

## Multipass Gas Cells

### CO Cell, Water Cell, Combination Gas Cell, Flow through Cell

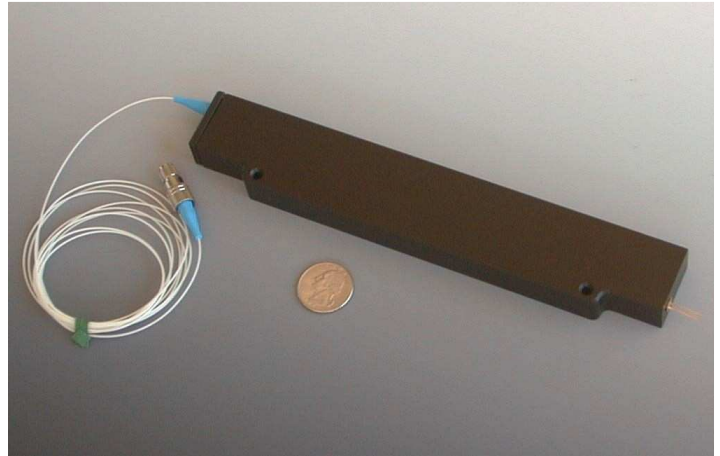
Carbon monoxide gas absorption has been widely researched and identified by national standards bodies as a primary wavelength reference in the band 1560nm-1630nm. Water has many absorption lines in the 1330-1480nm range

The cells feature a 1 meter absorption path in a compact multipass housing. The cells can be ordered with either isotope carbon monoxide or combined with acetylene, hydrogen cyanide, or methane to extend the calibration range. Water at 10 Torr pressure can also be provided which provides for operation down to 10 degC

The cells can be offered with a built in InGaAs photodiode that gives an electrical signal output or fiber input and output can also be provided.

The cells are also offered in an instrument housing with bulkhead optical connectors which is useful for a laboratory setting for ruggedness and convenience

An empty cell with tubulation for use with customer gas input can also be provided for chemical sensing or other research applications.



## Specifications<sup>1</sup>

### Carbon monoxide Gas Lines:

Wavelength Range	nm	1560-1597 carbon12 1594-1638 carbon13
Wavelength Accuracy	nm	±0.0003 (varies with line, many lines known to ±0.00001)
Temperature dependence	nm	<0.00001/°C
Atmospheric pressure or humidity dependence		not detectable
Fiber to fiber throughput	%	>30
Linewidth <sup>2</sup> (-3dB)	nm	0.030 typical (600Torr) 0.010 typical (200 Torr)
Carbon monoxide Pressure	Torr	600 Torr, 200 Torr, custom
Operating temperature range	°C	-10 to +65 (+10 to +65 for water)

Water Pressure	Torr	10 (2-10 custom)
Cell Lifetime	years	>20

### Combination cells:

H <sup>12</sup> CN + <sup>12</sup> CO wavelength range	nm	1518-1597
Other combinations available		

### Photodiode:

Net responsivity	A/W	>0.5
Capacitance (0V)	pf	80 typical
Shunt resistance	MΩ	20 typical

1. Specifications subject to change without notice  
2. Minimum linewidth at pressures <100Torr is 0.005nm. Match pressure to application for best performance

## Features

- **Reliable hard sealed tube, >20 year life**
- **AR coated optics, wedged windows for low level of interference effects**
- **Rugged package**
- **Available with fiber in/out or with built in photodiode**
- **Custom pressure, combination gas cell**
- **Extend wavelength range of gas cell to C + L band**

## Applications

- **Calibration lab source**
- **Embedded calibrator for tunable laser**
- **Embedded calibrator for OSA**
- **Wavelength locker**

## Ordering Information (example)

CO+HCN	-	12/12	-	CP	-	200/10	-	None
<b>Type:</b> Carbon monoxide: CO +HCN: CO+HCN +C2H2: CO+C2H2 H2O: water Empty: Empty				<b>Output:</b> Photodiode Output: CP Fiber output:C				<b>Connector:</b> FCPC FCAPC SCPC SCAPC None
		<b>Isotope:</b> Carbon 12: 12 Carbon 13: 13 Water: 16				<b>Pressure:</b> Torr: CO (+HCN)		

*Wavelength* **λ** *References*

## Wavelength References

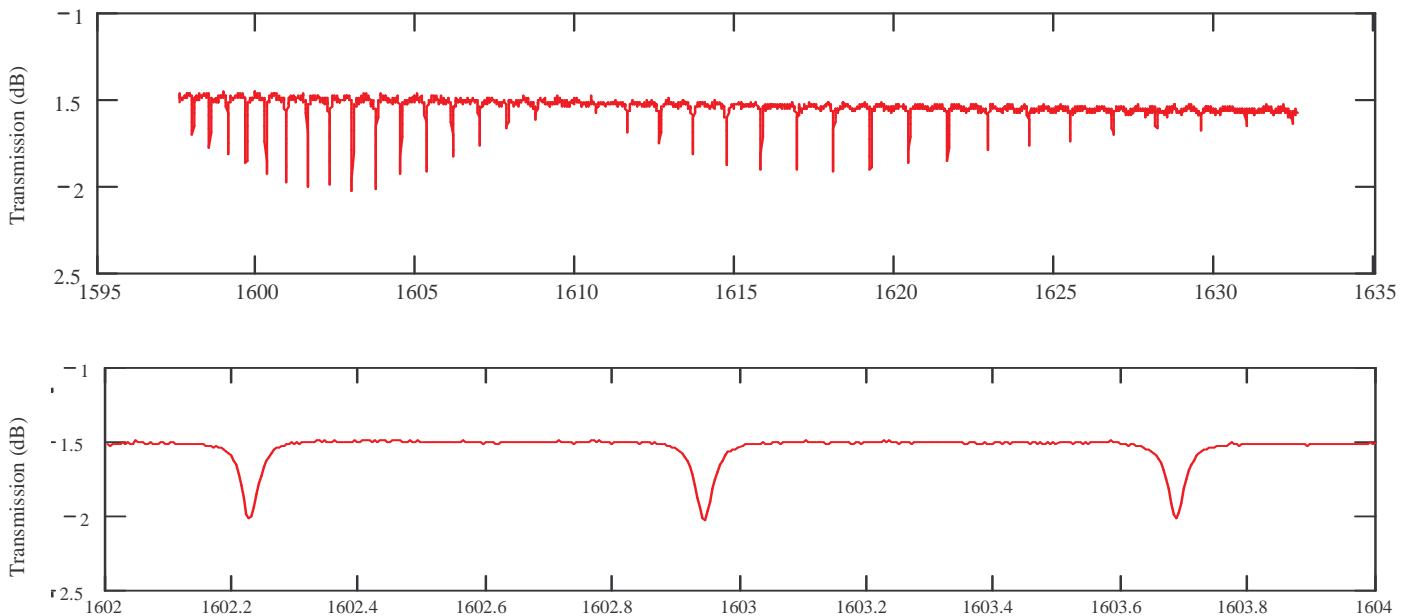
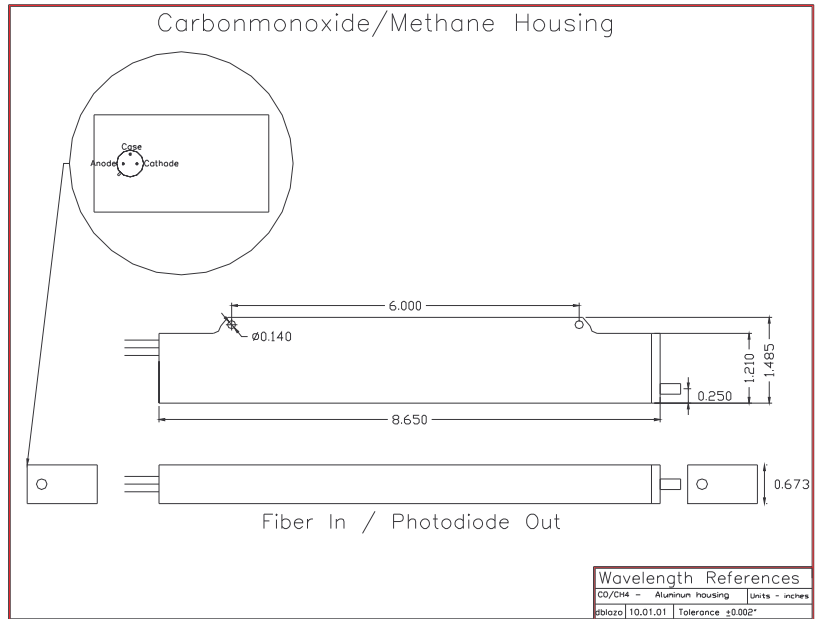
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Carbon 12 carbon monoxide lines			Carbon 13 carbon monoxide lines		
wavenumber	wavelength(nm)	Intensity(au)	wavenumber	wavelength(nm)	Intensity(au)
6259.5942	1597.5476	19.3	6103.2133	1638.4812	5.5
6265.3043	1596.0917	26.4	6109.0144	1636.9253	8.1
6270.9120	1594.6644	35.3	6114.7204	1635.3978	11.5
6276.4173	1593.2656	46.1	6120.3310	1633.8986	16.1
6281.8198	1591.8954	59	6125.8461	1632.4276	22.1
6287.1196	1590.5535	74	6131.2657	1630.9846	29.7
6292.3163	1589.2399	90	6136.5895	1629.5696	39.1
6297.4100	1587.9544	107	6141.8174	1628.1826	50.4
6302.4005	1586.6970	124	6146.9494	1626.8232	63.6
6307.2875	1585.4676	140	6151.9852	1625.4916	78.5
6312.0710	1584.2661	154	6156.9248	1624.1875	94.6
6316.7509	1583.0923	163	6161.7680	1622.9108	111
6321.3268	1581.9464	168	6166.5146	1621.6616	128
6325.7989	1580.8280	166	6171.1646	1620.4397	143
6330.1667	1579.7372	157	6175.7177	1619.2450	156
6334.4303	1578.6739	139	6180.1740	1618.0774	165
6338.5895	1577.6381	114	6184.5331	1616.9369	168
6342.6441	1576.6295	81	6188.7951	1615.8234	165
6346.5940	1575.6483	43	6192.9597	1614.7368	155
6354.1791	1573.7674	44	6197.0269	1613.6770	137
6357.8139	1572.8677	89	6200.9964	1612.6441	112
6361.3435	1571.9950	130	6204.8682	1611.6378	79.5
6364.7676	1571.1493	165	6208.6422	1610.6581	41.7
6368.0861	1570.3305	194	6215.8959	1608.7786	43.5
6371.2989	1569.5387	215	6219.3754	1607.8785	86.5
6374.4058	1568.7737	227	6222.7565	1607.0049	127
6377.4066	1568.0355	230	6226.0390	1606.1576	162
6380.3013	1567.3241	226	6229.2229	1605.3367	190
6383.0896	1566.6395	215	6232.3079	1604.5420	212
6385.7715	1565.9815	199	6235.2940	1603.7736	225
6388.3467	1565.3502	179	6238.1810	1603.0314	230
6390.8152	1564.7456	157	6240.9688	1602.3153	227
6393.1767	1564.1676	134	6243.6573	1601.6254	217
6395.4312	1563.6162	112	6246.2462	1600.9616	202
6397.5785	1563.0914	91	6248.7356	1600.3238	184
6399.6184	1562.5932	73	6251.1252	1599.7120	162
6401.5508	1562.1215	57	6253.4149	1599.1263	140
6403.3756	1561.6763	44	6255.6046	1598.5665	119
6405.0925	1561.2577	32	6257.6941	1598.0327	98.1
6406.7016	1560.8656	24	6259.6834	1597.5249	79.3
6408.2025	1560.5000	17	6261.5722	1597.0430	62.8
			6263.3605	1596.5870	48.7
			6265.0481	1596.1569	37.0
			6266.6349	1595.7528	27.5
			6268.1207	1595.3745	20.1
			6269.5054	1595.0222	14.4
			6270.7889	1594.6957	10.0



Plots of a fiber in fiber out carbon 13 CO cell at 600 Torr pressure. The very low ripple of our wedged optics is apparent from the scans. The use of such a device for OSA calibration with a broadband source such as an ELED typically requires a scan to be taken of the illumination source first to divide out any structure in the source. This has been done to generate the data above.