ProFLOW 6000

NEW
**Restek
ProFLOW 6000
Electronic Flowmeter**

HROMalytic +61(0)3 9762 2034
ECHnology Pty Ltd
Australian Distributors; Importers & Manufacturers

RESTEK

CE ⟨Ex⟩

Chromatography Products

RESTEK

www.restek.com

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's
ProFLOW 6000
Electronic Flowmeter

Users Manual
Version 5.5
for cat.# 22656

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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.
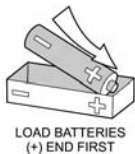

Figure 1 Product diagrams

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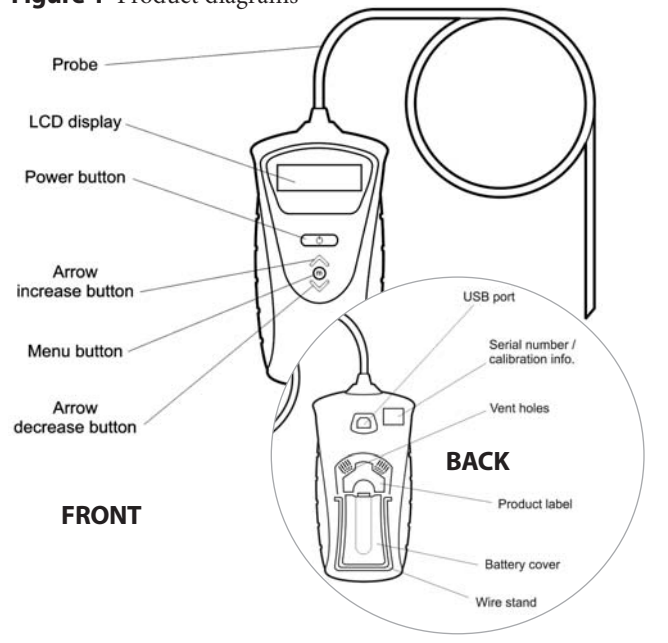
3.0 Installing the batteries

This unit uses 2 AA alkaline batteries.

To install batteries, extend the wire stand. Open the cover. Insert the batteries with the polarity ($\oplus$ and $\ominus$) correctly aligned. Close the cover. (Figures 2 and 3)

**LOAD BATTERIES
(+) END FIRST**

Precautions for battery replacement:
- Load the new batteries with their polarity ($\oplus$ and $\ominus$) 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.

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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.

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.

Figure 6 Example flow value.
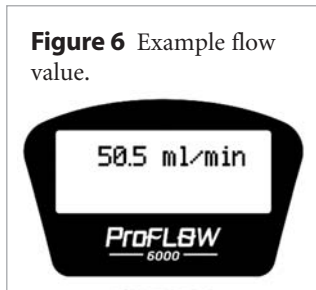
Table III Display resolution vs. flow range.

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.
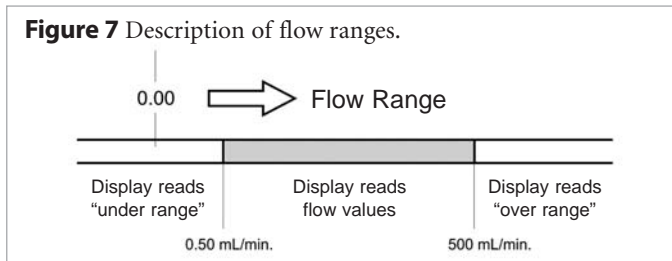
7.0 Data collection on the PC

⚠️ **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.

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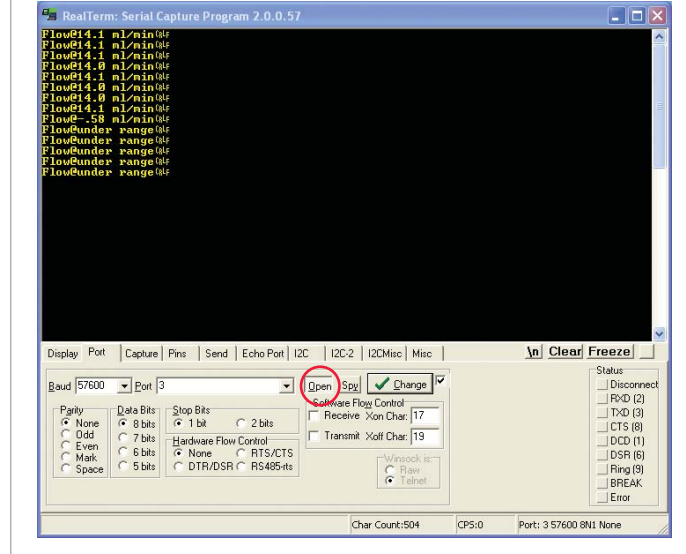
If you do not already have serial terminal software, free, open source options are available online (i.e. RealTerm, etc.). You can download RealTerm* software from:

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.
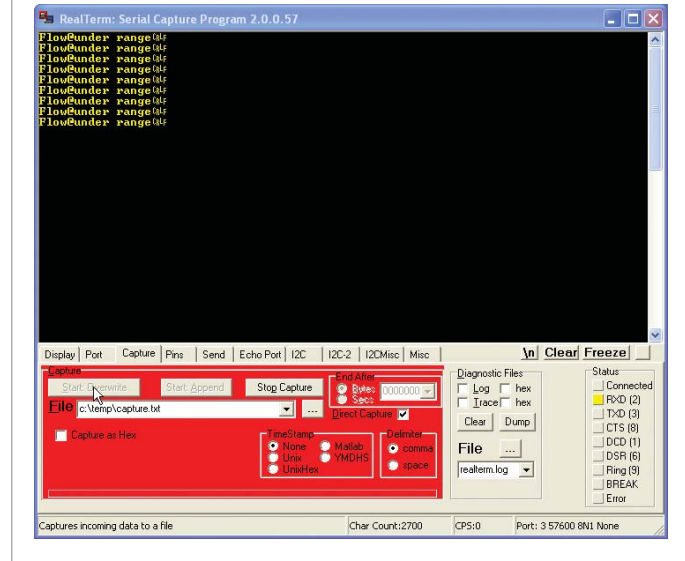
8.0 ProFLOW 6000 menu structure

8.1 Unit power up/power down
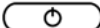
Press the ⟨ ⏻ ⟩ (power) button:

The LCD screen will display the device intro screen:

> Restek
> ProFLOW 6000
> *ProFLOW 6000*

Followed by measured flow data:

> 50.5 ml/min
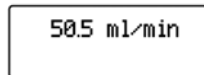
To power off, press and hold the ⟨ ⏻ ⟩ (power) button:

Other messages encountered at power up

> Calibration
> -expired-

Appears temporarily if the unit's calibration has expired (>1 year).
➜ See Section 14.0: Calibration and Service

> under range

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:
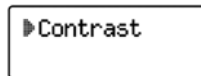
> ▶Contrast

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.

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8.3 USB activation

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

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

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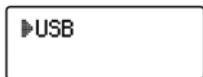
Press the (MENU) (menu) button again to enter the value select screen.

Use the ⌃⌄ (arrow) keys to toggle between USB 'on' and 'off'.
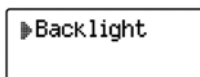
To return to the main menu screen, press the (MENU) (menu) button.

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

➜ See Section 7.0: Data Collection on the PC

8.4 Adjust LCD image backlight

Press the (MENU) (menu) button.

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

▶Backlight

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

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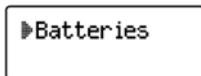Backlight Values: 0 (off) and 5 (maximum).

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

To exit and return to measuring flow, press the (MENU) (menu) button again.
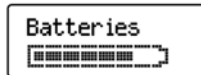
8.5 Show battery charge indicator

Press the (MENU) (menu) button.

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

```
▶Batteries
```

Press the (MENU) (menu) button again.

The battery life is displayed.

```
Batteries
▮▮▮▮▮▮▮▮▮▮▯
```

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.

8.6 Firmware version information

Press the (MENU) (menu) button.

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

```
▶Firmware
```

Press the (MENU) (menu) button again.

The most recent version of Firmware is displayed.
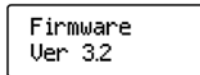
```
Firmware
Ver 3.2
```
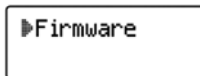
To return to the main menu screen, press the (MENU) (menu) button.

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

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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) (menu) button.

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

```
▶Power time
```

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

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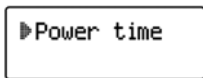   Values: 1–59 minutes or 'constant on' (max.)

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

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

9.0 Troubleshooting

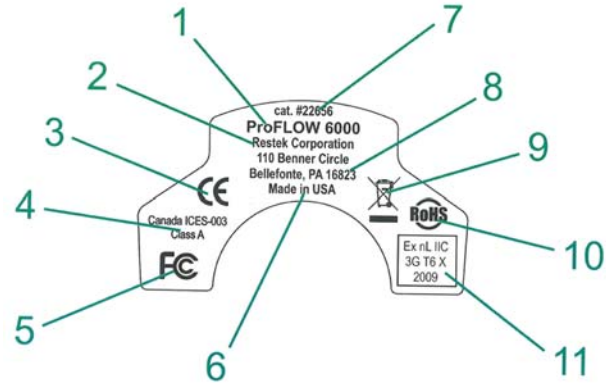| Problem	Possible Cause(s)	Suggested Solution(s)
Multiple readings are not giving reproducible results.	• Unit is out of calibration • Value is being compared to a bubble flowmeter	• Return the unit to Restek for recalibration* • See Section 12.0 for a discussion of the weaknesses of bubble flowmeters
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.

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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	

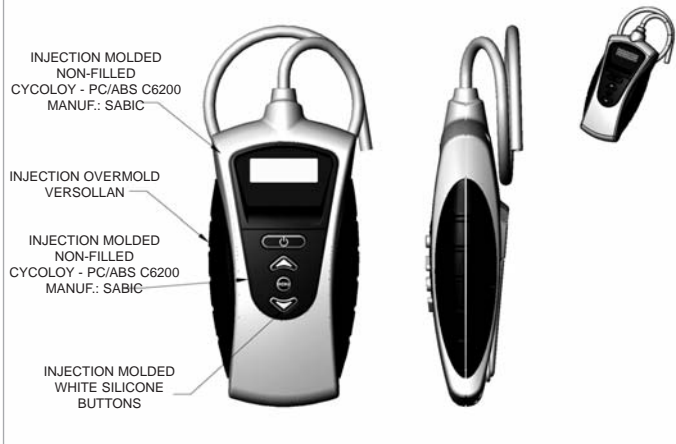|		
Ex nL	EN60079-0: 2006; Electrical apparatus for explosive gas atmospheres- Part 0: General Requirements. EN60079-15: 2005; Electrical apparatus for explosive gas atmospheres- Part 15: Construction, test and marking of type of protection "nL" energy limited apparatus.
IIC	Group II applies to areas 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.

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13.0 Product case specifications

INJECTION MOLDED
NON-FILLED
CYCOLOY - PC/ABS C6200
MANUF.: SABIC

INJECTION OVERMOLD
VERSOLLAN

INJECTION MOLDED
NON-FILLED
CYCOLOY - PC/ABS C6200
MANUF.: SABIC

INJECTION MOLDED
WHITE SILICONE
BUTTONS

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**.