

U N I V E R S A L  
**U M**  
F L O W M O N I T O R S

**INSTALLATION & MAINTENANCE  
INSTRUCTIONS FOR UFM DIGITAL  
TRANSMITTERS**

Contents of this Instruction Manual are applicable to instruments shipped on or after April 15, 2003. (Ref. S/N 030400040)

For instruments shipped on or before April 14, 2003,  
see REV #1 dated 5/17/1999.

*APPLIES TO CONTROL BOX WITH TRANSMITTER OPTIONS  
TT, TTV, TTL, TTZ, TTLZ, RT, RTV, RTZ, TP, RP AND REMOTE  
MOUNTED TRANSMITTER UT-PM-DT AND UT-PM-DTLCD.*

*See separate instructions for installing and maintaining the flow sensing portion of the unit*

See our Website for a copy of the  
Warranty Statement at [www.universalflow.com](http://www.universalflow.com)  
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## DESCRIPTION

This is a micro processor based flow transmitter. It provides a 2-wire linear 4-20mA dc output signal. High accuracy is assured by individual calibration. Reliability is assured by high temperature burn-in of the circuit boards. The transmitter is commonly supplied in the control box of the flowmeter along with the driving potentiometer. There are two styles of control boxes "T" & "R" (shown below).

The transmitter has been CE certified for general purpose locations, CSA NRTL/C for Non-Hazardous locations and Hazardous locations with an Intrinsically Safe Barrier. Wiring must be in accordance with Control Drawing #7079 and article 504 of NEC, ANSI NPF 70 (Fig. 1, pg. 5). Applicable Symbols for Intrinsically Safe (I.S.) versions are TTZ, TTLZ and RTZ.



### T Style Control Box with Transmitter Options

The T style box has two integral junction boxes. The one to the right of the nameplate is for connecting to the low-voltage transmitter (NEC Class II); the one to the left is for connecting to a mechanically-actuated micro switch (NEC Class I), or to the open collector alarm outputs, if present. The micro switch may be a 3-wire or a 4-wire type. (See flow meter instructions for switch information.)

**"TT":** T control box with transmitter option T contains an analog scale and pointer for indication of flow rate, 4-20 mA output signal, and optional electrical switch(es).

**"TTL":** T control box with transmitter option TL contains a LCD digital display for indication of flow rate, 4-20 mA output signal, 2 open collector outputs with local LED alarm indicators, and optional electrical switch(es).

**"TTV":** T control box with transmitter option TV contains an analog scale and pointer for indication of flow rate, with either 1-5 or 2-10 VDC output signal, and optional electrical switch(es).

**"TTZ":** T control box with transmitter option TZ contains an analog scale and pointer for indication of flow rate, 4-20 mA output signal, and is rated Intrinsically Safe. No switches or open collectors are available with this option.

**"TTLZ":** T control box with transmitter option TLZ contains a LCD digital display for indication of flow rate, 4-20 mA output signal, is rated Intrinsically Safe and local LED alarm indicators. No switches or open collectors are available with this option.



### R Style Control Box with Transmitter Options

The "R" style control box contains a large high resolution analog scale and one junction box for connection of transmitter and switches. This provides mechanical flow rate indication, a 4-20 mA output signal, and optional electrical switch.

**"RT":** R control box with transmitter option T contains an analog scale and pointer for indication of flow rate, 4-20 mA output signal, and one optional electrical switch.

**"RTV":** R control box with transmitter option TV contains an analog scale and pointer for indication of flow rate, with either 1-5 or 2-10 VDC output signal, and one optional electrical switch.

**"RTZ":** R control box with transmitter option TZ contains an analog scale and pointer for indication of flow rate, 4-20 mA output signal, and is rated Intrinsically Safe. No switches are available with this option.

## SPECIFICATIONS

### Input power

10-30 VDC @ 21 mA (24 VDC Max. for Intrinsically Safe)

### Output

4-20 mA DC Linear (2-Wire Transmitter)

V Option 1-5 VDC

Y Option 2-10 VDC

### Maximum Output Current

21mA

### Pot Voltage

1.25 VDC

### Operating Temperature

0°F +176°F (-18°C to +80°C)

### Response Time

250 Milliseconds

### Calibrated Accuracy

Same as primary device. Electrical Accuracy = +/- 1% of FS (over entire range of operation)

### Temperature Effect on Accuracy

No effect on Electrical Accuracy

### Output Noise

0.5% FS peak-to-peak, 0.25% FS RMS

### Display Type

4 1/2 Digit 7-segment LCD, 0.30" digit height

### Alarm Outputs

2 opto-isolated open-collector PNP transistors with corresponding LEDs (for Low & High Flowrate).

### Alarm Output Rating(Open Collectors)

50 mA per output at 30 VDC

### Data Retention

EEPROM (40 years)

### Approvals/Certification

CSA (NRTL/C), Intrinsically Safe for all Classes and Groups of hazardous locations and CE.

### Board Dimensions

1.15"W x 2.75"L x 0.50"H (including LCD)

## HOW IT WORKS

A precision potentiometer is attached to the spring loaded shaft of the flow meter. As this shaft is caused to rotate, due to flow, it turns the potentiometer shaft. The potentiometer output is a non-linear voltage varying with changes in flow. The transmitter conditions the voltage input from the potentiometer providing a linear 4-20 mA signal proportional to flow. For receivers that require a 1 to 5, or 2 to 10 VDC input the user may install a precision 250 ohm or 500 ohm resistor, 0.1%, 1/2-W respectively, between signal input and common of the receiver.

**Note: The transmitter and flowmeter are supplied factory calibrated. Recalibration is necessary if the transmitter is replaced or if the flowmeter is rebuilt or repaired. Consult Factory for instructions.**

## WIRING

Connect a twisted wire pair (not provided) to the terminals marked + and - in the right-hand junction box. The wire may be up to AWG 12 size, but no smaller than AWG 22. An electrical ground connection may be made to the ground screw provided in the box. If shielded cable is used the shield may also be grounded here. (See Fig. 3, Pg. 7).

The twisted wire pair connects the transmitter and all receiving equipment in a loop. Wire length of up to 1000 feet is acceptable if the wire is kept dry and distant from electrical noise sources. The receiving equipment must accept industry-standard 4-20 mA transmitter input. Supply power (typically 24 VDC at 30 mA) must be supplied by one of the receiving units (such as a recorder or controller) or by a separate power supply, as shown as Fig. 3, Pg. 7. While the transmitter is rated for supply voltages of 10-30 VDC, it can handle up to 39 volts, but will degrade signal accuracy and damage will occur above 39 VDC.

Several receivers may be connected in series, but only one power supply source should be used. All should have isolated inputs.

The supply voltage provided must be within the limits shown in Fig. 4, Pg. 7, which requires you calculate total loop resistance. To do this simply add up the resistance of all the receivers, indicators, and wire in the loop. If wire resistance is unknown, use a value of 50 ohms for up to 1000 feet of twisted wire pair.

All loop shields should be grounded, at only one end, either the transmitter(s) or receivers(s). Some receiving equipment inputs are grounded when they're manufactured. You can utilize this; but only one receiver per loop.

## HAZARDOUS ENVIRONMENT WIRING

### Applicable Control Box & Readout Options TTZ, TTLZ, RTZ

Intrinsically Safe wiring must be installed in accordance with Article 504 of NEC, ANSI NFP 70 and Control Drawing Number 7079, Revision 5(Fig. 1, 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.

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

### Applicable Control Box & Readout Options: TTZ, TTLZ & RTZ

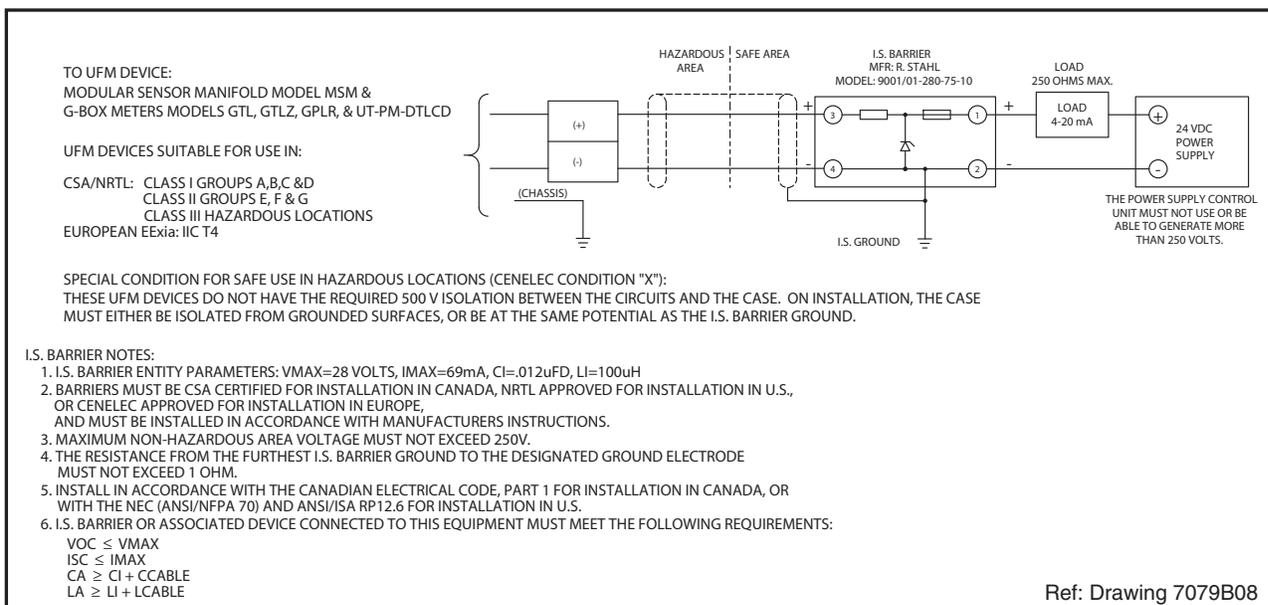


Fig. 1 Hazardous Location Transmitter Diagram

**WIRING REMOTE MOUNTED TRANSMITTER WITH 4-20 mA OUTPUT**

**Applicable Control Box & Readout Options TP & RP**

Note: The transmitter must be matched by the Serial Number to the meter, for which it has been calibrated. The TP or RP control box utilizes a Potentiometer for converting motion to a voltage output. Connect a twisted 3-wire shielded cable between the TP or RP control box and the transmitter, grounding the shield at only one end.

The potentiometer will be wired to a terminal strip inside the right electrical ear of the TP or RP control box. There will be a diagram affixed to the inside of the right cover plate identifying which terminal is the CCW, W and CW connection.

*NOTE: Shielded cable may be run in conduit with other low level signals but may not be run in conduit with 110 V.A.C. or other power wiring. Shielded cable may not be run in conduit with pulse signals.*

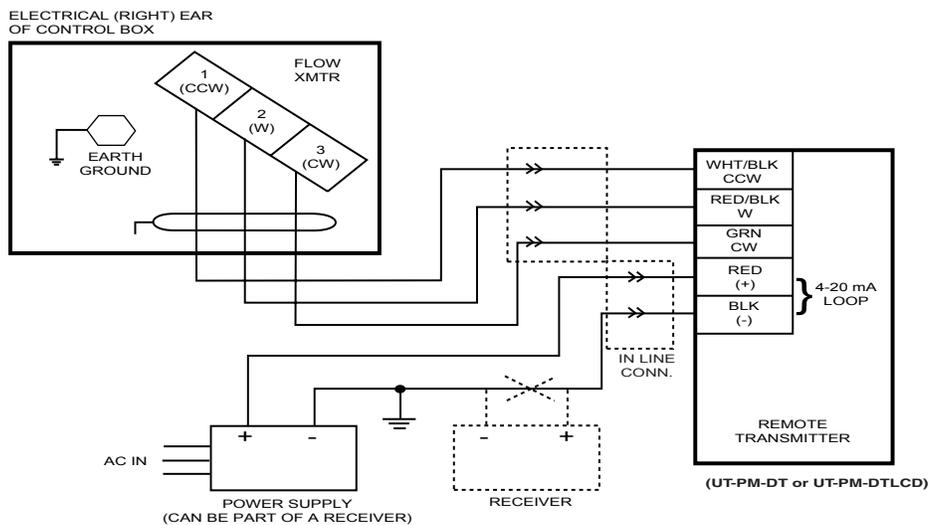
Supply power requirement (typically 10 - 30 VDC @ 21 mA) must be supplied by one of the receiving units (such as a recorder or controller) or by a separate power supply, as shown in Fig. 2, below.

Several receivers may be connected in series, but only one power supply source should be used. All receivers should have isolated inputs.

The Negative connection, for the loop, goes to terminal with black wire on the transmitter and the Positive connection goes to terminal with red wire as shown in Fig. 2, below.

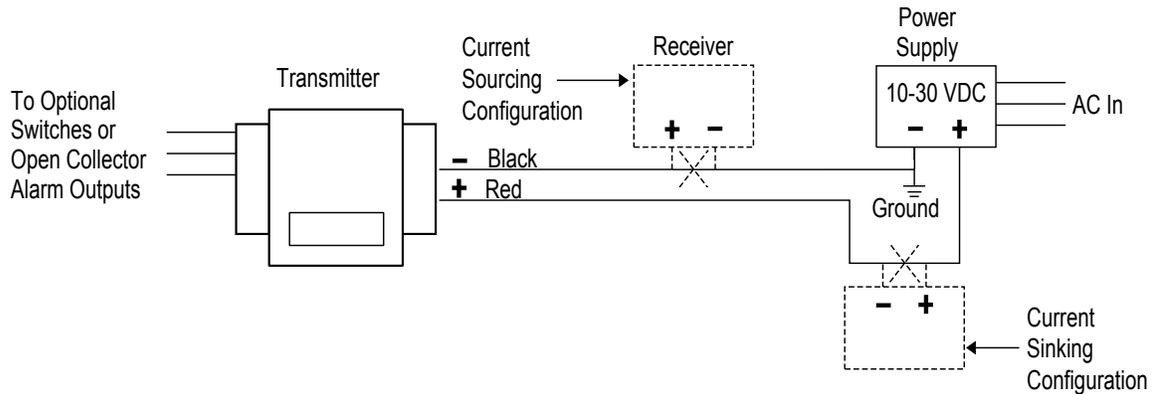
The 3-wire shielded cable will connect the terminal strip in the control box to the transmitter. (Fig. 2, below).

**Remote Mounted Transmitter Wiring**  
**Applicable Control Box & Readout Options: TP & RP**



**Fig. 2 Remote Mounted 4-20 mA Transmitter Wiring**

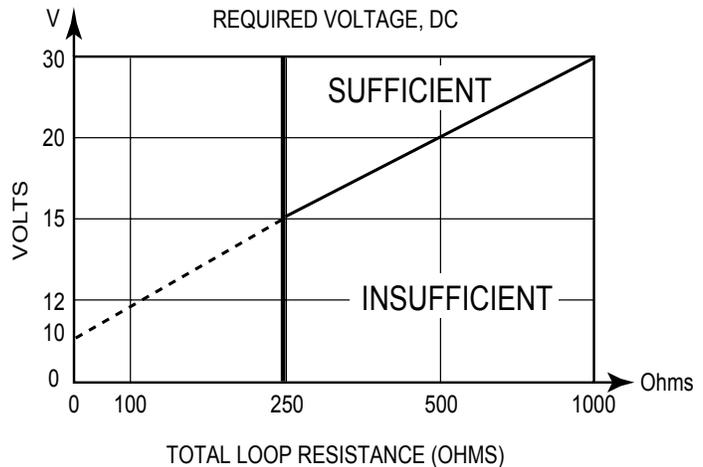
**DC Current (4-20 mA) Output Wiring**  
**Applicable Control Box & Readout Options: TT, TTL & RT**



**Fig. 3 Wiring for a 4-20 mA loop. (with switches).**

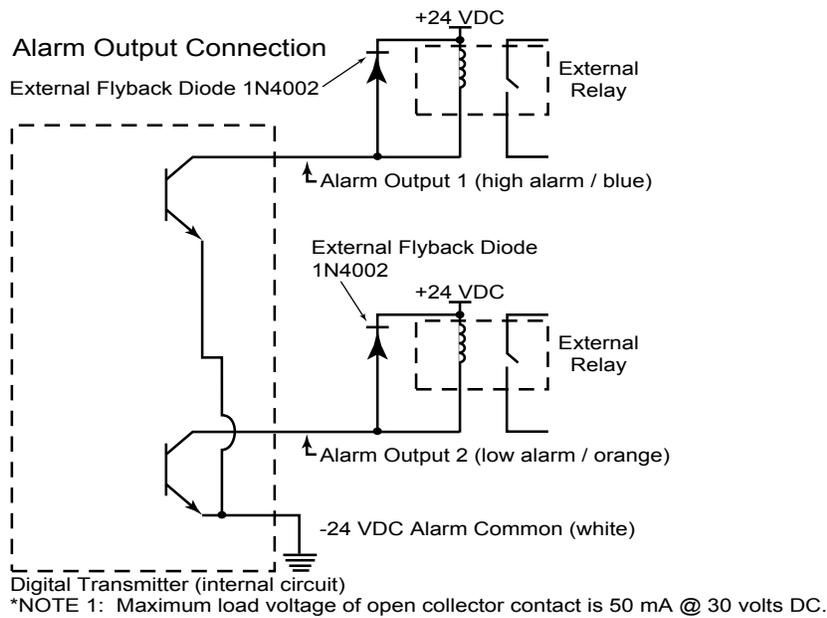
**Operating Voltage Requirements**  
**Applicable Control Box & Readout Options: TT, TTL & RT**

The Digital Transmitter is a 2-wire transmitter. It operates from loop voltages of 10 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.



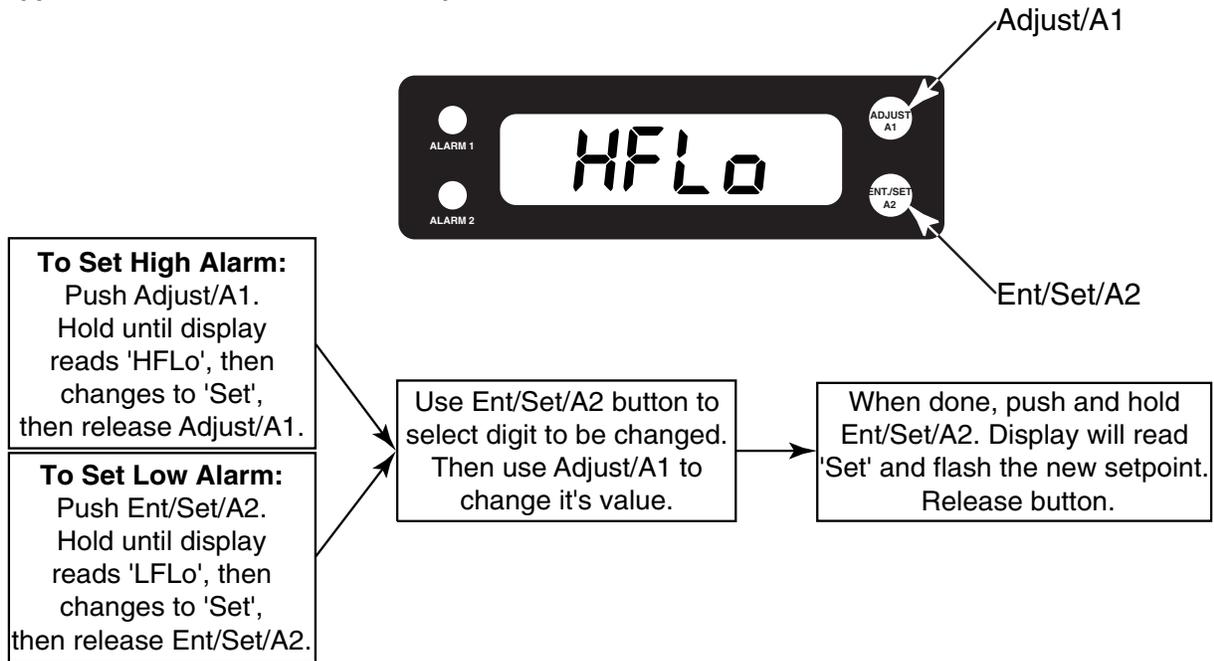
**Fig. 4 Operating Voltage Requirements**

**Open Collector Alarm Output Connections**  
**Applicable Control Box & Readout Options: TTL**



**Fig. 5 Open Collector Alarm Output Connections**  
 (Shown for Typical Relay Installation)

**Setting Open Collector Alarm Points**  
**Applicable Control Box & Readout Options: TTL & UT-PM-DTLCD**



**Fig. 6 Setting Open Collector Alarm Points**

## SETTING OPEN COLLECTOR ALARM POINTS

### Applicable Control Box & Readout Options TTL & UT-PM-DTLCD

High Alarm Programming mode is entered using the ADJUST-A1 button. Low alarm programming mode is entered using the ENT/SET-A2 button. (See Fig. 6, pg. 8)

1. To enter high alarm programming mode, press and hold the A1 button. The transmitter will display "HFLo" for 2 seconds followed by "SEt". Release the A1 button.
2. The transmitter will display a 4 digit value with the first digit blinking. To adjust this digit, press the ADJUST button to cycle from 0-9 and back to 0. To enter the value and cycle to the next digit, press and release the ENT/SET button.

Repeat step 2 for the subsequent digits. After the most significant digit is entered, hold down the ENT/SET button until "SEt" is displayed, and then release the button. The transmitter will display "SEt" for 1 second. It will then flash the calibrated high alarm value 2 times before exiting to run mode.

Note: If it is required to go back and change any of the digits, press and immediately release the ENT/SET button after the most significant digit is adjusted. The calibration will cycle back to the least significant digit.

3. To enter the low alarm programming mode, press and hold the A2 button. The transmitter will display "LFLo" for 2 seconds followed by "SEt". Release the A2 button.
4. Follow the instructions in steps 2 for programming the low alarm.

Note: While in alarm programming mode the transmitter is not monitoring flow. To prevent this condition from occurring for an extended period of time, there is a 20 second time limit for programming inactivity; i.e., no switches being pushed. If this time limit is exceeded then alarm programming is automatically exited with no change to any previous programming.

## ALARM SETTING LIMITATIONS

While it is possible for the user to input any 4 digit value in either high or low alarm programming mode, the transmitter is designed not to store values greater than 125% of the full scale display value for high alarm settings. The transmitter is also designed not to store values greater than 100% of the full scale display value for the low alarm settings. In the event of an invalid alarm value the transmitter defaults to an alarm setting equal to 125% of the full scale display value for high alarms or 100% of the full scale display value for low alarms. This value will then flash 2 times before exiting alarm programming mode.

#### Example 1: Invalid High Alarm Setting

100 gpm flow meter;

User inputs 150 for the high alarm setting;

Upon exiting high alarm programming mode, the value 125 flashes 2 times, indicating that the stored high alarm setting has defaulted to 125 gpm (125% of the full scale display value).

#### Example 2: Invalid Low Alarm Setting

100 gpm flow meter;

User inputs 110 for the low alarm setting;

Upon exiting low alarm programming mode the value 100 flashes 2 times, indicating that the stored low alarm setting has defaulted to 100 gpm (100% of the full scales display value).

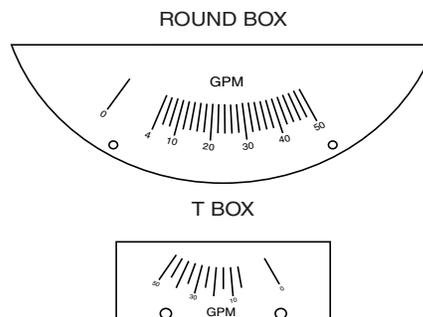
## DIGITAL TRANSMITTER REPLACEMENT PROCEDURE

Universal Flow Monitors' new Digital Transmitter is designed to be user friendly. Checking, recalibrating or replacement of a failed transmitter can be easily accomplished in the field. Each Flow Meter is supplied with its own Calibration Sheet (sample shown on page 14 & 15). Specific flow data such as mv signal, and related % of full scales calibration points are provided on this sheet. This procedure can be done in the field or at the bench level. Follow the instructions below for the applicable Control Box & Readout Options.

### Control Box & Readout Options TTL, TTLZ, Remote Mounted Transmitter UT-PM-DTLCD & Remote Programmer RPM-R\*



### Control Box & Readout Options TT, TTV, TTZ, RT, RTV, RTZ, TP, RP, & Remote Mounted Transmitter UT-PM-DT



Units with the LCD option require no special tools or instruments.

1. Shut off power to any switch in the control box, as well as isolate the loop if the process is running.
2. Remove the nameplate and cover assembly from the control box, disconnect the 3 Molex connectors between the Pot (3 wires) and the transmitter and the output terminal strip (2 wires going to terminations in the junction box) (Figs. 7A, 7B & 8, pg. 11).
3. Disconnect the Open Collector Outputs (3 wires going to terminating junction box) (Fig. 9, pg. 11)
4. Remove the scale using a 7/64 Allen wrench. Be careful not to bend the pointer when removing scale (Figs. 10A & 10B, pg. 11). If pointer is bent or moved during scale removal, reposition pointer when reinstalling scale. If the unit has a LCD, then there will be no scale to remove, go to step 5.
5. Remove the existing transmitter using a 9/64 Allen wrench (Figs. 11A & 11B, pg. 11).
6. Install the replacement Transmitter.
7. Reconnect the Pot connector and the Open Collectors.
8. Refer to Step 1 of the **Calibration Procedure** before reconnecting the LCD loop power to enter the calibration mode.
9. You are now in calibration mode and begin entering data from the Original Calibration Sheet for this meter, per the Steps 2-8 of the **Calibration Procedures**.

If you have Control Box & Readout options TT, TTV, RT, RTV, TTZ & RTZ you will require a RPM-R\* Calibrator which includes a special ribbon cable, pin connector and a 9-volt battery with a Molex connector to supply power to the Digital Transmitter to permit calibration at the bench, instead of using the loop power. Using this power source and special connector, either unit, LCD or others, may be calibrated at the bench or in the field, without using the loop power source. Control Box & Readout options TTZ & RTZ must be bench calibrated. Simply reattach the Molex connector of the loop power source when the calibration is complete or when the bench calibrated transmitter is installed into the meter. The Blind Digital Transmitter has a mating special ribbon cable that allows connection of the RPM-R\*, since it does not have an LCD display on which the calibration data can be viewed, changed or entered (See Figs. 12A & 12B, pg.13). It also does not have the Open Collector alarm function, as it is a function of the LCD board.

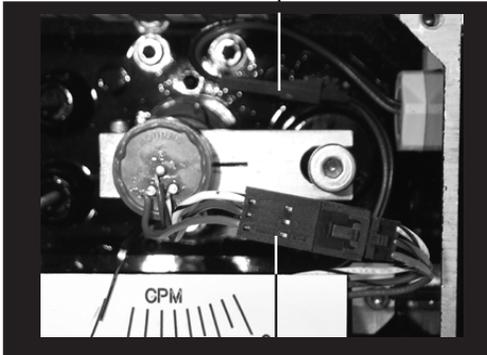
If the Digital Transmitter is a LCD version, refer to the section on Setting the Open Collector Alarms on page 8-9, to enter the low, low low, high or high high set points desired for this application.

\*Note: Open Collector outputs are normally open for low and high alarm functions. So when using the low as a second high contact, or the high as a second low contact, they will be normally closed in this format, providing one NO and one NC contact.

\*Indicates the current revision level of the Remote Calibrator.

DIGITAL TRANSMITTER REPLACEMENT

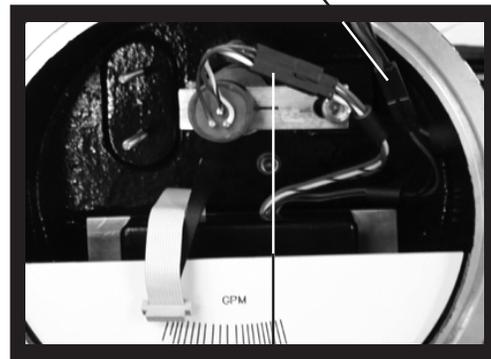
Molex Connector between Output Terminal Strip & Transmitter



Molex Connector between Pot and Transmitter

Fig. 7A Removing Molex Connectors in a T Box (Step 2)

Molex Connector between Output Terminal Strip & Transmitter



Molex Connector between Pot and Transmitter

Fig. 7B Removing Molex Connectors in a R Box (Step 2)

Output Terminal Strip in Junction Box

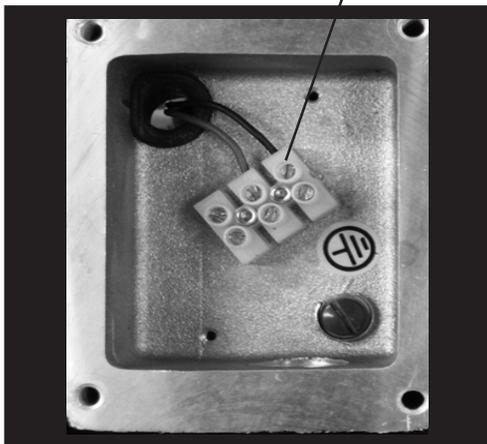


Fig. 8 4-20 mA or Voltage Terminal Strip (Step 2)

Open Collector and/or Microswitch Termination (Additional terminals supplied with microswitches)

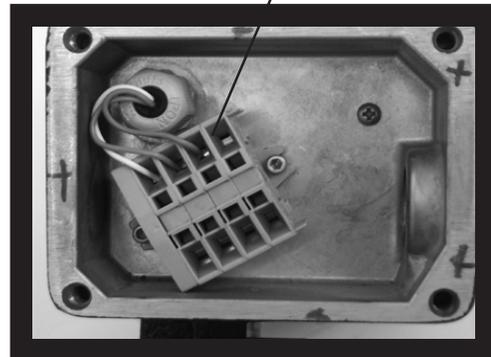
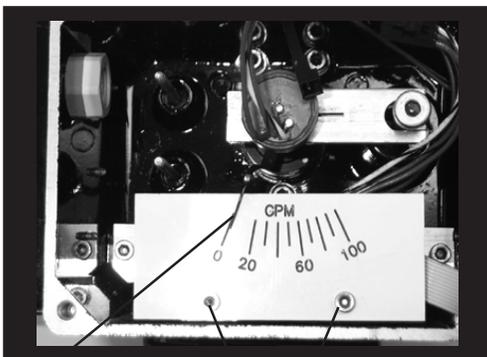


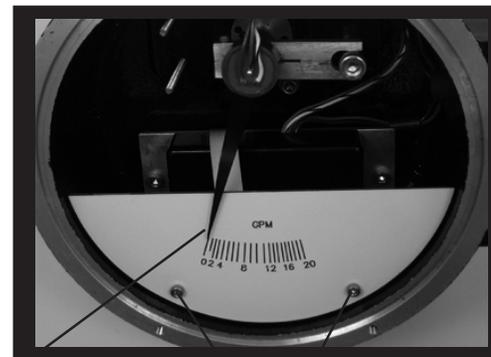
Fig. 9 Microswitch & Open Collector Outputs (Step 3)



Pointer

Screws to remove Scale

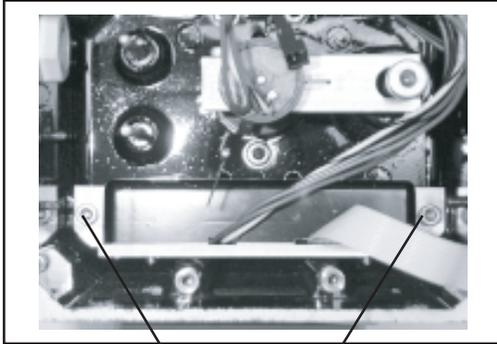
Fig. 10A Remove Scale on T Box (Step 4)



Pointer

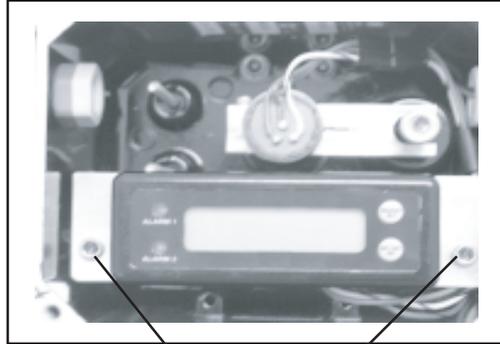
Screws to remove Scale

Fig. 10B Remove Scale on R Box (Step 4)



Screws to Remove Digital Transmitter on unit w/o LCD

Fig. 11A Remove Digital Transmitter (Step 5)



Screws to Remove Digital Transmitter on unit with LCD

Fig. 11B Remove Digital Transmitter (Step 5)

### CONNECTING THE REMOTE PROGRAMER TO A UNIT WITHOUT A LCD DISPLAY

1. Remove nameplate from meter (if the Digital Transmitter is installed in the control box).
2. Locate Ribbon cable, located under the scale (when installed in control box).
3. Connect the Remote Programmer to the unit by the Ribbon cable, making sure that the red line along the ribbon cable of the Remote Programmer lines up with the red line along the ribbon cable of the unit. Use either loop power if transmitter is installed in control box, or the special two-wire mollex connector and a 9 volt battery adaptor to provide power to the unit on the bench or in the field. This cable is to be connected to the 2-wire cable coming from the transmitter.
4. Follow the applicable Calibration Procedures detailed in this manual.

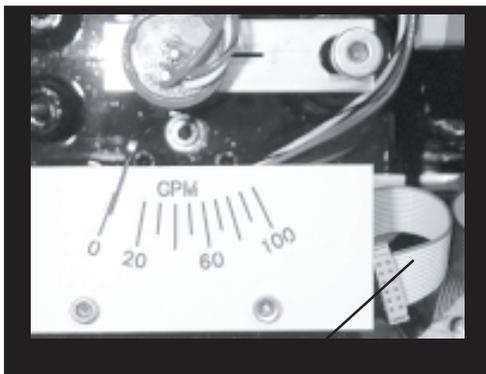
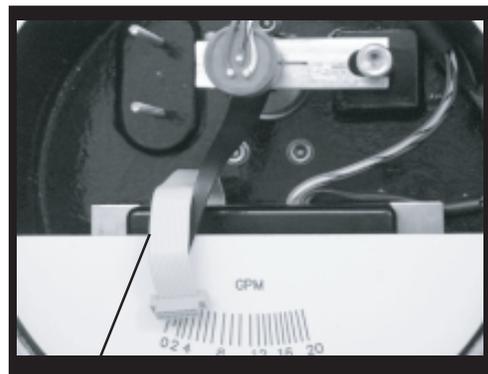


Fig. 12A Close up of Ribbon Cable for Connection to Remote Programmer in a T Box



Red Line

Fig. 12B Close up of Ribbon Cable for Connection to Remote Programmer in a R Box

## CALIBRATION PROCEDURE

Calibration is performed by entering Manual CAL mode upon power-up. To perform this, an LCD display must be connected to the digital transmitter, either internally on a display meter or externally using a remote programming module (RPM-R\*). The push buttons have multiple functions in CAL mode: the ADJUST button is used to either 1. "Skip" a parameter, 2. Adjust the digits for calibrating a set point, or 3. Switch between operating modes for the flow meter (forward or reverse flow). The ENT/SET button is used to enter the desired parameter into the EEPROM.

1. To enter CAL mode press the ADJUST and ENT/SET buttons within 4 seconds of applying power to the meter (12-30VDC supply).
2. Continue pressing both buttons during transmitter power up sequence. The transmitter will initially turn on all LCD segments for 2 seconds. It will then display the Code revision for 2 seconds, followed by displaying "CAL", indicating that the transmitter is now in calibration mode. Release the ENT/SET button first and then release the ADJUST button.
3. The transmitter will display "For"; indicating that forward flow mode is selected. For reverse flow mode the transmitter will display "rE". To switch between forward and reverse flow modes, press and release the ADJUST button. Once the desired mode of operation is selected, press and release the ENT/SET button.
 

**NOTE 1:** "For" is the default setting. Every time you enter CAL mode the transmitter will automatically be set for forward flow. If "rE" mode is desired it must be manually selected each time CAL mode is entered.
4. The transmitter will display "P-0", indicating that it is ready for the first percentage point (always 0%) to be calibrated. Press and release the ENT/SET button.
 

**NOTE 2:** To "skip" a calibration point (previously calibrated transmitter only), press and release the ADJUST button to cycle to the next percentage point (P-1, P-2, etc.).
5. The transmitter will display a four-digit value with the first digit blinking. To adjust this digit, press the ADJUST button to cycle from 0-9 and back to 0. To enter the value and cycle to the next digit press and release the ENT/SET button.
- 5.1. Repeat step 5 for the subsequent digits. After the most significant digit is entered, hold down the ENT/SET button until "SET" is displayed and then release the button.
 

**NOTE 3:** If you need to go back and change any of the digits, press and release the ENT/SET button after the most significant digit is adjusted. The calibration will cycle back to the least significant digit
6. The transmitter will display "U-0" for 1.5 seconds, followed by a four digit value indicating that it is ready for the voltage corresponding to the first percentage point (0%) to be calibrated. Input the voltage value, following steps 4 and 4.1 above for adjusting the display.
7. The transmitter will display "P-1", indicating that it is ready for the second percentage point to be calibrated. There are a total of 9 percentage points (including 0%) numbered P-0 through P-8, and 9 corresponding voltages numbered U-0 through U-8 to be calibrated on the digital transmitter. Repeat steps 5 through 6 for each of these calibration points up to and including P-8/U-8 (100% point).
 

**NOTE 4:** The percentage points and the corresponding voltages are listed on the Calibration Sheet for the Meter.

**NOTE 5:** There are two aids in determining whether the transmitter is displaying percentage or voltage. The first aid is the high and low alarm LED's. The high alarm LED is on during percentage point calibration. The low alarm LED is on during voltage calibration.

The second aid is the decimal point location. The display is to one decimal place during the percentage calibration. The display is to three decimal places during the voltage calibration.
8. When the ENT/SET button is pushed at the end of the P-8/U-8 calibration the transmitter will display "SET" for 1 second, followed by "FS" for 1 second. The transmitter will then display a 4-digit value, indicating that it is in full-scale display calibration mode.
 

**NOTE 6:** The first time that a transmitter is calibrated it is undetermined what 4 digit Value will be displayed and, in fact, it is possible that more than one decimal point will be initially activated. This is normal for a transmitter that has not been previously calibrated.
- 8.1. Set the decimal place for the display by pressing and holding the ADJUST button. The display will cycle between 0, 1 and 2 decimal places. When the decimal point is in the desired position, release the ADJUST button. Press and release the ENT/SET button.
- 8.2. The digits for the full-scale display value are calibrated following the instructions in steps 5 and 5.1. After the most significant digit is entered, press and hold the ENT/SET button. The transmitter will display "SET" for 1 second, indicating that it has exited to run mode. Release the ENT/SET button. The flow meter should now function properly under flow.
 

**NOTE 7:** If it is necessary to re-check or change any calibration points, it will be necessary to re-enter the Calibration Mode.

This calibration procedure requires the use of all available calibration points. If it is desired that fewer points be calibrated, the following must be done: All used calibration points must be in consecutive order starting with P-0 (0%) and ending with the 100% calibration point.

**NOTE:** ALL unused calibration points must be set to a valid value and the points entered into the Transmitter by pressing and releasing the ENT/SET button. For a 4-calibration point transmitter P2, P4, P6 & P8 will be duplicate numbers for the numbers entered into P1, P3, P5 & P7 and must be entered into the transmitter. For a 5-calibration point transmitter P4, P6 & P8 will be duplicate numbers for the numbers entered into P3, P5 & P7 and must be entered into the transmitter. For a 6-calibration point transmitter P6 & P8 will be duplicate numbers for the numbers entered into P5 & P7 and must be entered into the transmitter. For a 7-calibration point transmitter P8 will be a duplicate number for the number entered into P7 and must be entered into the transmitter. Failure to comply with these instructions will result in transmitter malfunction.



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**TRANSMITTER CALIBRATION SHEET**

```

O-----
; Transmitter S/N:          010300757   Model: SN-ASB2GM-6-789V.9-TT1WU-.6D
; Full-scale display:      30.0 GPM     Asset: 0001
; Calibration points:      6
; Flow direction:         Forward
; Hysteresis band (%):    +/- 2
; High Alarm:              6.0
; Low Alarm:               24.0
; Pot Zero (volts):        0.030
; Pot Offset (mV):         8
    
```

```

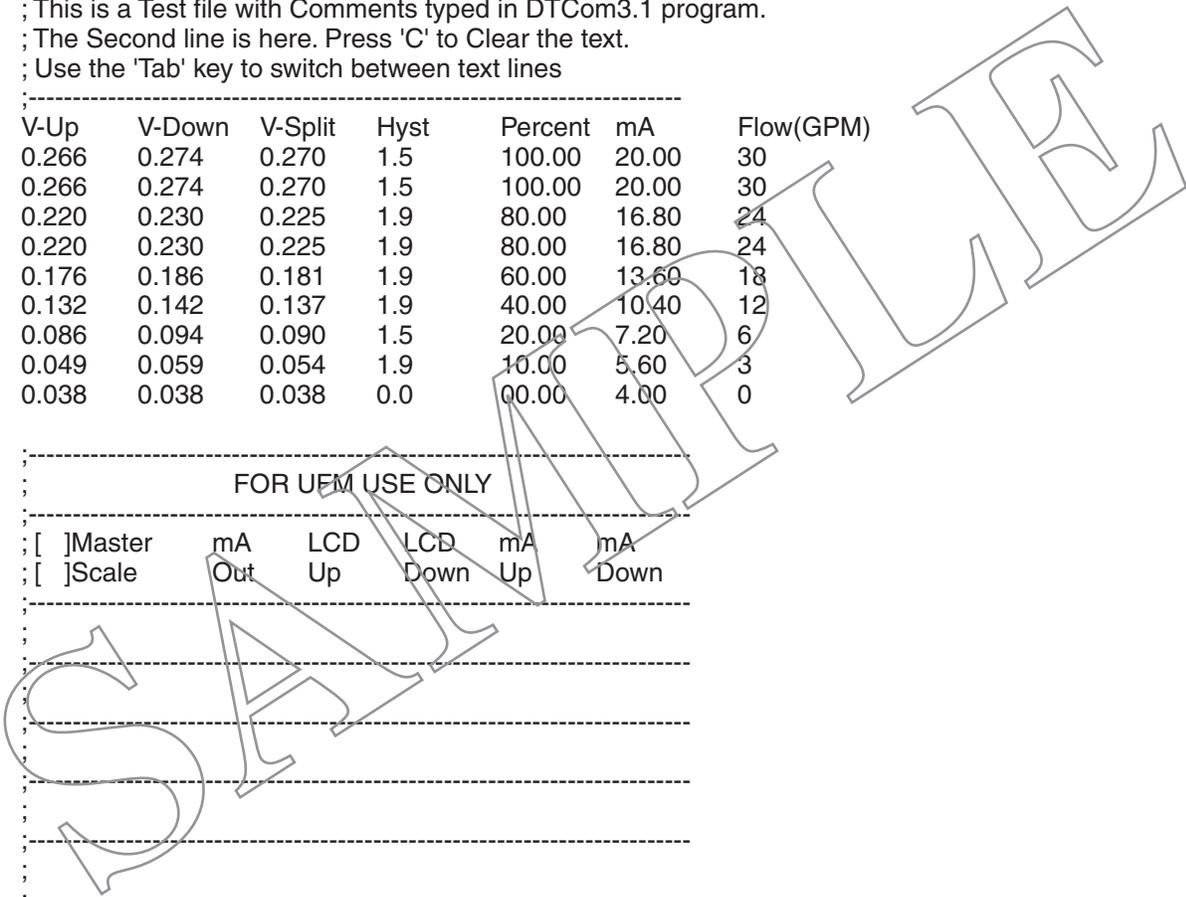
; Comments:
; This is a Test file with Comments typed in DTCom3.1 program.
; The Second line is here. Press 'C' to Clear the text.
; Use the 'Tab' key to switch between text lines
    
```

V-Up	V-Down	V-Split	Hyst	Percent	mA	Flow(GPM)
0.266	0.274	0.270	1.5	100.00	20.00	30
0.266	0.274	0.270	1.5	100.00	20.00	30
0.220	0.230	0.225	1.9	80.00	16.80	24
0.220	0.230	0.225	1.9	80.00	16.80	24
0.176	0.186	0.181	1.9	60.00	13.60	18
0.132	0.142	0.137	1.9	40.00	10.40	12
0.086	0.094	0.090	1.5	20.00	7.20	6
0.049	0.059	0.054	1.9	10.00	5.60	3
0.038	0.038	0.038	0.0	00.00	4.00	0

FOR UFM USE ONLY

```

; [ ] Master   mA   LCD   LCD   mA   mA
; [ ] Scale   Out  Up    Down Up    Down
    
```



----- DTCOM3.1 -----

## DIGITAL TRANSMITTER CALIBRATION SHEET INSTRUCTIONS

**PURPOSE:** This is to enable the Calibration Technician in filling out the Transmitter Calibration Sheet correctly and enable the customer to understand what the data that is recorded means.

**SCOPE:** This applies to all UFM Calibration Technicians and customers who need to understand the data recorded.

1. **Transmitter S/N:** This is for recording the serial number of the transmitter being calibrated.
2. **Model:** This is for recording the model number of the meter that is being calibrated.
3. **Full-scale display:** This is where the maximum calibrated flow point is recorded.
4. **Asset:** This is where the number that is written on the solder side of the Digital Transmitter circuit board is recorded.
5. **Calibration points:** This is where the number of calibration points that the transmitter has been calibrated for is recorded.
6. **Flow direction:** This is where the flow direction of the meter is recorded.
7. **Hysteresis Band (%):** This is where the Total allowable Hysteresis of the meter is recorded.
8. **High Alarm:** This is where the High Alarm Set Point is recorded which is only valid for those transmitters that have an LCD display.
9. **Low Alarm:** This is where the Low Alarm Set Point is recorded which is only valid for those transmitters that have an LCD display.
10. **Pot Zero (volts):** This is where the split voltage for 0% of flow is recorded before Pot Offset voltage is added for the deadband.
11. **Pot Offset (mV):** This is where the actual Pot Offset voltage is recorded.
12. **Comments:** This section is used for making any notes that the technician may feel is important for reference that may be helpful at a future date.
13. **V-Up:** This is where the actual voltage for the flow point when going from zero to the maximum flow is recorded.
14. **V-Down:** This is where the actual voltage for the flow point when going from the maximum flow to zero flow is recorded.
15. **V-Split:** This is where the split voltage, which was calculated from the V-Up and V-Down voltages is recorded.
16. **Hyst:** This is where the actual hysteresis of each flow point is recorded.
17. **Percent:** This is where the percentage of flow is recorded. This is calculated by dividing the flow rate at the point by the Max. Flow Rate. Example: The flow rate at this Calibration point is 2 GPM and the Max. Flow Rate is 10 GPM. 2 divided by 10 is .2 or 20%.
18. **mA:** This is where the output current that represents the flow rate for the 4-20mA output is recorded. The number is determined by multiplying 16.00 mA (which is the amount of current between 0 and the maximum calibrated current point) by the percentage of flow for that calibration point. Then 4.00 mA is added to the results. Example: The 2 GPM point on a 10 GPM meter is .2 (20%) times 16.00 plus 4.00 which is 7.20mA.
19. **Flow (XXX):** This is where the flow units of measurement are recorded and the type of measurement is recorded. Example: If the flow is measured in gallons per minute the GPM would be recorded and all the numbers in this column would reflect the GPM readings. P0 would be the 0 GPM flow point and P8 would be the Maximum calibrated flow point.
20. **FOR UFM USE ONLY:** This is where the actual flow rate is recorded with respect to the displayed flow rate. For those models that have a LCD Display, the actual flow rate on the calibration stand will be indicated for both up and down flow. For those units with a scale the current for that scale mark will be recorded.