

MASStrol

Mass Flow Computer

Features

- Compensates Steam, Gases and Liquids for Temperature and Pressure to Yield Corrected Volume, Mass and Heat Flow.
- Two Line by 20 Character Super Twist Back-Lit LCD Display
- Square Root Extraction of DP Inputs
- 16 Point Linearization
- Displays Compensated Rate and Total Flow
- Takes a Direct 100 Ω Platinum RTD
- Flow Rate, Temperature and Pressure Alarms
- 4-20 mA and Pulse Output Based on Compensated Flow
- Non-volatile Memory
- 24 Volt Excitation Provided
- Front Panel NEMA 4X/IP 65 Rated



Description:

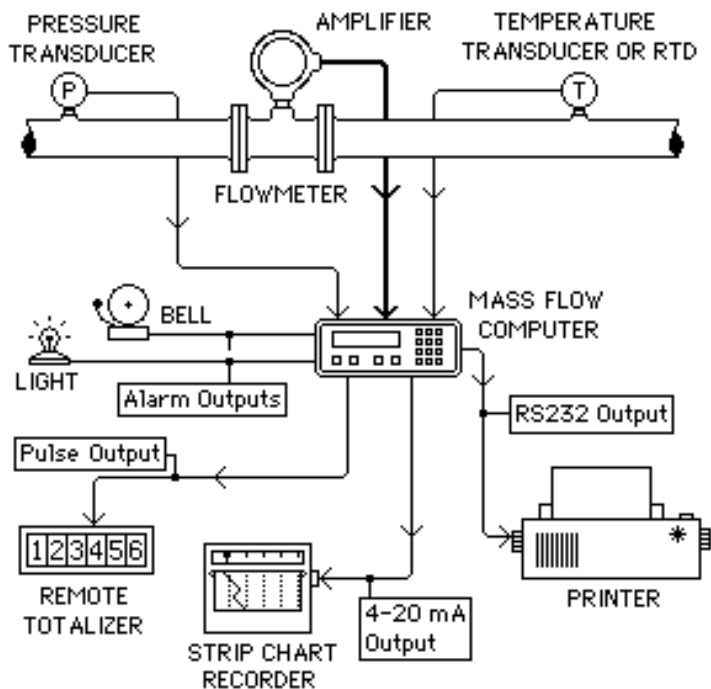
The KEP MASStrol is a microprocessor based instrument designed to measure compensated flow in an industrial environment. Three analog inputs for temperature, pressure and flow are provided to measure the parameters needed to calculate the actual compensated mass, volume or heat flow.

Special signal conditioning circuitry is included to allow direct connection of platinum resistance temperature detectors (RTD'S). A high speed digital input is provided to interface with pulse output type flowmeters. As an alternative, voltage inputs or current loops can be used for the above.

All instrument interface is with a 32 point screw terminal strip on the rear of the instrument.

Flow Computer Application

- § Pressure transducer sends 0-5V or 4-20mA signal to Flow Computer.
- § 100 Ω , 4 wire, RTD direct hook-up to Flow Computer.
- § Turbine flowmeter sends digital signal to Flow Computer.
- § Flow Computer calculates flow and generates output signals.
- § 5 V pulse out to remote totalizer in supervisory area.
- § 4-20 mA out to strip chart recorder tracks trends.
- § RS232 out to printer for data logging.
- § Alarm relays activate bell and/or light as needed.



General Specifications:

OVERALL ACCURACY: .25%

ENVIRONMENTAL:

Operating Temperature:

32° to 122° F (0° to 50° C)

Storage Temperature:

-10 to 160 F (-23 to 71 C)

Humidity: 0 to 90% Noncondensing

Front Bezel: NEMA 4X/IP 65

Case: ABS Plastic

Listing: CE Compliant

POWER: (Internally Fused)

Nominal Line Voltage: 100, 110, 220 or 240 VAC (50/60 Hz)

24VDC $\pm 20\%$ or 12VDC $+20\%/-10\%$

Power Consumption: 10 Watts max

Input Specifications:

The following applies to all inputs. Inputs are referenced to signal ground. All ground terminals are connected internally.

NOTE: All inputs are single-ended with one leg grounded. The exception is the RTD input which is differential but is referenced to ground.

CURRENT INPUTS:

Input Impedance: 100 Ω

Range: 0-20mA, 4-20mA

Maximum sustained input voltage:

5 VDC (Fault Condition)

Resolution: $\pm 0.024\%$ FS

VOLTAGE INPUTS:

Input Impedance: 115 k Ω

Range: 0-5V, 0-10V

Resolution: $\pm 0.024\%$ FS

TEMPERATURE INPUTS:

Compatible RTD type: 100 Ω Platinum

($\alpha = .00385$; DIN 43-760 Calibration)

Lead Wire Compensation: 4 Wire

Configuration: 2, 3 or 4 wire

Excitation Current: 2mA typical

Max Fault Current: 15mA

Max Volt on sense inputs: 50 VDC

Rejection of 50 or 60Hz signal: 40dB minimum (Automatically based on line frequency)

Raw Accuracy: $\pm .5^\circ\text{C}$

DIGITAL FLOW INPUT:

Range: 3-30 VDC Pulse

Max Input Frequency: 40kHz max

Min pulse width: 10 μsec (with 40kHz filter)

Thresholds: OFF is less than 2.0V; ON is greater than 2.5V

Input Impedance: 40k Ω to ground.

Minimum Frequency to Maintain Rate Display: 5 Hz

Output Specifications:

ANALOG OUTPUT:

Range: 4-20mA DC, sink only.

Compliance Voltage Range: 3.0 - 24 VDC

Load Type: Non Inductive

Accuracy: $\pm .5\%$ FS

Update Rate: 1Hz

RELAY OUTPUTS:

One relay is a flow alarm output and a second is for other alarm conditions. Each has the following electrical specifications:

Type: Dry Contact, Form C

Contact Rating: 10A @ 115/230VAC/28VDC

AUXILIARY POWER OUTPUT: (AC powered units only)

Voltage: 24VDC regulated and filtered

Isolation: 230VAC max

Current: 0 to 100mA

Protection: Short Circuit Proof

The 24VDC Output is supplied with a resettable fuse.

DIGITAL FLOW PULSE OUTPUT:

This output is intended to drive a counter with a minimum input impedance of 1000 Ω . It is compatible with TTL and 5V CMOS logic inputs.

Output High Voltage:

No load: 4.5 Volts min

4.0 mA source: 4.0 Volts min

Output Low Voltage:

No Load: 0.2 Volts max

4.0 mA sink: 1.0 Volts max

Output waveform: Symmetric square wave above 1Hz
100msec pulse below 1Hz

Frequency Range: 0 to 50kHz

Max Slew Rate: 27 Volts/ μsec

Sustained Fault Voltage for no permanent damage: 7 Volts

RS232 COMMUNICATIONS:

Connector: 25 Pin Sub-D

Input Impedance: 3000 Ω to 7000 Ω

Compliance Voltage:

Output: -25 to -5 (Mark);

5 to 25 (Space); Volts

Input: -25 to -3 (Mark);

3 to 25 (Space); Volts

Protection: Short circuit proof.

Protocol: 8 bits, 1 Stop bit

Parity: None (Not monitored)

Available Baud Rates: 300, 1200, or 9600

DATA DISPLAY AND KEYPAD:

Internal 2 line by 20 character dot matrix, Backlit LCD display.

Sealed, 16 key panel featuring numeric keys

0- 9, plus the following keys:

A Advance through menus

B Back up through menus

C Cancel current menu selection

D Decimal point key

ENT General purpose enter or recall data key

CLR Data clear key

OPERATION:

Through the 16 button, NEMA 4X/IP 65, front keypad, the operator enters all parameters necessary to configure the mass flow computer. One MASStrol will handle all of your mass flow requirements.

The type of flow equations desired (steam tables, ideal gas law or liquids) must be selected first. For steam flow and heat measurement, the 1967 ASME steam tables for both saturated and superheated steam are stored in memory. For gases, the ideal gas law is used. For liquids and heat calculations, factors are entered through the front keypad.

Additionally, the following hardware parameters must be entered to configure the MASStrol input signal types (from the flow, temperature and pressure transmitters) along with their corresponding ranges or K factors; alarm set points may be entered; the output range for the 4-20 mA signal and the pulse output scaling factor. The operator can select, in any order, up to 16 parameters to display on the read out.

If it is so desired, the operator then can lockout the unit from changes by entering a five digit lockout code.

Optional RS232 serial communications for ease of programming and timely printouts of flow results and/or parameters is available. If RS232 two way communications and the keypad are being used simultaneously, the serial port takes precedence.

SOFTWARE ACCESSORIES:

K1 Diskette:

A diskette program is available to assist in the computation of the K1 term. The K1 factor is used in Orifice/Pitot/Annubar calculations. The K1 factor is the calibration factor for the meter run. It is part of the Variables menu for flow input values (analog).

MASSCON Diskette:

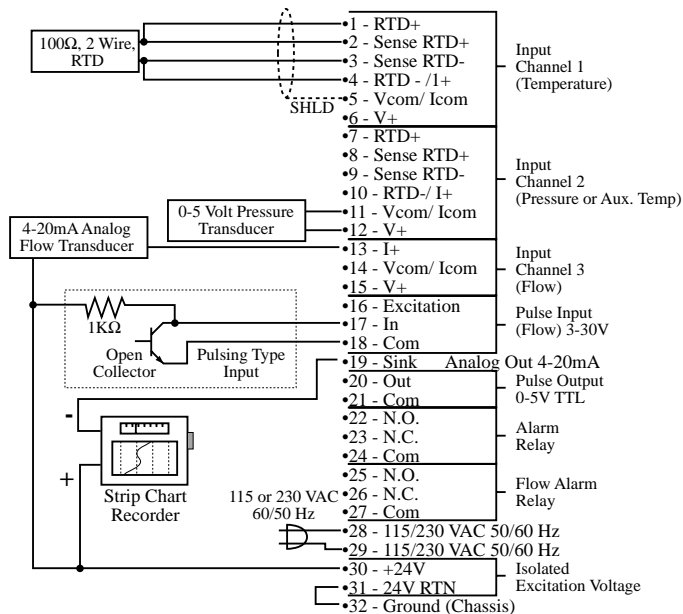
The MASSCON diskette program facilitates the configuration and calibration of the flow computer. The program runs on PC compatibles and communicates through the RS232 port.

TERMINAL BLOCK DESIGNATIONS:

| | RTD | VOLTAGE IN | CURRENT IN | FUNCTION |
|----|---|----------------------------|--------------|--|
| 1 | RTD EXCITATION + | ----- | ----- | CHANNEL 1 TEMPERATURE |
| 2 | RTD SENSE + | ----- | ----- | |
| 3 | RTD SENSE - | ----- | ----- | |
| 4 | RTD EXCITATION - | ----- | I IN + | |
| 5 | GROUND (SHIELD) | V IN - (GND) | I IN - (GND) | |
| 6 | ----- | V IN + | ----- | |
| 7 | RTD EXCITATION + | ----- | ----- | CHANNEL 2 PRESSURE or AUX. TEMP. |
| 8 | RTD SENSE + | ----- | ----- | |
| 9 | RTD SENSE - | ----- | ----- | |
| 10 | RTD EXCITATION - | ----- | I IN + | |
| 11 | GROUND (SHIELD) | V IN - (GND) | I IN - (GND) | |
| 12 | ----- | V IN + | ----- | |
| 13 | ----- | ----- | I IN + | CHANNEL 3 FLOW |
| 14 | GROUND (SHIELD) | V IN - (GND) | I IN - (GND) | |
| 15 | ----- | V IN + | ----- | |
| 16 | EXCITATION VOLTAGE (5.6K PULL-UP TO 5VDC) | | | CHANNEL 3 FLOW |
| 17 | PULSE INPUT (3-30VDC) | | | |
| 18 | GROUND (SHIELD) | | | PULSE INPUT |
| 19 | ANALOG OUTPUT (SINK) | | | ANALOG OUT |
| 20 | PULSE OUTPUT | | | 5V SCALED PULSE OUT |
| 21 | GROUND (SHIELD) | | | |
| 22 | N.O. | | | ALARM RELAY |
| 23 | N.C. | | | |
| 24 | COMMON | | | |
| 25 | N.O. | | | FLOW ALARM RELAY |
| 26 | N.C. | | | |
| 27 | COMMON | | | |
| 28 | 115/230 VAC 50/60Hz | | | POWER (AC) |
| 29 | 115/230 VAC 50/60Hz | | | |
| 30 | +24 VOLTS | 24VDC OUT | + VDC IN | POWER (DC) |
| 31 | 24 VOLTS RETURN | (AC POWERED UNITS ONLY) | -DC (GND) | |
| 32 | CHASSIS GROUND | | | |

Flow Instruments
FLOW COMPUTERS

TYPICAL HOOKUP:



Ordering Information

Example: MFC A 1 BL

Series: MFC

Operating Voltage:

- A: 115 VAC ± 15% at 50/60Hz
- B: 230 VAC ± 15% at 50/60Hz
- C: 24 VDC ± 20%
- D: 12 VDC -10, +20%

Options:

- 1: RS-232 Serial Interface
- CSA: CSA Approved Unit (pending) (consult factory)

Display:

- BL: Backlit Display (standard)

Accessories:

NEMATROL 4X1 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 1 TROL Series unit.

NEMATROL 4X2 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 2 TROL Series unit.

FLEXCOVER #36120

XTROL7/4- Explosion proof housing

P1000 Printer (see Accessories)

Dimensions:

