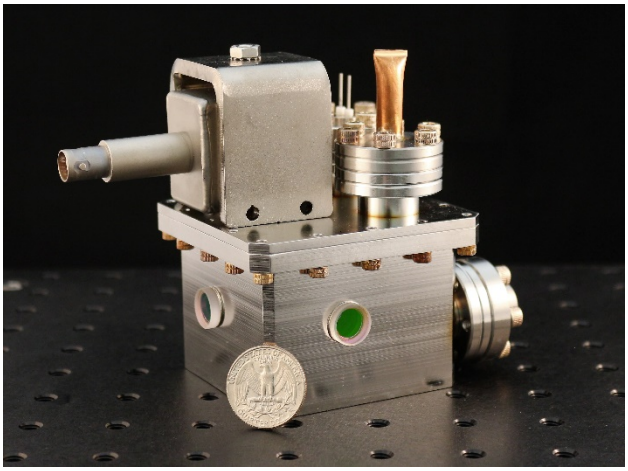
Transfer Cavity

Dual-axis Transfer Cavity

The AOS-Cav-λ_R-λ_1-λ_2 is a dual-axis, non-confocal Fabry-Perot optical cavity in UHV for stabilization transfer from a reference laser with wavelength λ_R (e.g., rubidium-stabilized 780 nm laser) to disparate laser wavelengths (e.g., for atomic ion laser cooling). This can be accomplished by the Pound-Drever-Hall (PDH) technique or scanning transfer techniques. The factory target finesse is > 1,000 for all the wavelengths. The transfer cavity includes an electrical interface for the PZTs, thermistors, and heating elements for temperature stabilization. A 3 L/s ion pump, with positive polarity, is attached to the chamber to keep the cavity pressure at ~10^{-9} Torr (*ion pump controller is not included).* The chamber has a pumping port pinch-off tube and getter activation pins for removing small amounts of gas.



Features

- **Thermally & acoustically stable by piezo and temperature tuning**
- **Cavity under UHV and vacuum compatible**
- **Compact and robust design**
- **Customizable mechanical and electrical layouts**

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Dual-axis Transfer Cavity

Specifications

Device Information	
Model No. (example)	AOS-Cav-780-369-493/650/935
Serial No.	CAV-SAMPLE
Axis 1: λ_R, λ_1	369 nm/493 nm/ 650 nm/ 780 nm/935 nm
Axis 2: λ_R, λ_2	369 nm/493 nm/ 650 nm/ 780 nm/935 nm
Safe Operating Conditions	
Heater power limit	<5 W
Heater resistance	5.5 Ω @ 27 °C
Maximum operational temperature	50 °C
PZT voltage min/max	0-150 V
Ion pump polarity	Positive
Ion pump bias voltage	5 kV
Parameters	
Free spectral range (FSR)	~ 5 GHz
Design finesse	369/493: 1,000 - 3,000 650/780/935: 3,000 - 5,000
Mirror curvature	M1: ROC 100 mm M2: Plano
Piezo tuning	>3 FSR @780 nm (full range, est.)
Temperature sensing	10 kΩ thermistor, Beta = 3669
Factory Calibration	
Finesse	>3,000 @ 778 nm
Vacuum pressure	~10^{-9} Torr

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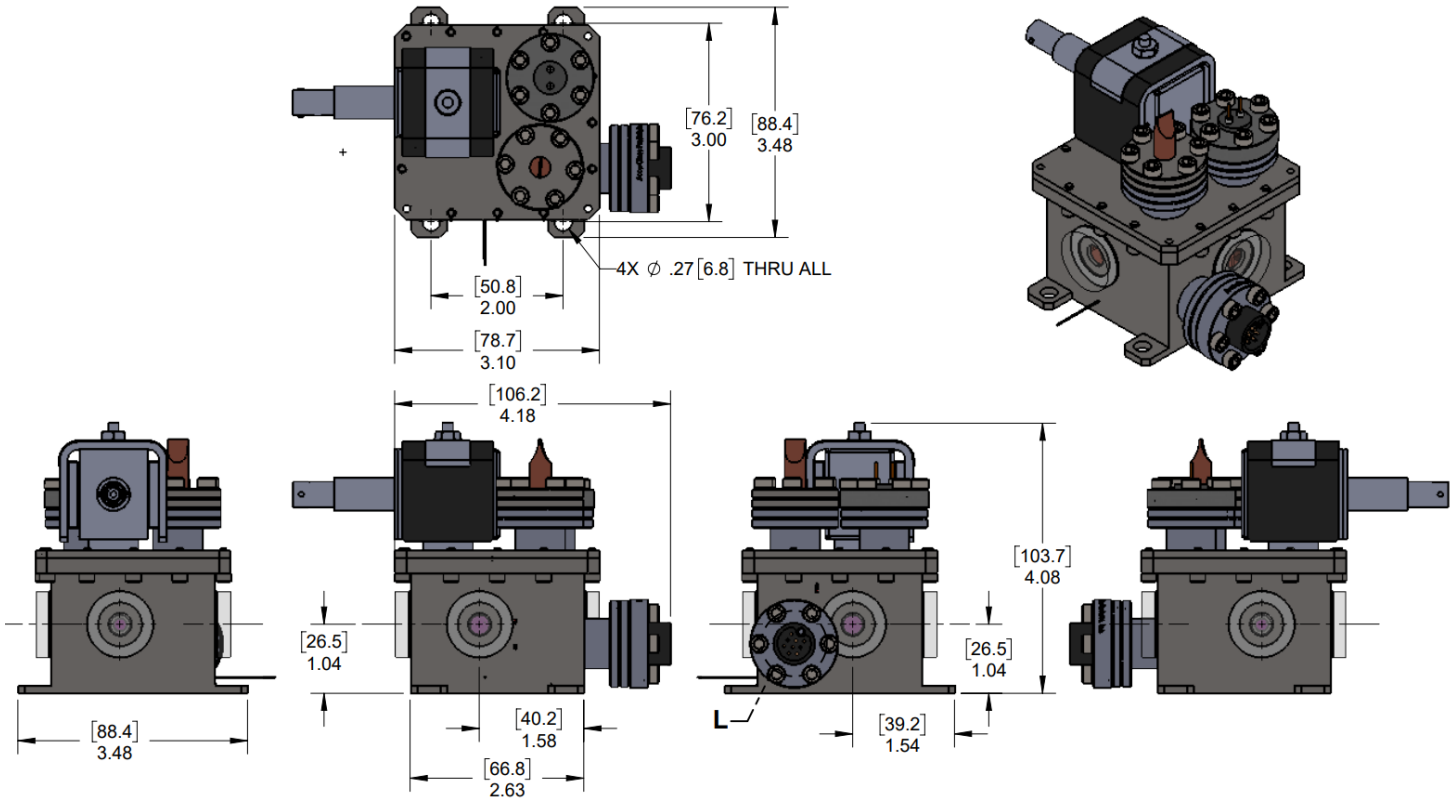
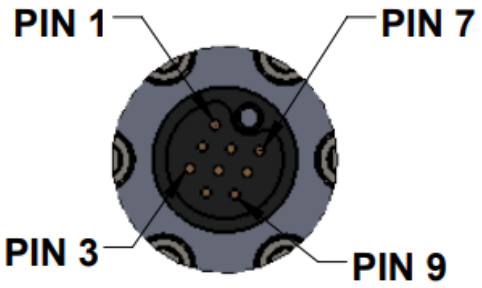
Package Dimensions



Pin Assignment

PIN #	DESCRIPTION
1	PZT2 (+)
2	PZT1 (+)
3	TEC (-)
4	PZT2 (-)
5	PZT1 (-)
6	TEC (+)
7	10 K-ohm NTC
8	10 K-ohm NTC
9	NC



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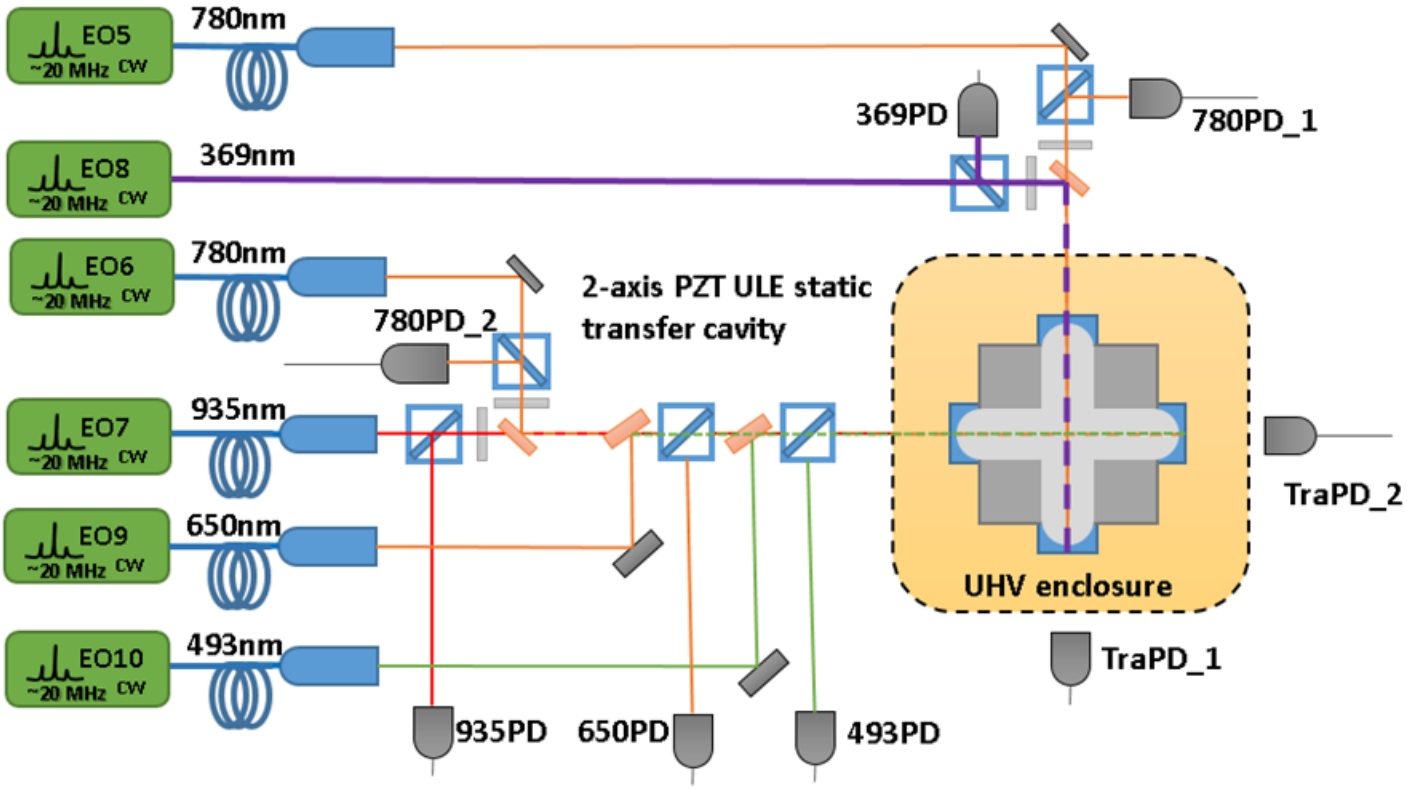
Dual-axis Transfer Cavity

Transfer cavities for laser frequency stabilization

- Laser stabilization at frequencies without convenient atomic resonances (e.g., ions)
- Multi-axis simultaneously references Doppler & repump for two species
- **Example: Two-axis transfer cavity for locking Ba^+/Yb^+ lasers**
  - Axis 1: 370 nm / 780 nm
  - Axis 2: 493 nm / 650 nm / 935 nm / 780 nm



For more information, contact us at sales@aosense.com