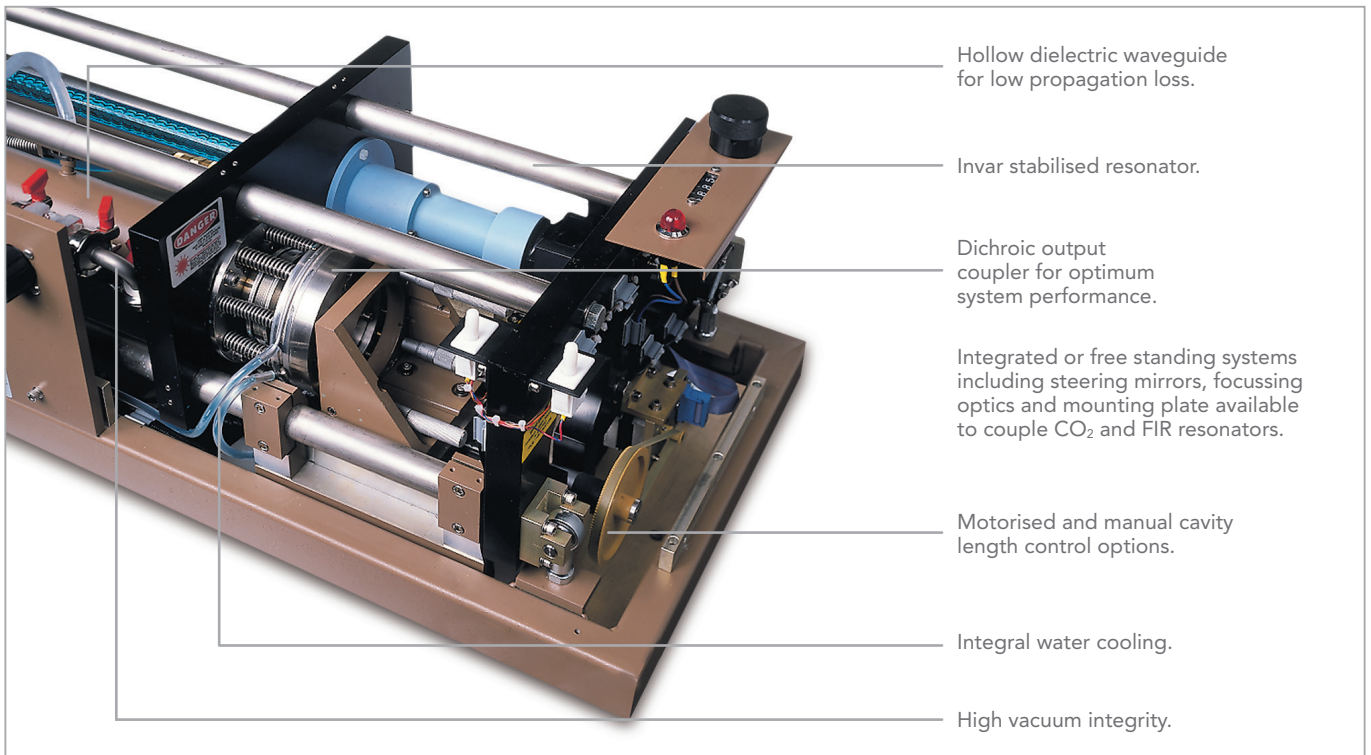


# FIR Series of Products

FAR Infrared lasers/Terahertz lasers

With over 30 years expertise in designing and manufacturing a range of optically pumped FIR (Terahertz) lasers, our products are used in applications where coherent radiation in the

range of 40  $\mu\text{m}$  to 1.22mm (0.25 –7.5 THz) is required. When combined with our PL Series of CO<sub>2</sub> lasers the FIR laser becomes a powerful tool for taking laser line measurement at high peak powers.



## 295

This model 295 is a stand-alone FIR laser designed for operation with high power CO<sub>2</sub> lasers. Guaranteed powers of 150mW when pumped by the PL5, and 500mW when pumped by the PL6, are available at 118.8 $\mu\text{m}$  and 184.3 $\mu\text{m}$ .

The 295 has a 3 bar invar support frame and features the same optical design as used in the FIRL 100. It has been engineered to allow UHV pumping for extended sealed operation, maximum power and number of lines.

## 395 Twin Laser

The model 395 features two identical FIR laser cavities within a single 5 bar invar stabilised frame. This is particularly designed for applications where two FIR outputs are required such as Plasma diagnostics, with one frequency offset from the other by up to a few MHz.

Both FIR cavities of the 395 are pumped by a single PL6 Laser to ensure optimum stability of the Intermediate Frequency (IF). A 50/50 beam splitter is used to generate the two identical pump beams required.

The output couplers of both FIR sections are mounted on precision linear translation stages for individual optimisation and to generate the cavity length difference for frequency offset.

## FIRL 100

The model FIRL100 has both the CO<sub>2</sub> pump laser and the FIR laser housed in an integrated structure combining a highly efficient optically pumped FIR system into a single compact unit. The lasers and coupling optics are mounted within a 5 bar invar rod frame for excellent thermal and mechanical stability.

The CO<sub>2</sub> section provides 80 lines between 9.1 $\mu\text{m}$  and 10.9 $\mu\text{m}$  and features a flowing gas single discharge tube giving more than 50W on the strongest lines. Mode performance ( $M^2 < 1.25$ ) is assured by internal profiling of the tube and the use of high quality optics. The resonator design is based on the proven PL5 laser with diffraction grating, two ZnSe Brewster windows and piezo ceramic mounted ZnSe output coupler.

The CO<sub>2</sub> laser output is coupled into the FIR laser via two steering mirrors and a ZnSe focussing lens. Access to the CO<sub>2</sub> radiation beam diagnostics for Infrared experiments is available via a precision, two position sliding mirror mechanism.



### FIRL 100 far infrared output specification

$\lambda(\mu\text{m})$	FIR Molecule	CO <sub>2</sub> pump line	Typical Power
96.5	CH <sub>3</sub> OH	9R10	60mW
118.8	CH <sub>3</sub> OH	9P36	150mW
184.3	CH <sub>2</sub> F <sub>2</sub>	9R32	150mW
432.6	HCOOH	9R20	30mW
513.0	HCOOH	9R28	10mW

FIR laser frequencies arise from rotational transitions in an excited vibrational state of a polar gas molecule at low pressure. The optically pumped FIR laser relies on the selective absorption of tunable infrared radiation to create a population inversion between rotational states and hence generation laser action. In practice, a few molecules are chosen to provide discrete frequencies across the entire FIR spectrum from 40 $\mu\text{m}$  upwards. Tables of FIR lines are available on request.

A wide range of accessories are available for the FIR Series which include:

#### Laser stabilisers –

For applications demanding excellent medium and long term stability, an active stabiliser may be required. This will compensate for laser output fluctuations caused by changes in ambient conditions and lock the variation in laser frequency or power to a value close to the passive jitter.

Edinburgh Photonics has designed a family of active stabilisation techniques appropriate to the type of laser and operating conditions.

#### Laser Pumping and Refilling Systems –

All flowing gas laser systems are supplied with the necessary valves, gauges and vacuum couplings for simple connection to the system vacuum pump. A range of turbo molecular and dry scrolling pumps are available.

#### Gas Mixing Stations –

Designed to allow mixing and metering of up to 3 component gases from independent gas cylinders. These comprise of 3 inlet ports, each with their own needle valve control, with individual flow meters for gas mixing.



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**PROTECTIVE GLASSES ARE AVAILABLE FOR THE FIR SERIES OF CO<sub>2</sub> LASER**

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