

### Single-Mode Fiber-coupled Gas Flowcells

Gas flow cells are a necessary component in many laser-based sampled gas sensing systems. Our single-mode fiber-coupled flowcells are available in path lengths of 16.7cm, 47.5cm, or 78.1cm and can be operated from full vacuum to 1000 Torr. Flowcells include SMF28e fiber and Swagelok® tube fittings to help integrate the flowcell easily into a gas manifold.

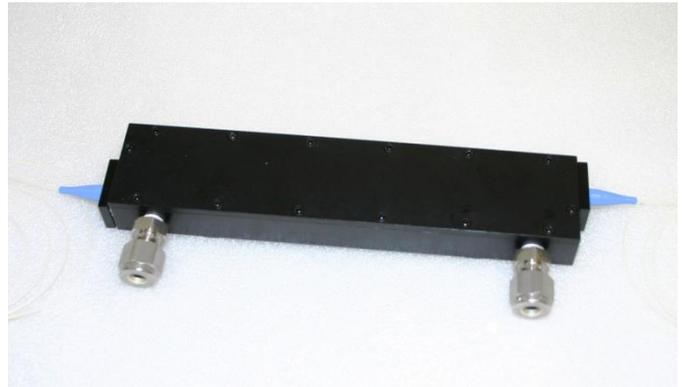
The Wavelength References FCS series flowcells feature advanced optical design for very low level of interference artifacts and are available with either fiber output or optionally with a built in InGaAs detector (extended range InGaAs detectors available). Folded optics allow for compact design of our longer paths: 47.5cm (3-pass) and 78.1cm (5-pass).

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

#### Specifications<sup>1</sup>

Parameter	Units	
Wavelength Range	nm	1260 – 1800(ask about other λ's)
Fiber type		SMF28e
Actual path lengths	cm	16.7 (FC-16), 47.5 (FC-48), 78.1 (FC-80)
Operating temperature	°C	-20 to +70
Fiber to fiber throughput <sup>2</sup>	%	>50 FC-16, FC-48 >35 FC-80
Fiber to fiber throughput over temperature	%	>40 FC-16, FC-48 >20 FC-80
Spectral ripple (P-P)	dB	<0.01 P-P in any 2nm span
Wetted surfaces		Anodized aluminum (AL models) 316 stainless steel SS, Viton, glass, epoxy, Teflon
Storage temperature	°C	-40 to +100
Swagelok® fitting style		1/4" or 1/8" tube, hose bib available
Leak rate	atm-cc/sec	<10 <sup>-6</sup>
Cell pressure	Torr	0 to 1000
Cell volume	cc	35 FC-48, FC-80 13 FC-16
Connector Types		FCPC, FCAPC, SCPC, SCAPC, None
<b>Photodetector:</b>		
Net Responsivity	A/W	>0.4 @1550nm
Reverse bias	V	≤10 PD; ≤1 PDX
Dark current	nA	1 PD 0.25 PDX <sup>3</sup>
Wavelength range	nm	850 to 1700nm PD 850 to 2200nm PDX

- 1550nm and 25 °C unless noted; Specifications subject to change without notice
- At 25degC, 1550nm
- Typical



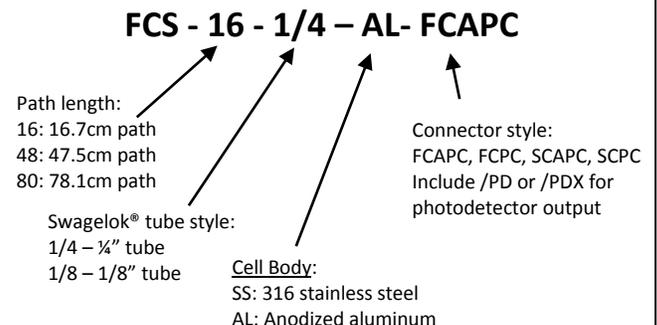
#### Features

- **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

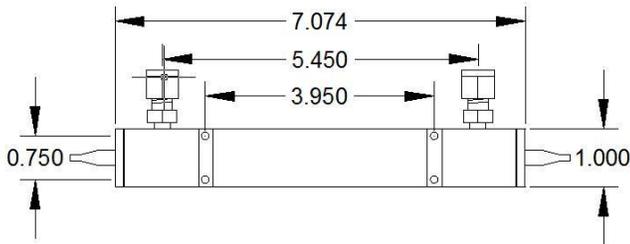
- **Gas sensing systems**
- **Spectroscopic research**
- **Chemical detection systems**

#### Ordering Information (example)

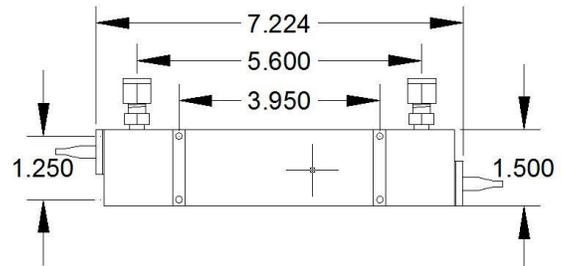


### Package Drawings

#### 16.7cm single pass:



#### 47.5cm, 78.1cm Multi-Pass:

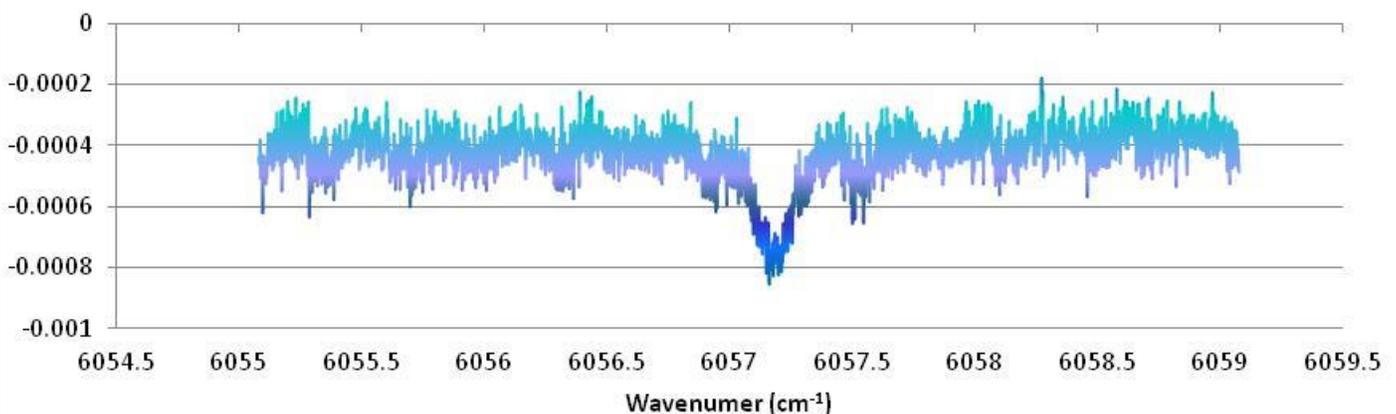


### Flowcell operation:

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 ¼" tube Swagelok fitting use two wrenches to minimize any stress on the gas cell. Hold the ½" 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.