

Meet All Your Gas Flow Measurement Needs

The Original DFC™ Flowmeter -
for routine flow measuring tasks



The NEW DFC-HR™ Flowmeter -
increased resolution at low flowrates

with Digital Flow Check™ Flowmeters!

- **Accurate** – NIST Traceable Calibration with up to 0.01cc/min Resolution
- **Precise** – Unaffected by Temperature or Pressure
- **Versatile** – Measure Air, Nitrogen, Oxygen, Hydrogen, Helium, and 5% Argon/Methane Up to 500cc/min and Carbon Dioxide Up to 300cc/min
- **Reliable** – The Dependable Choice for GC, Industrial Hygiene and General Lab Use



Simply a Better Way to Measure Flow

Reliable, Accurate Flow Measurement

Alltech's family of Digital Flow Check™ flowmeters – DFC™ and DFC-HR™ (patent pending) – meet all your flow measurement needs. They provide reliable, accurate real-time measurements of all your gas streams. With seven gas NIST-traceable calibration, 2% of reading accuracy, and a measuring range from 0.01-500cc/min*, one flowmeter replaces several separate flowmeters for GC, SFC, SFE, industrial hygiene, biotechnology, and general laboratory applications.

The DFC™ and DFC-HR™ flowmeters work equally well with positive and negative (vacuum) flow sources and may be placed in-line for continuous flow measurement (Figure 1). Use them to monitor flow to traps, sorbent tubes, incubators, fermenters, or reaction vessels without interrupting gas flow.

Choose the DFC™ flowmeter if you require an economical, accurate easy to use flowmeter for setting most analytical instrument operating parameters. Choose the high resolution DFC-HR™ flowmeter for your most demanding low-flow applications. It offers all the features of the DFC™ flowmeter plus higher resolution (0.01cc/min). It's ideal for setting capillary GC flowrates or for leak testing. Its high sensitivity easily detects the smallest leaks. (See "Leak Check – A Real World Application" on the back cover.)

* DFC™ - 0.1 to 500cc/min for Air, N₂, O₂, H₂, He & 5% Ar/CH₄ and from 0.1 to 300cc/min for CO₂.

DFC-HR™ - 0.01 to 500cc/min for Air, N₂, O₂, H₂, He & 5% Ar/CH₄ and from 0.01 to 300cc/min for CO₂.



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Rugged and Reproducible

Both models incorporate a rugged solid-state sensor that measures true mass flow without the ambient temperature and pressure change errors that affect soap film and acoustic sensor meters. There's also no water-vapor error (up to 5%) that plagues soap film techniques. You'll obtain more reproducible GC results: run-to-run, lab-to-lab, and day-to-day. It's easier to transfer methods and stay within retention windows.

Unlike competitive flowmeters, the DFC™ and DFC-HR™ flowmeters tolerate water vapor, making them suitable for purge and trap applications. If the sensor is exposed to an exceedingly moist sample, simply purge the sensor with dry gas for several minutes to restore performance.

Each unit's straight through gas flow path reduces backpressure, internal volume, and sensor purge time. Readings stabilize quickly and measurements at low flowrates are accurate and precise.

Convenient and Easy to Use

Obtaining flow data has never been faster or easier! The DFC™ and DFC-HR™ flowmeters continuously display gas flowrate, responding instantly when you make adjustments.

The DFC™ and the DFC-HR™ flowmeters are unsurpassed for GC applications. The "Linear Velocity" mode displays the column flow and linear velocity. Split ratios are just as easy. Simply measure the column flow, connect to the GC's split vent, hit the "Split" key and adjust the gas flow until the desired split ratio appears on the display. Unlike other meters that intermittently block flow as they take measurements, the DFC™ and DFC-HR™ flowmeters work with Electronic Pressure Control (EPC). There are no messy soap solutions, fragile glassware, stopwatches, averaging or bulky wall transformers. A single 9-volt alkaline battery powers the meter. The unit automatically powers-off five minutes after the last keystroke to conserve battery life. A low battery warning alerts you long before meter performance deteriorates.

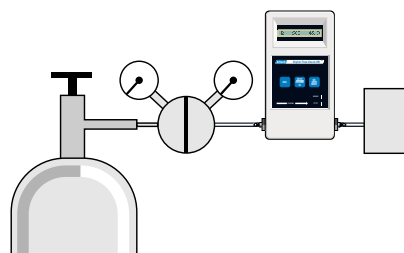


Figure 1 - In-Line continuous flow monitoring (20psig max).

Specifications for DFC™ and DFC-HR™ Flowmeters

Flow Range:	DFC™ Flowmeter:	0.1-500cc/min Air, N ₂ , H ₂ , O ₂ , He and 5%Ar/CH ₄ Autoranging 0.1-300cc/min CO ₂
	DFC-HR™ Flowmeter:	0.01-500cc/min Air, N ₂ , H ₂ , O ₂ , He and 5%Ar/CH ₄ Autoranging 0.01-300cc/min CO ₂
Accuracy:	DFC™ Flowmeter:	0.1cc/min or ±2% of reading
	DFC-HR™ Flowmeter:	0.01-9.99cc/min: 0.01cc/min or ±2% of reading
		10.0-500cc/min: 0.1cc/min or ±2% of reading
Sensor Type:	Solid-State Mass Flow, Silicon on Ceramic	
Calibration:	Multipoint, NIST Traceable, all Gases, Certificate supplied with % Error Data	
Modes:	Flow, Linear Velocity and Split Ratio	
Display:	16-Character Alpha-Numeric LCD, Autoranging	
Power:	9-Volt (Alkaline) Automatic Power Off 5 Minutes after Last Key Stroke, Low Battery Warning	
Dimensions:	190.5 x 57.4 x 101.6mm (7.5" x 2.26" x 4.0")	
CE Certification:	EN55011, EN55022 & EN50082-1	

Accurate, Reliable, and Precise

Versatile Fittings and Flow Adaptors

Each DFC™ and DFC-HR™ flowmeter includes interchangeable fittings and 1/32" and 1/8" ID tubing. Use the smaller tubing for low-flow measurements. The larger tubing minimizes backpressure for high-flow measurements.

Flow adaptors make convenient, leak-free connections to all of your flow sources. Both flowmeters include General Purpose and HP® Split Vent adaptors. The General Purpose adaptor connects to HP® FID, split vent traps, packed GC columns, and gas lines. The HP® Split Vent adaptor connects to Hewlett Packard GC split vents. The DFC-HR™ flowmeter also includes a capillary column adaptor.

NIST Traceable, CE Certified, and Y2K Compliant

The DFC™ and DFC-HR™ flowmeters are calibrated with seven gases using NIST traceable standards. An economical recalibration service maintains the unit's performance, and includes minor repairs and an NIST-traceable calibration certificate. The certificate includes percent error data indicating how far your meter was out of calibration, helping you meet ISO, GLP, GMP and other quality system requirements.

Both flowmeters carry the CE mark for electromagnetic susceptibility (EN55011/1991, Group 1, Class B & EN55022/994, Class B) and immunity (EN50082-1/1997) standard, and are year 2000 compliant per PD2000-1.

Enhanced Features for Measuring Low Flowrates

The DFC-HR™ flowmeter has all the features of the DFC™ flowmeter plus higher resolution for measuring low flowrates.

Most general-purpose flowmeters lack the accuracy or precision you need at low flowrates. Don't waste money purchasing two flowmeters, one for measuring low flowrates and another for general-purpose use. The DFC-HR™ flowmeter's autoranging display shows two decimal places (0.01cc/min resolution) below 10cc/min, for accurate, precise low flowrate measurements.

Zero-point thermal drift makes accurate low-flow measurement (0.01cc/min resolution) difficult or impossible with some flowmeters. But the DFC-HR™ flowmeter's fast convenient autozero sequence adjusts the zero point for your current laboratory conditions. Obtain accurate, reproducible readings without compromising the unit's NIST traceable calibration. Use the autozero sequence whenever your measurements require 0.01Scc/min resolution.

The DFC-HR™ flowmeter's integral by-pass valve isolates the flow sensor from the gas stream during the autozero sequence. An integral bypass channel maintains flow to downstream devices.

Suggested Applications

Low Flow Applications (DFC-HR™)

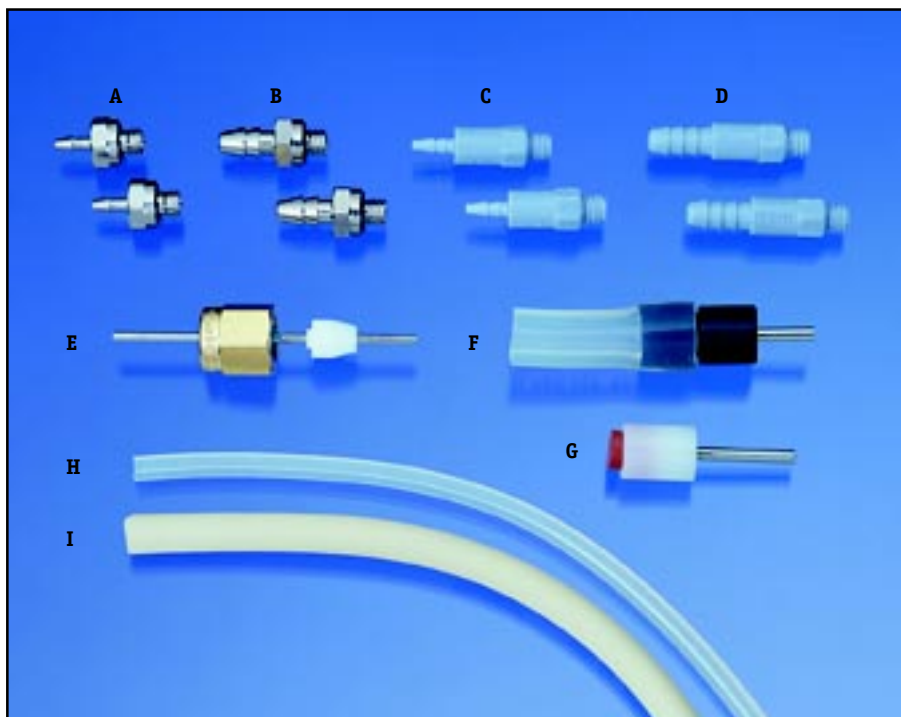
Capillary GC flows; split ratios; leak testing; and applications requiring precise flow measurement below 10cc/min.

GC Applications (DFC™ and DFC-HR™)

Detector gases; packed column flow; split ratios; and linear velocity.

Lab Applications (DFC™ and DFC-HR™)

Set instrument operating parameters; industrial hygiene; monitor flow to traps, sorbent tubes, incubators, fermentors, and reaction vessels; SFC; SFE; in-line applications; monitor vacuum processes, purging processes; and gas sampling.



Note: DFC™ Flowmeter includes C, D, E, F, H & I

DFC-HR™ Flowmeter includes A, B, E, F, G, H & I

Accessories:

- A 1/16" (1.6mm) Barbed Inlet/Outlet Fitting for DFC-HR™ Flowmeter (Part No. 5707)
- B 1/8" (3.8mm) Barbed Inlet/Outlet Fitting for DFC-HR™ Flowmeter (Part No. 5706)
- C 1/16" (1.6mm) Barbed Inlet/Outlet Fitting for DFC™ Flowmeter (Part No. 4721)
- D 1/8" (3.8mm) Barbed Inlet/Outlet Fitting for DFC™ Flowmeter (Part No. 4722)
- E Split Vent Adaptor (Part No. 4705)
- F General Purpose Adaptor (Part No. 4704)
- G Capillary Column Adaptor (Part No. 5705)
- H 1/32" (0.8mm) ID Connecting Tubing (Part No. 4703)
- I 1/8" (3.8mm) ID Connecting Tubing (Part No. 4785)

Digital Flow Check™ Flowmeters

DESCRIPTION	PART NO.	PRICE
Flowmeters		
DFC™	4700	
DFC-HR™	5700	
Recalibration Services		
for the DFC™*	4702	
for the DFC-HR™*	5710	

*Send Purchase Order with unit to be recalibrated.

Contact your Alltech office or distributor for current or local prices.

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Proven Performance in Real World Applications



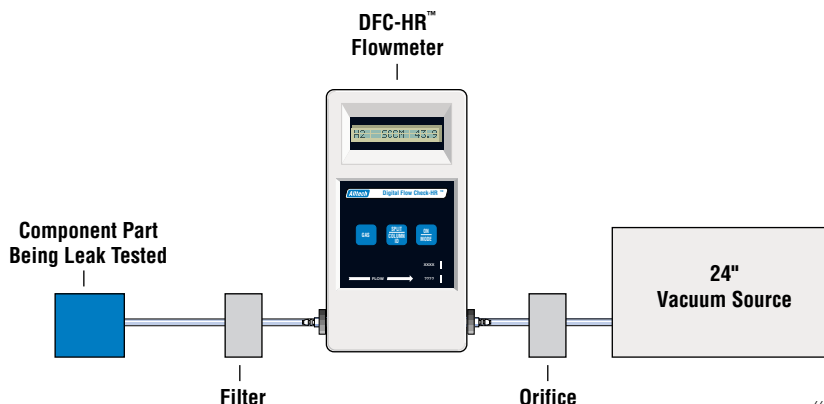
Save Time and Money Leak Checking Instrumentation

A leading medical instrument manufacturer saves time and money leak-checking their product with a DFC-HR™ flowmeter.

They thoroughly test each instrument component and the overall system using a DFC-HR™ flowmeter. A simple, fast procedure tests check valves, vacuum regulators, pneumatic switches, fittings, sensors, and seal surfaces. **Figure 1** illustrates their setup for leak checking.

The DFC-HR™ flowmeter replaces a costly, time-consuming absolute-pressure based test with a flow-based technique that takes just seconds to complete.

Figure 1 - Leak Check Test Set Up



- Install a filter on the inlet port of the DFC-HR™ flowmeter and a flow limiting orifice on the outlet port. The filter protects the DFC-HR™ flow sensor from oil and particulates that may be present on the test part. The orifice prevents sensor damage by keeping flow below 500cc/min.
- Turn on the DFC-HR™ flowmeter and select the air scale. Plug the system inlet. With the vacuum source off, verify that the DFC-HR™ flowmeter is reading 0.00cc/min. Apply 24" of relative vacuum. Verify that the DFC-HR™ reading stabilizes back at a reading of 0.00cc/min in several seconds. This indicates that there is no leak in the setup.
- Connect the test part to the DFC-HR™ inlet port (in front of the filter). Apply 24" of vacuum. If the DFC-HR™ flowmeter reads any value other than 0.00cc/min, there is a leak in the test part. If the component part does not have a leak, the DFC-HR™ reading quickly returns to 0.00cc/min after the vacuum is applied.

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