



Thermal Dispersion Airflow Measurement

Advantage

GOLD Series

(Firmware Version 4.XX)

Startup Procedures

GTx116-P Startup Checklist

TAG INFORMATION		
Location Name:	Model:	Type:
Reference Number:	Item:	Number of Probes:
Duct Size: x (in / mm)	Internal Insulation:	

The startup checklist is broken into 3 sections: Prior To Powering Up The Equipment, Power Applied To The Equipment and Field Adjustments. Each section begins with a table that applies to all transmitters followed by a table specific to the different transmitter types based on output configuration (Analog, RS485, Ethernet, LonWorks). Each step in the appropriate tables should be satisfactorily completed before proceeding to the next step. Consult the installation instructions, transmitter configuration guide and troubleshooting guide to assist in resolving issues.

Prior To Powering Up The Equipment

All Transmitters		
Step	Check	Result
1	Does the station location meet Ebtron's minimum placement guidelines?	Yes / No
2	Are the sensor probes mounted for equal area spacing as illustrated in the installation instructions?	Yes / No
3	Is air flowing through the sensor probes in the proper direction according to the airflow direction label?	Yes / No
4	Is the transmitter installed within the cable length of the sensor probes?	Yes / No
5	Is the transmitter installed so that it is not exposed to water or moisture?	Yes / No
6	Is the transmitter installed where the temperatures will be between -20°F and 120°F?	Yes / No
7	Has a minimum of 2" of unobstructed space around all of the edges of the transmitter been left for heat dissipation?	Yes / No
8	Is there a minimum of 10" of unobstructed space on the top of the transmitter so that the cover can be removed?	Yes / No
9	Has a "drip loop" in the sensor probe cable(s) been provided at the transmitter in the event of water runoff or condensation?	Yes / No
10	Are the 24 VAC power wires connected to positions L1 and L2 of the POWER terminal block?	Yes / No
11	If multiple transmitters are wired off of the same transformer, are they wired "in-phase"?	Yes / No
12	Are the cables from the sensor probes connected to the receptacles on the bottom of the transmitter?	Yes / No

GTA116 Transmitters – Analog Output		
Step	Check	Result
13	Are the output signal switches SW1 and SW2 set to the desired output type (mA or VDC)?	Yes / No

GTN116 Transmitters – RS485 Output		
Step	Check	Result
13	Are the PROTOCOL DIP switches in the proper position for the desired network protocol (see the transmitter installation and configuration guide for settings)?	Yes / No
14	Are the ADDRESS DIP switches set to the desired unique address between 1 and 255 (see the transmitter installation and configuration guide for settings)?	Yes / No
15	Are the TERMINATION DIP switches set to the proper termination type (see the transmitter installation and configuration guide for settings)?	Yes / No
16	Are the signal wires connected to the proper positions of the OUTPUT terminal block (position 1 for A, 2 for B and COM for common)?	Yes / No

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GTE116 Transmitters – Ethernet Output		
Step	Check	Result
13	Are the PROTOCOL DIP switches in the proper position for the desired network protocol (see the transmitter installation and configuration guide for settings)?	Yes / No
14	Is the Ethernet cable securely plugged into the RJ45 connector on the Ethernet Output Card?	Yes / No

GTL116 Transmitters – LonWorks Output		
Step	Check	Result
13	Are the signal wires connected to positions 1 and 2 of the OUTPUT terminal block?	Yes / No

Power Applied To The Equipment

All Transmitters		
Step	Check	Result
1	Is the voltage between positions L1 and L2 on the POWER terminal block between 22.5 and 29 VAC?	Yes / No
2	Turn the power switch to the ON position. Does the initialization screen “GTx116 INIT #.##” display for approximately 10 seconds on the LCD of the GTx116 transmitter?	Yes / No
3	Is the green LED labeled D3 flashing at 1 second intervals?	Yes / No
4	After the initialization screen, is the GTx116 transmitter displaying a flow and temperature?	Yes / No
5	Is the last letter of the flow units displayed in upper case?	Yes / No
6	Under SYS STATUS in the DIAGNOSTICS menu, does the number of probes match the total number of sensor probes for the location as indicated on the hang tag on the cables?	Yes / No
7	In the IP / SI UNITS menu, is the value set to the desired system of measurement?	Yes / No

GTA116 Transmitters – Analog Output		
Step	Check	Result
8	Under FS1 in the SETUP menu, is the value set to the desired full scale reading for airflow?	Yes / No
9	Record the value for FS1:	
10	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
11	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
12	Record the value for AREA (CFM or LPS U/M only):	(ft ² /m ²)
13	Under MS2 in the SETUP menu, is the value set to the desired minimum scale reading for temperature?	Yes / No
14	Record the value for MS2:	
15	Under FS2 in the SETUP menu, is the value set to the desired full scale reading for temperature?	Yes / No
16	Record the value for FS2:	
17	Record the displayed flow rate on the LCD of the GTA116 transmitter:	(FPM/CFM/MPS/LPS)
18	If the flow rate displayed on the LCD of the GTA116 transmitter is in FPM or LPS, proceed to step 19. If the flow rate is in CFM, divide the result from item 17 by the result from item 12. If the displayed flow rate is in LPS, divide the result from item 17 by the result from item 12 and divide again by 100.	
19	Measure and record the velocity output signal between position 1 and COM on the OUTPUT terminal block:	(mA/VDC)
20	If the output signal is in mA, subtract 4 from the result of item 19:	

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GTA116 Transmitters – Analog Output		
Step	Check	Result
21	Divide the result from item 19 for 0-10 VDC outputs or the result from item 20 for 4-20 mA outputs:	
22	Multiply the result from item 21 by the result of item 9:	
23	If the displayed flow is in FPM or MPS, does the result from item 17 match the result from item 22? If the displayed flow is in CFM or LPS, does the result from item 18 match the result from item 22?	Yes / No
24	Record the displayed temperature on the LCD of the GTA116 transmitter:	(F/C)
25	Measure and record the temperature output signal between position 2 and COM on the OUTPUT terminal block:	(mA/VDC)
26	If the output signal is in mA, subtract 4 from the result of item 25:	
27	Subtract the result of item 14 from the result of item 16:	
28	Multiply the result of item 25 by the result of item 27 for 0-10 VDC outputs or multiply the result of item 26 by the result of item 27 for 4-20 mA outputs:	
29	Divide the result of item 28 by 10 for 0-10 VDC outputs or divide the result of item 28 by 16 for 4-20 mA outputs:	
30	Add the result of item 29 to the result of item 14:	
31	Does the result of item 30 match the result of item 24?	Yes / No
32	Switch the transmitter OFF and connect the signal wires to the OUTPUT terminal block between positions 1 and COM for FLOW and between 2 and COM for temperature. (When configured for a 4-20 mA output, the GTA116 transmitter is a “4-wire” device. The host controls should not provide an excitation voltage to the output of the GTA116.) Switch the power ON for the transmitter; does the reading on the LCD of the GTA116 transmitter match that of the host controls?	Yes / No

GTN116 Transmitters – RS485 Output		
Step	Check	Result
8	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
9	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
10	Record the value for AREA (CFM or LPS U/M only):	(ft ² /m ²)
11	Record the displayed flow rate on the LCD of the GTN116 transmitter:	(FPM/CFM/MPS/LPS)
12	Record the displayed temperature on the LCD of the GTN116 transmitter:	(F/C)
13	Does the reading on the LCD of the GTN116 transmitter match that of the host controls?	Yes / No
14	Is the Status point/register/object returning an “OK” value?	Yes / No

GTE116 Transmitters – Ethernet Output		
Step	Check	Result
8	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
9	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
10	Record the value for AREA (CFM or LPS U/M only):	
11	Record the displayed flow rate on the LCD of the GTE116 transmitter:	(FPM/CFM/MPS/LPS)
12	Record the displayed temperature on the LCD of the GTE116 transmitter:	(F/C)
13	Are the IP Address, Subnet Mask and Default Router addresses on the GTE116 transmitter set to the desired values for the network (BACnet IP and TCP/IP only)? (see the transmitter installation and configuration guide for settings)	Yes / No
14	Does the reading on the LCD of the GTE116 transmitter match that of the host controls?	Yes / No

GTx116-P Startup Checklist

GTE116 Transmitters – Ethernet Output		
Step	Check	Result
15	Is the Status register/object returning an “OK” value?	Yes / No

GTL116 Transmitters – LonWorks Output		
Step	Check	Result
8	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
9	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
10	Record the value for AREA (CFM or LPS U/M only):	(ft ² /m ²)
11	Record the displayed flow rate on the LCD of the GTL116 transmitter:	(FPM/CFM/MPS/LPS)
12	Record the displayed temperature on the LCD of the GTL116 transmitter:	(F/C)
13	Are the following network configuration variables set based on the type of output data you would like to receive? (see the transmitter installation and configuration guide for settings) nciVSampleTime – Velocity/Flow data nciTSampleTime – Temperature data nciPSampleTime – Pressure data nciStatSampleTime – Status data	Yes / No
14	Does the reading on the LCD of the GTL116 transmitter match that of the host controls?	Yes / No
15	Is the Status variable returning an “OK” value?	Yes / No

Field Adjustments

All Transmitters		
Adjustment	Purpose	Usage
Low Limit	Forces the output to zero when the airflow rate falls below the user defined value.	Enter the SETUP menu of the GTx116 transmitter and scroll down to the LL1 menu item and adjust the low limit to the desired value (does not affect calibration).
Offset and Gain	Adjusting the factory calibration.	The factory calibration should not require adjustment if the sensor probes are installed in accordance with published installation guidelines.
Output Filter	Dampen signal fluctuations from transient wind and excessive turbulence.	Enter the SETUP menu of the GTx116 transmitter and scroll down to the FILTER1 menu item and adjust damping filter from 0 (off) to 99 (max).

GTx116-F Startup Checklist

TAG INFORMATION		
Location Name:	Model:	Type:
Reference Number:	Item:	Number of Probes:
Duct Size: x (in / mm)	Internal Insulation:	

The startup checklist is broken into 3 sections: Prior To Powering Up The Equipment, Power Applied To The Equipment and Field Adjustments. Each section begins with a table that applies to all transmitters followed by a table specific to the different transmitter types based on output configuration (Analog, RS485, Ethernet, LonWorks). Each step in the appropriate tables should be satisfactorily completed before proceeding to the next step. Consult the installation instructions, transmitter configuration guide and troubleshooting guide to assist in resolving issues.

Prior To Powering Up The Equipment

All Transmitters		
Step	Check	Result
1	Are the sensor probes installed in the same diameter of the throat of the fan upstream of the propeller without interfering with the fan operation?	Yes / No
2	Are the rod lengths set properly and evenly as per the installation instructions for the diameter that the sensor probes are installed in?	Yes / No
3	Is air flowing through the sensor probes in the proper direction according to the airflow direction label?	Yes / No
4	Do the protective shrouds of the fan inlet sensors face away from the center of the fan or the fan shaft?	Yes / No
5	Are the fan inlet sensor cables securely fastened as to not be drawn into the fan or cut by rough edges?	Yes / No
5	Is the transmitter installed within the cable length of the sensor probes?	Yes / No
6	Is the transmitter installed so that it is not exposed to water or moisture?	Yes / No
7	Is the transmitter installed where the temperatures will be between -20 ° F and 120 ° F?	Yes / No
8	Has a minimum of 2" of unobstructed space around all of the edges of the transmitter been left for heat dissipation?	Yes / No
8	Is there a minimum of 10" of unobstructed space on the top of the transmitter so that the cover can be removed?	Yes / No
10	Has a "drip loop" in the sensor probe cable(s) been provided at the transmitter in the event of water runoff or condensation?	Yes / No
11	Are the 24 VAC power wires connected to positions L1 and L2 of the POWER terminal block?	Yes / No
12	If multiple transmitters are wired off of the same transformer, are they wired "in-phase"?	Yes / No
13	Are the cables from the sensor probes connected to the receptacles on the bottom of the transmitter?	Yes / No

GTA116 Transmitters – Analog Output		
Step	Check	Result
14	Are the output signal switches SW1 and SW2 set to the desired output type (mA or VDC)?	Yes / No

GTN116 Transmitters – RS485 Output		
Step	Check	Result
14	Are the PROTOCOL DIP switches in the proper position for the desired network protocol (see the transmitter installation and configuration guide for settings)?	Yes / No
15	Are the ADDRESS DIP switches set to the desired unique address between 1 and 255 (see the transmitter installation and configuration guide for settings)?	Yes / No

GTx116-F Startup Checklist

16	Are the TERMINATION DIP switches set to the proper termination type (see the transmitter installation and configuration guide for settings)?	Yes / No
17	Are the signal wires connected to the proper positions of the OUTPUT terminal block (position 1 for A, 2 for B and COM for common)?	Yes / No

GTE116 Transmitters – Ethernet Output

Step	Check	Result
14	Are the PROTOCOL DIP switches in the proper position for the desired network protocol (see the transmitter installation and configuration guide for settings)?	Yes / No
13	Is the Ethernet cable securely plugged into the RJ45 connector on the Ethernet Output Card?	Yes / No

GTL116 Transmitters – LonWorks Output

Step	Check	Result
14	Are the signal wires connected to positions 1 and 2 of the OUTPUT terminal block?	Yes / No

Power Applied To The Equipment

All Transmitters

Step	Check	Result
1	Is the voltage between positions L1 and L2 on the POWER terminal block between 22.5 and 29 VAC?	Yes / No
2	Turn the power switch to the ON position. Does the initialization screen "GTx116 INIT #.##" display for approximately 10 seconds on the LCD of the GTx116 transmitter?	Yes / No
3	Is the green LED labeled D3 flashing at 1 second intervals?	Yes / No
4	After the initialization screen, is the GTx116 transmitter displaying a flow and temperature?	Yes / No
5	Is the last letter of the flow units displayed in upper case?	Yes / No
6	Under SYS STATUS in the DIAGNOSTICS menu, does the number of probes match the total number of sensor probes for the location as indicated on the hang tag on the cables?	Yes / No
7	In the IP / SI UNITS menu, is the value set to the desired system of measurement?	Yes / No

GTA116 Transmitters – Analog Output

Step	Check	Result
8	Under FS1 in the SETUP menu, is the value set to the desired full scale reading for airflow?	Yes / No
9	Record the value for FS1:	
10	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
11	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
12	Record the value for AREA (CFM or LPS U/M only):	(ft ² /m ²)
13	Under MS2 in the SETUP menu, is the value set to the desired minimum scale reading for temperature?	Yes / No
14	Record the value for MS2:	
15	Under FS2 in the SETUP menu, is the value set to the desired full scale reading for temperature?	Yes / No
16	Record the value for FS2:	
17	Record the displayed flow rate on the LCD of the GTA116 transmitter:	(FPM/CFM/MPS/LPS)

GTx116-F Startup Checklist

GTA116 Transmitters – Analog Output		
Step	Check	Result
18	If the flow rate displayed on the LCD of the GTA116 transmitter is in FPM or LPS, proceed to step 19. If the flow rate is in CFM, divide the result from item 17 by the result from item 12. If the displayed flow rate is in LPS, divide the result from item 17 by the result from item 12 and divide again by 100.	
19	Measure and record the velocity output signal between position 1 and COM on the OUTPUT terminal block:	(mA/VDC)
20	If the output signal is in mA, subtract 4 from the result of item 19:	
21	Divide the result from item 19 for 0-10 VDC outputs or the result from item 20 for 4-20 mA outputs:	
22	Multiply the result from item 21 by the result of item 9:	
23	If the displayed flow is in FPM or MPS, does the result from item 17 match the result from item 22? If the displayed flow is in CFM or LPS, does the result from item 18 match the result from item 22?	Yes / No
24	Record the displayed temperature on the LCD of the GTA116 transmitter:	(F/C)
25	Measure and record the temperature output signal between position 2 and COM on the OUTPUT terminal block:	(mA/VDC)
26	If the output signal is in mA, subtract 4 from the result of item 25:	
27	Subtract the result of item 14 from the result of item 16:	
28	Multiply the result of item 25 by the result of item 27 for 0-10 VDC outputs or multiply the result of item 26 by the result of item 27 for 4-20 mA outputs:	
29	Divide the result of item 28 by 10 for 0-10 VDC outputs or divide the result of item 28 by 16 for 4-20 mA outputs:	
30	Add the result of item 29 to the result of item 14:	
31	Does the result of item 30 match the result of item 24?	Yes / No
32	Switch the transmitter OFF and connect the signal wires to the OUTPUT terminal block between positions 1 and COM for FLOW and between 2 and COM for temperature. (When configured for a 4-20 mA output, the GTA116 transmitter is a "4-wire" device. The host controls should not provide an excitation voltage to the output of the GTA116.) Switch the power ON for the transmitter; does the reading on the LCD of the GTA116 transmitter match that of the host controls?	Yes / No

GTN116 Transmitters – RS485 Output		
Step	Check	Result
8	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
9	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
10	Record the value for AREA (CFM or LPS U/M only):	(ft ² /m ²)
11	Record the displayed flow rate on the LCD of the GTN116 transmitter:	(FPM/CFM/MPS/LPS)
12	Record the displayed temperature on the LCD of the GTN116 transmitter:	(F/C)
13	Does the reading on the LCD of the GTN116 transmitter match that of the host controls?	Yes / No
14	Is the Status point/register/object returning an "OK" value?	Yes / No

GTE116 Transmitters – Ethernet Output		
Step	Check	Result
8	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
9	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
10	Record the value for AREA (CFM or LPS U/M only):	

GTx116-F Startup Checklist

GTE116 Transmitters – Ethernet Output		
Step	Check	Result
11	Record the displayed flow rate on the LCD of the GTE116 transmitter:	(FPM/CFM/MPS/LPS)
12	Record the displayed temperature on the LCD of the GTE116 transmitter:	(F/C)
13	Are the IP Address, Subnet Mask and Default Router addresses on the GTE116 transmitter set to the desired values for the network (BACnet IP and TCP/IP only)? (see the transmitter installation and configuration guide for settings)	Yes / No
14	Does the reading on the LCD of the GTE116 transmitter match that of the host controls?	Yes / No
15	Is the Status register/object returning an “OK” value?	Yes / No


GTL116 Transmitters – LonWorks Output		
Step	Check	Result
8	Under LCD1 U/M in the SETUP menu, are the units of measure set to the desired value?	Yes / No
9	If LCD1 U/M is set to CFM or LPS, is the AREA factor set to the proper value for the location?	Yes / No
10	Record the value for AREA (CFM or LPS U/M only):	(ft ² /m ²)
11	Record the displayed flow rate on the LCD of the GTL116 transmitter:	(FPM/CFM/MPS/LPS)
12	Record the displayed temperature on the LCD of the GTL116 transmitter:	(F/C)
13	Are the following network configuration variables set based on the type of output data you would like to receive? (see the transmitter installation and configuration guide for settings) nciVSampleTime – Velocity/Flow data nciTSampleTime – Temperature data nciPSampleTime – Pressure data nciStatSampleTime – Status data	Yes / No
14	Does the reading on the LCD of the GTL116 transmitter match that of the host controls?	Yes / No
15	Is the Status variable returning an “OK” value?	Yes / No


Field Adjustments

All Transmitters		
Adjustment	Purpose	Usage
Low Limit	Forces the output to zero when the airflow rate falls below the user defined value.	Enter the SETUP menu of the GTx116 transmitter and scroll down to the LL1 menu item and adjust the low limit to the desired value (does not affect calibration).
Offset and Gain	Adjusting the factory calibration.	The factory calibration should not require adjustment if the sensor probes are installed in accordance with published installation guidelines.
Output Filter	Dampen signal fluctuations from transient wind and excessive turbulence.	Enter the SETUP menu of the GTx116 transmitter and scroll down to the FILTER1 menu item and adjust damping filter from 0 (off) to 99 (max).

Adjusting Factory Calibration

The factory calibration should not require adjustment if the sensor probes are installed in accordance with published installation guidelines on GTX116-PC and GTX116-PB high density airflow measurement systems. However, some installations may not meet placement guidelines or commissioning requirements may dictate field adjustment. Field adjustment may improve the performance of GTX116-PA, GTX116-F, and GTX116-B (across louvers) systems. Only OUTPUT1, airflow rate, can be adjusted. Make sure that the reference device and technique used to determine the airflow rate in the field is suitable for such measurement. Select a location that is acceptable for the device being used as the reference recognizing that this may not be the location where the EBTRON airflow station is installed. Field measurement accuracy will not be better than +/- (5% to 10%) of reading and can often exceed 10%. Do not adjust the output of the GTX116 if the difference between the transmitter and the field measurement are less than 10%. The GTX116 firmware can be adjusted for output 1 signal "offset" and "gain". To adjust the output signal "gain", the "Off-Gain" override must be set to "**OFFGAIN=ON" from the Setup Menu. The adjustments affect both the LCD display and output signal. When "**OFF-GAIN=OFF" is set, adjusting the output signal "offset" and/or "gain" will not affect the output of the transmitter.

 Do not adjust the offset if the airflow measuring station does not indicate "zero" when the fan system is off. The device is very sensitive and is measuring actual airflow currents driven by natural factors in the system.

 If performing a closed loop test and using another location as the reference, be aware that this method will not account for leakage in the system between the two points of measurement.

Procedure for 1 Point Field Adjustment

Select an airflow rate that represents a valid operating condition for the system. Set fan speed, dampers, and VAV boxes to a fixed speed or position when measurements are taken. Complete the following worksheet to determine the gain setting to be set on the transmitter.

1. Enter the setup menu and confirm that "**OFF-GAIN=OFF". This is the factory default setting and disables the offset and gain potentiometers.
2. _____ Record the transmitter output by taking the visual reading from the transmitter LCD. Readings can be taken by the host controls if the output signal conversion has been confirmed. Time averaging the data will improve field recalibration.
3. _____ Record the reference reading. Make sure that the unit of measure (FPM, CFM, MPS, or LPS) is identical for both the transmitter and the reference. If the unit of measure is velocity (FPM or MPS), make sure that the reference airflow measurement was corrected for the area where the measurement was taken.
4. _____ Calculate the gain factor (m): $m = \text{line 3} / \text{line 2}$
5. Enter the setup menu and set "**OFF-GAIN=ON". Press the down-arrow key to display the GAIN1 and OFFSET1 settings. Adjust the setting of GAIN1 until the value calculated in line 4 is displayed. Adjust the setting of OFFSET1 to 0.000. Press the "ESC" button until you return to the normal operating mode. Field adjustment is complete.

Adjusting Factory Calibration

Procedure for 2 Point Field Adjustment

Select the minimum and maximum airflow rate that the airflow station will encounter as a valid operating condition for the system. Set fan speed, dampers, and VAV boxes to a fixed speed or position when measurements are taken. Complete the following worksheet to determine the gain and offset settings to be set on the transmitter.

1. Enter the setup menu and confirm that "**OFF-GAIN=OFF". This is the factory default setting and disables the offset and gain potentiometers. MEASUREMENTS MUST BE RECORDED IN FPM (MPS for S.I. units).
2. Set the minimum airflow rate.
3. _____ Record the transmitter airflow rate by taking the visual reading from the transmitter LCD. Readings can be taken by the host controls if the output signal conversion has been confirmed. Time averaging the data will improve field recalibration.
4. _____ Record the reference airflow rate. Make sure that the unit of measure has been converted to FPM (MPS for S.I. Units). Make sure that the reference airflow measurement was corrected for the area where the measurement was taken.
5. Set the maximum airflow rate.
6. _____ Record the transmitter airflow rate.
7. _____ Record the reference airflow rate.
8. _____ Calculate the gain factor (m): $m = (\text{line 7} - \text{line 4}) / (\text{line 6} - \text{line 3})$
9. _____ Calculate the offset factor (b): $b = (\text{line 4} - (\text{line 8} \times \text{line 3}))$
10. Enter the setup menu and set "**OFF-GAIN=ON". Press the down-arrow key to display the GAIN1 and OFFSET1 settings. Adjust the setting of GAIN1 until the value calculated in line 8 is displayed. Adjust the setting of OFFSET1 until the value calculated in line 9 is displayed. Press the "ESC" button until you return to the normal operating mode. Field adjustment is complete.