

Advantage

Gold Series by Ebtron

GTx116 “Plug & Play” Transmitters Installation & Configuration Guide

Firmware Version 3.xx

Includes analog output models: GTA116-P, GTA116-F & GTA116-B
Includes network output models: GTN116-P, GTN116-F & GTN116-B
GTx116.INSTALLf3.05

“Configuration is a Feature, not a requirement on Plug & Play Transmitters”



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Johnson Controls.
Applies to GTN116 only.

Transmitter Installation

The **GTx116** transmitter aluminum chassis has been designed for use in a protected environment between -20° F and 120° F where it will not be exposed to rain or snow.

The transmitter should be mounted upright in a field accessible location. The chassis is designed to accept 3/4" conduit fittings for signal and power wiring at the top left and right of the enclosure. The transmitter should be located such that the connecting cables from all of the sensor probes reach the receptacles on the bottom of the transmitter enclosure.

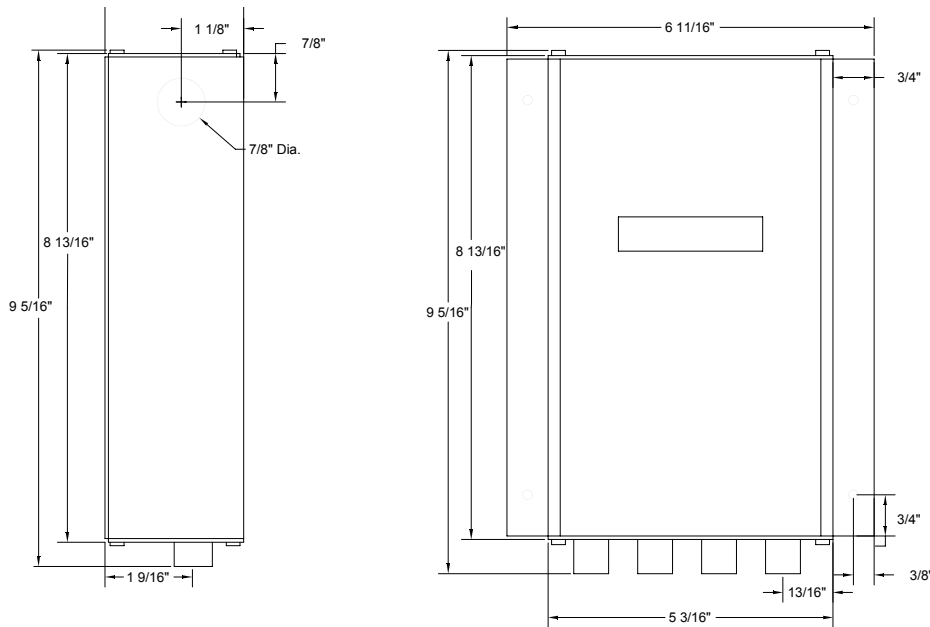


Do not expose the transmitter to rain or snow without providing a NEMA4 enclosure.



Leave at least 10 inches above, and 2 inches to each side and bottom, of unobstructed space around the transmitter to allow for heat dissipation and cover removal.

Transmitter Dimensions



Electrical Connections

All Transmitters

After mounting the sensor probes and transmitter, connect one or more sensor probe cable plugs to the circular receptacles located at the bottom of the **GTx116** transmitter enclosure. Probes are “plug and play” and do not have to be connected to a specific receptacle on the transmitter. Transmitters can accept GP1, GF1 or GB1 sensors. Mixing sensor types on a single transmitter is not permitted. Match probes to transmitter by type (A or B) as indicated on the metal tags on the transmitter and sensor probes.



Do not drill into the transmitter chassis since metal shavings could damage the electronics.



Provide a “drip loop” at the transmitter if there will be the potential for water runoff or condensation along the sensor probe cable(s).



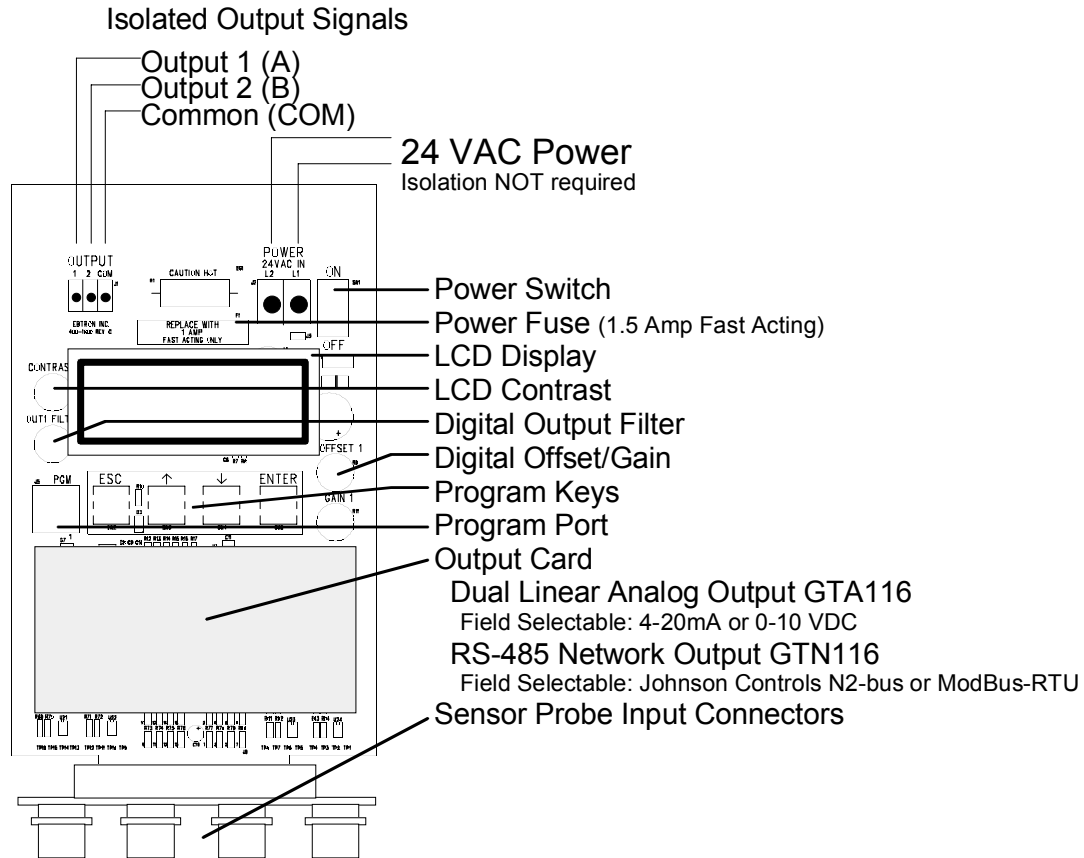
Sensor probe cable plugs are “keyed”. Line up plug with receptacle and push straight on to receptacle. **DO NOT TWIST.** Press cable plug “ribs” towards receptacle when removing. Forcing the cable plug in or out of the receptacle will damage the connection and void warranty.

24 VAC power should be connected to the large, two position power input terminal labeled “POWER” on the upper right hand side of the main circuit board. Since the output signals are isolated from the power supply, it is not necessary to provide an isolated (secondary not grounded) power source.



Multiple **GTx116** transmitters wired on a single transformer must be wired “in-phase”.

GTx116 Transmitter Wiring and Circuit Board Function Diagram



Analog Output GTA116 Transmitters

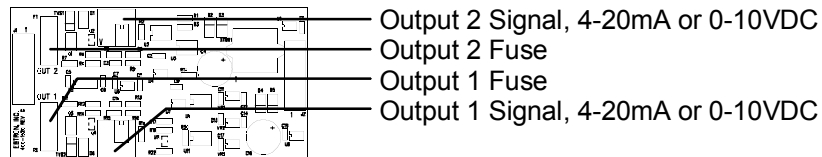
To wire the output signal and power, slide the cover plate up and out of the extruded chassis. Make sure that the power switch is in the “OFF” position. The **GTA116** wiring schematic is shown above. Signal wires for airflow and temperature should be connected to the small, three position output terminal labeled “OUTPUT” on the upper left hand side of the main circuit board.



When configured for a 4-20 mA output, the GTA116-P is “4-wire” device. The host controls should not provide an excitation voltage to the output of the GTA116-P.

The transmitter is factory shipped with the analog output signals set to the 4-20mA default. If a 0-10 VDC output is desired, simply move the corresponding switch (SW1 for Output 1, SW2 for Output 2) to the 0-10 VDC position prior to power-up (see figure below). If the output signal switches are moved after power up, the transmitter must be turned off and then on for the new switch positions to be activated. Since the accuracy of the GTA116 is “percent of reading” there should be no need to reconfigure the default output scales listed inside of the transmitter cover. However, factory default settings can be easily reconfigured in the field (see: **Changing Factory Default Settings**)

GTA116 Analog Output Card

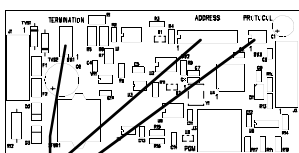


RS-485 Network GTN116 Transmitters for Johnson Controls N2-bus or ModBus-RTU

To wire the output signal and power, slide the cover plate up and out of the extruded chassis. Make sure that the power switch is in the “OFF” position. The **GTN116** wiring schematic is shown above. The RS-485 network cable should be connected to the small, three position output terminal labeled “OUTPUT” on the upper left hand side of the main circuit board.

Each transmitter must be configured for proper protocol, address, and termination. The transmitter is factory shipped with the protocol set to the Johnson Controls N2-bus, address 0, and no termination. If the DIP switches are moved after power up, the transmitter must be turned off and then on for the new switch positions to be activated. DIP switches are located on the output card. The location of the switches with their settings are indicated in the figures on the next page.

GTN116 RS-485 Network Output Card



Protocol DIP Switch
Address DIP Switch
Termination DIP Switch

TECHNICAL DATA

Protocol	Johnson Controls N2-bus or Modbus-RTU
Physical Interface	9600 Baud RS-485 Serial, no parity, 8 data bits, 1 stop bit
Cabling	Twisted shielded pair
Interface	Analog and binary input points (registers) for airflow, dynamic pressure, temperature, and status
Connectors	Terminal Block
Topology	"Daisy-chained" multi-drop bus
Unit Load	1/4 (128 devices)

Address DIP Switch

DIP Switch Position								Address
1	2	3	4	5	6	7	8	
off	off	off	off	off	off	off	off	0
off	off	off	off	off	off	off	on	1
off	off	off	off	off	off	on	off	2
off	off	off	off	off	off	on	on	3
:	:	:	:	:	:	:	:	:
on	on	on	on	on	on	on	on	255

Protocol DIP Switch

Pos.	Protocol	
1	2	
off	off	JCI N2-bus
off	on	ModBus-RTU

Termination DIP Switch

DIP Switch Position				Termination
1	2	3	4	
off	off	off	off	No Termination
off	on	on	off	End of Line
on	off	off	on	Fail-safe Bias

POINT MAP

Johnson Controls N2-bus		ModBus-RTU			Units	Point Description	Range/Value	Notes
NPT ¹	NPA ²	Function	Register	Length				
AI	1	04	30001	2 ^a	FPM	Airflow	0 to 10,000	
AI	2	04	30003	2 ^a	in.w.c.	Differential Pressure	-0.5 to +0.5	GTN116-B Only
AI	3	04	30005	2 ^a	°F	Temperature	-20 to +160	
BI	1	02	10001	1 ^b		Status	0:OK, 1:Trbl	
¹ Network Point Type		^a IEEE Floating Point (4 bytes total)						
² Network Point Address		^b Binary (1 byte total)						

Setting Transmitter Network Protocol

Transmitter protocol can be changed in the field by setting the DIP switch labeled "PROTOCOL" on the Network Output Card.

Setting Transmitter Address

Each transmitter must be assigned a **unique** address between 1 and 255 prior to power up by setting the DIP switch labeled "ADDRESS" on the Network Output Card. The least significant bit (LSB) is switch position number 8.

Setting Transmitter Termination

Transmitter termination can be changed in the field by setting the DIP switch labeled "TERMINATION" on the Network Output Card. Termination options are "No Termination", "End of Line", or "Fail-safe Bias".

Start-up

When installed in accordance with installation guidelines, no adjustment or calibration is necessary. To assure a successful startup, check that the airflow measuring station is installed in accordance with this document.



Check the physical installation, power connections, and signal wiring prior to turning the power switch to the "ON" position.

Move the power switch to the "ON" position. The transmitter executes a complete self-check each time the power is turned on that takes 10 seconds to complete. Check that scaling in the host control system returns an output that matches the output of the **GTx116**.

The **GTA116** is designed to operate on "power-up". Default output signals are set to 4-20mA. No field configuration is required. The **GTN116** must be properly configured based on the system network protocol. If factory default settings require a change in the field, review **Changing Factory Default Settings** or contact **EBTRON** Customer Service, toll free, at **800-232-8766**.

Maintenance

Periodic maintenance or recalibration is neither required nor recommended¹.

¹In extremely dirty environments, periodic inspection of the sensor element is advised. Carefully remove any excessive buildup of material with compressed air or with a small brush. Recalibration is not required.

Operation

Normal operation does not require any additional configuration. The following built-in features are available to increase the flexibility of your measurement system. **EBTRON Gold Series** sensors are individually wind tunnel calibrated at 16 velocities between 0 and factory default full scale to **EBTRON** calibration standards that are traceable to NIST. All sensors are independent.

Converting the Output Signal from FPM to CFM (MPS to LPS for S.I. scaling)

The equivalent volumetric flow full scale reading can easily be determined by multiplying the full scale reading selected in the **Setup Menu** by the free area where the airflow measuring station is located (free area x 1000 for S.I. scaling when the area is calculated in square meters). For **-P** units, the free area is printed on the hang-tag of each sensor probe. For **-F** and **-B** units, the free area should be determined after the units are installed. The factory default scaling is shown on the next page. Since the sensor probes are percent of reading devices, changing the full scale on **GTX116** analog output transmitters will not improve accuracy and is generally not required.

Changing the LCD Display from FPM to CFM (MPS to LPS for S.I. scaling)

GTX116 transmitters are shipped to display velocity, not volumetric flow. To change the LCD for volumetric flow indication, enter the **Setup Menu** and change the menu item “*LCD U/M = FPM” to “*LCD U/M = CFM” (“*LCD U/M = MPS” to “*LCD U/M = LPS” for S.I. units). After changing the display units, you will be prompted to enter the free area, in square feet (square meters for S.I. units) where the airflow measuring station is installed. Changing the display units will not affect the output signal of the transmitter.

Adjusting the 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 “*OFF-GAIN=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.

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=line 3/line 2**
5. Enter the setup menu and set “*OFF-GAIN=ON”. Press the down-arrow key to display the gain (m) and offset (b) settings of the GAIN1 and OFFSET1 potentiometers. Adjust potentiometer, GAIN1, until the value calculated in line 4 is displayed. Adjust potentiometer, OFFSET1, to 0.000. Press the “ESC” button until you return to the normal operating mode. Field adjustment is complete.

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 gain (m) and offset (b) settings of the GAIN1 and OFFSET1 potentiometers. Adjust potentiometer, GAIN1, until the value calculated in line 8 is displayed. Adjust potentiometer, 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.

Adjusting the Digital Output Filter

The digital output filter is useful for dampening signal fluctuations resulting from transient wind gusts on outdoor air intakes or excessive turbulence generated from duct disturbances. The digital output filter range can be set between “Off” (0) and 99%. Increasing the filter percentage limits the allowable change of the output signal. The output filter setting can be changed at any time by adjusting the potentiometer on the main circuit board labeled “Out1 Filter”. Turning the potentiometer clockwise increases the amount of filtering. To view the setting of the output filter, enter the **Setup Menu** and navigate to “*Filter = {current setting}”.

Sending Null and Full Scale Signals on GTA116 Transmitters

The **GTA116** transmitter can be set up to send both null and full scale signals to the host controls by forcing the transmitter into the catastrophic failure “ONFAIL” mode. Remove all sensor probes from the transmitter to simulate a catastrophic sensor failure. To send a null signal (0 VDC or 4 mA, depending on the output signal selected), enter the **Setup Menu** and set the “ON FAIL” to minimum scale for the output you wish to verify (example for Output 1: “*ONFAIL1 = MS1”). To send a full scale signal (10 VDC or 20 mA, depending on the output signal selected), enter the **Setup Menu** and set the “ON FAIL” to full scale scale for the output you wish to verify (example for Output 1: “*ONFAIL1 = FS1”). Set “ONFAIL” to the setting you desire during operation when complete.

Replacing Transmitter Circuit Boards

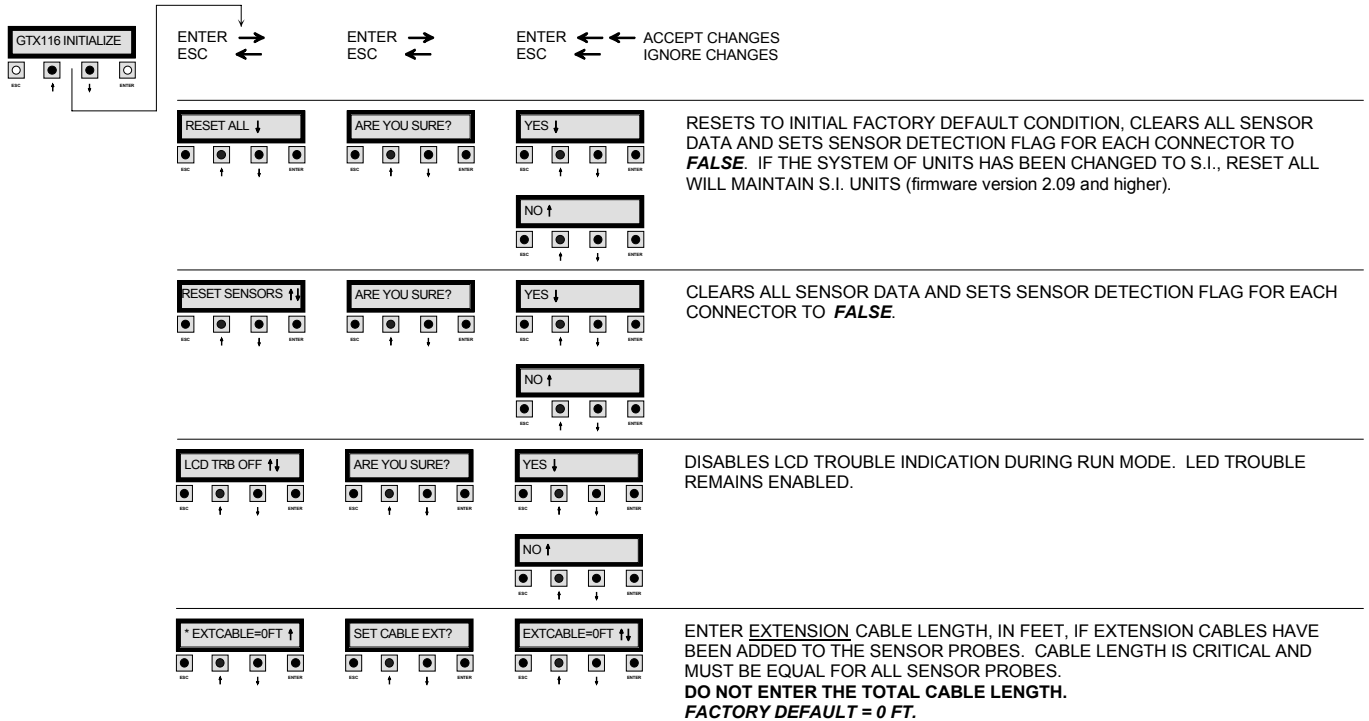
1. Move the power switch to the “off” position.
2. Remove the circuit board.
 - Main **GTX116** circuit board: Disconnect power and signal wiring and remove the four screws holding the plate at the top of the enclosure. Slide the circuit board out of the chassis.
 - Output card: Carefully pull the output card off of the **GTX116** circuit board being careful not to bend any of the pins on the **GTX116** circuit board.
3. Reinstall the circuit board and connect any power and signal wires that were removed.
4. Make sure all sensor probes are connected to the transmitter and move the power switch to the “on” position.

Replacing or Adding Sensor Probes

1. Move the power switch to the “off” position.
2. Remove any installed sensor probe(s) that need to be replaced.
3. Install the new sensor probe(s) and connect them to the transmitter.
4. Make sure all sensor probes are connected to the transmitter and move the power switch to the “on” position.

Transmitter Initialization

The **GTx116 Transmitter** automatically initializes at power-up and conducts full system diagnostics. **Under normal conditions, there is no reason to enter the Initialization mode.** The transmitter should only be initialized if a.) it is desired to reset the transmitter to the *Factory Default Settings* or b.) one or more probes are permanently removed from its receptacle. To enter the **Initialization** mode, simultaneously press and release the **Enter** and **Escape** keys during the first 10 seconds after transmitter power-up. Navigate through the menu using the flow chart below.



Changing Factory Default Settings & Entering Diagnostic Mode

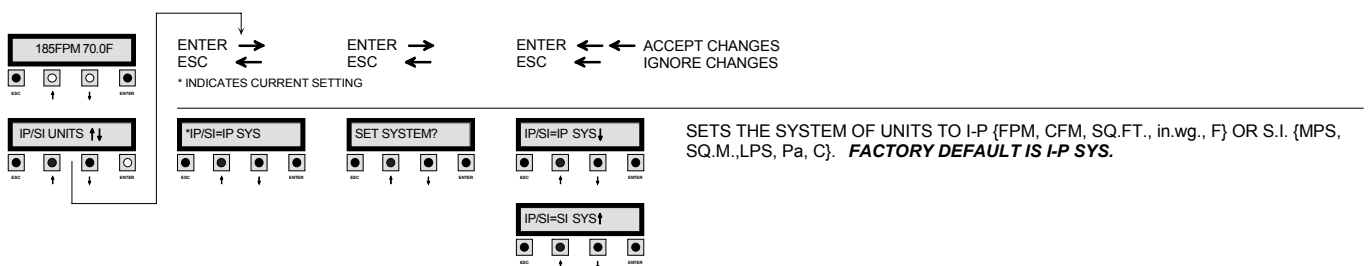
The **GTx116 Transmitter** has been setup and tested at the factory and fully operational when sensor probes are connected and power is applied by turning the power switch to the 'on' position. The transmitter automatically determines the type of sensors connected and defaults to predetermined factory settings. Factory settings can easily be changed in the field by entering the **Main Menu** by simultaneously pressing and releasing the **Up** and **Down** keys while the transmitter is in its normal operating mode. Navigate through the menus using the following flow charts. The configuration flow charts are divided into **System of Units**, **Setup**, and **Diagnostics**. The settings do not take effect until the transmitter is returned to its normal operating mode.

Factory Defaults for GP1 (-P), GF1 (-F), GB1 (-B) Sensor Probes:

System of measure: I-P
Output 1 units of measure: FPM
Output 2 units of measure: °F (-P,-F), +/- in.wg. (-B)
LCD display: FPM and °F (-P,-F), FPM (-B)
Analog output signals¹: Output 1 = 4-20mA, Output 2 = 4-20mA
Output 1 scale²: 0 to full scale
 full scale = 5,000 FPM (-P), 10,000 FPM (-F), 3,000 FPM (-B)
Output 2 scale²: -20° F to +160° F (-P,-F), +/- 0.50 in.wg. (-B)
Offset-Gain: OFF
Digital output filter: OFF
¹GTA116 Transmitters

System of measure: S.I.
Output 1 units of measure: MPS
Output 2 units of measure: °C (-P,-F), +/- Pa. (-B)
LCD display: MPS and °C (-P,-F), MPS (-B)
Analog output signals¹: Output 1 = 4-20mA, Output 2 = 4-20mA
Output 1 scale²: 0 to full scale
 full scale = 25 MPS (-P), 50 MPS (-F), 15 MPS (-B)
Output 2 scale²: -30° C to +70° C (-P,-F), +/- 125 Pa (-B)
Offset-Gain: OFF
Digital output filter: OFF
¹GTA116 Transmitters

Changing the System of Units



Changing the Setup Configuration on GP1 & GF1 Sensor Probes (I-P units)

ENTER →
ESC ←

ENTER →
ESC ←

ENTER ←←
ESC ←←

ACCEPT CHANGES
IGNORE CHANGES

* INDICATES CURRENT SETTING

RECTANGULAR FREE AREA = W X H / 144
ROUND FREE AREA = D X D X 3.14 / 576
OVAL FREE AREA = [(3.14 / 4 X H X H) + ((W - H) X H)] / 144

185.00FPM 70.05F

IP/SI UNITS

SETUP

*DISPLAY=ON

SET DISPLAY?

DISPLAY=ON

DISPLAY=OFF

DISPLAY "ON" WILL INDICATE BOTH **AIRFLOW** AND **TEMPERATURE**.
 DISPLAY "OFF" WILL INDICATE **GTX116 RUN**. **FACTORY DEFAULT IS "ON"**.

OUT1=4-20mA

SET SW1 ON BOARD

*OUT1=4-20mA

SET SW1 ON BOARD

OUTPUT 1, AIRFLOW, IS SELECTED WITH A PHYSICAL SWITCH LABELED "SW1" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA**.

MS1=0

NO OPTION

*MS1=0

NO OPTION

MINIMUM SCALE CAN NOT BE CHANGED FROM 0 FPM FOR AIRFLOW.

FS1=5000FPM

SET FS1?

FS1=5000FPM

*FS1=5000FPM

SET FS1?

FS1=5000FPM

FULL SCALE CAN BE SET BETWEEN 100 AND 10,000 FPM AT 100 FPM INCREMENTS. **UNITS ARE VELOCITY ONLY**. TO CONVERT TO CFM, SIMPLY MULTIPLY BY THE AREA (SQ.FT.) OF THE DUCT OR PLENUM. **FACTORY DEFAULT IS 5,000 FPM (-P), 10,000 FPM (-F)**.

ONFAIL1=MS1

SET ONFAIL1?

ONFAIL1=MS1

ONFAIL1=FS1

*ONFAIL1=MS1

SET ONFAIL1?

ONFAIL1=MS1

ONFAIL1=FS1

ANALOG OUTPUT SETTING FOR AIRFLOW ON TOTAL SENSOR FAILURE. **FACTORY DEFAULT = MS1**.

LCD1 UM=FPM

SET LCD UNITS1?

LCD1 UM=FPM

LCD1 UM=CFM

*LCD1 UM=FPM

SET LCD UNITS1?

LCD1 UM=FPM

LCD1 UM=CFM

THE LCD DISPLAY UNITS OF MEASURE ARE IN FPM OR CFM IN THE U.S. (I.P.) SYSTEM. CFM REQUIRES THAT THE AREA (BELOW) IS SET PROPERLY. **FACTORY DEFAULT IS FPM**.

AREA=0.00

SET AREA?

AREA=0.00

*AREA=0.00

SET AREA?

AREA=0.00

AREA IN SQUARE FEET FROM 0.00 TO 999.99 IN 0.01 INCREMENTS. THE LONGER YOU HOLD DOWN THE UP OR DOWN ARROW KEYS, THE FASTER THE INCREMENT WILL CHANGE. **FACTORY DEFAULT IS 0.00 SQ.FT.**

OFF-GAIN=OFF

SET OFF-GAIN?

OFF-GAIN=OFF

OFF-GAIN=ON

*OFF-GAIN=OFF

SET OFF-GAIN?

OFF-GAIN=OFF

OFF-GAIN=ON

"OFF-GAIN = OFF" OVERRIDES ANY SETTINGS OF THE DIGITAL OFFSET AND GAIN POTENTIOMETERS, "OFFSET 1" AND "GAIN 1", FOR OUTPUT 1 ON THE GTX116 CIRCUIT BOARD. "OFF-GAIN" MUST BE SET TO "ON" TO ALLOW FIELD ADJUSTMENTS. **FACTORY DEFAULT IS "OFF"**.

m=1.000 b=+0.00

FILTER=OFF

ADJUST POT OUT1F

m=1.000 b=+0.00

*FILTER=OFF

ADJUST POT OUT1F

FIELD ADJUSTMENTS AFFECT BOTH THE OUTPUT SIGNAL AND THE DISPLAYED OUTPUT.

THE DAMPENING FILTER IS ACTIVATED BY ADJUSTING DIGITAL POTENTIOMETER "OUT1 FILTER" ON THE GTX116 CIRCUIT BOARD. THE AMOUNT OF FILTERING, OFF TO 99% WILL BE DISPLAYED AS "FILTER=_%". ON THE LCD DISPLAY. FILTERING IS USEFUL WHEN TURBULENCE FROM THE SENSOR LOCATION OR WINDS ON OUTSIDE AIR INTAKES CREATE EXCESSIVE SIGNAL VARIATIONS. **FACTORY DEFAULT IS "OFF"**.

OUT2=4-20mA

SET SW2 ON BOARD

*OUT2=4-20mA

SET SW2 ON BOARD

OUTPUT 2, TEMPERATURE, IS SELECTED WITH A PHYSICAL SWITCH LABELED "SW2" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA**.

MS2=-20

SET MS2?

MS2=-20

*MS2=-20

SET MS2?

MS2=-20

MINIMUM SCALE CAN BE SET BETWEEN -50 F AND 150F AND CAN BE ADJUSTED AT 10F INTERVALS. **FACTORY DEFAULT IS -20**.

FS2=160

SET FS2?

FS2=160

*FS2=160

SET FS2?

FS2=160

FULL SCALE CAN BE SET BETWEEN 0F AND 160F AND CAN BE ADJUSTED AT 10F INTERVALS. THE FULL SCALE MUST BE 10F HIGHER THAN THE MINIMUM SCALE. **FACTORY DEFAULT IS 160**

ONFAIL2=MS2

SET ONFAIL2?

ONFAIL2=MS2

ONFAIL2=FS2

*ONFAIL2=MS2

SET ONFAIL2?

ONFAIL2=MS2

ONFAIL2=FS2

ANALOG OUTPUT SETTING FOR TEMPERATURE ON TOTAL SENSOR FAILURE. **FACTORY DEFAULT = MS2**.

Only visible when
"OFF-GAIN=ON"

Note: Analog output, minimum scale, full scale, and on-fail menu items appear on GTA116 transmitters only.

Changing the Setup Configuration on GP1 & GF1 Sensor Probes (s.i. units)

ENTER → ENTER → ENTER ← ACCEPT CHANGES
 ESC ← ESC ← ESC ← IGNORE CHANGES

* INDICATES CURRENT SETTING

RECTANGULAR FREE AREA = W X H
ROUND FREE AREA = D X D X 3.14 / 4
OVAL FREE AREA = [(3.14 / 4 X H X H) + ((W - H) X H)]

DISPLAY "ON" WILL INDICATE BOTH **AIRFLOW AND TEMPERATURE**.
 DISPLAY "OFF" WILL INDICATE **GTX116 RUN. FACTORY DEFAULT IS "ON"**.

OUTPUT 1, AIRFLOW, IS SELECTED WITH A PHYSICAL SWITCH LABELED "SW1" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA..**

MINIMUM SCALE CAN NOT BE CHANGED FROM 0 MPS FOR AIRFLOW.

FULL SCALE CAN BE SET BETWEEN 0.5 AND 50 MPS AT 0.1 MPS INCREMENTS. **UNITS ARE VELOCITY ONLY.** TO CONVERT TO LPS, SIMPLY MULTIPLY BY THE AREA (SQ.M.) OF THE DUCT OR PLENUM x1000. **FACTORY DEFAULT IS 25 MPS (-P), 50 MPS (-F).**

ANALOG OUTPUT SETTING FOR AIRFLOW ON TOTAL SENSOR FAILURE. **FACTORY DEFAULT = MS1.**

THE LCD DISPLAY UNITS OF MEASURE ARE IN MPS OR LPS IN THE S.I. SYSTEM. LPS REQUIRES THAT THE AREA (BELOW) IS SET PROPERLY. **FACTORY DEFAULT IS MPS.**

AREA IN SQUARE METERS FROM 0.00 TO 999.99 IN 0.01 INCREMENTS. THE LONGER YOU HOLD DOWN THE UP OR DOWN ARROW KEYS, THE FASTER THE INCREMENT WILL CHANGE. **FACTORY DEFAULT IS 0.00 SQ.M.**

"OFF-GAIN = OFF" OVERRIDES ANY SETTINGS OF THE DIGITAL OFFSET AND GAIN POTENTIOMETERS, "OFFSET 1" AND "GAIN 1", FOR OUTPUT 1 ON THE GTX116 CIRCUIT BOARD. "OFF-GAIN" MUST BE SET TO "ON" TO ALLOW FIELD ADJUSTMENTS. **FACTORY DEFAULT IS "OFF"**.

FIELD ADJUSTMENTS AFFECT BOTH THE OUTPUT SIGNAL AND THE DISPLAYED OUTPUT.

THE DAMPENING FILTER IS ACTIVATED BY ADJUSTING DIGITAL POTENTIOMETER "OUT1 FILTER" ON THE GTX116 CIRCUIT BOARD. THE AMOUNT OF FILTERING, OFF TO 99% WILL BE DISPLAYED AS "FILTER= _%" ON THE LCD DISPLAY. FILTERING IS USEFUL WHEN TURBULENCE FROM THE SENSOR LOCATION OR WINDS ON OUTSIDE AIR INTAKES CREATE EXCESSIVE SIGNAL VARIATIONS. **FACTORY DEFAULT IS "OFF"**.

OUTPUT 2, TEMPERATURE, IS SELECTED WITH A PHYSICAL SWITCH LABELED "SW2" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA.**

MINIMUM SCALE CAN BE SET BETWEEN -50C AND 60C AND CAN BE ADJUSTED AT 10C INTERVALS. **FACTORY DEFAULT IS -30.**

FULL SCALE CAN BE SET BETWEEN -20C AND 70C AND CAN BE ADJUSTED AT 10C INTERVALS. THE FULL SCALE MUST BE 10C HIGHER THAN THE MINIMUM SCALE. **FACTORY DEFAULT IS 70.**

ANALOG OUTPUT SETTING FOR TEMPERATURE ON TOTAL SENSOR FAILURE. **FACTORY DEFAULT = MS2.**

Only visible when *OFF-GAIN=ON

Note: Analog output, minimum scale, full scale, and on-fail menu items appear on GTA116 transmitters only.

Changing the Setup Configuration on GB1 Sensor Probes (I-P units)

185.00FPM

ENTER →
ESC ←

ENTER →
ESC ←

ENTER ←← ACCEPT CHANGES
ESC ←← IGNORE CHANGES

* INDICATES CURRENT SETTING

IP/SI UNITS ↓↑

SETUP ↓↑

"DISPLAY=ON ↓

SET DISPLAY?

DISPLAY=ON ↓

DISPLAY=OFF ↑

DISPLAY "ON" WILL INDICATE EITHER **AIRFLOW** OR **DYNAMIC PRESSURE**
DISPLAY "OFF" WILL INDICATE **GTX116 RUN**. **FACTORY DEFAULT IS "ON"**.

*OUT1=4-20 ↓↑

*MS1= 0 ↓↑

*FS1= 3000FPM ↓↑

SET SW1 ON BOARD

NO OPTION

SET FS1?

FS1= 3000FPM ↓↑

OUTPUT 1, AIRFLOW, IS SELECTED WITH A PHYSICAL SWITCH LABELED "SW1" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA..**

MINIMUM SCALE CAN NOT BE CHANGED FROM 0 FPM FOR AIRFLOW.

FULL SCALE CAN BE SET BETWEEN 100 AND 10,000 FPM AT 100 FPM INCREMENTS. **UNITS ARE VELOCITY ONLY**. TO CONVERT TO CFM, SIMPLY MULTIPLY BY THE AREA (SQ.FT.) OF THE LOUVER OR OPENING. **FACTORY DEFAULT IS 3,000 FPM (-B)**

*ONFAIL1=MS1 ↓↑

*LCD1 U/M=FPM ↓↑

*AREA= 0.00 ↓↑

"OFF-GAIN=OFF ↓↑

m=1.000 b=+0.00 ↓↑

SET ONFAIL1?

SET LCD UNITS1?

SET AREA?

SET OFF-GAIN?

ADJUST POT OUT1 F

ANALOG OUTPUT SETTING FOR AIRFLOW ON TOTAL SENSOR FAILURE. **FACTORY DEFAULT = MS1**.

THE LCD DISPLAY UNITS OF MEASURE ARE IN FPM, CFM OR +/-IN.WG. CFM REQUIRES THAT THE AREA (BELOW) IS SET PROPERLY. **FACTORY DEFAULT IS FPM**.

AREA IN SQUARE FEET FROM 0.00 TO 999.99 IN 0.01 INCREMENTS. THE LONGER YOU HOLD DOWN THE UP OR DOWN ARROW KEYS, THE FASTER THE INCREMENT WILL CHANGE. **FACTORY DEFAULT IS 0.00 SQ.FT.**

"OFF-GAIN = OFF" OVERRIDES ANY SETTINGS OF THE DIGITAL OFFSET AND GAIN POTENTIOMETERS, "OFFSET 1" AND "GAIN 1", FOR OUTPUT 1 ON THE GTX116 CIRCUIT BOARD. "OFF-GAIN" MUST BE SET TO "ON" TO ALLOW FIELD ADJUSTMENTS. **FACTORY DEFAULT IS "OFF"**.

FIELD ADJUSTMENTS AFFECT BOTH THE OUTPUT SIGNAL AND THE DISPLAYED OUTPUT.

THE DAMPENING FILTER IS ACTIVATED BY ADJUSTING DIGITAL POTENTIOMETER "OUT1 FILTER" ON THE GTX116 CIRCUIT BOARD. THE AMOUNT OF FILTERING, OFF TO 99% WILL BE DISPLAYED AS "FILTER=_%" ON THE LCD DISPLAY. FILTERING IS USEFUL WHEN TURBULENCE FROM THE SENSOR LOCATION OR WINDS ON OUTSIDE AIR INTAKES CREATE EXCESSIVE SIGNAL VARIATIONS. **FACTORY DEFAULT IS "OFF"**.

*OUT2=4-20 ↓↑

*FS2= 0.50 ↓↑

*ONFAIL2=MS2 ↑

SET SW2 ON BOARD

SET FS2?

SET ONFAIL2?

ONFAIL2=MS2 ↓

ONFAIL2=FS2 ↑

OUTPUT 2, DYNAMIC PRESSURE, IS SELECTED WITH A PHYSICAL SWITCH LABELED "SW2" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA**.

FULL SCALE CAN BE SET BETWEEN +/-0.005 AND +/-0.5 in.wg. AND CAN BE ADJUSTED AT 0.005 in.wg. INTERVALS. **FACTORY DEFAULT IS +/-0.50 in.wg.**

ANALOG OUTPUT SETTING FOR DYNAMIC PRESSURE ON TOTAL SENSOR FAILURE. **FACTORY DEFAULT = MS2**.

Only visible when
"OFF-GAIN=ON"

Note: Analog output, minimum scale, full scale, and on-fail menu items appear on GTA116 transmitters only.

Changing the Setup Configuration on GB1 Sensor Probes (s.i. units)

20.00 MPS

↑ ↓

ENTER →

ESC ←

ENTER →

ESC ←

ENTER ←

ESC ←

← ACCEPT CHANGES

← IGNORE CHANGES

* INDICATES CURRENT SETTING

↑ ↓

IP/SI UNITS

↑ ↓

↑ ↓

*DISPLAY=ON

↑ ↓

↑ ↓

SET DISPLAY?

↑ ↓

↑ ↓

DISPLAY=ON

↑ ↓

↑ ↓

DISPLAY=OFF

↑ ↓

DISPLAY "ON" WILL INDICATE EITHER **AIRFLOW** OR **DYNAMIC PRESSURE**
DISPLAY "OFF" WILL INDICATE **GTX116 RUN**. **FACTORY DEFAULT IS "ON"**.

↑ ↓

*OUT1=4-20

↑ ↓

↑ ↓

SET SW1 ON BOARD

↑ ↓

↑ ↓

*MS1= 0

↑ ↓

↑ ↓

NO OPTION

↑ ↓

↑ ↓

*FS1= 25MPS

↑ ↓

↑ ↓

SET FS1?

↑ ↓

↑ ↓

FS1= 25MPS

↑ ↓

FULL SCALE CAN BE SET BETWEEN 0.5 AND 50 MPS AT 0.1MPS INCREMENTS.
UNITS ARE VELOCITY ONLY. TO CONVERT TO LPS, SIMPLY MULTIPLY BY
THE AREA (SQ.M.) OF THE LOUVER OR OPENING x1000.
FACTORY DEFAULT IS 15MPS (-B)

↑ ↓

*ONFAIL1=MS1

↑ ↓

↑ ↓

SET ONFAIL1?

↑ ↓

↑ ↓

ONFAIL1=MS1

↑ ↓

↑ ↓

ONFAIL1=FS1

↑ ↓

↑ ↓

*LCD1 U/M=MPS

↑ ↓

↑ ↓

SET LCD UNITS1?

↑ ↓

↑ ↓

LCD1 U/M=MPS

↑ ↓

↑ ↓

LCD1 U/M=LPS

↑ ↓

↑ ↓

LCD1 U/M=Pa

↑ ↓

THE LCD DISPLAY UNITS OF MEASURE ARE IN MPS, LPS OR +/-Pa. LPS
REQUIRES THAT THE AREA (BELOW) IS SET PROPERLY. **FACTORY DEFAULT
IS MPS**.

↑ ↓

*AREA= 0.00

↑ ↓

↑ ↓

SET AREA?

↑ ↓

↑ ↓

AREA= 0.00

↑ ↓

↑ ↓

*OFF-GAIN=OFF

↑ ↓

↑ ↓

SET OFF-GAIN?

↑ ↓

↑ ↓

OFF-GAIN=OFF

↑ ↓

↑ ↓

OFF-GAIN=ON

↑ ↓

AREA IN SQUARE METERS FROM 0.00 TO 999.99 IN 0.01 INCREMENTS. THE
LONGER YOU HOLD DOWN THE UP OR DOWN ARROW KEYS, THE FASTER THE
INCREMENT WILL CHANGE. **FACTORY DEFAULT IS 0.00 SQ.M.**

"OFF-GAIN = OFF" OVERRIDES ANY SETTINGS OF THE DIGITAL OFFSET AND
GAIN POTENTIOMETERS, "OFFSET 1" AND "GAIN 1", FOR OUTPUT 1 ON THE
GTX116 CIRCUIT BOARD. "OFF-GAIN" MUST BE SET TO "ON" TO ALLOW FIELD
ADJUSTMENTS. **FACTORY DEFAULT IS "OFF"**.

↑ ↓

m=1.000 b=+0.00

↑ ↓

↑ ↓

*FILTER=OFF

↑ ↓

↑ ↓

ADJUST POT OUT1 F

↑ ↓

↑ ↓

*OUT2=4-20

↑ ↓

↑ ↓

SET SW2 ON BOARD

↑ ↓

↑ ↓

*FS2= 125

↑ ↓

↑ ↓

SET FS2?

↑ ↓

↑ ↓

FS2= 125

↑ ↓

OUTPUT 2, DYNAMIC PRESSURE, IS SELECTED WITH A PHYSICAL SWITCH
LABELED "SW2" ON THE OUTPUT CARD. POWER MUST BE TURNED OFF THEN
ON TO ACTIVATE. **FACTORY DEFAULT IS 4-20mA**.

FULL SCALE CAN BE SET BETWEEN +/-1.5 AND +/-125 Pa AND CAN BE
ADJUSTED AT 0.5 Pa INTERVALS. **FACTORY DEFAULT IS +/-125 Pa**

↑ ↓

*ONFAIL2=MS2

↑ ↓

↑ ↓

SET ONFAIL2?

↑ ↓

↑ ↓

ONFAIL2=MS2

↑ ↓

↑ ↓

ONFAIL2=FS2

↑ ↓

↑ ↓

*ONFAIL2=MS2

↑ ↓

↑ ↓

SET ONFAIL2?

↑ ↓

↑ ↓

ONFAIL2=MS2

↑ ↓

↑ ↓

ONFAIL2=FS2

↑ ↓

ANALOG OUTPUT SETTING FOR DYNAMIC PRESSURE ON TOTAL SENSOR
FAILURE. **FACTORY DEFAULT = MS2**.

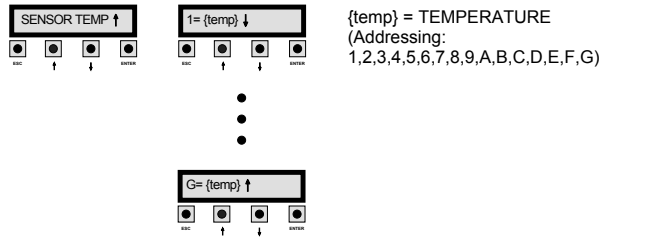
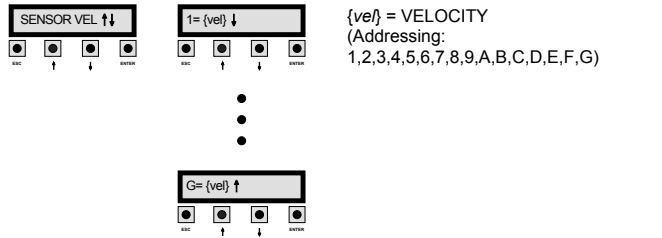
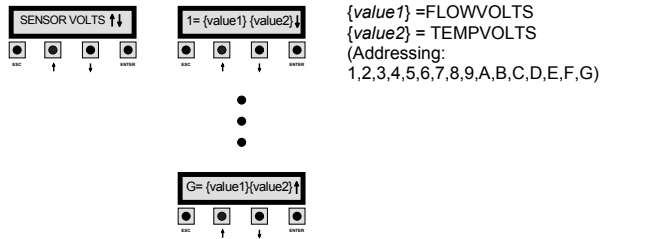
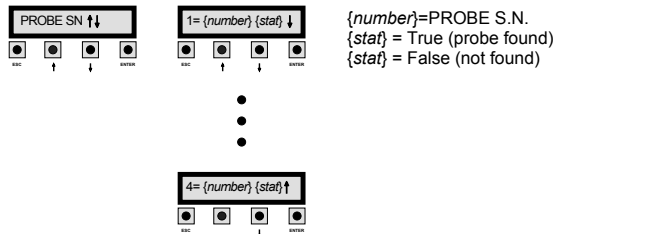
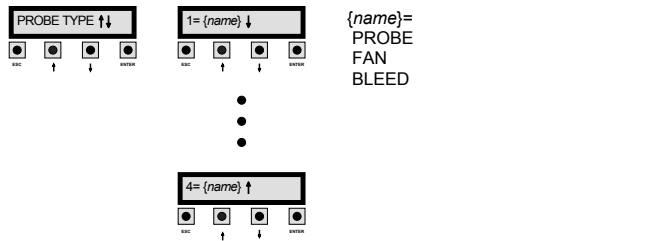
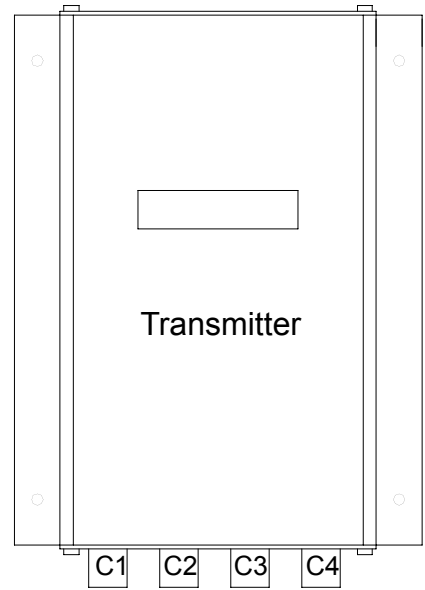
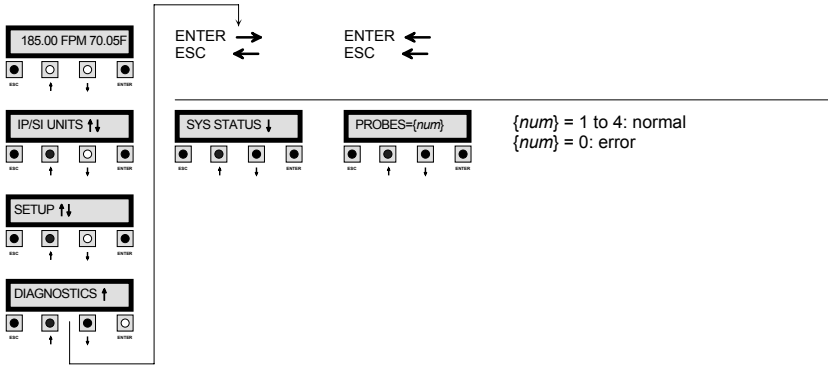
Only visible when
*OFF-GAIN=ON

Note: Analog output, minimum scale, full scale, and on-fail menu items appear on GTA116 transmitters only.

Troubleshooting Guide

Problem	Possible Cause	Remedy
No LCD display indication and the green LED on the main circuit board is not illuminated.	Power switch not in the "on" position.	Move the power switch to the "on" position.
	Improper supply voltage to the power input terminal block.	Make sure that input power wires are connected to positions L1 and L2 of the POWER terminal block and the voltage with the power switch in the "on" position is between 22.5 and 29 VAC.
No LCD display indication and the green LED on the main circuit board is flashing.	Blown fuse	Check power wiring. Make sure that multiple devices wired on a single transformer are wired "in-phase". Replace with a 1.5 amp, fast acting fuse only after the problem has been determined and corrected.
	LCD contrast too low.	Turn the contrast potentiometer on the main circuit board "clockwise".
The LCD display is scrambled or there is no LCD display indication after touching the switches, LCD display, or circuit board.	Static electricity.	Touch an earth-grounded object, such as a duct, to discharge static electricity then reset the power. Avoid direct contact with the LCD display or circuit board.
The LCD display indicates "0.00 FPM and -459.7"	The power switch on the transmitter was moved to the "on" position before the sensor probes were connected.	Reset the power by moving the power switch from the "on" to "off" position and then back to the "on" position.
The LCD display indicates "DIFF SENSOR TYPE".	Sensor probes have been mismatched.	Transmitters must have the same sensor type connected (GP1, GF1, or GB1 sensor probes).
The LCD display indicates "TOO MANY SENSORS".	A probe with 5 or more sensors has been connected to a 'Type B' transmitter with 4 receptacles.	Probes with 5 or more sensors are shipped with and require a 'Type A' transmitter with 2 receptacles.
The last digit of the flow rate units is displayed as a lower case letter.	The sensor detection system has detected one or more malfunctioning or missing sensors.	Check sensor probe cable connections. If sensor probe connections look OK and match the number of sensor probes indicated on each probes hang tag fill out the form at the end of this document and call Ebtron customer service.
The green LED on the main circuit board is "on" but not flashing.	The microprocessor is not running.	Reset the power by moving the power switch from the "on" to "off" position and then back to the "on" position.
The green LED on the main circuit board is flashing at 1 second intervals.	No problem, normal operation.	No remedy required.
The green LED on the main circuit board is flashing at 2 second intervals.	The sensor detection system has detected one or more malfunctioning or missing sensors.	Check sensor probe cable connections. If sensor probe connections look OK and match the number of sensor probes indicated on each probes hang tag fill out the form at the end of this document and call Ebtron customer service.
No output signal can be measured at the OUTPUT terminal block of the GTA116 transmitter.	Output card is not securely mounted on main circuit board.	Press output card firmly onto main circuit board.
	Blown output fuse (output 1 and output 2 are fused and protected independently on GTA116 transmitters).	Make sure that power has not been connected to the output terminal block. Correct the problem and replace with 0.125 amp, fast acting fuse only. Make sure that your host control system is not configured for a 2-wire device (no excitation voltage should be present on the signals from the host controls). Correct the problem and replace with 0.125 amp, fast acting fuse only.
The 4-20 mA output signal on the GTA116 transmitter outputs less than 4 mA.	The analog output signal switch (SW1 for Output 1 or SW2 for Output 2) was moved to the 4-20 mA position after power-up.	Turn the power switch to the "off" position. Select the desired 4-20 mA output signal for output 1 (SW1) and/or output 2 (SW2). Turn the power switch to the "on" position.
The 0-10 VDC output signal on the GTA116 transmitter does not output less than 2 VDC.	The analog output signal switch (SW1 for Output 1 or SW2 for Output 2) was moved to the 0-10 VDC position after power-up.	Turn the power switch to the "off" position. Select the desired 0-10 VDC output signal for output 1 (SW1) and/or output 2 (SW2). Turn the power switch to the "on" position.
The host control system is unable to communicate with the GTN116 transmitter.	Output card is not securely mounted on main circuit board.	Press output card firmly onto main circuit board.
	Network protocol, address and/or termination has not been properly set on GTN116 transmitters.	Set network protocol, address and termination based on your network requirements and reset transmitter power.
The transmitter indicates airflow when the HVAC system is not operating.	Sensors are sensitive and can measure very low air velocities. If a reading is indicated, there is airflow present where the airflow measuring station is located.	Do not attempt to adjust zero ("offset"). Doing so will result in an error in airflow measurement.
The LCD display does not match the readings indicated by the host control system.	The output signal switches on a GTA116 transmitter have been changed after the power switch had been turned to the "on" position.	Reset the power by moving the power switch from the "on" to "off" position and then back to the "on" position.
	The scaling in the host control system is incorrect.	Compare the current configuration of the GTX116 transmitter with that of the host control system (on GTA116 transmitters compare the minimum and full scale settings for each output by navigating through the setup configuration menus).

Navigating through the Diagnostics Menu (All units)



Sensor Address: 1-9, A-G

Sensor position from terminal end of probe	Connector Position Type B - 4 input			
	C1	C2	C3	C4
1	D	9	1	5
2	E	A	2	6
3	F	B	3	7
4	G	C	4	8

Sensor Address: 1-9, A-G

Sensor position from terminal end of probe	Connector Position Type A - 2 input	
	C2	C3
1	9	1
2	A	2
3	B	3
4	C	4
5	D	5
6	E	6
7	F	7
8	G	8

Contacting **EBTRON** Customer Service at 1-800-232-8766

EBTRON customer service is available, free of charge, between the hours of 8:00 AM and 4:30 PM, Monday through Friday. Many customer service issues are easily resolved by using the troubleshooting guides in this document. If you need more information or believe that there may be a problem with the sensor probes or transmitter, enter the data in the form below before calling the service department. If you feel you may have an application issue, a sketch of the installation location along with control sequence of operations is recommended. Fax the completed information, if possible to 843-756-1838 before you call or have it available when speaking with a service representative. Address all correspondence to the **EBTRON Customer Service Department**. Completing the form will significantly facilitate field troubleshooting. Additional information is also available from your local **EBTRON** representative or 24 hours a day online at www.ebtron.com.

TAG INFORMATION	
Location Name:	
Reference Number:	Item:
Duct Size: _____ x _____	(in / mm) Internal Insulation:

Record the LCD display output

24 VAC Power Input
POWER TERM. BLOCK L1 & L2 _____ VAC (power "off")
POWER TERM. BLOCK L1 & L2 _____ VAC (power "on")

Enter the Setup mode and record ALL current settings
*DISPLAY= (on / off) circle one
*OUT1=(4-20 / 0-10) circle one
*MS1=
*FS1=
*ONFAIL1= (MS1 / FS1) circle one
*LCD U/M= (FPM / CFM / iWC / MPS / LPS / PA) circle one
*AREA=
*OFFSET-GAIN= (on / off) circle one
m= _____ b= _____
* FILTER=
*OUT2= (4-20 / 0-10) circle one
*MS2=
*FS2=
*ONFAIL2= (MS2 / FS2) circle one

Note: When *OFFSET-GAIN=OFF, the gain and offset coefficients m and b are not displayed.

Enter the <i>Diagnostics</i> mode and enter all data			
	PROBE TYPE	PROBE SN	
	{name}	{number}	{stat}
1			
2			
3			
4			
	SENSOR VOLTS		SENSOR
	volts1	volts2	VEL
			TEMP
			temp
1			
2			
3			
4			
5			
6			
7			
8			
9			
A			
B			
C			
D			
E			
F			
G			

Analog Output Transmitters: Record output signal measurements with your host controls disconnected and connected to the transmitter.

Analog Output Signal with Host Controls Disconnected	
OUTPUT TERM. BLOCK 1 & COM _____	(ma / VDC)
SW1 POSITION ON OUTPUT CARD	(4-20 / 0-10)
OUTPUT TERM. BLOCK 2 & COM _____	(ma / VDC)
SW2 POSITION ON OUTPUT CARD	(4-20 / 0-10)

Analog Output Signal with Host Controls Connected	
OUTPUT TERM. BLOCK 1 & COM _____	(ma / VDC)
SW1 POSITION ON OUTPUT CARD	(4-20 / 0-10)
OUTPUT TERM. BLOCK 2 & COM _____	(ma / VDC)
SW2 POSITION ON OUTPUT CARD	(4-20 / 0-10)

Network Transmitters: Record airflow, dynamic pressure, temperature and status readings at your host controls and confirm that DIP switch settings on the network card are set properly.

Johnson Controls N2-bus		ModBus-RTU			Host Controls Reading
NPT ¹	NPA ²	Function	Register	Length	
AI	1	04	30001	2 ^a	
AI	2	04	30003	2 ^a	
AI	3	04	30005	2 ^a	
BI	1	02	10001	1 ^b	
¹ Network Point Type		^a IEEE Floating Point (4 bytes total)			
² Network Point Address		^b Binary (1 byte total)			

Protocol DIP Switch		
Pos.	Protocol Required	
1	2	

Address DIP Switch								
DIP Switch Position								Address Required
1	2	3	4	5	6	7	8	

Termination DIP Switch				
Switch Position				Termination Required
1	2	3	4	