Wavelength
REFERENCES

Fiber-coupled Gas Flowcell

Gas flow cells are a necessary component in many laser-based sampled gas sensing systems. Our fiber-coupled flowcells are ideally suited for customers working with fiber coupled components and are available in path lengths of 16.5cm, 47.5cm, or 79cm. Swagelok® fittings help integrate the flowcell easily into a gas manifold, and the cells can be operated from full vacuum to 1000 Torr.

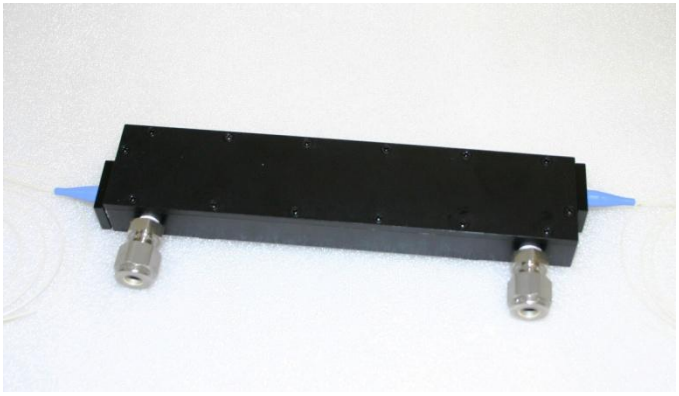
The Wavelength References FC flowcells feature advanced optical design for very low level of interference artifacts and are available with either fiber output or optionally with a built in InGaAs detector (optionally long wavelength InGaAs). Folded optics allow for compact design of our longer paths: 47.5cm (3-pass) and 79cm (5-pass).

The cells may be operated at elevated temperature to prevent condensation or to remove adsorbed contaminants such as water.

Specifications[1]

Gas Cell:	**Units**	
Wavelength Range	nm	1260 – 2300
Fiber type		SMF28e
Actual path lengths	cm	16.5 (FC-16), 47.5 (FC-48), 79 (FC-80)
Operating temperature	°C	-20 to +70
Fiber to fiber throughput @25degC, 1550nm	%	>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
Gas pressure	Torr	0 to 1000
Cell volume	cc	35 FC-48, FC-80 13 FC-16
Wetted surfaces		Anodized aluminum, Viton, glass, epoxy, Teflon
Storage temperature	°C	-40 to +100
Connector Types		FCPC, FCAPC, SCPC, SCAPC, None
Swagelok® fitting style		1/4" or 1/8" tube, hose bib available
Leak rate	Atm-cc/sec	$<10^{-6}$
Photodetector:		
Net Responsivity	A/W	>0.4 @1550nm
Reverse bias	V	≤10 PD; ≤1 LPD
Dark current	nA	.25 PD 300 LPD[3]
Wavelength range	nm	850 to 1700nm PD 850 to 2200nm LPD

1. 1550nm and 25 °C unless noted; Specifications subject to change without notice
2. Non operational
3. 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)

FC - 16 - 1/4 - FCAPC

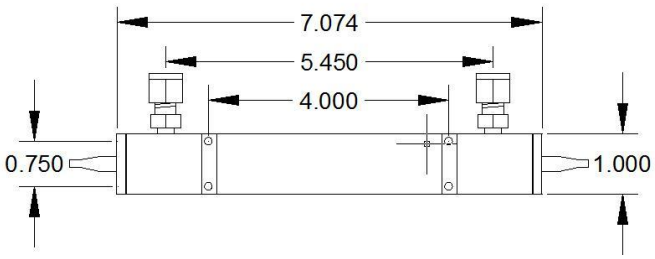
Path length:
16: 16.5cm path
48: 47.5cm path
80: 79cm path

Swagelok® tube style:
1/4 – ¼" tube
1/8 – 1/8" tube

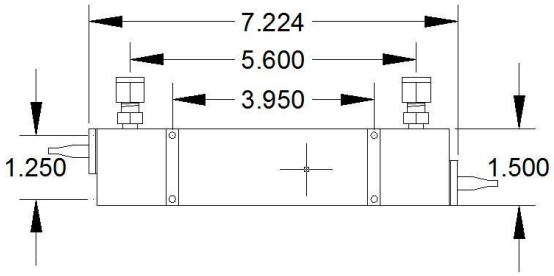
Connector style:
FCAPC, FCPC, SCAPC, SCPC
Include /PD or /LPD for photodetector output

Package Drawings

16.5cm single pass:



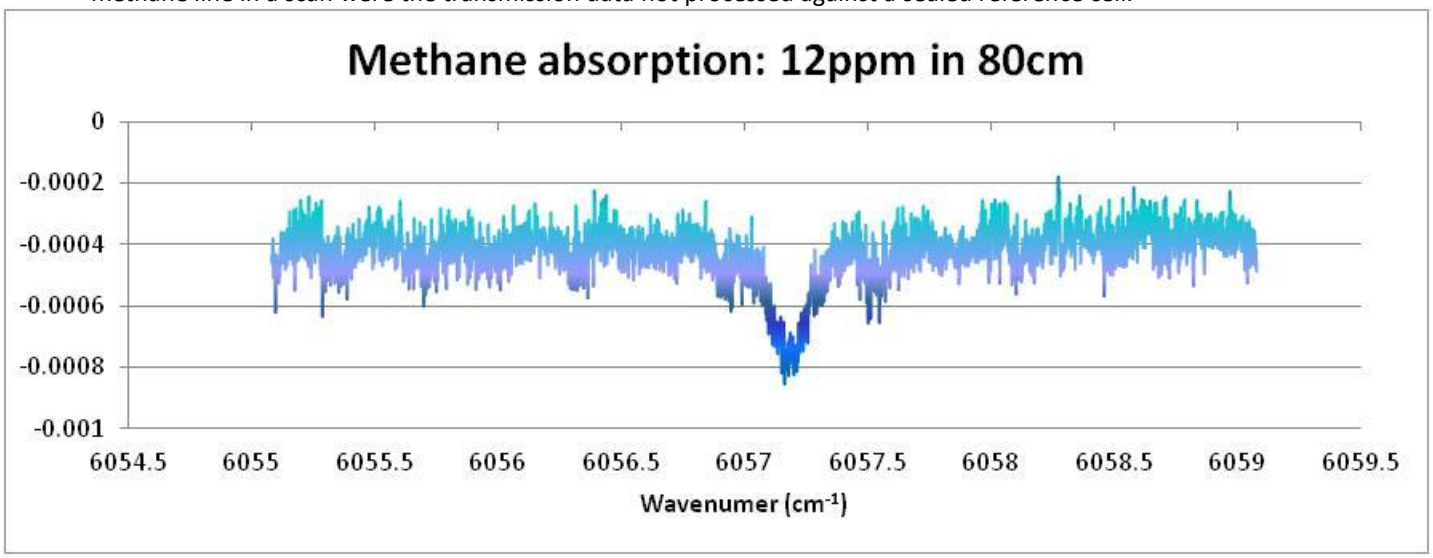
48cm, 80cm Multi-Pass:



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. When mounting be sure that the mounting plate is flat and that the mounting process does not stress the cell. This is best observed by measuring the throughput while mounting.
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. If you look at the data below there would appear to be a weak line about 6057.5 that could be mistaken for the methane line in a scan were the transmission data not processed against a sealed reference cell.



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