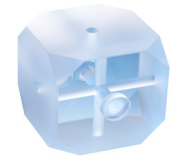
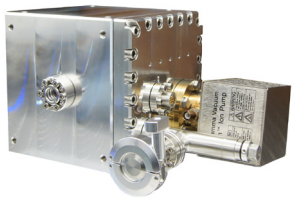
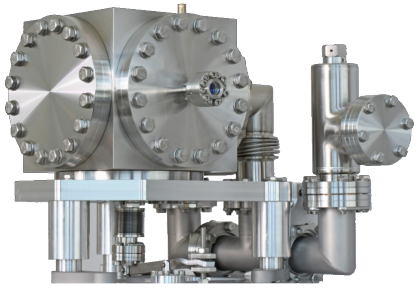
ORS-Cavity

Standalone Reference Cavities

MenloSystems







High finesse Fabry-Pérot cavities, with or without vacuum chambers, for ultra-stable laser systems. The resonator spacer is made out of ultra-low expansion (ULE) glass. The mirror substrates can be ULE or fused silica (FS), while the mirror coatings are either standard ion-beam sputtering (IBS) or low thermal noise crystalline (XTAL) coatings. Menlo Systems is the exclusive distributor of optically contacted cavities with mirrors based on Thorlabs Crystalline Solutions' technology. The compact design of the vacuum chamber minimizes experimental setup spatial demands while delivering state-of-the-art laser linewidth and stability. The ORS-Cubic-Cavity variant is based on the rigidly mounted 5 cm cubic cavity (3 GHz FSR, licensed NPL patented technology). The rigid mounting of the cubic cavity allows for the transportation of the cavity enclosure without the need for realignment. A PTB designed ORS-Cavity is based on a 12.1 cm cylindrical spacer (1.24 GHz FSR). A transportation locking mechanism enables fast installation after delivery, without the need for realignment. Access to the built in thermistor and Peltier elements is enabled via vacuum feedthroughs.

STABILITY AND PHASE NOISE

SUBSTRATE-COATING	ULE-IBS	FS-IBS	FS-XTAL
Thermal noise ADEV limit 5 cm CUBIC	1.4×10^{-15}	9×10^{-16}	4×10^{-16}
Thermal noise ADEV limit 12 cm CYLINDRICAL	5.8×10^{-16}	3.8×10^{-16}	1.6×10^{-16}

KEY SPECIFICATIONS

- Wavelength Range: 500-5000 nm
- Finesse ≈ 250 000
- 5 cm Cubic ULE Spacer
- 12 cm Cylindrical ULE Spacer
- Ion-getter pump and controller

APPLICATIONS

- Quantum computing
- Optical frequency metrology
- Laser cooling and trapping
- High resolution spectroscopy

FEATURES

- Compact footprint
- Tailored to customer needs
- Transportable
- IBS or crystalline mirror coatings

OPTIONS

- Cavities without the vacuum enclosure
- ULE compensation rings (licensed PTB technology)
- Dual or wideband, lower finesse coatings
- Measurement of the thermal expansion zero crossing (to ± 50 mK)
- Vertically mounted optical breadboards for PDH stabilization
- Electronics for PDH stabilization
- Temperature stabilization

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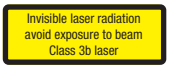
SPECIFICATIONS	ORS-CUBIC-CAVITY	ORS-CAVITY
Wavelength	500 - 1600 nm (IBS), 900 - 5000 nm (XTAL)	
Finesse	≈ 250 000	
Cavity Length	5 cm	12.1 cm
Free Spectral Range	3 GHz	1.24 GHz
Windows	AR coated, angled and wedged	
Temperature of Minimal Thermal Expansion	between 20 and 35 °C	
Thermal Shields	active and passive	active
Ambient Temperature Sensitivity	~ 4 mK/°C	
Temperature Sensor	10 k Ω NTC	
Peltier Elements	2x 25 W	1x 56 W
Ion Getter Pump	5 l/s	10 l/s
Achievable Pressure	$< 10^{-7}$ mbar	
Stainless Steel Valve	Cu sealed, KF flange	Cu sealed, CF flange
Dimensions	W 28 cm, L 28 cm, H 18 cm	W 48 cm, L 35 cm, H 35 cm
Vacuum Chamber Material	Al	stainless steel
Mass	15 kg	55 kg

REQUIREMENTS	
Operating Voltage	100 / 115 / 230 VAC
Line Frequency	50 to 60 Hz
Operating Temperature	22 ± 5 °C
Power Consumption	<150 W

OPTIONS
Fiber Doppler Noise Cancellation
Frequency Doubling
Frequency Shifting AOMs for Operation at Exact Atomic Transition (e.g. Sr at 698 nm)
Analysis of Technical Noise Floor

ORDERING INFORMATION		
Product Code	ORS-Cubic-Cavity	ORS-Cavity

Please call for pricing. Specifications are subject to change without notice. Custom modifications are available, please inquire.This configuration of the NPL cavity is intended for terrestrial use only. For further information on space-customised or space-qualified cavities, please contact NPL.



MenloSystems

Menlo Systems GmbH
T+49 89 189 166 0
sales@menlosystems.com

Menlo Systems, Inc.
T+1 973 300 4490
ussales@menlosystems.com

Thorlabs, Inc.
T+1 973 579 7227
sales@thorlabs.com

www.menlosystems.com