Sierratrak 6255

Thermal Mass Flow Meter

Instruction Manual

Document: IM-625S Rev B_PN 110064



GLOBAL SUPPORT LOCATIONS: WE ARE HERE TO HELP!

For Global Service Centers, go to http://www.sierrainstruments.com/facilities.html

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TRADEMARKS

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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.				
6	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.				



WARNING

- Warning! Agency approval for hazardous location installations varies between flow meter models. Consult the flow meter nameplate for specific flow meter approvals before any hazardous location installation.
- Warning! Hot tapping must be performed by a trained professional. U.S. regulations often require a hot tap permit. The manufacturer of the hot tap equipment and/or the contractor performing the hot tap is responsible for providing proof of such a permit
- Warning! All wiring procedures must be performed with the power Off.
- Warning! To avoid potential electric shock, follow National Electric Code safety practices or your local code when wiring this unit to a power source and to peripheral devices. Failure to do so could result in injury or death. All AC power connections must be in accordance with published CE directives.
- Warning! Before attempting any flow meter repair, verify that the line is depressurized.
- Warning! Always remove main power before disassembling any part of the mass flow meter.



CAUTION

- Caution! Before making adjustments to the device, 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

Disclaimer

Receipt of System Components

When receiving a Sierra mass flow meter, carefully check the outside packing carton for damage incurred in shipment. If the carton is damaged, notify the local carrier and submit a report to the factory or distributor. Remove the packing slip and check that all ordered components are present. Make sure any spare parts or accessories are not discarded with the packing material. Do not return any equipment to the factory without first contacting Sierra Customer Service.

Technical Assistance

If you encounter a problem with your flow meter, review the configuration information for each step of the installation, operation, and setup procedures. Verify that your settings and adjustments are consistent with factory recommendations. Installation and troubleshooting information can be found in the Chapter 2 (Installation) and Chapter 6 (Troubleshooting) of this manual.

If the problem persists after following the troubleshooting procedures outlined in Chapter 6 of this manual, contact Sierra Instruments by e-mail (see inside front cover). For urgent phone support you may call (831) 373-0200 between 8:00 a.m. and 5:00 p.m. PST. In Europe, contact Sierra Instruments Europe at +31 72 5071400. In the Asia-Pacific region, contact Sierra Instruments Asia at +8621 5879 8521. When contacting Technical Support, make sure to include this information:

- The flow range, serial number, and Sierra order number (all marked on the meter nameplate)
- The software version (visible at start up)
- The problem you are encountering and any corrective action taken
- Application information (gas, pressure, temperature and piping configuration)

Using This Manual

This manual provides information needed to install and operate the SeriesTrak 625S Mass Flow Meter.

Additional Resources

Visit <u>Sierrainstruments.com</u> for additional resources. Note: the most current versions of the 625S documents can be found at https://www.sierrainstruments.com/products/downloads.html.

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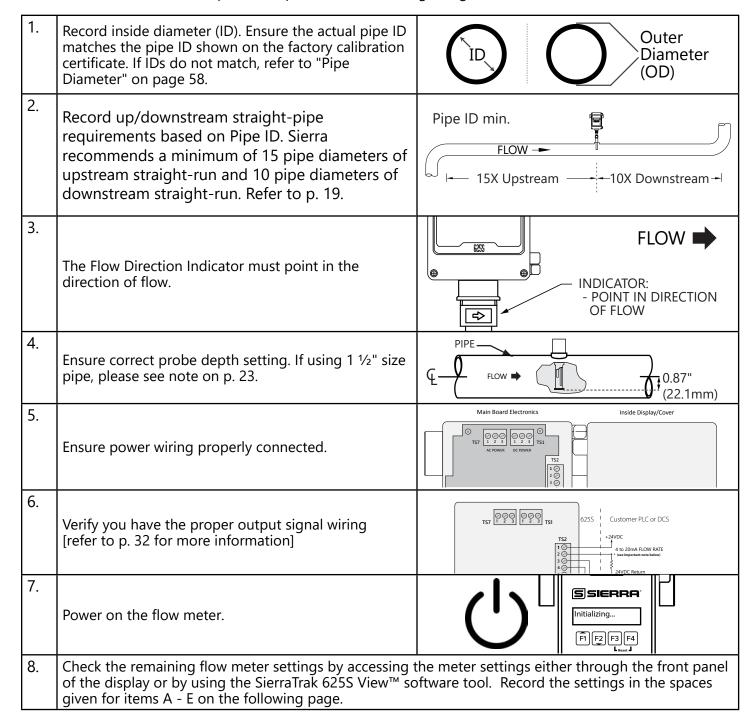
625S

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Use the table below as a guide while using the worksheet on the next page to record your notes.

NOTE! Please read the entire quick-start procedure before beginning installation.



625S

Quick Start Guide

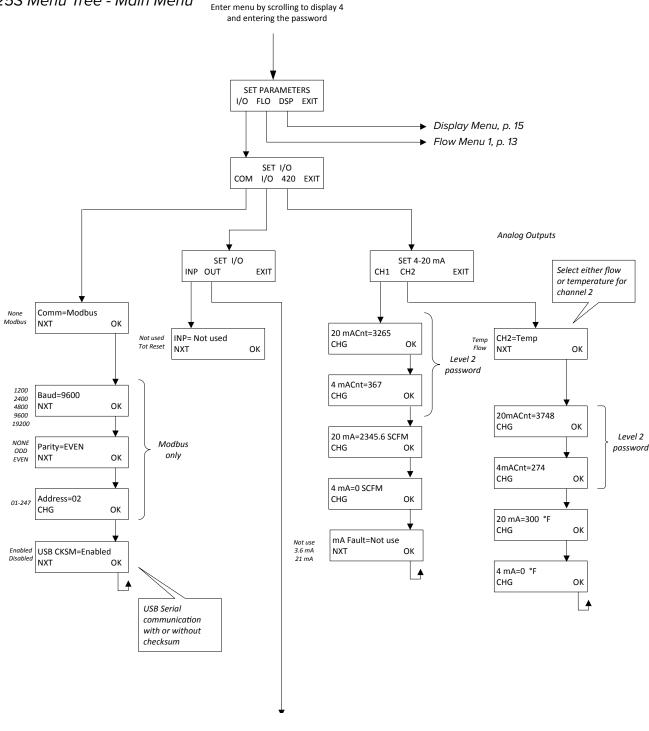
Before powering on your meter, use this worksheet to record your notes.

		Serial Number:	Serial Number:	Serial Number:	Serial Number:
	Item to verify				
1.	What is the Pipe ID?	ID =	ID =	ID =	ID =
2.	Calculate the Upstream/ Downstream straight-pipe requirements	UP = DN =	UP = DN =	UP = DN =	UP = DN =
3.	Is the flow indicator pointed in direction of flow?	Y/N	Y/N	Y/N	Y/N
4.	Is the probe depth setting correct?	Y/N	Y/N	Y/N	Y/N
5.	Verify proper power wiring				
6.	Verify proper input/output wiring				
After powering on your meter, check items A - E below by accessing the meter settings either through the front panel of the meter's display or by using the SierraTrak 625S View™ software tool.					
A.	Which flow units have been set in meter? (SCFM, KG/H, etc)				
В.	Correct values for reference temperature and pressure?	Y/N	Y/N	Y/N	Y/N
C.	Confirm the pipe ID listed above corresponds to the correct cross-sectional pipe area value (Pipe A^2).				
D.	Verify the first 4mA and 20mA meter settings	4mA = 20mA =	4mA = 20mA =	4mA = 20mA =	4mA = 20mA =
E.	Verify the second 4mA and 20mA meter settings	4mA = 20mA =	4mA = 20mA =	4mA = 20mA =	4mA = 20mA =

Your Notes:

If you are experiencing any problems after completing this procedure, please call the Sierra Instruments Service Department at 831-373-0200 to review this information.

Fig. 1.1: 625S Menu Tree - Main Menu



A

NOTE! Some menus will only be available with a level 2 password.

NOTE! Menu tree boxes are populated with example values.

Digital Output Menu, p. 12

Fig. 1.2: 625S Menu Tree - Digital Outputs

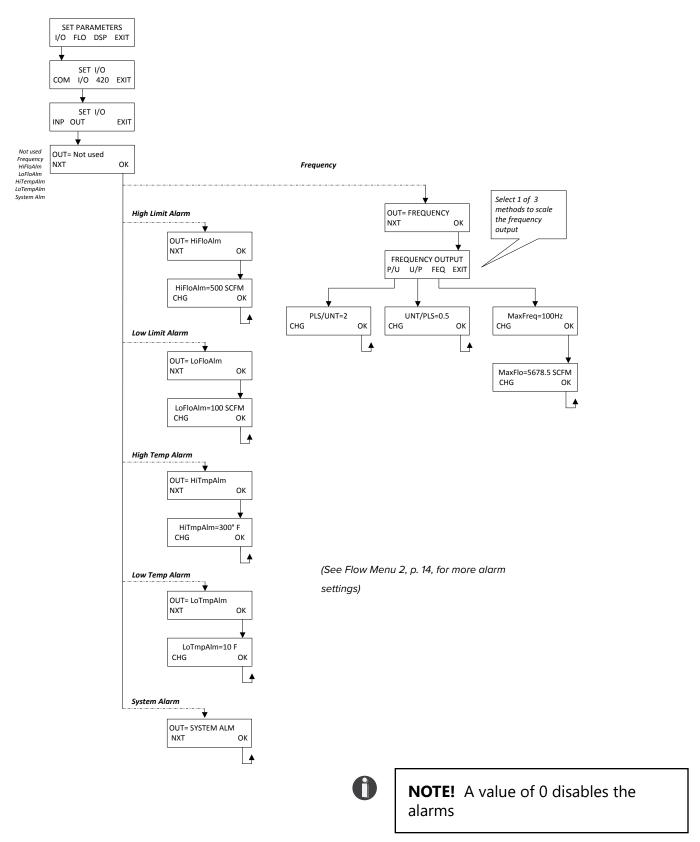


Fig. 1.3: 625S Menu Tree - Flow Parameter Menu 1

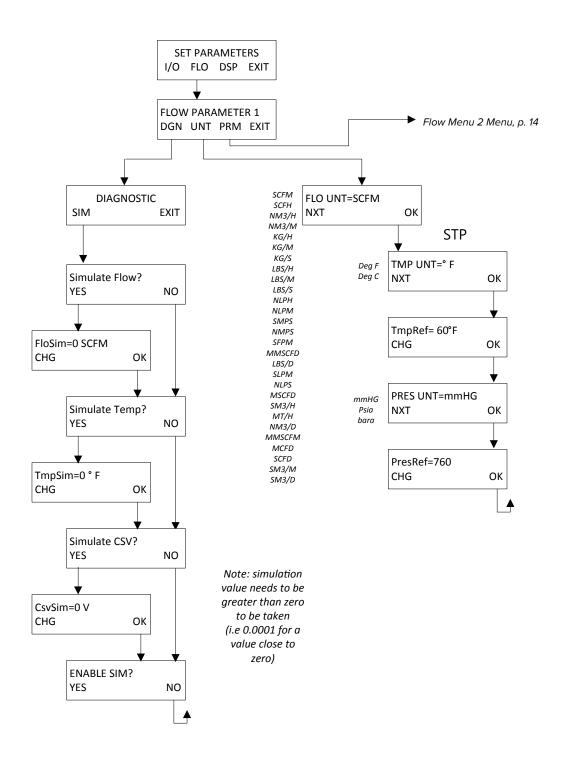


Fig. 1.4: 625S Menu Tree - Flow Parameter Menu 2

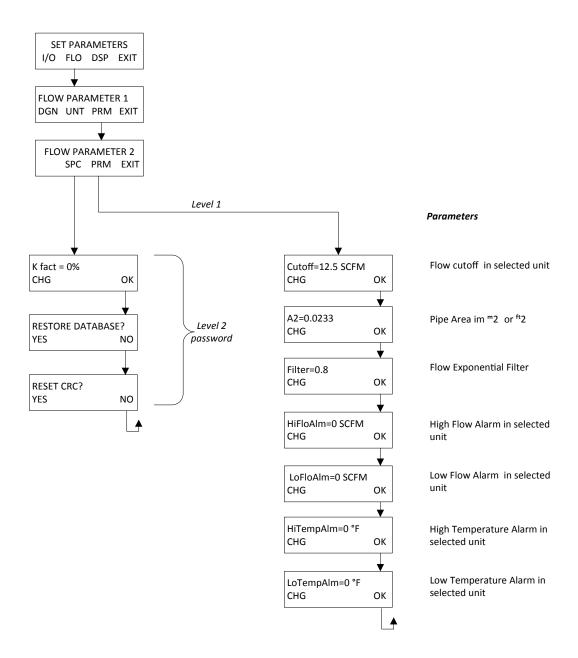
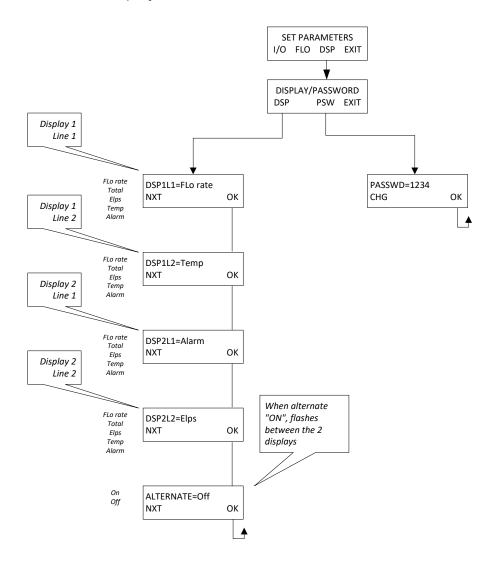


Fig. 1.5: 625S Menu Tree - Display Menu





NOTE! All readings updated every second

- Flo Rate = Flow rate of process gas
- Total = Total flow of process gas
- Elps = Elapsed time since reset of flow total
- Temp = Temperature of process gas
- Alarm = Notification of errors; diagnostic errors

Fig. 1.6: 625S Menu Tree - Engineering Screens

Enter: Press F1 & F2 at the same time Press F4 to return to normal mode

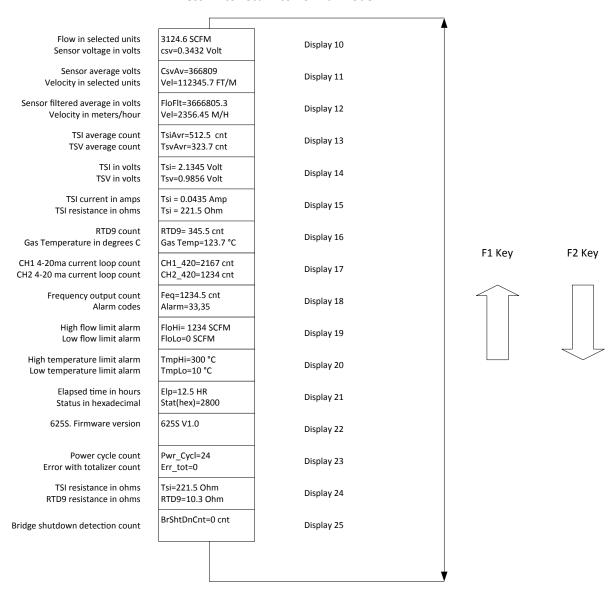
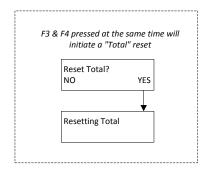


Fig. 1.7: 625S Menu Tree - Reset Flow Total



Welcome

Thank you for purchasing the SierraTrak 625S Thermal Gas Mass Flow Meter and Temperature Transmitter from Sierra Instruments. The 625S is an economical and easy-to-install solution for heaters and boilers to increase efficiency. Extensive engineering effort has been invested to deliver advanced features, accuracy measurement performance and outstanding reliability.

This instruction manual contains the electrical and mechanical installation instructions as well as details for programming, maintaining and troubleshooting the meter. This manual is divided into the following sections: Introduction, Installation, Wiring, Operation, Communications, Maintenance, Troubleshooting, Appendices, Glossary and Index.

Theory of Operation

The 625S is an innovative thermal mass gas flow meter and temperature transmitter. It is microprocessor-based and field programmable. The thermal sensor operates on the law that gases absorb heat. A heated sensor placed in an air or gas stream transfers heat in proportion to the stream's mass velocity. There are two sensor elements connected to a balanced bridge circuit. One sensor element detects the gas temperature and a second element is maintained at a constant temperature above the gas temperature. The energy applied to the heated sensor to maintain a constant temperature differential (constant Δ T) is directly proportional to the mass flow velocity. The SierraTrak 625S flow meter maintains accurate flow measurement over a large temperature and pressure range.

Mass Flow

The 625S measures mass flow; an advantage over other flow meters which measure volumetric flow rate. Volumetric flow is incomplete because temperature and pressure are unknown and must be measured separately. For example, the mass flow of a gas depends on its temperature and pressure. As temperature and pressure changes, the gas volume changes but not its mass. Therefore a device measuring mass flow is independent of temperature and pressure. The 625S provides a direct measurement of gas flow in mass units (kg/hr, lb/hr), standard units (SCFM, SLPM) or normal units (NM3/hr, NLPM) with no additional temperature or pressure measurements required.

Flow Calibration

The Sierra Calibration Lab maintains instrument calibration records on every flow meter. This data can also be accessed in the flow meter with a computer using the 625S TrakView™ software. Computer-generated calibration documents describe specific instrument details that can be sorted by serial number, tag number or customer purchase order. Calibration files include details on process conditions, calibration fluid, line size and other information. All NIST-traceable equipment utilized for the calibration procedure is identified, as is the calibration history of all reference equipment. In addition to the Calibration Certificate, a certified flow table that correlates current outputs with scaled units of flow is produced for each calibrated device.

I/O Description

The 625S features two galvanically isolated 4-20mA analog outputs, one isolated digital output, one discrete input, and a USB port for communication with a computer. The first 4-20mA output is for flow rate. The second 4-20mA output can be configured either for flow rate or process gas temperature.

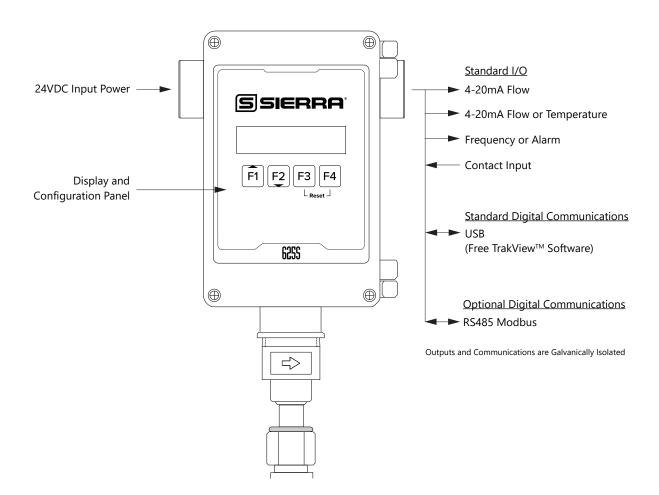
Both 4-20mA outputs can be scaled by the user. The digital output can be used for frequency or alarm, is programmable to represent flow rate and can be scaled for maximum flow/maximum frequency, units-per-pulse or pulse-per-units. The maximum frequency is 100 Hz. SierraTrak 625S View™ interfaces to the USB port and is a free Sierra PC-based software program that displays flow meter readings and permits flow meter configuration. The software is available for download on the Sierra website.

Industry standard communication options are available including optional Modbus RTU (RS485). This serial communication option can be selected when ordering the meter. Modbus may be enabled after purchase.

SierraTrak 625S Functional Diagram

An on-board 2 line x 16 character backlit LCD display shows flow rate, total flow, elapsed time, process gas temperature and alarms. The display is also used in conjunction with the Configuration Panel for field configuration of flow meter settings such as 4-20mA scaling, frequency output scaling, pipe area, zero flow cutoff, flow filtering or damping, display configurations, diagnostics and alarm limits.

Fig. 1.8: 625S Function Diagram



Installation Scope

This section describes how to install the Sierra Instruments SierraTrak 625S Flow Meter.

For Insertion Types:

- 1. Determine lateral position on the pipe.
- 2. Determine radial position of probe, if moisture or condensation is present in the gas.
- 3. Verify sensor installation depth.
- 4. Determine sensor orientation in relation to sensor length and direction of flow.
- 5. Ensure proper tightening of compression fitting for mounting meter.

Installation procedures must be performed using a combination of the end user's best engineering practices, in compliance with local codes, and with manufacturer's recommendations.

General Precautions



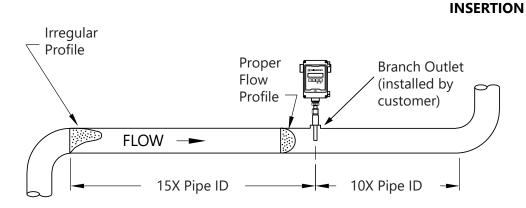
The following general precautions should be observed:

- 1. Exercise care when handling the flow meter to avoid damaging the probe, sensor or enclosure.
- 2. Close any unused conduit openings in the enclosure with plugs certified for your application.
- 3. The enclosure cover must be closed during installation except during configuration or at times during installation.
- 4. Mounting SierraTrak 625S in direct sunlight can cause the temperature inside the enclosure to increase beyond design limits, resulting in failure of LCD display and reduced component life. It is recommended that a sunshade be installed to avoid direct sunlight (see maximum enclosure operating temperature specification).
- 5. Ensure the flow direction indicator for the meter is in line with the direction of flow in the pipe.
- 6. Do not install the SierraTrak 625S enclosure near an igniter, igniter-controller or switching equipment.
- 7. Do not install an external power supply in a cabinet containing an igniter controller or switching equipment.
- 8. This flow meter contains components that can be damaged by static electricity. You must discharge yourself by touching a grounded steel pipe or other grounded steel material prior to working inside this flow meter.
- 9. Ensure that good engineering practices and applicable industry codes are followed throughout the installation process.
- 10. For accurate flow measurement, review flow meter placement instructions before installation to ensure a proper flow profile in the pipe.

Instructions for Flow Meter Lateral Placement

Install the model 625S flow meter so that it is far enough away from bends in the pipe, obstructions, or changes in line sizes to ensure a consistent flow profile. See Fig. 2.1 below for your meter type.

Fig. 2.1: Upstream and Downstream Pipe IDs for Insertion Flow Meters





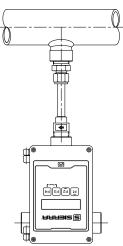
NOTE!

- Pipe ID = Inside Diameter
- The probe diameter is ½"
- An irregular flow profile will affect sensor accuracy

Radial Probe Positions - Moisture in the Gas or Condensation

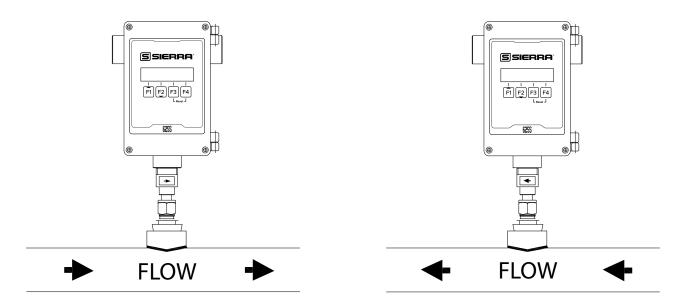
The radial position of the meter may help reduce collection of moisture on the sensor. Condensing liquids contacting the meter's sensing elements will disrupt accurate flow measurement. Sierra Instruments recommends the flow meter be used in dry gas conditions whenever possible for highest accuracy. Contact Sierra for further recommendations.

Fig. 2.2: Installation at 180°



Alternate Installations - Vertical Pipes or Restricted Installation Spaces

When restricted physical installation space exists, the SierraTrak 625S can also be installed at other angles. Please note that the display's orientation will remain aligned with the top of the meter. The display can be ordered in rotated orientations for better view.



See "SierraTrak 625S Display Configuration Codes" (Sierra Document F-142) for a complete list of display configuration codes.

Welding Branch Fitting to Pipe

The probe of the SierraTrak 625S must be installed perpendicular in the pipe to measure flow accurately. Use the following steps to ensure that the 3/4" branch fitting is correctly welded to the pipe. Directions:

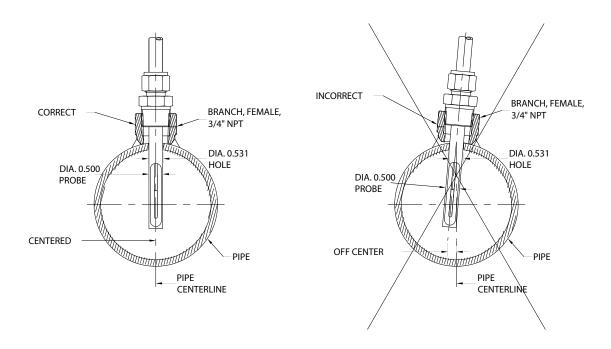
- 1. Drill a 0.531" (17/32") (13.5mm) hole inside the fitting through the wall of the pipe (1 wall only).
- 2. Assemble the compression fitting and branch fitting hand tight onto the probe of the 625S.
- 3. Insert the probe into the hole in the pipe and use the 625S probe and compression fitting to align the branch fitting with the hole and the probe perpendicular to the pipe.
- 4. Tack-weld the branch fitting carefully onto the pipe.
 - Before welding the fitting completely, verify the probe is aligned to the center of the pipe and the hole is centered in the branch fitting (see Figure 2.4).
- 5. To verify that the correct hole position has been achieved, carefully slide the 0.50" sensor in and out of the branch fitting and 0.531" hole.



WARNING! Do not force the 0.50" sensor through the 0.531" hole. Forcing it through the 0.531-inch hole can damage the probe!

- 6. Verify that the temporary weld of the branch fitting positions the probe window on the pipe's centerline.
 - Figure 2.4 shows an incorrect welding of the branch fitting, causing the 0.50" sensor to be "off center".
- 7. Once the branch fitting is aligned properly, remove the 0.50" sensor from the branch fitting and finish welding. Then verify the probe is still aligned with the center of the pipe.
- 8. Set the depth of the flow meter (see "Fig. 2.5: Insertion Sensor Depth in Pipe" on page 23).
 - Do not tighten compression fitting until proper depth of flow meter is determined. See Fig. 2.5.

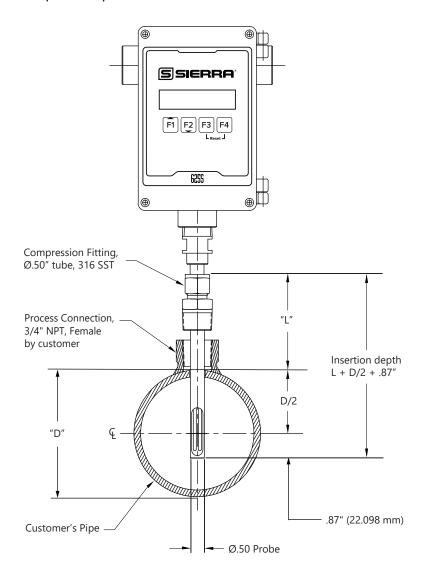
Fig. 2.4: Alignment of Branch Fitting



Installation Depth

The installation depth of the sensor in the pipe is dependent on the pipe size. To get the most accurate reading, proper placement of the sensor window within the pipe is necessary. As shown in Fig 2.5, the end of the sensor window should be 0.87" (22.1 mm) past the center line of the pipe. Review the dimensional drawing below with the following equation to calculate insertion depth: L + D/2 + .87" = insertion depth. Insertion depth is measured from the top of the compression fitting to the bottom end of the probe.

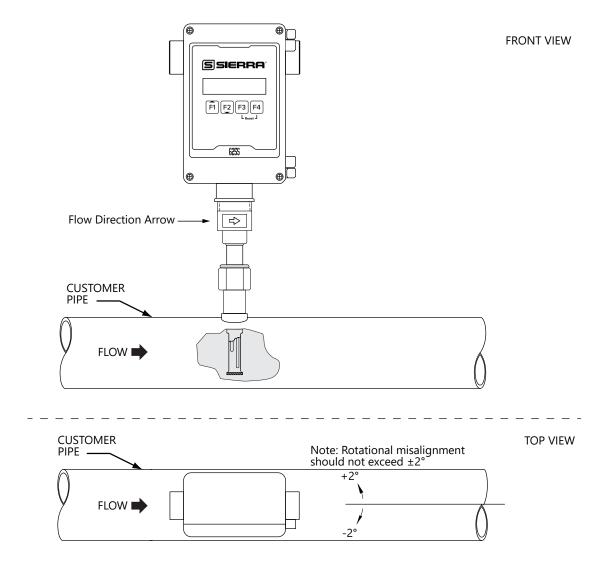
Fig. 2.5: Insertion Sensor Depth in Pipe



Direction of Flow and Orientation of the Probe

Install the meter with the flow direction indicator pointing in the direction of flow and centered on the middle of the pipe. The rotational misalignment of the flow direction indicator must be less than 2 degrees.

Fig. 2.6: Orientation of Flow Meter

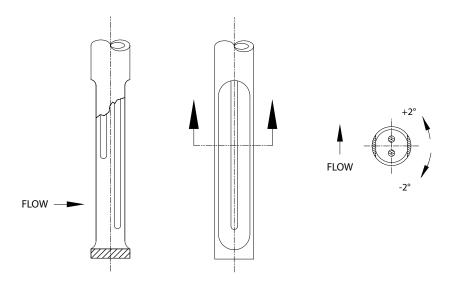


NOTE! Some flow meters are shipped with the sensor elements that are offset (see figure 2.7 on next page). Others are shipped with sensors that have equal length elements (see figure 2.8 on next page). The sensor type supplied was selected at the factory to be the best suited for your application. Follow the appropriate sensor orientation instructions.

Unequal Length Sensor Elements

Install the shorter element upstream from the longer one.

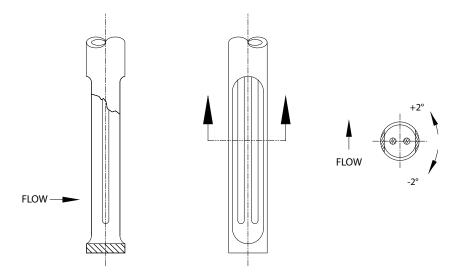
Fig. 2.7: Unequal Length Sensor Elements



Equal Length Sensor Elements

Install flow meter with both sensor elements facing the flow stream within ±2°.

Fig. 2.8: Equal Length Sensor Elements

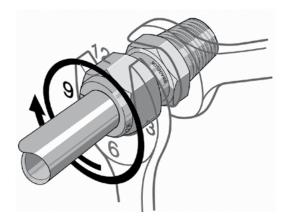


Mounting Instructions - Compression Fittings

The 625S is mounted through a 0.531" hole and a $\frac{3}{4}$ " female NPT branch outlet in the customer's pipe. Insertion style flow meters are not designed for use in pipes smaller than $\frac{1}{2}$ ".

- Install the compression fitting into the 3/4" female NPT branch outlet.
- When installing in a 2" pipe or larger, install the end of the probe 0.87" (22.098 mm) past the center line of the pipe (refer to figure 2.5) and tighten the compression fitting nut (refer to figure 2.9).
- When installing into a 1½" pipe carefully install the probe into the pipe until it touches the opposite wall and pull back 0.1".
- Rotate the nut finger-tight.
- Further tighten the nut until the tube will not turn by hand or move axially in the fitting.
- Mark the nut at the 6 o'clock position.
- While holding the fitting body steady, tighten the nut one and one-quarter (1 1/4) to the 9 o'clock position. See Figure 2.9.

Fig. 2.9: Proper Tightening of the Compression Fitting Nut





NOTE! Before removing a probe with compression fitting, mark the tube at the back of the nut, and mark a line along the nut and fitting body. Use these marks when reinstalling the probe. Reference the instructions on p. 27.

NOTE! When installing a probe with compression fitting that has been tightened previously, use the instructions on p. 27.

CAUTION! For a $1\frac{1}{2}$ " pipe, do not tighten compression fitting without 0.1" distance from wall or damage to probe will occur.

CAUTION! Once the stainless steel compression fitting ferrule is locked onto the probe, the probe can be removed or rotated, but the insertion depth is locked in place.

CAUTION! If the compression fitting is not properly tightened or the recommended pressure is exceeded, the fitting can slip on the probe and cause damage to the meter or bodily harm.

Mounting Instructions - Compression Fittings (Meters Previously Installed)

In cases where a compression fitting has already been swaged, use the following procedure.

- Carefully insert the probe with swaged ferrules into the fitting until the front ferrule seats against the fitting (see Figure 2.10).
- Verify that the probe is installed the correct depth in the pipe (refer to Figure 2.5 on p. 23).
- Rotate the nut with a wrench until the probe and nut are in their previously marked positions, or you feel a significant increase in resistance (see Figure 2.9).
- Tighten the nut slightly (approximately 1/8 turn).

Fig. 2.10: Proper Re-Tightening of the Compression Fitting Nut





CAUTION! Do not use a gap inspection gauge with reassembled fittings.



Wiring Precautions

WARNING! - DO NOT OPEN THE ENCLOSURE WHEN ENERGIZED OR AN EXPLOSIVE ATMOSPHERE IS PRESENT.

- All plumbing and electrical installations of flow meters must be in compliance with local codes, the end user's best engineering practices, and manufacturer's recommendations.
- An external power disconnect and 16A over-current protection are required for the DC powered 625S.
- Do not install the SierraTrak 625S enclosure near an igniter, igniter-controller or switching equipment to eliminate the possibility of noise interference.
- Do not install an external power supply in a cabinet containing an igniter controller or switching equipment.
- This flow meter contains components that can be damaged by static electricity. You must discharge yourself by touching a grounded steel pipe or other grounded metal prior to working inside this flow meter.
- Close any unused conduit openings with suitable certified plugs.

Installation Wiring

Cut all wires short for a minimum service loop. Obtain the correct length for the 625S wires using one of these methods:

- Trim the wires to extend 5 inches out of the enclosure after the conduit and wires are routed to the 625S.
- Trim the wires to extend 6 inches from the end of the conduit before attaching them to the 625S.

Power Wiring

For power wiring, use stranded copper wire, no larger than 16-gauge. If an external 24VDC power source is used, twisted pair shielded cable is recommended. Supply connection wiring must be rated for at least 90°C.

Grounding

The enclosure must be properly grounded with a quality earth ground. 16 gauge, stranded wire is recommended.

Signal Wiring

For signal wiring, the recommended wire gauge is 18 to 22 AWG. Always use twisted pair shielded cable. The cable shield should not be connected at the flow meter, it should be connected at the power supply ground terminal or instrumentation ground. Do not route the power and signal wires in the same conduit. Power wires must enter left-hand conduit entry.

Serial Communication Wiring

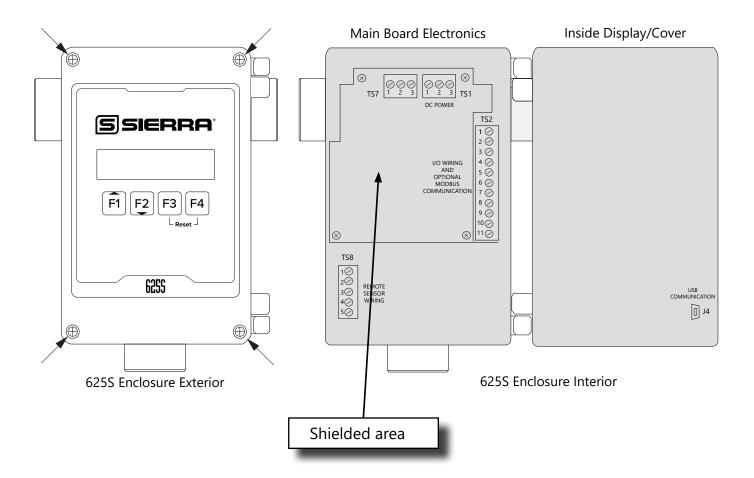
If you have purchased the Modbus communication option, the recommended wire gauge is 18 to 22 AWG. Always use twisted pair shielded cable. Two of the wires in the cable should be twisted pair and used for the Modbus transmit and receive signals. The third wire is for the Modbus common signal. The shield drain wire of the cable should be connected to chassis or earth ground at the Modbus modem. Belden number 3106A or a similar type of cable is recommended, depending on the environment or temperature requirements of the application.



Wiring Instructions

To wire the 625S connect the power and signal wires to the terminal blocks according to the label and instructions on the following pages.

Fig. 3.1: 625S Wiring Access





NOTE! Keep power and signal wires within the area of the metal shields and out of the unshielded area.

Wire the 625S by opening the enclosure cover, bringing customer supplied wires in through the conduit openings and connecting to the terminal blocks. The 625S has two conduit openings to maintain separation between input power and output signal wiring. To eliminate the possibility of noise interference; use a separate conduit for power, cut all wires short for a minimum service loop and keep the wires within the area of the 625S internal metal shields.



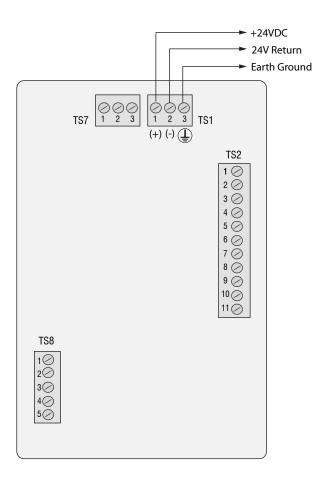
Power Input Requirements: 24VDC Supply

External DC power supply must provide 24VDC ±10%, at 0.7 Amps minimum.

The enclosure must be properly grounded with a quality earth ground. Sixteen (16) gauge, stranded wire, is recommended for power and earth ground.

Connect the power wiring as shown in the diagram below.

Fig. 3.2: Connections for 24VDC Supply Power Input Requirements





CAUTION!

Supply connection wiring must be rated for at least 90°C.



Setting Up the NE-43 Alarms

The 625S flow meter supports the NAMUR specification NE-43 for alarms on the 4-20mA output. See p. 46 for the 4-20mA output NAMUR operation.



CAUTION! Configure the 625S with the following setup when using the 4-20mA output to control equipment in a failsafe application.

4-20mA Failsafe Wiring: NAMUR NE-43

When the 4-20mA output is used to control equipment in failsafe applications:

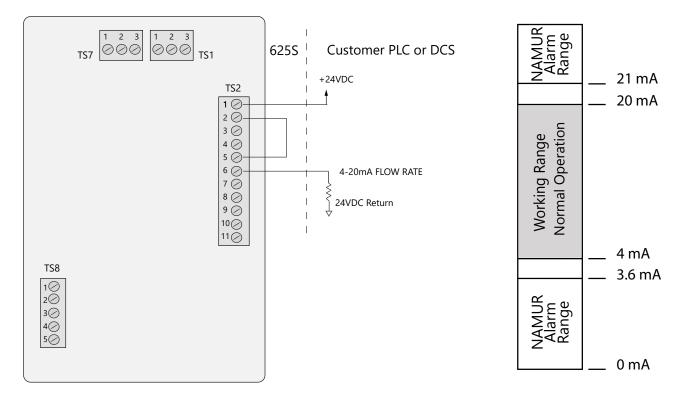
Wire the 4-20mA output in series with the Alarm output as shown in Figure 3.2.

Configure the Pulse/Alarm output to Alarm and select System Alarm as shown in the "Alarm Output" on p. 46.

The System Alarm output is designed to allow current to flow during normal operation and interrupts current when power to the meter is lost or in a System Alarm condition.

In the 4-20mA Failsafe Wiring configuration of Fig. 3.3, the 4-20mA signal goes to 0mA if power to the SierraTrak 625S is lost or a System Alarm occurs.

Fig. 3.3: 4-20mA Failsafe Wiring and Range of 4-20mA Output for NAMUR Alarm





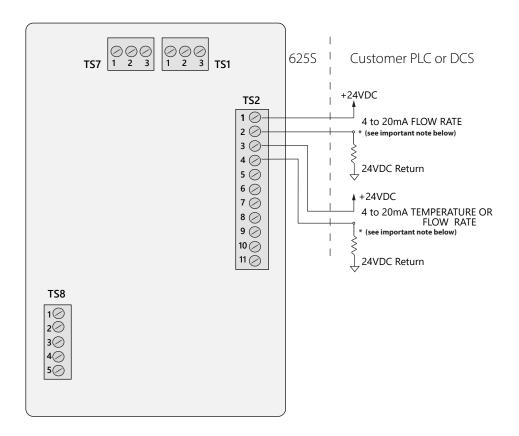
4-20mA Output Wiring: Customer-Supplied Power Source

Bring the 4-20mA wiring in through either conduit hub. Connect the FLOW RATE 4-20mA wiring to TS2 pin 1(+) and 2(-). Connect 4-20mA output #2 wiring to TS2 pin 3(+) and 4 (-).



CAUTION! Configure the 625S with the failsafe setup (see p. 31).

Fig. 3.4: 4-20mA Output Wiring for Customer-Supplied Power Source





NOTE!

The load resistor on the Sierra Flow Meter 4-20mA signal is typically 250 ohms and is located in or at the customers PLC or DCS. A 250 ohm resistor in the 4-20mA line will result in a 1 to 5VDC signal to the PLC or DCS. Some PLC/DCS equipment has the load resistor built in to the unit; please refer to the PLC/DCS technical manual. **Do not exceed a 600 ohm load on the Sierra Flow Meter 4-20mA signal.**



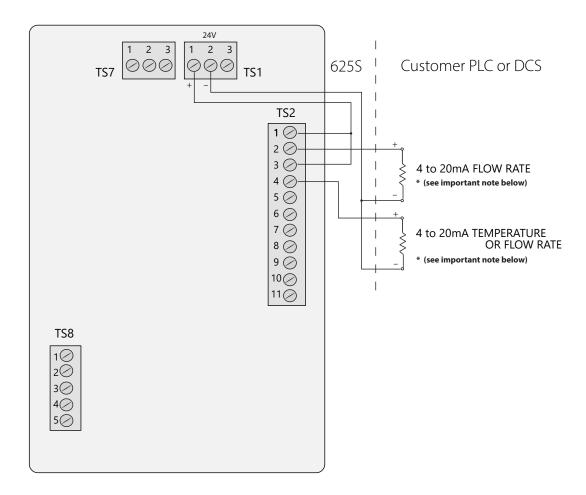
4-20mA Output Wiring: Loop Power Provided by 625S

Bring the 4-20mA wiring in through either conduit hub. Connect the 4-20mA flow rate wiring to terminal blocks TS1 and TS2 as shown in the diagram below.



CAUTION! Configure the 625S with the failsafe setup (see p. 31).

Fig. 3.5: 4-20mA Output Wiring for Loop Power Provided by 625S





NOTE!

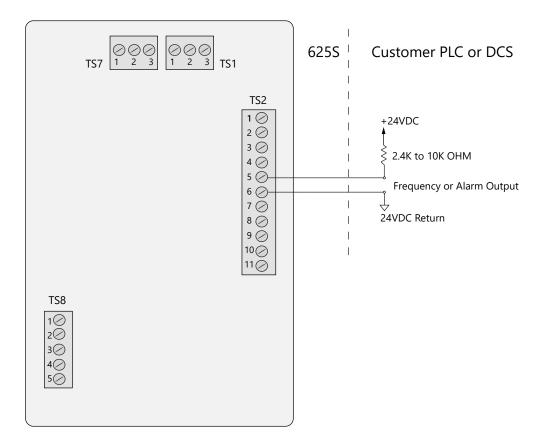
The load resistor on the Sierra Flow Meter 4-20mA signal is typically 250 ohms and is located in or at the customers PLC or DCS. A 250 ohm resistor in the 4-20mA line will result in a 1 to 5VDC signal to the PLC or DCS. Some PLC/DCS equipment has the load resistor built in to the unit; please refer to the PLC/DCS technical manual. **Do not exceed a 600 ohm load on the Sierra Flow Meter 4-20mA signal.**



Frequency/Alarm Output Wiring

Bring frequency/alarm wiring in through the right-hand conduit hub. Connect to TS2 pin 5(+) and 6(-). The frequency/alarm output is an open collector circuit capable of sinking a maximum of 20mA of current. Frequency or alarm selection is programmed using the display or SierraTrak 625S View™. Only one option, frequency or alarm, can be active at a time.

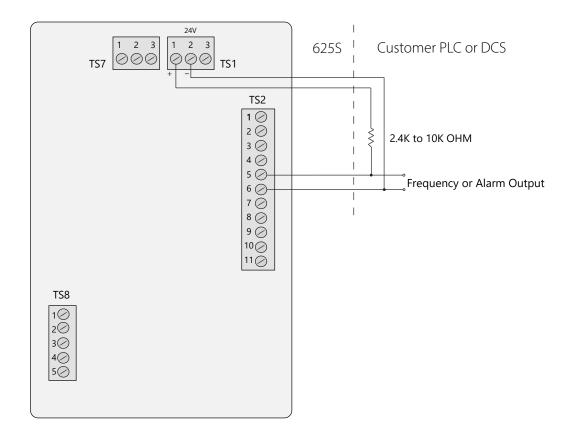
Fig. 3.6: Frequency/Alarm Output Isolated (Recommended)





Frequency/Alarm Output Wiring: Local +24V Power Option

Fig. 3.7: Frequency/Alarm Output Wiring: Local +24V Power Option





NOTE!

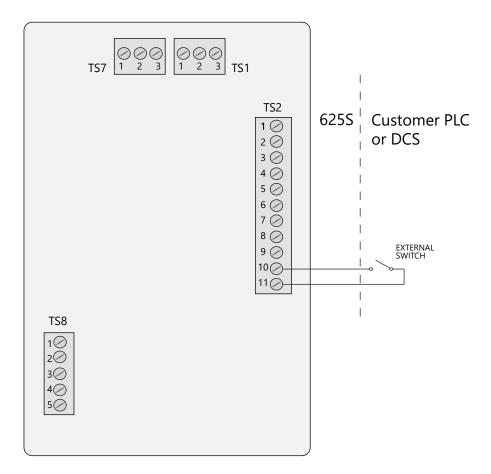
The 625S Frequency/Alarm output is typically used to drive digital circuitry or solid-state relays. The output of a solid state relay may, in turn, operate loads such as electromechanical relays or alarm indicators.



Remote Switch Wiring

A remote switch can be used to reset the Totalizer and elapsed time, if enabled in the programming settings. There is no polarity requirement on these connections. Use TS2 pin 10(+) and 11(-).

Fig. 3.8: Switch





RS485 Wiring for Modbus

Wiring connections are made to terminal block TS2 for Modbus communication.

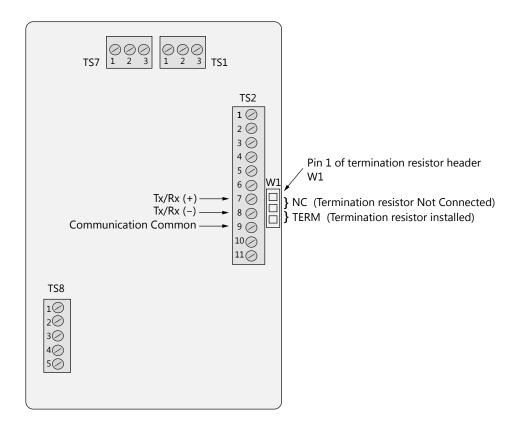
The Tx/Rx+ signal connects to pin 7, Tx/Rx- connects to pin 8 and communication common to pin 9 as shown in Figure 3.9.

Termination Resistor

Connect a termination resistor across the receive/transmit signals of the last device on the Modbus communication line. To connect the 121 ohm termination resistor on the 625S, set jumper W1 to the TERM position.

Disconnect the termination resistor on all other external Modbus devices. The termination resistor of the 625S is disconnected by setting jumper W1 to the NC (Not Connected) position.

Fig. 3.9: Modbus Wiring



NOTE: W1 jumper will either be in the NC or TERM position. It should be in the TERM position on the last meter in the Modbus daisy chain.

Start Up Sequence

The program automatically enters the Run/Measure mode after power up. The screen will show the software version of the 625S during power up.

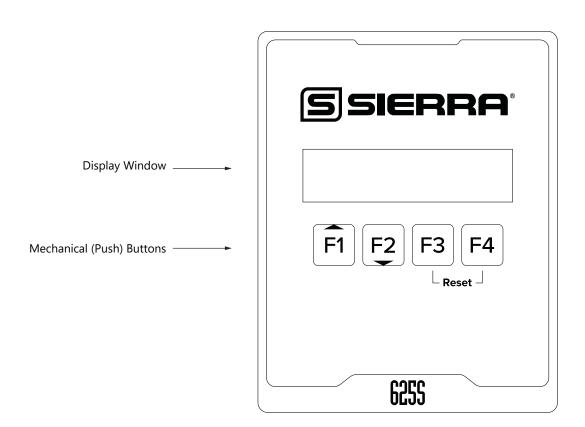
USB Interface

The USB interface is a standard feature which allows communication with a PC to monitor readings and configure settings. TrakView™, is a free application program from Sierra Instruments that connects to the USB interface and allows data monitoring, configuration setting, data logging to Excel, and an option to save and recall 625S configuration data.

SierraTrak 625S Display and Configuration Panel

The 625S has a 2 line x 16 character display with 4 mechanical buttons. The meter can be programmed by using the display and configuration panel.

Fig. 4.1: 625S Display and Configuration Panel



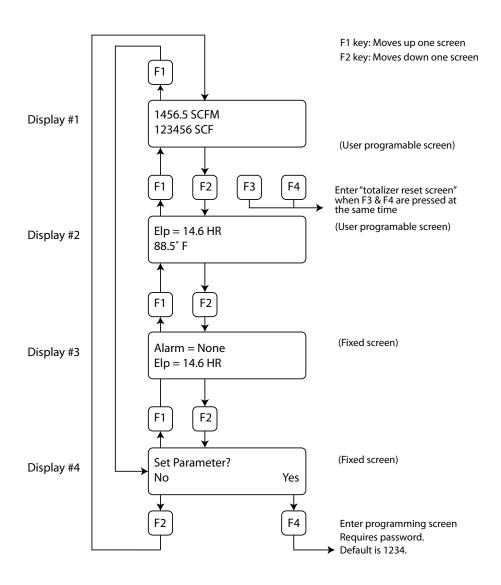
Measurement Mode Display Screens

In the measurement mode, there are four different display screens (display 1, 2, 3 and a prompt screen to enter the programming mode). Two display screens are user programmable (refer to Display Setup p. 48). Scrolling through the display is accomplished by pressing the F1 or F2 key to view the next or previous screen.

Pressing the F1 and F2 keys at the same time enters the Log Menu and Engineering Menu screens (refer to p. 16).

Pressing the F3 and F4 keys at the same time brings up the Reset Total screen prompt.

Fig. 4.2: 625S Measurement Mode Display Screen Navigation



SierraTrak 625S Engineering Displays

Pressing the F1 & F2 keys at the same time in the normal mode, brings up the engineering displays. These displays show internal parameters of the 625S which are used by Sierra service technicians.

Use the F1 & F2 keys to navigate. Press F4 to exit.

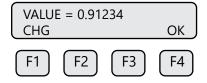
Fig. 4.3: SierraTrak 625S Engineering Displays

Enter: Press F1 & F2 at the same time Press F4 to return to normal mode 3124.6 SCFM Flow in selected units Display 10 csv=0.3432 Volt Sensor voltage in volts Sensor average volts CsvAv=366809 Display 11 Velocity in selected units Vel=112345.7 FT/M Sensor filtered average in volts FloFlt=3666805.3 Display 12 Velocity in meters/hour Vel=2356.45 M/H TSI average count TsiAvr=512.5 cnt Display 13 TSV average count TsvAvr=323.7 cnt Tsi= 2.1345 Volt TSI in volts Display 14 TSV in volts Tsv=0.9856 Volt TSI current in amps Tsi = 0.0435 Amp Display 15 TSI resistance in ohms Tsi = 221.5 Ohm RTD9 count RTD9= 345.5 cnt Display 16 Gas Temperature in degrees C Gas Temp=123.7 °C F1 Key F2 Key CH1 4-20ma current loop count CH1_420=2167 cnt Display 17 CH2 4-20 ma current loop count CH2 420=1234 cnt Frequency output count Feq=1234.5 cnt Display 18 Alarm codes Alarm=33,35 High flow limit alarm FloHi= 1234 SCFM Display 19 FloLo=0 SCFM Low flow limit alarm High temperature limit alarm TmpHi=300 °C Display 20 Low temperature limit alarm TmpLo=10 °C Elp=12.5 HR Elapsed time in hours Display 21 Status in hexadecimal Stat(hex)=2800 625S. Firmware version 625S V1.0 Display 22 Power cycle count Pwr_Cycl=24 Display 23 Error with totalizer count Err_tot=0 TSI resistance in ohms Tsi=221.5 Ohm Display 24 RTD9 resistance in ohms RTD9=10.3 Ohm BrShtDnCnt=0 cnt Display 25 Bridge shutdown detection count

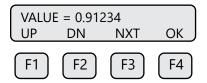
Programming: Data Entry using the Display and Configuration Panel

There are 2 basic types of menu entries: one for changing value or string and one for selecting from a selection list.

To Change a Value or String:

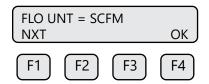


Press CHG (F1) key to change the value, OK (F4) to accept the value.



Press the **UP (F1) or DN (F2)** key to select a new digit or character, the cursor points to the selected digit. Press **NXT (F3)** to select the next digit and **OK (F4)** to accept the entry.

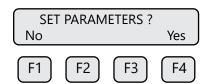
To Select from a List:



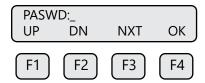
Press NXT (F1) key repeatedly until the correct selection is made and OK (F4) key to accept the entry.

Entering the Programming Mode

To enter the programming mode and access the Main Menu, press the **F1** or **F2** key in the normal running mode until the following screen is shown:



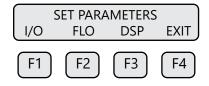
Press YES (F4) and the following screen will prompt user to enter password:



Enter the correct password, then follow the instructions for changing a value as specified on page p. 41. The default Level 1 password is "1234".

If the wrong password is entered, the message "Wrong Password" will display and then return to the programming entry screen.

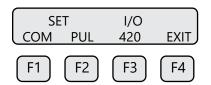
If the password is accepted, the Main Menu screen will be shown:



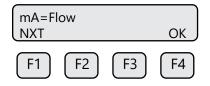
This is the Main Menu screen for the programming mode. Press **EXIT (F4)** repeatedly until "Normal Mode" is seen briefly to exit the programming mode.

Analog 4-20mA Outputs

The following menu allows the scaling of the analog 4-20mA output. From the Main Menu, press **I/O (F1)** to move to the 4-20mA output selection. In this screen press **420 (F3)** (screen appearance may vary according to options).



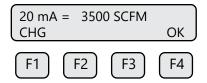
The 4-20mA output is programmable for flow or temperature:



Selections for the 4-20mA output are:

Flow Temp

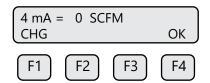
Select NXT (F1) to select Flow or Temperature and then press OK (F4).



Enter the value for the 20mA and press **OK (F4)** key to accept the setting. Then the following screen will display:



NOTE! When the flow rate exceeds the programmed value for the 20mA set point, the analog output will stay at 20mA and an alarm code will be generated.



Enter the value for the 4mA and press OK (F4).



NOTE! 4mA is normally set to 0.

The following menu item allows the user to select an alarm level on the 4-20mA output when a serious issue is detected that is preventing the calculation of a correct flow value.

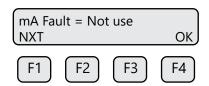
The options are:

- Force the 4-20mA signal to 3.6mA
- Force the 4-20mA signal to 21mA
- Do not force the 4-20mA signal (not used)



CAUTION! When using the 4-20mA output equipment in a failsafe application, use the wiring configuration on p. 31 and set the Pulse/Alarm Output to System Alarm as shown in "Alarm Output" on p. 46.

After setting the 4mA output value, choose the mA fault value:



The following events will set the output to 3.6mA or 21mA if the alarm level is selected:

- Sensor resistance above high limit
- Bridge Shutdown

When the 4-20mA output is wired through the System Alarm, the following cause the output to go to 0mA:

- Power to the Microprocessor is lost
- Sensor or electronics failure

Fig. 4.3: Range of 4-20mA Output and NAMUR Alarm



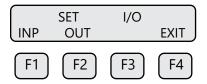
Press (F4) repeatedly until "Normal Mode" is seen briefly to exit the programming mode.



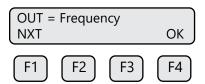
NOTE! When the flow rate exceeds the programmed value for the 20mA set point, the analog output will stay at 20mA and an alarm code will be generated.

Frequency Output

From the Main Menu, press I/O (F1), I/O (F2) and then OUT (F2).

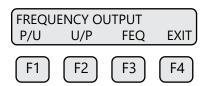


From the "SET I/O" menu, press **OUT (F2)** to select the output. The following screen will show:



Press **NEXT (F1)** to cycle through output options until you have the selection for "OUT=Frequency" and press **OK (F4).**

The frequency output can be configured in one of three ways: (1) specifying a maximum frequency to a defined maximum value of flow rate, (2) specifying how many flow units total per pulse, U/P (i.e., 0.1 SCF per pulse) or (3) specifying how many pulses per unit, P/U (i.e., 10 pulses per SCF). All of these approaches are equivalent.



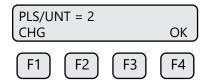
Use **P/U (F1)** to enter pulse per unit, **U/P (F2)** for unit per pulse or **FEQ (F3)** to enter the flow and maximum frequency to scale the pulse/alarm output.



NOTE! When data is entered with any of the three described methods, the other values will be re-calculated according to the settings.

Entering data in Pulse per Unit:

From the Frequency Output Menu above, press **P/U** (F1) and the following screen will show:

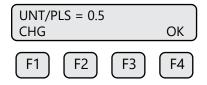


Press CHG (F1) to change the setting and then OK (F4) to accept entry.

The value entered is in pulse per selected flow unit total (i.e., 2 pulses per SCF).

Entering data in Unit per Pulse:

From the Frequency Output Menu, press **U/P (F2)** and the following screen will show:

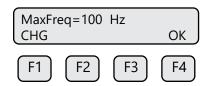


Press CHG (F1) to change the setting and then OK (F4) to accept entry.

The value entered is in unit per pulse (i.e. 0.5 flow unit total per pulse)

Entering data with flow and maximum frequency:

From the Frequency Output Menu, press **FEQ (F3)** and the following screen will show:

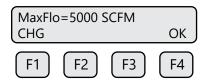


Enter the maximum pulse rate (frequency) and press OK (F4).



CAUTION! Maximum pulse rate (frequency) cannot exceed 100 Hz.

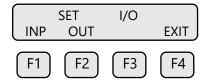
The next screen will show:



- **NOTE!** If the flow rate exceeds the maximum pulse rate (frequency), the output will stay at that maximum frequency but the SierraTrak 625S will issue an alarm code.
- **CAUTION!** Calculate the pulse rate at the maximum flow rate to ensure it does not exceed 100 Hz.

Alarm Output

To access the Alarm output, press **I/O (F1)** key from the "SET PARAMETERS" screen, then select **I/O (F2)**. The screen will show:



Then press **OUT (F2)** and the screen may show:



Then press NXT (F1) to select the correct alarm and press OK (F4).

Selections are:

Not used

Frequency

HiFloAlm = High Flow Alarm

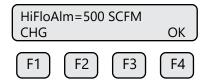
LoFloAlm = Low Flow Alarm

HiTempAlm = High Temperature Alarm

LoTempAlm = Low Temperature Alarm

System Alm = System Alarm

When the output is set to Alarm and there is no alarm condition, the output will be on (0 volts). When an alarm is active, the output is turned off (12 to 24 volts).



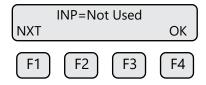
Enter the value for the limit by pressing CHG (F1) and then OK (F4). A value of 0 disables the alarm.



NOTE! There is only one output to operate as a pulse output or an alarm output. Both cannot operate at the same time.

For Discrete Input Settings

From the Main Menu, press I/O (F1) and then I/O (F2) and then INP (F1) key to select input. The following menu will display:



Press **NXT (F1)** until the correct selection is shown and then press **OK (F4)** to accept the setting. Selections are:

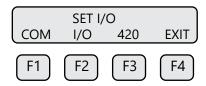
Not used

Tot Reset = Reset the totalizer

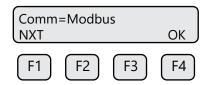
Press **EXIT (F4)** repeatedly until you exit programming mode.

Serial Communication Settings

To program the serial communication settings, press I/O (F1) key from the base menu:



Press COM (F1) to select Serial communication. The screen may show:



Options for serial communication are:

None



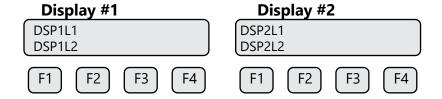


NOTE! Any selection other than "None" requires the communication option for the selected communication type. If enabling a communication option, see see the Communications section of this manual for operation.

Display Setup

There are four display screens that you can cycle through in normal operating mode (see Figure 4.2 on p. 39). Two of the four display screens are fixed and cannot be changed (displays #3 & 4).

The other two screens are programmable to show the information that you prefer and is discussed in this section.

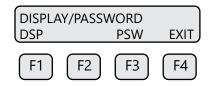


Selections are:

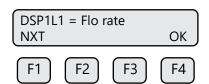
DSP1L1 = Display 1, Line 1 DSP2L1 = Display 2, Line 1 DSP1L2 = Display 1, Line 2 DSP2L2 = Display 2, Line 2

To Program Display Screens #1 & 2:

From the Main Menu press **DSP (F3)** to select the display menu:



Press **DSP** (F1) key. The display will show:



These are the selections for the Display #1 Line #1.

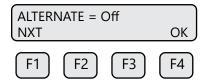
Selections are:

Flo rate Flow rate

Total Total mass or volume

Elps Elapsed time Temp Temperature Alarm Error codes

When the selection is correct, press **OK (F4)** to accept. The display will then go through the same process for all 4 lines of the 2 programmable displays (DSP1L1, DSP1L2, DSP2L1 and DSP2L2). After the last line of display 2 is accepted, the display will show the following menu:



This menu allows you to alternate between menu display 1 and 2 every few seconds.

Selections are: On or Off

Press **OK (F4)** to accept selection. Press **EXIT (F4)** repeatedly until "Normal Mode" is seen briefly to exit the programming mode.

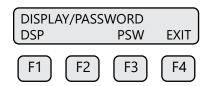
Password

There are two user level passwords, only **Level 1** is programmable and gives access to all the normal settings. The second password is used to allow access to calibration settings.

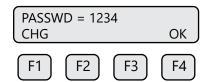
Default **Level 1** password is "1234", and **Level 2** password is "9111". The **Level 1** programmable password can be disabled by setting it to "0".

To Program the Password:

From the Main Menu press **DSP (F3)** to select the display menu.



Press **PSW (F3)** key to select password.



This screen displays the current **Level 1** password.

Press **CHG (F1)** key to change the password and enter new value.

Press **OK (F4)** to accept new data and exit programming by pressing **EXIT (F4)** key repeatedly until out of the programming mode.



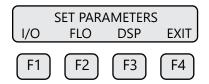
NOTE! Password can be number or letter characters up to 4 digits. Do not set the Level 1 password to the same number as the Level 2 password.

Units Settings Menu

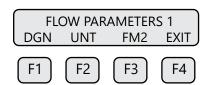
This menu is used to set the units for flow, temperature, and pressure reference as well as the setting of reference temperature, reference pressure, and density of gas when using Lbs/time or Kg/time.

These values will be set at Sierra Instruments using information supplied by the customer. These values can be changed to match a new application.

The units setting is accessed from the Main Menu. To access the Unit Settings Menu:

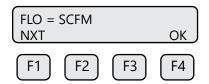


Press FLO (F2):



Press UNT (F2) for Unit selection.

The screen will show:



Press **NXT (F1)** to change selection and **OK (F4)** to accept.



NOTE! The totalizer (total flow measured) will roll over when reaching a certain value. The maximum value is dependent on the flow units selected (see Totalizer Rollover p. 57).

Flow Units

Selections for flow units are:

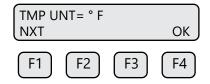
SCFM	KG/M	LBS/D	SM3/H	MSCFD (MCFD)
SCFH	KG/S	NLPH	SM3/D	MMSCFD (MMCFD)
NM3/H	LBS/H	NLPM	NM3/D	MCFD (MSCFD)
NM3/M	LBS/M	NLPS	SLPM	MMSCFM (MMCFM)
KG/H	LBS/S	SM3/M	SCFD	MT/H
SMPS	NMPS	SFPM		



WARNING! The 625S re-calculates area, 4 and 20mA values, maximum flow for the frequency output and zero flow cutoff when changing flow units except for velocity units. When going to or from velocity units, the 625S will not recalculate these values and these values must be re-entered manually.

Temperature Units

After pressing **OK (F4)** to accept the Flow unit the display will prompt for the temperature unit setting:

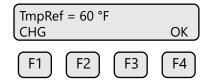


Press **NXT (F1)** to change selection and **OK (F4)** to accept.

Selections for Temperature units are: °C or °F

Reference Temperature

After pressing **OK (F4)** to accept the temperature unit setting, the display will prompt for temperature reference in selected unit.



Press **CHG (F1)** to change the reference and **OK (F4)** to accept.

Pressure Units

After pressing **OK (F4)** to accept the reference temperature, the display will prompt for the reference pressure unit selection:



Press **NXT (F1)** to select next entry and OK (F4) to accept.

Selections are:

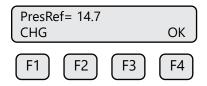
mmHG = Millimeters of mercury (absolute)

Psia = Pounds per square inch absolute

bara = Bar absolute

Reference Pressure

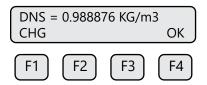
After the pressure unit selection is made, the display will show a menu to enter the reference pressure:



Press CHG (F1) to change it and OK (F4) to accept.

Gas Density

After the pressure reference is accepted, the display will prompt for the gas density if LBS or KG was selected for the flow unit:



Press **CHG (F1)** to change it and **OK (F4)** to accept. Density conditions are referenced to 0°C at 760 mmHg.



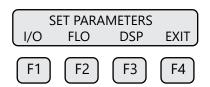
NOTE! The density entry is only used when KG/time or LBS/time is selected for flow rate units.

Accessing Flow Parameters and Alarm Settings

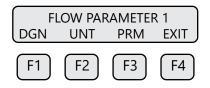
This is the menu used to set various flow parameter values. They are: Flow cutoff, pipe area, filter, high and low alarm for flow and temperature.



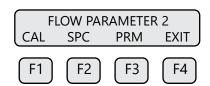
NOTE! The parameters in this menu are set to the customer specifications at the factory. They should only be changed when changing the application of the flow meter.



The menu is accessed from the Main Menu by pressing **FLO (F2)**:



Then press FM2 (F3):





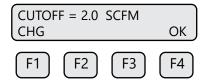
NOTE! The **CAL** AND **SPC** function key will only appear and be accessible from a **Level 2** password.

Then press **PRM (F3)**. This will move into settings for flow cutoff, pipe area, and filter value. These settings will be followed by the high and low alarm settings for flow rate and/or temperature.

Programming Flow Parameters

Flow Cutoff

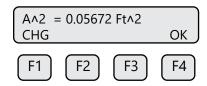
The first parameter is Flow Cutoff:



Enter the value for the flow cutoff and then press **OK (F4)**. When the flow rate falls below the flow cutoff, the flow meter will display a flow value of zero.

Pipe Area

To set the Pipe Area:



Enter the pipe area in **square meters** or **square feet** and then press **OK (F4)**. Use square meters for metric flow unit selections and square feet for English flow unit selections. This selection is dependent on the flow unit selected (English vs metric).

Filter Value

The filter value is also referred to as dampening factor and is used to quiet the readings. The filter value is an exponential filter that dampens the noise and is used as follows:

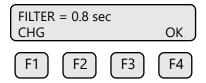
Flow Value = (FA * new value) + (FB * average)
Where FA = filter value, FA + FB is equal to 1.0.

A lower filter value will increase dampening of the flow rate and smooth the reading. A lower filter value will also slow the meter's response. For example, if we enter a filter of 0.8, the weight ratio for the new average is:

New average = (80% new sample) + (20% last average) Filter range is 0.01 to 1.0, 0.01 being a high filter value and 1.0 = no filter

Filter	Response (Sec.) 65% of Target
0.9	0.10
0.8	0.15
0.7	0.20
0.6	0.25
0.5	0.30
0.4	0.35
0.3	0.40
0.2	0.60
0.1	1.00
0.05	2.00
0.03	3.00
0.01	10.3

Enter the filter value and then press **OK (F4)**.



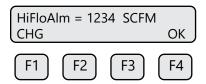
Programming High and Low Alarm Settings

Settings for the alarms directly follow the flow parameters for flow cutoff, pipe diameter, and filter value. These alarms can be used without the digital output assigned to the alarm. If that is the case, the alarm status will only be shown on the display, through serial communication, or TrakView. If the digital output is assigned to an alarm, changing the value here will change that setting.

High Flow Rate Alarm

This is the upper flow limit alarm value that can be associated with the alarm output. An alarm code is generated when the flow value exceeds this limit. If no alarm is needed, set this value to zero.

To set the parameters for a high flow rate alarm, press **CHG (F1)**:

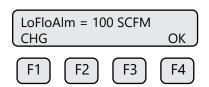


Press OK (F4) to accept the value.

Low Flow Rate Alarm

This is the lower flow limit alarm value that can be associated with the alarm output. An alarm code is generated when the flow value is below this limit. If no alarm is needed, set this value to zero.

To set the parameters for a low flow rate alarm, press **CHG (F1)**:

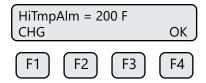


Press **OK (F4)** to accept the value.

High Temperature Alarm

This is the upper temperature limit alarm value that can be associated with the alarm output. An alarm code is generated when the temperature value exceeds this limit. If no alarm is needed, set this value to zero.

To set the parameters for a high temperature alarm, press **CHG (F1)**:

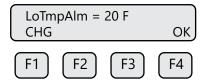


Press **OK (F4)** to accept the value.

Low Temperature Alarm

This is the lower temperature limit alarm value that can be associated with the alarm output. An alarm code is generated when the temperature value is below this limit. If no alarm is needed, set this value to zero.

To set the parameters for a high temperature alarm, press CHG (F1):



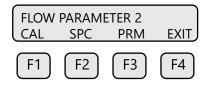
Press OK (F4) to accept the value.

Calibration Parameters

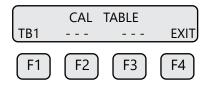
This menu allow changing the factory calibrated setting of the flow meter and is accessible with a **Level 2** password. Calibration parameter values are set for temperature and pressure at 0 degree C and 760 mmHg.

These settings should never be changed (except by Sierra technicians at the factory).

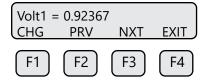
This menu is entered from the base menu and pressing FLO, PRM and CAL.



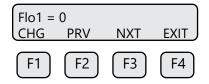
Press CAL (F1) then the display will show:



Press TB1 (F1) then the display will show:



Press NXT (F3) then the display will show:

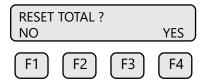


Use the CHG (F1) key to change the entry, PRV (F2) to move to the previous entry, NXT (F3) to move to the next entry and EXIT (F4) to return.

Pressing the **NXT (F3)** key will show the data point voltage, then mass velocity, and then go to the next data point. The number after Volt (i.e., Volt1) or Flo (i.e., Flo1) indicated the data point number. The calibration table can hold up to 20 data pair points. Each data point has a voltage and mass velocity associated with it.

Reset Total and Elapsed Time

Enter the flow totalizer and elapsed time screen by pressing the **F3** and **F4** keys at the same time in the normal running mode (password required).



Press YES (F4) and enter password to reset total and elapsed time. Press NO (F1) to cancel.



NOTE! This feature is not available on non-resettable units.

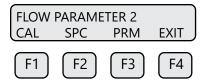
Totalizer Rollover

The SierraTrak 625S has an automatic roll-over function. The total flow count of the SierraTrak 625S will roll over after 99,999,999. Except for:

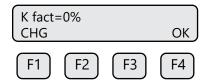
MSCFD: 999,999,999 MMSCFM: 9,999,999 MMSCFD: 999,999

Restore Database

Restoring the original factory settings is accomplished from the "Flow Parameter 2" menu by entering a **Level 2** password "9111" and pressing the **SPC** key (**F2**).



The following will show:



Upon pressing **OK (F4)**, an option to restore the database will follow:

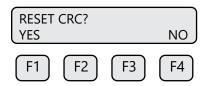


Press **YES (F1) ONLY** if you want to restore your database to the initial factory setting that the meter was shipped with. All current user-entered settings will be overwritten.

The green LP1 LED will flash at a faster pace until the recall is performed. The "RESET CRC" screen will follow "RESTORE DATABASE".

Reset CRC

If the NVRAM CRC check fails (Error Code 36), the programmed settings values will need to be verified and corrected before clearing the error. Call Sierra Instruments Customer Service if you need assistance.



Press **YES (F1) ONLY** if you want to reset the CRC and generate a new CRC value.

Simulation

This menu allows for simulation of flow rate, temperature, and flow input voltage. It should only be used for testing and demonstration purposes.



NOTE! Make sure to return all of these simulation values to zero, before returning to the normal mode of operation.

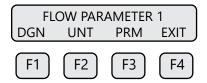


NOTE! Simulated values are only enabled when not set to zero.

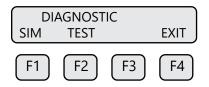


CAUTION! If the 4-20mA and/or the pulse outputs are connected to controllers, set the controllers to "manual" to ensure that the simulated signals do not cause false controller action.

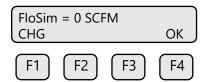
The menu is accessible from the Main Menu by pressing **FLO**:



Pressing **DGN (F1)** will show:



Pressing **SIM (F1)** will show:

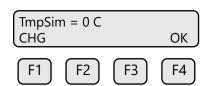


Enter the value and then press **OK (F4)**.

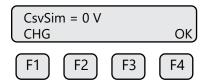


NOTE! Enter zero to disable this feature.

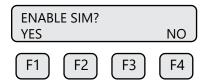
Temperature will be displayed according to Temperature Units settings.



Enter the value and then press **OK (F4)**. Enter zero to disable this feature.



Enter the CSV value and then press **OK (F4)**.



Press **YES** (**F1**) to start the simulation mode, otherwise press **NO** (**F4**). Upon pressing either key, the program will return to the FLOW PARAMETER 1 screen.



NOTE! Simulation Mode will be cleared if the power is cycled.

Scope

This section describes the Modbus implementation using RS485 serial communication physical layer for the 625S mass flow meter based on the Modicon Modbus Protocol (PI-MBUS-300 Rev. J).

Modbus Protocol

MODBUS Protocol is an application layer messaging protocol that provides client/sever communications between devices. MODBUS is a request/reply protocol and offers services specified by function codes.

The size of the MODBUS Protocol Data Unit is limited by the size constraint inherited from the first MODBUS implementation on Serial Line network (max. RS485 Application Data Unit = 256 bytes).

Therefore, MODBUS PDU for serial line communication = 256 – Server address (1 byte) – CRC (2 bytes) = 253 bytes.

RS485 ADU = 253 + Server address (1 byte) + CRC (2 bytes) = 256 bytes.

For more information on MODBUS go to the web site http://www.modbus.org/.

Command Request:

<Meter Address > <Function code > <Register start address high > <Register start address low > <Register count high > <Register count low > <CRC high > <CRC low >

Command Response:

<Meter Address> <Function code> <Data byte count> <Data register high> <Data register low> ... <Data register high> <Data register low> <CRC high> <CRC low>



NOTE: The data in shown in brackets < > represents one byte of data.

625S Commands Supported

The 625S supports the following commands:

- 1) Command 03: Read holding registers
- 2) Command 04: Read input register.
- 3) Command 06: Preset single register

Read Holding Registers (command 03)

This command reads the basic variable from the 625S and has the following format:

Request:

<Meter Address> <Command code=03> <Register start address high> <Register start
address low> <Register count high> <Register count low> <CRC high> <CRC low>

Response:

<Meter Address> <Command code=03> <Byte count> <Data high> <Data low> ... <Data high> <Data low> <CRC high> <CRC low>

Example:

Request data register at starting address 0x0000 and specifying only 1 register

Response:

Where xx xx is the data register value.

Table 4.1: 625S Modbus Holding Registers

Register Address	Modbus Address	Data Type	Scaling	Comment
0x00	40001	Flow in Eng units (low)	No	Mass flow in selected units
0x01	40002	Flow in Eng units (high)	No	
0x02	40003	Total (low)	No	Total in selected units
0x03	40004	Total (High)	No	
0x04	40005	Temperature (low)	*10	Temperature in selected units * 10
0x05	40006	Temperature (high)	*10	
0x06	40007	Elapsed time (low)	*10	Elapsed time in hours * 10
0x07	40008	Elapsed time (high)	*10	
0x08	40009	Velocity (Low)	No	Velocity in nm/hr
0x09	40010	Velocity (high)	No	

625S Commands Supported by Modbus

Register Address	Modbus Address	Data Type	Scaling	Comment	
0x0A	40011	Flow in Eng units * 10	10	Mass flow in selected units * 10	
0x0B	40012	Flow in Eng units *100	100	Mass flow in selected units * 100	
0x0C	40013	Total *100	100	Total in selected units * 100	
0x0D	40014	Spare/Not used			
0x0E	40015	Spare/Not used	1		
0x0F	40016	Status	No	Status	
0x10	40017	Status2	No		
0x11	40018	Spare/Not used			
0x12	40019	Spare/ Not used			
0x13	40020	Flow in Eng units (float, upper 16 bits)	No	Mass flow in selected units	
0x14	40021	Flow in Eng units (float, lower 16 bits)	No	Mass flow in selected units	
0x15	40022	Total in Eng units (float, upper 16 bits)	No	Total in selected units	
0x16	40023	Total in Eng units (float, lower 16 bits)	No	Total in selected units	
0x17	40024	Spare/Not used			
0x18	40025	Spare/Not used			
0x19	40026	Temperature in selected units (float, upper 16 bits)	No	Temperature in selected units	
0x1A	40027	Temperature in selected units (float, lower 16 bits)	No	Temperature in selected units	
0x1B	40028	Elapsed time in hours (float, upper 16 bits)	No	Elapsed time in hours	
0x1C	40029	Elapsed time in hours (float, lower 16 bits)	No	Elapsed time in hours	
0x1D	40030	Velocity in selected units (float, upper 16 bits)	No	Velocity in selected units	
0x1E	40031	Velocity in selected units (float, lower 16 bits)	No	Velocity in selected units	
0x1F	40032	Spare/ Not used			
Register A	ddress	Modbus Address - Data Type			
		40033 - 40055 Spare/ Not used	1		

Register Address	Modbus Address - Data Type		
0x20 - 0x36	40033 - 40055 Spare/ Not used		
0x37 - 0x43	40056 - 40068 Reserved	No	

^{*} The data in registers with scaling must be multiplied by 10 or 100 as indicated to be scaled properly.



NOTE: Registers A, B & C are provided to get more resolution for low flow and total. When value exceeds the 16 bit registers, they will be frozen with all 16 bits set. It is also possible to use the velocity to calculate the flow in engineering units by using the pipe area and conversion factor for the selected units.

Read Input Register (625S Status, Command 04)

This command is used to report the FT2A status information.

Request:

- <Meter Address> <Command code=04> <Register address =0> <Register address =0>
- <Register count =0> <Register count =1> <CRC high> <CRC low>

Response:

<Meter Address> <Command code=04> <Byte count =2> <Status High> <Status Low> <CRC high> <CRC low>

Table 4.2: Status Bits Definitions for Command 04, Modbus Address 30001

Bit	Definition	Comment
0	Power up indication	Cleared when out of the power up sequence
1	Flow rate reached high limit threshold	Set limit to zero to disable
2	Flow rate reached low limit threshold	Set limit to zero to disable
3	Temperature reached high limit threshold	Set limit to zero to disable
4	Temperature reached low limit threshold	Set limit to zero to disable
5	Sensor reading is out of range	Check sensor wiring
6	Velocity flow rate outside of calibration table	Check sensor wiring
7	Incorrect Settings	Check settings
8	In simulation mode	Set simulation value to 0 to disable
9	Frequency output is out of range	Check frequency output settings
10	Analog 4-20 mA for flow is out of range	Check analog output settings
11	Analog 4-20 mA for temperature is out of range	Check analog output settings
12	Reserved	
13	Bridge Shut Down	Check sensor wiring
14	CRC error	Check parameters and reset CRC
15	Error in Total	Reset total to clear alarm

Table 4.3: Status 2 Bits Definitions for Command 04, Modbus Address 30002

Bit	Definition	Comment
0	Not used	Not used
1	Busy	Busy
2	Not used	Not used
4	Not used	Not used
5	Not used	Not used
6	Not used	Not used

Preset Single Register (Command 06)

This command is used to perform miscellaneous functions such as clearing the totalizer and elapsed time. The register address is Modbus=40018 and the data to write is described below.

Request:

<Meter Address > <Command code=06> <Register address high=0x00> <Register address low=0x11> <Register data high=0x00> <Register data low =0x02> <CRC high> <CRC low>

Response:

<Meter Address > <Command code=06> <Register address =0x00> <Register address =0x11> <Register data=0x00> <Register data =0x02> <CRC high> <CRC low>

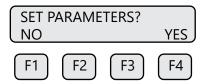
Reset Total:

Address = 40018, data = 0x02

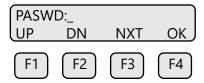
This command is used to clear the Totalizer and elapsed time registers

Enter the Programming Mode

Press the **F1** or the **F2** key repeatedly, in the normal running mode, until the following screen is shown. This enters the programming mode:



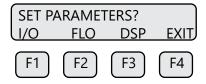
Press **YES (F4)** and then the following screen will prompt the user to enter the password if enabled:



Enter the correct password. Default password for Level 1 is 1234.

Press the **UP (F1)** or **DN (F2)** key to select a new digit or character, the cursor points to the selected digit. Press **NXT (F3)** to select the next digit and **OK (F4)** to accept the entry.

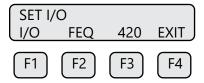
If the wrong password is entered, the message "Wrong Password" will be displayed for a few seconds and then return to the programming entry screen. If the password is accepted, the following screen will be shown:



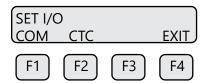
This is the base screen for the programming mode. To exit the programming mode, press **EXIT (F4)** repeatedly until "Normal Mode" is seen briefly.

Communication Protocol and Parameters

To program the communication parameters, press I/O (F1) key from the base menu.

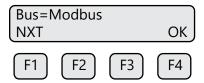


Then press I/O (F1) again:



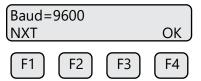
Then press **COM (F1)** to select communication parameters.

Set Bus protocol for Modbus:



Press **NXT (F1)** repeatedly until Modbus is selected as shown and then press **OK (F4)** to accept the setting.

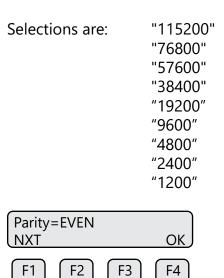
The following communication parameters are only available for MODBUS:



Press **NXT (F1)** repeatedly until the correct selection is shown and then press **OK (F4)** to accept the setting.

625S

Communications



Press **NXT (F1)** repeatedly until the correct selection is shown and then press **OK (F4)** to accept the setting.

Selections are: "NONE"
"ODD"
"EVEN"

Address=02
CHG OK

F1 F2 F3 F4

Press CHG (F1) to change the address and then press OK (F4) to accept the setting.

Selections are between 01 and 247.



NOTE: Power cycle is required for the new settings to take effect.



Precautions GB



WARNING! BEFORE ATTEMPTING ANY MAINTENANCE, TAKE THE NECESSARY SAFETY PRECAUTIONS BEFORE REMOVING THE PROBE FROM THE DUCT (EXAMPLE: PURGE LINES OF TOXIC AND/OR EXPLOSIVE GAS, DEPRESSURIZE, ETC...).

WARNING! EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE COMPONENTS OR FUSES UNLESS POWER HAS BEEN DISCONNECTED WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

WARNING! EXPLOSION HAZARD. DO NOT DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

WARNING! TURN OFF INPUT POWER BEFORE REMOVING OR INSTALLING A CIRCUIT BOARD ASSEMBLY FROM THE ENCLOSURE.

CAUTION! BE SURE POWER TO METER IS SWITCHED OFF BEFORE ATTEMPTING TO ACCESS ELECTRONICS. If there is a problem and a loose connection is not found, please contact Sierra Customer Service for technical assistance at 831-373-0200.



Precauciones ES



¡ADVERTENCIA! ANTES DE INTENTAR CUALQUIER MANTENIMIENTO, TOME LAS PRECAUCIONES DE SEGURIDAD NECESARIAS ANTES QUE RETIRAR LA SONDA DEL DUCTO (EJEMPLO: PURGUE LAS LÍNEAS DE GASES TÓXICOS Y/O EXPLOSIVOS, DESPRESURICE, ETC...).

¡ADVERTENCIA! PELIGRO DE EXPLOSIÓN. NO RETIRE O REEMPLACE COMPONENTES O FUSIBLES A MENOS QUE LA ENERGÍA HAYA SIDO DESCONECTADA SIEMPRE QUE ESTÉ PRESENTE UNA ATMÓSFERA INFLAMMABLE O COMBUSTIBLE.

¡ADVERTENCIA! PELIGRO DE EXPLOSIÓN. NO DESCONECTE NINGÚN EQUIPO CUANDO UNA ATMÓSFERA INFLAMABLE O COMBUSTIBLE ESTÉ PRESENTE PRONTO.

ADVERTENCIA! DESCONECTE LA ENERGÍA DE ALIMENTACIÓN ANTES DE REMOVER O INSTALAR UN ENSAMBLE DE TARJETA DE CIRCUITO DEL GABINETE.

PRECAUCIÓN: ASEGÚRESE QUE LA ALIMENTACIÓN DEL MEDIDOR ESTE DESCONECTADA ANTES DE INTENTAR EL ACCESO A LA ELECTRÓNICA. Si existe algún problema y no se encuentra ninguna conexión suelta, por favor póngase en contacto con el Servicio al Cliente de Sierra para asistencia técnica al número 831-373-0200.



Précautions



AVERTISSEMENT! AVANT TOUTE TENTATIVE DE MAINTENANCE, OBSERVER LES CONSIGNES DE SECURITE NECESSAIRES AVANT DE RETIRER LA SONDE DE LA CONDUITE (PAR EXEMPLE, PURGER LES LIGNES DES GAZ EXPLOSIFS/TOXIQUES QU'ELLES POURRAIENT CONTENIR, DEPRESSURISER LE CONTENEUR, ETC.).

AVERTISSEMENT! RISQUE D'EXPLOSION. NE PAS RETIRER NI REMPLACER DES COMPOSANTS OU DES FUSIBLES SI LA SOURCE D'ALIMENTATION N'A PAS ETE DEBRANCHEE DANS UNE ATMOSPHERE INFLAMMABLE OU COMBUSTIBLE.

AVERTISSEMENT! RISQUE D'EXPLOSION. NE PAS DEBRANCHER UN EQUIPEMENT DANS UNE AMBIANCE COMBUSTIBLE OU INFLAMMABLE.

AVERTISSEMENT! COUPER L'ALIMENTATION AVANT DE RETIRER OU D'INSTALLER UN ENSEMBLE DE CARTE DE CIRCUITS IMPRIMES DU BOITIER.

ATTENTION : S'ASSURER QUE L'ALIMENTATION DU COMPTEUR EST COUPEE AVANT D'ACCER AUX COMPOSANTS ELECTRONIQUES. En cas de problème et qu'aucune connexion lâche n'est détectée, veuillez contacter le service client de Sierra pour obtenir une assistance technique au 831-373-0200.



Vorsichtsmaßnahmen



ACHTUNG! BITTE ERGREIFEN SIE DIE ERFORDERLICHEN SICHERHEITSMAßNAHMEN, BEVOR SIE IRGENDWELCHE WARTUNGSARBEITEN DURCHFÜHREN UND DIE MESSSONDE AUS DEM ROHR ENTFERNEN (BEISPIEL: LEITUNGEN ZUR ENTFERNUNG VON GIFTIGEN UND/ODER EXPLOSIVEN GASEN REINIGEN, DRUCK SENKEN, USW.).

ACHTUNG! EXPLOSIONSGEFAHR. KOMPONENTEN ODER SICHERUNGEN BITTE ERST DANN ENTFERNEN ODER AUSTAUSCHEN, WENN DER STROM GETRENNT WURDE, FALLS EINE ENTZÜNDLICHE ODER BRENNBARE ATMOSPHÄRE VORHANDEN IST.

ACHTUNG! EXPLOSIONSGEFAHR. GERÄT NICHT VOM STROM TRENNEN, WENN EINE ENTZÜNDLICHE ODER BRENNBARE ATMOSPHÄRE VORHANDEN IST.

ACHTUNG! EINGANGSLEISTUNG AUSSCHALTEN, BEVOR LEITERPLATTENBAUGRUPPEN AUS DEM GEHÄUSE AUSGEBAUT ODER IN DIESES EINGEBAUT WERDEN.

VORSICHT: STELLEN SIE SICHER, DASS DER STROM AN DAS MESSGERÄT AUSGESCHALTET IST, BEVOR SIE VERSUCHEN, AUF DIE ELEKTRONIK ZUZUGREIFEN. Falls Probleme auftreten und keine lose Verbindung gefunden werden kann, wenden Sie sich bitte zwecks technischer Unterstützung an den Sierra-Kundendienst unter der Nummer 831-373-0200.

Broken or Damaged Probe

If the sensor is broken or damaged, the probe and electronics must be returned to the factory. A new sensor will be installed and calibrated. Refer to "Returning Your Meter" on page 93.

Flow Calibration

To ensure continued high accuracy of your Model SierraTrak 625S Flow Meter, Sierra Instruments provides a full NIST traceable calibration. It is recommended that the meter be returned to Sierra for a calibration check in our NIST traceable labs after two years of operation.

Fuse Replacement

Verify the fuse is defective by measuring it with an Ohm Meter (Two replacement fuses are provided with each unit). The fuse F1 is located near the power terminal block and can be removed by using tweezers or needle-nose pliers. Replacement fuse is Littelfuse part number 0454.750MR.



WARNING!

- Turn input power OFF before removing or installing a fuse. Use only recommended fuse replacements.
- It is the user's responsibility to install the flow meter in an appropriately designed system with adequate safety protections.
- DO NOT remove the flow instrument from the pipe while the system is under flow conditions.
- This product may experience temperatures from as low as -40F (-40C) and as high as 250F (121C). It is the user's responsibility to take safety precautions regarding operating temperature of the flow meter.

Sensor Wiring



NOTE! Sensor terminations are performed at the factory. Do not change or adjust sensor wiring unless instructed to do so by a Sierra customer service representative.

Sensor Cleaning

The sensor is insensitive to small amounts of residue, but continued use in dirty environments will necessitate periodic cleaning. To inspect the sensor, remove power from electronics and remove the unit from the pipe or duct, exposing the sensor elements. If they are visibly dirty, clean them with water or alcohol (ethanol) using an appropriate brush until they appear clean again. Even though the sensor elements are rugged, avoid touching them with any solid object and use a light touch while cleaning them.





Troubleshooting

CAUTION! The electronics and sensor supplied by Sierra Instruments are calibrated as a single precision mass flow meter. Interchanging sensors will decrease the accuracy of the flow meter. If you experience any problem with your 625S Flow meter, call Sierra Instruments Customer Service Department, Technical Assistance at 831-373-0200.

Problem	Possible Cause	Action
Display Error	Display not operating properly.	Check status of LP1 on the display board. Is green LED blinking once per second? If LED is not blinking, cycle power to reset meter. Call Sierra Tech Support.
Meter does not read up to full scale	Calibration table may be corrupted	 Check the calibration table for a corrupted location. Enter the password 9111. Start on p. 53 of the 625S manual and follow the steps to get to Flow Parameters 2 menu screen. Select CAL (F1) Select NXT (F1) to cycle through calibration table to verify entries match calibration certificate. Check for CRC error code
Velocity measure- ment seems low	Probe not oriented properly Sensor dirty	1. Orient probe per installation section starting on p. 21.2. Clean sensor (p. 71)
Unit will not power-up	a) No power input b) Bad fuse c) Bad Power supply	 Check fuse (F1) located next to TS1 on main board. Check for correct power supply voltage at TS1 on main board. If fuse is OK and unit still won't power up, call Sierra for additional assistance



Problem	Possible Cause(s)	Action(s)
Meter does not initialize	Electromechanical interference	 Check meter power cycles. Press and release F1 and F2 at the same time; the display will enter Engineering screens. Press F1 to get to screen #23; record power cycle value. Press F4 to return to normal operation; monitor meter until problem returns. Return to screen #23 to see if power cycles have increased; microprocessor is resetting due to EMI electrical noise entering the meter. Check Power input and output cables grounding and routing.
Velocity measurement is erratic or	1. Very turbulent flow	1. Increase dampening (see filter settings in "Flow Parameters" on p. 53).
fluctuating	2. Sensor dirty	2. Clean sensor (Refer to Maintenance section, p. 71).
	3. Sensor broken	3. Return flow meter to Sierra for repair (Refer to p. 93 for shipping instructions).
	4. Probe not mounted securely	4. Remount probe (see Installation section starting on p. 19; must be mounted securely without vibration. If vibration persists, choose a new mounting location without vibration.
	5. Malfunction in flow meter	5. Return flow meter to Sierra for repair (Refer to p. 93 for shipping instructions).
	6. Meter installed incorrectly	6. Re-install meter according to instructions (Refer to installation section starting on p. 19).
	7. Moisture in the process gas	7. Try to install the flow meter in a radial installation (refer to p.p. 21 for installation options).



Installation Problems

The following is a summary listing of problems that may be encountered with the installation of the 625S Thermal Mass Flow Meter.

- 1. Improper wiring connections for power and/or 4-20mA output signal.

 The 625S requires a separate power source for the main board and the two 4-20mA output signals.

 Two wires supply 24VDC power to the main board. Two wires are used for each of the 4-20mA output signals. Refer to Figure 3.5 and Figure 3.6 (p. 92-26). Also refer to "Wiring Precautions" and "Helpful Hints" in Wiring section (p. 28) for further guidance.
- 2. Inadequate power source.

A 24VDC ±10%, 0.7 Amp or greater power supply is recommended. If the voltage supplied is not within this range or if the power supply is not rated for 25 watts minimum, a variety of problems can occur including inaccurate flow readings, dim display and faulty programming action. The input voltage must be within the range of 21.6 to 26.4VDC as measured at the power input terminals of the flow meter electronics.

- 3. Flow measurement seems inaccurate.
 - Check to ensure that the flow meter is installed so that the Flow Direction Arrow engraved on the flat surface of the fitting below the electronics housing is properly pointing in the direction of flow. Refer to "Fig. 2.6: Orientation of Flow Meter" on page 24. If not, change orientation of meter.
 - Check that the insertion depth of the sensor/probe is correct. The end of the probe should be adjusted as per Figure 2.2 (p. 23).
 - Ensure that there are a minimum of fifteen diameters of straight pipe upstream of the sensor and ten diameters downstream. If complex flow disturbances are upstream of the sensor, extension of the straight pipe may be required to ensure accurate flow measurement. Contact Sierra for assistance.
 - Ensure that pipe area data in the meter matches data on the Sierra Instrument Calibration
 Certificate. The pipe internal cross sectional area is programmed into the flow meter through
 the front panel (see Programming Flow Parameters, p. 53). This area is programmed in
 square feet or square meters. The Calibration Certificate delivered with the flow meter contains
 the area that was programmed into the flow meter at the Sierra factory. Check to ensure that
 this area is correct.
- 4. Erratic flow reading (especially a flow reading spiking high).

 This may be a symptom of moisture in the flow stream. Sierra Instrument flow meters are designed to work in relatively dry gas applications only. Contact Sierra to discuss resolutions to this problem.



Installation Problems (Cont'd)

- 5. Flow meter is not responding to flow.
 - This problem could be caused by a number of reasons:
 - Check to ensure adequate power is supplied to the flow meter. If things appear to be correct, perform this functional test before calling Sierra. Carefully remove the probe and sensor from the pipe. **CAUTION!** The sensor can get HOT. For those flow meters with a display and if the display is reading zero blow on the sensor to see if a response occurs. If nothing happens, take a damp rag or sponge and place it in contact with the sensor. A reading should occur. Contact Sierra Customer Service with this information.
 - A corrupted calibration table may lead to a zero flow reading. Verify that all Cal Flow
 Parameter settings are correct by accessing the "Calibration Parameters" information on meter
 (see p. 57). Check meter data for any non-whole numbers and call customer service for
 assistance.
- 6. Display and/or 4-20mA signal reading above zero flow when no flow is occurring in the pipe. If the reading is less than 5% of full scale, it is likely this is a normal condition caused by convection flow created by the heated sensor. It does not mean that the zero of the instrument is improperly set. The Sierra sensor is extremely sensitive to gas flow and can even read the small flow caused by convection. If this is an unacceptable condition, please contact Sierra Customer Service for alternatives.
- 7. Mismatched serial numbers

If you have more than one meter, you must ensure that the serial numbers of meter match one another. These items have been manufactured and calibrated to operate as a unit and cannot be mismatched.



Alarm Codes

Alarm Code	Reason	Action
13	Flow rate above high limits	Refer to the PARAMETER MENU 2 section on p. 59 of this Manual to verify limit is within range. Check ALM = HiFloAlm under PRM.
14	Flow rate below low limits	Refer to the PARAMETER MENU 2 section on p. 59 of this Manual to verify limit is within range. Check ALM = LoFloAlm under PRM.
15	Temperature above high limits	Refer to the PARAMETER MENU 2 section on p. 59 of this Manual to verify limit is within range. Check ALM=HiTempAlm under PRM.
16	Temperature below low limits	Refer to the PARAMETER MENU 2 section on p. 59 of this Manual to verify limit is within range. Check ALM = LoTempAlm
22	Sensor out of range	Refer to the ENGINEERING DISPLAY MENU on p. 16 of this Manual and the Sierra Instruments factory Calibration Certificate to check CSV voltage. Compare Display 10 value to Calibration Certificate CSV voltage and verify it's within range.
23	Velocity out of calibration table range	Refer to the ENGINEERING SCREENS MENU on [page] of this Manual and the Sierra calibration certificate to check CSV voltage. Compare Display 10 value to calibration certificate CSV voltage and verify it's within range.
24	Check settings	One or more internal settings are corrupted or out of spec. Contact Sierra Instruments Service for instructions to verify settings.
25	Simulation mode	Meter is in Simulation Mode. Refer to the PARAMETER MENU 1 section on p. 56 of this Manual. Use the SIM Section under Diagnostics to return to normal operation.
26	Frequency output over range	Refer to the DIGITAL OUTPUT MENU on p. 12 of this Manual. Verify the Frequency Output settings are within limits.
32	4-20mA for rate is out of range	Refer to the MAIN MENU on p. 11 of this Manual. Use the Set I/O section to verify range limits under FLO Set Set 4-20mA.
33	4-20mA for temperature is out of range	Refer to p. 58# of this manual. Use the Set I/O section to veritfy range limits under FLO Set 4-20mA. Channel #2 can be set for flow or temperature. Be sure to check the Alarm limits (refer to p. 34-35).
34	Busy	Meter is recalculating new parameters.

Performance Specs

Flow Accuracy:

±1% of reading ±0.2% of full scale 15 diameters upstream; 10 downstream

Flow Repeatability: ±0.2% of full scale

Flow Response Time: 0.9 seconds (one time constant)

Temperature Accuracy:

 $\pm 1.8^{\circ}$ F ($\pm 1.0^{\circ}$ C) over the range -40 to 250° F (-40 to 121° C)

Minimum velocity 60 SFPM.

Calibration:

Factory Calibration to NIST traceable standards

Operating Specs

Units of Measurement (field selectable):

SCFM, SCFH, NMPS, NM3/M, NM3/H, NM3/D, NLPS, NLPM, NLPH, MCFD, MSCFD, SCFD, MMSCFD, MMSCFM, SMPS, SM3/D, SM3/H, SM3/M, LB/S, LB/M, LB/H, LB/D, KG/S, KG/M, KG/H, SLPM, SFPM, MT/H

Gas Pressure (maximum at 100° F): 500 psig (34.5 barg)

Check with factory for higher pressure options.

*NOTE! When teflon ferrule option ordered, gas pressure is 60psig (4.1 barg) maximum

Relative Humidity: 90% RH maximum; non-condensing

NOTE! Condensing liquids contacting the sensor can cause erratic flow indication.

Temperature:

ST Sensor: -40 to 250°F (-40 to 121°C)

Enclosure: -40 to 158°F (-40 to 70°C) DC power*

*NOTE! Display dims below -4°F (-20°C), function returns once temperature rises again.

Operating Specs (cont'd)

Flow Velocity Range:

15 to 25,000 SFPM (0.07 to 118 NMPS) Turndown: up to 1000:1; 100:1 typical

Maximum Flow Ranges for 625S Insertion Flow Meters			
Pipe Diameter	SCFM	MSCFD	NM ³ /hr
1.5" (40mm)	0-354	0-510	0-558
2" (50mm)	0-583	0-840	0-920
2.5" (63mm)	0-830	0-1,310	0-1,200
3" (80mm)	0-1,280	0-1,840	0-2,020
4" (100mm)	0-2,210	0-3,180	0-3,480
6" (150mm)	0-5,010	0-7,210	0-7,910
8" (200mm)	0-8,680	0-12,500	0-13,700
10" (250mm)	0-13,600	0-19,600	0-21,450
12" (300mm)	0-19,400	0-27,900	0-30,600



NOTE! Standard conditions of air at 70°F and one atmosphere. Consult factory for other gases and for flow ranges above those listed. Contact Sierra Instruments.

Input Power:

24VDC, = (±10%), 0.7 Amps (standard DC power)

Fluctuations of DC power supply are not to exceed ±10% of rating. Class I Equipment (Electrical Grounding Required for Safety). Installation (Over-voltage) Category II for transient over-voltages.

Operating Specs (cont'd)

Outputs:

Two isolated 4-20mA outputs (output one is for flow rate and output two is programmable for flow rate or temperature); fault indication per NAMUR NE43.

Isolated pulse output 0 to 100Hz, 5 to 24 volts p/p for flow (the pulse output can be used as an isolated solid state output for alarms); 20mA max.

Serial Communication:

USB connector for connecting to a laptop or computer is standard; free PC-based software tool - 625S TrakView™ - provides complete configuration, remote process monitoring, and data logging functions.

Optional isolated communication outputs: Modbus MS/TP (RS485)

4-20mA and Loop Verification:

Simulation mode used to align 4-20mA output with the input to customer's PLC/DCS.

Physical Specs

Sensor material:

316 stainless steel standard

Enclosure:

NEMA 4X, aluminum, dual 3/4" FNPT conduit entries.

Flow Meter Installation:

Sierra Instruments-supplied compression fitting connects to customer-supplied 3/4" female branch outlet welded to pipe.

Agency Approvals

CE: Approved

EMC Directive; 2014/30/EU

Electrical Equipment for Measurement, Control and Lab Use: EN61326-1:2013

Product Safety Testing: EN 61010-1: 2010

Fig 6.3: Insertion Meter Dimensions

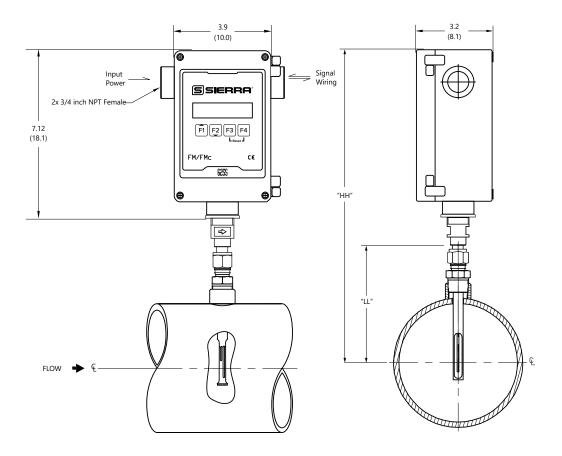


Table 6.3: Insertion Meter with 316 stainless steel probe

Probe Size	Probe Size	Dimension "LL" ± .10	Dimension "HH" ± .10
[model code]	[inches]	[inches / millimeters]	[inches / millimeters]
06IE	6"	6.0" (152mm)	14.4" (367mm)
091	9"	9.0" (229mm)	17.4" (443mm)
121	12"	12.0" (305mm)	20.4" (519mm)
241	24"	24.0" (610mm)	32.4" (824mm)

Warranty Policy

Limited Warranty Policy- Register Online

All Sierra products are warranted to be free from defects in material and workmanship and will be repaired or replaced at no charge to Buyer, provided return or rejection of product is made within a reasonable period but no longer than one (1) year for calibration and non-calibration defects, from date of delivery. To assure warranty service, customers must register their products online on Sierra's website. Online registration of all of your Sierra products is required for our warranty process. Register now at www.sierrainstruments.com/register.

Returning Equipment to Factory

Factory Calibration—All Models

Sierra Instruments maintains a fully-equipped calibration laboratory. All measuring and test equipment used in the calibration of Sierra transducers are traceable to NIST Standards. Sierra is ISO-9001 registered and conforms to the requirements of ANSI/NCSL-Z540 and ISO/IEC Guide 25.

Instructions for Returning Your Instrument for Service

The following information will help you return your instrument to Sierra Instruments' Factory Service Center and will ensure that your order is processed promptly. Prices may vary depending on the flow range, type of gas and operating pressure of your unit. To request detailed pricing, contact your local Sierra Instruments distributor or contact one of our offices directly.

Please follow these easy steps to return your instrument for factory service:

- 1. To obtain a Return Materials Authorization (RMA) number from the Sierra Instruments to http://www.sierrainstruments.com/rma/new.php to create a Sierra Account.
- 2. Once you have created an account, click on the Submit New RMA tab and fill in the RMA form and follow the instructions. You will receive an email confirmation once you have submitted your RMA.
- 3. Print a copy of the RMA (that now includes RMA #) and send a copy of the RMA form along with your meter back to the factory.

If you require service beyond calibration, but do not know which service(s) will be required, describe the symptoms as accurately as possible on the RMA form.

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Appendix

Pack your instrument carefully. Use the original packaging and foam or bubble wrap (packing peanuts NOT recommended) and include a copy of the RMA form (complete with Sierra supplied RMA number) with the unit(s).

NOTE: Probe and electronics with matching serial numbers must both be included in your return shipment for service

Ship the unit(s) to the following address:

Sierra Instruments, Inc.
Attention: Factory Service Center
5 Harris Court, Building L
Monterey, CA 93940 USA
RE: RMA# (your number)

Glossary of Terms and Definitions

AWG	American Wire Gauge	NL	Normal Liter
Bara	Bar absolute	NLPH	Normal Liter per Hour
CTC	Contact	NLPM	Normal Liter per Minute
CAL	Calibration	NM3	Normal cubic Meter
CHG	Change	NM3/H	Normal cubic Meter per Hour
COM	Communication	NM3/M	Normal cubic Meter per Minute
CSV	Current Sense Voltage	NPT	National Pipe Thread
DC	Direct Current	PDA	Personal hand held computer
DN	Down	PC	Personal Computer
DSP	Display	P/U	Pulse per Unit
ELP	Elapsed time	PIP A^2	Pipe Area
Feq	Frequency	PLC	Programmable Logic
Ft^2	Square Feet		Controller
I/O	Input/Output	PRM	Parameters
INP	Input	PRS	Pressure
LB	Pound	PSIA	Pounds per Square Inch
LB/D	Pound per Day		Absolute
LB/H	Pound per Hour	Pt	Point
LB/M	Pound per Minute	PSW	Password
LB/S	Pound per Second	SIM	Simulation
LCD	Liquid Crystal Display	SCF	Standard Cubic Feet
KG	Kilogram	SCFM	Standard Cubic Feet per
KG/H	Kilogram per Hour		Minute
KG/M	Kilogram per Minute	SCFH	Standard Cubic Feet per Hour
KG/S	Kilogram per Second	SCFD	Standard Cubic Feet per Day
M^2	Square Meter	SPC	Special Control
mmHG	Pressure in millimeters of mercury	STP	Standard Temperature and
MMSCFD	Million Standard Cubic Feet per		Pressure
	Day	TMP	Temperature
MXFLO	Maximum Flow	TSI	Internal Variable
NEMA	National Electrical Manufactures	TSV	Internal Variable
	Association	UNT	Unit
NIST	National Institute of Standards	U/P	Unit per Pulse
	and Technology	420	4-20mA output

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Appendix

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Wiring



Definition of Terms



Troubleshooting Tips



NOTE! is used for Notes and Information



WARNING! is used to indicate a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION! is used to indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.



Indicates compliance with the WEEE Directive. Please dispose of the product in accordance with local regulations and conventions.



Indicates compliance with the applicable European Union Directives for Safety and EMC (Electromagnetic Compatibility Directive 2014/30/EU).



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We Understand Flow is Tough. We can solve this together.