MASS-tron II
Microprocessor Based
Mass Flow "Smart" Transmitter

FLOW 68,000 LB/HR
TEMP 475 °F
PRES 29.74 In.Hg
The MASS-tron II transmitter is furnished with an automatic zeroing circuit capable of electronically adjusting the transmitter zero at predetermined time intervals while simultaneously holding the transmitter output signal.

The automatic zeroing circuit eliminates all output signal drift due to thermal, electronic or mechanical effects, as well as the need for initial or periodic transmitter zeroing. For transmitters operated in temperature controlled spaces (with no thermal effect upon span), this automatic zeroing function essentially produces a “self-calibrating” transmitter. The automatic zeroing circuit will re-zero the transmitter to within 0.1% of its operating span; for a transmitter with a 0.10 IN w.c. span, this represents a zeroing capability within 0.0001 IN w.c.

To permit manual zeroing and/or re-spanning of the MASS-tron II, an electronic switch is provided to permit manual positioning of the zeroing valve.

**Performance Specifications**

**Transmitter**

<table>
<thead>
<tr>
<th>Ranges.</th>
<th>Natural Full Span</th>
<th>Min Calibrated Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 10.00 IN w.c.</td>
<td>0 to 4.00 IN w.c.</td>
<td></td>
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<tr>
<td>0 to 5.00 IN w.c.</td>
<td>0 to 2.00 IN w.c.</td>
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<tr>
<td>0 to 2.00 IN w.c.</td>
<td>0 to 0.80 IN w.c.</td>
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<tr>
<td>0 to 1.00 IN w.c.</td>
<td>0 to 0.40 IN w.c.</td>
<td></td>
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<tr>
<td>0 to 0.50 IN w.c.</td>
<td>0 to 0.20 IN w.c.</td>
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<tr>
<td>0 to 0.25 IN w.c.</td>
<td>0 to 0.10 IN w.c.</td>
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<tr>
<td>0 to 0.10 IN w.c.</td>
<td>0 to 0.04 IN w.c.</td>
<td></td>
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<tr>
<td>0 to 0.05 IN w.c.</td>
<td>0 to 0.02 IN w.c.</td>
<td></td>
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</table>

**Accuracy.**

±0.25% of Natural Span, including non-linearity, hysteresis, and non-repeatability.

**Stability.**

±0.5% of Natural Span for six months.

**Transducer Response Time.**

0.5 second to reach 98% of a step change.

**Temperature Effect.**

Zero. None; corrected by AUTO-zero.

Span. 0.015% of Full Span/ºF.

**Mounting Position Effect.**

None; corrected by AUTO-zero.

**Span and Zero Adjustment.**

Digital, via internally located push-buttons.

**Automatic Zeroing.**

Accuracy. Within 0.1% of calibrated span.

Frequency. Every 1 to 24 hours on 1 hour intervals.

**Low Pass Filtration.**

Response time to reach 98% of a step change is adjustable from 1.75 to 28.0 seconds.

**Overpressure and Static Pressure Limit.**

25 psig.

**Temperature Limits.**

–20 to 180ºF Storage.

+40 to 120ºF Operating.

**Humidity Limits.**

0-95% RH, non-condensing.

**Indication**

**Displays.**

Standard 4 line x 20 character backlit LCD provides four lines of data display.

LED’S indicate CPU activated, AUTO-zero in progress, AUTO-zero over-ranged, AUTO-purge in progress, and auxiliary alarm “on” status.

**Inputs/Outputs**

**Analog Inputs.**

Dual inputs are field configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. One is reserved for temperature input; the other for use with optional special function.

**Analog Outputs.**

Four standard outputs are individually configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC.

**Digital Inputs.**

Dry contact for AUTO-purge external start command.

**Digital Outputs.**

Form C dry contacts rated for 3 amps at 24VAC/VDC for optional HI/LO alarm. Dual Form A dry contacts for AUTO-purge activation and acknowledgment.

**Temperature Compensation Selection.**

Push-button selection of linearized or non-linear input. Choice of thermocouple or 100 ohm platinum RTD temperature sensor type.

- Type E -50 to 1750ºF -50 to 950ºC
- Type T -50 to 750ºF -50 to 400ºC
- Type J -50 to 2000ºF -50 to 1090ºC
- Type K -50 to 2000ºF -50 to 1090ºC
- RTD -50 to 1500ºF -50 to 815ºC

**Pressure Compensation.**

Absolute pressure (atmospheric or duct static), up to 60 IN Hg.

**Power**

**Power Supply.**

Standard 24VAC (20-28VAC) or 24VDC (20-40VDC). Optional 120VAC (100-132VAC).

**Power Consumption.**

13.5VA at 24VAC, 10.0VA at 24VDC, 18.7VA at 120VAC.

**Circuit Protection.**

Power input is fused and reverse polarity protected.
Construction Features

Ultra-Low Mass Flow "Smart" Transmitter

- Removable top cover.
- Integral liquid crystal display.
- Aluminum NEMA 1 enclosure.
- Instrument mounting bracket.
- High and low pressure, 1/8" FPT input signal connections. Suitable to accept barb or compression fittings.
- External, unitary plug-in terminal strips for field wiring connections.
- Transmitter status LED's.
- Side located ON-OFF power switch.

Features

**Accuracy.** The MASS-tron II transmitter is designed to maintain an accuracy of ±0.25% of natural full span. For a span of 0 to 0.05 IN w.c., this accuracy is equivalent to an output accuracy of ±0.000125 IN w.c. differential pressure or ±1.12 FPM velocity.

**Continuous Display of Process.** All MASS-tron II transmitters are equipped with a 4x20 backlit liquid crystal display (LCD) for use during the configuration and calibration process, and to display up to four lines of output data (SCFM, °F, Absolute Pressure, lbs/hr, etc.) during normal operation, with each line individually scalable in user selectable format and units of measure.

**Special Functions Capability.** Built into the MASS-tron II microprocessor is the capability to perform special application functions involving two transmitters. Using a second transmitter as an input to the MASS-tron II, one of the following functions can be performed: summed flow, flow differential, low signal select, high signal select, or percent deviation. The special function output can be both displayed and provided as an analog output signal.

**High Turndown Ratio Operation.** The MASS-tron II transmitter, with its high level of accuracy and automatic zeroing circuitry, can maintain linear output signals on applications requiring velocity turndown of 10 to 1.

**Analog Communication.** Each analog input and output signal can be individually configured for 0-5VDC, 0-10VDC, or 4-20mA/DC by means of a single jumper.

**Primary Signal Noise Filter.** To eliminate background noise and pulsations from the flow signal, the MASS-tron II is equipped with a user selectable digital low pass filter.

**Microprocessor Based Functionality.** The MASS-tron II's on-board microprocessor performs the functions of operating parameter selection, transmitter configuration, input/output and display signal scaling, density correction, and transducer calibration. Input to the microprocessor is via push-button, with separate user and technician access.

**Air Density Correction.** The MASS-tron II transmitter is capable of performing both air temperature and air pressure correction. Temperature input is an analog signal from a remote temperature transmitter; non-linear temperature inputs can be linearized by the microprocessor. Process pressure is measured by means of an internal absolute pressure transmitter connected to the transmitter static pressure signal input.

**AUTO-purge Management** (optional). For “dirty air” applications requiring the use of an Air Monitor AUTO-purge system, the MASS-tron II provides the capabilities of establishing purge frequency and duration while giving the user a choice of either internally timed cycle frequency or externally triggered purge initiation. During the purge cycle all transmitter outputs are maintained at their last value prior to the start of the purge cycle.

**Multiple Operating Power Selections.** Standard input power supplied to the MASS-tron II can be either 24VAC or 24VDC via automatic selection. An optional 120VAC external power transformer (UL listed) can be provided.

**Enclosure.** The MASS-tron II transmitter is furnished in a NEMA 1 aluminum enclosure with external, unitary plug in terminal strips for ease of installation and removal. An optional junction box is available for applications requiring enclosed field wiring.
Physical Specifications

**Signal Connections.**
High and low pressure, 1/8" FPT.

**Electrical Connections.**
External terminal strip with plug-in connectors. Optional terminal strip enclosure with dual 1/2" (.875" actual) conduit connections.

**Enclosure.**
NEMA 1 aluminum enclosure.

**Weight.**
- 4.1 lbs. - 24VDC
- 5.1 lbs. - 24VAC and 120VAC

Dimensional Specifications

[Schematic diagram of the MASS-tron II]

Suggested Specification

The mass flow transmitter shall be capable of receiving flow signals (total and static pressure) from an airflow station or probe array equipped with a temperature sensing means, internally perform density correction for the process temperature and absolute pressure, and produce individual outputs linear and scaled for standard air volume or mass flow, temperature and absolute pressure.

The mass flow transmitter shall contain an integral digital display for use during the configuration and calibration process, and capable of simultaneous indication of the process flow, temperature and absolute pressure during normal operating mode. All transmitter configuration, parameter setting, zero and span calibration, plus display formatting and scaling will be performed digitally in the on-board microprocessor via input push-buttons.

The mass flow transmitter will be available in multiple natural spans covering the range of 0.05 IN w.c. to 10.0 IN w.c. with an accuracy of ±0.25% of natural span. The transmitter shall be furnished with a transducer automatic zeroing circuit and be capable of maintaining linear output signals on applications requiring 10 to 1 velocity or pressure turndown.

(Optional) The transmitter will provide the means of managing a system for automatic high pressure purge of the airflow station or probe array, with user selectable purge frequency and duration, while maintaining the last transmitter output during the purge cycle.

(Optional) Using a second transmitter as an input, the internal microprocessor can perform a summed flow, flow differential, low signal select, high signal select or percent deviation calculation, with the result being displayed and provided as an analog output signal.

The mass flow transmitter shall be the MASS-tron II as manufactured by Air Monitor Corporation, Santa Rosa, California.