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Model GTM116
Installation Guide

Gold Series Thermal Dispersion Airflow Measurement Technology

Advantage III

Gold Series by Ebtron

Installation Guide

GTM116

"Plug & Play" Transmitter with

Combination Ethernet Network Output and Dual Analog Output

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Models GTC116 and GTM116

Part Number 930-0016

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1 GTM116 TRANSMITTER INSTALLATION

The GTM116 transmitter is designed for use in an environment between -20° F to 120° F *(-28.8° C to 48.8° C)* where it will not be exposed to rain or snow. Install transmitter upright and in a field accessible location. The enclosure accepts 1/2 in. (12.7 mm) electrical fittings for signal and power wiring at both sides at the top of the enclosure.

Locate the transmitter so that the connecting cables from all of the sensor probes will reach the receptacles on the bottom of the transmitter enclosure.

In locations exposed to direct rain and/or snow, the transmitter must be enclosed in a NEMA4 enclosure.

Leave unobstructed space of at least 9 in. (228.6 mm) above, 2 in. (50.8 mm) to each side and 3.5 in. (88.9 mm) below the transmitter to allow for cover removal, sensor connections and heat dissipation.

Locate the transmitter in a location that can be reached by all connecting cables from the sensor probes.

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

1.1 GTM116 Mechanical Dimensions

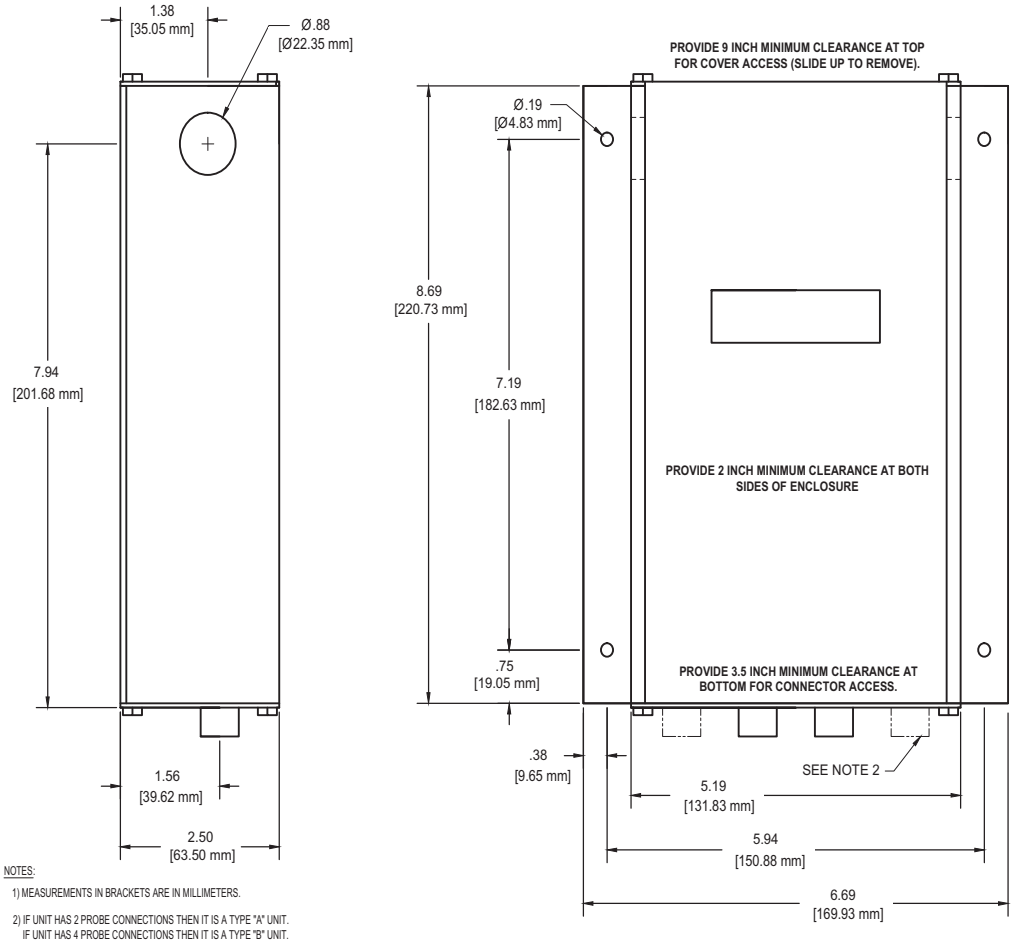

Figure 1. GTM116 Mechanical Dimensions

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2 GTM116 TRANSMITTER INTERIOR VIEW/FEATURES

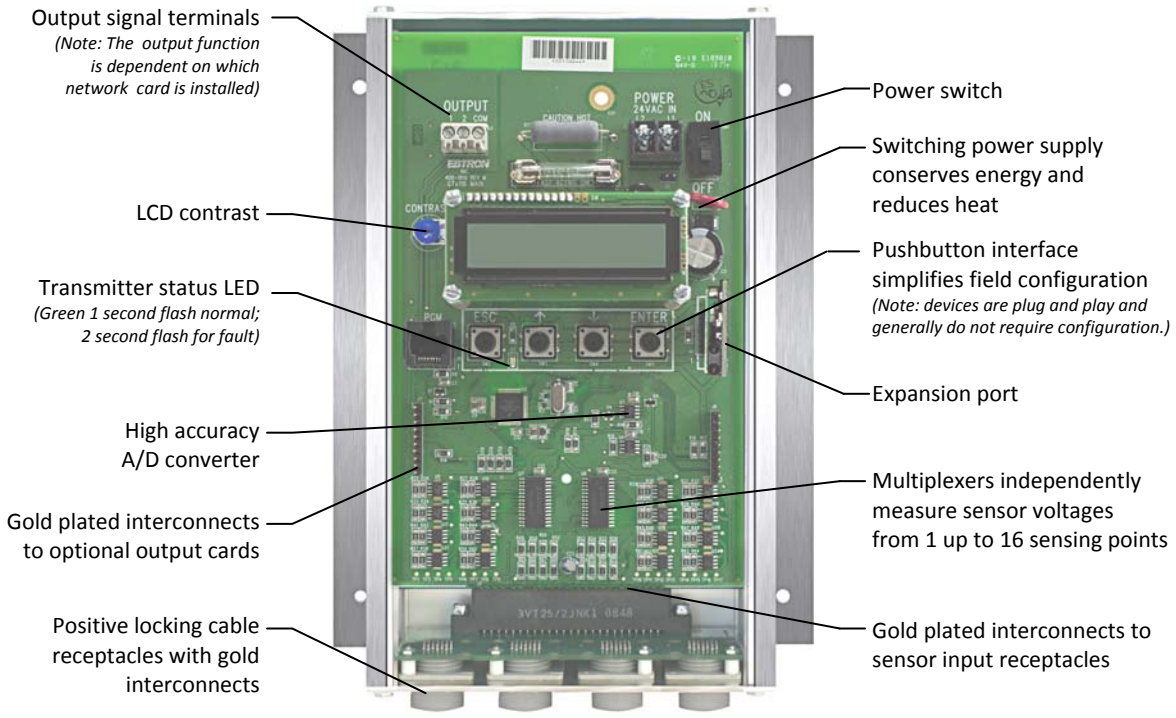

Figure 2. GTM116 Transmitter Interior View/Features

3 GTM116 TRANSMITTER POWER AND PROBE CONNECTIONS

3.1 Power Transformer Selection

Select a 24 VAC transformer based on the maximum power requirements indicated on the transmitter label (20 VA) or from the table below. The operating supply voltage (transmitter power "ON" with all sensor probes connected) should not be less than 22.8 VAC or greater than 26.4 VAC.

Table 1. GTM116 Power Transformer Selection Guide

Total Sensors	Minimum VA Req.	Total Sensors	Minimum VA Req.	Total Sensors	Minimum VA Req.	Total Sensors	Minimum VA Req.
1	12	5	14	9	17	13	19
2	13	6	15	10	17	14	19
3	13	7	15	11	18	15	20
4	14	8	16	12	18	16	20

3.2 Connecting Power to the Transmitter

Connect 24 VAC power to the large, two position power input terminal labeled "POWER" on the upper right hand side of the main circuit board (Figure 3). Since the output signals are isolated from the power supply, it is not necessary to provide an isolated (secondary not grounded) power source.

⚠ Multiple GTM116 transmitters wired to a single transformer must be wired "in-phase" (L1 to L1, L2 to L2).

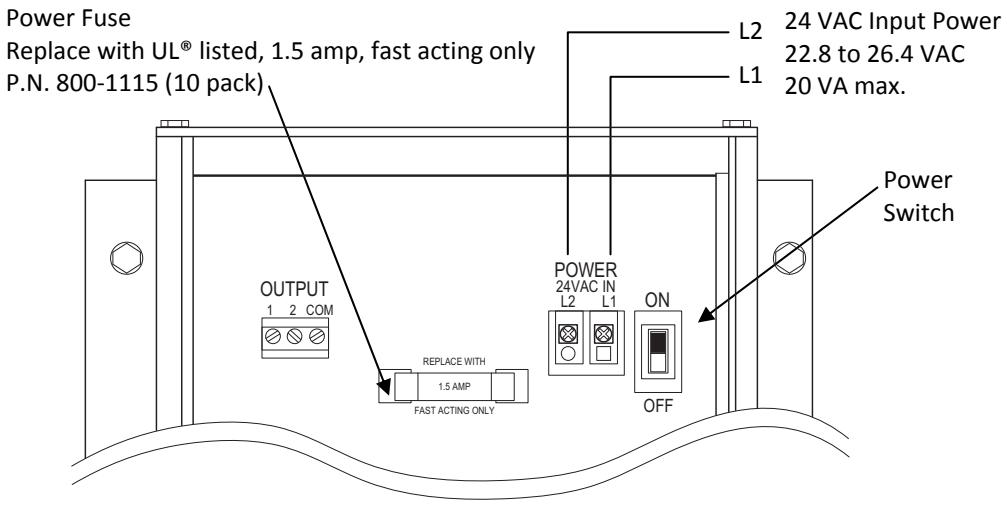

Figure 3. Connecting Power to the Transmitter

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3.3 Connecting Sensor Probes to the Transmitter

After installing the sensor probes and transmitter, connect each of the sensor probe cable plugs to the circular receptacles located at the bottom of the GTM116 transmitter enclosure. Probes are "Plug and Play" and do not have to be connected to a specific receptacle on the transmitter unless traverse data is desired (see note below). Transmitters accept only GP1 and GB1 sensors.

⚠ 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" as shown below. Line up plug with receptacle and push straight on to receptacle.

⚠ DO NOT TWIST. Squeeze cable plug "ribs" towards receptacle when removing. Forcing the cable plug in or out of the receptacle will damage the connectors and void warranty.

⚠ When traverse data is desired (especially when using the EB-Link Reader), probes should be installed and connected to the transmitter using the mounting convention specified in the separate GP1/GB1 sensor probe Installation Guide. Proper installation simplifies sensor location decoding during data analysis.

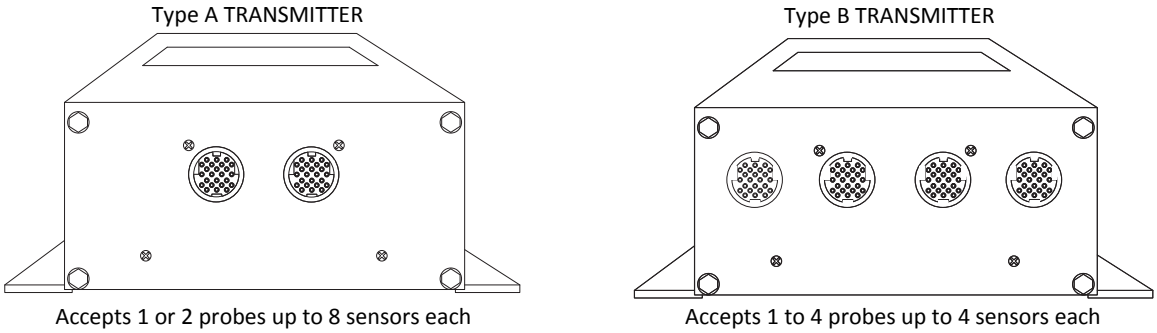

Figure 4. Type A and Type B Transmitter Connector Panel Detail

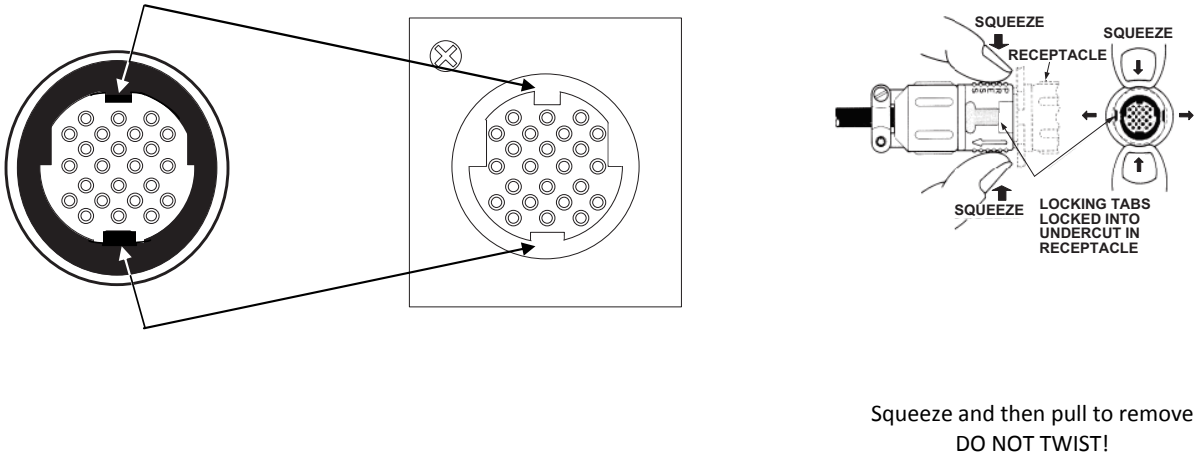

Figure 5. Connector Detail

4 GTM116 ANALOG OUTPUT AND NETWORK CONNECTIONS

This section contains analog and network output wiring instructions for the GTM116 transmitter with Ethernet and Dual Analog outputs.

4.1 GTM116 - ANALOG OUTPUT WIRING

Analog output connections are made at the top left of the transmitter main circuit board OUTPUT connector as shown in Figure 6. Independent linear analog outputs are provided for airflow at OUTPUT terminal 1, and for temperature (or alarm) at OUTPUT terminal 2, each with over voltage and over current protection. Airflow and temperature outputs are field selectable for either 0-5/0-10VDC or 4-20 mA. The OUTPUT terminal 2 can be assigned as an Alarm output to provide an active high, active low or trouble alarm output. Outputs are galvanically isolated from the main power supply to permit simple integration with virtually all building automation systems.

When configured for 4-20mA output, the GTM116 is a "4-wire" device. The host controls shall not provide any excitation voltage to the output of the GTM116.

For the analog outputs, shielded cable is recommended. To wire the analog outputs, slide the cover plate up and off of the enclosure. Ensure that the power switch is in the "OFF" position. Connect signal wires for airflow rate and temperature (or alarm) to the small, three position output terminal labeled "OUTPUT" on the upper left hand side of the main circuit board as shown in Figure 6.

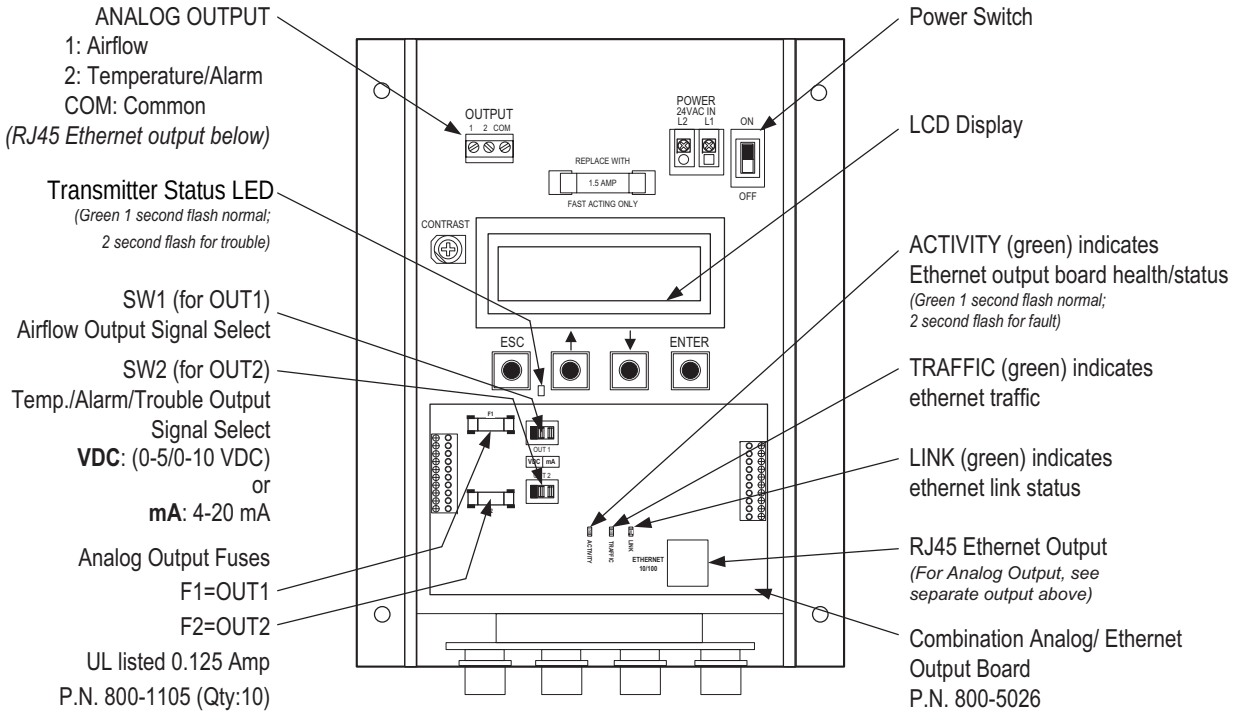

Figure 6. GTM116 Combination Analog/Ethernet Transmitter Interior Detail

4.2 GTM116 - ETHERNET NETWORK WIRING CONNECTIONS

4.2.1 GTM116 - Connecting to an Ethernet Network

Connect an Ethernet network cable to the RJ45 network connector provided on the GTM116 Ethernet/Analog combination board as shown in Figure 6.

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4.3 GTM116 - Transmitter Setup for Ethernet Network Operation

The user can manually select network protocol (BACnet/IP or BACnet Ethernet - MODBUS TCP is always enabled), IP address, and device instance number; or user can set the GTM116 to automatically configure itself when used on a network/segment with a DHCP server. By default, the DHCP setting is OFF (*DHCP=OFF) for manual device configuration, with BACnet IP protocol (BAC MODE=IP), a static IP address of 10.0.0.100, a subnet mask of 255.255.255.0, and with gateway set for 10.0.0.10. These values can be changed within the NETWORK sub menu as described below.

When IP configuration is complete, confirm communications locally by “pinging" the assigned GTM116 IP address and observing 5 rapid blinks of the ACTIVITY LED (Figure 7).

4.3.1 GTM116 - Selecting Static or Dynamic IP Settings

For automated device configuration on a network/segment with a properly operating DHCP server, go to the NETWORK Menu settings, set *DHCP=ON, set *BAC MODE= for BACnet/IP (factory default) or BACnet Ethernet operation, and set *DI= device instance number (factory default=2) as described below. No additional configuration is required.

For manual device configuration of the GTM116, set NETWORK menu item *DHCP=OFF (factory default). When manually changing IP settings (*DHCP=OFF), the display will blink the 3-digit address segment that is under change. Change the blinking segment by pressing the UP or DOWN buttons to arrive at the desired segment setting. Depress the ENTER key to set this segment and to move the blinking cursor to the next (right) segment. Repeat this until the last segment has been selected, and then depress ENTER to store the new address setting.

4.3.2 GTM116 - Setting Ethernet Transmitter IP Address

The GTM116 is factory set with an IP address of 10.0.0.100. Each transmitter must be assigned a unique address on the network/segment it is connected to. To change the IP address in the NETWORK menu, navigate to the *IP=10.0.0 NETWORK menu item, and set segments as previously described. (See note above regarding *DHCP=OFF).

4.3.3 GTM116 - Setting Subnet Mask

To change this value, navigate to the *MASK=255.2... NETWORK menu item, and set new segment values as previously described. (See note above regarding *DHCP=OFF).

4.3.4 GTM116 - Setting Gateway IP

To change this value, navigate to the *GATE=10.0.0... NETWORK menu item, and set new segment values as previously described. (See note above regarding *DHCP=OFF).

4.3.5 GTM116 - Setting BACnet Protocol Mode

The GTM116 is factory set with *BAC MODE=IP for BACnet IP protocol operation. This NETWORK menu item can be changed to *BAC MODE=ETH for BACnet Ethernet protocol.

Tables 3, 4 and 5 provide details of TCP/IP, BACnet Objects and Modbus Register Maps respectively. Note that Modbus IP is always enabled regardless of *BAC MODE setting.

NOTE:

For BACnet IP operation, use port 47808. For Modbus TCP operation, use port 502. Modbus IP is always enabled regardless of the *BAC MODE setting.

4.3.6 GTM116 - Setting Device Instance Number

The GTM116 is factory set with a Device Instance Number of 2 (*DI=2). The Device Instance Number can be set to any value between 0 and 4194302 as shown in Appendix A. The Device Instance Number can also be changed by writing to the Device Object's Object Identifier Property over the network.

4.3.7 GTM116 - Resetting Communications Options to Factory Default Values

Communications options can be reset to factory default values (asterisk) * values within the NETWORK menu through the GTM116 RESET NET menu.

Table 2. GTM116 TCP/IP Example

TCP/IP
http://10.0.0.100
(or your custom IP address)

GTM Data	
Parameter	Value
Flow	3094
Temperature	74

Table 3. GTM116 BACnet Objects List

Analog Inputs

Type, ID	Name	Default Units	
Device	GTM116		
AI, 1	Average Flow	CFM	
AI, 2	Average Temperature	°F	
AI, 3	Alarm Status		0: No alarm, 1: High Alarm, 2: Low Alarm, 3: Both

Analog Values

AV, 1	Area	sq.ft.	
AV, 2	Traverse Data Status		0=Disabled, 1=Flow, 2=Temp, 3=Both
AV, 3	Flow Traverse	FPM	
↕	↕	↕	
AV, 18	Flow Traverse	FPM	
AV, 19	Temperature Traverse	°F	
↕	↕	↕	
AV, 34	Temperature Traverse	°F	

Notes:
1. Flow and Temp traverse must be enabled through AV2.
2. User Executed Services Supported:
   Subscribe COV, Read Property, Write Property,
   Device Communication Control, Who-Is.

BACnet MS/TP

NOTE: For BACnet IP operation, use port 47808.

Table 4. GTM116 Modbus Register Map

Function	Address	Type	Units	Description	Range/Value
2	10001	boolean		Trouble Status	0:OK, 1:Trbl
4	30001-30002	float	FPM	Average Airflow	0 to 15,000
4	30003-30004	float	°F	Average Temperature	-20 to 160
4	30005	word		Number of Inserts	0 to 16
4	30006	word			0
4	30007	word		Alarm Status	0: No alarm 1: High Alarm 2: Low Alarm 3: Both
4	30008	word		Connector C1 Sensors	0 to 8
4	30009	word		Connector C2 Sensors	0 to 8
4	30010	word		Connector C3 Sensors	0 to 8
4	30011	word		Connector C4 Sensors	0 to 8
4	30012-30043	float	FPM	Airflow Flow Traverse	0 to 15,000
	30012-30013			Insert 1 Flow	
	↕			↕	
	30042-30043			Insert 16 Flow	
4	30044-30075	float	°F	Temperature Traverse	-20 to 160
	30044-30045			Insert 1 Temp	
	↕			↕	
	30074-30075			Insert 16 Temp	
4	30076-30077	float	Sq.Ft.	Area	0 to 100
4	300202	word		Float word order	0: high word first; 1: low word first

NOTE: For GTM116 Modbus operation, use port 502. Modbus IP is always enabled regardless of *BAC MODE setting.

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5 GTM116 TRANSMITTER START-UP, INITIALIZATION AND SETUP MENUS

To ensure a successful start-up, verify that the airflow measuring station sensor probes and transmitter are installed in accordance with *EBTRON* guidelines.

Check the physical installation, power connections and model specific 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.

5.1 Changing the System of Units - IP or SI Units

The GTM116 transmitter is provided with the system of units set to IP. To change to SI units, simultaneously press and release the "ENT" and "ESC" buttons during normal operation. "IP/SI UNITS" will be indicated on the LCD display. Refer to Appendix A SYSTEM OF UNITS MENU for details on the System of Units menu. Note that Setup Menu items are shown in IP System Of Units. When SI System of Units is selected, the units of measure abbreviations used in the menus is shown in Table 5.

Table 5. Standard "IP" and "SI" Menu Units Abbreviations

"IP" System of Units	Description	"SI" System of Units	Description
FPM	Feet per minute	MPS	Meters per second
CFM	Cubic feet per minute	LPS	Liters per second
SQF	Square feet	SQM	Square meters
F	Fahrenheit	C	Celsius

5.2 GTM116 Transmitter Calibration

The GTM116 uses high quality industrial grade components and is designed for years of trouble-free operation. Periodic recalibration of the transmitter is neither required or recommended. Transmitter field calibration verifiers are available for purchase from *EBTRON* for installations requiring periodic validation of instrumentation. Contact *EBTRON* for more information.

5.3 GTM116 LCD Display Notifications

Following a brief initialization at power up, the LCD display automatically displays airflow and temperature with units of measurement in all upper case (caps) characters. The display provides additional information on system status and alarm conditions. Refer to the ALARM FEATURES section of this manual for additional detail on Alarm and Trouble Error code indications.

5.4 Factory Default Menu Settings for GP1 Sensor Probes

The GTM116 transmitter is “plug and play” and does not require setup unless a network option is selected that requires configuration. Table 15 shows the factory default settings for all compatible sensor probes.

Table 6. Factory Default Menu Settings

Display	Description	I-P	S.I.
AIRFLOW=	Airflow measurement method, Actual or Standard.	ACT	ACT
*LCDU/M=	Airflow units of measure	ACFM	LPS
*AREA=	Free area where station is located (required for volumetric measurement)	0.00 sq.ft. (see note)	0.000 sq.meters (see note)
*AO1 SGNL=	Output 1 signal type voltage or mA (airflow)	mA	mA
*AO1 UM=	Output 1 units of measure	AFPM	MPS
*AO1 FS=	Output 1 signal full scale	5,000 FPM	25 MPS
*LLIMIT=	Low limit cutoff	0 AFPM	0 MPS
*FLOW ADJ=	Output 1 Offset-Gain On/Off	Off	Off
*GAIN=	Output 1 Gain factor	1.000	1.000
*OFF=	Output 1 Offset factor	0.000	0.000
*TEMP METH=	Temperature Averaging	Weighted Avg.	Weighted Avg.
*AO2 SGNL=	Output 2 signal voltage or mA (temperature or alarm)	mA (see alarms)	mA (see alarms)
*AO2 MS=	Output 2 signal minimum scale	-20° F	-30° C
*AO2 FS=	Output 2 signal full scale	160° F	70° C
*LCD INTG=	Number of flow calculations to be averaged for LCD display.	100	100
*AO1 INTG=	Number of flow calculations to be averaged for AO1 output.	30	30
*EB-LK INT=	Number of flow calculations to be averaged for EB-Link readings.	300	300
*ALT=	Altitude for flow correction relative to mean sea level (0 ft).	0 ft	0 m
*AO2 ASGN =	*AO2 ASGN = TEMP Output 2 Assigned Type is Temperature	TEMP	TEMP
*SETPNT=	Alarm setpoint value. For AO2 ASGN=ALARM , operates in conjunction with TOL=value.	0	0
*TOL=	Alarm range tolerance value. For AO2 ASGN=ALARM , this setting establishes the alarm range relative to the SETPNT= value.	10%	10%
*NO FAULT=	Sets the AO2 normal (not alarm) output state relative to the full scale analog output selected. HI provides maximum full scale under normal conditions and minimum scale during alarm. LO provides minimum full scale under normal conditions and maximum scale during alarm.	HI	HI
*DELAY=	Time that the alarm condition must exist before alarm output is activated.	2 minutes	2 minutes
*ZERO OFF =	Set to YES to inhibit LO alarm condition when flow reading is below LLIMIT= setting. Set to NO to disable this feature.	NO	NO
*RESET =	Set to AUTO to have alarm self-clear when alarm condition no longer exists. Set to MANUAL to require manual reset of alarm.	AUTO	AUTO

Note: For GP1 probes, area is stored in one-wire, but can be changed.

To change the Factory Default Settings, see: CHANGING FACTORY DEFAULT SETUP MENU SETTINGS.

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5.5 GTM116 Changing Factory Default Setup Menu Settings

5.5.1 Setup Menu Options

The GTM116 Transmitter is setup and tested at the factory to be fully operational when sensor probes are connected and power is applied (set the power switch to the "ON" position). Factory settings can easily be changed using the SETUP MENU by simultaneously pressing and releasing the "UP" and "DOWN" buttons while the transmitter is in its normal operating mode. Appendix A details the SETUP menus. Navigate through the SETUP menus to make changes to the transmitter configuration. The settings take effect immediately. The following are common field modifications to the factory default settings.

5.5.2 Selecting Actual and Standard Output Measurement Type

The transmitter is set from the factory to provide actual airflow measurement units (displayed as "ACFM" and "AFPM"). In this mode, airflow measurements are calculated for actual airflow conditions. If using actual airflow, corrections for altitude are entered through the ALT= setting in the Setup menu. If desired, the output can be set to provide standard airflow measurement units (displayed as "SCFM" and "SFPM) which provides measurements that are corrected to standard conditions.

5.5.3 Output Scaling

EBTRON's Gold Series sensors are individually calibrated between 0 and the factory default full scale in wind tunnels traceable to the National Institute of Standards and Technology (NIST). Sensors are independent and produce "percent of reading" accuracy. Changing the full scale value does not change the accuracy of the device. Factory default analog output scaling can be changed within the SETUP menus.

5.5.4 Changing the LCD Display from Volumetric Flow CFM to Velocity FPM

The GTM116 transmitter is shipped from the factory to indicate volumetric flow. To display velocity in FPM, enter the SETUP menu and in the DISPLAY submenu, change the "*LCD UM=ACFM" to "*LCD UM=AFPM". Changing the LCD display units will not affect the analog output signal.

5.5.5 Converting the Analog Output Signal from FPM to CFM

The GTM116 transmitter is shipped from the factory with analog output "OUTPUT 1" set to indicate velocity in AFPM. To automatically convert this analog velocity output to volumetric flow (ACFM), simply set the *AO1 UM from AFPM (default) to ACFM in the SETUP menu. If you wish to manually convert the velocity output to volumetric flow (ACFM), simply multiply the indicated output velocity (in FPM) by the free area of the air flow probe installation location. Refer also to Table 8 for a complete listing of conversions for each of the analog outputs of the GTM116. The AO1 full scale analog output (OUTPUT1) value is determined by the AO1 RNGE setting within the SETUP menu.

5.5.6 Locking the Configuration Settings

The GTM116 transmitter configuration settings can be locked at one of three security levels within the SECURITY submenu using the LOCK SEC= item.

When LOW security level is selected (LOCK SEC=LOW) the last 4 digits of the board serial number are automatically assigned as the lock code. To see the board serial number, navigate to DIAGNOSTICS menu in SERIAL NUMBERS item.

When the MED security level is selected (LOCK SEC=MED) the user enters and confirms a security code. In the event that this code is lost/misplaced, EBTRON can provide a key that is unique to the transmitter to unlock it. Contact EBTRON customer service for this code.

When the HIGH security level is selected (LOCK SEC=HIGH) the user enters and confirms a security code. In the event that this code is lost/misplaced, the transmitter must be returned to the factory in order to unlock it.

When LOCK SEC=HIGH is selected, the user defined setting can only be changed after entering the user defined code. STORE THE LOCK CODE IN A SAFE LOCATION! For security reasons, the HIGH level lock code can only be reset by returning the transmitter to the factory.

5.6 GTM116 - Alarm Features

Analog output AO2 (OUT2) can be assigned to function as an alarm output. The AO2 alarm output can be assigned in the SETUP menu to operate as an average alarm (A02 ASGN=ALRM) or as a trouble alarm (AO2 ASGN=TRBL) for monitoring the status of the transmitter and sensors. The AO2 ASGN= setting is located in the ANALOG OUT submenu of the SETUP menu. The transmitter LCD display will indicate the Alarm status for 2 seconds, and will cycle through any other alarms if multiple alarm events are active for 2 seconds each, and then display the current actual flow for 2 seconds. Detailed set up of the Alarm features is shown in the Setup menu.

5.6.1 Average Alarm (AO2 ASGN=ALRM)

AO2 output is assigned as an average airflow alarm output. Useful for applications where a low flow alarm, a high flow alarm for operation outside of a defined range (setpoint and tolerance) is required.

5.6.2 Trouble Alarm (AO2 ASGN=TRBL)

AO2 output is assigned as a transmitter trouble alarm indicating a fault within the transmitter or a sensor of the airflow measurement system. The transmitter LCD will indicate a trouble code and a brief description of the trouble. Contact EBTRON customer service for additional information or assistance with trouble codes.

5.6.3 No Fault (NO FAULT=HI)

When AO2 output is assigned as an alarm, this setting configures the normal output condition to be HI or LO relative to the full scale analog output level selected when no fault condition exists.

5.6.4 Alarm Indications

Table 7 details the alarm types, LCD indications and AO2 alarm output indications. User can select either or both of the two Average Alarms or the Trouble Alarm.

5.6.5 Low Alarm - “LO ALRM= ON”

The Low Alarm is activated when the average airflow falls to a defined level below the SETPNT= value. The defined level is equal to the SETPNT= value minus the calculated value of (TOL= value * SETPNT= value). Once active, the alarm can be cleared when the average airflow rises above the set point minus calculated tolerance value.

5.6.6 High Alarm - “HI ALRM= ON”

The High Alarm is activated when the average airflow rises above a defined level above the SETPNT= value. The defined level is equal to the SETPNT= value plus the calculated value of (TOL= value * SETPNT= value). Once active, the alarm can be cleared when the average airflow falls below the set point + calculated tolerance value.

5.6.7 Trouble Alarm - “AO2 ASGN=TRBL”

The Trouble alarm provides trouble codes useful for isolating setup issues or problems within the transmitter or sensors. The transmitter LCD will indicate TROUBLE! The Diagnostic submenu can be engaged for the error code and a brief description of the trouble. Contact EBTRON customer service for information on troubleshooting using the Trouble error codes.

Table 7. GTM116 Alarm Types and Notifications

ALARM OUTPUT ASSIGNMENT TYPE	LOCAL LCD DISPLAY OF ALARM TYPE AND NOTIFICATION	ANALOG OUTPUT 2 ALARM INDICATION	NETWORK ALARM INDICATION
****LOW ALARM** (Average Alarm)**	Display alternates between ****LOW ALARM**** (then any other alarms) and actual reading for 2 seconds each.	On alarm or trouble, OUT2 is active high (or active low) relative to the full scale maximum (or minimum) analog value as determined by the SETUP Menu “NO FAULT=” selection. Individual sensor velocities can be viewed using the Diagnostics submenu.	Alarm Status is available at BACnet Objects and Modbus Registers. Refer to BACnet Objects List and Modbus Register Map for additional detail.
****HIGH ALARM** (Average Alarm)**	Display alternates between ****HIGH ALARM**** (then any other alarms) and actual reading for 2 seconds each.		
TROUBLE ! (Trouble Alarm)	Display indicates **TROUBLE !** (Refer to DIAGNOSTIC menu to obtain a brief description of the error and any other alarms).		

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5.7 GTM116 - Analog Output Type Selection and Setup

The analog output signal type at AO1 (OUT1, airflow) and AO2 (OUT2, temperature/alarm) can be set for mA or VDC output by setting switches SW1/SW2 (Figures 6 and 7) and by selecting the 4-20mA, 0-5 VDC or 0-10VDC ranges in the ANALOG OUT sub menu options *AO1 RNGE= / *AO2 RNGE= settings. The transmitter is shipped from the factory with SW1/SW2 and Setup menu options *AO1 RNGE= and *AO2 RNGE= set for 4-20mA.

5.7.1 GTM116 - Converting Analog Output Signal Values to Airflow and Temperature

Table 8 lists specific conversion equations for analog voltage or current output options.

Table 8. GTM116 Converting Analog Output Values to Airflow/Temperature

When OUTPUT 1 is Configured as Linear Airflow (FPM, MPS):

	ANALOG OUTPUT SCALING AND TYPE		
TO CONVERT TO	**0-10 VDC**	**0-5 VDC**	**4-20 mA**
Airflow (FPM, MPS)	Output Voltage/10 x FS1	Output Voltage/5 x FS1	(Output Current-4)/16 x FS1
Airflow (CFM)	Area (SQF) x Output/10 x FS1	Area (SQF) x Output/5 x FS1	Area (SQF) x (Output - 4)/16 x FS1
Airflow (LPS)	Area (SQM) x Output/10 x FS1 x 1000	Area (SQM) x Output/5 x FS1 x 1000	Area (SQM) x (Output - 4)/16 x FS1 x 1000

When OUTPUT 1 is Configured as Volumetric Airflow (CFM, LPS):

	ANALOG OUTPUT SCALING AND TYPE		
TO CONVERT TO	**0-10 VDC**	**0-5 VDC**	**4-20 mA**
Airflow (CFM, LPS)	Output Voltage/10 x FS1	Output Voltage/5 x FS1	(Output Current - 4)/16 x FS1

When OUTPUT 2 is Configured as Temperature (°F,°C):

	ANALOG OUTPUT SCALING AND TYPE		
TO CONVERT TO	**0-10 VDC**	**0-5 VDC**	**4-20 mA**
Temp (°F,°C)	Output Voltage/10 x (FS2 - MS2) + MS2	Output Voltage/5 x (FS2 - MS2) + MS2	(Output Current - 4)/16 x (FS2 - MS2) + MS2

NOTES:
FS1 is AO1 full scale analog output value from ANALOG OUT MENU.
FS2 is AO2 full scale analog output value from ANALOG OUT MENU.
MS2 is AO2 minimum scale analog output value from ANALOG OUT MENU.

5.7.2 GTM116 - AO1/AO2 OUTPUT TEST - Sending a Test Output Signal to the Host Control System

A test output signal between 0 and 100% of the full scale output (4-20 mA or 0-5VDC/0-10VDC) can be provided by the GTM116 transmitter to verify proper conversion of the output signals from the transmitter at the host control system. To set a fixed output signal for airflow and temperature, navigate to the OUTPUT TEST submenu in the TOOLS menu. OUT1 and OUT2 tests are independently accessed, and the output will maintain the % selected until the “ESC” button is pressed and normal operation resumes.

5.8 Viewing Sensor Data

5.8.1 Viewing Sensor Data on the Local LCD Display

Airflow and temperature of individual sensors can be displayed on the local LCD display by entering the Diagnostic Menu. Simultaneously depress the up ↑ and down ↓ arrows to enter the GTM116 SETUP menu, and then navigate to the Diagnostic submenu.

5.8.2 Viewing Sensor Data via BACnet , Modbus networks or via EB-Link Reader)

Airflow and temperature of individual sensors can be read across BACnet or Modbus networks, or downloaded directly to an EB-Link Reader if the infra-red *EB-Link* option has been installed. Refer to the following Sensor Addressing and Probe Positioning paragraph for the suggested probe installation configuration. Tables 4 and 5 provide BACnet objects and register addressing information for individual sensor data.

5.8.3 Sensor Addressing and Probe Positioning

Sensors are automatically addressed after power is applied to the transmitter as follows:

The probe connected to the left most connector, C1, is defined as probe 1. The sensor opposite the cable end of the probe is defined as sensor 1 when viewing individual sensor data. Refer to Figure 7 below for additional detail.

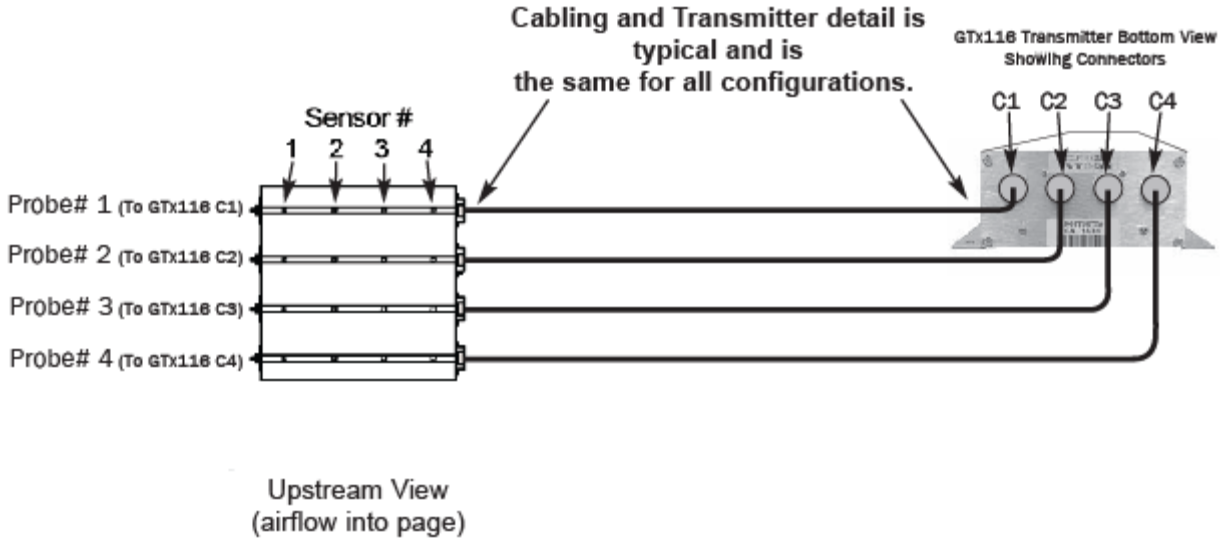

Figure 7. Sensor Addressing and Probe Positioning Detail

Note that if only average data is desired, the mounting position of the probes is not critical. When a probe is disconnected and then plugged in to a different port, the transmitter will re-discover it within 15 seconds and make any necessary addressing adjustments.

To standardize installation and decoding of data, particularly when using the EB-Link Reader product, *EBTRON* recommends a left to right (or top to bottom in vertical applications) sensor probe mounting convention as detailed in the separate sensor probe installation instructions.

6 SETUP MENUS

Appendix A details the various setup menus and submenus.

7 WIRING DIAGRAM

Appendix B is the wiring diagram for the GTM116 transmitter.

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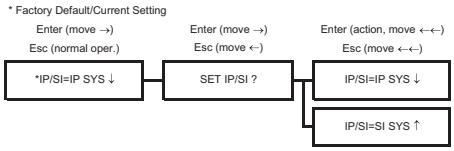
APPENDIX A -
ADVANTAGE 3 - SETUP MENUS

SYSTEM OF UNITS MENU

Simultaneously depress/release ENTER + ESC keys during normal operation to select

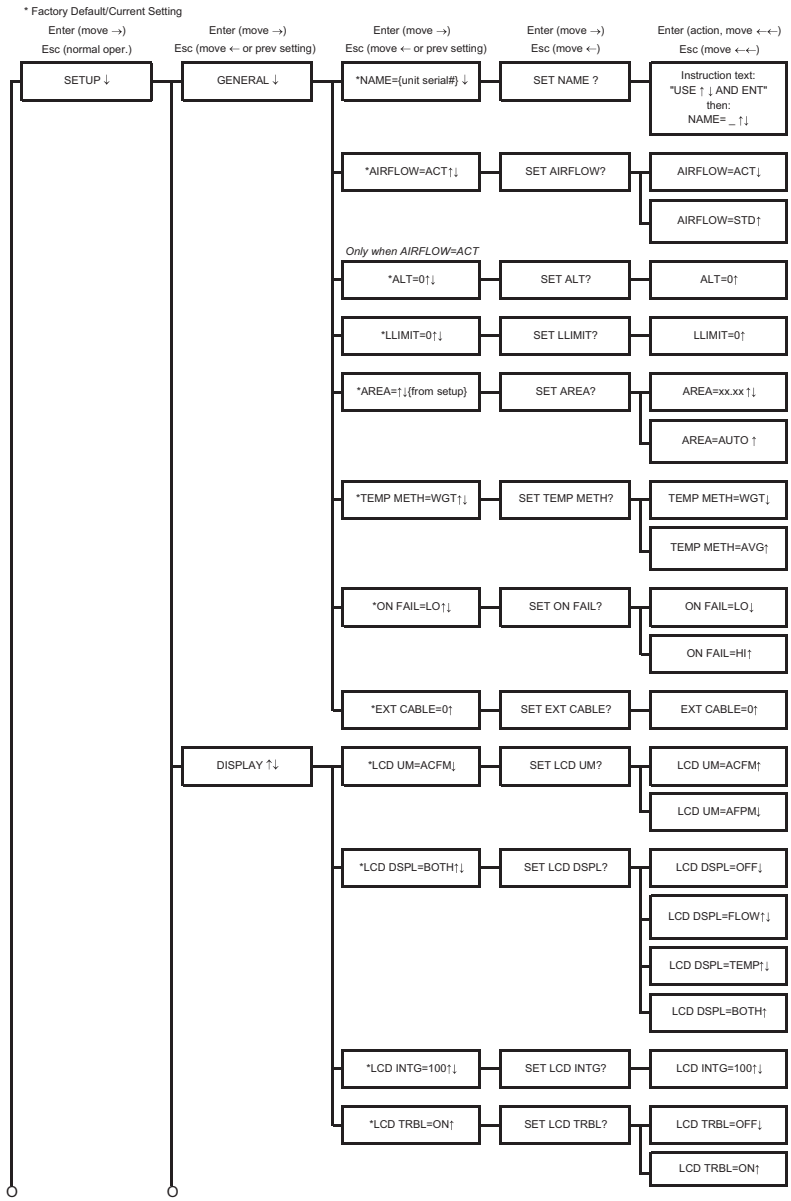


ACTION

Set system of units to I-P (FPM, CFM, sq.ft., ºF)
or Set system of units to S.I. (MPS, LPS, sq.M., ºC).
NOTE:
Changing IP/SI SYS resets alarm settings and scaling values.

SETUP MENU

Simultaneously depress/release ↑ + ↓ keys during normal operation to select



ACTION

Custom LCD Flow Text: Blinking prompt at position of the selected character. Character is selected using the up and down arrows and then ENTER to accept and move cursor forward (right); ESC moves the cursor back (left). Use space characters for blank or unwanted text.

Set the airflow measurement to ACTUAL units (AFPM/ACFM)

Set the airflow measurement to Standard units (SFPM/SCFM)

Set the altitude above sea level for flow correction: 0 to 18,000 ft.

This is always a velocity value.

Note: Value is from one-wire but can be overridden.

AUTO forces a re-read of the one-wire value. (AUTO not available if area value has not been written into one-wire chip).

Set temperature output for velocity weighted average of temperature sensors.

Set temperature output for mathematical average of temperature sensors.

Sets transmitter analog output state in the event of a major fault (all sensor failure) expressed as HI for full scale analog output or LO as minimum scale analog output.

Enter length of extension cable.

Set LCD airflow display units to CFM or FPM. (Note: A-ACT or S-STD measurement prefix is set by AIRFLOW= setting above).

Set what is displayed on LCD.

Integration samples for LCD.

Set whether or not TROUBLE will display on LCD during a trouble condition.

TO PART 5 'A' TO PART 2

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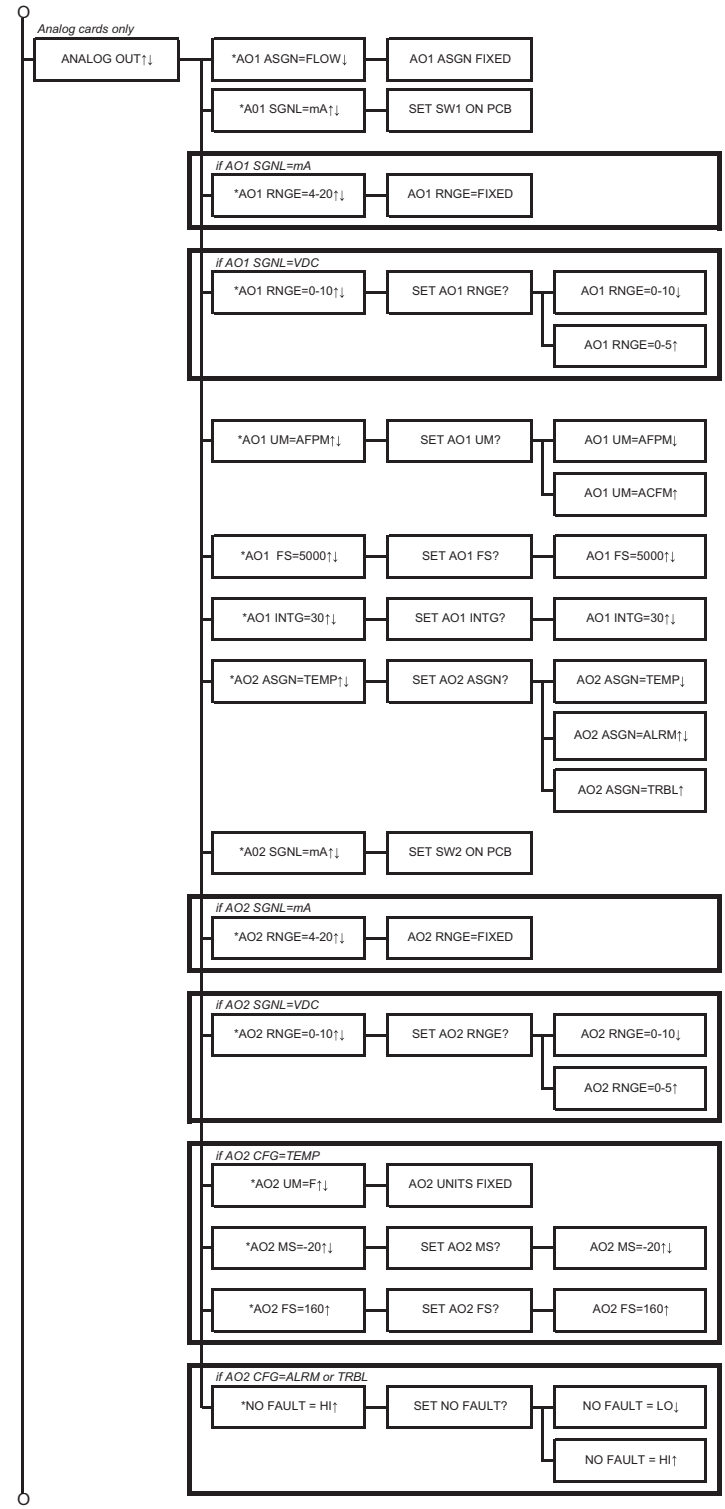
FROM PART 1



The text "AO1 ASGN FIXED" flashes to indicate that this setting is fixed and cannot be modified.

Display initially shows the current SW1 PCB switch setting (VDC or mA) for AO1. Pressing enter displays "SET SW1 ON PCB" prompt to confirm SW1 PCB setting.

The text "AO1 RNGE=FIXED" flashes to indicate that this setting is fixed and cannot be modified.

Set analog output range (VDC) for AO1.

Set AO1 output units to FPM or CFM. (Note: A-ACT or S-STD measurement is set by AIRFLOW= setting above).

Set full scale for AO1. FS default value is dependent on probe type connected.

Integration samples. Also same as network integration.

AO2 output is assigned as temperature output.

AO2 output is assigned as an airflow alarm output. Refer to ALARM settings (part 4).

AO2 output is assigned as a transmitter trouble alarm indicating that a sensor or transmitter fault has occurred.

Display initially shows the current SW2 PCB switch setting (VDC or mA) for AO2. Pressing enter displays "SET SW2 ON PCB" prompt to confirm SW2 PCB setting.

The text "AO2 RNGE=FIXED" flashes to indicate that this setting is fixed and cannot be modified.

Set analog output range (VDC) for AO2.

The text "AO2 UNITS FIXED" flashes to indicate that this setting is fixed and cannot be modified.

Set AO2 minimum scale.

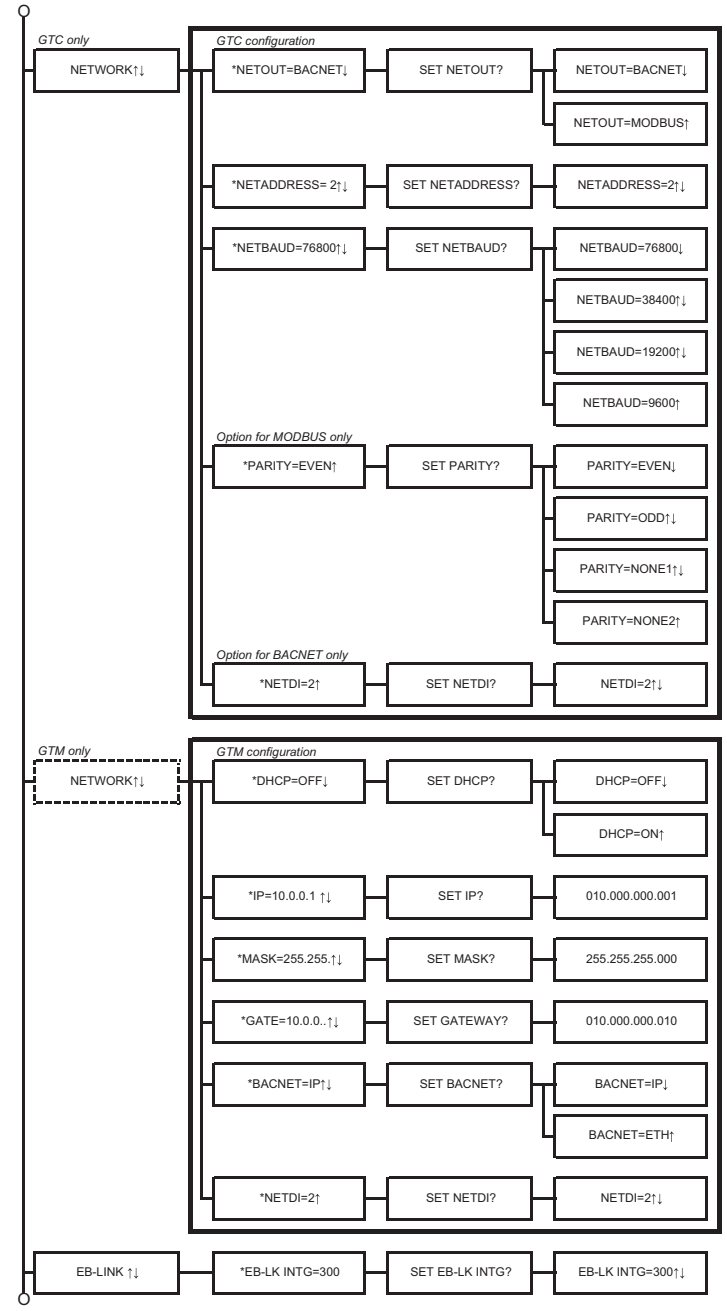
Set AO2 full scale.

Sets AO2 alarm/trouble output state when no fault condition is present, expressed as HI (full scale analog output) or LO (minimum scale analog output).

TO PART 3

IG_GTM116_R3A

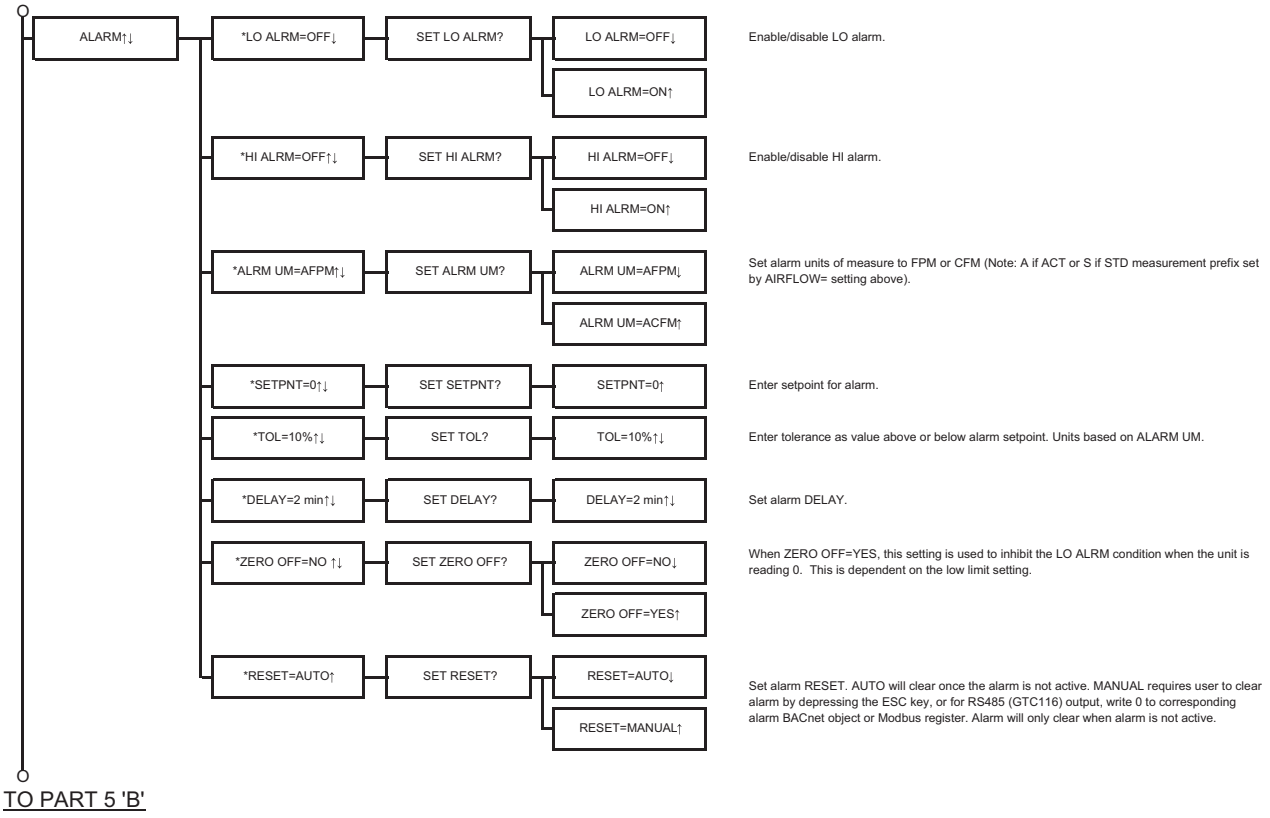
FROM PART 2



TO PART 4

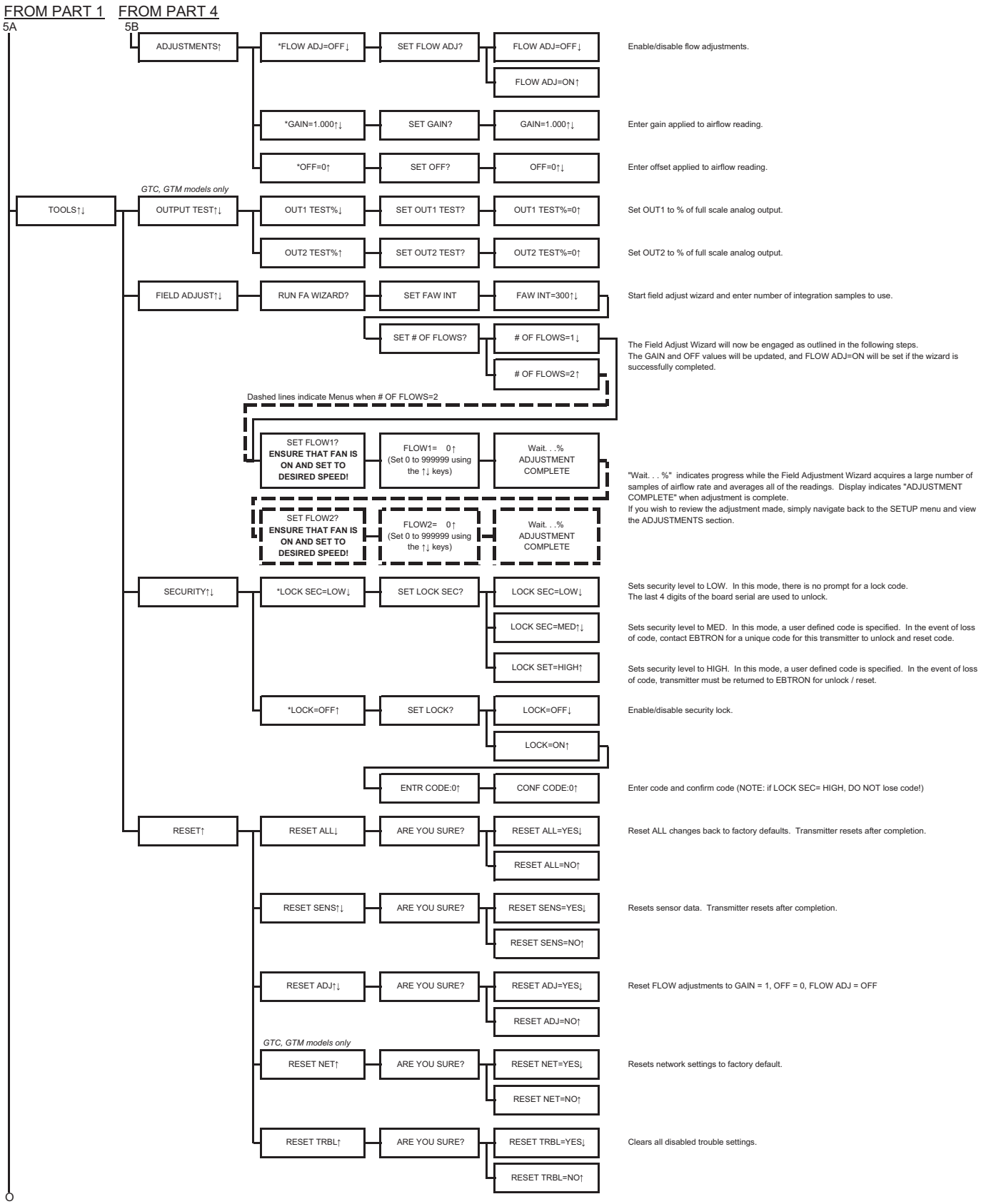
IG_GTM116_R3A

FROM PART 3



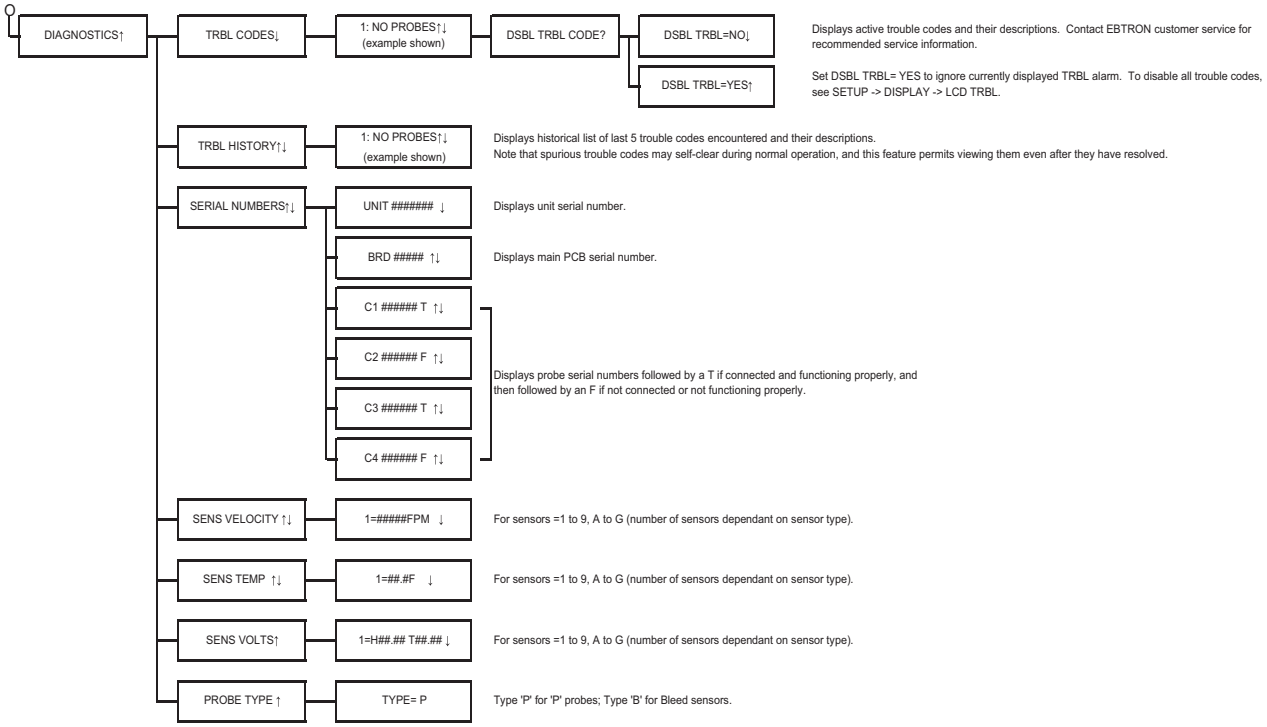
TO PART 5 'B'

IG_GTM116_R3A



IG_GTM116_R3A

FROM PART 5



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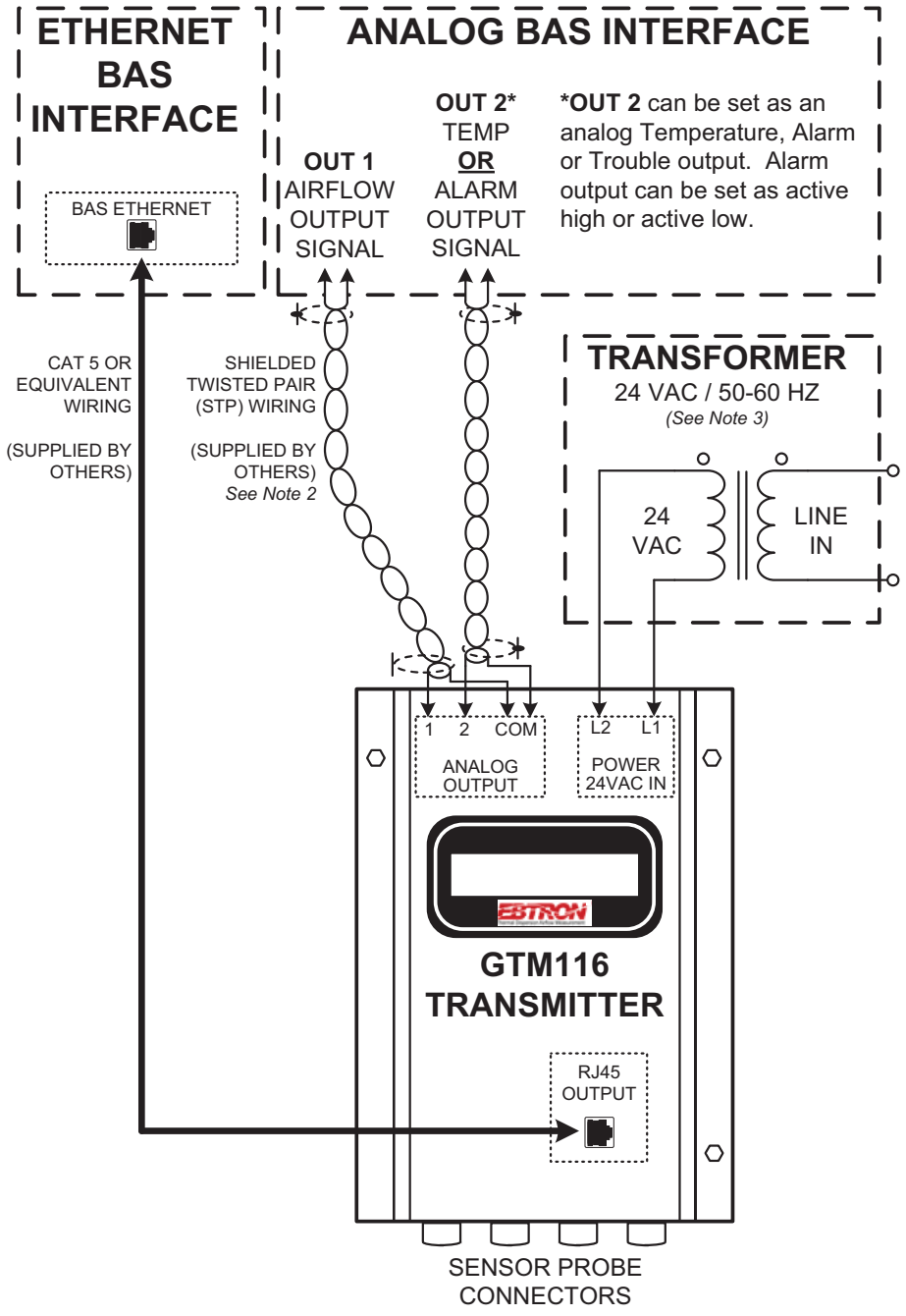
APPENDIX B -
GTM116 WIRING DIAGRAM



NOTES:

1. OUTPUT 2 CAN BE SET AS TEMPERATURE OR AS AN ALARM. ALARM CAN BE SET AS ACTIVE HIGH OR ACTIVE LOW.
2. CONNECT OUTPUT SIGNAL CABLE DRAINS TO EARTH GROUND AT ONE END OF EACH CABLE ONLY.
3. ON MULTIPLE TRANSMITTER INSTALLATIONS WITH A COMMON 24VAC SOURCE, WIRE 24 VAC POWER IN-PHASE TO THE SAME TERMINALS ON ALL TRANSMITTERS (e.g.: L1 to L1, L2 to L2).

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