Dynamic Duo

Restek's Leak Detector and ProFLOW 6000 Flowmeter
An Unbeatable Combination

Restek's Dynamic Duo

An Unbeatable Combination!

Restek's New Leak Detector

Redesigned and better than ever, our new leak detector is an essential tool for troubleshooting and routine maintenance of your gas chromatograph. Don't risk damaging your system or losing sensitivity; check for leaks often and protect your GC column and instrument with a Restek leak detector!

Detect More Gases

Only Restek's leak detector can detect helium, nitrogen, argon, and carbon dioxide, as well as combustible gases, such as hydrogen. Similar units only detect some of these common lab gases.

Easy Sampling

Optimized internal flow sweeps the sample path clean, permitting more sensitive detection.

Redesigned Circuitry

Longer battery life means the unit is ready when you need it with fewer charges and less downtime.

Audible Feedback

You can determine the severity of a leak with an audible tone; no need to look away from the probe to check the LED display.

Universal Charger Set

Recharge around the world—includes U.S., EU, UK, and Australian plugs.

ProFLOW 6000 Flowmeter

With its wide range of capabilities, the ProFLOW 6000 flowmeter simplifies gas flow measurement in the lab. Real-time measurements can be made for various types of flow paths, including continually changing gas types.

NIST-Traceable Calibration

You can rely on accurate calibration over the entire range of measureable flow rates. Recalibration service is also available to support preventative maintenance programs.

Volumetric Flowmeter

Measure the flow rate of any gas, including gas mixtures. Unlike mass flowmeters, this volumetric unit is not limited to a preset list of gases.

Ease of Use

Ergonomic design and side grips ensure comfortable handheld use; extendable stand makes conversion to benchtop use quick and easy.

Accurate Measurements

More accurate than a bubble flowmeter, the ProFLOW 6000 flowmeter is accurate to ±2% of the flow reading or ±0.2 mL/min, whichever is greater.

Extended Flow Range

Offering a wide range of flow rates, the ProFLOW 6000 flowmeter accurately measures flows from 0.5 mL/min to 500 mL/min.

Dynamic Duo (Restek Leak Detector and ProFLOW 6000 Flowmeter)

Protect your instrument and improve data quality with this powerful pair from Restek. Checking for leaks and verifying flows before you start helps you avoid costly problems later.

Description	qty.	cat.#
Dynamic Duo Combo Pack (Restek Leak Detector and ProFLOW 6000 Flowmeter)	kit	22654
Related Products and Accessories		
Leak Detector With Hard-Sided Carrying Case and Universal Charger Set (U.S., UK, European, Australian)	ea.	22655
Small Probe Adaptor for Leak Detector	ea.	22658
Restek ProFLOW 6000 Electronic Flowmeter With Hard-Sided Carrying Case	ea.	22656
Soft-Sided Storage Case for Leak Detector or ProFLOW 6000 Flowmeter	ea.	22657
Car Charger/Adaptor	ea.	22652
Universal AC Power Adaptor	ea.	22653

Restek's New Leak Detector

Redesigned and better than ever, our new leak detector is an essential tool for trouble-shooting and routine maintenance of your gas chromatograph. Don't risk damaging your system or losing sensitivity; check for leaks often and protect your GC column and instrument with a Restek leak detector!

Leak Detector Specifications:

Detectable Gases:	Helium, nitrogen, argon, carbon dioxide, hydrogen
Battery:	Rechargeable lithium ion internal battery pack (12 hours normal operation)
Operating Temp. Range:	32–120 °F (0–48 °C)
Humidity Range:	0–97%
Warranty:	One year
Certifications:	CE, Ex, Japan
Compliance:	WEEE, RoHS

Limits of Detection

These gases can be detected with the Restek electronic leak detector at the following leak rates:

Minimum Detectable Gas Limits and Indicating LED Color:

- Helium, 1.0 x 10^{-5}, red LED
- Hydrogen*, 1.0 x 10^{-5}, red LED
- Nitrogen, 1.4 x 10^{-3}, yellow LED
- Argon, 1.0 x 10^{-4}, yellow LED
- Carbon dioxide, 1.0 x 10^{-4}, yellow LED

Gas detection limits measured in atm cc/sec.

ProFLOW 6000 Flowmeter

With its wide range of capabilities, the ProFLOW 6000 flowmeter simplifies gas flow measurement in the lab. Real-time measurements can be made for various types of flow paths, including continually changing gas types.

Flowmeter Specifications:

Type of Flowmeter:	Volumetric
Battery:	2-AA
Operating Temp. Range:	32–120 °F (0–48 °C)
Warranty:	One year
Certifications:	CE, Ex
Compliance:	WEEE, RoHS

Patented

Optional Accessories

22657

Soft-Side Carry/Storage Case
Ideal for storing your leak detector or flowmeter in smaller spaces such as a tool box.

22658

Small Probe Adaptor for Leak Detector
Verify hard-to-reach leaks using the small probe adaptor.

Order today at **www.restek.com**

RESTEK®
Lit. Cat.# GNBR1769A-UNV

Japan • phone: +81 (3)6459 0025 • fax: +81 (3)6459 0025 • e-mail: restekjapan@restek.com
UK • phone: +44 (0)1494 563377 • fax: +44 (0)1494 564990 • www.thamesrestek.co.uk

NEW Restek ProFLOW 6000 Electronic Flowmeter

Flowmeters that can measure flammable gases are becoming mandatory, due to the increased use of hydrogen in chromatography. With its Ex rating, the Restek ProFLOW 6000 Flowmeter is designed specifically with explosive and flammable gases in mind.

The new Restek ProFLOW 6000 is the only flowmeter you need for any type of chromatography gas measurement because of its wide range of capabilities. The ProFLOW 6000 is an electronic device capable of measuring bidirectional volumetric flow for most gases. Real-time measurements can be made for various types of flow paths, including continually changing gas types. This portable unit is designed for easy hand-held use, and the stand adds bench-top convenience.

State-of-the-art features include:

- Measures volumetric flow for all gases across a range of 0.5-500 mL/min.
- NIST traceable calibration
- Explosion-proof rating for flammable and explosive gases
- Accuracy of +/- 2% of flow or +/- 0.05 mL/min., whichever is greater
- Over range warning indicator
- Auto shut-off feature
- Use as a bench-top or hand-held unit
- Ergonomic design and side grips for comfort
- Measures most gas types*
- Convenient carrying/storage case included
- CE certified
- Uses 2-AA batteries
- Data output via USB port
- Re-calibration service available

Backed by a 1-year warranty, the Restek ProFLOW 6000 flowmeter will set the industry standard for electronic flowmeters!

Contact your local Restek representative to **order yours TODAY!**

A perfect companion for your Restek Electronic Leak Detector!

Flowmeter Facts:

Type of Flow Meter:	volumetric
Battery:	2AA
Operating Temp. Range:	32-120°F (0-48°C)
Humidity Range:	0-97% (noncondensing)
Warranty:	one year
Certifications:	CE, Ex
Compliance:	WEEE,RoHS

Description	qty.	cat.#
Restek ProFLOW 6000 Electronic Flowmeter	ea.	22656
Soft-Side Storage Case	ea.	22657

*This flowmeter is designed to measure clean, dry, non-corrosive gases.

Carrying/storage case included with purchase of unit.

Soft-side storage case is ideal for storing your flowmeter in smaller spaces such as your tool box.

www.restek.com/flowmeter

RESTEK

ISO 9001:2000 cert.# FM80397

Lit. Cat.# GNPC1194-INT

Restek's
ProFLOW 6000
Electronic Flowmeter

Users Manual
Version 5.5
for cat.# 22656

RESTEK www.restek.com

The ProFLOW 6000 volumetric flowmeter.

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1.0 Introduction

Restek's ProFLOW 6000 Flowmeter is specifically designed for use with gas chromatography (GC) systems. The probe is applied directly to the gas flow stream and the measured flow rate is presented on the LCD screen. Units of flow are measured in mL/min.

This unit provides continuous real-time measurements of gas streams ranging from 0.50 mL/min to 500 mL/min. Because the technology uses volumetric flow measurement, the unit is compatible with all laboratory gases.

CAUTION: Do NOT exceed maximum operating flow rates. Recalibration may be required if the unit has been subjected to extreme flow rates.

Always use appropriate laboratory safety practices when operating this device. Wear laboratory safety goggles when operating this unit.

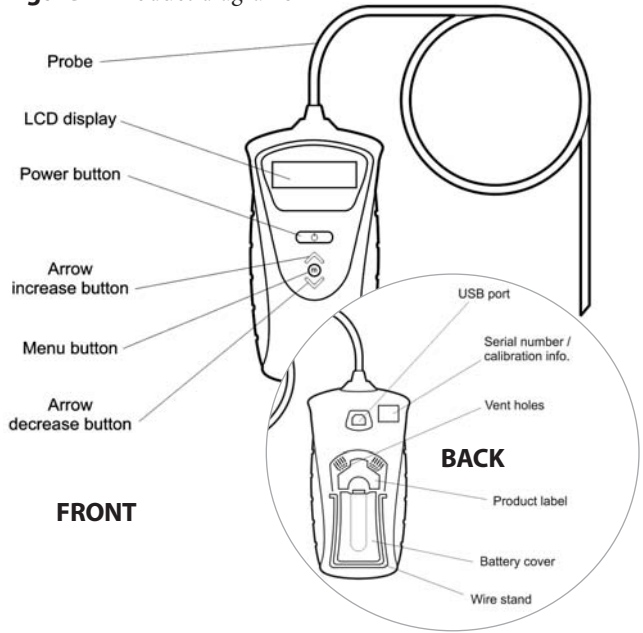
2.0 Specifications

Table I

Type of measurement	Volumetric flow
Accuracy of measurements	± 2% flow or ± 0.2mL/min., whichever is greater
Power requirements	2 AA Alkaline Batteries 1.5VDC each/3VDC 200ma
Operating flow range	0.50 to 500mL/min.
Operating temperature range	32°-120°F (0°- 48°C)
Available communication	USB data port
Warranty	one year
Calibration	NIST traceable. Yearly recalibration is recommended.
Certifications	CE, Ex (see section 10.0)
Compliance	WEEE, RoHS (see section 10.0)

NOTE: There are no serviceable parts in this unit. Opening the device—other than to change the batteries—or tampering with the internal parts will void the factory warranty.
NOTE: To ensure accurate measurements and effective clearance of the flow gas from the unit, DO NOT obstruct the vent holes on the back of the unit.

Figure 1 Product diagrams



3.0 Installing the batteries

This unit uses 2 AA alkaline batteries.

To install batteries, extend the wire stand. Open the cover. Insert the batteries with the polarity (⊕ and ⊖) correctly aligned. Close the cover. (Figures 2 and 3)

Precautions for battery replacement:

- Load the new batteries with their polarity (⊕ and ⊖) aligned correctly.
- Do not use rechargeable batteries.

4.0 Battery power consumption

4.1 Battery lifetime

The battery lifetime is dependant on the number of options the user has enabled.

The unit is shipped with the most energy demanding options disabled (Table II).

The power saving functions can be changed.

➜ See Section 8.2: Adjust LCD Character Contrast (p.9).
➜ See Section 8.3: USB Activation (p.10).
➜ See Section 8.4: Adjust LCD Image Backlight (p.10).
➜ See Section 8.7: Adjust Auto Shutoff Duration (p.12).

4.2 Battery charge indicator

The unit includes a battery charge indicator. Replace batteries as needed.

➜ See Section 8.5: Show Battery Charge Indicator (p.11).

Figure 2 Extend the wire stand before opening battery door.

Figure 3
Insert the batteries as marked.

Table II Default settings for the ProFLOW 6000

Auto shutoff duration	6 minutes
LCD backlight	0 (off)
LCD character contrast	5
USB port	disabled

NOTE: Store your ProFLOW 6000 in its protective storage case following use. Keep the manual under the unit; placing the manual on top can result in the unit being turned on when the lid is closed.

5.0 Operating instructions

CAUTION: Do not exceed maximum operating flow rates. Recalibration may be required if the unit has been subjected to extreme flow rates.

Connect the white probe end tip to the output of the gas flow line to be measured. Be sure the probe tip connection is completely sealed around the flow source outlet and is free of leaks (Figure 4).

Press and hold the (power) button until the unit responds with a regular clicking sound. The ProFLOW will immediately begin to provide flow measurements (Figure 5). Wait for the measured values to stabilize. It takes a few seconds for the unit to reach a steady state with the gas flow line.

To power down the unit press and hold the (power) button until the unit stops clicking.

The unit is equipped with a timed auto shutoff option (Default: 6 minutes).

➜ See Section 8.7: Adjust Auto Shutoff Duration (p.12).

Figure 4 Probe connected to a GC gas outlet.

Figure 5 LED displays the measured flow value.

6.0 Interpreting results

The unit has an operating range of 0.50mL/min. to 500mL/min. (Figure 7). If the flow is less than 0.50mL/min., the display will read "under range".

If the flow exceeds 515mL/min., the display will read "over range". Excessively high flow rates may damage this unit.

NOTE: units of mL/min. are equivalent to ccm.

Figure 6 Example flow value.

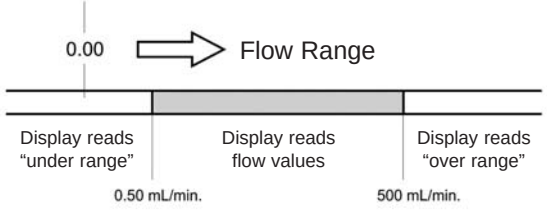
6.1 Flow range display

The unit automatically adjusts the resolution of the display depending on the flow range being measured. Table III shows the resolution of the flow ranges.

Table III Display resolution vs. flow range.

Flow range	Display resolution (mL/min.)
0.50 – 9.99	0.01
10.0 – 99.9	0.1
100 – 500	1

Figure 7 Description of flow ranges.



7.0 Data collection on the PC

WARNING: ONLY connect USB cable to USB port while unit is OFF.

The ProFLOW 6000 provides you with a data stream of real time flow values via the USB port (Figure 1, p. 3). In order to use this feature, you must first install the appropriate FTDI Virtual Com Port (VCP) Driver available at:

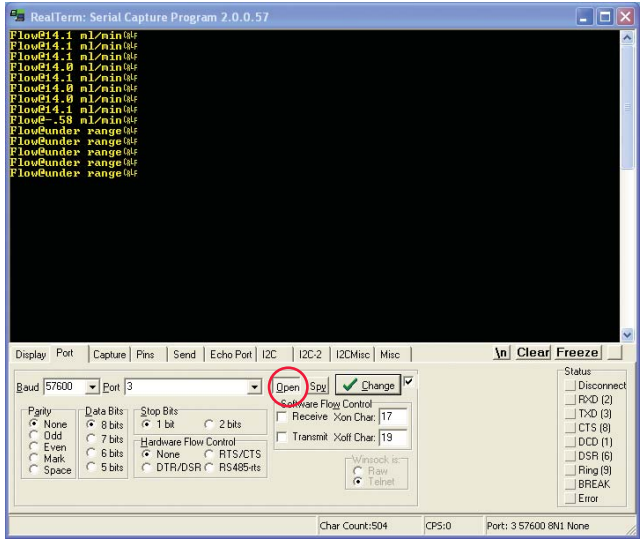
http://www.ftdichip.com/Drivers/VCP.htm

The VCP driver will cause the ProFLOW to appear as a standard RS-232 port. This will work on any operating system for which there is an FTDI VCP driver. After installing the driver, connecting the device, and determining which port it creates, you can access the data stream through any programmatical means, or by using any serial terminal software.

For Windows systems:
To determine which port the ProFLOW is using, go to the Control Panel and open System. Go to the Hardware tab and click the Device Manager button. Expand the Ports (COM & LPT) entry. Make sure the VCP driver is installed, then connect a powered ProFLOW 6000 to the USB port. You will see the new COM port appear. Open your serial terminal.

➜ See Section 8.3: USB Activation (p.10).

Figure 8 Screen capture of data collection.



If you do not already have serial terminal software, free, open source options are available online (i.e. RealTerm, etc.). You can download RealTerm* software from:

http://realterm.sourceforge.net/

After installation, click the Port tab and set the following:

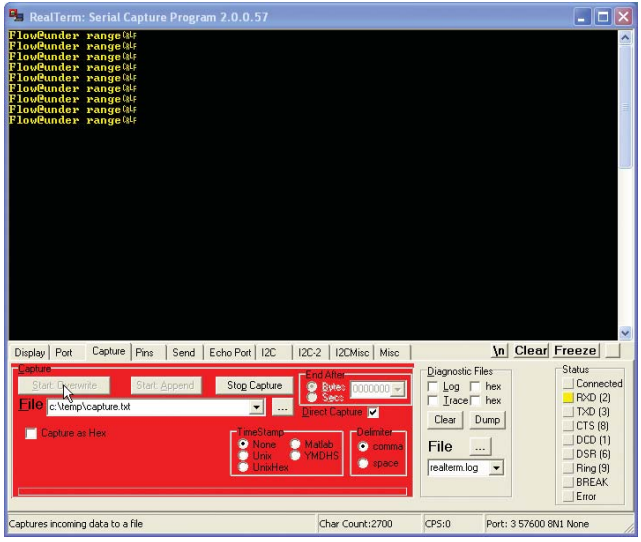
Baud: 57600
Port: the appropriate VCP for your ProFLOW
Parity: None
Data Bits: 8 bits
Stop Bits: 1 bit
HardwareFlow Control: None

Go to the USB menu entry in the ProFLOW and turn the transmission on. Finally, click **Open** on the Port tab in RealTerm and you will see the serial data stream begin in the terminal window (Figure 8).

If you would like to log the flow data, this can be done by clicking on the Capture tab. Set File to the name and location of the log file that you would like to save and click either the **Start: Overwrite** or **Start: Append** buttons appropriately (Figure 9).

**This software is not supplied or supported by Restek. User assumes all responsibility for the downloading and use of the program.*

Figure 9 Screen capture of data collection.



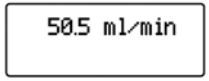
8.0 ProFLOW 6000 menu structure

8.1 Unit power up/power down

Press the (power) button:

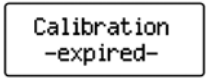
The LCD screen will display the device intro screen:

Followed by measured flow data:



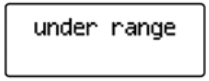
To power off, press and hold the (power) button:

Other messages encountered at power up



Appears temporarily if the unit's calibration has expired (>1 year).

➜ See Section 14.0: Calibration and Service

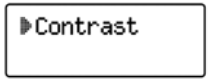


If the unit is hooked up to a flow stream with a flow rate less than 0.50 mL/min. the unit will report an "under range" status for the flow. This message will appear until the flow rate exceeds 0.50 mL/min.

8.2 Adjust LCD character contrast

Press the (MENU) (menu) button.

Use the (arrow) keys to select the contrast menu:



Press the (MENU) (menu) button again to enter the value select screen.

Use the (arrow) keys to select the contrast value.
Contrast Values: 1 (lightest) and 5 (darkest).

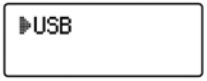
To return to the main menu screen, press the (MENU) (menu) button.

To exit and return to measuring flow, press the (MENU) (menu) button again.

8.3 USB activation

To enable the USB, press the (menu) button.

Use the (arrow) keys to select the USB menu:



Press the (menu) button again to enter the value select screen.

Use the (arrow) keys to toggle between USB 'on' and 'off'.

To return to the main menu screen, press the (menu) button.

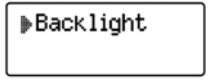
To exit and return to measuring flow, press the (menu) button again.

➜ See Section 7.0: Data Collection on the PC

8.4 Adjust LCD image backlight

Press the (menu) button.

Use the (arrow) keys to select the backlight menu:



Press the (menu) button again to enter the value select screen.

Use the (arrow) keys to select the backlight value.
Backlight Values: 0 (off) and 5 (maximum).

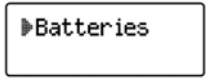
To return to the main menu screen, press the (menu) button.

To exit and return to measuring flow, press the (menu) button again.

8.5 Show battery charge indicator

Press the (menu) button.

Use the (arrow) keys to select the Batteries menu:



Press the (menu) button again.

The battery life is displayed.

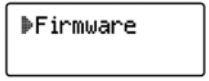
To return to the main menu screen, press the (menu) button.

To exit and return to measuring flow, press the (menu) button again.

8.6 Firmware version information

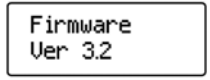
Press the (menu) button.

Use the (arrow) keys to select the Firmware menu:



Press the (menu) button again.

The most recent version of Firmware is displayed.



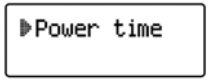
To return to the main menu screen, press the (menu) button.

To exit and return to measuring flow, press the (menu) button again.

8.7 Adjust auto shutoff duration

To conserve battery life, the unit automatically turns off after 6 minutes. To customize the auto shutoff setting, press the (menu) button.

Use the (arrow) keys to select the Power time menu:



Press the (menu) button again to enter the value select screen.

Use the (arrow) keys to select the auto shutoff setting.
Values: 1–59 minutes or 'constant on' (max.)

To return to the main menu screen, press the (menu) button.

To exit and return to measuring flow, press the (menu) button again.

9.0 Troubleshooting

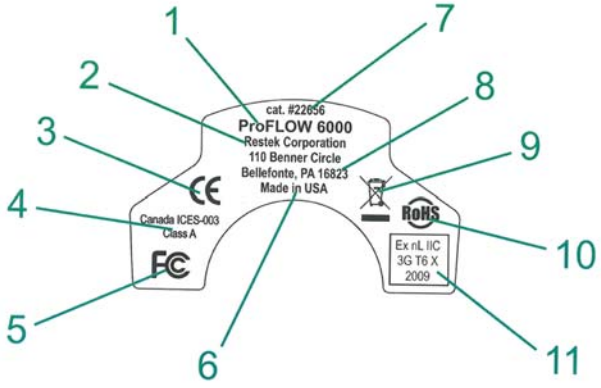
Problem	Possible Cause(s)	Suggested Solution(s)
Multiple readings are not giving reproducible results.	• Unit is out of calibration • Value is being compared to a bubble flowmeter	• Return the unit to Restek for recalibration* • See Section 12.0 for a discussion of the weaknesses of bubble flowmeters
Unit does not power up	• Dead batteries	• Replace with 2 new AA alkaline batteries
Flow value display is erratic/jumpy	• The ProFLOW 6000 is very sensitive to small changes in flow	• Allow more time for flow to stabilize

*Contact Restek or your Restek representative for return instructions for servicing a damaged unit. Additional charges may apply if the warranty has expired or the unit is damaged due to misuse.

Call Technical Service at 800-356-1688 or 814-353-1300, ext. 4 (or your Restek representative) if you have any questions about this product or any other Restek product.

10.0 Product back label legend

#	Description
1	Product name
2	Company name
3	This unit conforms to EU/EMC Directive 2004/108/EC; standards to which conformity is declared include 61326:1997 w/A3 Class A.
4	This Class A digital apparatus complies with Canadian ICES-003.
5	This complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
6	Country of origin
7	Product catalog number
8	Company address
9	This unit is WEEE compliant.
10	This unit is RoHS compliant.
11	



	Ex nL	EN60079-0: 2006; Electrical apparatus for explosive gas atmospheres- Part 0: General Requirements. EN60079-15: 2005; Electrical apparatus for explosive gas atmospheres- Part 15: Construction, test and marking of type of protection "nL" energy limited apparatus.
	IIC	Group II applies to areas above ground environments. Gas Group IIC relates to hydrogen and related gas types.
	3G	Category 3 relating to gas analysis; normal safety measure. Sufficient safety during normal operation. Normal operation described as measuring flows of flammable or explosive gases in a nonflammable environment.
	T6	During testing neither internal nor external elements exceed 85°C.
	X	Additional information: Operating range: 32°F ≤ Tamb ≤ 120°F 0°C ≤ Tamb ≤ 48°C Not intended for outdoor use or wet locations.
	2009	Year of product design release.

11.0 Volumetric vs. mass flow measurements

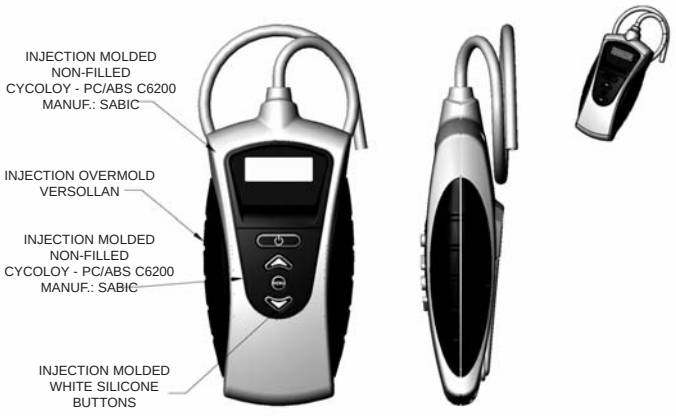
The Restek ProFLOW 6000 is a volumetric flow measurement device. Volumetric flow is the measurement of the volume of gas through a conveyance per quantity of time. Standard units of measure for this parameter are given in mL/min. The advantage of measuring volumetric flow is its independence to the composition of the flow gas. It is not necessary to correct the flow values based on the gas composition, as is required for mass flow devices.

Mass flow measures the weight of the gas flowing through the instrument per quantity of time. Mass flow units of measure are commonly g/sec.

12.0 Bubble flowmeter measurements

If you employ bubble flowmeters in your laboratory, you may find they give slightly different flow rate values than the Restek ProFLOW 6000. This error is due to technology limitations inherent in the bubble flowmeter device; error from variances in air humidity within the bubble chamber and its direct contribution to the measured flow rate. In the event a bubble flowmeter is used to measure flow gas where the gas is at elevated temperatures, the error due to humidity contributions can be extreme. For the most accurate measurement of laboratory gas flow rates, we recommend using the Restek ProFLOW 6000 over bubble flowmeters.

13.0 Product case specifications



14.0 Calibration and service

The Restek ProFLOW 6000 comes factory calibrated and carries a one year warranty from time of purchase. All units are calibrated to NIST traceable standards.

Recommended schedule for recalibration is once every year from time of purchase. Customers will need to return the unit to Restek for recalibration. At that time, preventative maintenance services can also be performed. A fee will be charged for recalibration and servicing of the unit. Prolonged failure to recalibrate the instrument may result in increased error.

Call Technical Service at 800-356-1688 or 814-353-1300, ext. 4 (or your Restek representative) if you have any questions about this product or any other Restek product.

Please have the serial number available when calling Restek with any concerns you may have. Additional charges may apply if the warranty is expired or the damage is due to misuse.

This manual is also available in electronic format at **www.restek.com**.

Restek® Electronic Leak Detector

(cat.# 22655)

Instruction Manual

RESTEK® www.restek.com

Table of Contents

Operating Instructions

1.0 Introduction

Restek's portable leak detector is specifically designed for use with gas chromatography (GC) systems. It detects minute leaks of any gas with a thermal conductivity different from air. The reference gas inlet (Figure 1) draws in ambient air for comparison to gas drawn into the sample probe. The severity of a leak is indicated by both an LED light display and an audible alarm.

It is best practice to use a leak detector daily to check critical seals (septa, column nuts, reducing nuts, and gas lines).

If this instrument is used in any manner other than described in the manual, the CE and Ex declaration is void.

Restek's leak detector is manufactured by Restek, so you are assured of the same Restek® quality and service you have come to recognize with the Restek® name.

Should you require assistance at anytime regarding our leak detector, please contact Restek® Customer Service at 1-800-356-1688 or 1-814-353-1300, ext. 3.

2.0 Battery Charging

The leak detector should be fully charged prior to use. Only use the AC adaptor provided (cat.# 22653). To charge the battery, first install the correct plug for your country's AC outlets onto the provided AC adaptor. Insert the AC adaptor into an electrical outlet, and then insert the barrel plug on the other end of the AC adaptor into the connector on the bottom of the leak detector unit. The green battery charge indicator LED will illuminate. When the battery is fully charged, the green battery charge indicator LED will go out. When the leak detector's charge is low, the blue LED located between the red and yellow LEDs will begin to flash.

If unit is off, the blue LED may flash when the power button is depressed. If the battery is fully discharged, no LED will illuminate.

CAUTION: The leak detector contains a Li-Ion battery. Like other battery-operated devices, if the battery is left for long periods of time without being charged, it can discharge to a point where the protection circuit will not allow you to charge the battery. We recommend that you charge the battery at least once every 3–4 months.

CAUTION: *DO NOT charge the leak detector in a hazardous location.*

NOTE: Replacement of the rechargeable battery in this unit is performed at the factory. There are no serviceable parts in this unit. Opening the case or tampering with the internal parts will void the factory warranty.

NOTE: Recharging a fully discharged battery will take 3–5 hours.

NOTE: If the battery is fully discharged and you need to use the leak detector, charge the battery for 15 minutes, and then disconnect the unit from the AC adaptor. You will be able to use it for approximately 30 minutes. After use, fully charge the battery.

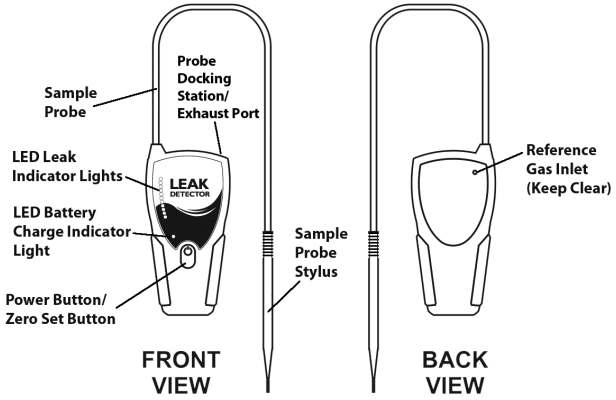
3.0 Powering Up

Depress and hold the power button (Figure 1) until the unit responds with the wake-up mode. The leak detector will run through a self-calibration sequence for approximately 15 seconds. During this time **DO NOT** attempt to zero the unit.

4.0 Zeroing the Unit

After the LED lights stop flashing, the unit is ready for use. The instrument may need to be zeroed periodically between uses, especially if it is moved from room to room or between areas of differing temperature or humidity. Do not attempt to zero the unit while the probe is stored in the holder. The probe **MUST** be removed from the probe docking station before zeroing the unit. To re-zero, press the zero set button. The unit will run a self-calibration sequence for approximately 4 seconds. When all LED lights stop flashing and the blue LED light is lit, the unit is ready for use.

Figure 1: Leak detector schematic.



NOTE: To avoid false readings, do not attempt to use or zero the unit while the self-calibration sequence is in progress.

5.0 Prior to Operation

Verify the operation of the leak detector before each use by sampling gas from a GC split vent or other source of hydrogen or helium. Also, visually inspect the probe tip, reference gas inlet, and exhaust port for obstructions (Figure 1).

IMPORTANT: *Fittings being checked must be clean and dry; liquid leak-detecting agents, dust, and other debris may damage the leak detector if drawn into the probe.*

The leak detector responds to almost any gas you can smell and many gases that you can't smell. Solvent vapors, split vent exhaust, or even strong air currents around the probe or reference inlet can cause instability or false positive readings. Be careful not to breathe into the reference inlet when checking for leaks or to cover/block the inlet with your hand.

6.0 Detecting Leaks

Slowly move the probe tip around fittings and other potential leak sources. If the leak detector senses a gas other than air, the LED bar graph will begin to light, with more lights indicating a more significant leak. On the third red, or second yellow LED, an audible tone will begin to beep. The more LEDs that illuminate, the faster the beep. When the last red or yellow LED illuminates, the beep becomes a steady tone. The red LED lights indicate a helium or hydrogen leak. The yellow LED lights indicate a nitrogen, argon, or carbon dioxide leak. Remove the probe from the vicinity of the leak and allow the unit to return to zero. If a large amount of gas has entered the probe, it may take a few seconds for the instrument to clear itself. Do not attempt to zero the unit while it is clearing out the gas from the probe. This may cause the unit to malfunction. Place the probe near the leak again to confirm its location. The reference gas inlet (Figure 1) must not be restricted or the unit will not operate correctly. Similarly, the exhaust port allows the gas being tested to exit the leak detector and must remain unobstructed. The exhaust port is located in the probe docking station.

CAUTION: *This unit is designed to detect trace amounts of hydrogen arising from a small leak in a nonflammable environment, e.g., laboratory room air, etc. This unit is rated for use in a nonflammable atmosphere where the sample gas may become sufficiently high in concentration to become explosive.*

NOTE: To disable the audible beep during leak detection, depress and hold the zero set button for 2–3 seconds. After you hear a steady tone for 1 second, release the button; the beep function is disabled. To turn the beep function on again, depress and hold the zero set button. The beep function is always enabled at power-up.

NOTE: The leak detector will power down after 6 minutes of operation. This feature prevents excess battery discharge if the unit is accidentally left on.

7.0 Specifications

Power Rating: 3.7 volts DC, 60 mA (AC adaptor supplied)
Battery Rating: 12 hours normal operation
Operating Temp. Range: 32–120 °F (0–48 °C)
Humidity Range: 0–97%

Warranty: 1-year warranty
Certifications: CE, Ex, and Japan
Compliance: WEEE, RoHS, China RoHS2

8.0 Maintenance

Avoid spilling liquids onto the unit or it may malfunction. If a liquid is spilled onto the unit, turn off the power immediately, remove heavy liquids with a dry towel, and let the unit sit until the liquid dries. Dust and debris can enter the probe tip of the leak detector and, over time, can clog the small-bore tubing inside the unit. To prevent this, clean the probe tip periodically. To clean the probe tip, unscrew the cap to expose the brush (Figures 2 and 3). Gently clean the probe using a small brush or your fingers to remove dust and debris, then replace the cap. Do not use liquids to clean the probe. Liquids can damage the leak detector if drawn in through the probe.

Information on where to have the unit sent for maintenance or service* is listed at the end of this document.

Figure 2: Cap unscrewed and partially removed.

Figure 3: Cap removed, exposing probe tip brush for cleaning.

9.0 Troubleshooting

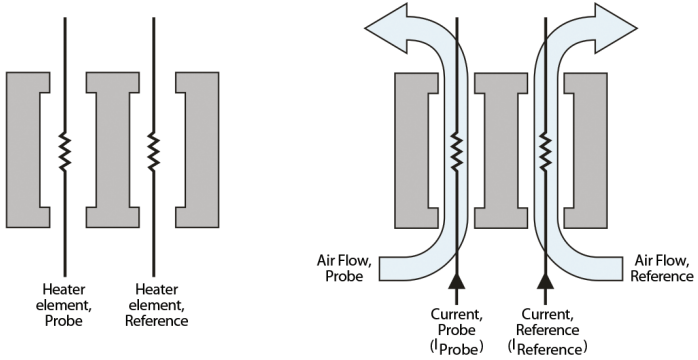
Problem	Possible Cause	Suggested Solution
Sensitivity decreased	Probe clogged	Clean the probe tip to remove any debris
	Probe line punctured	Visually inspect probe line for holes*
Response decreased	Detector not zeroed	Re-zero detector
LED bar graph stays lit during operation	Detector re-zeroed before unit was purged out	Allow adequate time for detector to purge, then re-zero
	Reference gas inlet covered by hand or other object	Remove obstruction
Does not power up	Batteries need to be charged	Charge unit

*Contact Restek or your Restek® representative for return instructions for servicing a damaged unit. Additional charges may apply if the warranty has expired or the unit is damaged due to misuse.

10.0 Technology

The leak detector measurement is based on thermal conductivity comparisons between the probe air and a reference air. The device employs a dual thermistor technology that measures the ratio of [probe]:[reference] heat exchange values and displays the results on an LED scale (Figure 4). Under ideal operating conditions, a ratio of 1:1 indicates identical air samples for both [probe] and [reference], and therefore, no leak is present.

Figure 4: Schematic layout of the leak detector technology.



LEFT: Dual analysis is achieved with heater elements positioned in separate flow chambers.

RIGHT: Probe and reference air streams are simultaneously monitored for thermal conductivity. Differences in air composition are indicated by differences in the heater element currents.

Because of slight differences in air temperature and/or humidity between the reference inlet (Figure 1) and the probe tip, a small response indicated by a single red or yellow LED light is generally insufficient to positively identify a gas leak. Small to moderate leaks are reliably indicated with 3 red or 2 yellow LED lights and an intermittent beep. Larger leaks are indicated with all red or yellow LED lights lit and a continuous audible alarm.

11.0 Interpretation of Results

Figure 5 illustrates the leak detector's LED light response range. The greater the number of red or yellow LED lights lit correlates in general to the size of the leak. **NOTE:** The leak detector is not a quantitative device, rather it is designed to detect leaks in gas line connections commonly associated with laboratory equipment.

Gas	Minimum Detectable Leak Rate (atm cc / sec)	Indicating LED Light Color
Helium	1.0×10^{-5}	Red
Hydrogen**	1.0×10^{-5}	Red
Nitrogen	1.4×10^{-3}	Yellow
Argon	1.0×10^{-4}	Yellow
Carbon dioxide	1.0×10^{-4}	Yellow

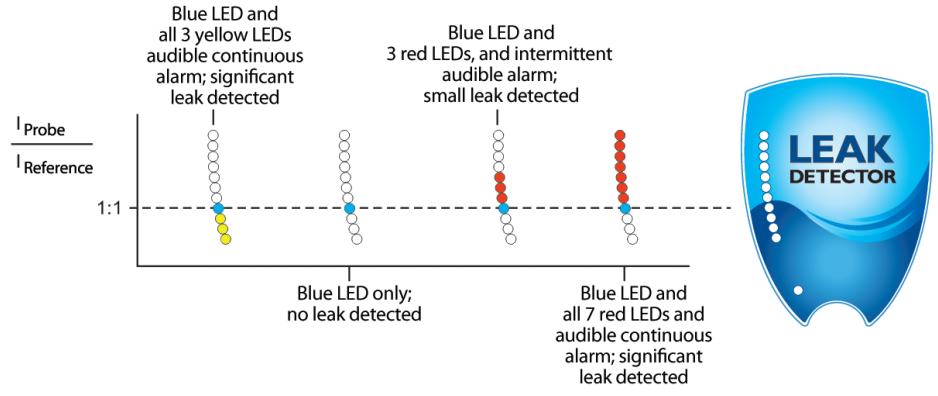


Figure 5: LED light response chart for the leak detector. A 1:1 ratio of $I_{Probe} : I_{Reference}$ indicates no leak present. Red LED lights indicate the presence of helium and/or hydrogen. Yellow LED lights indicate the presence of nitrogen, argon, and/or carbon dioxide.

****CAUTION:** This unit is designed to detect trace amounts of hydrogen arising from a small leak in a nonflammable environment, e.g., laboratory room air, etc. This unit is rated for use in a nonflammable atmosphere where the sample gas may become sufficiently high in concentration to become explosive.

Tip drift

Tip drift is the phenomenon when a false LED light response is registered as the unit is quickly turned or swept in dramatic arc movements. Tip drift is inherent to all dual thermistor leak detector technology and is based in large part on the asymmetry of the flow cells; shaking or tipping the unit influences the air flow profiles, which impacts the rates of heat exchange. If the device is functioning normally, the LED light signal will return to zero in 3–5 seconds after the unit is held still. In extreme cases, the unit may require another "zero" cycle before using. To avoid tip drift, be sure to hold the unit steady while making measurements.

12.0 Back Label Explanation

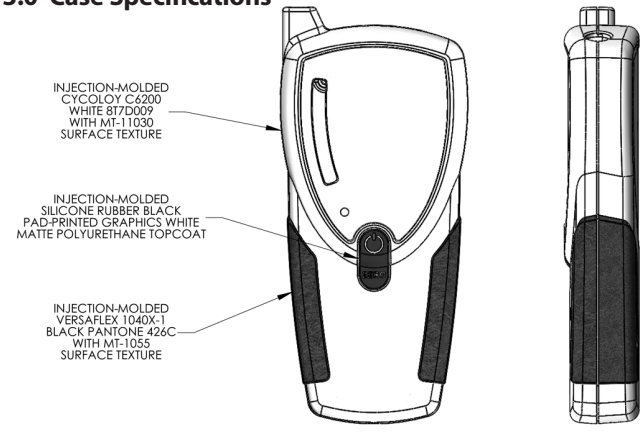
1. Product name.
2. Product catalog number.
3. Product serial number.
4. Warning note: This plastic case does not exhibit adequate surface resistance properties suitable for high electric fields. DO NOT CHARGE THIS DEVICE IN A HAZARDOUS AREA.
5. Definition of symbols—see table at right.
6. This unit conforms to EU/EMC Directive 2004/108/EC, Standards to which Conformity is declared include EN61326-1:2006 w/A3 Class A.
7. Unit is WEEE compliant.
8. Unit is RoHS and China RoHS2 compliant.
9. This complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
10. This Class A digital apparatus complies with Canadian ICES-003.
11. Units must be sent back to Restek Corporation for service.
12. Manufacturer company name, address, and contact information.
13. Electrical parameters.
14. ATEX coding: for definition of symbols see table to the right.

For the most up-to-date information, see our website **www.restek.com/leakdetector**

Definition of back label symbols.

⎓	DC Voltage.
Ex nA	EN60079-0: 2012; Electrical apparatus for explosive gas atmospheres—Part 0: General Requirements EN60079-15: 2010; Electrical apparatus for explosive gas atmospheres—Part 15: Electrical Apparatus With Type of Protection "n."
IIC	Group II applies to areas above ground environments. Gas Group IIC relates to hydrogen and related gas types.
T6	While testing this unit neither internal nor external elements exceed 85 °C.
X	Additional information. Operating range. $32\ °F \leq T_{amb} \leq 120\ °F$ $0\ °C \leq T_{amb} \leq 48\ °C$ This unit is designed to detect trace amounts of hydrogen arising from a small leak in a nonflammable environment, e.g., laboratory room air, etc. This unit is rated for use in a nonflammable atmosphere where the sample gas may become sufficiently high in concentration to become explosive.
13.0517	Certificate Reference.
Ex	EU Explosive Atmosphere symbol.
11	Equipment Group (non-mining).
3	Normal protection.
G	Gas.

13.0 Case Specifications



14.0 Service

The Restek® leak detector carries a one-year limited warranty from time of purchase. Please have the leak detector serial number available when calling Restek with any concerns you may have. Additional charges may apply if the warranty is expired or the damage is due to misuse.

Expected battery lifetime is two years from time of purchase. Customers will need to return the unit to Restek for battery replacement. At that time, preventative maintenance services can also be performed on the unit. A fee will be charged for servicing the unit.

For questions, problems, or repair services:

Within the U.S.:
Call Restek® Customer Service at 1-800-356-1688 or 1-814-353-1300, ext. 3.

Outside the U.S.:
Contact your local Restek® representative.