

IRcell-S4

Long optical path length in a compact design

The small volume, robust multipass cell. Now without absorption mask and available with 4 and 15 meters path length.

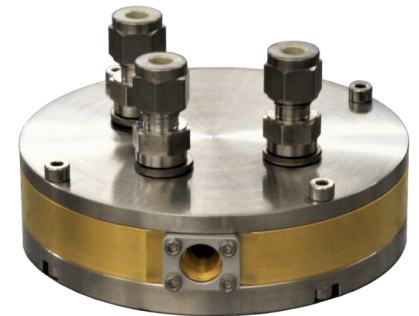
Multipass cells are used to fold a long optical path into a small volume to increase the sensitivity of an optical measurement. Such cells are regularly used for gas phase spectroscopy of trace species in several applications, e.g. environmental air quality or breath analysis.

A key parameter of multipass cells is the ratio of path length to volume, because smaller volumes result in shorter system response times and lower sample consumption. The IRcell-S has a **particularly low volume** due to its planar star-shaped beam pattern and outperforms most White- and Herriott-based designs in terms of path length per volume.

The IRcell-S has a substantially improved optical design compared to IRsweep's previous IRcell: the rotationally symmetric ring mirror is replaced with a series of individually curved mirror segments, yielding a **more stable beam pattern**. As a result, the alignment is substantially simplified, no absorption mask is required, no teflon is exposed to the inside of the cell and there is more tolerance on the coupling angle.

The beam profile of the transmitted beam is also improved compared to the previous IRcell. The IRcell-S additionally offers two separate ports for coupling light in and out, which simplifies placement of optical components.

The cell comes with three gas ports by default, which are typically used as inlet, outlet and pressure sensor. It has also been used without top and bottom to directly measure a flow through the ring, e.g. as part of a tube.

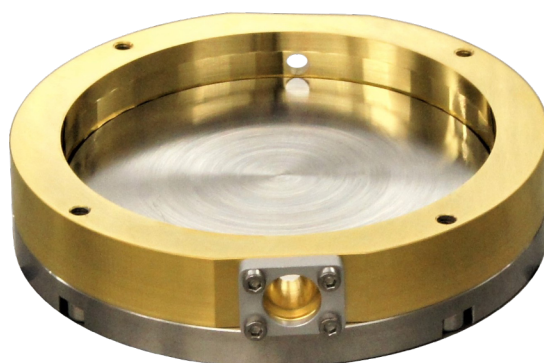


APPLICATIONS

- Laser absorption spectroscopy in the NIR, mid-IR
- Trace gas sensing in industrial, medical, environmental applications
- Industrial process control
- Safety and security screening
- Compact spectroscopic instrumentation
- Applications that require low sample volumes

BENEFITS

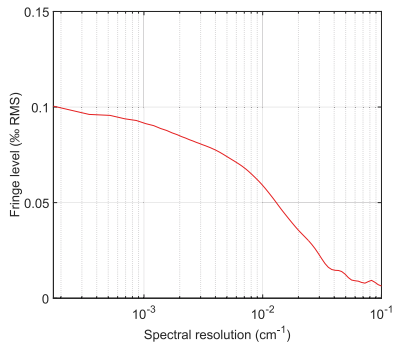
- Small volume
- Low fringes
- Rugged design
- Easy alignment
- No more absorption mask
- Separate optical ports for incoupling and outcoupling



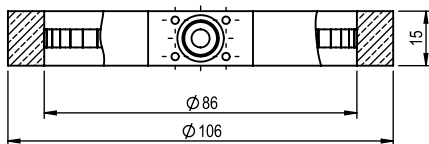
PATH LENGTHS

- 4 meters
- 15 meters

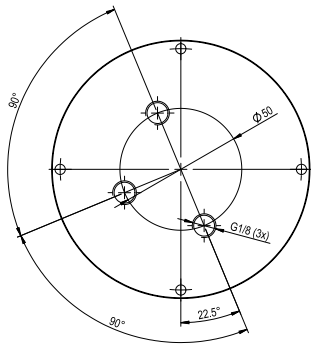
Typical fringe level as function of resolution



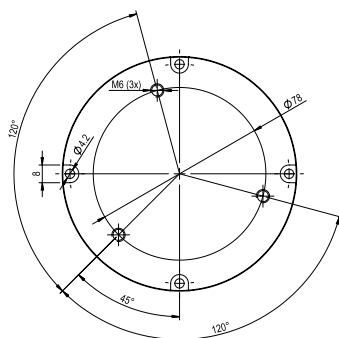
Side view



Top view with gas fittings



Bottom view with threaded holes for mounting



All measures in mm unless stated otherwise.

SYSTEM SPECIFICATIONS FOR 4 METER VERSION

Optical path length	403 cm / 159"
Angle between in-coupling and out-coupling aperture	172.5°
Angle between aperture normal and coupling angle	3.75° horizontal 0° vertical
Beam alignment tolerance	±0.75° horizontal ±0.75° vertical
Angle between in-coupling and out-coupling beam	165°
Ideal numerical aperture (NA)	Collimated beam
Input hole diameter	5 mm / 0.197", circular
Fringe level	< 2.0 x 10 ⁻⁴ rms@ λ=4.3 μm
Wavelength range	NIR / mid-IR / THz
Gas volume	31 ml
Gas fittings	Swagelok 6 mm or 1/4" or Whitworth G 1/8"
Absolute pressure range	0-1 bar / 0-750 torr
Leak rate	< 1 x 10 ⁻⁷ bar x l/s
Mirror surface	Gold
O-Ring material	Standard: NBR Optional: FKM and EPDM
Window material options	BaF ₂ , CaF ₂ , Al ₂ O ₃ , N-BK7, ZnSe, Others on request
Dimensions	10.6 cm diameter, 3.2 cm height (excluding gas connectors)
Mounting	3 x M6

