CalTrak® XL

High Accuracy High Flow
Primary Standard Gas Flow Calibrator
Up to 1500 slpm

Instruction Manual

Model: XL

Part Number: IM-Cal-XL Rev. I, 7-17

SIERRA®

GLOBAL SUPPORT LOCATIONS: WE ARE HERE TO HELP!

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Warnings and Cautions

Note and Safety Information

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

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.

Caution!

This statement appears with information that is important for protecting your equipment and performance. Read and follow all cautions that apply to your application.

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 de-pressurized.

Warning! Always remove main power before disassembling any part of the mass flow meter/controller.

Caution! Before making adjustments to the device, verify the flow meter/controller is not actively monitoring or reporting to any master control system. Adjustments to the electronics will cause direct changes to flow control settings.

Caution! When using toxic or corrosive gases, purge the line with inert gas for a minimum of four hours at full gas flow before installing the meter.

Caution! The AC wire insulation temperature rating must meet or exceed 80°C (176°F).

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

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 information can be found in Chapter 2 of this manual.

If the problem persists after following the troubleshooting procedures outlined in this manual, contact Sierra Instruments by fax or by E-mail (see inside front cover). For urgent phone support you may call (800) 866-0200 or (831) 373-0200 between 8:00 a.m. and 5:00 p.m. PST. In Europe, contact Sierra Instruments Europe at +31 (0)72-5071400. In the Asia-Pacific region, contact Sierra Instruments Asia at +86-21-58798521. 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)

Table of Contents

Table of Contents 5
Chapter 1: Introduction 6
Chapter 2: Operating Your CalTrak XL 8
Chapter 3: Notes 12
Chapter 4: Annual Maintenance and Calibration 14
Chapter 5: Product Specifications 16
Chapter 6: CalSoft™ Software 19
Appendix A: Warranty Policy 19

Chapter 1: Introduction

Bring world class accuracy to your facility. Sierra's CalTrak® XL is the leading high flow primary gas flow calibrator on the market today. With increased demand for higher flows of process gas, there is a requirement to validate and calibrate high flow gas meters and controllers. Designed to replace aging bell provers, the XL meets that need with an impressive standardized accuracy of +/- 0.25% of reading over a flow range of 5 slpm to 500 slpm or +/- 0.45 % from 15 slpm to 1500 slpm.

The flow cell is fitted with low mass borosilicate glass pistons with a low friction coating that oscillate between two detectors to quickly and accurately measure gas flow rates. The design of the CalTrak allows for increased flexibility and speed of reading.

Flow measurements can be taken manually (one reading at a time), or automatically in continuous mode. CalTrak calibrators offer digital communications via RS-232 and USB and come with our CalSoft™ data collection software suite.

This manual will provide the information needed to operate your CalTrak XL. If at any time you have questions regarding its operation, please contact Sierra through our web site (www.sierrainstruments.com) or call us at 800.866.0200 to speak with a member of our professional customer service staff.

In Your CalTrak XL Shipment

Your CalTrak XL is a laboratory primary standard, and has been shipped in Sierra's rugged, reusable shipping container.

The CalTrak XL weighs 90 lbs (41 kilograms). Unpacking by two people is recommended. The CalTrak XL can be lifted from the shipping container by verifying the nuts on the large inlet and outlet fittings are tight and lifting the CalTrak XL by grasping these fittings. While lifting the CalTrakXL from the shipping container, the top of the CalTrak XL should be supported to prevent tipping.

Your CalTrak XL has been packaged with care and includes all components necessary for complete operation. Please take a moment to check that you have received the following items. If you believe you have not received a full shipment or if you have any questions, please contact Sierra immediately.

Your CalTrak XL comes with the following:

- AC Power Adapter
- PC Serial Cable (RS-232)
- Instruction Manual
- Calibration Certificate
- Reusable shipping container

Warnings!

- The CalTrak XL is not intrinsically-safe and is not for use with explosive or flammable gases, or for use in explosive environments. If you choose to calibrate explosive or flammable gases with your CalTrakCalTrak XL, please follow your organization's laboratory safety procedures, which typically require operation within an inert atmosphere. To enable use in an inert atmosphere, your CalTrak XL has two (2) 1/4" gas Purge fittings, located on its right side, and its electronics are isolated from the gas flow stream, contained within an internal, partitioned compartment. The CalTrak 800 is not designed for gas flows above the rated specifications of the flow cell in use. Please consult the product specification on the inside front cover of the manual for more information regarding acceptable gas flow ranges or visit our website at www.sierrainstruments.com for the most current product specifications
- The CalTrak XL is not designed to be pressurized above 45 psiA (3102 mbarA) or for gas flows above 1500 Lpm. If pressurization reaches 45 psiA (3102 mbarA), the following warning will appear on the display on the main control panel: OVERPRESSURE! If this occurs, remove the overpressure situation, then choose "Reset" from the LCD display to clear this warning.
- The CalTrak XL does not contain user-serviceable parts and must be returned to Sierra for maintenance.

Chapter 2: Operating Your CalTrak XL

Connections

Your CalTrak XL should be placed on a steady, secure work surface. For optimum stability, the CalTrak XL has self- adjusting feet at its base.

Locate both the Inlet (pressure) and Outlet (suction) fittings (see Figure 1) and remove their protective caps.

Maintain only minimum amount of tubing necessary between your CalTrak XL and the flow source. As with any primary standard, the more internal ("dead") volume between your CalTrak XL and the flow restrictor (MFC, needle valve, or sonic nozzle), the more uncertainty (error) is added to the calibration process.

You're now ready to make the following connections (as needed), using Figures 1 and 2 as reference.

Power

Plug your AC power adapter (supplied) into an AC wall outlet, and attach its DC output cord to your CalTrak XL's rear DC Power 12VDC, 3A connection.

Valve Actuation Air Source

Your CalTrak XL's internal valve actuates by air pressure, and must be connected to a filtered oil free air source of at least 80 psi (5516 mbar) and no higher than 100 psi (6895 mbar). Using tubing (not supplied) and the 1/4 inch (6.35mm) Swagelok Valve Actuation Fitting on the rear of the unit, connect your laboratory air to your CalTrak XL. Turn on the air source, and verify that the pressure is between 80 and 100 psi (5516 and 6895 mbar) (pressure gauge not supplied).

Inlet (Pressure) and Outlet (Suction) Fittings

When using a pressure flow source, connect the gas flow to the 1.5 inch (38.1 mm) Swagelok®
fitting labeled Inlet – Pressure.

When using a suction flow source, connect the gas flow to the 1.5 inch (38.1 mm) Swagelok®
fitting labeled Outlet – Suction.

Your CalTrak XL's internal pressure transducer is rated at 45 pisa (3102 mbara) maximum, or 5.3 psi (365 mbar) more than typical ambient pressure. When taking standardized flow measurements, we recommend that any tubing or exhaust system connected to your CalTrak XL's outlet fitting have a maximum pressure drop of 3 psi (207 mbar).

When taking volumetric flow measurements, there should be no significant pressure difference (such as the pressure drop of restrictive tubing or filters) between your CalTrak XL and the point in the flow stream that is of interest (i.e., at its inlet or outlet fitting). If there is a significant pressure difference, there will also be a corresponding volumetric flow difference (from the Ideal Gas Law). In that case, your CalTrak XL's indicated volumetric flow should be adjusted by a factor of the absolute pressure at your CalTrak XL, divided by the absolute pressure at the point of interest.

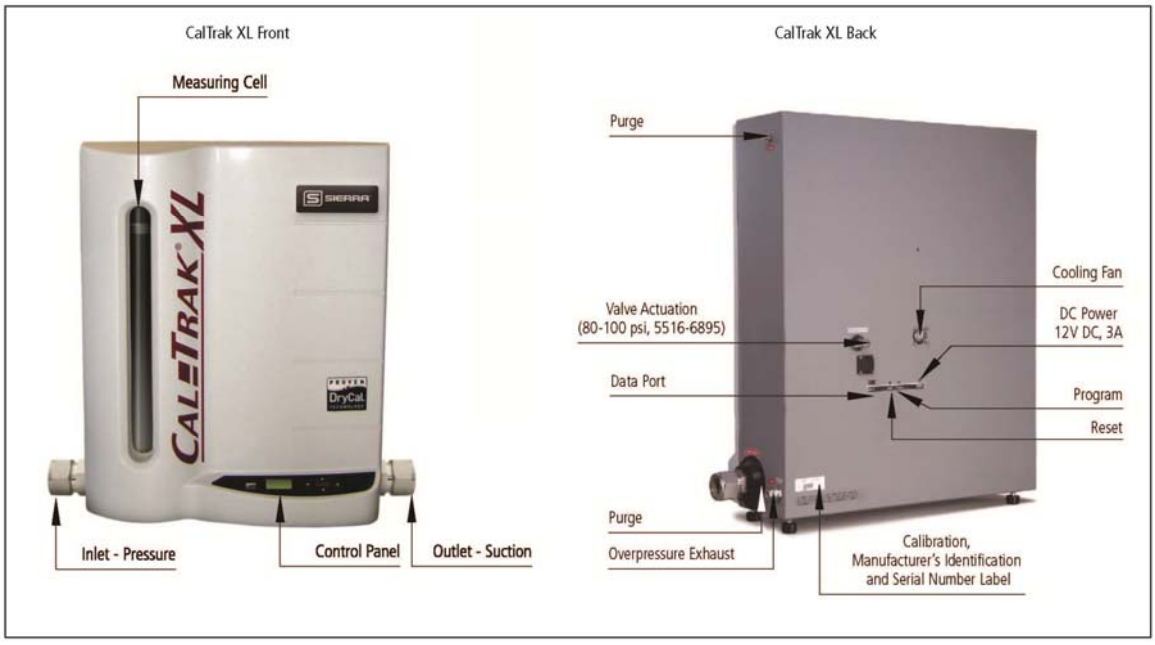
Overpressure Exhaust

When your CalTrak XL completes a flow measurement, its internal valve opens, releasing the gas from the flow cell and enabling the piston to drop to the bottom (reset). If for any reason the valve doesn't open, the piston will move to the top of the flow cell and a safety switch will automatically reset the CalTrak XL. If for any reason the valve doesn't open, the piston will remain at the top of the flow cell and pressure will build. To prevent over-pressurization of the flow cell, your CalTrak XL's has an overpressure sensor that will reset the unit. Additionally the CalTrak XL has a mechanical pressure relief valve that exhausts the gas if over pressurization occurs through a 1/2-inch Swagelok® fitting (Overpressure exhaust). If this fitting is currently open to ambient and you don't want the gas to vent to atmosphere, you should connect a direct line from this fitting to your exhaust system; or, if your CalTrak XL is already directly connected to your exhaust system, you can "tee" a line from the Overpressure Exhaust fitting to your exhaust line.

Purge Fittings

Your CalTrak XL is not intrinsically-safe for use with explosive or flammable gases (see About Your CalTrak XL – Warnings). If you choose to calibrate explosive or flammable gases with your CalTrak XL, please follow your organization's laboratory safety procedures, which typically require operation within an inert atmosphere. To enable use in an inert atmosphere, your CalTrak XL has two (2) ¼-inch (6.25 mm) gas Purge fittings, located on its right side, and its electronics are isolated from the gas flow stream, contained within an internal, partitioned compartment.

Please note that electric current is still present within your CalTrak XL's gas flow stream, at the pressure sensor and temperature transducer.



Getting Started

To turn on your CalTrak XL, press the On/Off button in the lower right corner of the control panel for one second. To turn it off, press and hold the On/Off button for three seconds.

When turned on, your CalTrak XL's LCD displays an opening screen indicating the product name, model number and flow range, and its cooling fan will turn on.

Navigating through your CalTrak XL's menu screens is easy and intuitive – simply use the four directional arrows on the control panel for toggling between menu options (right, left, up, down). Your location within each menu or menu item is highlighted (shaded). A menu item in angle brackets (< >) indicates that multiple options exist for that item; these options are displayed when that item is selected. To select highlighted or bracketed items, press ENTER at the center of the navigational display on the control panel.

When you're ready, visit the SETUP menu and take some time to explore your CalTrak XL's many user-definable settings (see Setup).

Customizing Your Calibration

Your CalTrak XL's calibrations may be customized and automated for your convenience. To customize each option, move between menu selections using the up and down arrows. When a selection is highlighted, use the right and left arrows to toggle between your choices for that selection. Press CONFIRM to save any changes and return to SETUP, or press EXIT to return to SETUP without saving any changes.

Setup

From the initial screen, choosing SETUP gives you access to many customizable options. If at any time you'd like to return your CalTrak XL to its factory default settings, navigate to Preferences, set Default Settings to "Yes" and then Confirm the changes. In each setup sub-menu, selecting CONFIRM applies the settings and returns to the main setup menu. Selecting EXIT returns to the main menu retaining the settings as they were originally.

Readings. Select Volumetric flow or Standardized flow (volumetric flow corrected to specified temperature and pressure conditions, for calibrating instruments that read in mass flow, such as MFCs). Choose your preferred number of measurements in the average, from 1 to 100. If you'd like a delay between flow measurements (i.e., in order to time-profile MFCs to verify their long-term performance), set the "Time Between" from 1 to 60 minutes. As applicable, change the Sensor Factor from its default value of 1.000 to the value provided by the MFC or MFM manufacturer (see Using Sensor Factors).

Units. Depending on whether you've selected Volumetric or Standardized flow in the Readings menu, you may view flow measurements in liters or cubic feet (all units are per minute). Choose to view pressure in mmHg, kPa or psi, and choose to view temperature in Celsius or Fahrenheit. If you're measuring standardized flow, enter the temperature to which the gas flow volume will be standardized depending on the application. Pressure standardization is not adjustable, and is always 101.325 kPa, 760 mmhg, or 14.696 PSI of absolute pressure.

Time: Set the current time in the format you prefer.

Date: Set the month/date/year in the format you prefer.

Preferences: Read Default offers a choice of Single, Continuous or Burst measurements; choose the type of flow measurement you will normally use. Once selected, your CalTrak XL always defaults to this setting when Measure is selected. Default Settings allows you to reset your CalTrak XL to the factory defaults. Magnification controls the

amount of data on the display; choose Zoom to view only flow measurements in larger font, or choose Detail to simultaneously view flow measurements, temperature conditions, pressure conditions, and sensor factor in smaller font.

About: Tells you more about your CalTrak XL, a useful screen to refer to when speaking with a technical support representative or your Sierra sales representative.

Taking Measurements

Once you've finished customizing your CalTrak XL's SETUP and have confirmed your changes, select MEASURE to begin a set of measurements. MEASURE gives you access to the main menu, where you can choose between the following flow measurement options:

- Single. Each time the "Enter" button is pressed, one measurement is taken.
- Cont. When the "Enter" button is pressed, measurements continue automatically until stopped by the user.
- Burst. A single series of measurements is taken until the number of readings in the average is met.

To take a flow measurement, select the type of flow measurement you want, and then press ENTER. Your CalTrak XL will begin taking flow measurements. When taking flow measurements, the previous measurement, the running average of all measurements and the number of measurements in the average are provided simultaneously. The flow-cell viewing window lights each time the piston rises, and you will hear the internal valve clicking open and closed at the beginning and end of each flow measurement.

You can stop flow measurements at any time by choosing either PAUSE or RESET. PAUSE terminates the flow measurement but leaves the flow results on the screen and returns to the measurement menu. The set of measurements may be resumed where they were stopped by selecting SINGLE, CONT., or BURST. You may switch between continuous and burst modes at will but once single readings are selected RESET must be selected once or twice to return to the measurement menu to choose continuous or burst modes. RESET clears the screen, resets the average counter to 0, and returns to the measurement menu.

From the measurement menu, selecting EXIT returns the main menu. Choosing SETUP in the main menu allows you to further customize your CalTrak XL's operation.

Using Sensor Factors

Your CalTrak XL is factory-calibrated with nitrogen or purified laboratory air, although you can run other gases, provided they are noncorrosive, noncondensing and noncombustible (like most primary standards, your CalTrak XL is not intrinsically-safe).

When calibrating an MFC or MFM using a surrogate or proxy gas (meaning the MFC or MFM was originally calibrated by the manufacturer for a gas other than what you are currently using), refer to the manufacturer's sensor factor.

To enable your CalTrak XL to scale its actual flow measurements to match the adjusted flow from the MFC or MFM, input the sensor factor into the CalTrak XL before calibrating the MFC or MFM (see SETUP – Readings).

Because a sensor factor other than your CalTrak XL's default value of 1.000 modifies the actual flow to a "reported" flow, an exclamation mark (!) will appear next to any CalTrak XL measurement that is being adjusted according to a sensor factor when your display is set to Zoom (see SETUP, Preferences, Magnification). If your display is set to Detail, then no exclamation point appears. Rather, the sensor factor (SF) will be displayed, along with its value on the measurements screen along with the individual flow measurements.

Chapter 3: Notes

Out of Range!

If your Device Under Test is generating more flow than your CalTrak XL's rated flow range of 1500 liters per minute, the "Out of Range!" warning appears when you attempt to take a flow measurement. Immediately lower or disconnect the flow source. When the flow is within the proper range, either choose "Reset" from the LCD display to clear the last measurement, or try to take another flow measurement.

You may verify your CalTrak XL's flow range by navigating to SETUP, then About.

Over Pressure!

If your CalTrak XL has an internal pressure that is greater than 49 psiA (134.4 kpaA, 1008 mmHgA), the "Over Pressure!" warning appears. This can occur before or during a flow measurement. If the CalTrak XL is in the process of taking a flow measurement, the unit will open the valve; the piston will reset, and display the "Over Pressure!" warning. You will need to determine the source of the over pressure. This is most likely caused by a restriction in the flow path. It can also be caused by a faulty sensor allowing the piston to go to the top without resetting. When the source of the restriction is cleared, pressing any key will clear the fault.

Program

The recessed Program button, located on the rear of your CalTrak XL, enables firmware updates. To update your CalTrak XL's firmware (available from our website www.sierrainstruments.com), connect your serial cable (supplied) to your CalTrak XL's RS-232 serial port and to the serial port of your PC, then hold the Program button down while pushing the recessed Reset button, also on the rear of your CalTrak XL.

Reset Function

If your CalTrak XL fails to respond to push-button commands, try resetting the unit by pressing the reset button on the back. This can be done easily with a bent paper clip. Please note that resetting your CalTrak XL will not affect your user settings. However, if you are in the middle of a calibration, your CalTrak XL will return to the initial measurement phase and you'll need to initiate a new flow measurement.

Storage

To store your CalTrak XL for an extended period, please follow these guidelines:

- Always store it in a clean, dry place
- Disconnect your lab's air supply from its Valve Actuation fitting
- Cap its Inlet and Outlet fittings

Accessory Items

These inlet/outlet fitting adapters are available at an additional cost from Sierra. Please check with Sierra directly for updated information.

Part	Description
100-436	Swagelok reducer used to reduce from a 1 1/2-inch Swagelok fitting to 1-inch tube OD, includes Nut and Ferrule Set 1 1/2-inch
100-437	Swagelok reducer used to reduce from a 1-inch Swagelok fitting to 3/4-inch tube OD
100-438	Swagelok reducer used to reduce from a 1-inch Swagelok fitting to 1/2-inch tube OD
100-439	Swagelok Nut and Ferrule Set 1 1/2-inch
100-440	Swagelok Nut and Ferrule Set 1-inch
100-441	Swagelok Nut and Ferrule Set 3/4-inch
100-442	Swagelok Nut and Ferrule Set 1/2-inch

Chapter 4: Annual Maintenance and Calibration

Your CalTrak XL is engineered to provide years of reliable service, with appropriate care and maintenance. Sierra recommends annual calibration by an ISO 17025-accredited laboratory, such as Sierra's Monterey, California location, to help ensure the best possible flow measurements, meet regulatory requirements and provide a bulletproof audit trail in the event of litigation. Should you encounter any problems with your CalTrak XL, immediately contact Customer Service.

Recertification

Your CalTrak XL is a precision measuring standard with moving parts machined to extremely close tolerances. Various environmental factors, product wear, drift of the temperature sensors and pressure transducers or inadvertent damage may adversely affect your CalTrak XL's measurement accuracy or general performance.

For these reasons, we highly recommend having your CalTrak XL annually verified and serviced by our experienced personnel in our accredited ISO 17025 metrology laboratory, located in New Jersey, USA.
For those applications subject to regulatory or ISO requirements, verification by our accredited laboratory provides you with assurance of measurement integrity. Please note that while many accredited gas flow measurement laboratories may be capable of properly verifying the accuracy of your CalTrak XL, Sierra is the only authorized service center in the USA for Sierra CalTrak products. Outside the USA, please check with Sierra to determine if a local authorized Sierra CalTrak service center is available.

Our elective recertification program is a complete product service package that provides pre-calibration at significant flow points; complete product refurbishment, testing, and available upgrades; post-calibration at significant flow points; and NIST-traceable Sierra calibration certificates backed by our accreditation to ISO 17025, ANSI Z-540, and NIST Handbook 150 quality standards. Recertification includes a 90-day service warranty should any related labor or parts replacements prove faulty.

Turnaround time is generally two to three weeks within Sierra's facility from the date we received your CalTrak XL. To obtain current Recertification pricing, please contact Sierra at **800.866.0200**, or visit our web site at **www.sierrainstruments.com**.

Please contact us to see if expedited service is available for an additional charge.

Returning Equipment to Factory

If you are sending in your CalTrak for repair or evaluation (rather than elective re-certification), contact Sierra for technical support or troubleshooting assistance prior to shipping the unit. Provide us a detailed description of your issues. If we are unable to resolve the situation by phone or email, we will issue you an RMA (return merchandise authorization) number. Follow the instructions for returning your instrument for service as noted below. Sending your CalTrak XL to Sierra without an RMA number may result in return of the instrument without inspection or a substantial delay in service turnaround time.

Please note that Sierra will make every attempt to verify your issue, as we want you to get the most out of your CalTrak XL. However, if we are unable to detect a product issue or if we determine that the issue is application-related rather than product-related, we reserve the right to charge an evaluation fee.

Follow the instructions for returning your instrument for service as noted below.

RMA Note – Returning Unit for Service

Sierra will not evaluate or service your instrument without an RMA number. Go to http://www.sierrainstruments.com/rma to complete an RMA.

When requesting an RMA number, provide your CalTrak XL serial number and revision level. Also describe any product issues you may be experiencing. Please keep in mind that Sierra will not begin evaluation and service of your CalTrak XL until you have approved our formal RMA quote.

Shipping

When shipping your CalTrak, be sure to follow some simple guidelines to avoid costly damage to your property.

- When shipping your CalTrak XL, please use the reusable shipping container that was supplied with your CalTrak XL.
- We highly recommend insuring the product against damage in transit, and using a standard freight carrier (e.g., FedEx, UPS) that provides tracking numbers and offers door-to-door delivery directly to Sierra. Please note that Sierra does not arrange, or pay for, shipment transfers from local airports to our facility, so we are not responsible for additional expense and transit time incurred through airport deliveries.
- Include a copy of the RMA form (complete with Sierra supplied RMA number) with the unit(s).

- Use a major freight carrier (e.g., FedEx, UPS) that supplies tracking numbers.
- Insure your CalTrak against damage in transit. Sierra is not responsible for damage occurred during transit.
- Understand our mutual shipping obligations. Sierra is responsible for shipping cost only if the issue is product related and the CalTrak is still under warranty.

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)

Chapter 5: Product Specifications

WHY PRIMARY STANDARD?

CalTrak XL is a true primary standard in every sense of the word, because its accuracy is based upon primary SI units: The interior diameter of the glass measuring cylinder; the length of piston travel within the cylinder; and the time it takes the piston to travel this distance, implying a known volume. Our patented technology, therefore, offers accuracies at the level of national laboratories in one portable device.

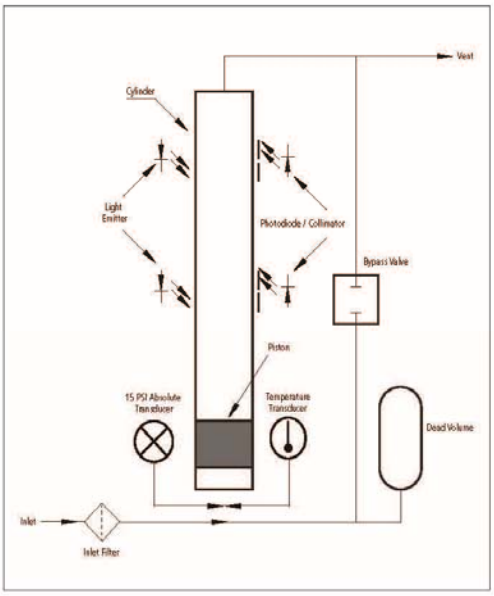
OPERATING PRINCIPLE

Sierra's CalTrak models contain a nearly frictionless graphite piston that moves freely inside a borosilicate glass tube. When the parallel bypass valve is closed, the gas flow is directed into the tube to push the piston up (See Figure 1).

Two photo-optic sensors detect the piston as it travels past. The distance the piston travels between the two sensors is precisely defined and represents a known volume. Accurate crystal-based timers drive a micro-processor which calculates the rate of rise. This defines the volumetric flow rate.

At the same time, extremely accurate temperature and absolute pressure sensors collect data used to calculate the mass flow rate.

Figure 1: CalTrak XL Operating Principle



PERFORMANCE SPECIFICATIONS

Standardized Accuracy*
+/- 0.25% of reading 15°C to 30°C (59°F to 86°F), from 5 slpm to 500 slpm
+/- 0.45% of reading 15°C to 30°C (59°F to 86°F), from 15 slpm to 1500 slpm
*Note: Volumetric accuracy (lpm) is the same

Time per Measurement
5 to 100 seconds (approximate)

Type
Single, continuous or burst, with averaging function user-selectable from 1 to 100

OPERATION SPECIFICATIONS

Flow Ranges
5 splm to 500 slpm*
15 slpm to 1500 slpm*

*Note: At a gas pressure of 760 mmHg (1 atm), and a gas temperature of 25°C (77°F) with standardization temperature set to 21.1 °C (69.98°F)

Gas Compatibility
Non-corrosive, non-combustible gases, less than 70% humidity, non-condensing

Operating Pressure (Absolute)
XL 500L: 10–19.5 psia
XL 1500: 14–45 psia
Pressure Accuracy: 0.05% full scale

Operating Temperature
15°C to 30°C (59°F to 86°F)
Temperature accuracy +/- 0.2% full scale

Ambient Humidity
0–70%, non-condensing

Storage Temperature
0°C to 70°C (32°F to 158°F)

Flow Modes
Pressure or suction

Pressure & Suction Fittings
1 1/2-inch Swagelok® compression tube fitting
Reducing fittings are available for 1 inch, 3/4 inch and 1/2 inch connections (as detailed in our price list)

Flow Units
Volumetric: L/min, cf/min, mL/min
Flow: smL/min, scf/min, slpm

Warranty
1 year; battery 6 months

Approvals
CE RoHS compliant

Digital Communication
RS-232 port and serial cable

PHYSICAL SPECIFICATIONS

Display
Backlit graphical LCD

Dimensions
Height: 34 inches (863.6mm)
Width: 32 inches (812.8 mm)
Depth: 12 inches (304.8 mm)

Weight
90 lbs (41 kg)

Configuration
Integrated flow measuring cell, valve and timing mechanism

Display
Backlit graphical LCD

POWER REQUIREMENTS

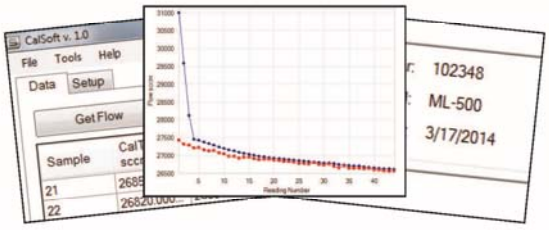
AC Power Adapter/Charger
External power module
Input: 100-240 VAC, 1.6A (max), 50-60 Hz
Output: 12 VDC, 3.0A

USER INTERFACE & SOFTWARE

Local Interface
Backlit LCD graphical display; Four directional arrow buttons on the control panel allow you to navigate through the menu; user selectable flow units plus time intervals

CalSoft™ Software
Software System Requirements
Windows® XP, Windows® 7
Microsoft Excel® 2003 and up

- Captures flow data from your CalTrak instrument for easy export into common software packages, a PC, or Microsoft enviornment.
- Real-time data monitoring
- Upload the latest version of the firmware to your CalTrak
- Enter flow rates from pumps or other flow source or flow meters and calibrate the flow source.
- Compare the flow measurements from your CalTrak precision calibrator.

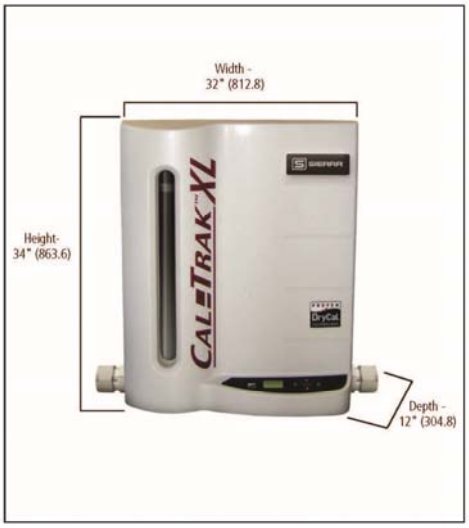


GAS FLOW SOURCE CONTROL

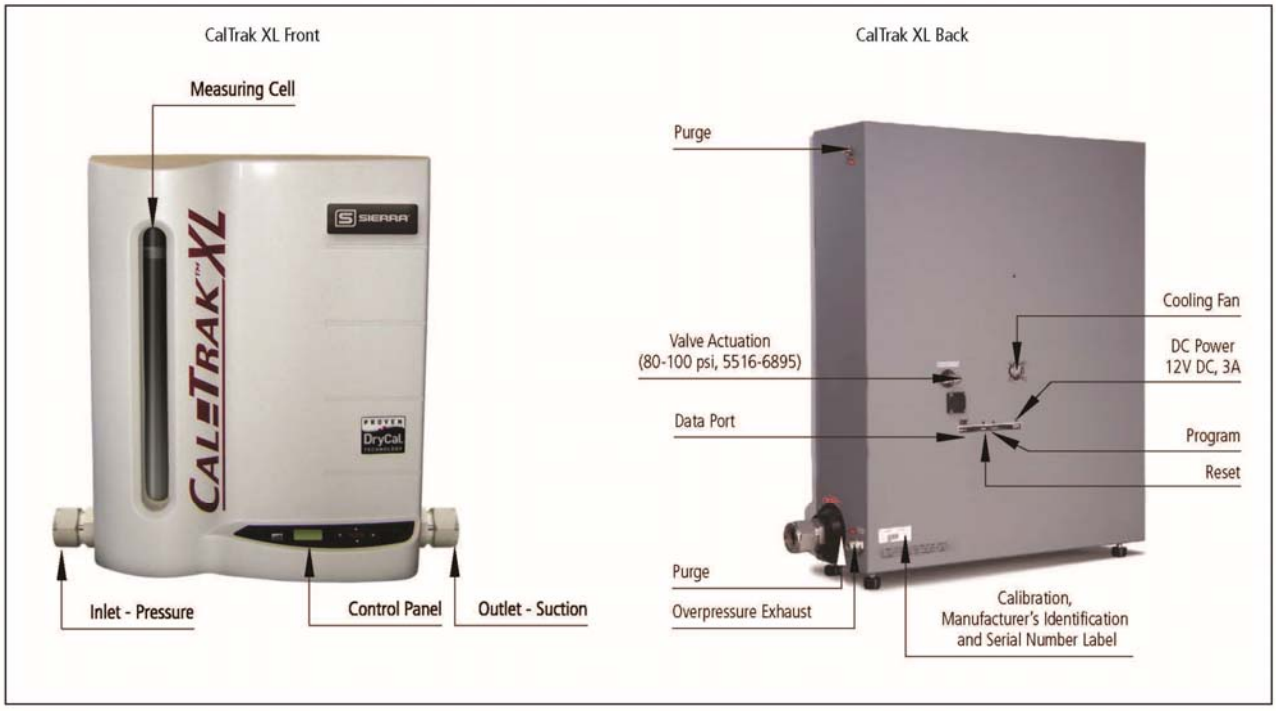
Mass Flow Controllers
Sierra's popular SmartTrak® 100 Series Mass Flow Controllers are ideal for generating and maintaining a constant flow of gas so that any type of flow meter can easily be calibrated. Special versions of the SmartTrak are available to cover the range of each CalTrak flow cell. With the built-in display and controls, SmartTrak is a complete gas flow generation system.

SmartTrak 100 Mass Flow Controller

DIMENSIONAL DRAWINGS



CalTrak XL Front and Back view



ORDERING THE CALTRAK® XL

Parent -

Instructions: To order a CalTrak XL, please fill in each feature number block by selecting the codes from the corresponding features below.

Parent Number CalTrak® XL Bases	
CalTrak® XL-500	CalTrak high flow gas calibrator, complete system. Complete calibrator to measure flows from 5 slpm to 500 slpm with a standardized accuracy of +/-0.25% reading. Designed to replace aging Bell Provers, the CalTrak XL comes complete with power supply, shipping case, cables. Note: Fittings on the XL are 1.5 inch diameter, so adapters below recommended.
CalTrak® XL-1500	CalTrak high flow gas calibrator, complete system. Complete calibrator to measure flows from 15 slpm to 1500 slpm with a standardized accuracy of +/-0.45% of reading. Designed to replace aging Bell Provers, the CalTrak XL comes complete with power supply, shipping case, cables. Note: Fittings on the XL are 1.5 inch diameter, so adapters below recommended.

Note: Fittings on the XL are 1.5 inch diameter, so adapters recommended.

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CALXL E 05/17

Chapter 6: CalSoft™ Software

Visit Sierra's website to download your copy of CalSoft software (http://www.sierrainstruments.com /drycal-pro/). DryCal

Pro captures flow data from your CalTrak XL directly to a pre-configured table. The data can be exported to selectable

Microsoft office environment. To run DryCal Pro, you must have Windows® XP or 7, Microsoft Excel® 2003 and up, and a RS232 port, or if your PC does not have an RS-232 port you will need a USB to RS-232 adapter.

Appendix A: 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. Learn more about Sierra's warranty policy at www.sierrainstruments.com/warranty.