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FLOWSTREAM

Installation & Maintenance Manual for Precision Mass/Volumetric Flow Measurement for Gases

SERIES:

OFS



EFFECTIVE UNITS WITH THE SERIAL NUMBER 010800004 AND GREATER*

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UNIVERSAL UFM FLOW MONITORS

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***SERIAL NUMBERS ARE GENERATED BY TAKING LAST 2 DIGITS OF THE YEAR + MONTH + DAY + SEQUENTIAL NUMBER.**

Precision Mass/Volumetric Flow Measurement for Non-Aggressive Gases

Maximum flow rates ..... 500 to 1000 SCCM, 1 to 2100 SCFH
..... 0.5 to 1000 SLPM
Turndown ratio ..... 100 to 1
Accuracy ..... (All flow accuracies are specified for
..... "Air Equivalent" meter sizes)
Flow: ..... ±2% of F.S. for capacities ≤2.0 SLPM (4SCFH)
..... ±1% of F.S. for capacities ≤566 SLPM (1200 SCFH)
. ±2% of F.S. for capacities of 567 to 1000 SLPM (1201-2100 SCFH)
Pressure: ..... ± 1 PSI
Totalizer: ..... Same as flow range
Open Collectors ..... Maximum Load Voltage: 30 VDC @ 50mA
Repeatability ..... ±0.25% of F.S. flow rate
Supply Voltage ..... 4-20mA, 0-5 VDC, Frequency output: 12-30 VDC
..... (12-24 VDC for intrinsic safety)
..... 0-10 VDC output only: 15-30 VDC
Supply Current* ..... Voltage output models: 15mA
..... Current output models: ≥ 20mA
..... *(excluding load of alarm output)

Output	**Response Time**
4-20mA	500 ms (std)
.....	(1000 ohm max. loop resistance)
.....	100 ms (optional)
0-5 VDC, 0-10 VDC	50 ms, or 5 ms
.....	(1000 ohm min load)

Linearity ..... All outputs are linear with flow

Frequency Output	**Response Time**
Range: 0-1000 Hz.	5/50 ms
Output Signal Level:	0-5 V, ± 0.25V
Duty Cycle:	50%
Output Impedance:	1K ohm
Signal rise/fall Time ..... (into 100 K ohm/50 Pico Farad load)	<1 microsecond

LCD Display ..... LCD rate, 4 digits
..... LCD Total 9 Digit (displayed as 3 digit groups)
..... LCD Pressure (PSIA), 4 digits
Operating temperature ..... -13°F to 176°F (-25°C to 80°C)
Temperature effect on zero ..... < 0.05% F.S. / °F
Temperature effect on span ..... < 0.05% F.S. / °F
Operating pressure ..... 0-100 PSIG
Burst Pressure ..... 300 PSIG
Pressure effect on zero ..... Consult factory
Pressure effect on span ..... Consult factory
Pressure Drop* ..... (typical values at F.S. flow rate for air at 70°F)
Meters with no valve: ..... 1.5 PSI (all models up to 520 SCFH)
2 PSI (models above 520 SCFH)
Meters with valve: ..... Add 0.5 PSI at 50 SCFH
Add 2 PSI at 100 SCFH
Add 8 PSI at 200 SCFH
(*For lower pressure drop, consult factory)
Orientation sensitivity ..... None
Process connections ..... 1/4" SAE, 1/4", 3/8", 1/2", 3/4" NPTF
Enclosure rating ..... NEMA 4
Approvals ..... CE, CSA & CENELEC

How It Works

UFM FlowStream series flowmeters are designed to accurately measure the mass flow rate of most gases. The flow rate is determined by measuring the pressure drop across a unique internal restriction, known as Laminar Flow Element (LFE). The restriction is designed such that the gas molecules are forced into moving in parallel paths along the entire length of the passage, for the entire range of operation of the device. Unlike other pressure-flow measuring devices, the relationship between pressure drop and flow is **linear** in laminar flowmeters.

FlowStream mass flowmeters utilize an absolute pressure sensor along with a temperature sensor to compensate for density variations of the gas. When combined with the differential pressure (volumetric flow) output, mass flow rate of the gas can be determined, as depicted in Figure 1.

Caution: These flowmeters are designed to work with noncorrosive, nonionic, clean, dry gases only. Introduction of liquids to the internal sensors will damage the unit, and the repair is not covered under warranty. Relative humidity of the gas can be as high as 100%, as long as it can be guaranteed by proper installation that no internal condensation will occur. A 50 micron filter and/or dryer may be required for some applications.

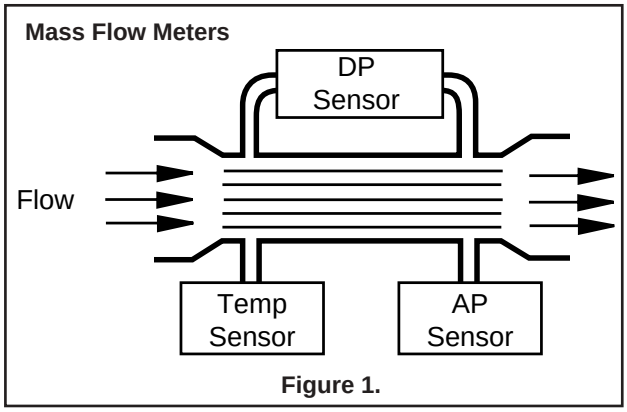
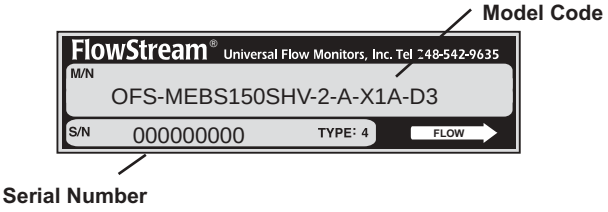


Figure 1.

Using This Manual

To use this manual you will require the model number, which can be found on the nameplate of the meter, as shown in the example below. See page 10 for "Model Number Decoding". Knowing the options that are specific to your meter will assist in the use of this manual and eliminate any confusion.

Nameplate Example



OFS Feature Summary

Current Output:
- 4-20 mA
- Rate Display
- 2 Rate Alarms
- 9-digit totalizer or absolute pressure display (but not both)
- 100/500 msec response time

Note: Intrinsically Safe instruments are available with LCD display and LED alarm indicators (no external alarm connection for safety purposes)

Voltage Output:
- 0-5V or 0-10 V*
- Rate Display
- 2 Rate Alarms
- 9-digit totalizer or absolute pressure display (but not both)
- 5/50 msec response time

Frequency Output:
- 0-1000 Hz
- Rate Display
- Absolute Pressure Display
- 5/50 msec response time

Current Output Only:
- 4-20 mA
- No Display

Voltage:
- 0-5 V or 0-10 V
- No Display

*5ms response time not available with RT option

Using Flowstream Series Flowmeters With Different Gases

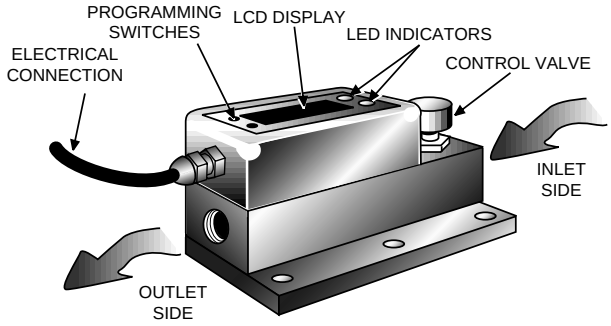
Flowstream series laminar flowmeters can easily be used to measure the flow rate of gases other than the one factory-calibrated for, as long as the gas compatibility criteria are observed. For instance, a flowmeter that is factory-calibrated for air can be used to measure the flow of Argon. (Consult Factory for additional information.)

Reference Conditions for Mass Flow Measurement

Although the correct units for mass are expressed in grams, kilograms, etc., it has become somewhat standard that mass flow rate is specified in SLPM (standard liters per minute), SCFH (standard cubic feet per hour) or other similar units.

This means that the mass flow rate is calculated by normalizing the volumetric flow rate to some standard temperature and pressure (STP). By knowing the gas density at that STP, one can determine the mass flow rate in grams per minute, kilograms per hour, etc. STP is usually specified at sea level conditions; however, no single standard exists for this convention. UFM uses STP of 70º F and 14.7 PSIA.

Features



Options for Flowmeters with LCD



Set High Rate Alarm
Applies to Alarms Symbol "B"

1) Push and hold A1 until "HFLo" is displayed, continue holding until "SEt" is displayed.
2) Release A1, the first digit starts blinking
3) Push A1 to change the blinking digit
4) Push A2 to select different digits
5) After the last digit, temporarily push A2 and release it to go back to the first digit again, or continue holding A2 until "SEt" is displayed.

Note: To disable the high alarm, set its value to zero.

Set Low Rate Alarm
Applies to Alarms Symbol "B"

1) Push and hold A2 until "LFLo" is displayed, continue holding until "SEt" is displayed
2) Repeat steps (2) through (5) as explained above in "Set High Alarm"

Note: To disable the low alarm, set its value to zero.

Re-Zero the Flowmeter
Applies to Visual Readout Symbol "X' with LCD Display**

Because of the excellent sensitivity of these flowmeters, small readings may actually indicate leaks in the system and should not be zeroed out. Ensure that there is no flow through the device when attempting to Re-Zero.

1) Push A2 and hold
2) Push A1 immediately after A2 and hold both buttons down.
3) After 2 seconds of holding both switches, "- - - -" is displayed.
4) Hold both buttons down for 5 more seconds until either "SEt" or "EEEE" is displayed. "SEt" means Re-Zero was successful. "EEEE" is an error message meaning Re-Zero was not implemented because the current flowmeter reading is outside the allowed limit.

Note: Allowed range for zero adjustment is 8% of full-scale value with respect to the original factory calibration at atmospheric pressure.

**See page 11 “Rezero Procedure for Meters without LCD Options”

Display Total Instead of Flow Rate

This option is not available on flowmeters with pressure display or frequency output.

1) Push A1 and hold.
2) Push A2 immediately after A1 and hold both buttons down. (this is the opposite of Re-Zero Procedure).
3) Continue holding both buttons until "tot" is displayed to indicate totalizer mode.
4) Release both buttons.
5) The LCD will display one of three totalizer segments as shown below:

   _ 000 This is the low-order 3 digits (0 through 999)
   = 000 This is the middle-order 3 digits (1,000 through 999,000)
   ≡ 000 This is the high-order 3 digits (1,000,000 through 999,000,000)
6) Press and release A1 to toggle the display between different 3 digit banks.

Note:
Rate alarms cannot be set while in the totalizer mode, but they are active in the background and their corresponding LED lights up when alarm condition is encountered.

The totalizer reading is saved once every 5 minutes in the nonvolatile memory. This means that the maximum error due to power loss can be up to the last 5 minutes of operation.

Response time for flow meters with the totalizer option is 50 msec for voltage output and 500 msec for current output.

The low-order digits may or may not include a decimal point. This depends on the displayed units in rate mode. Maximum totalizer reading is therefore scaled according to the decimal point position and is between 999,999.999 and 999,999,999.

When the total readout exceeds 9 digits (inclusive of the decimal places), the display shows a vertical bar on the left side to indicate overflow. The leftmost display will look like the following patterns:

   |_ low order digits
   |= middle order digits
   |≡ high order digits

The count shown on the display remains accurate until a second overflow occurs (2,000,000,000 is reached). In this case the vertical bar does not reflect how many times overflow has occured.

Options for Flowmeters with LCD-*continued*

Reset the Totalizer
Applies to Visual Readout Symbol "X"
Options Symbol "RT"

1) Push A2 and hold.
2) Continue holding for 7 seconds, until the displayed total is reset.
3) Release A2.

Display Rate Instead of Total
Applies to Visual Readout Symbol "X"
Options Symbol "RT"

1) Push A1 and hold, then immediately push A2 (while holding A1).
2) The LCD will show 'Rate'
3) Release both switches.

Display Line Pressure Instead of Flow
Applies to Visual Readout Symbol "X"

This feature is not available on meters with the totalizer option.
1) Push A1 and hold.
2) Push A2 immediately after A2 and hold both buttons down. (This is the opposite of Re-Zero procedure, explained previously.)
3) Continue holding both buttons until "Pr" is displayed to indicate pressure mode.
4) Release both buttons.
5) The LCD now indicates line pressure in PSIA and the output signal is proportional to pressure instead of flow rate. The full-scale displayed pressure is 115 PSIA with an accuracy of 1 PSI.

Note 1: Both alarms are activated in pressure mode to differentiate it from flow output.
Note 2: The output signal is clamped to 0 Hz on frequency meters to prevent confusion between flow and pressure modes.

Display Flow Instead of Pressure
Applies to Visual Readout Symbol "X"

1) Push A1 and hold.
2) Push A2 immediately after A1 and hold both buttons down.
3) Continue holding both buttons until "FLo" is displayed to indicate flow mode.
4) Release both buttons.

Change the Output Voltage
Applies to Visual Readout Symbol "X"

1) Push A1 twice (double click).
2) The LCD will show either "5 V" or "10 V" , depending on the range that it is programmed for.
2) Push and release A1 to toggle between "10 V" and "5 V"
3) Push A2 to accept one of the two values.

Note 1: This feature is accessible only in 'rate' mode.
Note 2: This feature does not exist in flowmeters with current or frequency output.

Response Time:
For Voltage meters, set output voltage first, then push A1 twice to enter the following menu.

4) The LCD will show either "HS" or "LS", depending on the setting that it is programmed for.
- "HS" means High Speed Response (5 msec for flowmeters with voltage or frequency output)
- "LS" means Low Speed (50 msec for flowmeters with voltage or frequency output)
- High-speed flowmeters update the output based on single flow samples. Low-speed flowmeters integrate the flow signal internally to provide a smoother output.

Push A2 to accept one of the two values.

DC Current (4-20 mA) Output Wiring

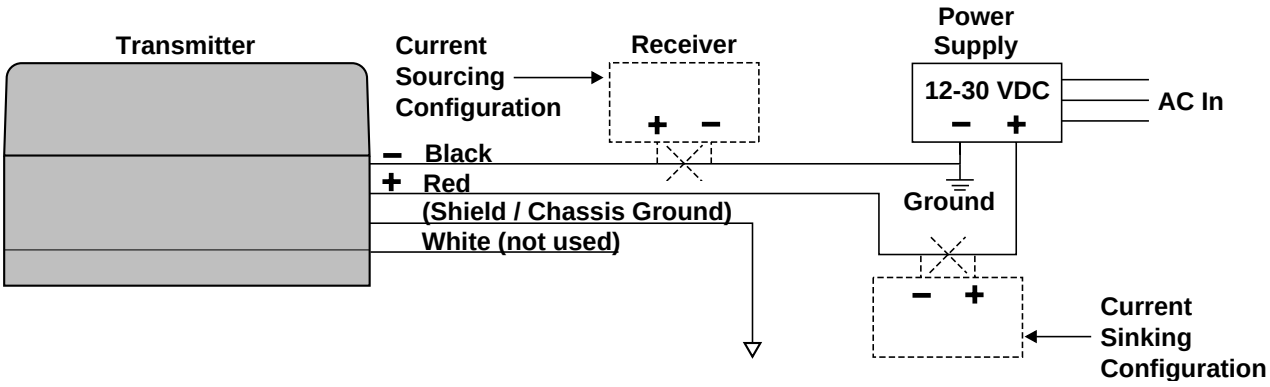


Fig. 3 Wiring for a 4-20 mA loop. (No alarm option).

Standard Wiring

MODEL: OFS

FlowStream model OFS as a 2-wire transmitter, operates from loop voltages of 12 to 30 Volts DC (4 - 20mA) **(24 VDC Maximum for I.S.)**. Output is 4-20 mA and is linearly proportional to flow. Figure 3 shows a typical wiring diagram. Maximum loop resistance is related to the available supply voltage. Since the flowmeter requires 10 volts to operate, the voltage drop across the loop resistance at full scale flow output (20mA) must be added in to determine the minimum supply voltage. For example, if a 250-Ohm resistor is used to convert the current signal to voltage, the voltage drop across the resistor will be 1-5 Volts for 4-20 milliamps, respectively. Minimum required loop voltage in this case is 15 Volts, as shown in Figure 4.

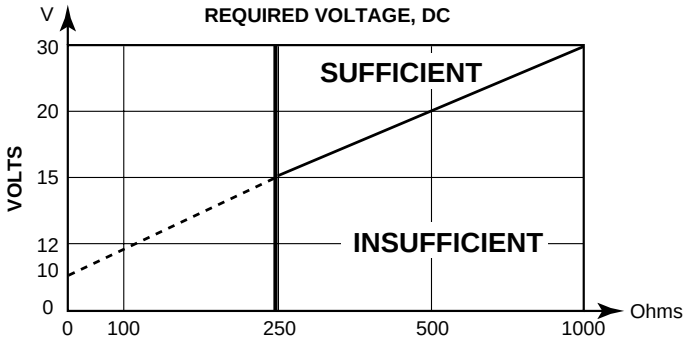


Fig. 4 Total loop resistance (Ohms).

DC Voltage Output Wiring 0- 5, 0-10 VDC Electrical Output Connections

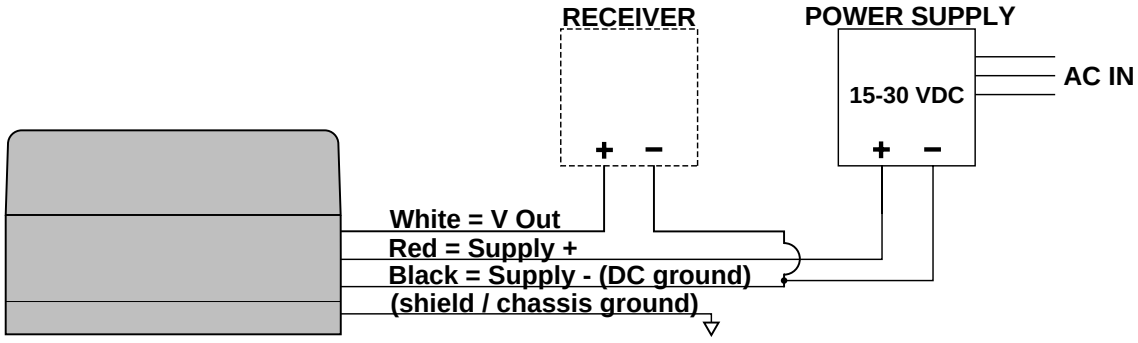


Fig. 5 Wiring for 0-5V and 0-10V models.

Output voltages can be measured between the black (-) and white wires. Minimum operating voltage 15 VDC
Note: Voltage output is usually intended for transmission over short distances. The transmission distance varies with cable shield quality and wire gage. Poor shielding may result in noise pickup while wire gage (resistance) introduces voltage drops in the transmission lines. The optimum operating condition is left to the user's discretion.

HAZARDOUS ENVIRONMENT WIRING

Intrinsically Safe wiring must be installed in accordance with Article 504 of NEC, ANSI NPF 70 and Control Drawing Number 7079, Revision 6 (Fig. 6, shown below).

The transmitter approval by the Canadian Standards Association for installation in Hazardous environments is based on installation through a Intrinsic Safety Barrier.

The Transmitter when wired through the I.S. Barrier is suitable for use in:
CLASS I GROUPS A, B, C & D
CLASS II GROUPS E, F & G
CLASS III HAZARDOUS LOCATIONS

Earth Ground of the I.S. Barrier must be connected to the earth ground of the AC feeder supply. The resistance between Intrinsically Safe ground terminals and A.C. Earth ground must be less than one Ohm. (UFM suggested I.S. Barrier R.Stahl 9001/01-280-75-10, UFM part number 8140)

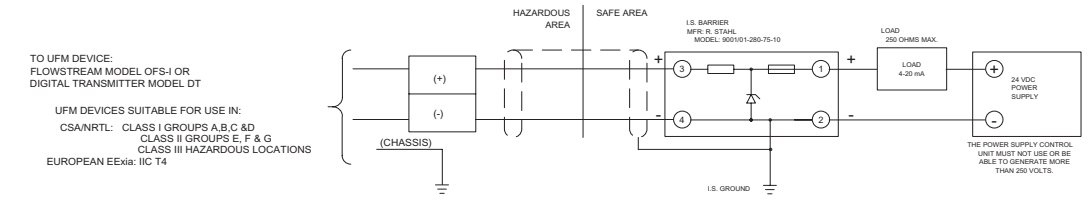
The Power Supply voltage is limited to 24 VDC Max. The Power Supply Control Unit must not use or be able to generate more than 250 volts.

The Maximum Load that can be put on the system is 250 Ohms.

All repairs on the Flow Transmitter should be accomplished at the factory because any substitution of components may impair Intrinsic Safety.

INTRINSICALLY SAFE WIRING

REV.	E.C.O.#	REVISION NOTE	BY	DATE	APPV'D BY	DATE
06	99-090	ADDED CENELEC NOTATIONS	RLS	8/5/99		
07	00-049	REMOVE WIRE COLORS & TERMINAL STRIP NUMBERS	CP	5/11/00		
08	00-089	CHASSIS GROUND RECONFIGURED	CP	10/17/00		



UFM DEVICES SUITABLE FOR USE IN:
CSA/NRTL: CLASS I GROUPS A,B,C &D
CLASS II GROUPS E, F & G
CLASS III HAZARDOUS LOCATIONS
EUROPEAN EExia: IIC T4

SPECIAL CONDITION FOR SAFE USE IN HAZARDOUS LOCATIONS (CENELEC CONDITION "X"):
THESE UFM DEVICES DO NOT HAVE THE REQUIRED 500 V ISOLATION BETWEEN THE CIRCUITS AND THE CASE. ON INSTALLATION, THE CASE MUST EITHER BE ISOLATED FROM GROUNDED SURFACES, OR BE AT THE SAME POTENTIAL AS THE I.S. BARRIER GROUND.

I.S. BARRIER NOTES:

1. I.S. BARRIER ENTITY PARAMETERS: VMAX=28 VOLTS, IMAX=69mA, CI=.012uFD, LI=100uH
2. BARRIERS MUST BE CSA CERTIFIED FOR INSTALLATION IN CANADA, NRTL APPROVED FOR INSTALLATION IN U.S., OR CENELEC APPROVED FOR INSTALLATION IN EUROPE, AND MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
3. MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250V.
4. THE RESISTANCE FROM THE FURTHEST I.S. BARRIER GROUND TO THE DESIGNATED GROUND ELECTRODE MUST NOT EXCEED 1 OHM.
5. INSTALL IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART 1 FOR INSTALLATION IN CANADA, OR WITH THE NEC (ANSI/NFPA 70) AND ANSI/ISA RP12.6 FOR INSTALLATION IN U.S.
6. I.S. BARRIER OR ASSOCIATED DEVICE CONNECTED TO THIS EQUIPMENT MUST MEET THE FOLLOWING REQUIREMENTS:
   VOC ≤VMAX
   ISC ≤IMAX
   CA ≥CI + CCABLE
   LA ≥LI + LCABLE

UNLESS OTHERWISE SPECIFIED
FRACTIONS ±1/64
2 PLACE DIMS ±.01
3 PLACE DIMS ±.005
ANGLES ±1/2
CONCENTRICITY .002 T.I.R. MAX.
BREAK SHARP EDGES 1/64 MAX
PATENTS PENDING

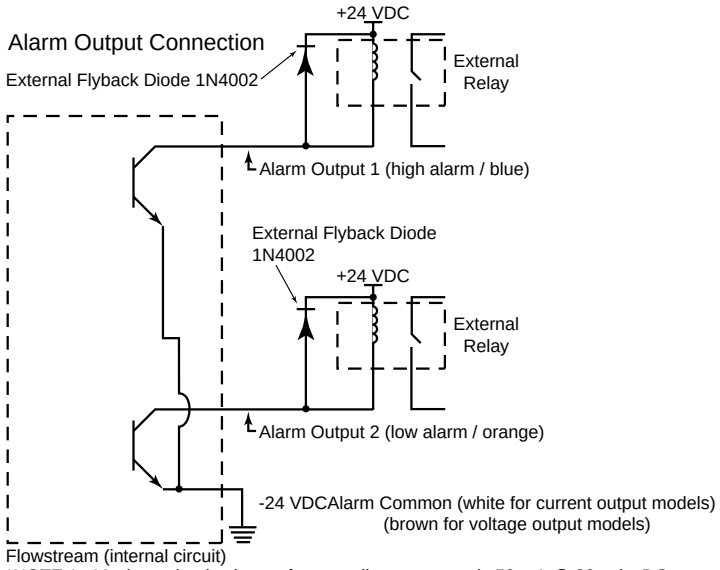
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MATERIAL
HEAT TREATMENT
DSGN CM | DATE | SCALE FULL | REF. NO.
DRAWN RLS | DATE 10/6/97 | DO NOT SCALE
APPV'D | DATE | INV.#

UNIVERSAL FLOW MONITORS, INC.
1755 EAST NINE MILE ROAD
HAZEL PARK, MI 48030-0249
NAME WIRING DIAGRAM, I.S. BARRIER TO OFS-I
FLOWSTREAM & DIGITAL TRANSMITTER
MODEL
DWG. NO. 7079 | SIZE B | REV. 08
SHT. OF

Fig. 6 Hazardous Location Diagram
(Drawing is Not Controlled. Contact factory for current revision)

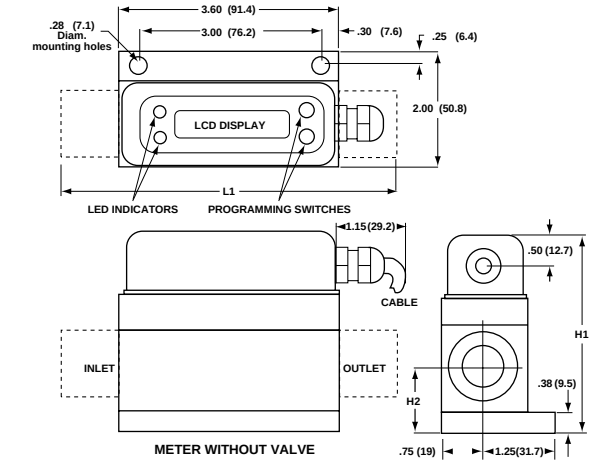
Alarm Output Connections



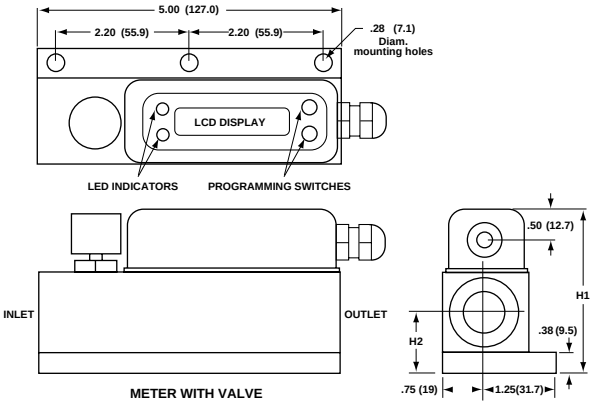
*NOTE 1: Maximum load voltage of open collector contact is 50 mA @ 30 volts DC.
*NOTE 2: Current versions have 6 wires.
*NOTE 3: Voltage versions have 7 wires.

Fig. 7

Dimensions



FLOW*	SIZE** NPTF (SAE)	DIM.	INCHES	(mm)
.5-56 SLPM 1-120 SCFH	1/4" NPT (4T)	H1 H2 L1	2.36 0.69 N/A	(59.8) (17.5)
57-132 SLPM 121-280 SCFH	1/4" NPT	H1 H2 L1	2.60 0.93 N/A.	(65.9) (23.6)
133-245 SLPM 281-520 SCFH	3/8" NPT	H1 H2 L1	2.98 0.55 N/A	(75.7) (14.0)
246-566 SLPM 521-1200 SCFH	1/2" NPT	H1 H2 L1	3.81 1.10 5.60	(96.8) (27.9) (142.2)
567-1000 SLPM 1201-2100 SCFH	3/4" NPT	H1 H2 L1	4.64 1.50 5.60	(118) (38) (142)



FLOW*	SIZE** NPTF (SAE)	DIM.	INCHES	(mm)
.5-37 SLPM 1-80 SCFH	1/4" NPT (4T)	H1 H2	2.61 0.91	(66.2) (23.0)
38-94 SLPM 81-200 SCFH	1/4" NPT	H1 H2	2.79 1.09	(70.7) (27.6)

* Flow ranges are based on air flow, for other gases consult factory.

** Process Connection is listed as NPTF with SAE Straight Thread in parenthesis.

N/A = Not Applicable
Standard flow direction is shown above. For others consult factory.

Model Number Decoding

Example: OFS-MEBS150SHV-2-A-X1A-D3-25/140

SERIES
FlowStream® = **OFS**

TYPE/STYLE
Mass Flow Meter = **M**

MATERIALS OF CONSTRUCTION

Body Material
Anodized Aluminum = **E**
Brass = **F**
Stainless Steel = **I**

Seals/Gaskets
Buna N O-Rings and Gaskets = **B**
Viton O-Rings and Gaskets = **F**

Sensor
Standard general - purpose sensor = **S**

Full Scale Flow Rates
Select 500 to 1000 SCCM
Select 1 to 1000 SLPM
Select 1 to 2100 SCFH = **150**
Note: Maximum operating pressure of 50 PSIG for full scale ranges of 1 SCFH, and 500 SCCM

Engineering Units
SCCM = **SCM**
SLPM = **SLM**
SCFH = **SH**
For others consult factory

Valve
Valve, only on meters up to 200 SCFH (100 SLPM) = **V**
No Valve = **N**

PROCESS CONNECTIONS

FLOW RANGE From	To	NPTF Connection		SAE Straight Thread
500 1 1	1000 SCCM 132 SLPM 280 SCFH	1/4"	= **2**	**4T**
133 281	245 SLPM 520 SCFH	3/8"	= **3**	
246 521	566 SLPM 1200 SCFH	1/2"	= **4**	
567 1201	1000 SLPM 2100 SCFH	3/4"	= **6**	

Flow ranges are based on air flow, for other Gas and Gas Mixtures consult factory.

SET POINTS

Factory Programmed (Alarm Option B)
List initial setpoints as low/high. Example, if you have a meter calibrated for a full-scale flow rating of 150 SCFH and you want setpoints at 25 SCFH and 140 SCFH, you would list it as **25/140**.
The rate alarm is activated when the flow rate drops below the low setpoint or exceeds the high setpoint.

OPTIONS
D3 = 3-foot cable (Std.)
D* = Specify required cable length in feet
IS = Intrinsically Safe* (IS) Rating IS (must have barrier and power limited to 24 VDC)
TB = Nema 4 Terminal Box
RT = Rate & Total LCD Display, (pressure display not available with this option) - Affects response time. Not available with transmit/Response output 6 or 7.
C1 = Clean for Oxygen Service
ZFS = Special feature. Consult factory with model code and serial number.
***IS Rated units suitable for use in Class I; Groups A, B, C, D; Class II groups E, F & G; Class III Hazardous Location. To maintain Intrinsic Safety install per control drawing # 7079. Requires safety barrier.**
See available accessories shown below.

ALARMS
A = None (no alarm)
B = 2 set points with independent open collectors, normally open* (Alarm hysteresis is 5% of full scale)
***Requires LCD display, N/A with Options IS or Transmitted Output Option 19**

TRANSMITTED OUTPUT/RESPONSE TIME
1 = 4-20mA (500 ms response time)
4 = 0-5 VDC (50 ms response time)
5 = 0-10 VDC (50 ms response time)
Optional
6 = 0-5 VDC (5 ms response time)*
7 = 0-10 VDC (5 ms response time)*
10 = 4-20mA (100 ms response time)
19 = 0-1000 Hz (50 ms response time)
***Not available with RT option**

ELECTRONIC OPTIONS
Visual Readout
Z = No Readout (not available w/ alarms)
X = LCD Readout (rate and pressure display standard)
For direct reading Rate & Total, select Options "RT" with Visual Readout Option "X"

GAS CALIBRATION
A = Air
R = Argon
HE = Helium
N2 = Nitrogen
CO2 = Carbon Dioxide
NG = Natural Gas
M = Methane
H2 = Hydrogen
O2 = Oxygen
***** = Gas Mixtures
*EXAMPLE: 75% argon and 25% carbon dioxide is shown as 75R25C02. For other gases consult factory.
Note: All natural gas meters are factory calibrated based on properties of Methane gas. Accuracy may be affected. Consult factory. Meters used for Oxygen service may require CI cleaning depending on customer requirements.

Available Accessories & Calibration Certificates

Meters ordered with option IS require a safety barrier. To order use part number 8140R for rail mount (R.STAHL 9001/01-280-75-10 Intrinsic Safety barrier) and 8140 for surface mount (R.STAHL 9001/01-280-75-10-001 Intrinsic Safety barrier). NIST Certified Calibration, Consult Factory.
For remote rate indicators, flow totalizers, batch control and chart recorders, see the Universal Catalog sections on Mensah 140 and 145, Remote Panel, and Octopus.

Meters are calibrated for standard conditions of 14.7 PSIA and 70°F. For optimum performances specify actual operating conditions. Calibration charges may apply to special calibration considerations, consult Factory.

Re-Zero Procedure for Meters without LCD Option

LCD Remote Programmer Instructions

Installation of the Remote Programmer on a 'blind' meter allows the user to Re-Zero the meter for slight changes of the zero offset. The part number for the programmer is RPM-R1.

Tools Needed

1. 7/64" Allen wrench
2. 15 MM open end wrench or adjustable wrench
3. 6" scale

Procedure

1. Remove power from the Flowmeter
2. Loosen the watertight fitting for the power/output cable with the 15 MM wench.
3. Remove the cover screws (4) using a 7/64" Allen wrench.
4. Tilt the cover from the end opposite the cable up. Push the cable through the watertight connector while raising the cover. Feed the cable through until the cover is clear of the circuit board and body assembly.
5. Locate the programming port on the circuit board. It is 2 rows of 6 holes. For 4-20 mA output meters it is located above TP1 and TP2. For 0-5 and 0-10V output meters it is neat the input cable connection.
6. Plug in the ribbon cable from the remote programmer. On the 4-20 mA circuit board, orient the red stripe on the ribbon cable (pin 1) to the pin 1 marking on the board., On the voltage output circuit board, orient the red stripe (pin 1) on the cable toward the power/output cable.
7. Apply power to the meter. Check the programmer for correct display, if there is no display or garbled display, the cable may be plugged in incorrectly. Remove power and check the connection.
8. Use the following procedure to Re-Zero the Flowmeter:

   Note: Because of the excellent sensitivity of these flowmeters, small readings may actually indicate leaks in the system and should not be zeroed out. Ensure that there is no flow through the device when attempting to Re-Zero.

   1. Push A2 and hold
   2. Push A1 immediately after A2 and hold both buttons down
   3. After 2 seconds of holding both switches, "- - - -" is displayed.
   4. Hold both buttons down for 5 more seconds until either "SEt" or "EEEE" is displayed. "SEt" means Re-Zero was successful. "EEEE" is an error message meaning Re-Zero was not implemented because the current flowmeter reading is outside the allowed limit.

      Note: Allowed range for zero adjustment is 8% of full-scale value with respect to the original factory calibrations at atmospheric pressure.
9. When Re-Zero is complete remove power and then the ribbon cable from the circuit board.
10. Slide the cable through the watertight connector. Tilt the cover when it is close to the assembly and ensure the ferrite bead feeds into the watertight connector.
11. Replace the O-ring seal around the raised edge. It is very important that this seal is seated around the meter before placing the cover over the meter body.
12. Center the cover over the body and hold it down over the O-ring seal. Inspect the gap and push in the O-ring with a 6" scale wherever it is not in place in the seal groove. The cover should seat easily with hand pressure. If it does not, the O-ring is pinching and should be pushed in with the scale.
13. Install the four cover screws with the 7/64" Allen wrench.
14. Inspect the cable near the watertight fitting making sure the cable jacket is inside the fitting. Do not tighten the fitting if separate wires are exposed. Push the cable in until the jacket is inside the fitting. Hand tighten and continue to tighten with the wrench 1/2 to 3/4 of a turn.
15. Re-Zero procedure is complete. Power may be applied and the meter placed back into service.

NOTICE

RETURN MATERIAL AUTHORIZATION

Please read the following UFM policy information carefully. By following the guidelines outlined below you will assist in providing a timely evaluation and response regarding the status of your flow meter. UFM evaluates all AUTHORIZED RETURNED MATERIALS in a timely manner and will promptly provide notification regarding the status of the related materials and/or a written quotation indicating the total charges and description of the necessary repairs.

1. All returns must have a RMA form completed by the customer.
2. Any meter returned that was previously in service must have the OSHA requirements completed and a MSDS included where applicable.
3. An RMA number will only be issued when UFM has received a copy of the completed RMA form and any applicable MSDS.
4. A "Return Goods" shipping label (located in the back of the Instruction Manual) must be used for returning materials to UFM.
5. Returned goods must be shipped prepaid or they will be rejected.

REPAIRABLE MATERIAL

Written or verbal authorization to proceed with the repair under an assigned Purchase Order, must be received within 30 days of repair quotation. If the unit(s) are repaired, the $90.00 evaluation charge will be applied to the quoted repair costs. If no repairs are authorized within this 30 day period, the customer will be billed $90.00 plus shipping charges and the materials will be returned to the customer.

NON-REPAIRABLE MATERIAL

If materials are found not repairable, a written notice that the material is not repairable will be provided to the customer by UFM. If no disposition to scrap or return the material is received from the customer within 30 days, unrepairable material will be scrapped and the customer will be billed the $90.00 evaluation charge. If a UFM replacement unit is purchased within 30 days of non-repairable condition notice, the $90.00 evaluation fee will be waived. The return of non-repairable materials may be ordered by customer Purchase Order providing for shipping and handling charges.

RETURN FOR RESTOCK

All goods returned for restock adjustment **must** be:
A. New and unused.
B. **Returned to the factory within ONE YEAR of date of original shipment.**
C. Returned through the distributor where the goods were originally purchased.
This material will also be subject to an evaluation charge of $90.00.

The customer will be advised of the restocking adjustment for all restockable goods. Upon acceptance of the restocking adjustment, by the customer, the $90.00 evaluation fee will be waived and a credit issued by UFM . The customer will be advised of any **non-restockable** goods and will be charged the $90.00 evaluation fee plus any shipping charges if returned to the customer.

If no disposition is received by UFM within 30 days, the goods will be scrapped and the $90.00 evaluation fee will be billed.

WARRANTY RETURNS

Warranty returns must be shipped prepaid to UFM. UFM will review the goods and advise the customer of the evaluation and validity of the warranty claim. Valid warranty claims will be repaired or replaced at no charge. No evaluation fee will be charged for repairs made under warranty. Return shipping costs will be prepaid by UFM. Should UFM determine the returned material is not defective under the provisions of UFM's standard warranty, the customer will be advised of needed repairs and associated costs. All materials returned for warranty repair that are determined to not have a valid warranty claim will be subject to the "**Repairable Material**" policy outlined above.

UNIVERSAL UFM FLOW MONITORS

RETURN MATERIAL AUTHORIZATION

(RMA) REQUEST FORM

FAX TO: UFM Repair Department

IMPORTANT: *This form must be filled out completely and faxed to UFM Repair Department prior to UFM issuing*

Customer: _____ Product Information Qty: _____

Ship To: _____ Model Code: _____

_____ Universal #: _____

_____ Operating Temp: _____ Max Temp: _____

_____ Operating Pressure: _____ Max Pressure: _____

Contact Name: _____ Viscosity _____ Specific Gravity _____

Return P.O.# _____ Date Purchased _____ Date Installed _____

Phone# _____

Fax #_____

Reason for return: (Please be detailed as possible. **Lack of Information may increase labor charges.**)

Mechanical

- ☐ Meter leaks
- ☐ Pointer sticks
- ☐ Pointer is not accurate (calibration off)
- ☐ Alarm switch does not work
- ☐ Other (describe below)

Electronics

- ☐ No signal
- ☐ Inaccurate signal
- ☐ Remote Readout
- ☐ (MENSAH) Digital Display
- ☐ Signal at no flow
- ☐ Others (describe below)

Details: _____

_____

_____

Note: *There will be a minimum evaluation charge of $90.00 for all units returned (excluding units covered under warranty). Units WILL NOT be accepted without a valid UFM Return Material Authorization Number (RMA#). A Material Safety Data Sheet on the process fluid must be received by UFM when applicable, prior to the RMA# being issued.*

* OSHA Requirements: (to be filled out by customer) ***NO EXCEPTIONS!!***

Process Fluid: _____

Meter must be flushed to remove all process fluids.

I hereby certify that the material being returned has been properly flushed and cleaned of all hazardous materials and does not require any special handling.

Print or Type Name _____ Signature: _____

Title _____ Date: _____

Distributor Information

Company Name _____

Contact Name _____

P.O. # _____

Phone # _____ Fax # _____

RMA#_____

Authorized by _____

Date _____

UNIVERSAL FLOW MONITORS, INC. PRODUCT WARRANTY

1) **ACCEPTANCE AND INTEGRATION CLAUSE:** This Sales Order Acknowledgment constitutes an acceptance by Universal Flow Monitors, Inc., (hereinafter "Universal") of an offer by the buyer upon the conditions and terms and at the prices stated herein. The issuance of this written acknowledgment confirms the existence of a contract binding upon the buyer upon the terms and conditions stated herein. This acknowledgment states all of the terms of the agreement between the parties relative to the purchase and sale of the goods described herein. Said agreement cannot be modified except through a written modification signed by Universal. **EXCEPT FOR SUCH WRITTEN MODIFICATION, NO DEVIATION FROM THE TERMS AND CONDITION OF THE AGREEMENT AS SET FORTH IN THIS ACCEPTANCE IS AUTHORIZED.**

2) **WAIVER:** Waiver by Universal of any specific default or defaults by the buyer shall not constitute waiver by Universal of any of the conditions of the agreement between Universal and the buyer as set forth here under with respect to any further or subsequent default by the buyer.

3) Universal shall not be responsible for failure or delays in deliveries due to fire, strikes, breakdowns, acts of God, failure of carrier's, inability to secure required materials, or other causes beyond Universal's control. Buyer waives any claims for damage arising by virtue of delay in delivery of material by Universal.

4) **LIMITED WARRANTY:** For a period of one (1) year from the date of manufacture, Universal warrants each product covered by this Acknowledgment and manufactured by Universal to be free from defects in material and workmanship. In the case of a repaired product, for a period of one (1) year from the date of repair, Universal warrants each part replaced or repaired covered by this Acknowledgment and manufactured by Universal to be free from defects in material and workmanship. In order to qualify for any remedy as specified herein, buyer must give notice to Universal within the one (1) year period, return the product intact, accompanied by MSDS Documents and prepay any transportation charges. Universal's **SOLE OBLIGATION** pursuant to this limited warranty or otherwise for any defect in its product(s) is the following:

Universal shall, at its sole and exclusive option, at no charge to buyer, either repair or replace the defective product at its factory or refund purchase price thereof.

REWORK, REPLACEMENT OR REFUND, AS PROVIDED UNDER THIS WARRANTY, ARE THE EXCLUSIVE REMEDIES PROVIDED TO THE CUSTOMER OR ANY OTHER PERSON OR ENTITY, WHETHER IN CONTRACT OR IN TORT AND IN CONNECTION WITH ANY WARRANTY, WHETHER EXPRESS OR IMPLIED. BUYER AGREES THAT UNIVERSAL SHALL NOT BE LIABLE FOR ANY DIRECT OR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR DEFECT AND/OR FOR BREACH OF ANY WARRANTY ON ANY PRODUCT, WHETHER IN CONTRACT OR IN TORT, EXPRESS OR IMPLIED IN LAW OR IN FACT. The warranty and the associated repair, replacement or refund remedy provided for herein are for the benefit of and may directly be enforced by past and present owners of Universal's Product, as appropriate, to the exclusion of any other right or remedy which might otherwise be available to such person or entity.

The expressed warranty set forth herein shall be in lieu of any other warranty, expressed or implied, in contract or in tort, including but not limited to any **IMPLIED WARRANTY OF MERCHANTABILITY and any IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.** However, should it for any reason be determined that Universal has given one or more implied warranties to buyer or any other person or entity, the repair, replacement or refund remedy provided for here under shall be the exclusive remedy pursuant to such warranty or warranties for any and all such persons.

This warranty extends to any Owner of the Product at the time of failure, whether or not such owner was or is the Privity of contract with Universal, to the exclusion of any other right or remedy which might otherwise be available to such person or entity; provided, however, that under no circumstances shall Universal be obligated to supply more than one replacement or refund for any defective product.

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