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.

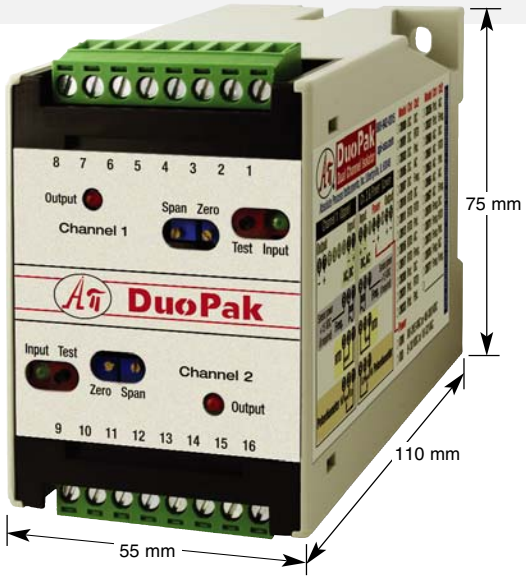
API exclusive features include two **LoopTracker** LEDs and a **Test Pushbutton** for each channel. The LoopTracker LEDs vary in intensity with changes in the process input and output signals. Monitoring the state of these LEDs can provide a quick visual picture of your process loop at all times. The 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

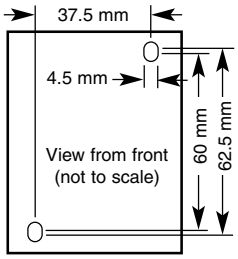
API GP8	Spare green 8-terminal connectors (2)
API TK36	Aluminum DIN rail, 39" long

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

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.



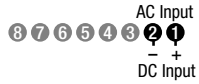
Surface mounting

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.

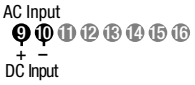
Terminal 7 Signal output positive (+)
Terminal 8 Signal output negative (–)

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

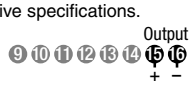
Refer to the sensor manufacturer's data sheet for wiring requirements.

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.

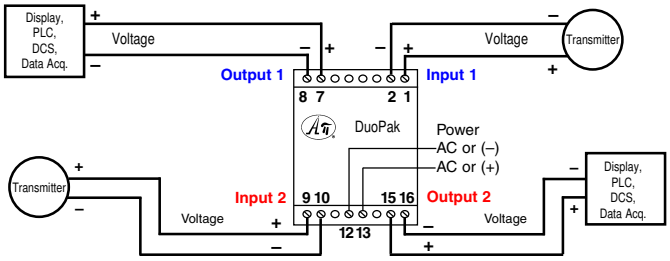
OPERATION

GREEN *LoopTracker*® Input LED

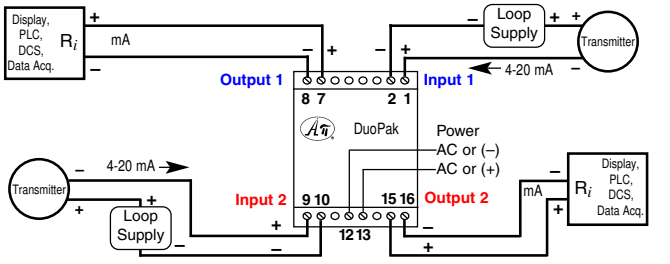
Provides a visual indication that a signal is being sensed by the input circuitry of the module. It also indicates the input signal level by changing in intensity as the process changes from minimum to maximum. If the LED fails to illuminate, or fails to change in intensity as the process changes, this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