

TM500[®] View Software **Instruction Manual**

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Warnings and Cautions

General Safety Information

We use caution and warning statements throughout this book to draw your attention to important information.

Symbol Key						
Symbol	Symbol Meaning	Description				
	Warning	This statement appears with information that is important to protect people and equipment from damage. Pay very close attention to all warnings that apply to your application.				
0	Caution/Note	This statement appears with information that is important for protecting your equipment's performance. Read and follow all cautions that apply to your application.				



CAUTION

- Caution! Before making adjustments to the TM500, verify the flow meter is not actively monitoring or reporting to any master control system. Adjustments to the electronics will cause direct changes to flow control settings.
- Caution! All flow meter connections, isolation valves and fittings for hot tapping must have the same or higher pressure rating as the main pipeline.
- Caution! The flow meter electronics and sensor probe have been manufactured and calibrated to operate as a unit. The flow meter will not operate properly if parts are replaced from another meter.
- Caution! Printed circuit boards are sensitive to electrostatic discharge. To avoid damaging the board, follow these precautions to minimize the risk of damage:
 - before handling the assembly, discharge your body by touching a grounded, metal object
 - handle all cards by their edges unless otherwise required
 - when possible, use grounded electrostatic discharge wrist straps when handling sensitive components

Notice

This publication must be read in its entirety before performing any operation. Failure to understand and follow these instructions could result in serious personal injury and/or damage to the equipment. Should this equipment require repair or adjustment beyond the procedures given herein, contact the factory at:

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Introduction

Introduction

Thank you for purchasing the TM500[™] Thermal Gas Mass Flow Meter from Sierra Instruments. The TM500 is one of the most technically advanced flow meters in the world. Extensive engineering effort has been invested to deliver advanced features, accuracy measurement performance, and outstanding reliability.

The new TM500-View[™] software allows users to easily display data and configure the TM500 to their specific application parameters. The software can also access the Gas-Mix[™] menu, the TM-Cal[™] calibration validation diagnostic test, and log flow/temperature data to an Excel file.

The TM500 is available with Modbus or HART communication options and the Gas-Mix option. The TM500-View software has been developed to react intuitively to the type of TM500 meter with which it is interfacing.

This manual contains the installation and operation instructions for the TM500-View software.

This manual is divided into the following sections: Introduction, Installation, Operation, Glossary, and Index.

Installation

Unscrew the rear enclosure cap to access the wiring terminals and USB communication port. Connect the TM500 to a PC with a USB (type A, micro cable). If the PC is connected to the internet and running Windows[®], the PC will try to automatically load the VCP driver. If the driver does not load automatically, download the VCP driver at: www.ftdichip.com/Drivers/VCP.htm



NOTE! The latest version of the TM500-View[™] software is available for download at https://www.sierrainstruments.com/products/upgrades/tm500-view.html

Fig. 2.1: Online Download Location for TM500-View™ software

	TMEOO Mater Data and Configuration
	TM500 Meter Data and Configuration
	TM500-View Software
2000	Get quick access to all configuration parameters with pop-up windows and
	pull-down menus
	View raw data to diagnose or troubleshoot your meter
	Select measurement units, flow and temperature ranges, alarm settings, and
	more
	 Print or save a TM-Cal™ Calibration Validation Certificate
4	Set alarms and display alarm codes
	 Optional Gas-Mix Menu (14 gases / unlimited mixes)
	 Use simulation mode to align 4-20mA output with the input to the user's
	PLC/DCS
	TM500-View Software Download Request a Quote
Content Sections:	Overview
Overview	Sierra's TM500-View advanced software is a free PC-compatible application available for download
Clear All	from Sierra's website. Connect your Windows-based laptop or PC to the meter using the USB port
	interface to access meter data and configure the meter's settings.

1 - Click on the TM500-View[™] software download button

Installation

To install the TM500-View[™] software program, run the "TM500-View software_V#.##-setup.exe" file that is located in the downloaded file. After clicking "Next" the screen will show:



Select the folder in which you wish to install TM500-View software, then click "Install."

Program Group		\times
	Please enter a name of a program group where shortcuts to programs and documents will be placed in.	
	Program Group:	
	TM500-View	
Chie		
in the second		
ALC: NO		
	< Back Next > Cancel	

When the program is done installing, you may exit, then restart your computer.



COM Port Assignment

М

Be sure to have your TM500 connected by USB to a PC or laptop before opening TM500-View software. Upon opening TM500-View software for the first time, Windows[®] will assign a "virtual COM port". The COM port number that has been assigned will appear automatically in the drop down box. If the correct COM Port does not appear, go to Control Panel/Device Manager and click on Ports (COM & LPT). The COM port number should be displayed under the USB symbol.

If prompted, enter the assigned COM port in TM500-View software[™] by using the drop down menu and press **OK**.

NOTE! The TM500 meter must be plugged into the computer in order for the system to register it.

Fig. 2.2: COM Port Selection Window



Operations

Main Screen

The image below depicts the main screen that appears upon entering TM500-View software.

Charts Button

This calls up two charts that can be configured for either temperature or flow. Each chart can be individually enlarged and re-scaled from the original default settings. For more information on how to change the charts settings, refer to p. 12.

NOTE! The charts are refreshed at user selected update rate. See p. 12 for more information on setting up charts.

Data Log

This function allows all selected data to be logged to an Excel® file at the specified sample time. All readings are time/date stamped. For more information on using the Data Logger function, refer to "Data Logger" on page 17.

Configure

This allows the operator to go in and set the application parameters. This can be done either via the TM500-View[™] software or manually via the instrument's display. For more information on configuring application parameters, refer to p. 14.

Simulation

This function can be used to verify that all the flow meter outputs are working properly. The easiest way to perform this check is to enter a specific temperature/flow rate. The corresponding analog outputs can be verified using a DMM and using a timer for the pulse. Refer to p. 18 for more information on how to use the Simulation function.

TM-Cal[™]

Sierra Instruments has developed the TM-Cal[™] Calibration Validation to help our customers avoid sending the meter back for annual or biennial re-calibrations. Calibration Validation allows our customers to validate the accuracy and functionality of the meter in the field with the push of a button. By performing a simple test, the operator can verify that the meter is running accurately. TM-Cal[™] ensures the repeatability, functionality of the sensor and its associated signal processing circuitry, and cleanliness of the sensor.

The TM-Cal[™] calibration validation test can be performed while the unit is still in the pipe. The TM-Cal[™] calibration validation test is explained in greater detail on p. 21.

Alarms

The unit can be configured for high/low alarms for either flow or temperature. The "alarms window" displays any alarms or warnings.

Exit

Exit the application.

Operations

Charts Settings

From the main menu screen, click on "Charts". Two charts will appear side-by-side. Each chart can be selected for flow, temperature or total flow and scaled in one of three ways: a plus/minus percent scale, inputting min/max values manually, or real-time automatic scaling.

Fig. 3.2: Chart Settings Window - Charts 1 and 2

5 TM500-View v3 Chart 1 Setup	.3.0			- 🗆 X
Total Points Update Rate (s) Parameter	100 1.0 Flow	Manual Settings Min 25.0000 Max 50.0000	O % Scale	Auto Save Settings
		FLOW		
0.136738				
0.120158 -		18.16	A A	
0.103577 -		- A. DAAN	INN	
0.0869972				+
0.070417 -			j · v	
0.0538367		1		V' Y
		TIME (100.0 sec	s)	

Operations | 12

Save Setting

Click the Save Settings button to save the chart settings to the main page window. These settings can then be closed by clicking on the "X" at the top right corner of the window.

Parameters

Flow, temperature or total flow can easily be selected for charting.

Total Points

The total points specifies the number of points plotted on the graph. Older data is automatically omitted.

Update Rate

The update rate controls the data refresh rate.

Percent (%) Scale

This sets the scale to a plus/minus specified percentage from the initial measured value. Typically, the minimum/maximum is scaled at plus/minus 10% of that initial value.

Manual Chart Setting

The Manual mode allows a user to input min/max values for chart scaling. When entering new values, click on Save Settings for them to take effect.

Automatic Chart Setting

Automatic mode lets the program adjust the scaling on a real-time basis based on the entire range of values.

Operations

Configure

From the main menu, click on the "Configure" button and enter the requested password for either Level I (1234) or Level II (9111) access.

Fig. 3.3: Password Window

S Password Entry		×	
Enter Password			
		ОК	

NOTE! Most users will only need access to the Level I screen to do basic setting of units, alarms and output scaling.

Fig. 3.4: Level II Configuration Screen

S TM500-View v3	.3.0								- 🗆 X
Meter Info		Process V	ariables						
Firmware	TM500 V8.2	Flow 0.2	63 SCFM	Tempe	rature [73.95 Deg F			Reset Total
Password Level	Level 2	Total 52	5 67 SCF	CSV	Г	0.04393.V	GHV 1015 5 BTUVER3	_	
Serial	F06658				и 1972 — П			_	
Main SN	Q60946	Massnow [0.3	32 Kg/Hr	Elapse		15.9 Hrs	Density 0.71509 Kg/M3		Reset CRC
Bridge SN	P97795	Gas-Mix				Current Alarms		_	
Sensor SN	300580	Gas Type	Natural Gas(Mix)		•	No alarms			
Alarm Codes	None	Mathana		Ovugen la co					
		Carbon Diquida	94.90002	Holium Lago	0000				
Meter Setting	s	Nitrogen	0.700000	Hudrogen 0.00	0000				
Pipe ID	4.026 In	Propulene	0.000000	nydrogen [0.00	0000				
Cutoff	0. SCFM	Propane	0.000000						
Filter	0.8 Sec	Butane	0.00000						
Ref.Temp	60. Deg F	Ethane	0.000000						
Ref.Pressure	14.73 Psia	Ethulene	0.00000						
Password	1234	Air	0.000000						
Kfact	0.%	Araon	0.000000	TOTAL 100%					
			0.000000						
Unit Select								_	
Flow Units	SCFM 💌	4-20 mA Cł	nannel 1			Digital Input		_	
Temp. Units	Deg F 💌	Data Select	Flow		Ψ.	None		-	
Pressure Units	PSIA 💌	20 mA Value	694.44 SCF	М					
		4 mA value	U. SCFM						
Alarm Limits		Natitur Fault Ac	Not used		•				
High Flow Limit	0. SCFM					Pulse Output C	onfiguration		
Low Flow Limit	0. SCFM	4-20 mA Ch	nannel 2			Pulse Option	Max Freq & Max Flow	-	
High Temp Limit	0. Deg F	Data Select	Flow		•	Max Frequency	100.00 Hz		
Low Temp Limit	0. Deg F	20 mA Value	0. SCFM			Max Flow	694.44 SCFM		Display Setting
		4 mA Value	0. SCFM			Pulses Per Unit	8640.0		
		Namur Fault Ac	tion Not used		•	Units Per Pulse	0.0001157407		Serial COM Settings
Low Temp Limit	0. Deg F	20 mA Value 4 mA Value Namur Fault Ac	0. SCFM 0. SCFM tion Not used		•	Max Flow Pulses Per Unit Units Per Pulse	694.44 SCFM 8640.0 0.0001157407		Display Setting Serial COM Settings

The RS485 and HART settings can be accessed by clicking on the "Serial COM Settings" button.

The Pulse Output settings can be accessed in the "Pulse Output Configuration" and "Digital Output Select" fields.

Unit Select

The "Unit Select" section is used to change the desired units in the flow rate, temperature and reference pressure parameters.

Process Properties

Pipe Inner Diameter (ID): The pipe inner diameter can be entered in either inches or millimeters, depending on whether the flow or mass measurement units selected are metric or US standard. Once entered, the program will automatically recalculate the pipe cross-sectional area for the velocity/flow calculations. A precise ID is required to ensure accurate flow measurement.

Cut-off: A gas flow rate at (or below) the cut-off setting will cause the meter to read zero. Default cut-off is set to 1% of maximum flow value.

Filter: Changing this value will increase or decrease the damping of the flow rate reading. Increase the setting to increase damping. The default setting is 0.8 seconds (see TM500 Instruction Manual for more details).

Serial Numbers: Serial numbers of the meter, the main board, bridge and sensor (factory set).

Display

The four drop-down boxes can be used to select the data to present on Screen 1 and Screen 2 of the flow meter display. By selecting "Alternate", the screen automatically switches between the data screens.

Alarm Limits

Users can set both high/low alarms for both flow and temperature. When a limit is reached, an alarm message is displayed. In addition, if the meter's digital output is activated, breaching the alarm limit automatically activates a discrete output to control an external buzzer, light or some other way to alert the operator.

Analog 4-20mA

The TM500 has two analog 4-20mA outputs. Channel one is always set to output flow, and channel two is configurable for either flow or temperature. Though the TM500 will be scaled for the specific application coming from the factory, TM500-View TM software allows the operator to easily re-scale the 4-20mA output as needed.

Process Variables

Flow: Current flow rate in selected units Total: Cumulative mass or volume flow in selected units Velocity: Massflow Temperature: Gas temperature (Fahrenheit or Celsius) CSV: Current sense voltage Elapsed Time: Time since the Totalizer was reset

Reference Conditions

Reference temperature and pressure are the standard (or normal) temperature and pressure (STP) for which the flow rate is calculated.

Gas-Mix[™]

This menu allows the user to choose from a list of gases. More information on Gas-Mix $^{\rm m}$ can be found on p. 19.

Digital Output Select

This selection configures the TM500 digital output for either pulses (counts) or as an alarm discrete output.

If the pulses (counts) output is selected, it can be programmed in three different ways using the pull-down menu "Frequency Output Configuration".

Maximum flow and maximum frequency

Pulses per Unit Units per Pulse

Serial COM Settings

Use this function to set the serial communication settings for any of the TM500 communication options.

Fig. 3.8: Select Serial Communication Window

S TM500-View v3.3.0		\times
Bus Type Modbus	Baud Rate 9600	•
Address 1	Parity None	 •

0

NOTE: This is only available on meters with the RS485 or HART serial communication

options.

Data Logger

The Data Logger screen can be accessed from the main screen. Clicking the "Data Logger" function will prompt the user for a password. Enter a Level I or Level II password and the Data Logger window will appear.

S TM500-View v3.3.0			- D >	<
Excel Filename				
Select C:\Users\nburnam\Documents\TM	500-Data	og.xlsx Proviow		
CSV (Current Sense Voltage) Flow Flow M3/H Gas Temperature Total Elapsed Time		Name	Value	
Logged Values		^	Sample Time Hrs Min Sec 00 ▼ : 00 ▼	
		~	Start Data Logger	

Operations

Fig. 3.11: Data Logger Window - Logging Turned Off

Select the sample time from the drop down menu, and then select the required data from the Data Selection list. Select or create a name for the Excel[®] file and then press the "Start Data Logging" button.

- 1			
Excel Filename			
Select C:\Users\nburnam\Documents\TMS	500-D atal	og.xlsx	
Data Selection	Data	Preview	
CSV (Current Sense Voltage)	Index	Name	Value
Flow	15	Csv []	0.043988872
Flow NM3/H	0	Flow [SCFM]	0.25531009
🗹 Gas Temperature	8	FloVol [NM3/H]	0.41116461
Total	12	Gas_temp [Deg F]	73.902679
Elapsed Time	20	Total [SCF]	526.239
	21	ElapsedTime [Hrs]	15.883333
Logged Values			Sample Time
10/31/23 11.18:20 0.0 0.3 0.4 73.9 526.2 15.9 10/31/23 11.18:24 0.0 0.3 0.4 73.9 526.2 15.9 10/31/23 11.18:25 0.0 0.3 0.4 73.9 526.2 15.9 10/31/23 11.18:26 0.0 0.3 0.4 73.9 526.2 15.9 10/31/23 11.18:27 0.0 0.3 0.4 73.9 526.2 15.9		^	Hrs Min Sec 00 • : 00 • : 01 •
10/31/23 11:18:28 0.0 0.3 0.4 73.9 526.2 15.9 10/31/23 11:18:29 0.0 0.3 0.4 73.9 526.2 15.9		0	Stop Data Logger

Fig. 3.12: Data Logger Window - Logging Turned On

When "Start Data Logging" is pressed, the data is recorded in the specified Excel[®] file - and also displayed in the Data Logged window. Pressing "Stop Data Logging" ends data acquisition.

Simulation Mode

After clicking on "Simulation", a password will be requested. Enter the password and then the Simulation screen will be shown.

S TM500-View v3.3.0	- 🗆 🗙	
Flow Simulation		
0	Flow enable	
Temperature Simulation		
0	🔲 Temp enable	
Start Simulati	ion	

Fig. 3.13: Simulation Mode Window

The simulation mode simulates flow rate or temperature. Click on the required data and enter a value. Simulation mode allows users to verify the operation of the analog output, digital outputs and totalizer at simulated flow rates and temperature.

Enter the value, select the corresponding checkbox, and press "Start Simulation".

S TM500-View v3.3.0				– 🗆 X
Flow	Temperature	Total	Elapsed	
9. SCFM	33. Deg F	8.4 SCF	0.4 Hr	Charts
		Reset Total	and Elapsed Time	
FL	.ow	TEMP	ERATURE	Collect Data To Excel
22		73.3736		Configure
17.6098		65.2988		Configure
13.2197		57.224		
8.82948		49.1491		Simulation
4.43931		41.0743	s	TM500-View v3.3.0 — X
0.0491353		32.9995	L	low Simulation
TIME (1	00.0 secs)	TIME (100.0 secs)	Flow enable
Alarms				
In simulation mode			т [3	Temperature Simulation 3 Temp enable
			1	Halt Simulation

Fig. 3.15: Simulation Running

In Simulation mode, all TM500 outputs and the Totalizer respond as if in normal measurement mode. Click "Halt Simulation" to end. Gas-Mix™ Gas Menu

Each TM500 flow meter is calibrated in the factory and pre-programmed with the gas specified in the order. If the Gas-Mix option is ordered, the pure or gas mixture gas can be changed. To choose what gas or gas mixture flow for the TM500 to monitor, select from the list of gases under Gas-Mix:

- Methane
- Hydrogen
- Carbon Dioxide •
- Nitrogen •
- Propylene .
- Propane •
- Butane
- Ethane

- Ethylene
- Air •
- Argon •
- Oxygen
- Helium
- Natural Gas (Mix) •
- Gas Mix .

Fig. 3.16: Gas-Mix[™] Menu

NOTE: A list of pure and mixed gases available on the TM500 flowmeter are kept on the Sierra website at www.sierrainstruments.com.

When the "Gas-Mix" option is chosen, a series of additional gas concentration fields will appear. These fields are labeled "CH4%", "CO2%", etc. A default amount will appear in each field, these can be changed to any percentage between 1 and 100. The total for the gases in the Gas-Mix must equal 100% or an error will occur.

Ci

NOTE: If the total of all gases is greater or less than 100%, an alarm will show. Adjust the percentages until 100% is achieved.

TM-Cal[™]

TM-Cal[™] is performed to verify the proper operation of the TM500 flow meter. From the Main menu, click on the "TM-Cal" button to access the TM-Cal[™] Menu Window.

S TM500-View v	3.3.0	- 🗆 X
TM-Cal Setti	ngs	
Performed By		
Meter TAG		
Comments		
Test Type	Hold last flow value	
Log File	c:\users\nburnam\Documents\TM-Cal_55log.txt	Browse File
Test TM-Cal Value		
Time Remaining		
Result		Perform TM-Cal
	View TM-Cal Log	View Certificate

Fig. 3.18: TM-Cal[™] Test Menu Window

On the TM-Cal[™] Menu, there are fields to enter information about the person performing the test, meter tag information, and any other important information may be entered into the comments area.

A drop-down menu allows the user to choose between these two options: Flow goes to Zero during TM-Cal[™] Flow holds the last value during TM-Cal[™]

Please note that the test will take about four minutes. If the "go to zero" option is chosen, the flow measurement will stop and go to zero for this period. If the "hold value" option has been chosen, the totalizer will continue to increment..

The user can also specify a particular folder name and location for the data to be stored in a log to access test results at later times.

When ready to start, click the "Perform TM-Cal" button.

Operations

Fig. 3.19: Running a TM-Cal[™] Test

TM500-View v	3.3.0	—
TM-Cal Setti	ngs	
Performed By	NB	
Meter TAG	1234	
Comments	TEST	
Test Type	Hold last flow value	
Log File	c:\users\nburnam\Documents\TM-Cal_55log.txt	Browse File
TM-Cal Value	7 94	
Time Remaining	288 \$	
Result		Stop TM-Cal
	View TM-Cal Log	View Certificate

A Pass/Fail message for the TM-Cal[™] test will be displayed at the test conclusion.

Fig. 3.20: TM-Cal[™] Results Window

S TM500-View v3.3.0		– 🗆 X
TM-Cal Sett	ings	
Performed By	NB	
Meter TAG	1234	
Comments	TEST	
Test Type	Hold last flow value	
Log File	c:\users\nburnam\Documents\TM-Cal_55log.txt	Browse File
Test		
TM-Cal Value	0.35	
Time Remaining	000 s	
Result	TM-Cal Pass (-0.73)	Perform TM-Cal
	View TM-Cal Log	View Certificate

TM-Cal[™] Certificate

The TM-Cal[™] Certificate function displays the latest certification. When performing a TM-Cal[™] test, all the data is logged into a log file with all pertinent data, including the serial number. A laptop or PC can be used to perform the TM-Cal[™] test on the TM500 meter. When a TM-Cal[™] certificate is requested, the program will search the log file for the specific serial number and will display only the last check performed.

Fig. 3.21: TM-Cal[™] Certificate

SIERRA® SIERRA® SIERRA® SIERRA® TM-Cal [™] CERTIFICATE CAUBRATION VALIDATION				
TM-Cal™ Performed on:	October 31 2023, 12:31:55			
Firmware version:	TM500 v8.3			
Sierra Meter Serial Number:				
TM-Cal [™] Results:	Pass			
TM-Cal™:	-0.73			
Test Temperature	83.0 F			
Tag #/Meter Location:	1234			
Test performed by:	NB			
Additional Comments:	TEST			
TM-Cal TM is a calibration routine that w Repeatability of sensor Repeatability of sensor electronics * Confirms Calibration Algorithms At the conclusion of the test, the meter A "pass" result confirms the meter is m TM-Cal TM limits: $\pm 0 - 0.8$ Pass, $\pm 0.8 - 1$: Configuration:	alidates the flow meter's calibration accuracy by r will display a pass/fail message and the TM-Ci neasuring accurately. O Warning, > ± 1.0 Fail	y testing the following: al [™] data.		
Pipe Diameter: Customer STP: 4-20 mA Range: Zero Flow Cutoff: Previous TM-Cal [™] Value: Previous TM-Cal [™] Result: Previous TM-Cal [™] Cale: Gross Heating Value[BTU/FT3]:	4 In Gas Se 32.0 Deg F & 760.00 mmHG 0 - 10 SCFM 0 SCFM 0 SCFM 0,00 Pass 0,000 0:0.0 546.9	lect: Mil: Gas Mitthene 1.55603% CO2 1.85603% Nitrogen 2.475738% Helium 3.65053% Argon 1.960704% Hydrogen 3.56503% Air 61.274502% Propane 3.273607% Butune 4.332547%		

TM-Cal[™] Log

The "View TM-Call Log" button allows the operator to view a log of previous TM-Cal[™] tests that have been executed on the meter.

Fig. 3.22: TM-Cal[™] Log

Definition & Index

Definition

COM	Communication
CSV	Current Sense Voltage
DMM	Digital Multimeter
ID	Inner Diameter
mA	Milliamps
PC	Personal Computer
RTD	Resistance Temperature Detector
STP	Standard Temperature and Pressure
TSI	Temperature Sense Current

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