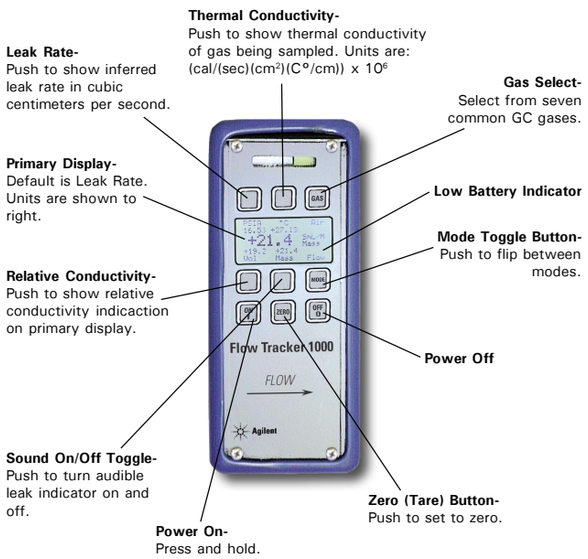
Flow Tracker 2000 Leak Mode



The Agilent Flow Tracker 2000 GC Flow Meters utilize the thermal conductivity property of gases to detect leaks. Generally, only gases with thermal conductivities substantially different, either higher or lower, than air can be detected with this method. The absolute thermal conductivity (at 80 °F, 26.7 °C) of the gases that are selectable in the Flow Tracker 2000 are:

Gas	Absolute Thermal Conductivity cal/(sec)(cm²)(°C/cm) X 10^{-6}	Detectable	Temp
			80 °F, 26.7 °C
Air	62.20	No	80 °F, 26.7 °C
Nitrogen	62.40	No	80 °F, 26.7 °C
Carbon Dioxide	39.67	Yes	80 °F, 26.7 °C
Methane*	81.83	*	80 °F, 26.7 °C
Hydrogen*	433.92	*	80 °F, 26.7 °C
95-5 Argon-Methane		Yes	80 °F, 26.7 °C
Helium	360.36	Yes	80 °F, 26.7 °C

***CAUTION**- These gases are technically detectable, however this device is not rated for use in hazardous areas.

Flow Tracker 2000 Leak Mode cont.

Leak Detector Operating Steps

1. Insert the suction probe into the probe receptacle on the top of the unit as shown in figure. If desired, a length of inert tubing can be substituted for the included sampling probe.
2. Turn on the unit and cycle the mode indicator to "Leak" by pressing the **MODE** button three times. Main display will default to "Warmup".
3. Let the detector warm up its sensors for approximately 1 to 2 minutes. The "WarmUp" will disappear from the primary display and the suction pump will power up (this can usually be heard as a faint squeaking sound) when the device is ready to make gross leak measurements.
4. Making sure that the device is well away from the suspected leak area, press the **"ZERO"** button. If the unit is not completely warmed up, the displayed parameters will begin a slow drift. For gross leak detections this can generally be ignored, as any substantial leak will rapidly outpace the drift.
5. Select the gas to be detected.
6. If desired, the sound can be toggled on at this point. Normal no leakage conditions are indicated by a constant high pitch sound. As the conductivity varies from that of air (either higher or lower), the pitch becomes proportionately lower.
7. When a satisfactory zero has been obtained, the end of the suction probe can be moved to the point of the suspected leak. It may take a few seconds for the sample to reach the sensors.
8. It is good practice to allow the detector to purge away from the suspected leak for a minute or two between leak detections.

Leak Rate: The engineering unit associated with this parameter is cubic centimeters per second (cc/sec).

Thermal Conductivity: The thermal conductivity of a gas is a measure of its ability to conduct heat. The engineering units associated with the thermal conductivity are the value X 10^{-6} cal/(sec)(cm²)(°C/cm)).

Relative Conductivity Indicator: The relative conductivity indicator is a dimensionless value reflecting the raw sensor measurement of the difference in temperature between the heated and unheated sensors. Thus, if the unit is completely warmed up and zeroed in air, the Relative Conductivity Indicator will read approximately zero until a leak is detected. If a gas with a greater conductivity than air is introduced, more current will be required and the Rel. reading will increase positively and vice versa.

Sound On / Off Toggle: The unit defaults in sound off. The sound can be toggled on and off simply by pushing the button located under the dynamic label.

Replacing the Batteries: Remove the flexible boot from the meter housing. Remove all three screws from the back cover. Carefully remove the back cover to expose batteries. Carefully remove old batteries. Install new batteries as shown in on the back cover. Replace back cover and re-install screws. Replace the flexible boot, pushing the bottom end of the meter into the boot first.

RS-232 Output - The Flow Tracker Series Flow Meters are equipped with a serial RS-232 output that toggles with the selected operating mode. All parameters in the selected mode are output in space-delimited format for data collection and analysis. No special software is required; any terminal program, such as HyperTerminal®, which comes packaged with all Microsoft Windows® operating systems is all that is required. The 8 pin Mini-DIN data output jack for RS-232 output is located as shown in figure. The included data cable plugs into this jack with the flat on the cable plug towards the back of the flow meter. If the serial port on your computer is female, the flow meter can simply be plugged into your serial port via the 8 Pin Mini-DIN to DB-9 serial adapter cable included with the Flow Tracker. If the serial port on your computer is male, you will need a common double ended female adapter cable. For details on data collection using the RS-232 output go to www.agilent.com/chem/supplies & go to gas management section.

Maintenance & Recalibration

General: The Flow Tracker requires very minimal maintenance. With the exception of the sampling pump in the 2000 Series, the Flow Tracker has no moving parts. The single most important thing that affects the life and accuracy of this device is the quality of the gas being measured. It is designed to measure **CLEAN, DRY, NON-CORROSIVE** gases. Filtering the gas upstream of the meter is highly recommended. Moisture, oil, and other contaminates can affect the laminar flow elements and/or reduce the area that is used to calculate the flow rate. This directly affects the accuracy.

Cleaning: The Flow Tracker requires no periodic cleaning. If required, the outside of the meter can be cleaned with a soft dry rag. Avoid excess moisture or solvents.

Recalibration: The recommended period for recalibration is every two years providing the **CLEAN, DRY,** and **NON_CORROSIVE** gases are used. A label located on the back of the meter (under the flexible cover) lists the recalibration due date. The meter should be returned to Agilent Technologies for recalibration near the listed due date. Before calling to schedule a recalibration, please note the serial number on the back of the meter.

For repairs, re-calibrations, or recycling of this product, contact

Agilent Technologies
Little Falls Analytical Division
Attn: **CABU**
2850 Centerville Road
Wilmington, **DE** 19808
302-633-8000

For questions or more information about the flow tracker contact your local sales office or go to www.agilent.com/chem/supplies and go to gas management section.

Flow Tracker 1000 and 2000 Flow Measurement Specifications:

Flow Range for Measurement:	0-500 ml/min	
Accuracy: (over 5-500 ml/min)	Flow:	+/- 2% of reading, +/- 0.2 ml/min*
	Temp:	+/- 0.5 °Celsius
	Press:	+/- 0.5% of reading
Sensor Type:	Flow:	Solid state piezoresistive differential pressure sensor with measurement in the laminar flow region. No heated elements.
	Temp:	Integrated circuit absolute temperature sensor. No RTD's.
	Press:	Solid State Absolute Pressure Sensor
Calibration:	NIST traceable Multipoint Calibration Certificate included.	
Calibrated Gases:	Nitrogen, Hydrogen, Helium, Air, Carbon Dioxide, Methane, 95% Argon / 5% Methane Blend	
Modes:	Flow, Gas Chromatography, Leak Detection (2000 Only)	
Display:	Dynamically labeled multi-function 7 line LCD with 99 chars.	
Power:	Six AA Batteries (included) or optional universal AC/DC Adapter.	
Dimensions:	8.3"(h) x 3.75"(w) x 1.9"(d)	
Certification:	CE Marked	
Operating Pressure:	100 PSI (690 kPa) Maximum	
Output:	RS-232 output for all variables for selected mode, no special software required.	
Weight:	Approx. 2.4 lbs (1.1 kg)	
Inlet and Outlet:	1/8" NPT(Female) Threads	
Accessories:	RS-232 cable, stand, batteries, 1/8" and 1/4" barbed fittings.	
*	Median reading using test procedure. Test procedure can be found at: www.agilent.com/chem/supplies under gas management section	

Flow Tracker 2000 Leak Detector Specifications:

Sensor Type:	Solid state thermal conductivity detector, low power consumption for extended battery life.
Response Time:	1 second*
Sensitivity:	1 x 10^{-5} ml/sec for He
Gases:	All calibrated gases (as above) with a thermal conductivity significantly different than air.**
Detection:	Thermal conductivity, relative conductivity, inferred leak rate, audible signal.
*	Gross detection in 1-2 seconds, leak rate quantification may take 1-2 minutes.
**	Other gases are detectable but not quantifiable.

To order, contact your local sales office or Agilent authorized distributor, or visit the Agilent web catalog at **www.agilent.com**

Information, descriptions and specifications in this publication are subject to change without notice.

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Agilent Flow Tracker Series 1000/2000

Gas Chromatography Flow Meters

Agilent Technologies
Innovating the HP Way

Introduction

The Agilent Flow Tracker 1000 and 2000 Series Gas Chromatography Flow Meters are designed to provide a multitude of useful flow data in one simple, reliable, and portable instrument. The Flow Tracker 1000 has two operating modes, Flow Mode and GC (Gas Chromatography) Mode. The Flow Tracker 2000 has an additional Leak Detector Mode and incorporates a separate, built in sampling pump and probe.

For Indoor Use Only. This product should not be used in Hazardous Locations. Operating temperature range is 10-50 °C, operating humidity range is 0-90% RH (non-condensing), and maximum recommended altitude is 15,000 ft. This product is rated as Safety Class III, Installation category II, and Pollution Degree 2. If this equipment is used in a manner not specified, the protection of the equipment may be impaired. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

NOTE: This device has been tested and found to comply with the limits of CISPR 11. These limits are designed to provide reasonable protection against harmful interference in an installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna. Increase the separation between the equipment and the receiver. Connect the equipment into an outlet on a circuit different form that to which the receiver is connected. Consult the dealer or an experienced radio/TV technician for help. Unauthorized modification or installation of this equipment may invalidate the user's ability to operate this equipment. This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-oo1 du Canada. This device is CE marked for ISM Group 1, Class A equipment.

Basic Operation

General: Each operating mode displays all of the parameters that are associated with that mode of operation. Each parameter has a button associated with it. Each parameter is either labeled with a "dynamic label" on the display, or if it is a "global parameter", meaning that it is common to all modes, the button associated with it will be labeled. The two global parameters are GAS and MODE.

Dynamically labeled parameters are either active or passive. Active parameters are directly affected by the flow and are constantly changing. Active parameters can be moved to the primary display by pushing the button associated with the parameter. Passive parameters are generally variables that require input from the user. The button associated with passive parameters is generally used to select the value of the variable.

Operating the Flow Tracker:

ON – To turn the unit on, press and hold the button labeled "ON" for approximately a half second. Should the unit ever fail to come on as expected, push the "OFF" button and then press and hold the "ON" button.

ZERO – Pushing the button labeled "ZERO" tares the flow meter and provides it with a reference point for zero flow. ***This is a very simple but important step in obtaining accurate measurements***. It is good practice to "zero" the flow meter each time it is turned on. If the flow reading varies significantly from zero after an initial tare, give the unit a minute or so to warm up and re-zero it. If possible, it is helpful to zero the unit near the expected operating pressure by positively blocking the flow downstream of the flow meter prior to pushing the "ZERO" button. Zeroing the unit while there is any flow will directly affect the accuracy by providing a false zero point. If in doubt about whether the flow is positively blocked, remove it from the line and positively block both ports before pressing the "ZERO" button.

GAS – Pushing the button labeled "GAS" scrolls through the gas list. The default gas is air. The selected gas is shown on the display under the "GAS" button . It is very important that the gas being measured is selected to get an accurate flow rate measurement.

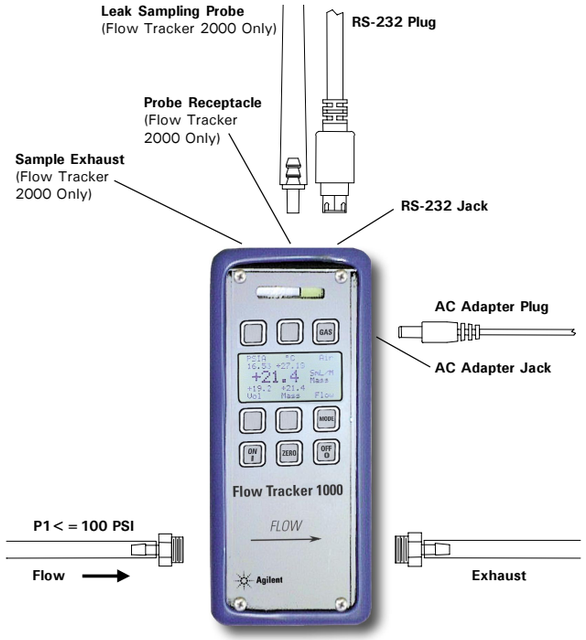
MODE – Push the button labeled "MODE" to switch between operating modes. There are two operating modes (Flow and GC) in the 1000 Series Flow Meters and three operating modes (Flow, GC, and Leak) in the 2000 Series Flow Meters. The deafult operating mode is "Flow".

OFF – Push the button labeled "OFF" to turn the unit power off from any operating mode.

Low Battery Indicator -This indicator is located on the lower right corner of the display just above the mode indicator and is displayed only if the batteries run below a certain voltage level that can affect the accuracy of the meter. Caution: To avoid inaccurate readings, change the batteries when the LO BAT indicator is displayed! Low power can result in inflated temperature sensor readings, which affects the expected gas viscosity and mass flow calculations.

Auto-off feature automatically shuts the flow meter off after approximately 5 minutes of continuous no flow (less than 4 ml/min) condition. This applies ONLY under battery power. The auto-off feature is disabled when power is supplied via an AC to DC adapter.

Installation

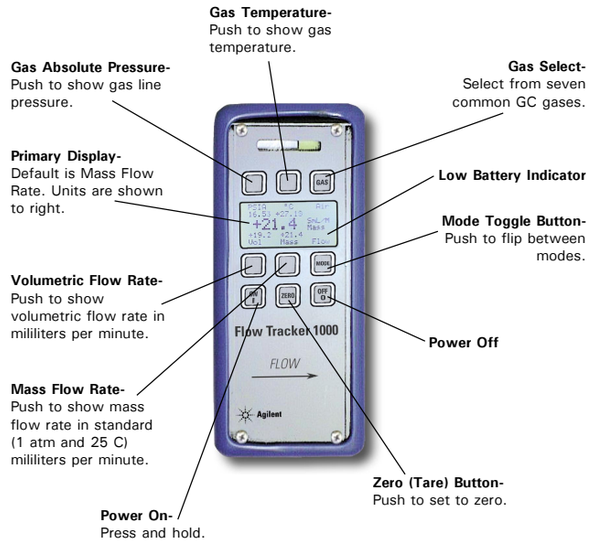


Connections: The Flow Tracker has standard 1/8" NPT(Female) inlet and outlet fittings as shown in Figure 1. To prevent possible clogging of the internal structure, it is recommended that a 20 micron filter be installed upstream of the meter. The unit is packaged with simple plastic hose barbs for your convenience, however it can be used with any fitting that is appropriate for the application. **Caution: When installing fittings into the NPT ports, do not exceed 12 ft-lbs of torque.** Avoid use of pipe dopes and sealants on the NPT ports as these compounds can cause permanent damage to the meter should they get into the flow stream. If a thread sealing tape is required, avoid wrapping the first thread or two to minimize the possibility of getting a piece of shredded tape into the flow stream. When changing fittings, always clean any tape out of the threads that may come loose and enter the flow stream.

Maximum operating line pressure is 100 PSIG (690 kPa). **Caution: Exceeding the maximum specified line pressure may cause permanent damage to the solid-state differential pressure transducer.** If the line pressure is higher than the 100 PSIG (690 kPa), a pressure regulator must be used upstream from the flow meter to reduce the pressure to 100 PSIG (690 kPa) or less. Although the meter's operation is uni-directional, reversing the flow direction will inflict no damage as long as the maximum specified limits are not exceeded. The differential pressure sensor utilized in the Flow Tracker is a very sensitive device capable of detecting minute differences in pressure. Avoid installations (such as snap acting solenoid valves upstream) that apply instantaneous high pressure to the meter as permanent damage to the differential pressure sensor could result.

Power/Batteries: Power is supplied by six (6) standard AA size batteries or by an optional AC/DC adapter. New batteries can provide power for several days of continuous operation depending on the quality of the batteries and whether the leak-sampling pump in model 2000 is used. The power adapter jack is located as shown above. A P-5 style, positive center, 6-15 Vdc adapter rated for at least 100 mA is required.

Flow Tracker 1000/2000 Flow Mode



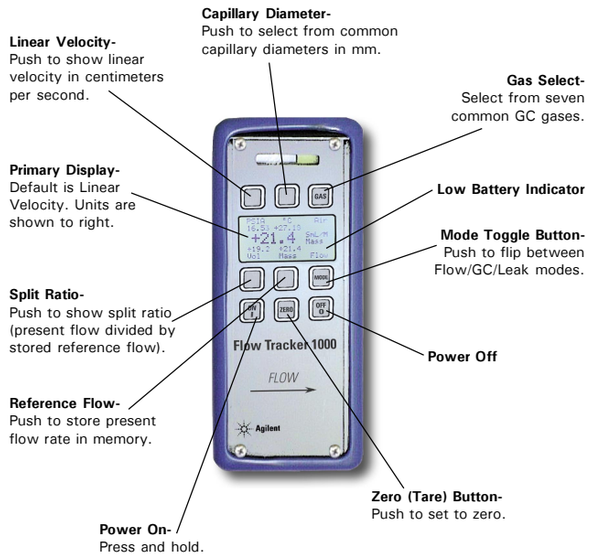
Gas Absolute Pressure: The Agilent Flow Trackers utilize an absolute pressure sensor to measure the line pressure of the gas flow being monitored. This sensor references hard vacuum and accurately reads line pressure both above and below local atmospheric pressure. The engineering unit associated with absolute pressure is pounds per square inch absolute (PSIA). For working in metric units, 1 PSI = 6.89 kPa.

Gas Temperature: The Flow Tracker Series Flow Meters also utilize a temperature sensor to measure the line temperature of the gas flow being monitored. The temperature is displayed in engineering units of degrees Celsius (°C).

Volumetric Flow Rate: The engineering unit associated with the volumetric flow rate is milliliters per minute (mL/min). In order to get an accurate volumetric flow rate, the gas being measured must be selected (see Gas Select below). Anything that has an effect on the gas viscosity (e.g. water vapor, odorant additives, etc.) will have a direct proportional effect on the accuracy. Absolute viscosity changes very little with pressure therefore a true volumetric reading does not require a correction for pressure. Changes in gas temperature do affect viscosity and are internally compensated. No outside temperature correction is required for volumetric measurement.

Mass Flow Rate: The mass flow rate is the volumetric flow rate corrected to a standard temperature and pressure (14.695 psia and 25°C). The engineering unit associated with the mass flow rate is called a standard milliliter per minute (SmL/min).

Flow Tracker 1000/2000 GC Mode



Linear Velocity: The Agilent Flow Tracker Series Flow Meters utilize the volumetric flow rate and the selected capillary diameter (inside diameter) to calculate the average velocity of the selected gas through the capillary. The engineering unit for linear velocity is centimeters per second (cm/sec).

Capillary Diameter: Pushing the button located above this dynamic label scrolls through the list of available capillary diameters in mm. The capillary inside diameters are 0.10 mm, 0.18 mm, 0.25 mm, 0.32 mm, 0.53 mm, and 0.75 mm.

Reference Flow: The reference flow allows the user to store a volumetric flow rate in memory and has default of zero. When the button under this dynamic label is pushed, the current volumetric flow rate is stored in memory and the fixed value is shown above the label. The engineering unit associated with this parameter is milliliters per minute (mL/min). In gas chromatography, this is normally used to store the main column flow rate prior to attaching the flow meter to the split vent, so that a running split ratio can be calculated and displayed. *Note: When the power is turned off, the stored reference flow returns to the default zero.*

Split Ratio: The split ratio is the ratio of the present volumetric flow rate to the stored Reference flow rate detailed above. In gas chromatography, the reference flow rate is normally the main column flow rate, and the present flow rate is normally the split vent flow rate.
Note: This parameter reads "DIVO", denoting "Division by Zero Error" until a value is stored in the reference flow buffer as described in the section labeled Reference Flow above.
Note: This parameter will read "OVRFLO", denoting "Over Flow" if the resulting ratio is too large to display. The maximum value that can be displayed here is 655.35. This can occur if the stored reference flow is very near zero and/or the present flow is high.