

MEMS MASS FLOW METER

TFM5700 TOF Series

User Manual

Rev 3.4



Thermal Time-of-flight



Please read this entire manual before using this product.

MEMS MASS Flow Meters

TFM 5700 TOF Series

Quick User Manual

Document No. TFM-5700IM

Issue date: 2021.04

Revision: 3.1 Added wire color notes and notes on Offset Function
Updated ModBus instructions

NOTICES

1. This meter is manufactured for general purpose industrial applications for flow measurements. Do not alter any hardware and software of the product. Any user modifications may cause product damage.
2. All practices for electronic device safety must be observed.
3. Do not use this product in any environment where human safety may be at risk.
4. Only qualified personnel from TacticalFlowMeter.com can perform troubleshooting, TacticalFlowMeter.com is otherwise not liable for any consequences created by customer alteration or mis-use of the product.

SAFETY PRECAUTIONS

1. The product can be utilized to measure and/or monitor in-line mass flow rate of any clean, dry and preferably gases with constant concentration in industrial applications. For other special gases or variable concentration gases, the product may not function properly or even can be damaged. Please contact Tactical Flow Meter for further information.
2. The operational environments of the product are shown in the product specification section. If the product is used for other applications, the product may not function properly or can even be damaged.
3. Operation, installation, storage, and maintenance of the product must strictly follow the instructions illustrated in this user manual. Otherwise, unintended damage and even injuries or other severe results may occur. All installation, storage, and maintenance of the product must be performed by skilled workers. This user manual should be kept near the product for easy reference.
4. Before using the product, the user should read this user manual completely and in detail so that the user is well versed in all the important instructions. It is recommended that the product be re-calibrated and serviced once every two years, as the elements are nearly digital and do not drift with time.

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TacticalFlowMeter.com designs, develops, and manufactures the world leading MEMS mass flow sensing products for various applications in gas flow monitoring, measurement and control. This manual provides the instructions for proper use of the TFM-5700 series of products, including installation, maintenance, and troubleshooting. For customization or other product related questions, please contact the manufacture or visit www.TacticalFlowMeter.com

Features

- ✎ Proprietary thermal time-of-flight sensing indicates true mass flow
- ✎ Automatic temperature and pressure compensation
- ✎ High sensitivity for very low flow measurement
- ✎ Excellent turndown of 100:1 and above
- ✎ Supports multiple gas measurements and customizable user calibration
- ✎ Instant, Rate, flow rate and Total, accumulated, flow rate
- ✎ Remote communication with RS485 Modbus and 4-20mA output
- ✎ Easy User Configuration Setup and data access with front panel 3 button user interface
- ✎ Customer configurable alarms
- ✎ IP 66 /NEMA 4X protection

Applications



Industrial



Food



Tobacco



Chemistry



Beverage



Glass



Agriculture



Research

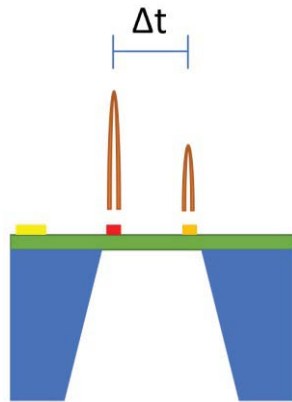


Pharmaceuticals

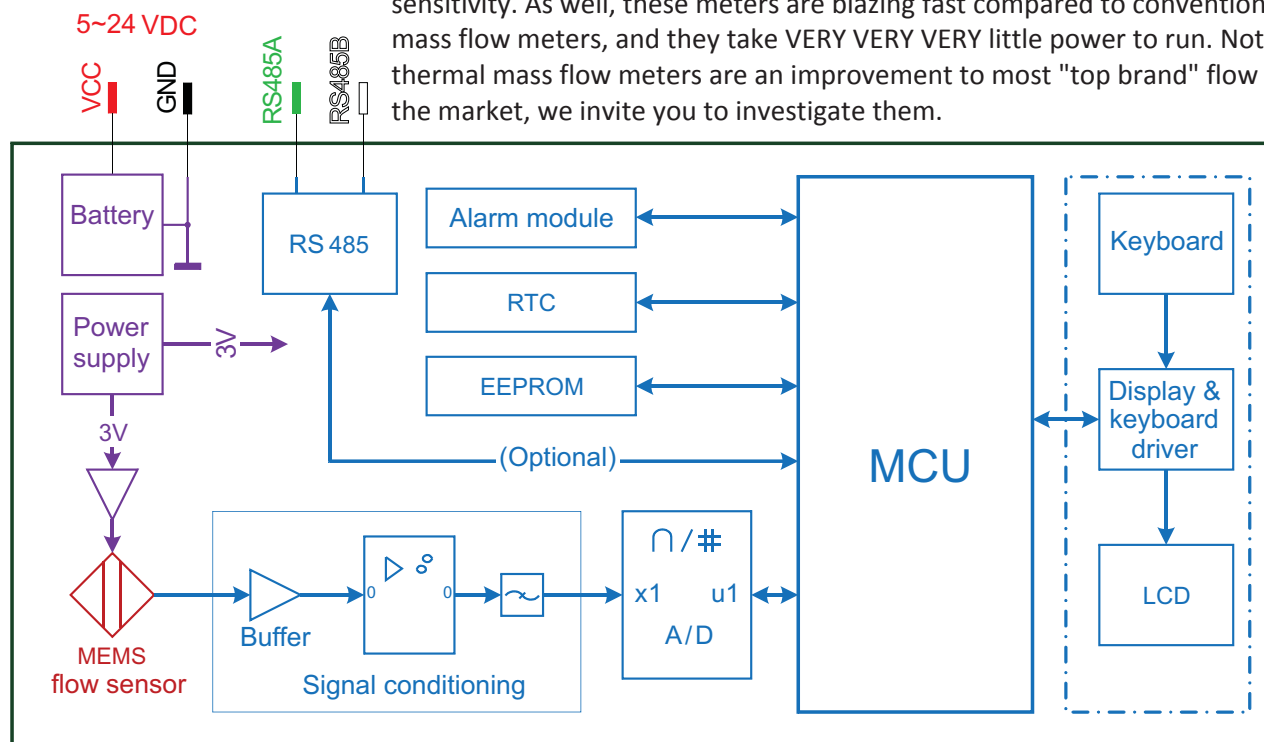


Instrumentation

Principle of Operation



Schematic Overview



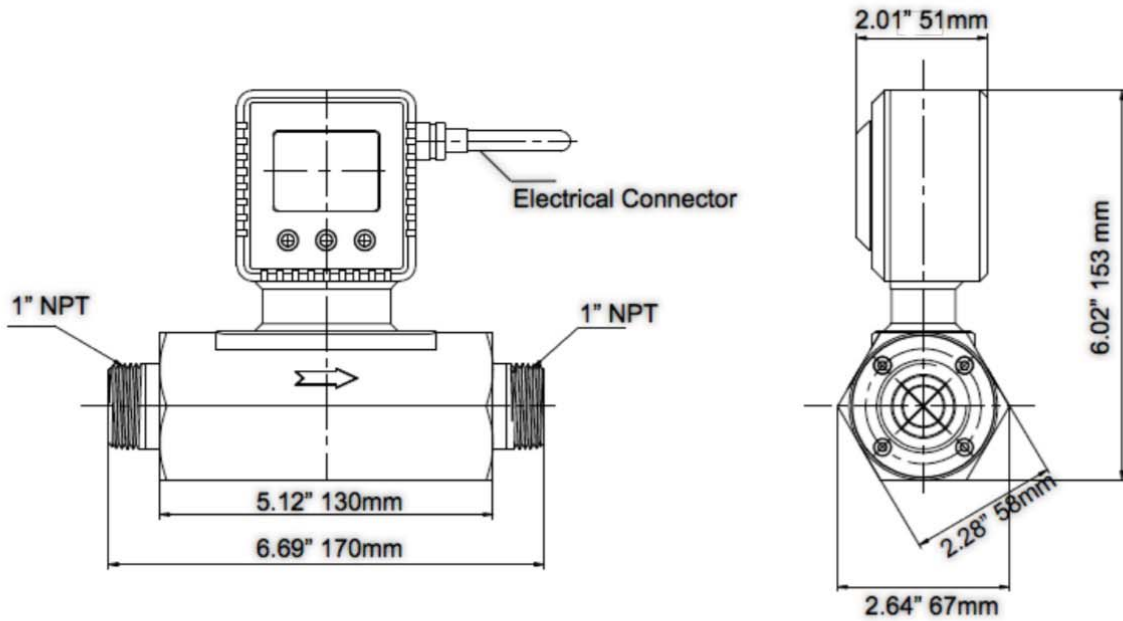
TFM-5700 series TOF Mass Flow meters feature our proprietary and state-of-the-art MEMS thermal time-of-flight mass sensor installed in a laminar flow channel that forms a boundary layer ensuring laminar flow exists in the desired measurement area. The flow measurement, using our innovative time of flight MEMS technology, provides superior accuracy over conventional thermal mass flow meters. We utilize a a very low power micro heater that is pulsed where we measure the time the pulse takes to arrive at the measuring point located a precise distance away. The flow meter is a "mass velocity measuring machine" that measures the gas thermal properties to extract the density for true Mass Flow Rate Indication.

Why is this an improvement over conventional Thermal Mass Flow Meters?

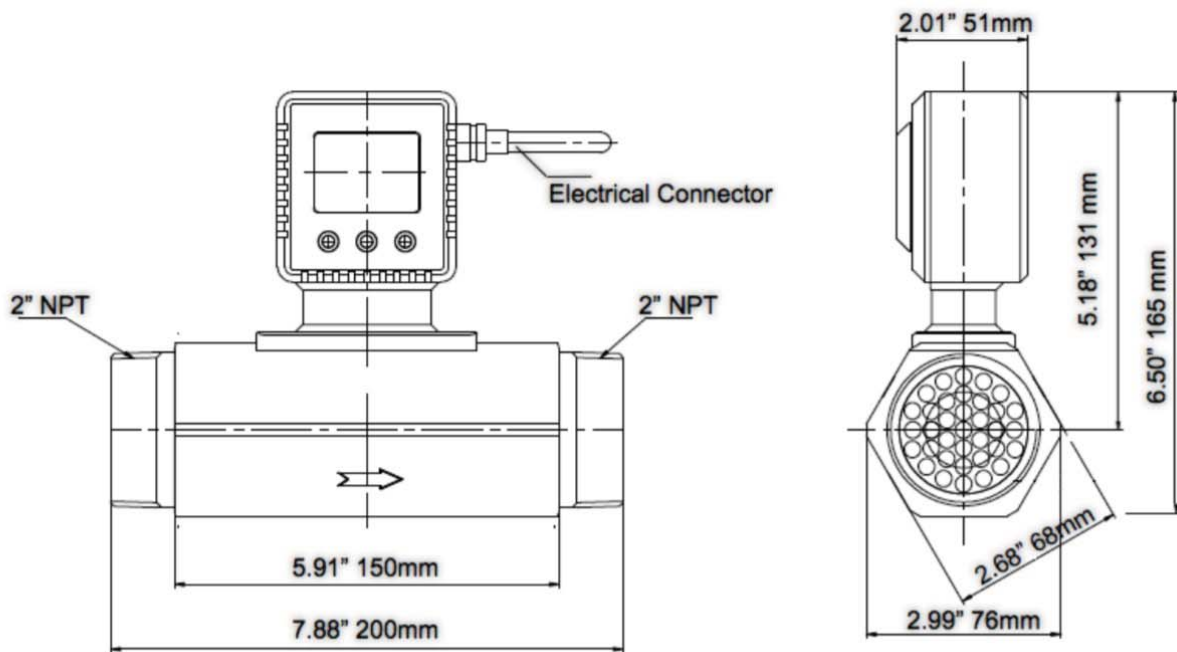
Conventional thermal mass flow meters have sensitivity to the thermal properties of the gas as well as to the gas flow conditions. Our time of flight meter, utilizing the time of flight of micro pulses of thermal bursts of energy, has no sensitivity to temperature or gas properties when the system is "zeroed" in the desired gas. It is a pure "mass velocity" measuring machine that does not care about gas temperature or composition. Consider conventional thermal mass flow meters you may have used in the past that have to be calibrated for the specific gas and do not do well when the temperature of the gas changes rapidly. This series of Mass Flow Meters has no such sensitivity. As well, these meters are blazing fast compared to conventional thermal mass flow meters, and they take VERY VERY VERY little power to run. Note: Our thermal mass flow meters are an improvement to most "top brand" flow meters on the market, we invite you to investigate them.

Dimensions

1" Meter Dimensions



2" Meter Dimensions



Installation

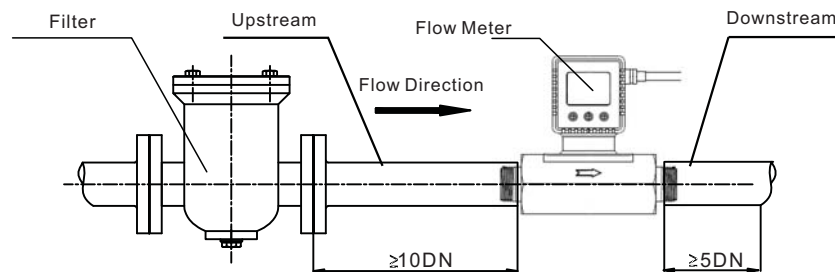
The flow meter is fully inspected at the time of shipment for product quality and meets all safety requirements. Additional safety measures during the installation should be applied. This includes, but is not limited to leak testing procedures, standard EDS (electrostatic discharge) precautions, DC voltage precautions, and installation precautions. Other tasks such as calibration, parts replacement, repair, and maintenance must only be performed by trained personnel. Upon request, manufacturer will provide necessary technical support and/or training of the personnel for larger orders.

Do not take the meter apart or alter any part of the product. Any such actions will void the warranty and release our liability for any damages thereafter.

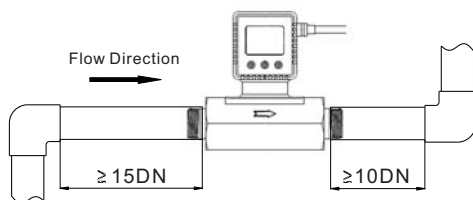
The product should ideally be installed horizontally. Flow direction should be aligned with the arrow mark on the meter body. If the flow fluid has any particles or debris, a filter is strongly recommended to be installed upstream of the meter.

Use the following steps to complete the installation:

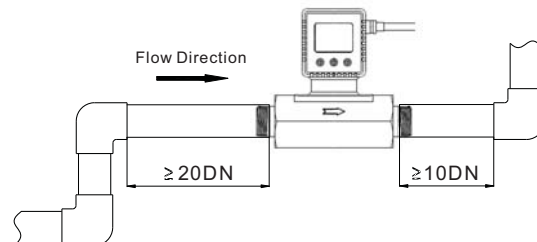
- a) Upon opening the package, the product physical integrity should be inspected to ensure no visual damage.
- b) Before installation of the product, please ensure that any pipe debris or particles or any other foreign materials are completely removed.
- c) Cautions during installation:
 - (i) We suggest to install the inlet end of the meter first, and then the outlet end of the meter; To ensure the measurement accuracy, an upstream straight pipe of length no less than 10DN and a downstream straight pipe of length no less than 5DN should be in place. Of course installation configuration may dictate otherwise. The Inlet upstream is more important than the downstream value.



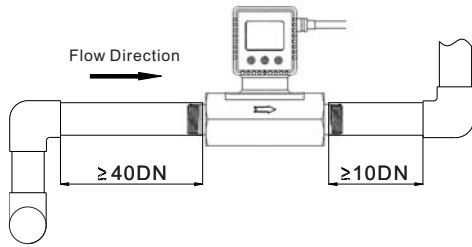
- (ii) If there is requirement for different pipe sizes at either upstream or downstream, the size of the pipe diameters should be larger than that of the meter size. Please see details as below:



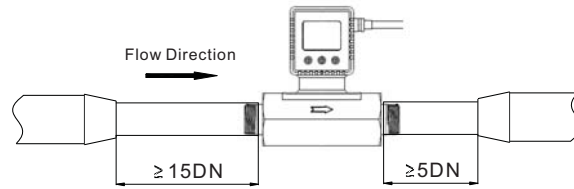
(a) 90 degree elbow or T-piece



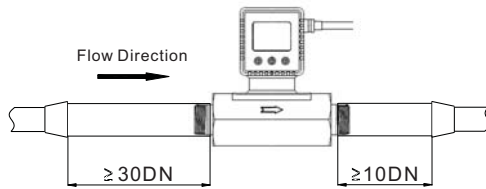
(b) 2 x 90 degree elbow



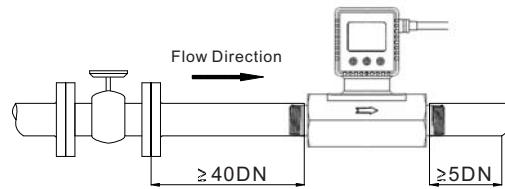
(c) 2 x 90 degree elbow, 3-dimensional



(d) Reduction



(e) Expansion



(f) Control valve

(iii) During installation, please make sure no foreign materials (such as water, oil, dirt, particles, etc.) enter into the pipe.

d) Connect electrical wires for power, and then electrical wires for inputs/outputs. Please pay special attention to power supply range (i.e., 5 -24 VDC) and power supply polarity. (see the description in Electrical Interfaces in this manual).

e) When connecting the communication wires, please make sure that the wires are correctly connected to the proper ports on your data device/equipment. For ModBUS RTU we have A and B terminals available.

f) Turn on the power supply, and make sure that the LCD works correctly. It will initialize invoking a Self Check showing Slave ID and the software version.

g) Slowly open the valves at the both ends of the pipeline, and the meter should then start to measure the flow in the pipeline

h) The meter may now be utilized.

Cautions

a) Do not take the meter apart as this will void the warranty.

b) Ensure all electrical wires for the power, and inputs/outputs are properly connected.

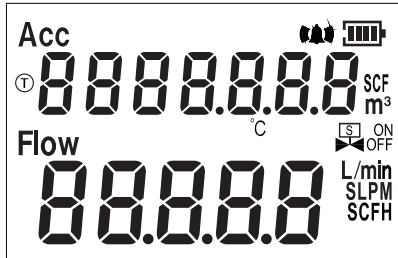
c) Ensure there are no stresses exerted on the flow meter fittings.

d) Avoid proximity to strong electromagnetic sources or vibration to the flow body or pipeline.

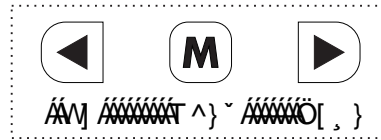
e) Slowly open/close valves to prevent abrupt flow pulse, or pressure waves, which may damage the product.

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1. Interface illustration



The User Interface includes *total flow, instant flow, temperature, alarm, battery status, valve status, menu and other process data during setup*. See the graphic at the left for details. There are 3 keys on the front of the meter enclosure:



2. Operation

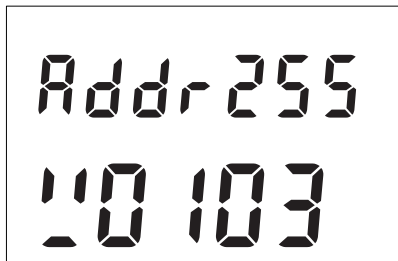
The following describes the details for the user interface. Please read carefully,

2.1 Display at default operation

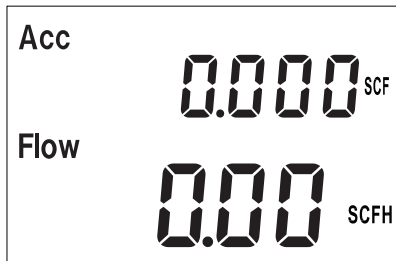
Upon power on, the meter will start self-check. Upon self-check, the meter will show the RS485 Modbus address (255) and the firmware version (V0103).

After self-check, the meter will display the accumulated, total, flow mode, accumulated flow or total unit is SCF, instant flow unit is SCFH.

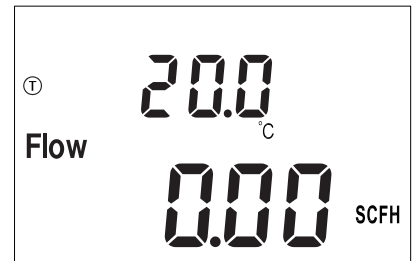
Briefly press **M** key, and the meter will switch to temperature mode, temperature units are in °C.



Self check screen



Accumulated/Total & Instant flow mode



Temperature & Instant Flow mode

2.2 Password Input

In the default operation display, press the **M** key, to enter into the password verification interface. Input the correct password, the *Setup Menu* will display. If the password is incorrect, the display will not change. For your first time use, the default factory password is



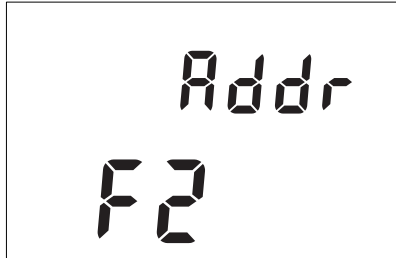
To enter the password, press **←** or **→** key to change the flashing digit when it flashes, and press **M** key to confirm the entry. Repeat this process for all 5 digits and the meter will enter the menu interface.

Note: During password input, the flow measurements will not be interrupted.

2.3 Modbus address, Slave ID, setting

When the meter completes the “password verification”, the following menus may be accessed:

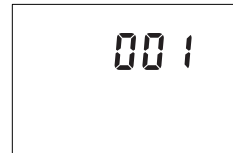
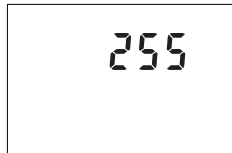
F2-Addr	F31-UnT-A	F51-ALm-H	F91-PASS
F3-bPS	F32-UnT-F	F52-ALm-L	F92-CLr-A
F11-oFFST	F39-dISP	F53-ALm-A	F99-qUIT
F12-GCF			



The main menu will show **F2 Addr**. ModBus Address, Same as Slave ID

The meter address cuses 3 digits, and can be any value from 001 to 255 Press ◀ or ▶ key to change the digit when it flashes, and press (M) key to confirm the change. Slave ID 157 if for factory only.

After the last digit, press (M) key, the meter will return to **F2 Addr** menu.



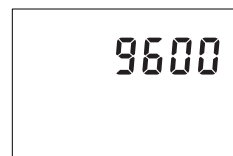
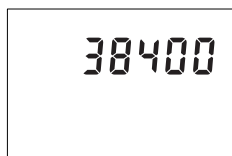
2.4 RS485 communication BAUD rate setting



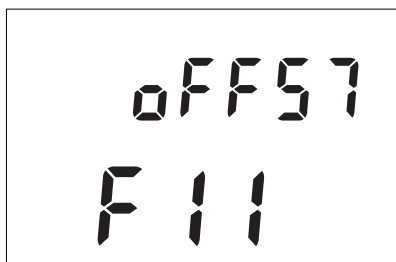
Press ▲ or ▼ key to switch to **F3 bPS**, for ModBUS RS485 communication BAUD rate setting.

Press (M) key and the meter will show current BAUD rate. Press ◀ or ▶ key to choose other BAUD rate, **4800, 9600, 19200, 38400, 57600, or 115200**. Note: 9600 BAUD is default

Press (M) key to confirm and return to **F3 bPS** menu.

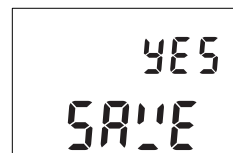
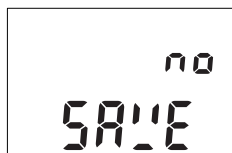


2.5 Offset calibration



Press ◀ or ▶ key, switch to **F11 oFFST**, to invoke offset calibration

Press (M) key, the meter will then show **SAVE-no** or **SAVE-yES**. Press or (M) key to confirmation and return to **F11 oFFST** menu. Save with YES, abort with no. <<<CAUTION>> Only invoke this function when the flow rate is ZERO. This function is used to determine the gas properties, such as density and thermal diffusivity, at the ZERO condition. Setting the Offset with flow will alter the calibration significantly.



2.6 GCF setting

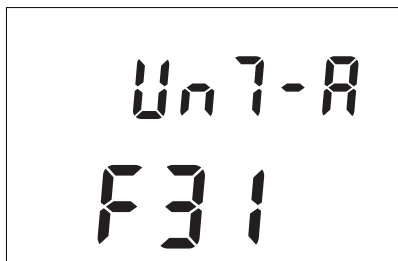


Press ◀ or ▶ key, switch to **F12 GCF**, for the GCF setting.

Press **M** key, the meter will show current GCF. Change to a new value, press **M** key to confirm and return to **F12 GCF** menu. Default is 1000.



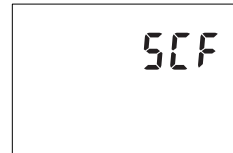
2.7 Accumulated flow unit setting



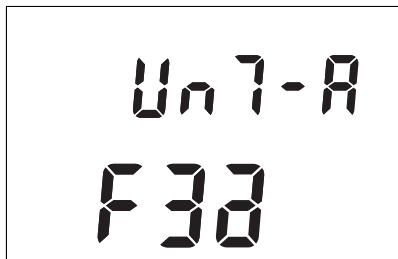
Press ◀ or ▶ key, switch to **F31 UnT-A**, for Total or accumulated flow unit setting.

Press **M** key and meter will show current flow units. Press ◀ or ▶ key to choose **m3** or **SCF**.

Press **M** key to confirm and return to **F31 UnT-A** menu.



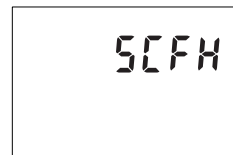
2.7 Instant flow unit setting



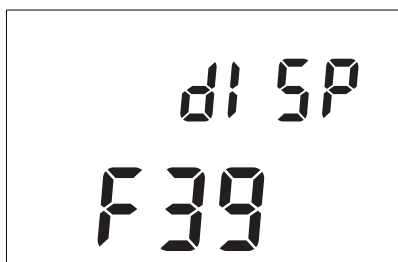
Press ◀ or ▶ key to switch to **F31 UnT-A**, for instant or flow rate flow unit setting.

Press **M** key and meter will show current total units. Press ◀ or ▶ key to choose **m3** or **SCF**.

Press **M** key to confirm and return to **F31 UnT-A** menu.



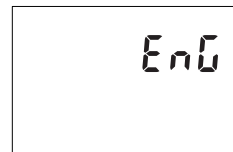
2.9 Language setting



Press ◀ or ▶ key, switch to **F39 dISP**, for language setting.

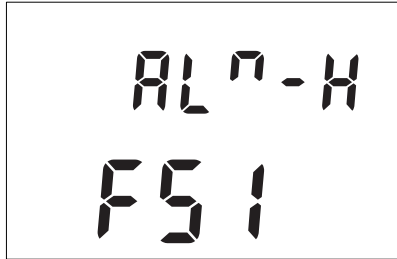
Press **M** key, the meter will show current language. Press ◀ or ▶ key to choose **CHn** or **EnG**.

Press **M** key to confirm and return to **F39 dISP** menu.



2.10 High instant flow alarm setting

The high instant flow alarm function allows the user to set the maximum instant flow. When the instant flow rate is greater than the high instant flow alarm value, the alarm function will be triggered. When the high alarm is triggered the instant flow and alarm icon will flash.

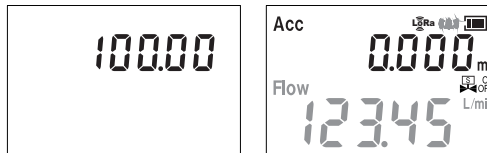


Press ◀ or ▶ key, switch to **F51 ALm-H**.

The alarm contains 5 digits, and can select from 0.00 to 999.99. Press ◀ or ▶ key to change the digit when it flashes, and press **M** key to confirm the change.

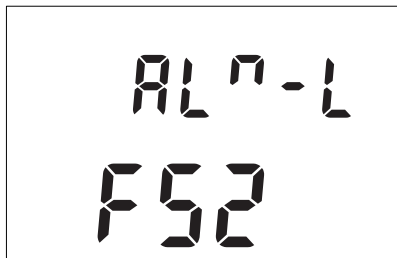
After the last digit, press **M** key, the meter will return to **F51 ALm-H** menu.

e.g.: Set ALm-H to 100.00, when the flow rate is greater than 100.00, the flow rate and alarm icon will flash. The flashing is depicted in the grayed out characters below:



2.11 Low instant flow alarm setting

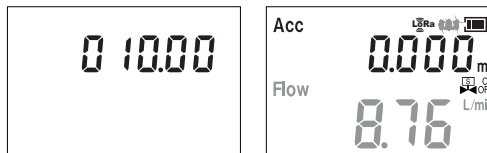
The low instant flow alarm function allows the user to set the minimum instant flow. When the instant flow is less than the low instant flow alarm value, the alarm function will be triggered and the flow value and alarm icon will flash. The flashing is depicted in the grayed out characters below:



Press ◀ or ▶ key, switch to **F52 ALm-L**.

The alarm contains 5 digits, and can be any value from 0.00 to 999.99. Press ◀ or ▶ key to change the digit when it flashes, and press **M** key to confirm the change.

After the last digit, press **M** key, the meter will return to **F52 ALm-L** menu.



2.12 Accumulated flow alarm setting

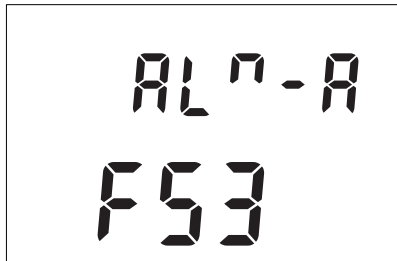
The accumulated flow alarm function allows the user to set the maximum accumulated flow or total. When the set value is reached and the flow is still accumulating, the alarm function will be triggered. During alarm the accumulated flow and alarm icon will flash.

If the flow is driven to ZERO flow, the alarm will be switched off automatically. If the flow starts again, the alarm will come back on. User can also disable the alarm by resetting the total or accumulated flow value or switch off the flow. The main menu will show **F53 ALm-A**.

The alarm uses 7 digits, and can be any value from 0 to 9999999. The alarm uses 7 digits, and can be any value from 0 to 9999999. The alarm uses 7 digits, and can be any value from 0 to 9999999. The alarm uses 7 digits, and can be any value from 0 to 9999999.

Press ◀ or ▶ key to change the

digit when it flashes, and press **M** key to confirm the change.

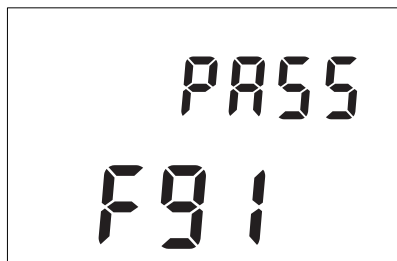


After the last digit, press **(M)** key, the meter will return to **F53 ALm-A** menu.



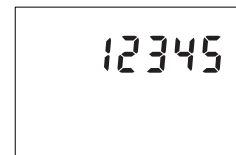
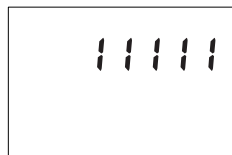
2.13 Password setting

For data safety, it is advised that the default or factory set password should be changed when you first use of the product, (The factory preset password is 11111.) to prevent unauthorized configuration setting.



Press **(◀)** or **(▶)** key, switch to **F91 PASS**, for password setting.

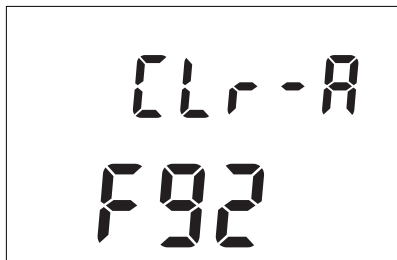
Press **(M)** key, the meter will show current password. Change to another password, press **(M)** key to confirm and return to **F91 PASS** menu.



It is advised that your password be kept in a safe location and can be retrieved when it is needed. In the case of a lost password, please contact TacticalFlowMeter to obtain the secret password for access.

2.14 Reset the accumulated flow

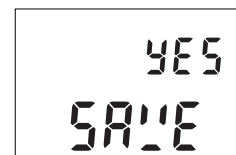
The function allows user to reset, or zero the accumulated flow value. By selecting this menu, the accumulated flow or total will be set to zero.



Press **(◀)** or **(▶)** key, switch to **F92 CLr-A.**, to clear or reset the totalizer, accumulated flow, or total flow.

Press **(M)** key, the meter will display **SAVE-no** or **SAVE-yES**.

Press **(◀)** or **(▶)** key to confirmation and return to **F92 CLr-A** menu.



Save with YES and ABORT with no

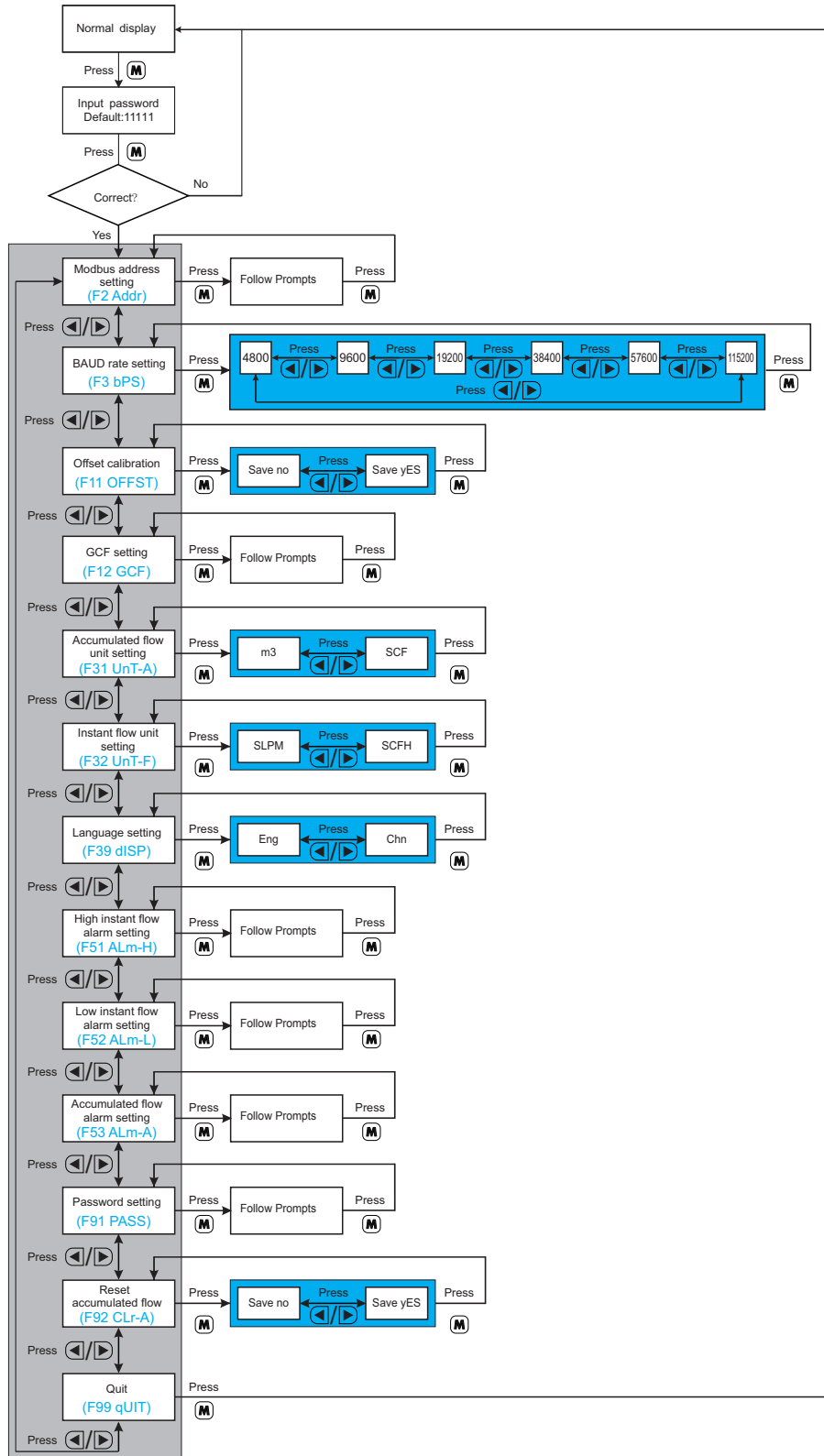
2.15 Quit



The main menu will show **F99 qUIT**.

Press **(M)** key, the meter will return to normal display mode.

2.16 Button Menu



Communication

This product supports RS485 Modbus RTU protocol.

1. Cable definition NOTE: Wire Color Scheme is on the label of the meter. Below colors are for our standard 8' Cables colors in parenthesis are for shorter cables

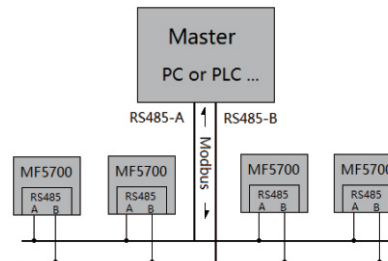
Color	Signal Name	Pin#	Signal Description
Red (Brown)	VCC	1	Power supply (8 - 24 VDC+)
Black (Blue)	GND	3	Power/signal ground (-) (Use for 4-20 Output -)
Green (Black)	RS485-A	4	RS485-A
White (White)	RS485-B	2	RS485-B
Yellow (Gray)	4 - 20 mA	5	4 - 20 mA output (Use GND for return. Dont apply 24 VDC to 4-20 mA signal)

2. RS-485 ModBus RTU Protocol

RS485 communication is based on the standard Modbus communication protocol. It supports either single meter communication or multi-meter networking.

2.1 Hardware connection

Based on standard ModBus RTU mode, a master (PC or PLC) can communicate with several slaves (TFM-5700) setting parameters or reading data. The hardware layer is TIA/EIA-485-A. The "daisy chain" connection is shown below:



2.2 Communication parameters

The UART parameters are shown below:

Communication parameters	Protocol
	RTU
Baud rate(Bits per second)	9600 bps.. Select from available BAUD rates
Start bits	1
Data bits	8
Stop bits	1
Even/Odd parity	None
Bit period	104.2µs
Byte period	1.1458ms
Maximum data length	20
Maximum Nodes	247

2.3 Frame

The framing function is accord with The Standard Modbus RTU framing, which is shown as below:

Start_bits	Address	Function code	Data	CRC	Stop_bits
T1-T2-T3-T4	8Bit	8Bit	N 8Bit (20≥n≥0)	16Bit	T1-T2-T3-T4

Start_bits:	4 periods bit time, to indicate a new frame.
Address:	The ModBus address, can be set from 0 to 255 (157 reserved). Note, 0 is broadcast address.
Function code :	Defines the action that TFM-5700 should take, or indicate code the meter is to respond to
Data:	Includes the address of register, length of data and code.
CRC:	CRC code , the low byte is flowed by high byte. For example, the 16bit CRC code is divide as BYTE_H BYTE_L, in the frame, the BYTE_L goes first, then the BYTE_H, at last ,is the stop signal .
Stop_bits:	Wait 4 periods bit time, to indicate that the current framing session is over.

2.4 Function code

TFM-5700 Modbus Function-code is a subclass of Standard Modbus Function-code. By using these function-codes, We can set or read the registers of TFM-5700.

The codes are shown in the following table:

Code	Name	Action
0x03	Read register	Read register (one or more)
0x06	Set single register	Write one single 16bit register
0x10	Set multi registers	Write multiple registers

2.5 Registers

The TFM-5700 has several registers. We can get the information (such as “total flow”, “flow rate” and so on) by reading these registers, or we can write into some of the registers for setting various parameters of the meter

The registers are shown below:

Name	Description	Register	Modbus
Flow Rate	The instant flow (R)	0x003A~ 0x003B	40059(0x003A)
Accumulated flow	Accumulated/Total flow (R)	0x003C~ 0x003E	40061(0x003C)
Modbus Address	The Modbus address (R/W)	0x0081	40130(0x0081)
Band Rate	Communication band rate (R/W)	0x0082	40131(0x0082)
GCF	Gas correction factor (R/W)	0x008B	40140(0x008B)
Acc Alarm	Accumulated flow alarm (R/W)	0x0096 ~ 0x0097	40151(0x0096)
High Alarm	High instant flow alarm (R/W)	0x0098 ~ 0x0099	40153(0x0098)
Low Alarm	Low instant flow alarm (R/W)	0x009A ~ 0x009B	40155(0x009A)
Password	Password value (R/W)	0x00AE~ 0x00AF	40175(0x00AE)
Offset Calibration	Calibrate meter offset (W)	0x00F0	40241(0x00F0)
Reset Acc	Reset total / accumulated flow (W)	0x00F2	40243(0x00F2)
Write enable	Write Enable for some parameters (W)	0x00FF	40256(0x00FF)

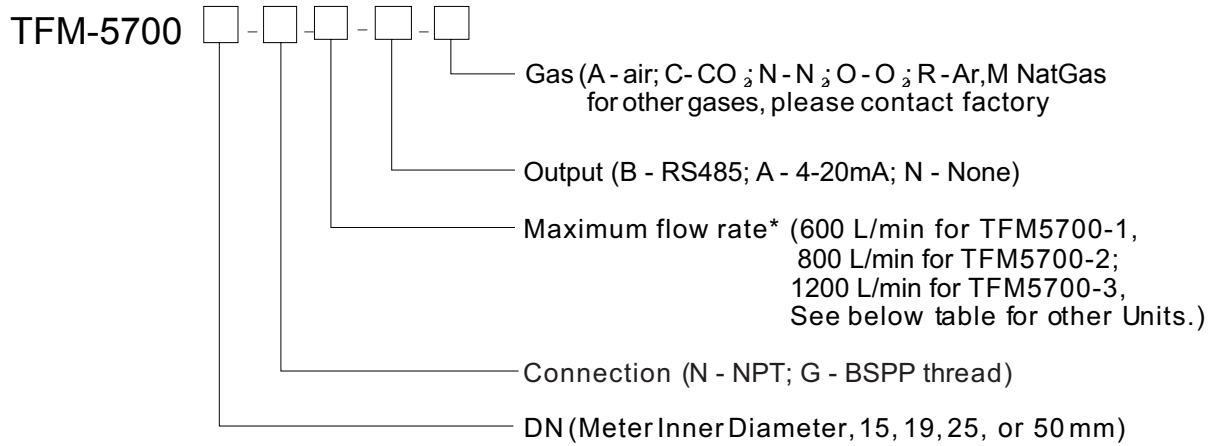
* R-read only, W-write only, R/W-read and write.

Flow Rate	0x003A ~ 0x003B	WRITE	N
		READ	A
Description	The instant flow, or flow rate		
Value type	UINT16		
Detail	<p>Flowrate = (value(0x003A) * 65536 + value(0x003B)) /1000</p> <p>Example:</p> <p>When the LCD shows 20.34 L/min, we can get “0” form register 0x003A and “20340” form register 0x003B.</p> <p>Thus, flowrate = (0*65536 + 20340)/1000= 20.340</p>		
Accumulated flow	0x003C ~ 0x003E	WRITE	N
		READ	A
Description	The accumulated or total flow value		
Value type	UINT32 + UINT16		
Details	<p>V1 = value (0x003C) * 65536 +value;</p> <p>V2 = value (0x003D); V3 = value (0x003E);</p> <p>Accumulated flow = (V1 x 65536+ V2 + V3/1000</p> <p>Example: When the LCD shows 3452.245 cf, we can get “0” from register 0x003C, “3452” from register 0x003D, “245” from register 0x003E.</p> <p>Then, V1 = 0*65536= 0 V2= 3452;</p> <p>V3= 245;</p> <p>Accumulated flow=(3452 +245/1000) = 3452.245.</p>		
Modbus Address	0x0081	WRITE	A
		READ	A
Description	The Modbus address or Slave ID		
Value type	UINT16		
Detail	Values from 1 to 255 except 157 (0x9d), 0 is broadcast address.		
Baud Rate	0x0082	WRITE	A
		READ	A
Description	Communication BAUD rate		
Value type	UINT16		
Detail	<p>0: 4800, 1: 9600, 2: 19200, 3: 38400, 4: 57600, 5: 115200.</p> <p>The default value is 1 (BAUD rate: 9600).</p> <p>Example: Reading “1” from register 0x0082, shows the BAUD rate is 9600</p>		

GCF	0x008B	WRITE	A
		READ	A
Description	Gas correction factor		
Value type	UINT16		
Detail	<p>The value is 1000 x the gas correction factor. The default value is 1000.</p> <p>Note: Need to set write-enable as shown below.</p> <p>Example: The GCF of air is 1.0, you will get “1000” from register 0x008B.</p>		
Acc Alarm			
Acc Alarm	0x0096 ~ 0x0097	WRITE	A
		READ	A
Description	Accumulated, or total flow alarm		
Value type	UINT32		
Detail	<p>Acc Alarm= (value(0x0096) * 65536 +value (0x0097)).</p> <p>When the set value is hit and the flow is still accumulating, the Acc alarm function will be triggered.</p>		
High Alarm			
High Alarm	0x0098 ~ 0x0099	WRITE	A
		READ	A
Description	High instant flow alarm		
Value type	UINT32		
Detail	<p>High Alarm= (value(0x0098) * 65536 +value (0x0099)).</p> <p>When the instant flow rate is greater than the high instant flow alarm value, the alarm function will be triggered.</p>		
Low Alarm			
Low Alarm	0x009A ~ 0x009B	WRITE	A
		READ	A
Description	Low instant flow alarm		
Value type	UINT32		
Detail	<p>High Alarm= (value(0x009A) * 65536 +value (0x009B)). When the instant flow rate is less than the low instant flow alarm value, the alarm function will be triggered.</p>		

Password	0x00AE ~ 0x00AF	WRITE	A
		READ	A
Description	Password value		
Value type	UINT32		
Detail	Password = (value(0x00AFE) * 65536 +value (0x00AF)). Selectable: 00000~99999.		
Offset Calibration			
	0x00F0	WRITE	A
		READ	N
Description	Calibrate offset value for specific gas (must have gas in meter)		
Value type	UINT16, Fixed value 0xAA55		
Detail	Set the fixed value 0xAA55 to register 0x00F0. Note: Ensure there is NO flow in the pipeline when invoking.		
OffsetCalibration and Reset Acc Note: You must set write-enable.			
Reset Acc	0x00F2	WRITE	A
		READ	N
Description	Reset the accumulated flow		
Value type	UINT16, Fixed value 0x0001		
Detail	Set the fixed value 0x0001 to register 0x00F2.		
Write-enable			
	0x00FF	WRITE	A
		READ	N
Description	Write-enable for GCF, Offset Calibration and Reset Acc.		
Value type	UINT16, Fixed value 0xAA55 30 second timer on write enable		
Detail	Example: To allow setting GCF, you must send a fixed valve 0xAA55 to register 0x00FF to enable the write enable function.		

Product Selection



* Flow rates shown in L/min. If other units are selected convert from L/min

Typical flow range:

Model	DN	Connection	Flow Range		
			SLPM	SCFH	NCMH
TFM5700-1	15mm	1/2" NPT	600	1200	35
TFM5700-2	19mm	3/4" NPT	800	1700	50
TFM5700-3	25mm	1" NPT	1200	1500	70
TFM5700-4	50mm	2" NPT	2400	3000	140

Specifications

	TFM5700-1 TFM5700-2 TFM5700-3				
Flow range	0 - 600	0 - 800	0 - 1200		L/min
Turn-down ratio	100:1				%
Accuracy	±(1.5+0.25FS)				%
Repeatability	0.5				%
Response time	≤ 0.2				sec
Power supply	8 - 24 Vdc				
Output	RS485 Modbus RTU, Optional: 4-20mA				
Display	LCD				
Display information*	Instant flow: L/min; Accumulated flow: m ³ ;				
Display resolution	Instant flow 0.01 Accumulated flow 0.001				L/min m ³
Protection	IP66 (NEMA 4X)				
Max. pressure	≤116/0.8				PSI/MPa
Pressure loss	≤600	≤1000	≤2000		Pa
Working temperature	-10 - 55				°C
Storage temperature	-20 - 65				°C
Humidity	< 95%RH (No icing or condensation)				
Keyboard	3 keys				
User functions	Password; high alarm; low alarm, acc alarm; offset calibration				
Calibration gas	air @ 20 °C, 101.325 kPa				
User interface	M12				
Inner diameter	15.0	19.0	25.0	50.0	mm
Flow connection	NPT 1/2"	NPT 3/4"	NPT 1"	NPT 2"	
Weight	3.5/1.56	4.3/1.95	5.2/2.34	7.2/3.27	lb/Kg
Maximum overflow	720	960	1450	2900	SLPM
Maximum flow change	15	30	60	120	SLPM/sec

*Display units can be switched from "SCFH" and "SCF".

Parts in Package

TFM5700 mass flow meter	1
User manual (e-copy)	1
QC certificate	1
Connector & cable	1

Safety and Maintenance

1. Safety Precautions

The product is designed for use with general purpose gases such as air and nitrogen. It is advised that the products are best used for non-explosive clean gases. The sensors cannot be used for gas metrology with fluoride or fluoride containing gases. For updates of the product certification information, please contact manufacturer or visit www.TacticalFlowMeter.com. Use with other gases such as corrosive and toxic gases may cause product failure or even severe damage.

Maximum pressure is 116 PSIG (0.8 MPA). Do not exceed this pressure or warranty will be voided. Ensure there are no leaks in the plumbing before use by testing using best practices in the specific application.

Power the meter with a voltage between 5 to 24 VDC and use all safety precautions for electrical systems.

CAUTION: Any alternation and/or improper use of the product without the permission of the manufacturer can cause unpredicted damages and even injuries or other severe situations. TacticalFlowMeter or any of its employees, subsidiaries shall not be hold and shall be indemnified against such consequences due to such circumstances via improper use of the product.

2. Cautions for models with optional batteries:

When the battery life indicator on LCD shows low, batteries should be changed immediately or switch to AC power. Do not allow battery leakage inside the meter.

3. Maintenance

Attention: without prior permission of the manufacturer, please do not attempt to alter any part of the product as it may cause unrecoverable damages. If there are questions or doubts, please contact manufacturer immediately by calling 831-455-0418 and ask for Customer Service. Secret code is 85139

All maintenance of the sensor should be done by trained and certified personnel by TacticalFlowMeter.