg/cm² vac
–30.0 inHg/200.0 psig	**200.0 inHg**	1600 torr abs	140.0 bar	±1.000 kg/cm²
3.000 psig	50.00 oz/in²	2100 mmH_2O	200.0 bar	1.000 kg/cm²
5.000 psig	80.0 oz/in²	3500 mmH_2O	350.0 bar	2.000 kg/cm² abs
15.00 psi abs	240.0 oz/in² abs	210.0 cmH_2O	20.00 kPa	2.000 kg/cm²
15.00 psig vac	240.0 oz/in² vac	350.0 cmH_2O	35.00 kPa	4.000 kg/cm²
±15.00 psig	±240.0 oz/in²	1000 cmH_2O	100.0 kPa abs	7.000 kg/cm² abs
15.00 psig	240.0 oz/in²	2100 cmH_2O	100.0 kPa vac	7.000 kg/cm²
30.00 psi abs	85.0 inH_2O	200.0 mbar	±100.0 kPa	14.00 kg/cm²
30.00 psig	140.0 inH_2O	350.0 mbar	100.0 kPa	20.00 kg/cm²
60.00 psig	400.0 inH_2O abs	1000 mbar abs	200.0 kPa abs	35.00 kg/cm²
100.0 psi abs	400.0 inH_2O vac	1000 mbar vac	200.0 kPa	70.00 kg/cm²
100.0 psig	±400 inH_2O	±1000 mbar	400.0 kPa	140.0 kg/cm²
200.0 psig	400.0 inH_2O	1000 mbar	700.0 kPa abs	200.0 kg/cm²
300.0 psig	850 inH_2O	2000 mbar abs	700.0 kPa	350.0 kg/cm²
500.0 psig	7.000 ftH_2O	2000 mbar	1500 kPa	1.000 atm abs
1000 psig	12.00 ftH_2O	4000 mbar	2000 kPa	±1.000 atm
2000 psig	35.00 ftH_2O	1.000 bar abs	3500 kPa	1.000 atm
3000 psig	70.00 ftH_2O	1.000 bar vac	5000 kPa	4.000 atm
5000 psig	140.0 ftH_2O	±1.000 bar	3.500 MPa	7.000 atm
6.000 inHg	230.0 ftH_2O	1.000 bar	7.000 MPa	14.00 atm
10.00 inHg	480.0 ftH_2O	2.000 bar abs	14.00 MPa	20.00 atm
30.00 inHg abs	150.0 mmHg	2.000 bar	20.00 MPa	35.00 atm
30.00 inHg vac	260.0 mmHg	4.000 bar	35.00 MPa	70.00 atm
±30.00 inHg	760.0 mmHg abs	7.000 bar abs	1000 g/cm² abs	135.0 atm
30.00 inHg	760.0 mmHg vac	7.000 bar	1000 g/cm²	200.0 atm
60.00 inHg abs	760.0 mmHg	14.00 bar	2100 g/cm² abs	340.0 atm
60.00 inHg	1600 mmHg abs	20.00 bar	2100 g/cm²	

Accuracy (linearity, hysteresis, repeatability)

Standard: ±0.25% of full scale ±1 least significant digit
Optional: **-HA** ±0.1% FS ±1LSD (most ranges)
-4A ±0.4% FS ±1LSD
CD Factory calibration data
NC NIST traceable test report and calibration data

Display

4 readings per second nominal display update rate
4½ digit LCD, 0.5" H main display
5 character 0.25" H alphanumeric lower display for units, functions, and setup
ADABL models: Red LED backlight on whenever gauge is on.
LCD Alarm 1 and Alarm 2 indicators and bi-color (red/green) LEDs on front panel

Controls & Functions

S Select: display alarm trip points
T Test: alarm acknowledge, or toggle alarm states when in test mode
▲ Up: increase alarm set point when in setpoint adjust mode
▼ Down: decrease alarm set point when in setpoint adjust mode

Calibration

User settable passcode required to enter calibration mode
All pressure and absolute models: zero, midpoint, span
All vacuum models: –span, –midpoint, zero
Vacuum/pressure models: –span, zero, +midpoint, +span
±15 psi models: –span, –midpoint, zero, +midpoint, +span

Alarm Deadband

Hysteresis factory set at 1% of of full scale

Alarm Outputs

Dual form C (SPDT) relay contacts; 1A/24VDC, 0.5A/115VAC, non-inductive
Normal action standard
3 ft long, 6-conductor 22 AWG cable
HI/LO with optional HI/HI, LO/LO, normal or reverse acting
120 milliseconds typical response time

Power

Gauge is on whenever power is applied
Any AC source of 8 to 24 VAC 50/60 Hz or any DC source of 9 to 32 VDC
1.0 watt maximum, 3 ft long, 22 AWG cable
Order optional **WMPSK** 12 VDC wall mount power supply kit to operate on 115 VAC

- ***±0.25% Test Gauge Accuracy***
- ***316 Stainless Steel Wetted Parts***
- ***Dual SPDT Alarms with Programmable Setpoints***
- ***Bi-Color Red/Green Alarm LEDs***
- ***Alarm Test Function***

F16ADA100PSIG-1N
100.0 psig range

Mechanical Specifications

Size

3.38" W x 2.88" H x 1.65" D housing
Add approximately 0.75" to height for pressure fitting
Add approximately 1" to depth for strain relief and wire clearance

Weight

Gauge: 9 ounces Shipping weight: 1 pound (approximate)

Housing Material & Color

Extruded aluminum case, light gray epoxy powder coated
Black polycarbonate cover. Front and rear gaskets. Black gold polycarbonate label

Pressure/Vacuum Connection and Material

¼" NPT male, 316 stainless steel

Media Compatibility

All wetted parts are 316 SS, compatible with most liquids and gases

Overpressure

3000 psig range and metric equivalents: 5000 psig
5000 psig range and metric equivalents: 7500 psig
All others 2x rated pressure minimum
112.5% out-of-range display: *I* – – – or *I* –.–.–.– depending on model

Burst Pressure

4x rated pressure minimum or 10,000 psi, whichever is less

Environmental

Storage Temperature –40 to 203°F (–40 to 95°C)
Operating Temperature –4 to 185°F (–20 to 85°C)
Compensated Temperature 32 to 158°F (0 to 70°C)

Models and Options

F16ADA range units ref - alarm
F16ADABL range units ref - alarm

Pressure/Vacuum Range
Units
G=Gauge, **A**=Absolute, **VAC**=Vacuum
Alarm Options

1N = Hi/Lo Normal action (Std)
2N = Hi/Hi Normal action
3N = Lo/Lo Normal action
1R = Hi/Lo Reverse action
2R = Hi/Hi Reverse action
3R = Lo/Lo Reverse action

Example: **F16ADABL500PSIG-1N** = F16ADA with BL display backlighting, 500 psig, HI/LO normal action alarms

Cecomp Electronics
cecomp.com

INSTALLATION AND PRECAUTIONS

Install or remove gauge using wrench on hex fitting only. Do not turn using housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation. **NEVER** insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

POWER CONNECTIONS

***NEVER** connect the gauge power wires directly to 115 VAC or permanent damage not covered by warranty will result!* The **F16ADA** and the **F16ADABL** can be powered by:

AC source: **8** to **24 VAC 50/60 Hz** or DC source: **9** to **32 VDC**

Connect power to the smaller two-conductor cable with one RED and one BLACK lead. The gauge will operate on either AC or DC power, so there is no need to observe polarity. Operation with less than 8 VAC RMS if AC, or 9 VDC may cause erratic or erroneous readings or alarm operation.

The gauge is powered on whenever a supply voltage is applied. During power-up, the display briefly indicates the rated full-scale pressure with "FS" indicated on the lower display. This is followed by a test of all LCD display segments. The gauge then proceeds to the normal operating mode. The gauge may be left on at all times or as required. Alarm setpoints, the calibration passcode, and calibration information are stored in non-volatile memory.

ALARM OUTPUT WIRING

The larger 6-conductor cable is for the alarm relay contacts.

Contact	Setpoint 1	Setpoint 2	
Normally Closed (NC)	**BLACK**	Normally Closed (NC)	**GREEN**
Common (C)	**RED**	Common (C)	**BROWN**
Normally Open (NO)	**WHITE**	Normally Open (NO)	**BLUE**

Contact Rating and Protection - The contacts of the alarm relays are rated at 1A/24VDC or 0.5A/115VAC. Using mechanical relay contacts above their rating, or with large inductive loads, will shorten their useful life. In circuits other than low-level switching or pilot duty, the user should consider whether external contact protection such as snubber networks or arc suppression networks are required to protect the contacts. No internal fusing is included in the alarm contact circuits. The alarm outputs should be externally fused by the user in applications where good design practice dictates.

NORMAL OPERATION

In normal operation the display indicates the applied pressure with engineering units displayed on the character segments. A green LED indicates a normal or no-alarm condition. If any alarm condition is present, the relevant LCD alarm icon will be shown on the display and the corresponding bi-color LED will be red and blink at a slow rate until the alarm is acknowledged or the alarm condition clears. Press and release the "T" button to acknowledge an alarm condition.

The alarm trip point values are displayed by pressing the "S" (Select) button. Press once to show TRIP 1 and press again to show TRIP 2. Pressing the "S" button again returns the gauge to the normal display.

If a particular setpoint is configured as a HI alarm, the gauge will provide a RED alarm indication when the system pressure exceeds the setpoint. If a particular setpoint is configured as a LO alarm, the gauge will provide a RED alarm indication when the system pressure falls below the setpoint. Alarm configurations are set at the factory and may be ordered as HI/LO, HI/HI, or LO/LO configurations.

USING THE ALARM TEST FUNCTION

For system setup, testing, and troubleshooting, the test function can be used to toggle the state of the alarm relays. This allows them to be switched to their opposite state on demand without the need to vary the system pressure to test devices connected to the alarms.

While in the normal operating mode, press and hold the "T" button and press the "S" button. Release both buttons when the display indicates " – – – – ".

While in the Test Alarms mode the display will indicate the applied pressure with engineering units blinking at a slow rate.

To invert the alarm states, press the "T" button. As long as the "T" button is held pressed, the alarm indicators and the alarm relays will be opposite to what they would normally be for the applied pressure displayed.

When the "T" button is released, the alarm indicators will return to their normal operating state corresponding to the applied pressure being displayed. To exit the Test Alarms mode and return to normal operation, press and release the "S" button.

ALARM TYPES: NORMAL VS. REVERSE ACTION

With Normal configuration (alarm options 1N, 2N, or 3N), the alarm output relays will be CLOSED (relay energized) for a non-alarm condition and OPEN (relay not energized) for an alarm condition. This produces an alarm condition if the gauge loses power. In the wiring diagrams, the normally closed and normally open designations refer to standard relay terminology; i.e., the relay contact status with the relay coil not energized.

Therefore, with the Normal configuration, in a green or non-alarm condition the relay will be energized so that continuity can be expected between the common and normally open leads. In a red or alarm condition, the relay will be open (not energized), so that continuity can be expected between the common and normally closed leads.

If no alarm condition is required when the gauge power is off specify Reverse action (alarm options 1R, 2R, or 3R). In this case, the relay will be open (not energized) in the non-alarm condition and closed for the alarm condition. In this case, continuity can be expected from common to normally closed in the green (non-alarm) condition and from common to normally open in the red (alarm) condition.

DEADBAND

The alarm circuit setpoints have built-in deadbands, also known as hysteresis, of 1% of span as standard. This is a fixed value set at the factory. This means, for example, the deadband is approximately 1 psi in a 0 to 100 psi gauge.

This deadband serves to eliminate output oscillation or "chatter" in the process due to minor fluctuations in pressure. If, for example, the system pressure in a 0-100 psi system is 40.0 psi, and Setpoint 1 is set to 50.0 psi (HI alarm), the alarm indication will trip if the pressure exceeds 50.0 psi. After the HI alarm has tripped, pressing the SP1 button will show that the alarm indication will "release" at 1 psi lower (approximately 49 psi).

ALARM SETPOINT 1 ADJUSTMENT

1. Make sure the gauge is in the normal operating mode. To adjust set point 1 press the "S" (Select) button once to show TRIP 1 on the lower display.
2. While pressing and holding the "T" button, press the "S"button. Release both buttons when the display indicates " – – – – ".
3. The display will indicate trip point 1 with TRIP 1 blinking on the lower display.
4. To adjust the set point 1 value, press and hold the "T" button. The display will indicate set point 1 with SP1 on the character segments.
5. Operate the ▲ and ▼ buttons to adjust Set Point 1 to the desired value. The Set Point 1 value is stored when the "T" button is released. Note: The LEDs will turn off and the gauge will not respond to changes in applied pressure while the "T" button is held pressed. The alarm relays and LCD indicators will maintain their prior states until the "T" button is released.
6. To exit the Set Point 1 Adjust mode and return to normal operation, press and release the "S"button.

ALARM SETPOINT 2 ADJUSTMENT

Set Point 2 is adjusted in the same manner as setpoint 1.

1. Make sure the gauge is in the normal operating mode. To adjust setpoint 2 press the "S" (Select) button twice to show TRIP 2 on the lower display.
2. While pressing and holding the "T" button, press the "S"button. Release both buttons when the display indicates " – – – – ".
3. The display will indicate Trip Point 2 with TRIP 2 blinking on the lower display.
4. To adjust the set point 2 value, press and hold the "T" button. The display will indicate Set Point 2 with SP2 on the character segments.
5. Operate the ▲ and ▼ buttons to adjust set point 2 to the desired value. The set point 2 value is stored when the "T" button is released. Note: The LEDs will turn off and the gauge will not respond to changes in applied pressure while the "T" button is held pressed. The alarm relays and LCD indicators will maintain their prior states until the "T" button is released.
6. To exit the Set Point 2 Adjust mode and return to normal operation, press and release the "S"button.

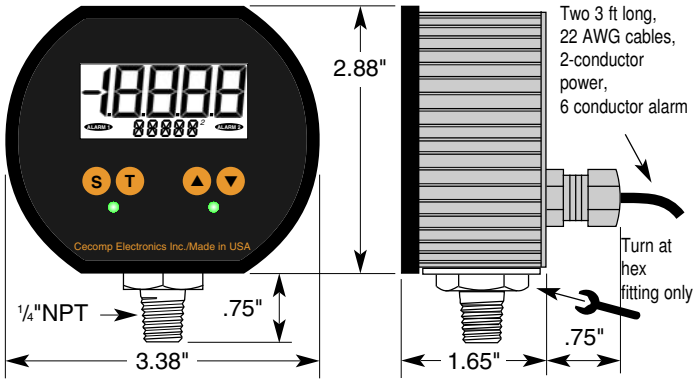
Note: "Set Point" is defined as the value of applied pressure that will result in a change of state only from a normal to an alarm condition. "Trip Point" is defined as the value of applied pressure that will result in a change of state of alarm condition, and includes the effect of deadband when returning from an alarm to a normal condition.

CALIBRATION

Calibration should only be attempted if the user has access to pressure calibration equipment at least four times the gauge accuracy. Absolute reference gauges require vacuum generation and atmospheric pressure measurement equipment for accurate calibration and thus are more difficult to calibrate in the field.

The user-settable passcode is required to access the gauge calibration functions. The default passcode, passcode setting instructions, and gauge calibration instructions can be downloaded from **cecomp.com** or requested by calling us at 800-942-0315. Gauges may be also returned to Cecomp for factory certified or NIST traceable calibration.

DIMENSIONS



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

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

Electrical Specifications

Ranges and Resolution

Bold: Standard ranges, price adder for all others
abs: Absolute reference (atmospheric pressure to zero at full vacuum)
vac: Vacuum gauge, minus sign not used unless specified
Resolution is fixed as indicated in table

–30.0 inHg/15.0 psig	**120.0 inHg**	1600 mmHg	35.00 bar	1.000 kg/cm² abs
–30.0 inHg/100.0 psig	200.0 inHg abs	760.0 torr abs	70.00 bar	1.000 kg/cm² vac
–30.0 inHg/200.0 psig	**200.0 inHg**	1600 torr abs	140.0 bar	±1.000 kg/cm²
3.000 psig	50.00 oz/in²	2100 mmH_2O	200.0 bar	1.000 kg/cm²
5.000 psig	80.0 oz/in²	3500 mmH_2O	350.0 bar	2.000 kg/cm² abs
15.00 psi abs	240.0 oz/in² abs	210.0 cmH_2O	20.00 kPa	2.000 kg/cm²
15.00 psig vac	240.0 oz/in² vac	350.0 cmH_2O	35.00 kPa	4.000 kg/cm²
±15.00 psig	±240.0 oz/in²	1000 cmH_2O	100.0 kPa abs	7.000 kg/cm² abs
15.00 psig	240.0 oz/in²	2100 cmH_2O	100.0 kPa vac	7.000 kg/cm²
30.00 psi abs	85.0 inH_2O	200.0 mbar	±100.0 kPa	14.00 kg/cm²
30.00 psig	140.0 inH_2O	350.0 mbar	100.0 kPa	20.00 kg/cm²
60.00 psig	400.0 inH_2O abs	1000 mbar abs	200.0 kPa abs	35.00 kg/cm²
100.0 psi abs	400.0 inH_2O vac	1000 mbar vac	200.0 kPa	70.00 kg/cm²
100.0 psig	±400 inH_2O	±1000 mbar	400.0 kPa	140.0 kg/cm²
200.0 psig	400.0 inH_2O	1000 mbar	700.0 kPa abs	200.0 kg/cm²
300.0 psig	850 inH_2O	2000 mbar abs	700.0 kPa	350.0 kg/cm²
500.0 psig	7.000 ftH_2O	2000 mbar	1500 kPa	1.000 atm abs
1000 psig	12.00 ftH_2O	4000 mbar	2000 kPa	±1.000 atm
2000 psig	35.00 ftH_2O	1.000 bar abs	3500 kPa	1.000 atm
3000 psig	70.00 ftH_2O	1.000 bar vac	5000 kPa	4.000 atm
5000 psig	140.0 ftH_2O	±1.000 bar	3.500 MPa	7.000 atm
6.000 inHg	230.0 ftH_2O	1.000 bar	7.000 MPa	14.00 atm
10.00 inHg	480.0 ftH_2O	2.000 bar abs	14.00 MPa	20.00 atm
30.00 inHg abs	150.0 mmHg	2.000 bar	20.00 MPa	35.00 atm
30.00 inHg vac	260.0 mmHg	4.000 bar	35.00 MPa	70.00 atm
±30.00 inHg	760.0 mmHg abs	7.000 bar abs	1000 g/cm² abs	135.0 atm
30.00 inHg	760.0 mmHg vac	7.000 bar	1000 g/cm²	200.0 atm
60.00 inHg abs	760.0 mmHg	14.00 bar	2100 g/cm² abs	340.0 atm
60.00 inHg	1600 mmHg abs	20.00 bar	2100 g/cm²	

Accuracy (linearity, hysteresis, repeatability)

Standard: ±0.25% of full scale ±1 least significant digit
Optional: **-HA** ±0.1% FS ±1LSD (most ranges)
-4A ±0.4% FS ±1LSD
CD Factory calibration data
NC NIST traceable test report and calibration data

Display

4 readings per second nominal display update rate
4½ digit LCD, 0.5" H main display
5 character 0.25" H alphanumeric lower display for units, functions, and setup
ADAHBL models: Red LED backlight on whenever gauge is on
Green LEDs on front panel to indicate relay status

Controls & Functions

S Select: display alarm trip points
T Test: toggle relay state when in test mode
▲ Up: increase set/reset point when in setpoint adjust mode
▼ Down: decrease set/reset point when in setpoint adjust mode

Calibration

User settable passcode required to enter calibration mode
All pressure and absolute models: zero, midpoint, span
All vacuum models: –span, –midpoint, zero
Vacuum/pressure models: –span, zero, +midpoint, +span
±15 psi models: –span, –midpoint, zero, +midpoint, +span

Relay Trip and Reset

Keypad adjustable trip and reset points
ON trip point: green LEDs on, relay off for normal acting, relay on for reverse acting
OFF reset point: green LEDs off, relay on for normal acting, relay off for reverse acting

Relay Outputs

DPDT relay contact set
1A/24VDC, 0.5A/115VAC, non-inductive
Normal action standard, reverse acting optional
3 ft long, 6-conductor 22 AWG cable
120 milliseconds typical response time

Power

Gauge is on whenever power is applied
Any AC source of 8 to 24 VAC 50/60 Hz or any DC source of 9 to 32 VDC
1.0 watt maximum, 3 ft long, 22 AWG cable
Order optional **WMPSK** 12 VDC wall mount power supply kit to operate on 115 VAC

- ***Programmable Set and Reset Points***
- ***Green Relay Indicator LEDs***
- ***±0.25% Test Gauge Accuracy***
- ***316 Stainless Steel Wetted Parts***
- ***Relay Test Function***
- ***DPDT Relay***

F16ADAH100PSIG-NR
100.0 psig range

Mechanical Specifications

Size

3.38" W x 2.88" H x 1.65" D housing
Add approximately 0.75" to height for pressure fitting
Add approximately 1" to depth for strain relief and wire clearance

Weight

Gauge: 9 ounces Shipping weight: 1 pound (approximate)

Housing Material & Color

Extruded aluminum case, light gray epoxy powder coated
Black polycarbonate cover. Front and rear gaskets. Black gold polycarbonate label

Pressure/Vacuum Connection and Material

¼" NPT male, 316 stainless steel

Media Compatibility

All wetted parts are 316 SS, compatible with most liquids and gases

Overpressure

3000 psig range and metric equivalents: 5000 psig
5000 psig range and metric equivalents: 7500 psig
All others 2x rated pressure minimum
112.5% out-of-range display: **I** – – – or **I** –.–.–.– depending on model

Burst Pressure

4x rated pressure minimum or 10,000 psi, whichever is less

Environmental

Storage Temperature –40 to 203°F (–40 to 95°C)
Operating Temperature –4 to 185°F (–20 to 85°C)
Compensated Temperature 32 to 158°F (0 to 70°C)

Models and Options

F16ADAH range units ref - relay
F16ADAHBL range units ref - relay

Pressure/Vacuum Range
Units
G=Gauge, **A**=Absolute, **VAC**=Vacuum
Relay Options

-NT Normal action, relay Tripped at power up when inside deadband
-NR Normal action, relay Reset at power up when inside deadband
-RT Reverse action, relay Tripped at power up when inside deadband
-RR Reverse action, relay Reset at power up when inside deadband

Example: **F16ADAHBL500PSIG-NR** = F16ADAH with BL display backlighting, 500 psig, normal action, reset at power up

Pressure

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

INSTALLATION AND PRECAUTIONS

Install or remove gauge using wrench on hex fitting only. Do not turn using housing or any other part of the gauge. Use fittings appropriate for the pressure range of the gauge. Do not apply vacuum to gauges not designed for vacuum operation. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation. **NEVER** insert objects into the gauge port or blow out with compressed air. Permanent damage not covered by warranty will result to the sensor.

POWER CONNECTIONS

***NEVER** connect the gauge power wires directly to 115 VAC or permanent damage not covered by warranty will result!* The **F16ADAH** and the **F16ADAHBL** can be powered by:

AC source: **8** to **24 VAC 50/60 Hz** or DC source: **9** to **32 VDC**

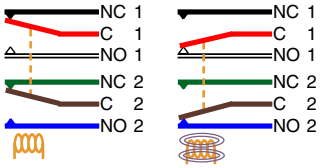
Connect power to the smaller two-conductor cable with one RED and one BLACK lead. The gauge will operate on either AC or DC power, so there is no need to observe polarity. Operation with less than 8 VAC RMS if AC, or 9 VDC may cause erratic or erroneous readings or alarm operation.

The gauge is powered on whenever a supply voltage is applied. During power-up, the display briefly indicates the rated full-scale pressure with "FS" indicated on the lower display. This is followed by a test of all LCD display segments. The gauge then proceeds to the normal operating mode. The gauge may be left on at all times or as required. Relay setpoints, the calibration passcode, and calibration information are stored in non-volatile memory.

ALARM OUTPUT WIRING

The 6-conductor cable is for the DPDT relay contacts.

Contact 1	Normally Closed (NC)	**BLACK**
Contact 1	Common (C)	**RED**
Contact 1	Normally Open (NO)	**WHITE**
Contact 2	Normally Closed (NC)	**GREEN**
Contact 2	Common (C)	**BROWN**
Contact 2	Normally Open (NO)	**BLUE**



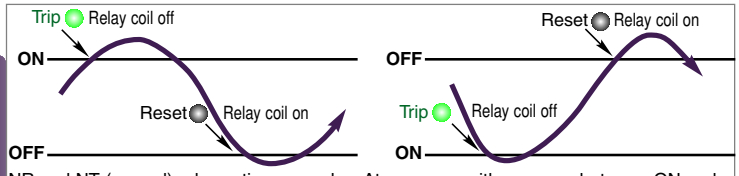
Contact Rating and Protection

The relay contacts are rated at 1A/24VDC or 0.5A/115VAC. Using mechanical relay contacts above their rating, or with large inductive loads, will shorten their useful life. In circuits other than low-level switching or pilot duty, the user should consider whether external contact protection such as snubber networks or arc suppression networks are required to protect the contacts. No internal fusing is included in the contact circuits. The relay outputs should be externally fused by the user in applications where good design practice dictates.

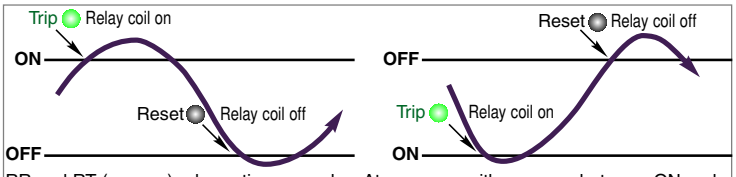
RELAY TYPES: -NT, -NR, -RT, -RR

ON or "Trip Point" is defined as the value of applied pressure that will result in a change of state from a normal to an tripped condition. The OFF or "Reset Point" is defined as the value of applied pressure that will result in a change of state to a reset condition.

It is important to consider what will happen if the gauge loses power and the contacts return to their NC position. Also consider the desired alarm action (Tripped or Reset) when the gauge powers up with the pressure is inside the deadband.



NR and NT (normal) relay action examples. At power-up with pressure between ON and OFF settings NT versions would be Tripped until an OFF setting is reached.



RR and RT (reverse) relay action examples. At power-up with pressure between ON and OFF settings RT versions would be Tripped until an OFF setting is reached.

USING THE TEST FUNCTION

For system setup, testing, and troubleshooting, the test function can be used to toggle the state of the relay. This allows it to be switched to its opposite state on demand without the need to vary the system pressure to test devices connected to the relay.

While in the normal operating mode, press and hold the "T" button and then press the "S" button. Release both buttons when the display indicates " – – – – ".

While in the Test mode the display will indicate the applied pressure with engineering units blinking at a slow rate.

To invert the relay state, press the "T" button. As long as the "T" button is held pressed, the LED indicators and the relay will be opposite to what they would normally be for the applied pressure displayed.

When the "T" button is released, the LED indicators and the relay will return to their normal operating state corresponding to the applied pressure being displayed.

To exit the Test mode and return to normal operation, press and release the "S" button.

SETTINGS

The trip (ON) and reset (OFF) points are independently adjustable anywhere within the range of the gauge. ON may be higher or lower than OFF.

ON Trip Adjustment

1. Make sure the gauge is in the normal operating mode. To adjust the trip point (ON) press the "S" (Select) button once to show **ON** on the lower display.
2. Press and hold the "T" button, and press the "S" button. Release both buttons when the display indicates " – – – – ".
3. The display will indicate the trip point value with **ON** blinking on the lower display.
4. To adjust the ON value, press and hold the "T" button. The display will indicate the trip point value with **ON** on the character segments.
5. Operate the ▲ and ▼ buttons to adjust ON to the desired value. The trip point value is stored when the "T" button is released. The gauge will not respond to changes in applied pressure while the "T" button is held pressed. The alarm relay and LCD indicators will maintain their prior states until the "T" button is released.
6. To exit the ON adjust mode and return to normal operation, press and release the "S"button until the engineering units are displayed.

OFF Reset Adjustment

The reset point (OFF) is adjusted in the same manner as the set point.

1. Make sure the gauge is in the normal operating mode. To adjust the reset point (OFF) press the "S" (Select) button twice to show **OFF** on the lower display.
2. Press and hold the "T" button, and press the "S" button. Release both buttons when the display indicates " – – – – ".
3. The display will indicate the reset point value with **OFF** blinking on the lower display.
4. To adjust the OFF value, press and hold the "T" button. The display will indicate the reset point value with **OFF** on the character segments.
5. Operate the ▲ and ▼ buttons to adjust OFF to the desired value. The reset point value is stored when the "T" button is released. The gauge will not respond to changes in applied pressure while the "T" button is held pressed. The alarm relay and LCD indicators will maintain their prior states until the "T" button is released.
6. To exit the OFF adjust mode and return to normal operation, press and release the "S" button until the engineering units are displayed.

Note: "trip point" is defined as the value of applied pressure that will result in a change of state from a normal to a relay trip condition. "Reset point" is defined as the value of applied pressure that will result in a change of state to a relay reset condition.

NORMAL OPERATION

In normal operation the display indicates the applied pressure with engineering units displayed on the character segments. Green LEDs indicate the setpoint has been exceeded and the relay is tripped. Once the pressure is out of the deadband, the LEDs will be off and the relay reset. Note that the actual relay operation will vary depending on the setpoints and the relay configuration that was ordered with the gauge.

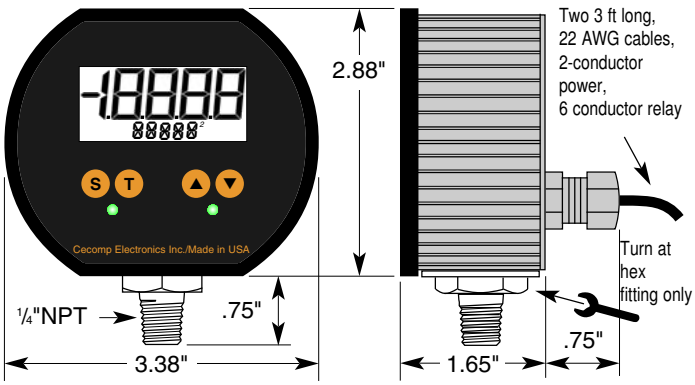
The relay trip point values are displayed by pressing the "S" (Select) button. Press once to show the **ON** setting and press again to show the **OFF** setting. Pressing the "S" button again returns the gauge to the normal display.

CALIBRATION

Calibration should only be attempted if the user has access to pressure calibration equipment at least four times the gauge accuracy. Absolute reference gauges require vacuum generation and atmospheric pressure measurement equipment for accurate calibration and thus are more difficult to calibrate in the field.

The user-settable passcode is required to access the gauge calibration functions. The default passcode, passcode setting instructions, and gauge calibration instructions can be downloaded from **cecomp.com** or requested by calling us at 800-942-0315. Gauges may be also returned to Cecomp for factory certified or NIST traceable calibration.

DIMENSIONS



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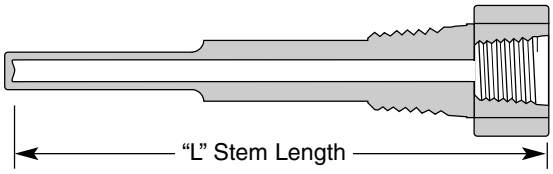
ABSOLUTE PROCESS INSTRUMENTS, Inc.
1220 American Way Libertyville, IL 60048
Phone: 800-942-0315 Fax: 800-949-7502

Input: ***Built-In RTD Probe, –58.0°F to 392.0°F or –50.0°C to 200.0°C***
Output: ***4-20 mA***

- ***User-Programmable Temperature Range***
- ***Precision RTD Temperature Element***
- ***NEMA 4X Housing***
- ***Powered by 4-20 mA Current Loop***
- ***316 Stainless Steel Probe***
- ***1/2" NPT Fitting for Standard Thermowells***



Spring-loaded RTD probes MUST be used with a thermowell.
Length = thermowell "S", "L", "A" or "stem length" dimension.
See your thermowell manufacturer's specifications.
NOTE: probe length is NOT the same as thermowell insertion depth.
Probe length is measured from top of full threads to tip of probe.
Consult factory for custom probe lengths.

Specifications

Range
–58.0°F to 392.0°F or –50.0°C to 200.0°C, selectable °F or °C
Keypad programmable range to correspond to 4-20 mA output

Resolution
0.1°F or 0.1°C

Accuracy (linearity, hysteresis, repeatability)
±0.3°C at 0°C, ±1.1°C at 150°C

Sensor
IEC-751 Class B 100 Ω 0.00385 alpha curve RTD
Consult factory for other probe types or configurations

Display
4 readings per second nominal display update rate
4½ digit LCD, ½" digit height, alphanumeric lower display for units

Controls & Functions
TEST When held sets loop current and display to test level, independent of temperature input, to allow testing of system operation
▲ Up: increase output or calibration values during setup
▼ Down: decrease output or calibration values during setup

Calibration
User settable passcode required to enter calibration mode
Zero and span temperature calibration

Loop Supply Voltage
Any DC supply/loop resistance that maintains 8 to 32 VDC at gauge terminals
Reverse polarity protected
3 ft long, 2-conductor 22 AWG cable
Order optional **9046-24-008** loop power supply to power 4-20 mA loop

Loop Output Characteristics
12,000 count 4-20 mA output
Updated approximately 4 times per second
Configurable temperature range to correspond to 4-20 mA output
Configurable for upscale or downscale burnout
Indication on display for low loop power

Mechanical Specifications

Housing Size
3.5" W x 3.0" H x 2.0" D (not including probe or cable strain relief)
Add approximately 1" to depth for strain relief and wire clearance

Weight (approximate)
Transmitter: approx. 12 ounces
Shipping weight: approx. 1 pound

Material and Color
ABS/polycarbonate housing. Gasketed rear cover, NEMA 4X
Light gray body, light gray/blue front

Connection and Probe Material
½" NPT male, 316 stainless steel. Consult factory other connections

Environmental
Storage temperature –40 to 203°F (–40 to 95°C)
Operating temperature –4 to 185°F (–20 to 85°C) for housing

Model	Type	Fitting	Length
F16LT2	Fixed RTD	1/2 NPT	2.5" L
F16LT4	Fixed RTD	1/2 NPT	4" L
F16LT6	Fixed RTD	1/2 NPT	6" L
F16LT9	Fixed RTD	1/2 NPT	9" L
F16LT12	Fixed RTD	1/2 NPT	12" L
F16LT2S	Spring-Loaded RTD	1/2 NPT	2.5" L
F16LT4S	Spring-Loaded RTD	1/2 NPT	4" L
F16LT6S	Spring-Loaded RTD	1/2 NPT	6" L
F16LT9S	Spring-Loaded RTD	1/2 NPT	9" L
F16LT12S	Spring-Loaded RTD	1/2 NPT	12" L

Cecomp Electronics cecomp.com

ABSOLUTE PROCESS INSTRUMENTS, Inc.
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ThermoPro® F16LT Series Installation and Setup

DESCRIPTION

The ***ThermoPro*** series is microprocessor controlled industrial temperature indicator with a digital temperature display and 4-20 mA retransmission in a rugged NEMA 4X housing. The 2-wire connection allows the ***ThermoPro*** to be used as a temperature display powered by a low-voltage DC source and/or as a loop-powered 4-20 mA transmitter. All operating power is supplied by the 4-20 mA current loop.

The 316 stainless steel RTD probe with a 1/2" NPT fitting is available in either a fixed-length or a spring loaded design to fit standard industrial thermowells. A high accuracy 0.00385 alpha curve RTD element with a three-wire transitionless design is used. The temperature probe assembly is replaceable. Contact factory for special probe versions.

The RTD temperature reading is linearized for both the digital display and the 4-20 mA output. The temperature display may be set up to read °F or °C and the 4-20 mA output may be set to correspond to a desired temperature range.

The ***ThermoPro*** NEMA 4X housing, when properly installed, is suitable for indoor or outdoor non-hazardous locations and provides a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, corrosion and ice formation.

The ***ThermoPro*** features a TEST pushbutton which, when depressed, switches the display and output loop to a preset user-selectable level. This test mode will allow setup and testing of the current loop by switching to this test level whenever desired without having to alter the system temperature.

INSTALLATION AND PRECAUTIONS

Install or remove using wrench on probe hex fitting only. Do not attempt to tighten by turning housing or any other part of the gauge.

The spring-loaded design is intended for use only with a thermowell. Use a thermowell appropriate for the process. A thermowell is required for pipelines with flowing material or pressurized applications. Consult thermowell manufacturer for proper thermowell selection with regard to material compatibility, pressure and flow rates.

The non-spring-loaded design can be used in non-pressurized applications or applications with no flow. Due to the hardness of 316 stainless steel, it is recommended that a thread sealant be used to ensure leak-free operation.

ELECTRICAL CONNECTION

Connection to the ***ThermoPro*** is made with the 2-wire cable at the gauge rear. Connect the loop (+) supply to the RED lead and the loop (–) supply to the BLACK lead. Reversing the connections will not harm the transmitter but it will not operate with incorrect polarity.

LOOP VOLTAGE

Select a loop power supply voltage and total loop resistance so that when the loop current is 20 mA, the transmitter will have at least 8 VDC at its terminals. For correct operation and to avoid erratic or erroneous readings, the terminal voltage must not fall below 8 VDC. Too large a loop resistance will cause the output to "limit" or saturate before reaching its full 20 mA output. The minimum loop supply voltage may be calculated from the formula:

Vmin = 8V + (20mA x Total loop resistance)

If the terminal voltage falls below about 7.8 VDC erratic operation may occur. This is an indication that the loop supply/resistance may not allow adequate headroom for reliable operation. This should never occur in normal use. If it does, examine the loop supply/resistance.

SETUP AND OPERATION

The ***ThermoPro*** is designed for continuous operation. Warm-up time is negligible. When power is first applied, the ***ThermoPro*** will set the loop current to maximum and check the voltage available. If there is sufficient voltage available to power the unit, all active segments will be displayed briefly. Then the display and the loop current will correspond to the temperature of the RTD probe.

At power-up, if the voltage available is not sufficient, only the low power segment will be displayed. This is an indication that the loop impedance is too high or the loop power supply voltage is too low. After successful power-up, if the loop voltage falls below the minimum required for reliable operation, the ***ThermoPro*** will continue to indicate the temperature of the RTD with the low power segment blinking at a slow rate.

If the RTD temperature goes above 392°F or 200°C, ALARM1 will be displayed. If the RTD temperature goes below the –58°F or –50°C, ALARM2 will be displayed. If the RTD temperature continues beyond these limits, the display will eventually indicate 1.-.-.-. and the loop current will be minimum if downscale burnout is configured or maximum if upscale burnout is configured.

To configure the ***ThermoPro*** press and hold the Up and then press the TEST button until the upper display indicates CFG. When the buttons are released the the upper display will indicate _ _ _ _ with the left-most position blinking, and the lower display will indicate PASS. Pressing and releasing TEST exits configuration.

Enter the factory default passcode of **3510**. Use the up and down buttons to set the digit and the TEST button to move to the next position. Press and release the TEST pushbutton to proceed to the configuration sequence. If an incorrect passcode was entered, the gauge will exit to the normal operating mode.

The upper display section will be blank, and the lower section will display either DEG C or DEG F. To change from °C to °F, press and release the UP pushbutton. The lower section of the display will change to DEG F. To change from °F to °C, press and release the Down pushbutton. The lower section of the display will change to DEG C. Note: whether or not a change is made, the Test value will be reset to 0.0°C or to 32.0°F. Press and release the TEST pushbutton to move on to the next parameter.

The upper display section will be blank, and the lower section will display either DN BO or UP BO. To change from downscale burnout to upscale burnout, press and release the Up button. The lower section of the display will change to UP BO. To change from upscale burnout to downscale burnout, press and release the Down button. The lower section of the display will change to DN BO. Press and release the TEST pushbutton to move on to the next parameter.

The upper display section will indicate the temperature corresponding to a loop current of 4 mA. The lower section will display RNGLO. To change the temperature corresponding to a loop current of 4 mA, use the Up and the Down pushbuttons to set the desired value. Press and release the TEST pushbutton to move on to the next parameter.

The upper display section will indicate the temperature corresponding to a loop current of 20 mA. The lower section will display RNGHI. To change the temperature corresponding to a loop current of 20 mA, use the Up and the Down buttons to set the desired value. Press and release the TEST pushbutton to save the configuration parameters and restart the gauge. The configuration parameters will not be saved if the procedure is interrupted before completion.

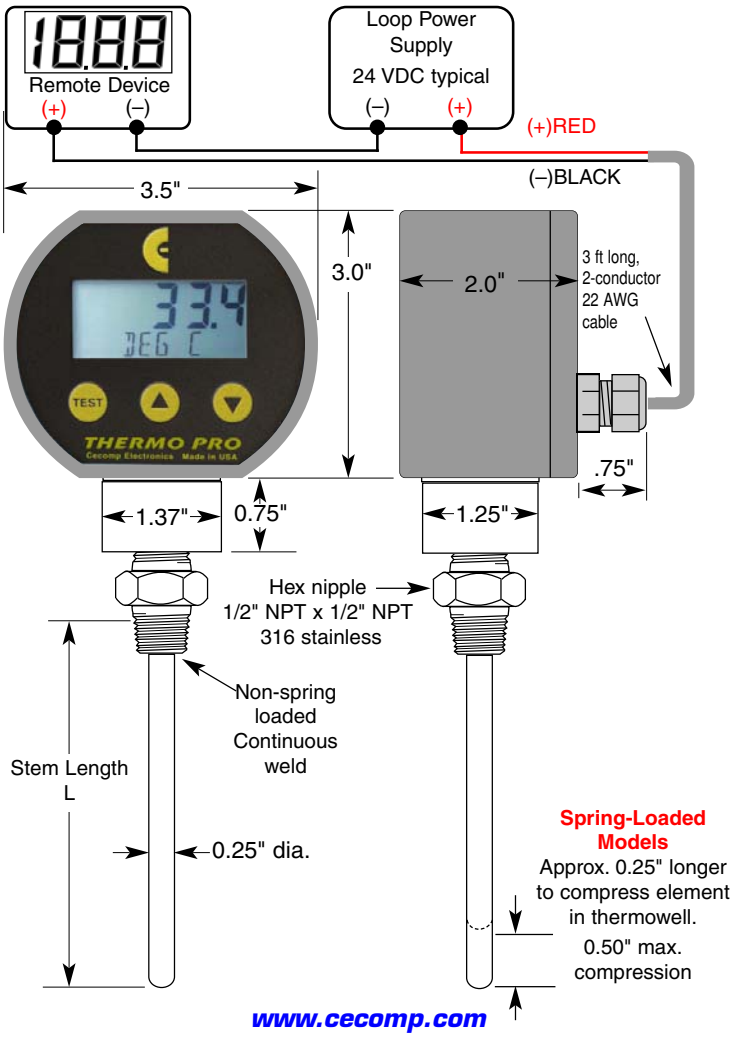
TEST BUTTON

To set the test output level, press and hold the front-panel TEST button and press the up or down arrow buttons to adjust the test output to the desired temperature setting. This setting is stored in non-volatile memory.

When the TEST button is held depressed, the display and loop current are switched, independent of the RTD temperature, to a level determined by the test setting. When the button is released, normal operation is resumed.

CALIBRATION

The ***ThermoPro*** is factory calibrated and there is generally no need to alter calibration settings. If recalibration is necessary, consult factory, or refer to **cecomp.com** for calibration information. Calibration should only be attempted if the user has access to a temperature reference of known accuracy. The quality of the calibration is only as good as the accuracy of the calibration equipment and ideally should be at least four times the unit's accuracy.



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