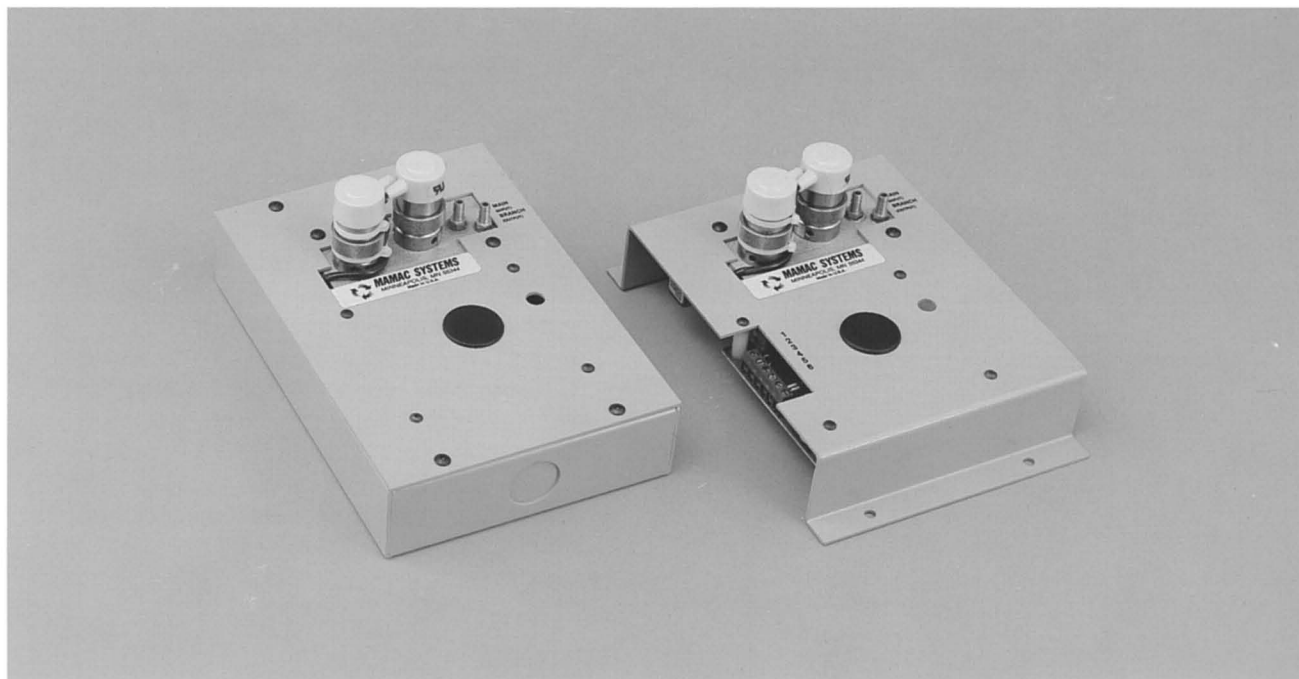


# Proportional Electropneumatic Transducer

## Model EP-310



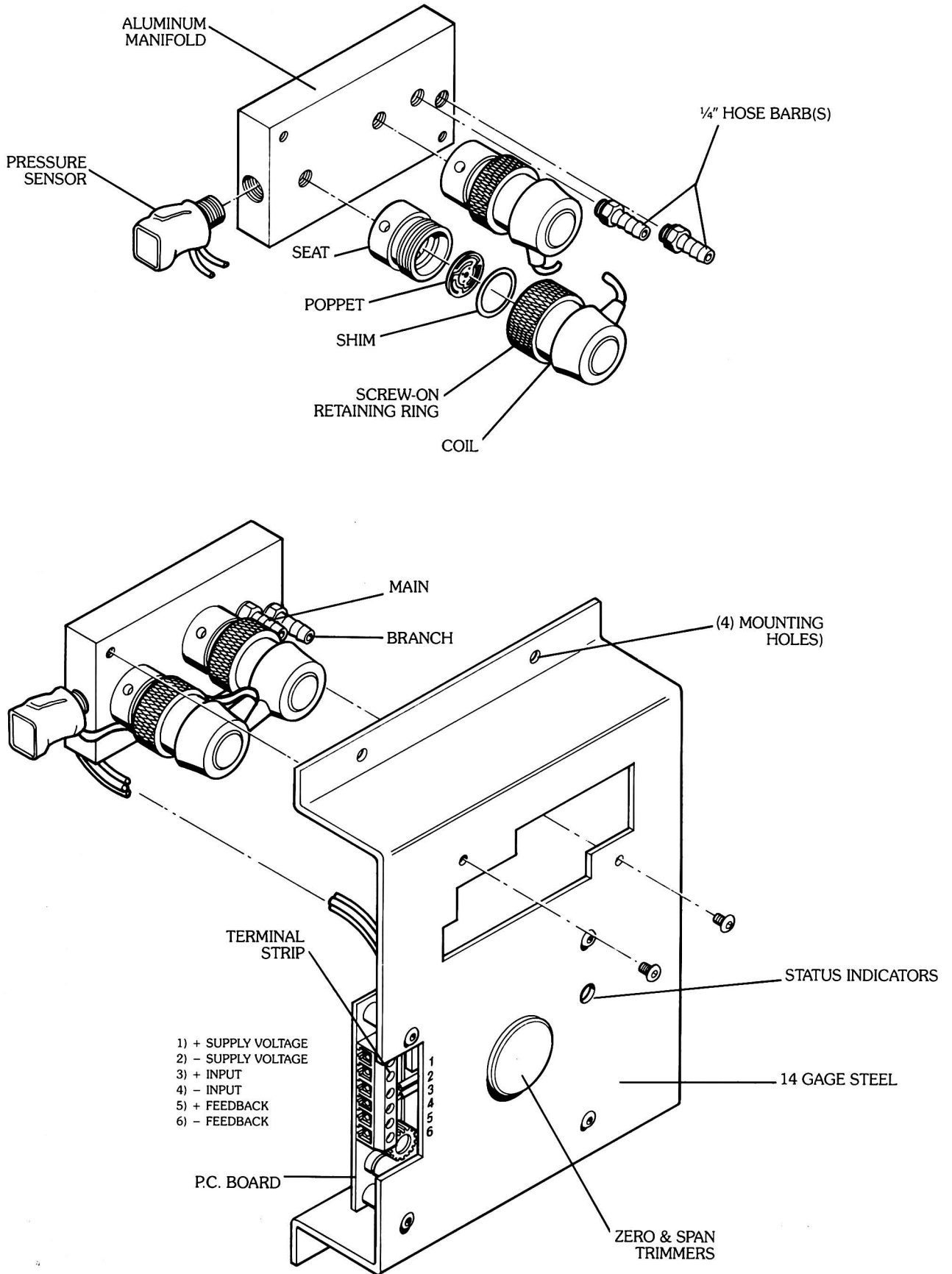
The EP-310 converts an analog signal (0-1, 0-5, or 0-10 VDC or 4-20 mA) to a proportional linear pneumatic output (3-15 or 0-20 psig). Unlike other units which bleed air to maintain pressure, our transducer uses a 100% solid state piezoresistive silicon pressure sensor and a unique field-serviceable electropneumatic converter to provide desired pneumatic pressure without constant air consumption. EP-310 is also immune to mounting orientation and supply pressure fluctuations and does not require filtered air. In this way, the EP-310 provides a reliable, repeatable, and accurate means of converting any analog signal into pneumatic pressure.

- **100% solid state • State-of-the-art circuit for repeatable performance •**
  - **Unique electropneumatic converter assembly •**
  - **More than four supply voltage and output options •**
    - **Analog output for feedback purposes •**
  - **Two unique packaging options for ease of installation •**
- **Guaranteed compatible to all control systems and all actuators/operators •**



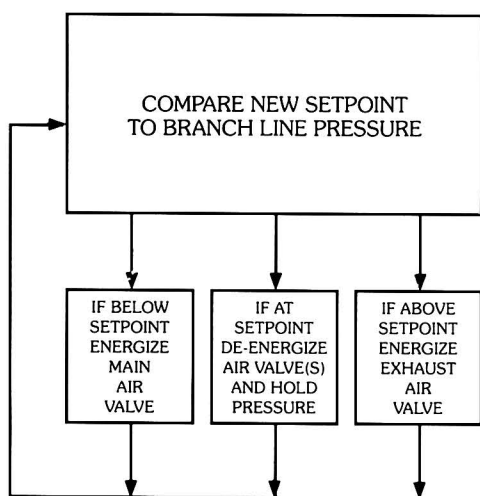
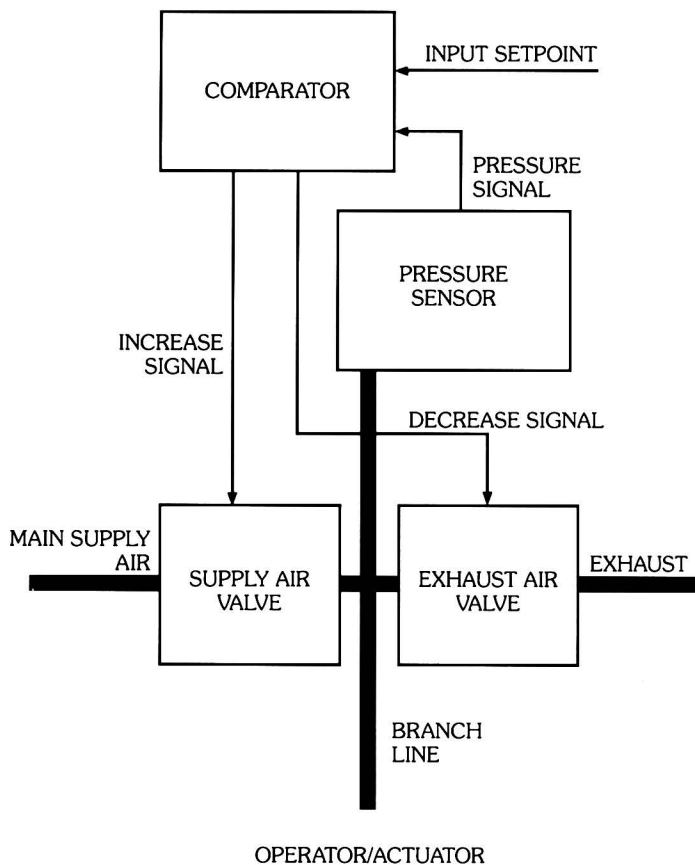
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# EP-310



## EP-310

Model EP-310 incorporates a revolutionary new design to convert an analog signal into proportional pneumatic pressure. The EP-310 transducer does not use any springs, diaphragms, levers, or any other mechanical components. Unlike other units which act like air regulators and bleed air to maintain pressure, the EP-310 incorporates a 100% solid state piezoresistive silicon pressure sensor to measure the pneumatic branch line pressure going to the operator. This information is used by an ultra fast integrated circuit comparator to compare the analog input from the system to the branch line pressure. If the pressure is below, the logic energizes an air valve to increase the pressure to the operator while constantly monitoring the pressure change. The moment the branch line pressure reaches set point, the airflow is instantly cut off. If the pressure is above set point, a second air valve is opened to relieve pressure. Unlike other units which constantly bleed air, the EP-310 does not require any additional air consumption once desired pressure is achieved. By using 100% solid state electronics and fast, reliable I.C. logic, the EP-310 not only responds to a change instantly, but does so without "hunting." Unlike other units which require a filtered and regulated main air supply, the EP-310 can use non-regulated, unfiltered plant air and can achieve branch line pressure with a zero differential to main line pressure. Since the EP-310 is 100% solid state, it is not affected by mounting orientation, vibration, temperature, or other environmental conditions.



MAMAC Systems pioneered the concept of using a two-solenoid and pressure sensor electropneumatic converter in the early 1980s. This extensive experience has taught us many things. We have found that units which rely on hoses to interconnect components often develop "chattering," "hunting," or needless air consumption problems due to air leakage in the hoses caused by age, heat, moisture, and contamination. Our competition has chosen to use P.C. board-mounted, sealed, low-wattage, inexpensive needle valves, which, as experience has demonstrated, are susceptible to mounting orientation. If a needle valve is mounted horizontally, the needle tends to eventually cut a groove in the sleeve, causing "sticking" problems. Needle valves also incorporate a spring to put tension on the needle against the seat. The spring may lose tension over time, resulting in air leaks. Other manufacturers have also opted to use inexpensive, low-wattage (1 watt) coils to switch the valves. If the coil wattage is insufficient, it may not have the power to pull the needle, especially if the needle has cut a groove in the sleeve. Use of a low-wattage coil and needle valves has forced our competition to minimize the output airflow, resulting in insufficient output for the operator/actuator and creating a need for an expensive output booster. Our extensive experience has established that the main air supply usually contains moisture, scale, rust particles, and other contaminants. These contaminants may cause blockage in a sealed valve such as the needle valve our competitors employ.

MAMAC Systems, with more than four years of concentrated R & D effort, has produced a unique, revolutionary electropneumatic converter assembly which eliminates all of the above problems. Our electropneumatic converter consists of a solid aluminum manifold with all the interconnections machined within, thus eliminating all hoses and hose-related leakage

# EP-310

problems. This solid manifold also has threaded ports machined in to accommodate the air valves and the pressure sensor, forming a rigid, interchangeable assembly. If any component fails, it can be easily replaced in the field by unscrewing the faulty component and substituting a new one.

Our electropneumatic converter also incorporates a unique single-component poppet valve which has no needle or springs. Instead, it employs a low-mass steel disc with a Teflon seat which is immune to mounting orientation or vibration. Unlike needles, this poppet has minimum travel and cannot lose tension over time, thus providing years of trouble-free service. In case of blockages caused by contaminants, this unique valve can be easily serviced in the field by merely unscrewing the coil assembly and removing the contaminants. Similarly, if the poppet is damaged, it can be replaced in the field without removing the entire valve. If the contaminant is blocking the valve seat, the customer may easily unscrew the lower portion of the valve, replace it with a new seat and poppet, and screw back the existing coil assembly. In the same way, the pressure sensor can also be easily field serviced if needed. If a problem exists within the manifold ports, the complete electropneumatic converter may be replaced in the field and the EP-310 brought back on line. In order to ensure that sufficient airflow is available to move any actuator/operator without an external booster, the air valves in our electropneumatic converter incorporate a large port and a hefty 3 watt coil to maximize the output airflow.

By using a solid manifold without any hoses, poppet valves versus needle valves, a 3 watt coil instead of a 1 watt, and a totally interchangeable and field serviceable assembly, the EP-310 offers a reliable alternative to inexpensive, disposable units.

The EP-310 is available with an analog feedback signal (0-1, 0-5, or 0-10 VDC or 4-20 mA) which can be used to monitor the branch line pressure. This feedback is provided by the pressure sensor, and it should be noted that, unlike other units, the feedback is not a translated input signal but the true status of the branch line. This signal can be used for troubleshooting and alarming purposes; an air leak or a failure of the main supply air can be very easily diagnosed by analyzing the feedback signal.

The EP-310 is available with all the standard pneumatic outputs and is guaranteed compatible to all actuators and operators on the market. The EP-310 is also available with more than four supply voltage options, including AC. It incorporates a full-wave bridge rectifier, a filter, and a regulator which provide clean regulated power to the circuits. In this way, the unit can handle non-regulated AC or DC power. A reverse-acting option is available on the EP-310 for applications which require the pneumatic output signal to increase as the sensed variable decreases. For example, if the static air pressure in a duct decreases, we would want to increase the airflow. The EP-310 with a reverse-acting option solves this problem very easily by accepting a 0-10 VDC forward-acting input and providing a reverse-acting pneumatic output (15-3 or 20-0 psig) to control fan inlet vane dampers.

The EP-310 is shipped fully calibrated. Zero and span trimmers are provided for field calibration if necessary. The EP-310 also incorporates three LED indicators, visible from the outside: one for supply voltage condition and two for indicating either increasing or decreasing pressure status. The EP-310 is available with two unique, revolutionary packaging options: 1) a 14 gage steel enclosure ideally suited for panel mounting; and 2) a fully enclosed, stand-alone NEMA 1 enclosure. Both options are designed to facilitate installation and provide easily accessible wiring terminations and pneumatic connections. Unlike our competitors who ship unprotected P.C. boards which require expensive field modification and installation, the EP-310 is shipped completely packaged and ready to install with minimum labor required at the job site.

The EP-310 provides an inexpensive yet accurate means to translate any analog output from a control system into a precise, repeatable analog pressure value to control mixed air/return dampers, discharge air dampers, chiller inlet vanes, three-way mixing valves, and other pneumatic actuators/operators.

## SPECIFICATIONS:

<b>Accuracy:</b> +1% (0.2 psig)	<b>Maximum Supply Pressure:</b> 40 psig	<b>Manifold Material:</b> Aluminum
<b>Linearity:</b> +0.1%	<b>Pressure Differential:</b> (Supply to Branch) 0.1 psig	<b>Solenoid Type:</b> Floating Poppet
<b>Repeatability:</b> +0.1 psig	<b>Supply Current:</b> 150 mA/3.0 VA	<b>Solenoid Coil:</b> 3 watts
<b>Resolution:</b> 0.2 psig	<b>Operating Temperature:</b> 0-70° C	<b>Enclosure Material:</b> 16-gage steel
<b>Flow Rate:</b> 0.5 scfm	<b>Pressure Sensor:</b> Piezoresistive Silicon	<b>Enclosure Finish:</b> Enamel Painted PMS#2GR88B

## PRECAUTIONS:

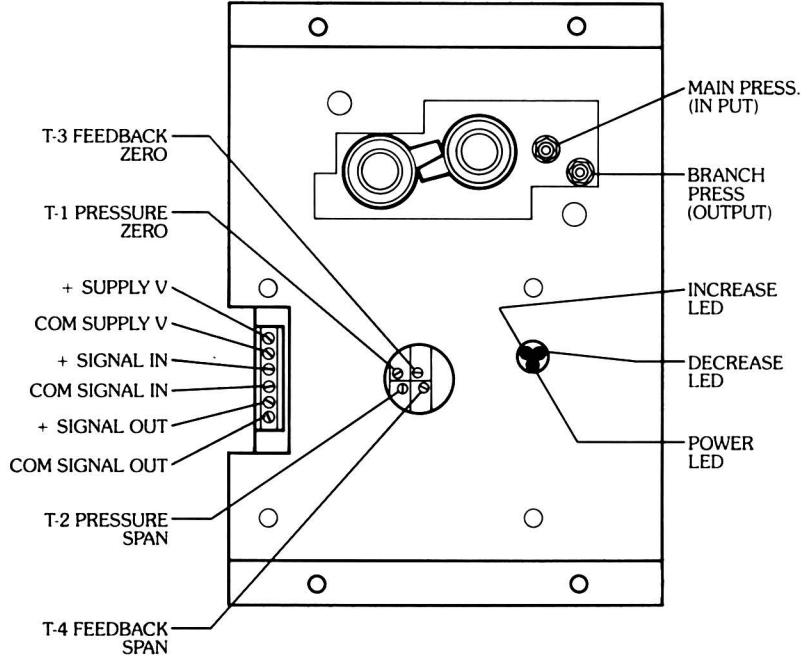
- Do not exceed 24 VAC/VDC supply voltage
- Do not connect less than 5 ft. hose to branch (output) port
- Do not turn any other trimmer
- Do not earth ground 24 VAC secondary of power transformer on 24 VAC unit
- Main pressure must be at least 0.1 PSIG higher than desired maximum branch (output) pressure

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## CALIBRATION INSTRUCTIONS:

NOTE: All units are factory calibrated to meet or exceed published MAMAC specifications. If field adjustment is needed, please perform following steps:

- 1) Connect main air to input port
- 2) Connect output port to an accurate gage with minimum 5-10 ft. hose
- 3) Connect terminals 1 & 2 to appropriate power source for the unit
- 4) Apply low input to terminals 3 & 4 (0 VDC or 4 mA)
- 5) Adjust T-1 trimmer to obtain desired output low pressure
- 6) EP-310AO adjust T-3 to obtain desired feedback low output (VDC or mA)
- 7) Apply high input to unit
- 8) Adjust T-2 to obtain desired high output pressure
- 9) EP-310AO adjust T-4 to obtain desired feedback high output (VDC or mA)
- 10) Repeat steps 4-9 two or three times until the unit is completely calibrated.



## TROUBLESHOOTING:

- 1) If unit is constantly "chattering," increase the hose connecting the output hose barb to the operator.
- 2) If unit is bleeding air constantly and the increase or decrease LED is also on constantly; disconnect power, main air and disassemble both air valves, clean all contaminants and reassemble per exploded view on page 2.
- 3) If unit is correcting output pressure in intervals of less than 60 seconds, check and eliminate any leaks in the control system after the EP-310.
- 4) If unit is not achieving desired output pressure, verify that main air supply is at least 0.1 psig higher than desired output.
- 5) If there is no output, verify that the power supply LED is on, if not check power supply.
- 6) For further technical assistance, call 1-800-843-5116.

## ORDERING INFORMATION:

EP-310	INPUT	PRESSURE RANGE	SUPPLY VOLTAGE	FEEDBACK	ENCLOSURE	OUTPUT TYPE
	1) 0-1VDC 2) 0-5VDC 3) 0-10VDC 4) 4-20mA 5) Custom	A) 0-20 psig B) 3-15 psig C) 0-30 psig D) Custom	1) 24 VDC 2) 24 VAC 3) 115 VAC 4) Custom	A) 0-1 VDC B) 0-5 VDC C) 0-10 VDC D) 4-20 mA E) Custom	P) Panel E) Enclosure	1) Linear 2) Reverse

The MAMAC Systems warranty covers parts and labor for 1 year from date of shipment.

MAMAC Systems reserves the right to change any specifications without notice to improve performance, reliability, or function of our products.