

Single-Mode Fiber-coupled Gas Flowcells

Gas flow cells are a necessary component in many laser-based sampled gas sensing systems.

The Wavelength References FCS series flowcells feature advanced optical design for very low level of interference artifacts and are available for fiber-coupled interrogation and sensing systems, using SMF28e fiber.

They can be operated from full vacuum to 1000 Torr and incorporate Swagelok® tube fittings to help integrate the flowcell easily into a gas manifold.

Customers can choose from three paths lengths: 16.7cm (1-pass), 47.5cm (3-pass) and 78.1cm (5-pass). Folded optics allow for compact design of our multi-pass options.

The FCS flowcells are made with 316 stainless steel, and may be operated at elevated temperature to prevent condensation or to remove adsorbed contaminants such as water.



Specifications¹

Parameter

Wavelength Range	1260 nm – 1800 nm
Fiber type	SMF28e
Path length (cm)	16.7 (FC-16), 47.5 (FC-48), 78.1 (FC-80)
Operating temperature	0°C to +70°C
Fiber to fiber throughput ²	>50% FC-16, FC-48; >35% FC-80
Spectral ripple (P-P)	<0.01 dB, any 2nm span
Wetted surfaces	316 stainless steel SS, Viton, glass, epoxy
Storage temperature	-40°C to +85°C
Swagelok® fitting style	1/4" or 1/8" tube, hose bib available
Leak rate	<10 ⁻⁶ atm-cc/sec
Cell pressure	0 to 1000 Torr
Cell volume	35cc FC-48, FC-80; 13cc FC-16
Connector Types	FCPC, FCAPC, SCPC, SCAPC, None

1. 1550nm and 25 °C unless noted; Specifications subject to change without notice
2. At 25degC, 1550nm

Features

- **Low Cost**
- **Designed for minimum optical interference artifacts**
- **Compact multi-pass design for low concentrations/weak absorption lines.**
- **Swagelok® fittings for easy integration**
- **Broadband wavelength operation**

Applications

- **Gas sensing systems**
- **Spectroscopic research**
- **Chemical detection systems**

Ordering Information (example)

FCS - 16 - 1/4 - FCAPC

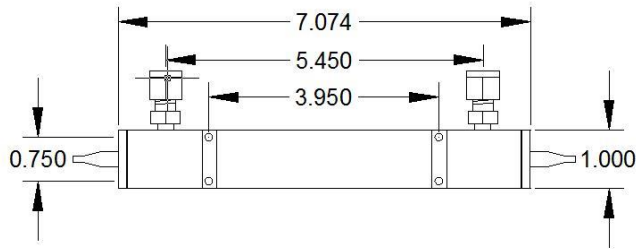
Path length:
16: 16.7cm path
48: 47.5cm path
80: 78.1cm path

Connector style:
FCAPC, FCPC, SCAPC, SCPC

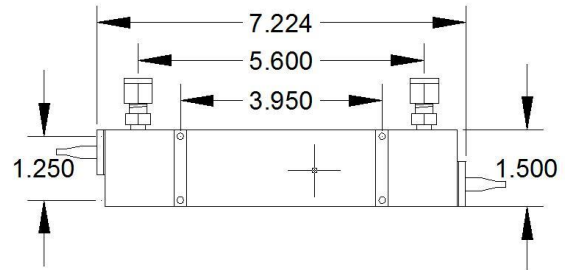
Swagelok® tube style:
1/4 – 1/8" tube
1/8 – 1/8" tube
HB – Hose Bib

Package Drawings

16.7cm single pass:



47.5cm, 78.1cm Multi-Pass:

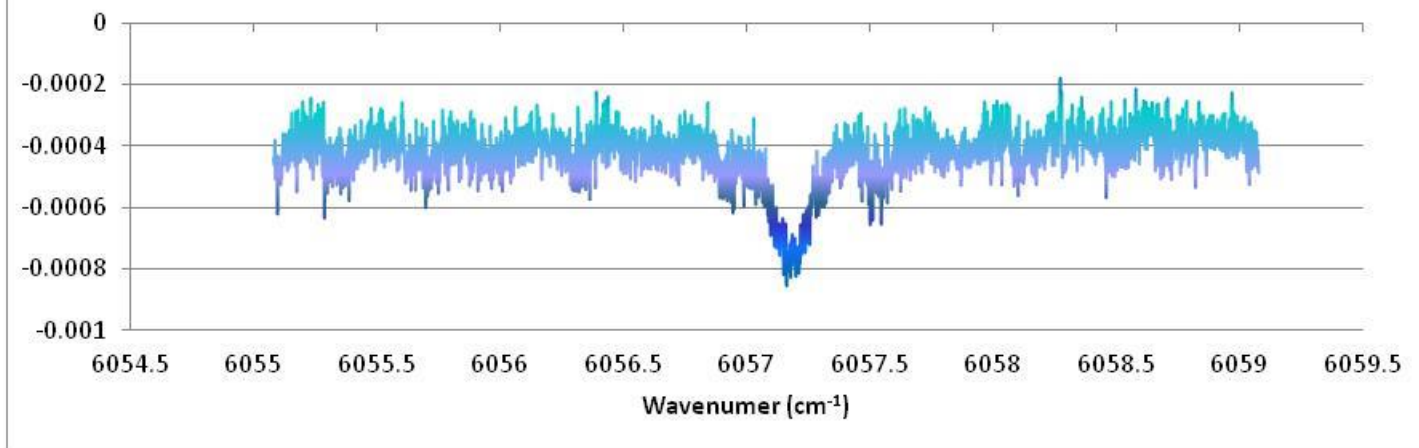


Flowcell operation:

Wavelength References Flowcells are very simple to use but to get the best performance pay attention to the following:

1. The cell is provided with four mounting holes tapped with 4-40 threads on the bottom.
2. Do not apply any mechanical stress on the endcaps (connected to fiber boots). These hold the collimating lenses.
3. When attaching the cell to use with the 1/4" tube Swagelok fitting use two wrenches to minimize any stress on the gas cell. Hold the 1/2" nut closest to the housing firm while you tighten whatever you attach.
4. Prevent dust and condensation from entering the cell. Uniform heating can reduce condensation.
5. If the cell optics are damaged due to contamination we can rework the cell for lifetime cost savings. Please contact factory.
6. Minimum detectable signal will depend on many factors such as the noise level of your detection apparatus, the noise and repeatability of your laser scan as well as any signal processing you might apply. Some customers use a laser power split to pass part of the beam through a sealed gas cell containing a known amount of the gas. This provides an exact replica of the absorption line and line position to be searched for in the flowcell data. Wavelength References sells sealed gas cells for this purpose.

Methane absorption: 12ppm in 80cm



Example of 12ppm concentration of methane in 80cm flowcell. Simulated using HITRAN methane data and actual scanned cell data. Used Agilent 8164A tunable laser to scan line. 0.02% is roughly the noise floor of the laser.