

Advantage III

Gold Series by Ebtron

Installation Guide

GTC108

“Plug & Play” Transmitter with
Combination RS-485 Network Output and Dual Analog Output

Document Name: IG_GTC108_R1A



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Models GTC108 and GTM108

Part Number 930-0011

Table of Contents

1. GTC108 TRANSMITTER INSTALLATION	4
1.1 GTC108 Mechanical Dimensions.....	4
2. GTC108 TRANSMITTER INTERIOR VIEW/FEATURES.....	5
3. GTC108 TRANSMITTER POWER AND PROBE CONNECTIONS.....	6
3.1 Power Transformer Selection	6
3.2 Connecting Power to the Transmitter	6
3.3 Connecting Sensor Probes to the Transmitter	7
Sensor Addressing and Probe Positioning	8
4. GTC108 ANALOG OUTPUT AND NETWORK CONNECTIONS.....	11
4.1 GTC108 - ANALOG OUTPUT WIRING.....	11
4.2 GTC108 - RS-485 NETWORK WIRING CONNECTIONS	12
4.2.1 GTC108 - RS-485 Network Cable Specifications	12
4.2.2 GTC108 - Connecting to an RS-485 Network:.....	12
4.2.3 GTC108 - Setting Transmitter Termination for RS-485 Network	12
4.3 GTC108 - Transmitter Setup for RS-485 Network Operation.....	12
4.3.1 GTC108 - RS-485 Network Options and Communications Menu Settings	12
4.3.2 GTC108 - Setting RS-485 Network Protocol	13
4.3.3 GTC108 - Setting Transmitter Address	13
4.3.4 GTC108 - Setting Baud Rate	13
4.3.5 GTC108 - Setting Modbus Parity.....	13
4.3.6 GTC108 - Setting BACnet Device Instance Number.....	13
4.3.7 GTC108 - Resetting Communications Options to Factory Default Values.....	13
5. GTC108 TRANSMITTER START-UP, INITIALIZATION AND SETUP MENUS.....	15
5.1 Transmitter Initialization and Setup Menus	15
5.2 Changing the System of Units - IP or SI Units	15
5.3 GTC108 Transmitter Calibration	15
5.4 GTC108 LCD Display Notifications.....	16
5.5 Factory Default Menu Settings for GF2 Fan Inlet Sensors	16
5.6 GTC108 Changing Factory Default Setup Menu Settings.....	17
5.6.1 Setup Menu Options.....	17
5.6.2 Selecting Actual and Standard Output Measurement Type	17
5.6.3 Output Scaling	17
5.6.4 Changing the LCD Display from Volumetric Flow CFM to Velocity FPM.....	17
5.6.5 Converting the Analog Output Signal from FPM to CFM.....	17
5.6.6 Locking the Configuration Settings	17
5.7 GTC108 - Alarm Features	18
5.7.1 Average Alarm (AO2 ASGN=ALRM).....	18
5.7.2 Fan Alarm (AO2 ASGN=FA)	18
5.7.3 Trouble Alarm (AO2 ASGN=TRBL).....	18
5.7.4 FA Remove (FA REMOVE=YES).....	18
5.7.5 No Fault (NO FAULT=HI)	18
5.8 Alarm Indications	18
5.8.1 Average Low Alarm - "LO ALRM= ON"	18
5.8.2 Average High Alarm - "HI ALRM= ON"	19
5.8.3 Fan Alarm - "FA TYPE= MIN"	19
5.8.4 Fan Alarm - "FA TYPE= DEV"	19
5.8.5 Fan Alarm - "FA TYPE= %MAX"	19
5.8.6 Trouble Alarm - "AO2 ASGN=TRBL"	19
5.9 GTC108 - Analog Output Type Selection and Setup	20
5.9.1 GTC108 - Converting Analog Output Signal Values to Airflow and Temperature	20
5.9.2 GTC108 - OUTPUT TEST - Sending a Test Output Signal to the Host Control System.....	20
5.10 Viewing Sensor Data	21
5.10.1 Viewing Sensor Data on the Local LCD Display	21
5.10.2 Viewing Sensor Data via BACnet , Modbus networks or via EB-Link Reader	21
6. SETUP MENUS.....	21
7. WIRING DIAGRAM.....	21
APPENDIX A - ADVANTAGE 3 - FAN ARRAY FAN INLET SENSOR SETUP MENUS	22
APPENDIX B - GTC108 WIRING DIAGRAM	22

List of Figures

Figure 1. GTC108 Mechanical Dimensions	4
Figure 2. GTC108 Transmitter Interior View/Features	5
Figure 3. Connecting Power to the Transmitter	6
Figure 4. Type B and Type C Transmitter Connector Panel Detail.....	7
Figure 5. Connector Detail.....	7
Figure 6. Sensor Addressing Detail	8
Figure 7. Suggested Sensor Configurations (for Traverse decoding and EB-Link Data).....	9
Figure 8. GTC108 Combination Analog/RS-485 Transmitter Interior Detail.....	11

List of Tables

Table 1. GTx108 Connectivity Options.....	5
Table 2. GTC108 Power Transformer Selection Guide	6
Table 3. Suggested Sensor Configurations (for Traverse decoding and EB-Link Data).....	10
Table 4. GTC108 BACnet Objects List	14
Table 5. GTC108 Modbus Register Map	14
Table 6. Standard “IP” and “SI” Menu Units Abbreviations	15
Table 7. Factory Default Menu Settings	16
Table 8. GTC108 Alarm Types and Notifications	19
Table 9. GTC108 Analog Output Conversion Factors.....	20

1. GTC108 TRANSMITTER INSTALLATION

This document provides only the instructions necessary to install the GTC108 Transmitter. Transmitter installation consists of mounting the transmitter, installing output/network cables, connecting the sensor probes cables and preparing the transmitter for operation. For complete setup and operating instructions refer to the Installation, Operation and Maintenance technical manual TM_GTx108 under separate cover. The GTC108 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 sensors 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 sensors.
- ⚠ Do not drill into the transmitter enclosure since metal shavings could damage the electronics.

1.1 GTC108 Mechanical Dimensions

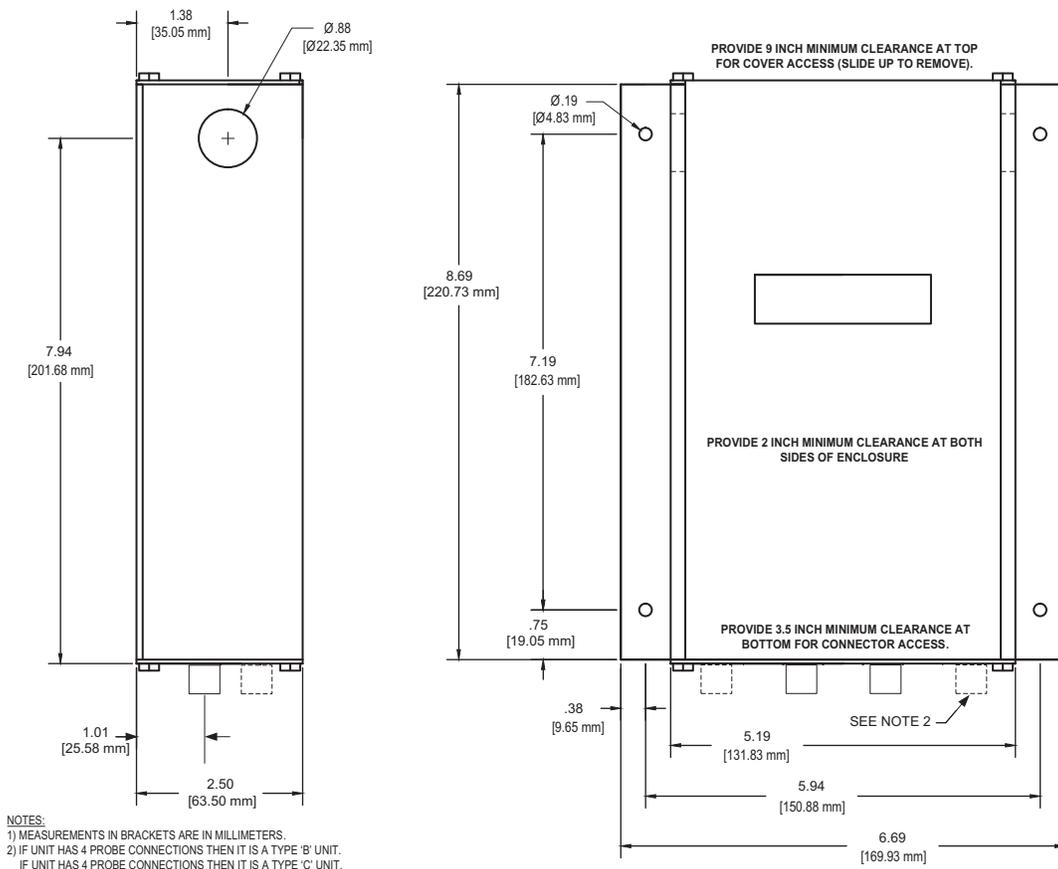
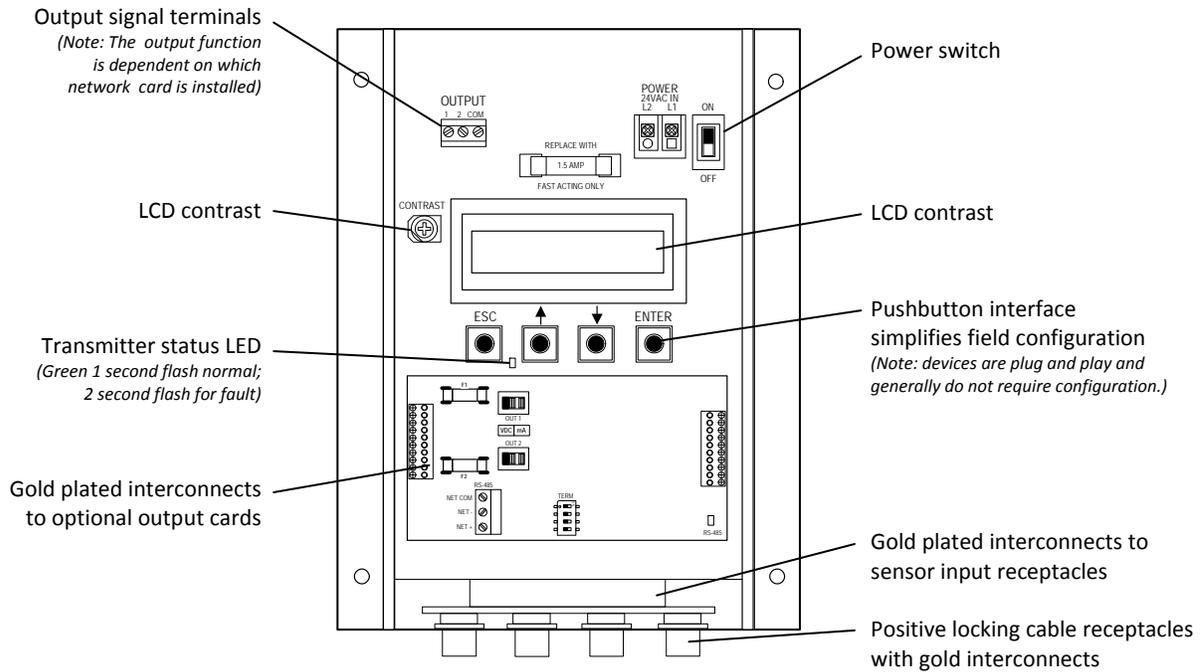


Figure 1. GTC108 Mechanical Dimensions

2. GTC108 TRANSMITTER INTERIOR VIEW/FEATURES



Note: Specify Model GTx108-B for 4 Sensor Connectors, and Model GTx108-C for 8 Sensor Connectors

Figure 2. GTC108 Transmitter Interior View/Features

Table 1. GTx108 Connectivity Options

Output to Host Controls	Output/Protocols Supported	Airflow	Temperature	Status
Combination Analog / RS-485 Model GT C 108	Analog: Linear 0-5VDC / 0-10VDC or 4-20mA	Yes	Yes	Yes
	RS-485: BACnet [®] -MS/TP, Modbus-RTU	Yes	Yes	Yes
Combination Analog / Ethernet Model GT M 108	Analog: Linear 0-5VDC / 0-10VDC or 4-20mA	Yes	Yes	Yes
	BACnet Ethernet	Yes	Yes	Yes
	BACnet-IP			
	Modbus-TCP			
TCP/IP				
LonWorks [®] - Model GT L 108	Free Topology Transceiver	Yes	Yes	Yes

3. GTC108 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 (16 VA) or from Table 2. 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.

NOTE

In order to retain the GTx108 device CE marking, GTx108 transmitters must be powered by a transformer that also carries the CE mark.

Table 2. GTC108 Power Transformer Selection Guide

Total Sensors	Minimum VA Req.	Total Sensors	Minimum VA Req.
1	12	5	14
2	13	6	15
3	13	7	15
4	14	8	16

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 GTC108 transmitters wired to a single transformer must be wired “in-phase” (L1 to L1, L2 to L2).
- ⚠ Sensor probes must be connected to the transmitter before turning the power switch to the “on” position to properly “flash” sensor calibration data to the transmitter.

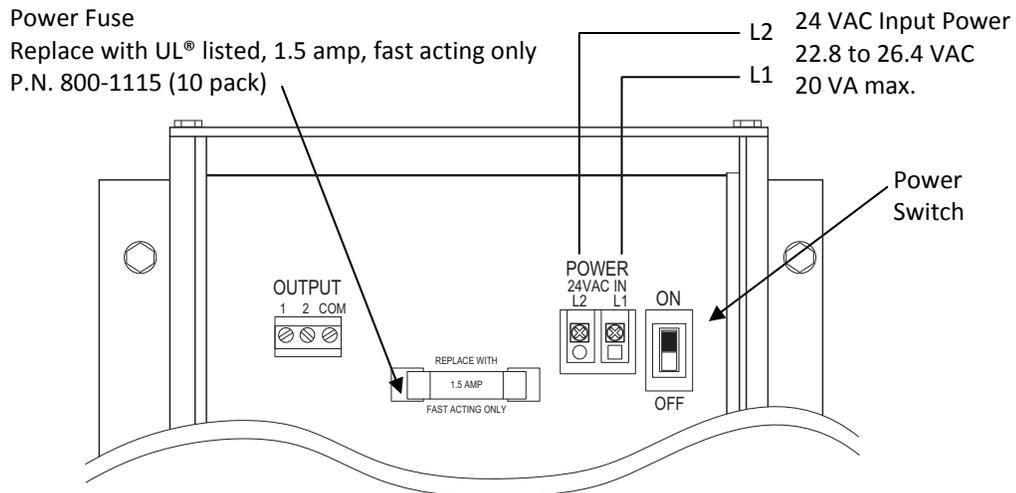


Figure 3. Connecting Power to the Transmitter

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 GTC108 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 GF2 sensors. For fan array applications, sensors must be connected in the specific order shown in Figure 6 to ensure that proper parameters (area, number of sensors, etc.) are entered during set up.

- ⚠ 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 Figure 6. Proper installation simplifies sensor location decoding during data analysis.

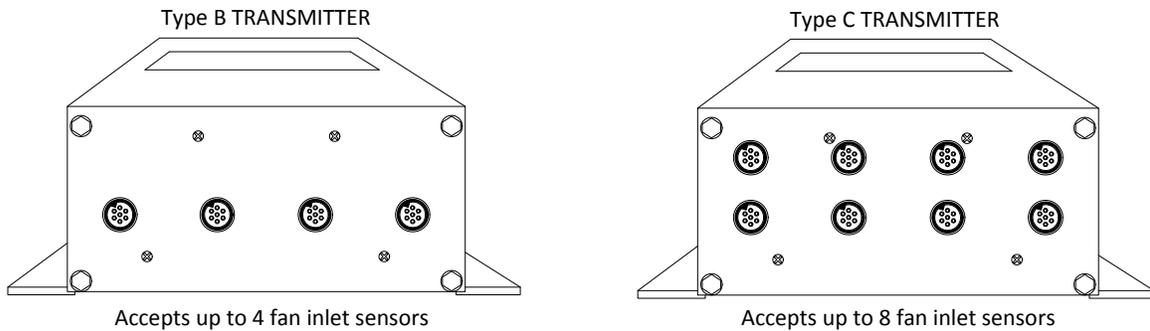


Figure 4. Type B and Type C Transmitter Connector Panel Detail

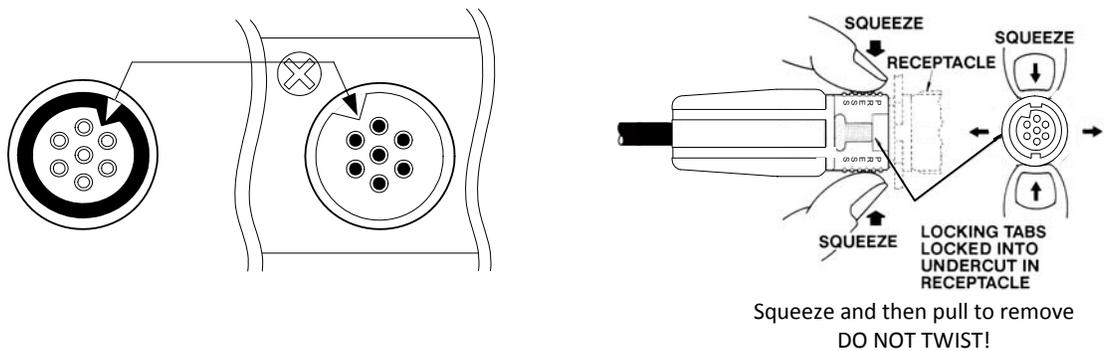


Figure 5. Connector Detail

Sensor Addressing and Probe Positioning

Sensors are automatically addressed after power is applied to the transmitter as shown in Figure 6 and detailed in the following paragraphs:

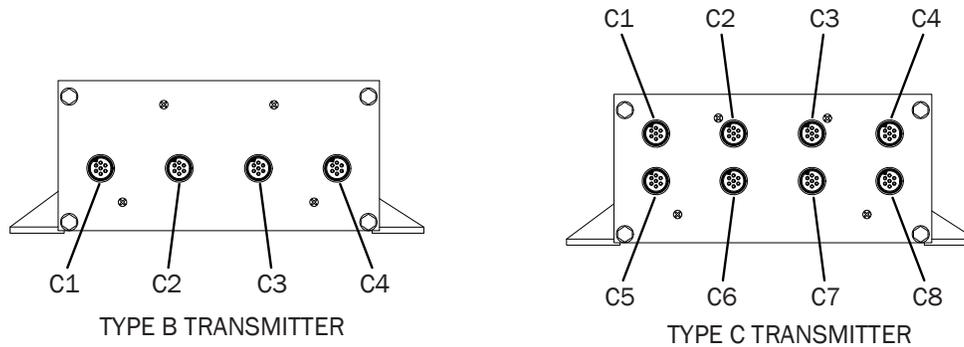


Figure 6. Sensor Addressing Detail

Type 'B' (4 Connector) Transmitters

The probe that is connected to the left-most **used** receptacle (labeled **C1-C4**) on the transmitter is addressed as **probe 1**. Up to 4 sensors can be individually viewed. To standardize installation and decoding of the data, EBTRON suggests the sensor probe mounting convention as shown in Figure 7 and Table 3.

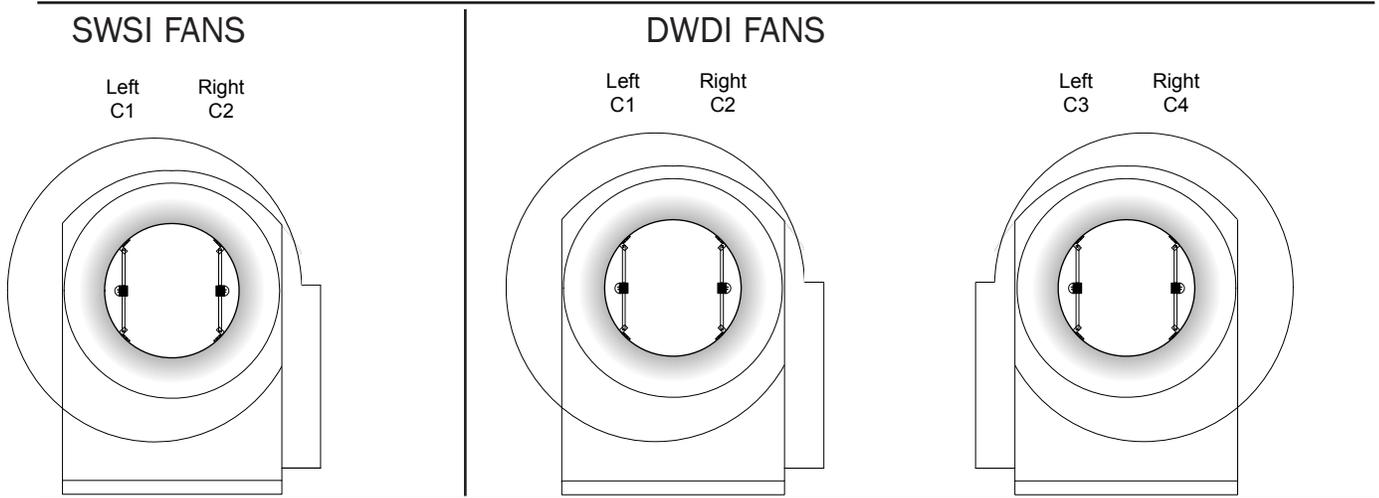
Type 'C' (8 Connector) Transmitters

Probes are statically numbered. The probe that is connected to the upper row and left-most receptacle (labeled **C1**) on the transmitter is addressed as **probe 1**. Up to 8 sensors can be individually viewed. To standardize installation and decoding of the data, EBTRON recommends the sensor probe mounting convention as shown in Figure 7 and Table 3 as viewed from fan inlet.

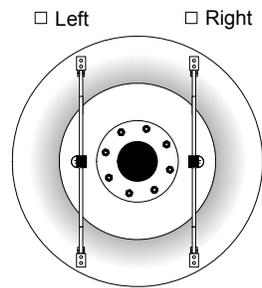
When a probe is disconnected and then plugged in to a different port, the transmitter will re-discover it within 15 seconds and make any necessary addressing adjustments.

For fan arrays, the fan information provided is specific to the numbered connector.

**SINGLE WIDTH SINGLE INLET (SWSI) AND
DOUBLE WIDTH DOUBLE INLET (DWDI) - SUGGESTED SENSOR
CONFIGURATIONS**



FAN ARRAYS - SUGGESTED SENSOR CONFIGURATIONS



Refer to Fan Arrays
Suggested Sensor
Mounting Configurations
of Table 3.

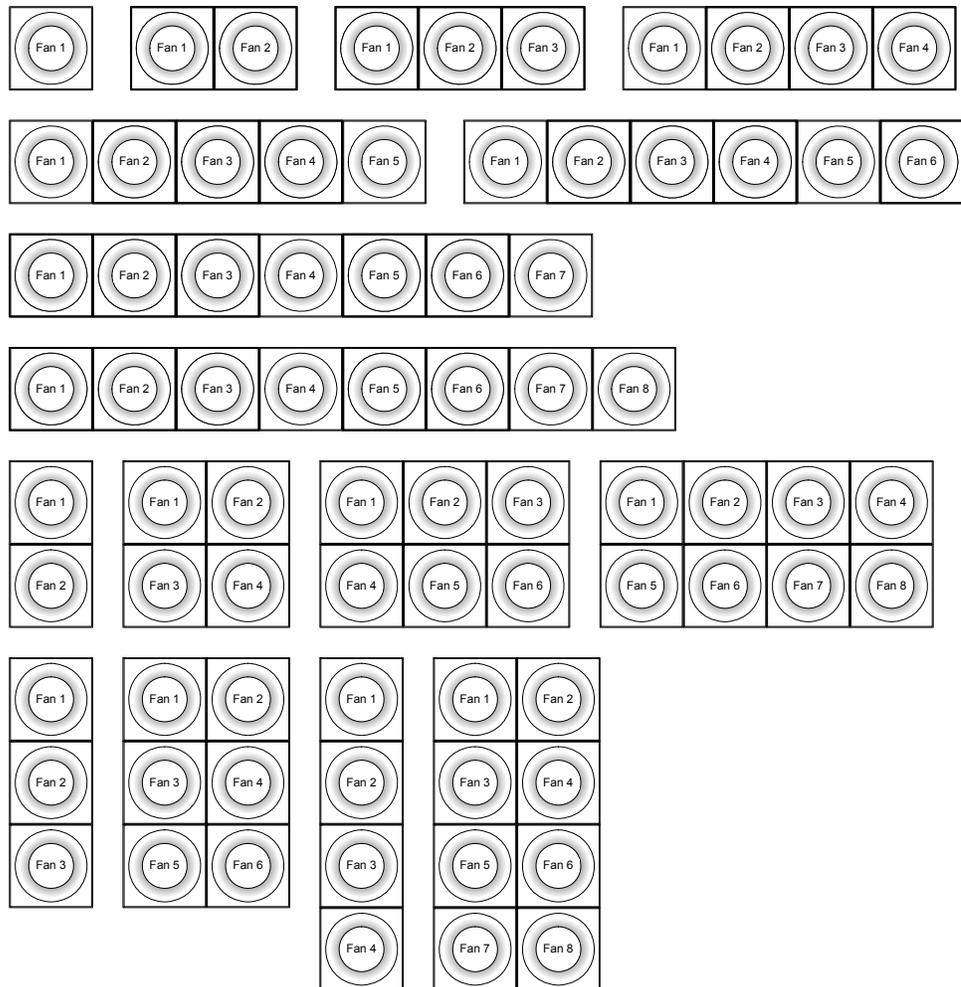


Figure 7. Suggested Sensor Configurations (for Traverse decoding and EB-Link Data)

Table 3. Suggested Sensor Configurations (for Traverse decoding and EB-Link Data)

FAN ARRAYS- SUGGESTED SENSOR MOUNTING CONFIGURATIONS

# OF FANS	PROBES/INLET	PROBE#	1	2	3	4	5	6	7	8
		CONNECTOR#	C1	C2	C3	C4	C5	C6	C7	C8
		ORIENTATION	Left	Right	Left	Right	Left	Right	Left	Right
		MODEL NUMBER	FAN NUMBER (see diagram on previous page)							
1	1	GTx108-F/A1	1							
	2	GTx108-F/A2	1	1						
2	1	GTx108-F/A2	1	2						
	2	GTx108-F/A4	1	1	2	2				
3	1	GTx108-F/A3	1	2	3					
	2	GTx108-F/A6	1	1	2	2	3	3		
4	1	GTx108-F/A4	1	2	3	4				
	2	GTx108-F/A8	1	1	2	2	3	3	4	4
5	1	GTx108-F/A5	1	2	3	4	5			
6	1	GTx108-F/A6	1	2	3	4	5	6		
7	1	GTx108-F/A7	1	2	3	4	5	6	7	
8	1	GTx108-F/A8	1	2	3	4	5	6	7	8

Note: The probe numbering and suggested fan numbering convention and transmitter connections facilitates and enhances the FAN ALARM feature and use of the optional EB-Link Interface and reader.

4. GTC108 ANALOG OUTPUT AND NETWORK CONNECTIONS

This section contains analog and network output wiring instructions for the GTC108 transmitter with RS-485 and Dual Analog outputs.

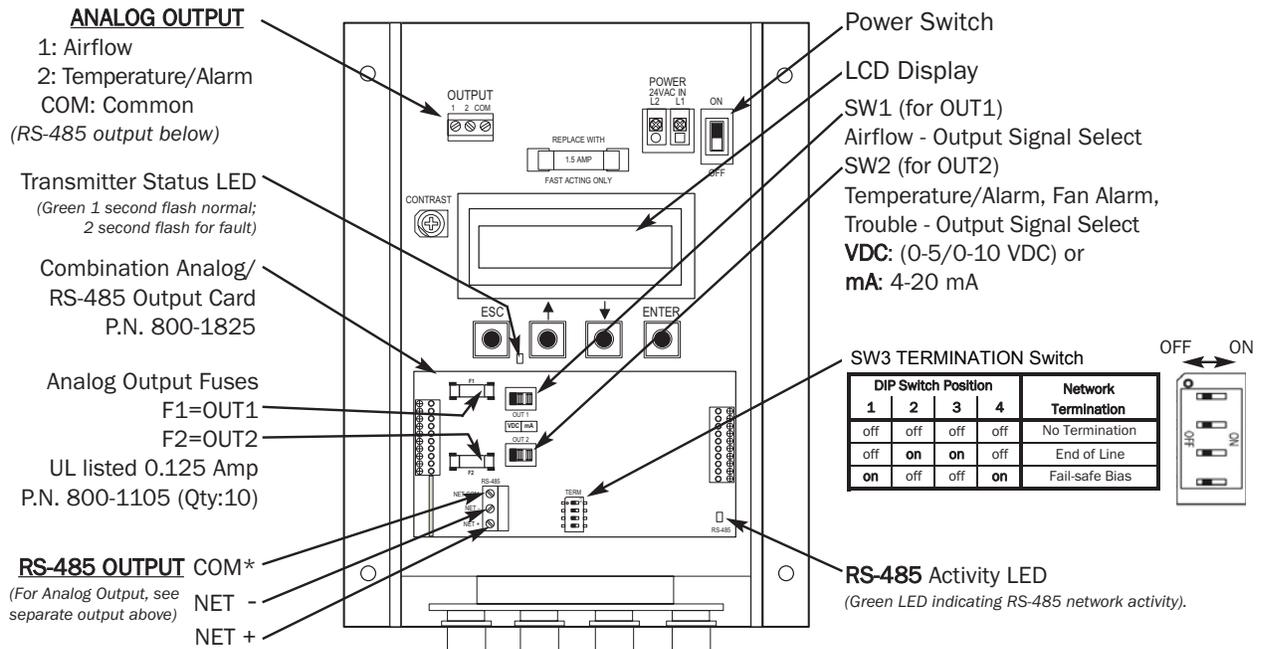
4.1 GTC108 - ANALOG OUTPUT WIRING

Analog output connections are made at the top left of the transmitter main circuit board OUTPUT connector as shown in Figure 8. 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 GTC108 is a "4-wire" device. The host controls shall not provide any excitation voltage to the output of the GTC108.

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 8. Airflow output is at terminal 1, and temperature or airflow alarm or trouble alarm output (depending on setup) is at terminal 2.



***CAUTION**



The common for the ANALOG and the RS-485 outputs must be at the same potential. For **ISOLATED** RS-485 output, **COM** connection **MUST BE CONNECTED** to network common. For **NON-ISOLATED** output, **COM** connection **MUST BE CONNECTED** to the common ground that other network devices are using (typically the ground side of the 24VAC supply - L2 of the POWER terminals). Refer to **RS-485 Network Wiring Connections** paragraph for additional detail.

Figure 8. GTC108 Combination Analog/RS-485 Transmitter Interior Detail

4.2 GTC108 - RS-485 NETWORK WIRING CONNECTIONS

4.2.1 GTC108 - RS-485 Network Cable Specifications

The RS-485 network cable shall be shielded twisted pair with a characteristic impedance of 100 to 130 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter. Distributed capacitance between conductors and shield shall be less than 200 pF per meter. The maximum recommended length of a network segment is 1200 meters with AWG 18 cable.

4.2.2 GTC108 - Connecting to an RS-485 Network:

Connect the NET+, NET- and COM terminals with shielded twisted pair cable meeting the specifications defined in the previous paragraph (typically using two pairs, with one wire not used; one pair for +/- and both wires in other pair for COM when using 2-pair cable). The connection to the network must be made in a "daisy chain" configuration. "T" connections and stubs are NOT permitted. The shield should be terminated at one end on the network only. If the GTC108 is not the first or last device, set the on-board termination DIP switches for NO TERMINATION. If the GTC108 is the first or last device, set the on-board termination DIP switches to either END OF LINE or FAIL SAFE BIAS termination.

***CAUTION**



For ISOLATED output, the COM connection MUST BE CONNECTED to the network common for proper operation. In addition, when the Analog Output is concurrently used with the RS-485 Output, the Common connection for both Analog and RS-485 Outputs must be at the same potential.



For NON-ISOLATED output, the COM connection MUST BE CONNECTED to the common ground that is used by the other network devices (typically the ground side of the 24VAC supply; terminal L2 at the POWER connector block in Figure 8). In addition, when the Analog Output is concurrently used with the RS-485 Output, the Common connection for both Analog and RS-485 Outputs must be at the same potential.

4.2.3 GTC108 - Setting Transmitter Termination for RS-485 Network

The GTC108 is shipped with the Termination switch set for No termination, which is the recommended setting for devices installed on the network bus anywhere EXCEPT at the ends of the bus/segment. *EBTRON* recommends the following termination strategy for devices connected at the ends of the network bus/segment: When the transmitter is at one end of the network, it should be terminated with "End of Line" (or 120 ohm standard) termination, and the device at the other end should be terminated with "Fail Safe Bias" termination. This method provides proper network termination and ensures that the bus is in a known state during idle-line conditions (when no devices are driving the bus). *EBTRON* GTC108 transmitters include three termination options for "End of Line" (standard 120 ohm) and "Fail-safe Bias" (recommended at one end of the bus) or for "No Termination". Termination is selected by setting TERMINATION DIP switch SW3 as shown below.



Check the network/network segment to ensure that only one device is terminated with either method. If multiple devices are terminated as described above, network segment operation will be adversely affected.

4.3 GTC108 - Transmitter Setup for RS-485 Network Operation

For RS-485 operation, network connections are made on the GTC108 Combination board as shown in Figure 8, and set up is as follows. Network protocol, MS/TP address, device instance number and baud rate options are all selected with- in the NETWORK section of SETUP menu shown in Appendix A.

4.3.1 GTC108 - RS-485 Network Options and Communications Menu Settings

The transmitter is shipped from the factory with the protocol set for BACnet MS/TP Master, address 2, MS/TP Device ID 2, Baud rate of 76,800 and no termination. Initial RS-485 communications settings are accomplished within the GTC108 NETWORK sub menu shown in Appendix A. Termination is set up by the TERM DIP switch SW3 located on the Combination card shown in Figure 8.

4.3.2 GTC108 - Setting RS-485 Network Protocol

Transmitter protocol can be set for MS/TP or MODBUS as shown in the NETWORK submenu (Appendix A). Tables 4 and 5 list the specific features of each protocol.

4.3.3 GTC108 - Setting Transmitter Address

The GTC108 is factory set to an address of 2. Each transmitter must be assigned a unique address between 0 and 127 for BACnet or 1 and 247 for Modbus prior to connecting it to the network. Set the address in the NETWORK submenu (Appendix A).

4.3.4 GTC108 - Setting Baud Rate

The GTC108 transmitter default baud rate for MS/TP is 76,800 and for MODBUS is 19,200. Baud rate can be configured in the NETWORK sub menu (Appendix A).

4.3.5 GTC108 - Setting Modbus Parity

When using Modbus communications protocol, Parity can be changed in the NETWORK submenu. Parity can be set for Even (default), Odd, None 1 (with 1 stop bit), or None 2 (with 2 stop bits).

4.3.6 GTC108 - Setting BACnet Device Instance Number

When using BACnet communications protocol, the factory default Device Instance Number is 2. Device Instance Number can be set as shown in the NETWORK submenu. Device Instance Number can also be changed to any number between 0 and 4,194,302 by writing to the Device Object's Object Identifier Property over the network.

4.3.7 GTC108 - Resetting Communications Options to Factory Default Values

Communications options can be reset to factory default values (asterisk) * values using the GTC108 RESET NET menu option.

Table 4. GTC108 BACnet Objects List

Analog Inputs

Type, ID	Name	Default Units	
Device	GTC108		
AI, 1	Avg. Flow	CFM	
AI, 2	Average Temperature	°F	
AI, 3	Alarm Status		0: No alarm, 1: High Alarm, 2: Low Alarm, 3: Both
AI, 4	Fan Alarm Status		0: No alarm, 1: Alarm

Analog Values

AV, 1	Fan 1 Area	sq.ft.	
AV, 8	Fan 8 Area	sq.ft.	
AV, 9	Fan 1 Flow	CFM	
AV, 16	Fan 8 Flow	CFM	
AV, 17	Fan 1 Temperature	°F	
AV, 24	Fan 8 Temperature	°F	



BACnet MS/TP

Notes:

- Number of AV objects is dependent on the fan count.
- User Executed Services Supported:
Subscribe COV, Read Property, Write Property,
Device Communication Control, Who-Is.

Table 5. GTC108 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 8
4	30006	word		Fan Count	1 to 8
4	30007	word		Alarm Status	0 - 3: Flow alarm 4: Fan alarm
4	30008	word		Fans in alarm	bitwise representation
4	30009-30024	float	FPM	Fan Flows	0 to 15,000
	30009-30010			Fan 1 Flow	
	30023-30024			Fan 8 Flow	
4	30025-30040	float	°F	Fan Temperatures	-20 to 160
	30025-30026			Fan 1 Temp	
	30039-30040			Fan 8 Temp	
4	30041-30056	float	FPM	Insert Flow Traverse	0 to 15,000
	30041-30042			Insert 1 Flow	
	30055-30056			Insert 8 Flow	
4	30056-30072	float	°F	Insert Temp Traverse	-20 to 160
	30056-30057			Insert 1 Temp	
	30071-30072			Insert 8 Temp	
4	30073-30088	float	Sq.Ft	Fan Areas	0 to 49.99
	30073-30074			Fan 1 Area	
	30087-30088			Fan 8 Area	
4	30202	word		Float word order	0: high word first; 1: low word first

5. GTC108 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.

The GTC108 default analog output signals AO1 and AO2 are set to 4-20mA. The output signal can be changed to 0-5VDC/0-10VDC by setting switches SW1, SW2. The GTC108 must be properly configured for the desired system network protocol. Review the section for the corresponding transmitter output card or contact *EBTRON* Customer Service, toll free, at 800-232-8766.

5.1 Transmitter Initialization and Setup Menus

The GTx108-F Transmitter automatically initializes at power-up and conducts full system diagnostics. At the first start-up, the system will initiate the Setup Wizard that guides the user through the setup of the transmitter. When completed, the Setup Wizard will store all values entered. If not completed, the Setup Wizard will again restart at the next power-up of the transmitter. Navigate through the menus as shown in Appendix B.

5.2 Changing the System of Units - IP or SI Units

The GTC108 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 as shown below.

Table 6. 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

5.3 GTC108 Transmitter Calibration

The GTC108 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.

5.4 GTC108 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.

5.5 Factory Default Menu Settings for GF2 Fan inlet Sensors

The GTC108 transmitter is “plug and play” and does not require setup unless a network option is selected that requires configuration. Table 7 shows the factory default settings for GF2 sensors.

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

Table 7. 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	10,000 FPM	50 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 = TEMP	AO2 Output indicates temperature.	TEMP	TEMP
*SETPNT=	Alarm setpoint value. When AO2 ASGN=ALARM , or AO2 ASGN=FA only, operates in conjunction with TOL= value.	0	0
*TOL=	Alarm range tolerance value. When AO2 ASGN=ALARM , or AO2 ASGN=FA only, 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 zero (dependent on 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: Area is entered during setup using SETUP WIZARD.

5.6 GTC108 Changing Factory Default Setup Menu Settings

5.6.1 Setup Menu Options

The GTC108 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.

5.6.2 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 inlet conditions. If using Actual conditions, 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.

5.6.3 Output Scaling

EBTRON’s Gold Series sensors are individually calibrated between 0 and the factory default full scale to standards 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 output scaling for analog GTC108 transmitter can be changed within the SETUP menus.

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

The GTC108 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. The analog output signal can be scaled if required as described below.

5.6.5 Converting the Analog Output Signal from FPM to CFM

The GTC108 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 9 for a complete listing of conversions for each of the analog outputs of the GTC108. The AO1 full scale analog output (OUTPUT1) value is determined by the AO1 RNGE setting within the SETUP menu.

5.6.6 Locking the Configuration Settings

The GTC108 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 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 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.

5.7 GTC108 - Alarm Features

Analog output AO2 (OUT2) of the GTC108 transmitter can be assigned to function instead as an alarm output. The OUT2 alarm output can be assigned in the SETUP menu to operate as an average alarm (AO2 ASGN=ALRM), as a fan alarm (AO2 ASGN=FA) 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

5.7.1 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 or an alarm for operation outside of a defined range (setpoint and tolerance) is required.

5.7.2 Fan Alarm (AO2 ASGN=FA)

AO2 output is assigned as a fan alarm output for multiple fan (fan array) applications. In fan arrays this is useful for indicating which fan is in alarm state by providing an analog output level proportional to the fan number. For example, if fan number 3 is in alarm, OUT2 will provide an output of 30% of the full scale analog range selected.

For fan arrays, the Fan Alarm can be set for one of 3 modes through the FA TYPE= setting in the FAN ALARM submenu:

- FA TYPE=MIN: Alarm activates if a fan flow falls below a minimum defined flow rate setpoint
- FA TYPE=DEV: Alarm activates if a fan flow deviates more than a defined percentage setpoint from the median flow of all fans
- FA TYPE=%MAX: Alarm activates if a fan flow deviates more than a defined percentage setpoint from its own maximum flow

In both AO2 ASGN=ALRM and AO2 ASGN=FA alarm modes, a delay feature can be specified to prevent nuisance alarms, and a zero-off feature can be engaged to prevent low flow alarms when the system is reading zero flow (i.e. when fans are off). In addition, a reset feature allows for the alarm to be reset either manually or automatically in the event that the alarm condition no longer exists.

5.7.3 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.

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.

5.7.4 FA Remove (FA REMOVE=YES)

This setting determines whether a fan that is in alarm should be removed from the transmitter calculated average.

5.7.5 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.

5.8 Alarm Indications

Table 8 details the alarm types, LCD indications and AO2 alarm outputs available from the GTC108. User can select either of the two Average Alarms, one of the three Fan Alarms or the Trouble Alarm:

5.8.1 Average 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.

5.8.2 Average 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.

5.8.3 Fan Alarm - “FA TYPE= MIN”

The Fan Alarm Minimum alarm is activated when the airflow of any of the fans in the fan array falls below the selected set point (SETPNT=) value. Once active, the alarm can be cleared when the airflow rises above the set point value. The magnitude of the fault signal is proportional to the (lowest) fan number that is in alarm state.

5.8.4 Fan Alarm - “FA TYPE= DEV”

The Fan Alarm Deviation alarm is activated when the airflow of any of the fans in the fan array exceeds the median airflow by the percentage specified by the (SETPNT=) value. Once active, the alarm can be cleared when the airflow returns within the specified percentage of median airflow. The magnitude of the fault signal is proportional to the (lowest) fan number that is in alarm state. If only 2 fans, the highest flow will be used for median comparison.

5.8.5 Fan Alarm - “FA TYPE= %MAX”

The Fan Alarm Maximum alarm is activated when the airflow of the any of the fans deviates from its highest stored value by the percentage specified by the (SETPNT=) value. Once active, the alarm can be cleared when the airflow returns within the range specified by the set point value. The magnitude of the fault signal is proportional to the (lowest) fan number that is in alarm state.

5.8.6 Trouble Alarm - “AO2 ASGN=TRBL”

The Sensor Trouble alarm is selected in the ANALOG OUT submenu (AO2 ASGN=TRBL) and 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 8. GTC108 Alarm Types and Notifications

ALARM OUTPUT ASSIGNMENT TYPE	LOCAL LCD DISPLAY OF ALARM TYPE AND NOTIFICATION	ALARM (OUT2) INDICATION
User can select either of the two Average Alarms, one of the Fan Alarms or the Trouble Alarm:		
LOW ALARM (Average Alarm)	Display alternates between **LOW ALARM** (then any other alarms) and actual reading for 2 seconds each.	On alarm, OUT2 is active high (or active low) relative to the full scale maximum (or minimum) analog value as determined by SETUP Menu “NO FAULT=” selection. Individual sensor velocities can be viewed using the Diagnostics submenu.
HIGH ALARM (Average Alarm)	Display alternates between **HIGH ALARM** (then any other alarms) and actual reading for 2 seconds each.	
** FAN n MIN ** (Fan Alarm)	Display alternates between ** FAN n MIN ** (then any other alarms) and actual reading for 2 seconds each.	For multiple fan array applications, the alarm output is proportional to the (lowest) fan number that is in alarm. For example, if fan number 3 is in alarm, OUT2 will provide an output of 30% of the full scale analog range selected. Individual fan velocities can be viewed using the Diagnostics submenu. <i>n</i> = fan number. If multiple fans are in alarm, <i>n</i> = lowest fan number in alarm.
** FAN n DEV ** (Fan Alarm)	Display alternates between ** FAN n DEV ** (then any other alarms) and actual reading for 2 seconds each.	
** FAN n %MAX ** (Fan Alarm)	Display alternates between ** FAN n %MAX ** (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).	On alarm, OUT2 is active high (or active low) relative to the full scale maximum (or minimum) analog value as determined by SETUP Menu “NO FAULT=” selection. Individual sensor velocities and temperatures can be viewed using the Diagnostics sub- menu.

5.9 GTC108 - Analog Output Type Selection and Setup

The analog output signal type at OUT1 (airflow) and OUT2 (temperature/alarm) can be set for mA or VDC output by setting switches SW1/SW2 (Figure 8). SW1/SW2 settings enable the appropriate 4-20mA, 0-5 VDC or 0-10VDC menu ranges in Setup menu options for *AO1 RNGE= / *AO2 RNGE= settings (Appendix B). The transmitter is shipped from the factory with SW1/SW2 and Setup menu options *AO1 SGNL= and *AO2 SGNL= set for 4-20mA.

5.9.1 GTC108 - Converting Analog Output Signal Values to Airflow and Temperature

Since the accuracy of the GTC108 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).

The equivalent volumetric flow full scale reading can easily be determined by multiplying the full scale reading 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 GF1/GF2 sensors, the free area must be determined after the units are installed. Table 9 lists specific conversion factors for analog voltage or current output options.

5.9.2 GTC108 - 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 GTC108 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 TOOLS sub menu to access OUTPUT TEST. OUT1 and OUT2 tests are independently accessed, and the output will maintain the % shown until the “ESC” button is pressed and normal operation is resumed.

Table 9. GTC108 Analog Output Conversion Factors

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.

5.10 Viewing Sensor Data

5.10.1 Viewing Sensor Data on the Local LCD Display

Airflow and temperature can be displayed on the local LCD display by entering the Diagnostic Menu. Simultaneously depress the up ↑ and down ↓ arrows to enter the GTC108 SETUP menu, and then navigate to the Diagnostic submenu.

5.10.2 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.

6. SETUP MENUS

Appendix A details the various setup menus and submenus.

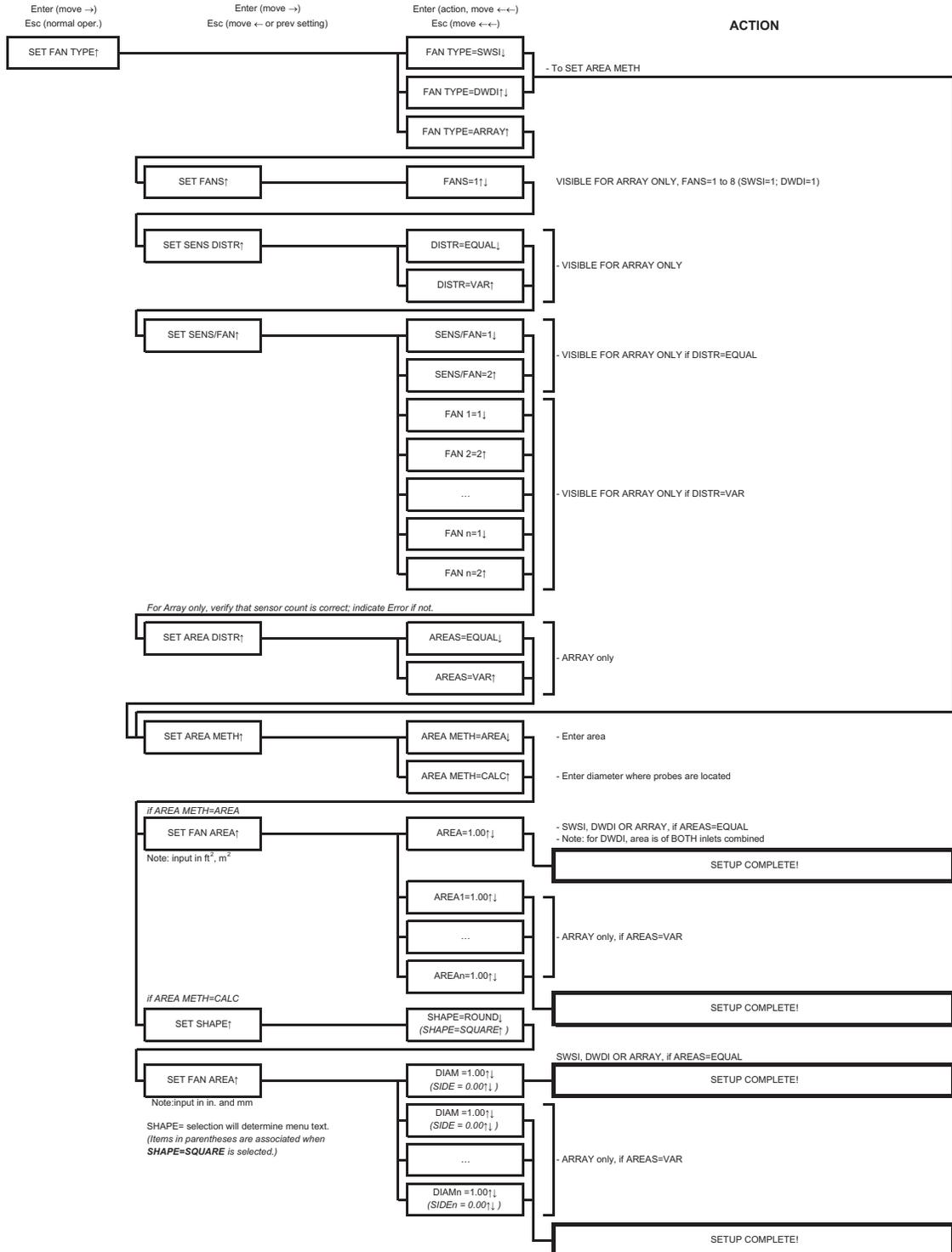
7. WIRING DIAGRAM

Appendix B is the wiring diagram for the GTC108 transmitter.

APPENDIX A - ADVANTAGE 3 - FAN ARRAY FAN INLET SENSOR SETUP MENUS

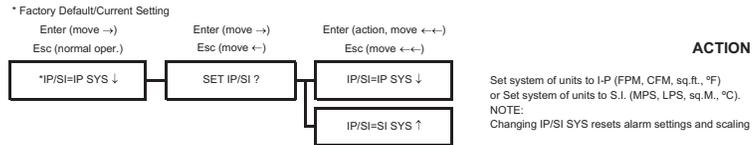
SETUP WIZARD

Launched at initial power-up, and if Setup Wizard was not completed.



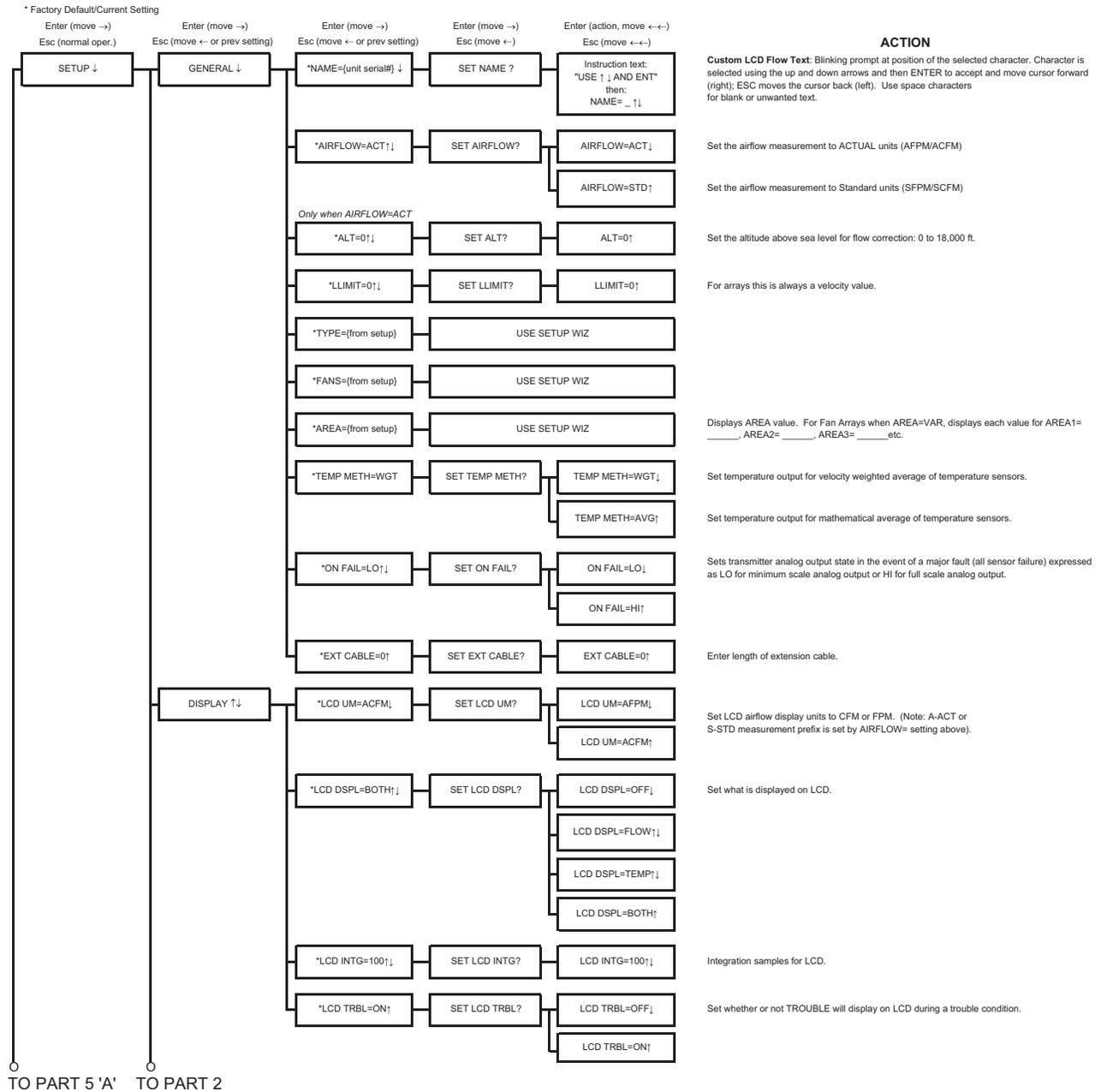
SYSTEM OF UNITS MENU

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

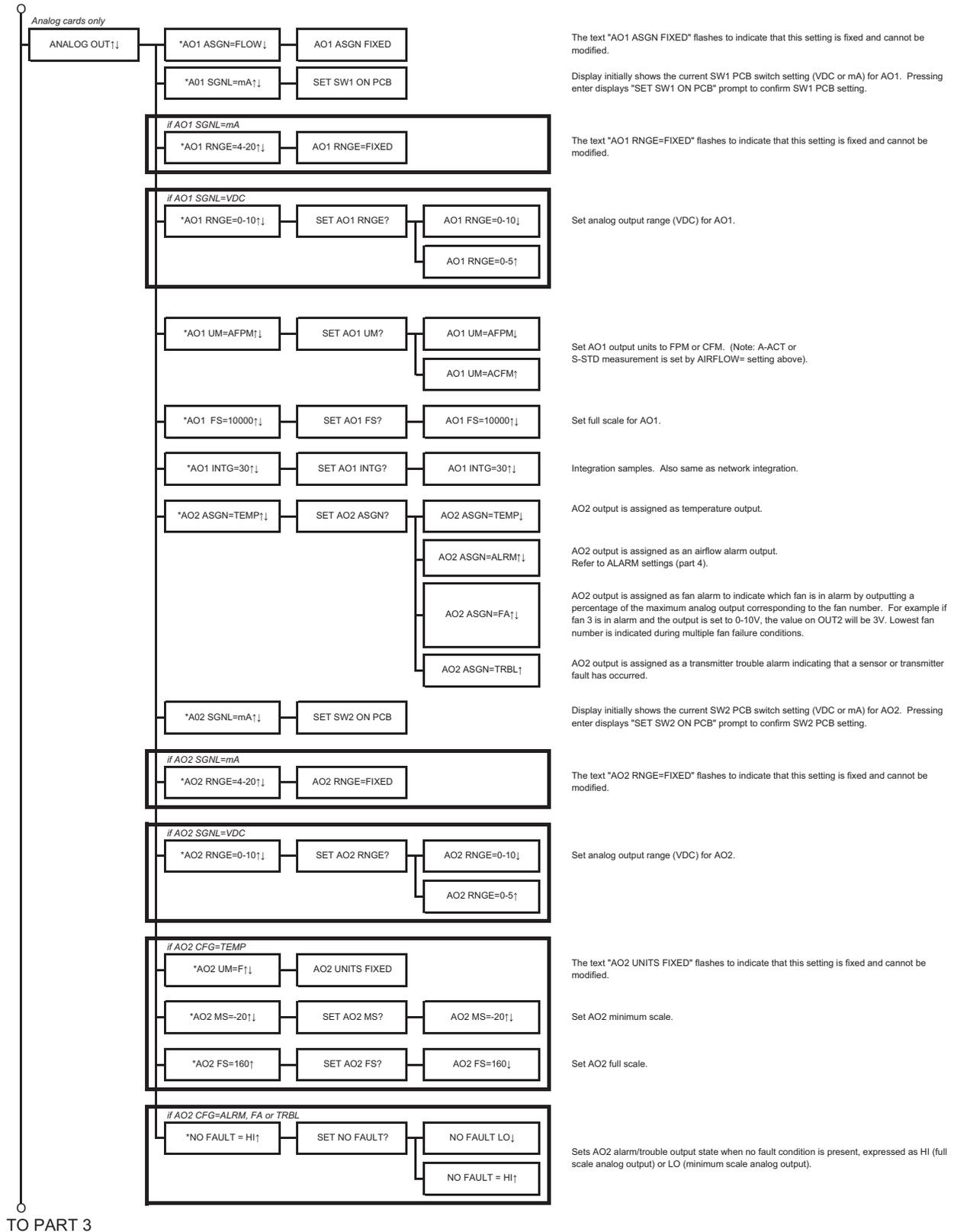


SETUP MENU

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

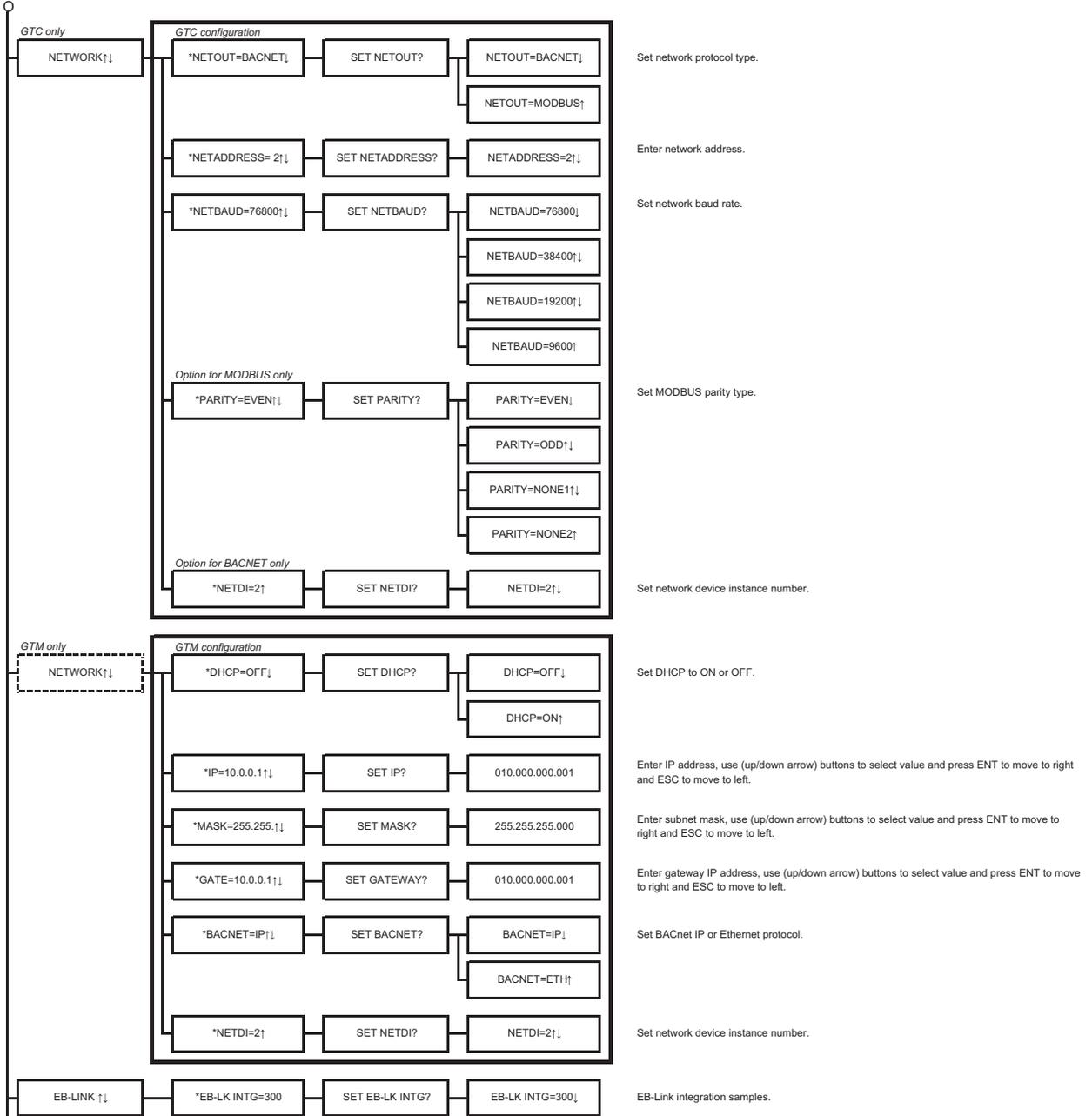


FROM PART 1



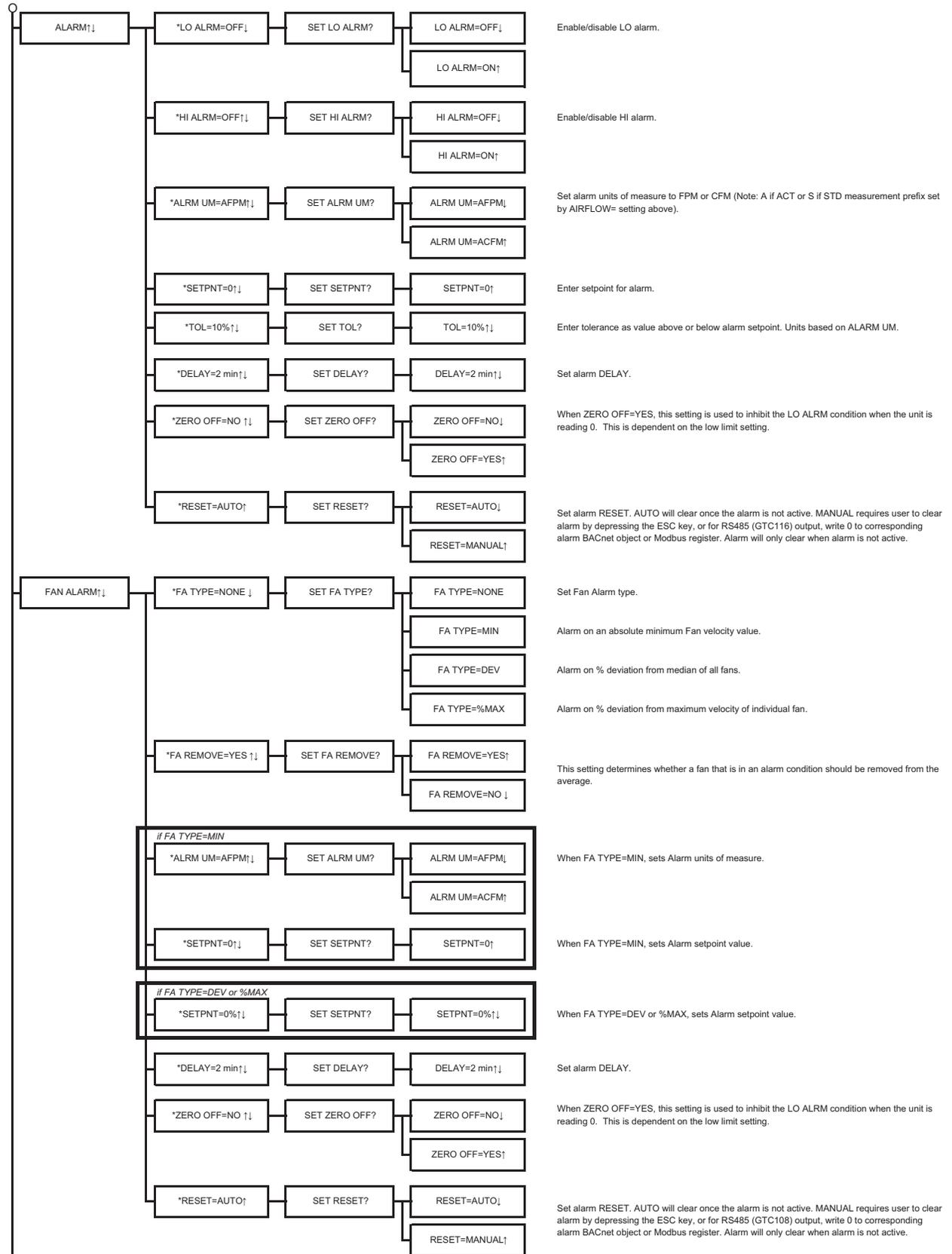
TO PART 3

FROM PART 2

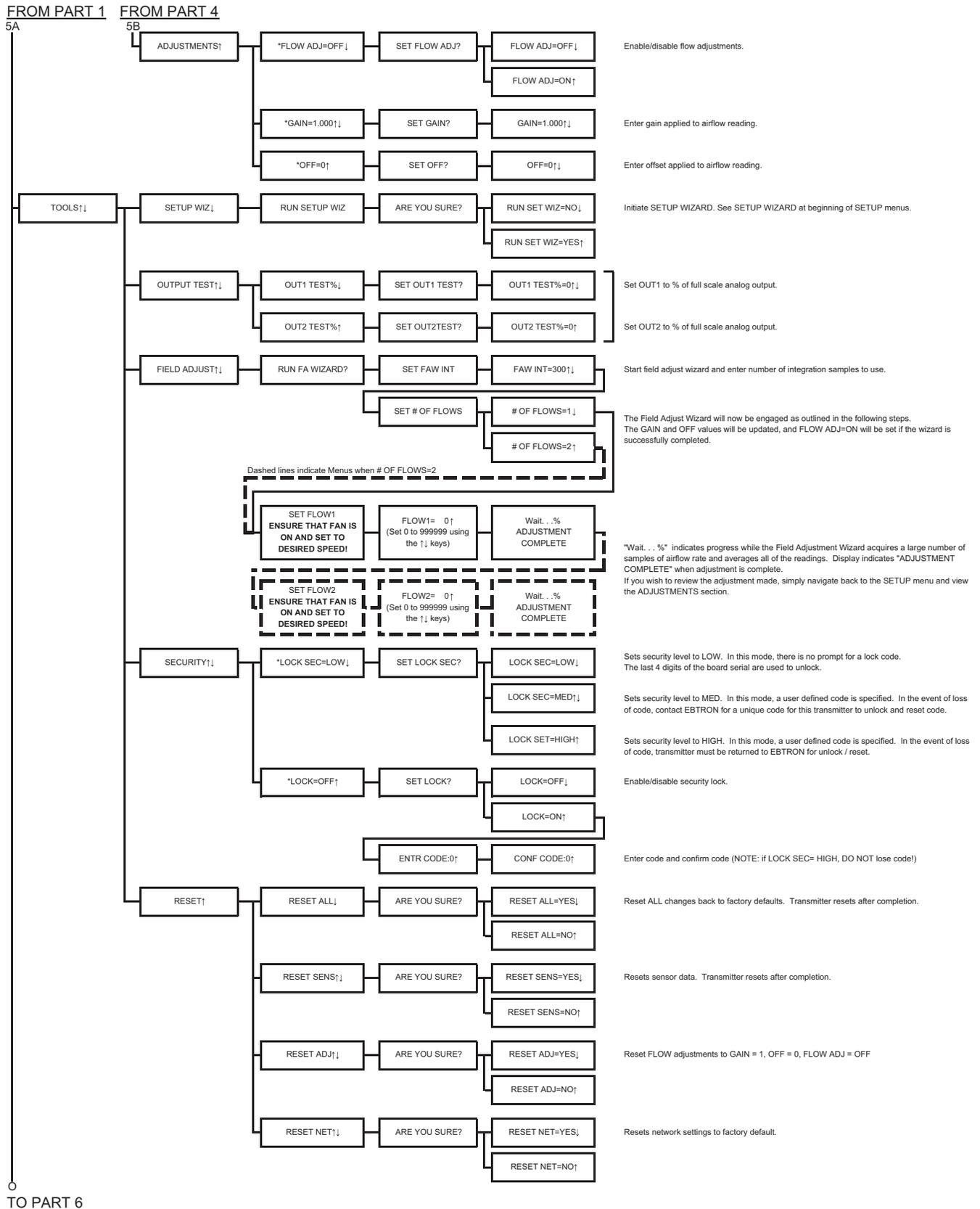


TO PART 4

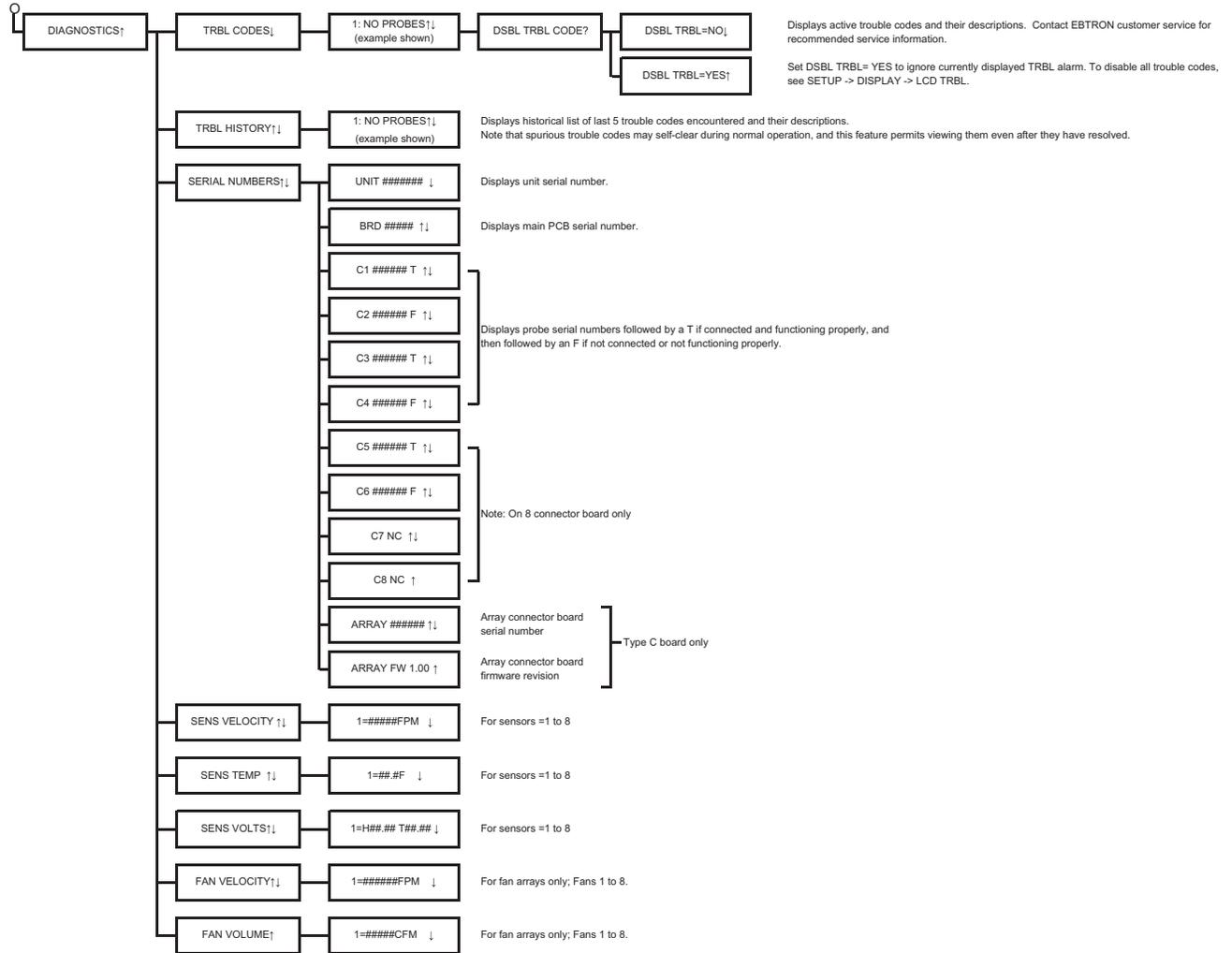
FROM PART 3



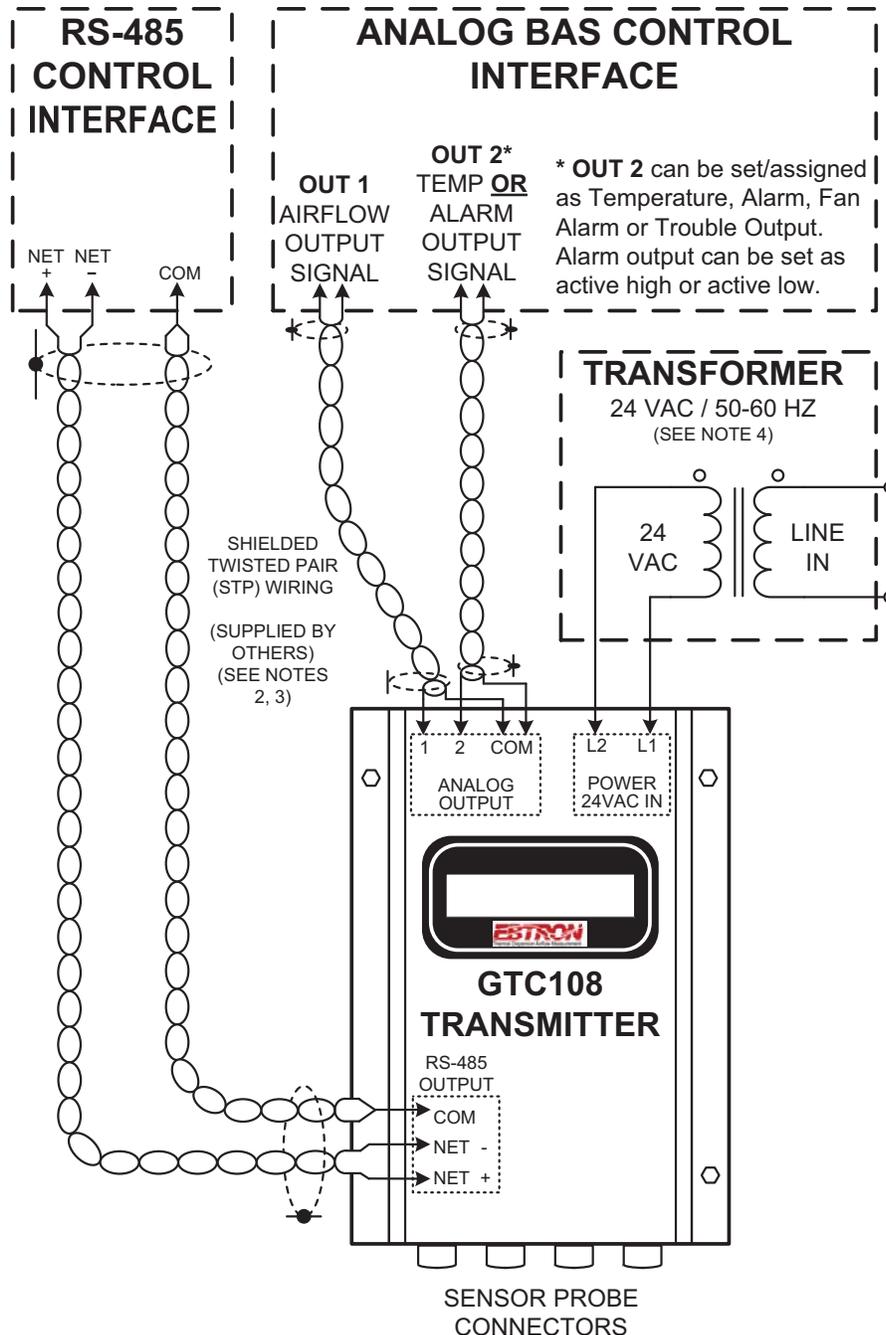
TO PART 5 'B'



FROM PART 5



APPENDIX B - GTC108 WIRING DIAGRAM



NOTES:

1. OUTPUT 2 CAN BE SET AS TEMPERATURE, ALARM, FAN ALARM OR TROUBLE 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. RS-485 COM CONNECTION MAY USE A SINGLE CONDUCTOR.
4. 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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