VACUUM RESEARCH™ Digital Convection Gauge; 1 x 10^{-3} Torr to Atmosphere

Photo shows digital Convection Gauge Controller with two adjustable setpoints and angle style 1/8" NPT gauge tube

- **Wide Range; 1 mTorr to Atmosphere**
- **Select Calibration in Torr, Pascal, or mBar**
- **Linear Analog Outputs for Computer Interface**
- **Large Easy To Read Green LED Display**
- **1/4 DIN Bench or Panel Mount Enclosure**
- **Two Set Points with 3 Amp Relays Optional**
- **Single Sensor Covers Entire Range**
- **Under 1 Second Response to Rising Pressure**
- **All Cables and Mounting Hardware Included**
- **Extension Cables Available up to 500 Feet**

Wide Range and Low Cost

The convection gauge is the lowest cost instrument that can provide a continuous monitoring and control of your vacuum system from atmosphere all the way down to 1 mTorr. The gauge tube is all stainless steel and has both 1/8 inch NPT and 1/2 inch O.D. smooth tubulation for sealing in compression ports. Optional flanges include NW and Conflat® and are described in the ordering information section below.

Nitrogen, Argon and Other Gases

As a general purpose instrument for monitoring the pump down of systems vented to air or nitrogen, the convection gauge is an excellent choice. The convection gauge can be provided to read directly for argon or other gases. But, if your system uses a variety of gases, or if accuracy between 2 Torr and 800 Torr is critical in your process, then our diaphragm manometer instruments may be a better selection.

Specifications for Digital Convection Gauges

Range of Measurement: 1 milliTorr to Atmosphere; Pa, mbar available.

Sensor Type: Thermal convection.

Resolution: ± 1 milliTorr from 1 to 2000 milliTorr; ± 1 Torr above 2 Torr.

Response Time: Less than 1 second for 90% of an increase in pressure, less than 4 secs. for a decrease in pressure from atmosphere to 1 mTorr.

Hysteresis: Minimum hysteresis is less than 2 mTorr from 1 to 2000 mTorr and less than 2 Torr from 2 Torr to atmosphere. To prevent relay chatter hysteresis is adjustable to as high as 5% of full range.

Maximum Pressure without Calibration Change: 2300 Torr (30 PSIG)

Maximum Gauge Tube Temperature: 100 °C (212 °F) maximum bake out of gauge tubes in air or vacuum. Automatic compensation 0 to 35°C.

Display: 3 1/2 digit, Green LED character height 11 mm (.47 in.) 2 ranges: 1 mTorr to 1999 mTorr and 1 Torr to 777 Torr.

Analog Outputs: Convection Gauge has 3 simultaneous outputs:

1 mTorr to 2000 mTorr:	1 mV per mTorr	(0 to 2 VDC Linear)
2 Torr to 20 Torr:	100 mV per Torr	(0.2 to 2 VDC Linear)
20 Torr to 800 Torr:	1 mV per Torr	(.020 to .800 VDC Linear)

Gauge Tube Orientation: Axis of tube must be horizontal.

Line Power: 95 to 125 VAC, 50/60 Hz; 220 VAC optional, no extra cost.

Wattage: 5 watts with both relays energized.

Line Cord: 3 wire 1.7 meter (65 inch) attached.

Gauge Tube Cable: Standard length is 3 m (10 ft.) attached to cabinet. Use up to 150 m (500 ft.) without affecting calibration.

Mounting: 1/4 DIN enclosure suitable for panel or bench mounting. Panel mounting jack screws included. Carry handles also available.

Weight with Gauge Tube: Net: 1 lb. 2 oz. (0.5 kg); Ship: 3 lbs. (1.4 kg.)

Optional Set Points and Relays: 2 independent set points with front panel LED indicators and 2 SPDT relays 3 amp @ 115 VAC, non-inductive. Adjustable from front panel over 100% of range.

Ordering Information; Digital Convection Gauges

Digital Dual Set Point Convection Gauge Controller
Two adjustable set points plus 3 linear analog outputs. 1/4 DIN enclosure with jack screws for panel mounting. Standard power 95 to 125 VAC 50/60 Hz, 220 VAC optional at no extra cost. Built to CSA standards. All cables are included but gauge tube is not. Use angle or inline style.

1 mTorr to atmosphere, P/N: 902171 . . . . . .$636.
.001 mbar to atmos., P/N: 902176-mbar . . . . . .$636.
0.1 Pa to atmos., P/N: 902177-Pascal . . . . . .$636.

Digital Convection Gauge Indicator 1 mTorr to Atmosphere
Three linear analog outputs, no serial I/O or setpoints. 1/4 DIN enclosure with jack screws for panel mounting. Standard power 95 to 125 VAC 50/60 Hz, 220 VAC optional at no extra cost. Built to CSA standards. All cables are included but gauge tube is not. Use angle or inline style.

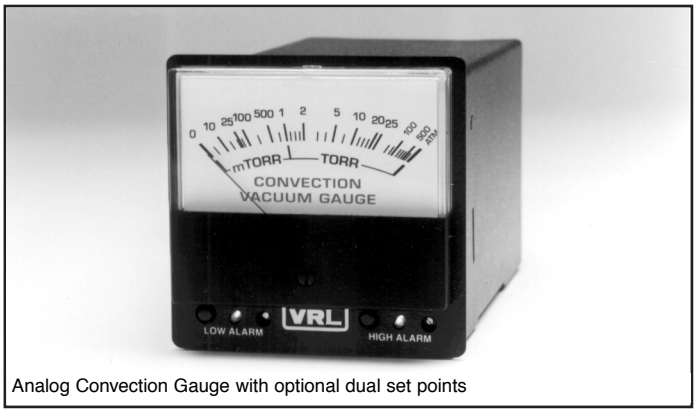
1 mTorr to atmosphere, P/N: 902178 . . . . . .$438.
.001 mbar to atmosphere, P/N: 902179-mbar . . . . . .$438.
0.1 Pascal to atmosphere, P/N: 902180-Pascal . . . . . .$438.

Angle Style Convection Gauge Tubes (Interchangeable with Inline)
Gauge Tube body and all wetted parts are 304 SS Connector pins are nickel plated Kovar.

With 1/8 in. NPT and 1/2 inch OD Tube, P/N: 912161 . . . . . .$105.
With NW-16 Flange, P/N: 912162 • **NW-25 Flange**, P/N: 912201 $144.
With 15 mm OD Tube, P/N: 912167 . . . . . .$144.
With 1.33 in. OD Conflat® (rotatable), P/N: 912163 . . . . . .$144.
With 2.75 in. OD Conflat® (rotatable), P/N: 912164 . . . . . .$144.
With VCR-8 Female, P/N: 912165 . . . . . .$166.
With VCR-4 Female, P/N: 912166 . . . . . .$166.
All Stainless Steel Gauge Tubes for outdoor applications. All wetted parts as well as all external parts and connector pins are 304 SS. Add SS sufffix to tube P/N and to tube price: . . . . . .add $42.
3 Position Gauge Tube Selector, P/N: 902027 . . . . . .$350.

Calibrators for Digital Convection Gauge Indicator or Controller
P/N: 912170 . . . . . .$471.

VACUUM RESEARCH™ Analog Convection Gauge; 1 x 10^{-3} Torr to Atmosphere



Analog Convection Gauge with optional dual set points

- **Wide Range; 1 mTorr to Atmosphere**
- **5 VDC Analog Output for Computer Interface**
- **1/4 DIN Bench or Panel Mount Enclosure**
- **Two Set Points with 3 Amp Relays Optional**
- **Single Sensor Covers Entire Range**
- **Under 1 Second Response to Rising Pressure**
- **All Cables and Mounting Hardware Included**
- **Extension Cables Available up to 500 Feet**

Wide Range and Low Cost

The convection gauge is the lowest cost instrument that can provide a continuous monitoring and control of your vacuum system from atmosphere all the way down to 1 mTorr. The gauge tube is all stainless steel and is very rugged and reliable. The standard gauge tube has both 1/8 inch NPT and 1/2 inch O.D. smooth tubulation for sealing in compression ports. Optional flanges include NW and Conflat® and are described in the ordering information section below.

Temperature Compensated

An internal temperature compensator virtually eliminates the errors due to ambient temperature changes that are so troublesome with other convection gauges.

Safe With Mercury and Fluorine

Mercury and Fluorine vapors are no problem for the Vacuum Research convection gauge. Our filament is a platinum alloy which operates below 100 ^{o}C and all other gauge tube components exposed to vacuum are 300 series stainless steel. For outdoor applications, or for corrosive environments, gauge tubes are also available with stainless steel connector pins.

Nitrogen, Argon and Other Gases

The convection gauge can be provided to read directly for argon or other gases. But, if your system uses a variety of gases, or if accuracy between 2 Torr and 800 Torr is critical in your process, then the Vacuum Research Wide Range Diaphragm Manometer instruments may be a better selection.

Specifications, Analog Convection Gauges

Range of Measurement: 1 milliTorr to Atmosphere.

Sensor Type: Thermal convection.

Resolution: ± 2 milliTorr from 1 to 25 milliTorr; or 2% of meter full scale.

Response Time: Less than 1 second for 90% of an increase in pressure, less than 4 secs. for a decrease in pressure from atmosphere to 1 mTorr.

Hysteresis: Minimum hysteresis is less than 2 mTorr from 1 to 25 mTorr and less than 2% of full scale to atmosphere. To prevent relay chatter hysteresis is adjustable to as high as 5% of full scale.

Maximum Pressure without Calibration Change: 2300 Torr (30 PSIG)

Maximum Gauge Tube Temperature: 100 °C (212 °F) maximum bake out of gauge tubes in air or vacuum. Automatic compensation 0 to 35°C.

Display: Precision analog meter.

Analog Output: 0 to 5 VDC, non linear.

Gauge Tube Orientation: Axis of tube must be horizontal.

Line Power: 95 to 125 VAC, 50/60 Hz; 220 VAC optional, no extra cost.

Wattage: 5 watts with both relays energized.

Line Cord: 3 wire 1.7 meter (65 inch) attached.

Gauge Tube Cable: Standard length is 3 m (10 ft.) attached to cabinet. Use up to 150 m (500 ft.) without affecting calibration.

Mounting: 1/4 DIN enclosure suitable for panel or bench mounting. Panel mounting jack screws included. Carry handles also available.

Weight with Gauge Tube: Net: 4 lb. (1.8 kg); Ship: 4.8 lbs. (2.2 kg.)

Optional Set Points and Relays: 2 independent set points with front panel LED indicators and 2 SPDT relays 3 amp @ 115 VAC, non-inductive. Adjustable from front panel over 100% of range.

Ordering Information; Analog Convection Gauges

Analog Convection Gauge Controller
Two adjustable set points and a non-linear 0 to 5 VDC analog output. Large analog meter calibrated from 1 milliTorr to atmosphere, 760 Torr. 1/4 DIN enclosure with jack screws for panel mounting. Standard power is 95 to 125 VAC 50/60 Hz, 220 VAC optional at no extra cost. Add "220" suffix to P/N. Built to CSA standards. All cables included but gauge tube is not. (Use angle or inline style.) P/N: 902215 . . . . . .$519.

Analog Convection Gauge Indicator
Large analog meter calibrated from 1 milliTorr to atmosphere, 760 Torr. 1/4 DIN enclosure with jack screws for panel mounting. Standard power is 95 to 125 VAC 50/60 Hz, 220 VAC optional at no extra cost. Add "220" suffix to P/N. Built to CSA standards. All cables included but gauge tube is not.(Use angle or inline style.) P/N: 902214 . . . . . .$323.

Inline Style Convection Gauge Tube (Interchangeable with Angle) Gauge Tube body and all wetted parts are 304 SS. Connector pins are nickel plated Kovar®.

With 1/8 in. NPT and 1/2 inch OD Tube, P/N: 912232 . . . . . .$92.
With NW-16 Flange, P/N: 912233 • **NW-25 Flange**, P/N: 912234 $131.
With 15 mm OD Tube, P/N: 912235 . . . . . .$131.
With 1.33 in. OD Conflat® (non-rotatable), P/N: 912236 . . . . . .$131.
With 2.75 in. OD Conflat® (non-rotatable), P/N: 912237 . . . . . .$131.
With VCR-8 Female, P/N: 912238 . . . . . .$154.
With VCR-4 Female, P/N: 912239 . . . . . .$154.

For Leak Detectors **1/4 in. NPT**, P/N: 912105 . . . . . .$119.
1/2 in. OD Tube, P/N: 912280 . . . . . .$119.

All Stainless Steel Gauge Tubes for outdoor applications. All wetted parts as well as all external parts and connector pins are 304 SS. Add SS suffix to tube P/N and to tube price: . . . . . .add $42.
3 Position Gauge Tube Selector, P/N: 902027 . . . . . .$350.
5 Position Gauge Tube Selector, P/N: 902026 . . . . . .$472.
Calibrator for Analog Convection Gauge, P/N: 912183 . . . . . .$231.

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Convection Gauge; PC Board, 24 VDC Power

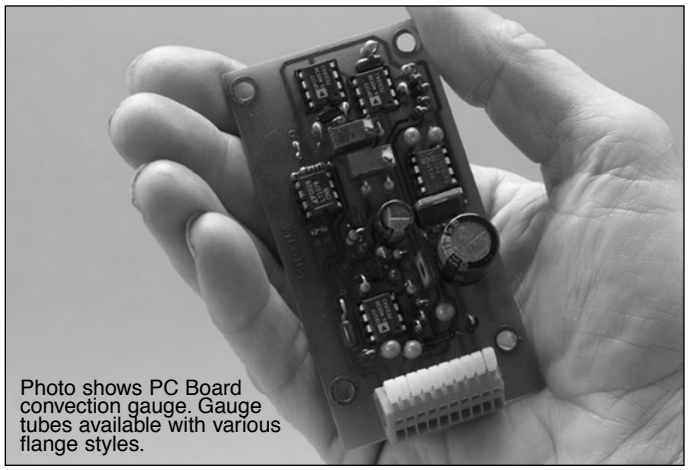
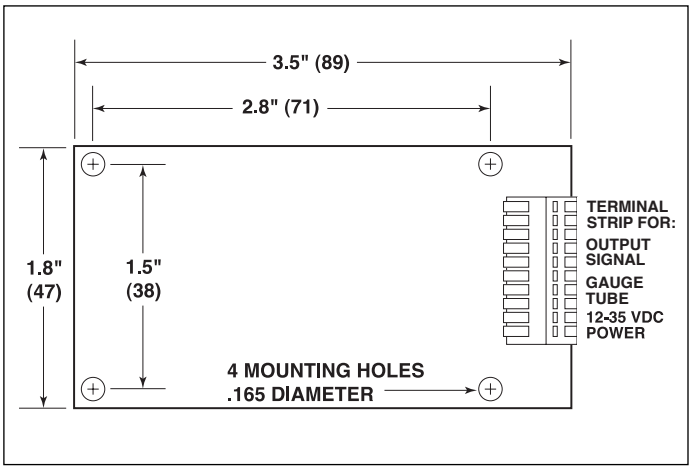


Photo shows PC Board convection gauge. Gauge tubes available with various flange styles.



PC Board Convection Gauge

Convection gauges are very popular because they can measure from atmosphere to 1 mTorr. More properly described as "Convection Enhanced Pirani Gauges," these rugged and inexpensive instruments can directly interface with your PLC to control all crossovers and inititate substrate heat down to 1 X 10^{-3} Torr. Other units of measure such as mbar and Pascal can be easily selected. Below about 20 Torr the principle of measuring is the same as traditional Pirani gauges so accuracy of ± a few milliTorr is easily achieved.

Specifications, PC Board Convection Gauges

Range of Measurement: 1 milliTorr to Atmosphere or equivalent range in Pascal or mbar.

Sensor Type: Thermal conductivity with convection enhancement.

Resolution: ± 2 milliTorr from 1 to 25 milliTorr; or 2% of full scale.

Response Time: Less than 1 second for 90% of an increase in pressure, less than 4 secs. for a decrease in pressure from atmosphere to 1 mTorr.

Hysteresis: Minimum hysteresis is less than 2 mTorr from 1 to 25 mTorr and less than 2% of full scale to atmosphere.

Maximum Pressure without Affecting Calibration: 2300 Torr (30 PSIG)

Maximum Gauge Tube Temperature: 100 °C (212 °F) maximum bake out of gauge tubes in air or vacuum. Automatic compensation 0 to 35°C.

Analog Output: 0 to 5 VDC, non linear. Other outputs such as 0 to 10 VDC can be provided. Look up table of output vs. pressure in Torr, mbar and Pascal included.

Gauge Tube Orientation: Axis of tube must be horizontal.

Power: 12 to 35 VDC, less than 200 mA

Gauge Tube Cable: See ordering information Use up to 150 m (500 ft.) without affecting calibration.

Weight: Net: 0.12 lb. (57 g); Ship: 0.4 lbs. (300 g.)

Power Supplies These instruments will operate with any voltage from 12 to 35 volts D.C. and can be powered from your D.C. bus. If no D.C. power is available these wall mount supplies will operate with any input from 100 to 240 VAC (90 to 264 VAC) 47 to 63 Hz. 4 A.C. plugs are included for outlets in USA, UK, Europe and Australia.

P/N V104134, 800 mA Suitable for 4 instruments . . . . . .$69.

P/N V104135, 1600 mA Suitable for 8 instruments . . . . . .$101.

Safe With Mercury and Fluorine

Mercury and Fluorine vapors are no problem for the Vacuum Research PC Board convection gauge. Our filament is a platinum alloy which operates below 100 ^{o}C and all other gauge tube components exposed to vacuum are 300 series stainless steel. For outdoor applications, or for corrosive ambient conditions, gauge tubes are also available with stainless steel connector pins.

Nitrogen, Argon and Other Gases

The convection gauge can be calibrated to read directly for argon or other gases. But, if your system uses a variety of gases, or if accuracy between 2 Torr and 800 Torr is critical in your process, then the Vacuum Research Wide Range Diaphragm Manometer instruments may be a better choice. Complete specifications for these diaphragm sensor instruments can be found in our catalog and our web site.

Ordering Information, PC Board Convection Gauges

Convection Gauge PC Board
Convection gauge PC board with range of 1 milliTorr to atmosphere and output signal of 0 to 5 VDC. Power required is 12 to 35 VDC @ 200 mA. Calibrated and ready to operate.
P/N: 801188. . . . . .$190.

Gauge Tube with 1.4 in. NPT thread P/N 912105. . . . . .$110.

Gauge Tube with 1/2 in. outside diameter P/N 912280. . . . . .$119.

Gauge Tube with NW-16 flange P/N 912286. . . . . .$131.

Gauge Tube with NW-25 P/N 912287. . . . . .$131.

Gauge Tube with VCR-8 female flange P/N 912288. . . . . .$154.

Calibrator for Convection Gauge PC Board
Plugs directly onto the gauge tube connector for easy verification of zero and span. P/N: 912279. . . . . .$49.

Cable Assembly includes a connector for the sensor on one end and stripped and tinned leads on the other end to connect to the terminal strip on the circuit board. Connector on only one end allows the cable to be pulled through conduit or to more easily enter your cabinet. Specify length. Calibration not affected by cables less than 150 meters (500 ft.)

P/N V801029 xxx feet . . . . . .$20. plus $1./Ft