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GTFM V™

Gas Turbine Flow Monitor

Operation / Installation Manual

Manual Part Number: A8M5026
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1.0 OVERVIEW

1.1 System Requirements

The GTFM V™ Gas Turbine Flow Monitor is designed to permit the user to precisely measure the flow rates of the weld shielding gases. **WARNING – DO NOT USE WITH ANY FLAMMABLE GASES.** The unit comes in both "portable" and "in-line" models. The GTFM IV is software configurable for English or Metric units of measure. The portable version can be used to check the gas flow rates directly at the welding torch. The unit is battery powered, which allows it to be carried throughout the shop. This version is ideal for use by maintenance personnel to correctly set and verify shielding gas flow rates at the welding torch.

1.2 Benefits

The "in-line" version is designed to be permanently installed in a welding fixture to continuously monitor the gas flow rate. When used in this manner the GTFM can provide "sure-flow" gas testing by setting upper and lower control limits for the user defined gas flow rates. An internal fault relay can be used to warn or interrupt the welding process if an out-of-limits condition is detected.

1.3 Features

Some of the features contained in the unit are the capability to limit test, provide an accumulated gas usage and peak flow rates as well as displaying on-going gas flow rates. The unit also provides an analog output voltage representing measured gas flow rates. The GTFM also has a Modbus® RS-485 serial port. The sensor can communicate with third party controllers via the Modbus® protocol. The sensor defines 16 coils and 10 Registers for use with the Modbus® serial port. See the serial communications section for further descriptions of the feature. The GTFM uses an OLED graphic display panel to display the gas flow rates, to provide programming menus and user defined optional parameter display.

1.4 Mechanical Specifications

Dimensions	3-7/16"W x 1-13/16"H x 5-3/8"L (86.6 mm W x 46 mm H x 136.5 mm L)
Weight	23 oz. (652 gm)
Pipe Fittings	3/8" NPT with 3/8" hose barb fittings

1.5 Sensor Specifications

Measurement Range	5 - 255 CFH (2 - 120 LPM)
Display Resolution	±1 CFH (± 1 LPM)
Accuracy	±3 % of full-scale ±1 digit
Operating Pressure	50-PSI maximum (344 KPA)
Fault Relay Output	Opto-Isolated Solid State Relay (N.O. Contacts)
Relay Rating	48 vac @ 0.5 amps non-inductive, 48 vdc @ .5 amps non-inductive
Analog Sensor Output	0 - 2.55 vdc @ 10 ma.
Analog Scaling	0.01 vdc = 1 CFH (.01 V = 1 LPM)
Power Requirement	12 - 28 vdc @ 100 ma.
Operating Temperature	20° - 140° F (-7° - 60° C)
Battery Charger	120 vac 60 hz @ 300 ma (220 VAC 50 hz @ 300 ma)
Battery Life	Approximately 8 hours with full charge

(User configurable English / Metric units of measurement)

Note: Specifications subject to change without notification.

1.6 Models

The following models are covered in this document:

Part No.	Description
A0A0138	120/240 VAC Portable GTFM V™ System
A0A0139	120/240 VAC In-Line GTFM V™ System
A0A0140	ADM IV™ GTFM V™ System
A0A0141	WDL II™ GTFM V™ System

2.0 INSTALLATION

2.1 Options

The GTFM can be used as a portable or in-line gas flow monitor. If the unit was purchased as a portable monitor, it will be equipped with a rubber gas cone. The cone is designed to fit standard torch gas cups and allows the GTFM to measure the actual gas flow at the torch. To install, simply press the GTFM gas cone onto the welding torch gas cup. Make sure that the cone is fitted snugly to the gas cup.

2.2 Gas Line Hookup

The GTFM may also be installed into the gas line and used to permanently monitor the gas-flow rate. This model is supplied with barbed 3/8 ID hose fittings. The sensor will accept any 3/8" NPT pipefitting. The user may hard plumb the sensor if desired. **DO NOT USE PIPE DOPE OR TEFLON TAPE ON THE PIPE FITTINGS.** The sensor should be located between the welding-gas solenoid and the torch. **DO NOT INSTALL THE SENSOR ON THE INLET SIDE OF THE GAS SOLENOID.** If the sensor is installed on the inlet pressure side of the gas solenoid, the maximum operating pressure (50 psi) of the transducer may be exceeded.

WARNING: Do not over tighten fittings as it may twist the sensor out of position.

2.3 Cable Hookup

The GTFM provides an analog voltage, which will represent gas flow. This analog voltage can be monitored by using the Auxiliary cable and connecting the plug to the "AUX" connector on the bottom panel. The output voltage will have the following relationship:

$$\begin{aligned} 2.55 \text{ volts} &= 255 \text{ scfh} \\ &\text{or} \\ .01 \text{ volt/scfh} \end{aligned}$$

The output impedance of this signal is 100 ohms and can source 10 milliamps of current. The analog-interface cable can also be used to supply power to the GTFM. The power requirement is (12 - 28) vdc @ 100 ma. This cable also has the connections for the Fault Relay and Modbus® RS-485 serial port. The following is the pin out for the GTFM V AUX Cable (P/N: A3W0352).

Pin No.	Function
1 (WHT)	Modbus RS-485 D+ serial port
2 (BRN)	User supplied Power Input VIN+ (12-28 VDC @100 ma)
3 (GRN)	CR-A - Will be active when gas flow is within programmed limits.
4 (YEL)	CR-B – Will be active when gas flow is within programmed limits.
5 (GRY)	User supply power common VCOM
6 (PNK)	Modbus RS485 and Vout analog common
7 (BLU)	Modbus RS-485 D- serial port
8 (RED)	Gas Flow Analog output VOUT+ (0.00 – 2.55 vdc)

2.4 Gas Flow Limits

The GTFM can be used to test for High/Low gas flow limits. An internal fault relay will be set (CLOSED) when the gas flow is within the programmed limits. The fault relay can be interfaced to an external weld fixture controller.

2.5 Gas Flow Volume

The GTFM can also be used to monitor accumulated gas flow and to provide an indication when the volume in a gas cylinder has reached a programmed minimum limit. The GTFM will calculate the volume of gas used based on the measure flow rate. If the user programs the minimum volume for safe operation, the GTFM will indicate when the estimate minimum volume has been reached. The GTFM will set a fault relay when the estimated volume has decreased below the programmed minimum. Setting the starting volume “V” to 0 disables the function.

NOTE: THE LOW GAS VOLUME FAULT WILL NOT ACTIVATE THE FAULT RELAY BUT WILL INDICATE THE FAULT CONDITION BY SETTING A MODBUS® COIL CR15.

3.0 OPERATION

3.1 Firmware Version

The GTFM is supplied with a plug-in the wall transformer, which powers the GTFM and will also charge the optional internal battery. Plug the transformer into a suitable ac receptacle, and connect the power cable into the "POWER" jack located on the bottom panel of the GTFM. Press the power switch on the front panel "ON". The "POWER" LED will light and the following power up message will be displayed:

```
**** GTFM V ****  
P/N A5Z0044 Ver #.##  
Copyright (c) 2011  
Computer Weld  
Technology Inc.  
All Rights Reserved
```

Where: #.# is the firmware version number

Followed by the run time display:

```
0 CFH
```

Note: CFH will be replaced with LPH in metric mode

Activate the gas solenoid for the welding torch. The GTFM will now display the gas flow rate in CFH (Cubic Feet per Hour) or LPM (Liters per Minute).

3.2 Program Limits

To program the High/Low limits and test parameters press both "▼" and "▲" switch simultaneously to enter the "**Select Para INC/DEC**" mode. The first programmable parameter will appear on the display. To increment through the program menus press the "▲" button. To decrement through the menus press the "▼" button. To edit a menu option press both "▼" and "▲" switch simultaneously to enter the "**Edit Para INC/DEC**" mode. To increment the parameter press the "▲" button. To decrement the parameter press the "▼" button. To end the "**Edit Para INC/DEC**" press both "▼" and "▲" switch simultaneously to exit and return to the normal display mode. The user can edit only one parameter at a time. To edit other parameters repeat the above sequence.

3.3 Parameters

The following is the list of the parameters and system configurations that can be modified by the user:

- **Max Limit= ###** - Maximum gas flow Limits. This value is used to set the high fault alarm and disable the output alarm. This value is also used to trigger the Peak Flow detector. The Peak flow value is updated and the peak flow time is incremented when the flow rate is greater than this limit. (Value range 5 – 255)
- **MIN Limit= ###** - Minimum gas flow rate limits. This limit in conjunction with the test delay time is used to set the Low Fault alarm and to disable the output alarm. When the flow is detected the Test delay timer is decremented and when the user defined delay time is reached the Low limit is tested and the output relay will be disabled if the flow rate is below this limit. (Value range 5 to 100)
- **Test Delay= ##.#** - This is the time in seconds that the GTFM will wait before testing for a Low or High limit fault following an initial detection of gas flow. (Value range 0.5 to 10.0 seconds)
- **Enable Alarms?** - Allows the user to enable or disable the High Low limit testing. Setting this option to “No” will disable the alarm relay output. Setting this option to “Yes” will enable the alarm relay output. (Status Yes or No)
- **Enable Peak?** – Setting this parameter to yes will enable the Peak Flow display. When enabled an additional “**Peak= ### *.** sec**” display will be active. Where **###** is the last peak flow rate measured and “***.****” is the Total time at peak flow. The time at peak is the total time measured above the High limit value. The Peak is the peak flow measured above the High Limit. The peak value and time is reset at the start of the next detected gas flow period. This peak display will remain on the display until the peak is set to “**No**”.
- **Log Mode?** – Setting this parameter to yes will enable the flow volume accumulator and it will enable the “**Tot Volume= ##.#**” and the “**Total Time= HR:MN:SS**” display. Where **##.#** is the total accumulated volume and **HR:MN:SS** is the total time of gas flow since the last user reset. When disabled the volume display will be inactive and the gas flow accumulator will be disabled.
- **Metric Units?** – This parameter is used to select the units of measure for the gas flow rate. When set to “Yes” the units of measure is in Liters per Minute (LPM). When set to no, the units of measure are standard Cubic Feet per Hour (CFH).

- **DEVICE ID=** - This parameter sets the Modbus address ID number for the GTFM. This address is used to identify the Device when using the Modbus® serial communications protocol. Each sensor connected to the Modbus® network must have a unique ID number assigned. (Value Range 1 to 247)
- **Clear Log Timer?** – This Option is used to reset the accumulated gas flow timer used when the log option is enabled. When set to “Yes” the timer will be reset to 00:00:00.
- **Reset Volume?** – This option is used to reset the gas volume accumulator to zero. The accumulator is used when the Log mode is set to yes. Setting this option to “Yes” will clear the accumulated volume of gas to zero.
- **Filter TC = ##** - The parameter sets the filter time constant for the displayed gas flow. Increasing this value will decrease the fluctuation in the gas flow reading. This filter does not impact the peak readings or accumulated flow parameters. (Value Range from 1 to 255).

3.4 Battery Specifications

The portable GTFM is supplied with an internal, rechargeable battery. The battery will operate the GTFM continuously for approximately 8 hours when fully charged. The supplied plug-in the wall transformer will recharge the battery in approximately 8-10 hours. The GTFM can be operated while charging the battery. The battery charge status is displayed by the “CHRG” LED. When the LED is on the GTFM is charging the Battery or supplying power to the GTFM. When the charge is complete the LED is off. The LED will be on until the charge current drops below a C/10 rate or when the float charge timer has expired (22.5 minutes).

4.0 SETTING GAS FLOW CONTROL LIMITS

4.1 Description

To use the GTFM as a Sure-Flow gas switch, the user can set the **“Max Limit”** and **“Min Limit”**.

The GTFM will activate the internal fault relay as long as the gas flow remains above the lower limit and below the upper limit. If the gas flow rate moves outside of the control limits the fault relay will be deactivated. The **“Test Delay”** parameter is used to delay the start of high limit testing. The value of this parameter will determine when the GTFM will begin testing for the upper control limit after the gas flow is initiated. The lower limit is always being checked during the gas flow period. A high gas flow fault will only occur after this time period has expired.

4.2 Setup

To program the High/Low limits and test parameters press both “▼” and “▲” switch simultaneously to enter the **“Select Para INC/DEC”** mode. The first programmable parameter will appear on the display. To increment through the program menus press the “▲” button. To decrement through the menus press the “▼” button. To edit a menu option press both “▼” and “▲” switch simultaneously to enter the **“Edit Para INC/DEC”** mode. To increment the parameter press the “▲” button. To decrement the parameter press the “▼” button. To end the **“Edit Para INC/DEC”** press both “▼” and “▲” switch simultaneously to exit and return to the normal display mode.

5.0 GAS FLOW SURGE "PEAK" MEASUREMENT

5.1 Description

The GTFM has a peak value "sample and hold" feature. This allows the user to measure the maximum gas flow rate, which occurred during the welding cycle. The maximum value is the result of a gas surge, which occurs when the gas solenoid is activated. The trigger used to determine the time at peak is the "Max Limit" value. The time above this level is measured and displayed. Whenever the Flow rate exceeds this value the time is accumulated. When the flow stops the GTFM will display the Peak flow and the accumulated time above the max limit. When the flow starts again the values are cleared and new values are displayed.

5.2 Setup

To enable the Peak flow and set the High limits and test parameters press both "▼" and "▲" switch simultaneously to enter the **"Select Para INC/DEC"** mode. The first programmable parameter will appear on the display. To increment through the program menus press the "▲" button. To decrement through the menus press the "▼" button. Until the "Enable Peak?" option is displayed. To edit a menu option press both "▼" and "▲" switch simultaneously to enter the **"Edit Para INC/DEC"** mode. To toggle the option to "YES" press the "▲" button. To end the **"Edit Para INC/DEC"** press both "▼" and "▲" switch simultaneously to exit and return to the normal display mode. The "Peak= ### #.# sec" window will be displayed and the Peak function will be enabled.

6.0 GAS FLOW USAGE LOG

6.1 Description

The GTFM has a gas flow volume accumulator and gas flow accumulated timer which can be used to display total gas usage and Total gas flow Time. This function allows the user to measure the total cubic ft. or liters of gas used from the last time that the accumulator was reset. The maximum volume displayed is 6550.0 cubic ft. or cubic Liters. If the usage exceeds this value the accumulator will be reset to 0 and will count up from zero as the usage increases.

6.2 Setup

To enable the Log mode press both “▼” and “▲” switch simultaneously to enter the “**Select Para INC/DEC**” mode. The first programmable parameter will appear on the display. To increment through the program menus press the “▲” button. To decrement through the menus press the “▼” button until the “**Log Mode=**” option is displayed. To edit a menu option press both “▼” and “▲” switch simultaneously to enter the “**Edit Para INC/DEC**” mode. To toggle the option to “**On**” press the “▲” button. To end the “**Edit Para INC/DEC**” press both “▼” and “▲” switch simultaneously to exit and return to the normal display mode. The “**Tot Volume=###.#**” and the “**Total Time= HR:MN:SS**” will be displayed. Where **###.#** is the total accumulated volume and **HR:MN:SS** is the total time of gas flow since the last user reset. Log mode option will be enabled.

NOTE: THE GTFM PROVIDES A REASONABLE ESTIMATE OF SHIELDING GAS USAGE. HOWEVER, THIS NUMBER CANNOT BE CONSIDERED TO BE ABSOLUTE SINCE THE GTFM DOES NOT MEASURE OR MONITOR OTHER VARIABLES, WHICH MAY HAVE AN AFFECT ON GAS USAGE, SUCH AS PRESSURE AND TEMPERATURE.

6.3 Reset Log mode clock

To reset the Log mode clock press both “▼” and “▲” switch simultaneously to enter the “**Select Para INC/DEC**” mode. The first programmable parameter will appear on the display. To increment through the program menus press the “▲” button. To decrement through the menus press the “▼” button. Until the “**Clear Log Time?**” option is displayed. To edit a menu option press both “▼” and “▲” switch simultaneously to enter the “**Edit Para INC/DEC**” mode. To toggle the option to “**Yes**” press the “▲” button. To end the “**Edit Para INC/DEC**” press both “▼” and “▲” switch simultaneously to exit and return to the normal display mode. The “**Total Time=00:00:00**” will be reset to zero.

6.4 Reset Log mode volume

To reset the Log mode volume press both “▼” and “▲” switch simultaneously to enter the **“Select Para INC/DEC”** mode. The first programmable parameter will appear on the display. To increment through the program menus press the “▲” button. To decrement through the menus press the “▼” button. Until the **“Reset Volume?”** option is displayed. To edit a menu option press both “▼” and “▲” switch simultaneously to enter the **“Edit Para INC/DEC”** mode. To toggle the option to **“Yes”** presses the “▲” button. To end the **“Edit Para INC/DEC”** press both “▼” and “▲” switch simultaneously to exit and return to the normal display mode. The **“Tot Volume = 0.0”** will be reset to zero.

7.0 GTFM CONNECTOR PIN ASSIGNMENT

7.1 AUX Connector

The following is the pin out for the AUX Connector.

Pin No.	Function
1 (WHT)	Modbus RS-485 D+ serial port
2 (BRN)	User supplied Power Input VIN+ (12-28 VDC @100 ma)
3 (GRN)	CR-A - Will be active when gas flow is within programmed limits.
4 (YEL)	CR-B – Will be active when gas flow is within programmed limits.
5 (GRY)	User supply power common VCOM
6 (PNK)	Modbus RS485 and Vout analog common
7 (BLU)	Modbus RS-485 D- serial port
8 (RED)	Gas Flow Analog output VOUT+ (0.00 – 2.55 vdc)

8.0 CHANGING THE BATTERY AND POWER OPTIONS

8.1 CHANGING THE BATTERY

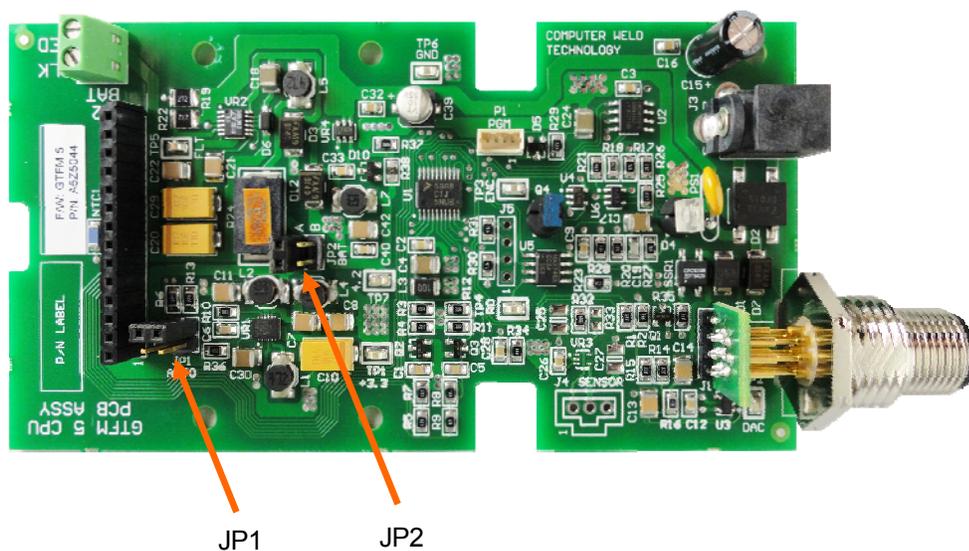
To open the unit, remove the eight screws on the sides of the box. Do not remove the two socket screws in the brass fittings on each side of the box where the inlet/outlet holes are. Carefully lift the cover off. To remove the battery from terminal block J1 loosen the two terminal screws and remove the battery wires. To install the new battery pack, connect the Black wire into the terminal marked "BLK" and tighten the screw terminal. Connect the Red wire into the terminal marked "RED" then tighten the terminal screw. Make sure that the Red wire is in the terminal marked "RED" on the P.C. board and the Black Wire is in the terminal marked "BLK" on the P.C. board. Reinstall the cover and the eight mounting screws.

CWT Replacement Part - P/N X3B5013 - 4.1V Rechargeable Battery

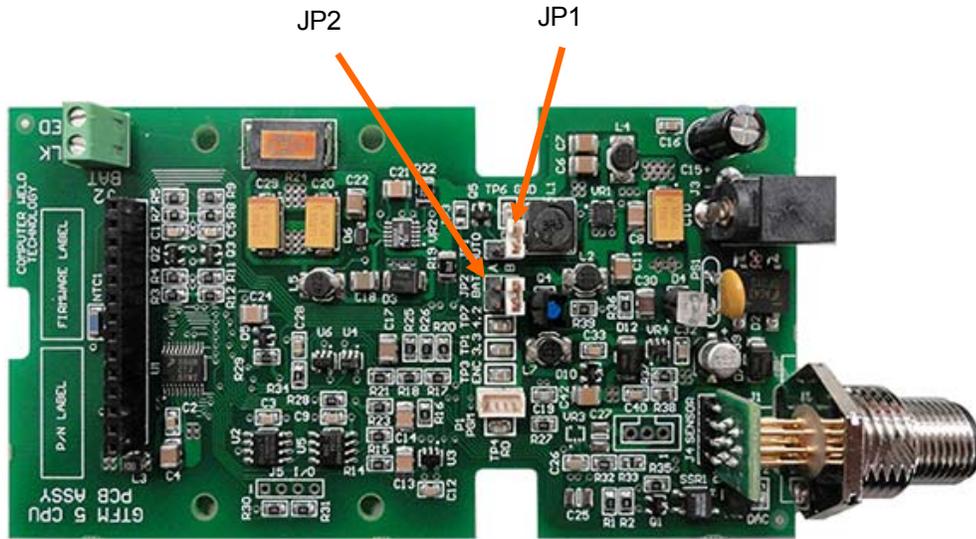
8.2 POWER SUPPLY OPTIONS

The GTFM V can be used as a Battery Powered device or installed in-line and powered from a Plug-in Wall power supply or user supplied 12 - 24 Vdc power supply. To switch from battery power to external power the user will need to move the internal jumper JP2-A to JP2-B.

To enable the "Auto Power Up" function, move the jumper on JP1-A to JP1-B. When the jumper is on A the power switch will turn the GTFM On/Off. When the jumper is installed on B the GTFM will power up when the external power is applied.



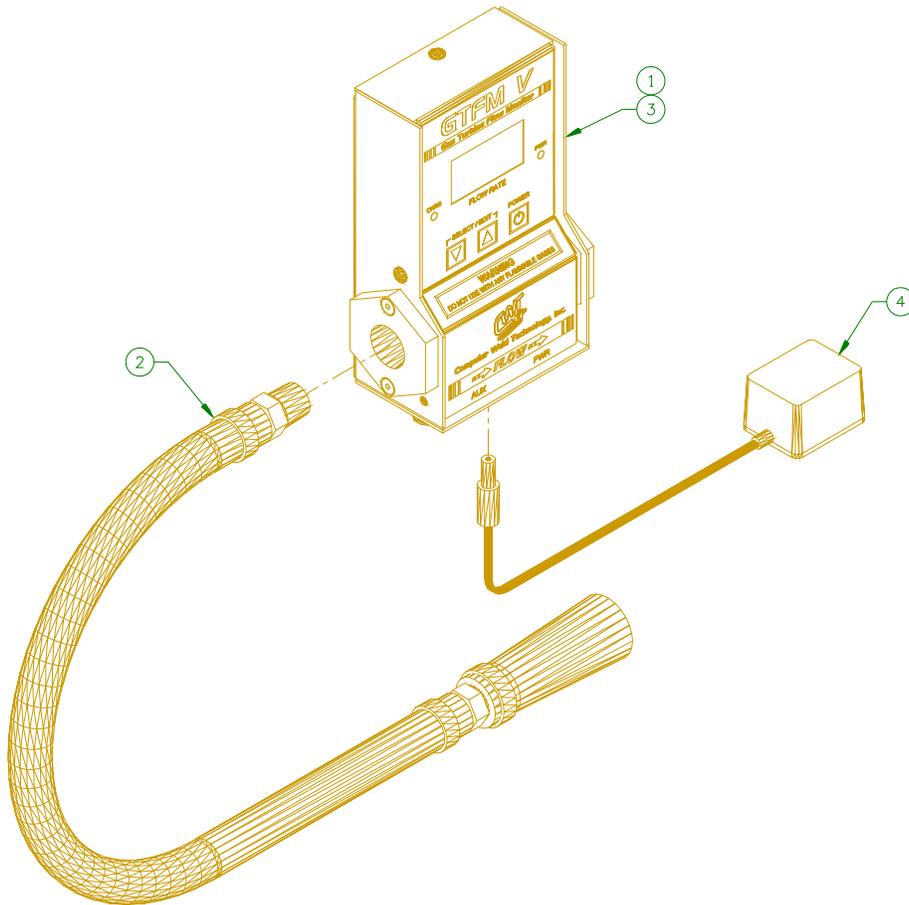
ADM V CPU PCB Assembly - Revision: C



ADM V CPU PCB Assembly - Revision: D

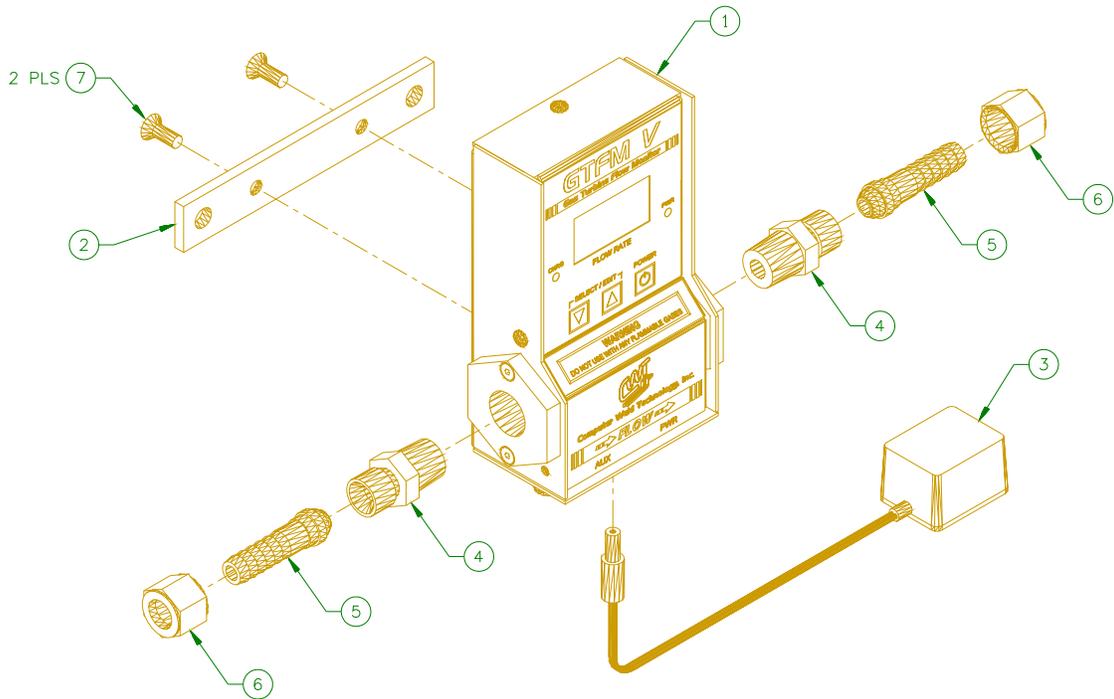
9.0 MODEL SPECIFICATIONS

9.1 120/240 VAC Portable GTFM V™ System P/N: A0A0138



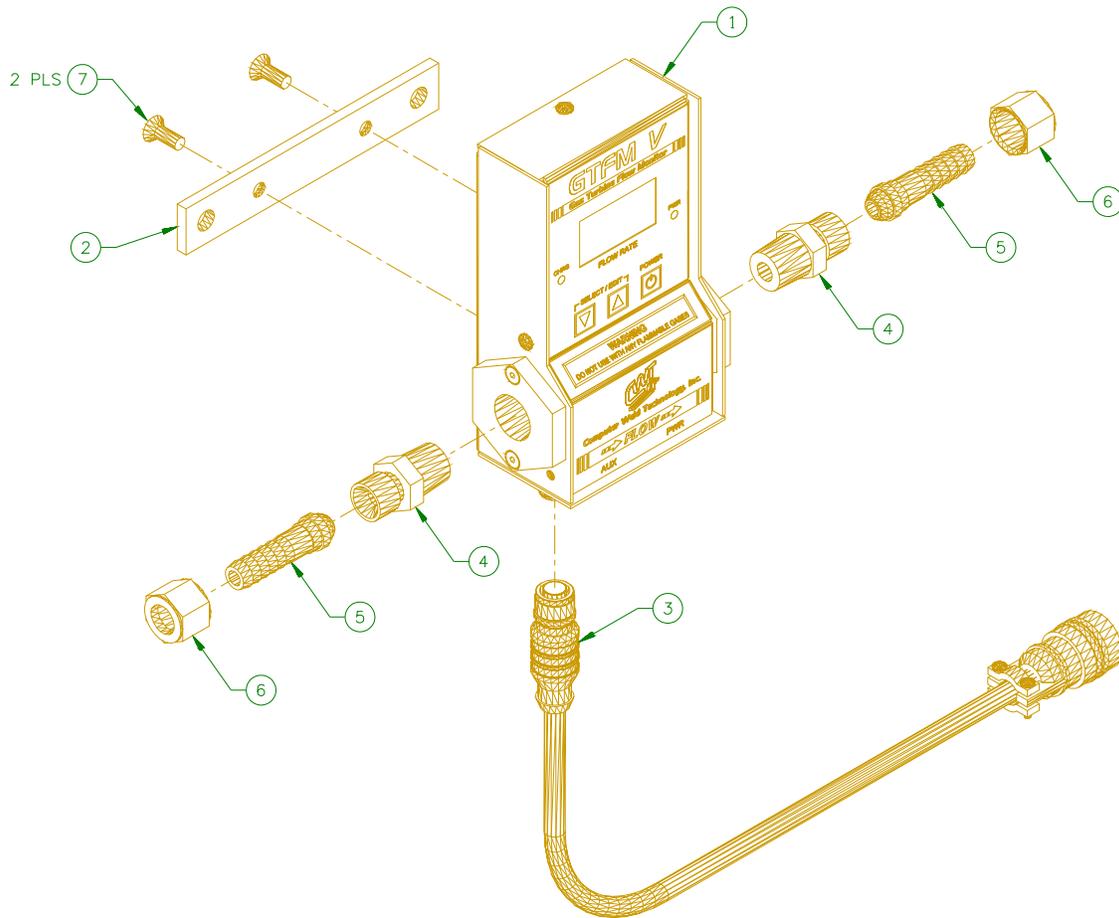
ITEM	QTY	PART NO	DESCRIPTION
1	1	A3A0259	GTFM Enclosure Assembly
2	1	A2M0170	Hose/Cone Assembly
3	1	X3B5013	Rechargeable Battery
4	1	X3T5089	12VDC Universal Switching Power Supply

9.2 120/240 VAC In-Line GTFM V™ System P/N: A0A0139



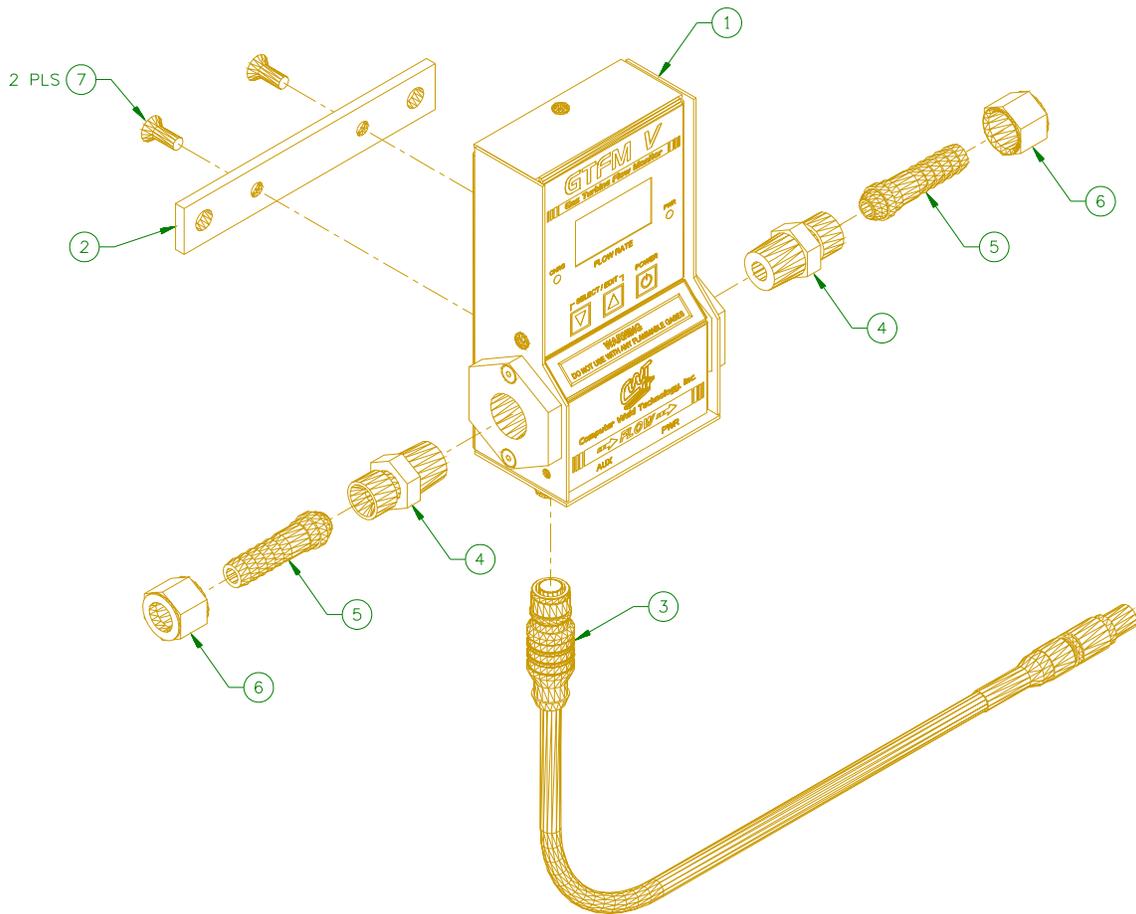
ITEM	QTY	PART NO	DESCRIPTION
1	1	A3A0259	GTFM5 Enclosure Assembly
2	1	A3E0104	GTFM Mounting Bar
3	1	X3T5089	12VDC Universal Switching Power Supply
4	2	X6F5093	Adaptor Fitting
5	2	X6F5094	Barb Fitting
6	2	X6F5095	"B" Size Nut
7	2		#10-32 x 1/2" Lg. Socket Flat Hd. Screw

9.3 ADM IV™ GTFM V™ System P/N: A0A0140



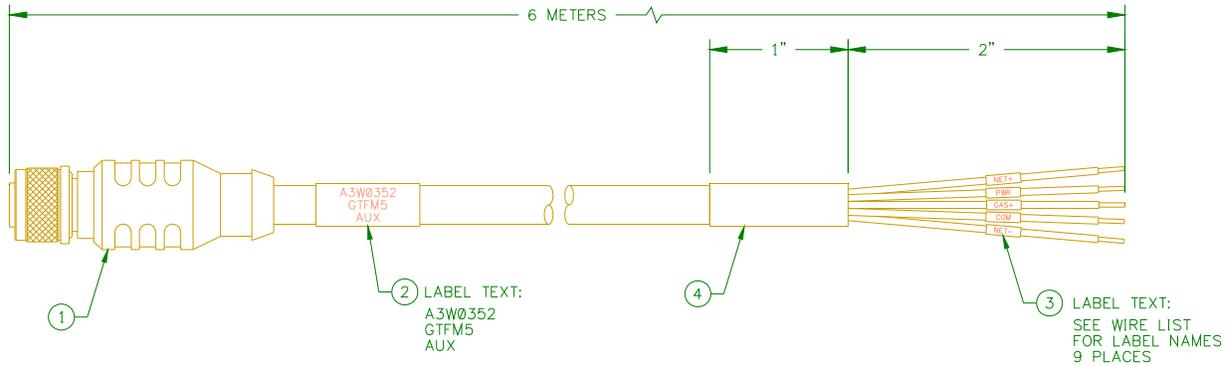
ITEM	QTY	PART NO	DESCRIPTION
1	1	A3A0259	GTFM Enclosure Assembly
2	1	A3E0104	GTFM4 Mounting Bar
3	1	A3W0350	ADM4 – GTFM5 Sensor Cable
4	2	X6F5093	Adaptor Fitting
5	2	X6F5094	Barb Fitting
6	2	X6F5095	"B" Size Nut
7	2		#10-32 x 1/2" Lg. Socket Flat Hd. Screw

9.4 WDL II™ GTFM V™ System P/N: A0A0141



ITEM	QTY	PART NO	DESCRIPTION
1	1	A3A0259	GTFM Enclosure Assembly
2	1	A3E0104	GTFM4 Mounting Bar
3	1	A3W0351	WDL2 – GTFM5 Sensor Cable
4	2	X6F5093	Adaptor Fitting
5	2	X6F5094	Barb Fitting
6	2	X6F5095	"B" Size Nut
7	2		#10-32 x 1/2" Lg. Socket Flat Hd. Screw

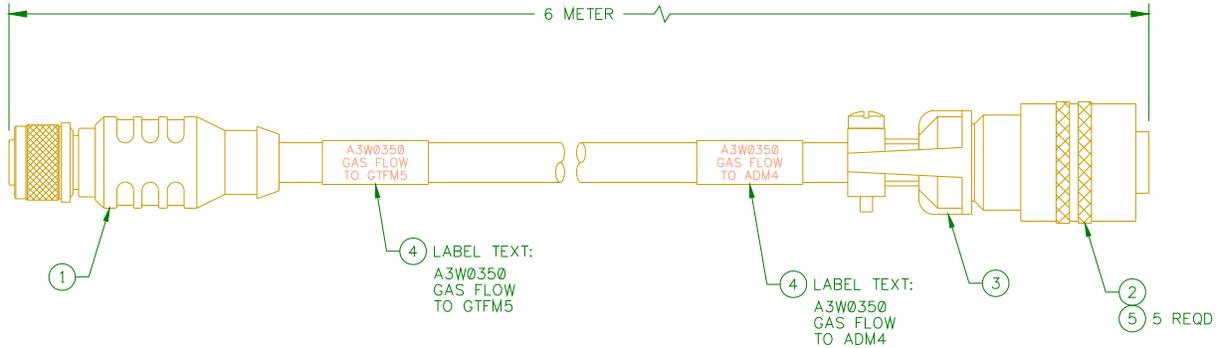
9.5 GTFM V™ Aux Cable P/N: A3W0352



ITEM	QTY	PART NO	DESCRIPTION
1	1	X3W5118	8 Conductor Shielded Cable
2	1		Cable Label Sleeve
3	9		Wire Label Sleeve
4	1		Heat Shrink Tubing

WIRE COLOR	FROM	DESCRIPTION
White	Pin 1	Net+
Brown	Pin 2	Power In (12 – 28 VDC)
Green	Pin 3	Relay CR-A
Yellow	Pin 4	Relay CR-B
Grey	Pin 5	Power Common
Pink	Pin 6	Sensor Vout common
Blue	Pin 7	Net-
Red	Pin 8	Sensor Vout+ (0 – 2.55 VDC)
Shield	Conn Ring	Earth

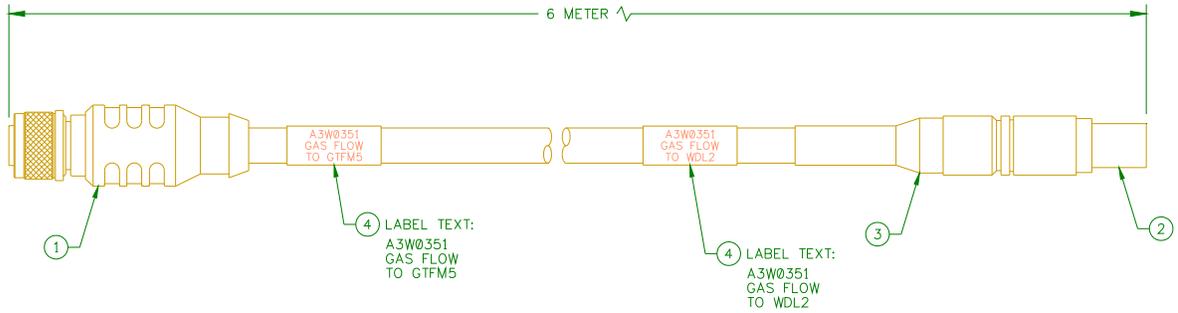
9.6 ADM IV™ GTFM V™ Sensor Cable P/N: A3W0350



ITEM	QTY	PART NO	DESCRIPTION
1	1	X3W5118	8 Conductor Shielded Cable
2	1	X3P5606	Plug 6 Circuit Connector
3	1	X3P5588	Cable Clamp
4	2		Cable Label Sleeve
5	5		Heat Shrink Tubing

WIRE COLOR	FROM	TO	DESCRIPTION
White	Item 1 Pin 1	Not Connected	Net+
Brown	Item 1 Pin 2	Item 2 Pin A	Power In (12 – 28 VDC)
Green	Item 1 Pin 3	Not Connected	Relay CR-A
Yellow	Item 1 Pin 4	Not Connected	Relay CR-B
Grey	Item 1 Pin 5	Item 2 Pin E	Power Common
Pink	Item 1 Pin 6	Item 2 Pin C	Sensor Vout common
Blue	Item 1 Pin 7	Not Connected	Net-
Red	Item 1 Pin 8	Item 2 Pin B	Sensor Vout+ (0 – 2.55 VDC)
Shield	Conn Ring	Item 2 Pin F	Earth

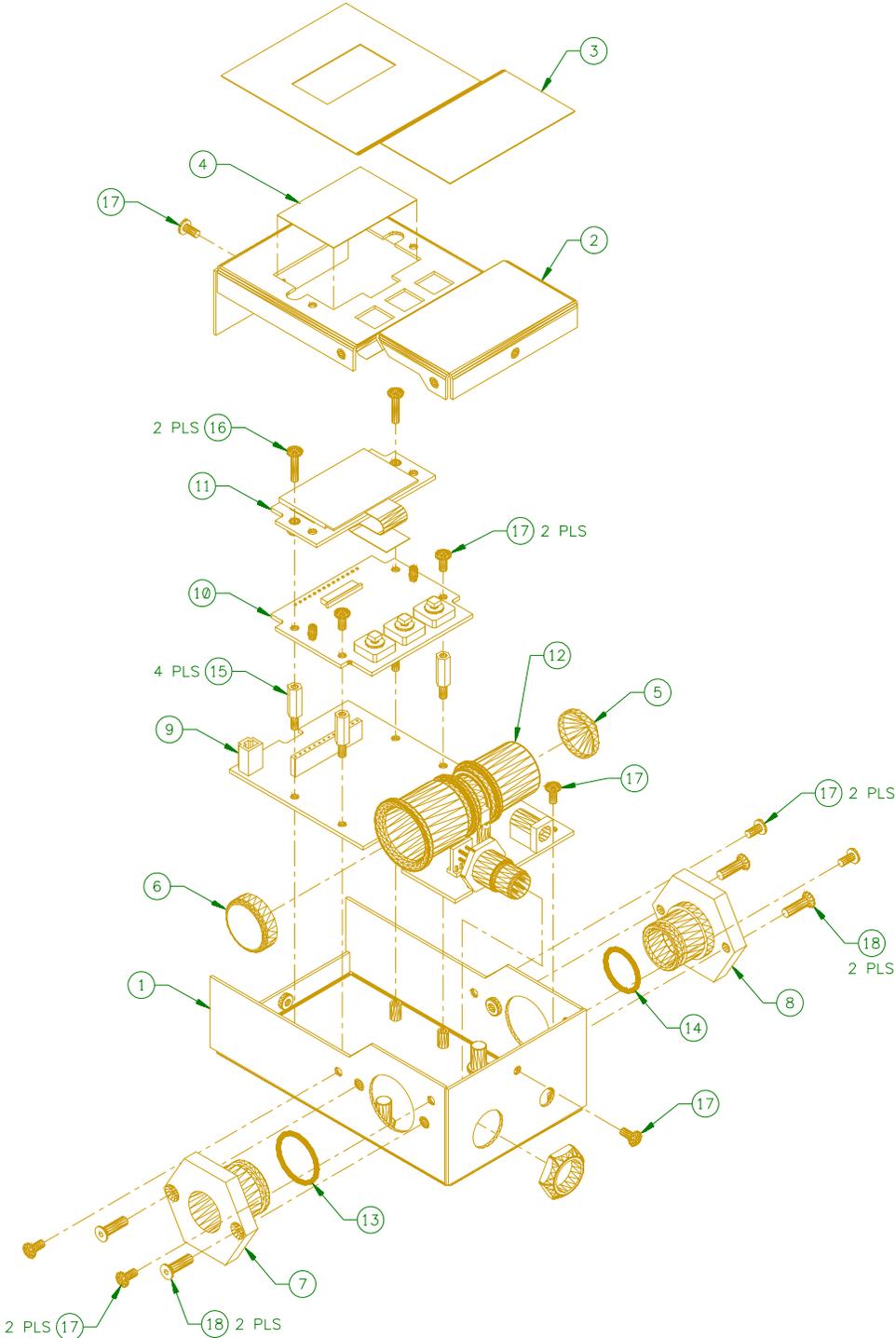
9.7 WDL II™ GTFM V™ Sensor Cable P/N: A3W0351



ITEM	QTY	PART NO	DESCRIPTION
1	1	X3W5118	8 Conductor Shielded Cable
2	1	X3P5682	Plug 6 Circuit Connector
3	1	X3P5629	Yellow Strain Relief
4	2		Cable Label Sleeve

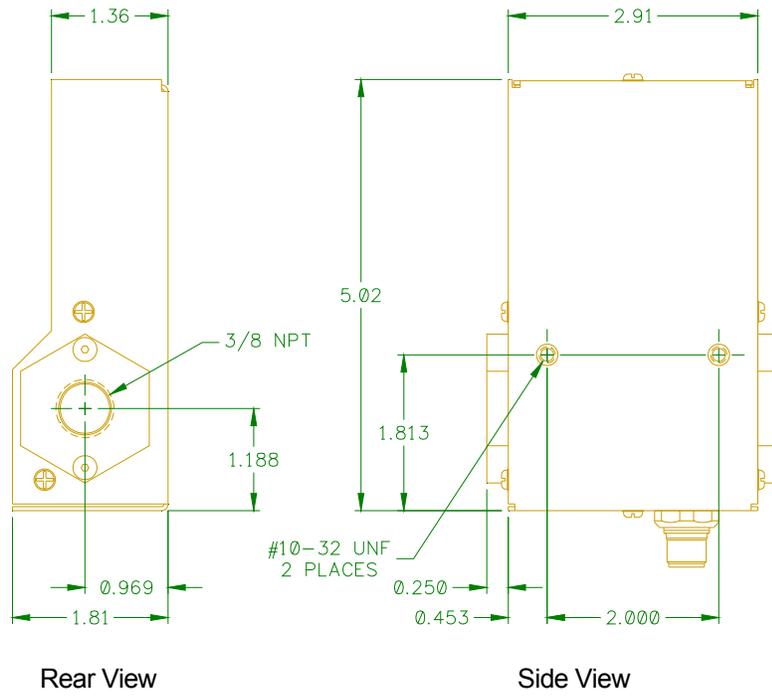
WIRE COLOR	FROM	TO	DESCRIPTION
White	Item 1 Pin 1	Not Connected	Net+
Brown	Item 1 Pin 2	Item 2 Pin 1	Power In (12 – 28 VDC)
Green	Item 1 Pin 3	Not Connected	Relay CR-A
Yellow	Item 1 Pin 4	Not Connected	Relay CR-B
Grey	Item 1 Pin 5	Item 2 Pin 5	Power Common
Pink	Item 1 Pin 6	Item 2 Pin 3	Sensor Vout common
Blue	Item 1 Pin 7	Not Connected	Net-
Red	Item 1 Pin 8	Item 2 Pin 2	Sensor Vout+ (0 – 2.55 VDC)
Shield	Conn Ring	Item 2 Pin 6	Earth

9.8 GTFM V™ Enclosure P/N: A3A0259

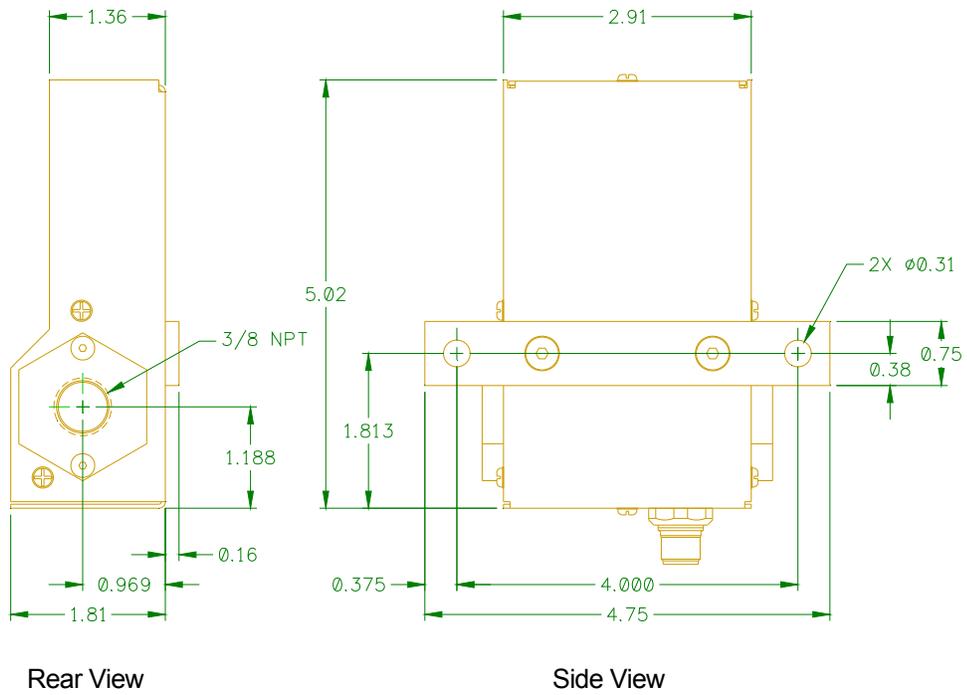


ITEM	QTY	PART NO	DESCRIPTION
1	1	A3E0176	GTFM5 Enclosure Base
2	1	A3E0177	GTFM5 Enclosure Cover
3	1	A3E0178	GTFM5 Enclosure Overlay
4	1	A3E0179	GTFM5 Display Lens
5	1	A2M0191	GTFM Small Screen
6	1	A2M0192	GTFM Large Screen
7	1	A2M0195	GTFM5 Inlet Adaptor
8	1	A2M0196	GTFM5 Outlet Adaptor
9	1	A5A0140	GTFM5 Dual PCB Assembly
10	1	A5A0141	GTFM5 Display Control PCB Assembly
11	1	A5A0142	GTFM5 Display Holder PCB Assembly
12	1	X3Q5002	Flow Cartridge
13	1	X4S0100	O-Ring
14	1	X4S5001	O-Ring
15	4	X6S5053	Standoff
16	2		#4-40 x 1/2" Pan Head Screw w/ Lock Washer
17	9		#4-40 x 1/4" Pan Head Screw w/ Lock Washer
18	4		#6-32 x 1/2" Socket Flat Head Screw

9.9 GTFM V™ Mounting Dimensions



Installation with Threaded Inserts



Installation with Mounting Bar

10.0 MODBUS SCIFICATIONS

10.1 GTFM V MODBUS REGISTER DATA

This document provides the basic Modbus memory map and command structure for the GTFM V RS-485 communications port. The GTFM V supports the Modbus Protocol as specified in the Modicon Technical publications "Modbus Protocol" (intr7.html). The GTFM V control does not support the Broadcast mode. The controller provides the slave side communications routines for the RTU mode. The user must set the Slave ID to 1-247 the default ID is set to 1. Default Baud rate is 19.2 K baud with 8 data bits, One Stop and no parity. The following Modbus commands are supported:

CODE	DESCRIPTION	ADDRESS RANGE
01	Read Coil Status	1-49
03	Read Holding Registers	1-124
05	Force Single Coil	1-49
06	Preset Single Register	1-124
15	Force Multiple Coils	1-49
16	Preset Multiple Registers	1-124
17	Report Slave ID	5 bytes

All Modbus Register values are word sized unsigned integer unless otherwise indicate.

10.2 MODBUS COILS CR [1..16]

INPMSK - Simulated Relay Inputs CR [1...8]

- Bit 0 = Enable Log Mode
- Bit 1 = Enable Metric
- Bit 2 = Enable Alarms
- Bit 3 = Reset Volume
- Bit 4 = Reset RTC
- Bit 5 = Spare 1 – Not used
- Bit 6 = Spare 2 – Not used
- Bit 7 = Spare 3 – Not Used

RELMSK - Simulated Outputs CR [9...16]

- Bit 0 = System Ready Output
- Bit 1 = Gas Flow Active
- Bit 2 = Gas Flow Low Limit
- Bit 3 = Gas Flow Ok – Hardware SSR Relay Output
- Bit 4 = Gas Flow High Limit
- Bit 5 = Low Gas Volume level alarm
- Bit 6 = Spare 4 – Not used
- Bit 7 = Spare 5 – Not used

10.3 MODBUS REGISTER REG [1..10]

REG NO.	MNEMONIC	FORMAT	PARAMETER DESCRIPTION
1	GASFLOW	###	Gas flow rate
2	MAXLMT	###	Max Gas Flow Alarm Limit
3	MINLMT	###	Low Gas flow Alarm Limit
4	MINVOL	#####	Low Volume Alarm (Not Enabled)
5	ACCVOL	#####.#	Accumulated Gas Flow since last reset
6	RTCHR	#####	Total Gas Flow hours since last reset
7	RTCMIN:SEC	##.##	Total Minutes (MSB) and Seconds(LSB)
8	PKFLOW	###	Peak Gas flow rate for last Flow period
9	PKTIME	###.##	Peak Flow rate Time for last flow period
10	SPARE1	#####	Spare REG – Not used

10.4 MODBUS SERIAL PORT CONNECTIONS

To use the Modbus communications port the user must connect a suitable RS-485 driver and Modbus host device to the GTFM V Auxiliary cable A3W0352. Connect the RS-485 driver output “A/(TxD-/RxD-)” to the “BLUE” (Pin 7) wire. Connect the RS-485 driver output “B/(TxD+/RxD+) ” to the WHITE (Pin 1) wire. Connect the RS-485 driver output “COM” to the “PINK” (Pin 6) wire. The RS-485 driver “COM” should also be connected to the user supplied GTFM V Power Input common.

The following is the pin out for the GTFM V AUX Cable (P/N: A3W0352).

Pin No.	Wire Color	Function
1	WHITE	Modbus RS-485 B(TxD+/RxD+) serial port
2	BROWN	User supplied Power Input VIN+ (12-28 VDC @100 ma)
3	GREEN	CR-A - Will be active when gas flow is within programmed limits.
4	YELLOW	CR-B – Will be active when gas flow is within programmed limits.
5	GREY	User supply power common VCOM
6	PINK	Modbus RS485 and Vout analog common
7	BLUE	Modbus RS-485 A(TxD-/RxD-) serial port
8	RED	Gas Flow Analog output VOUT+ (0.00 – 2.55 vdc)