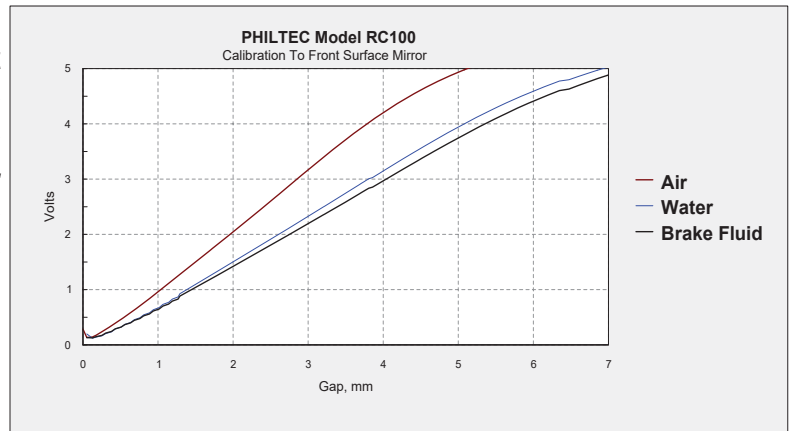


Measurements in Fluids

When a sensor is submersed in a fluid, light rays diverging from the probe tip are more collimated than they would be in air. This increases the operating range of the sensor. The degree of collimation is proportional to the ratio of the refractive index of the fluid to that of air.

For example, this chart shows the output function of a model RC100 sensor in three different fluids: air, water and DOT 5 silicone brake fluid. **The fluids increase the operating range by approximately 30%.** To be precise, the sensor must be calibrated in the same medium in which the measurements will be made.



CRYOGENIC FLUIDS

Liquid fueled rockets burn pressurized cryogenic fluids to create thrust. Philtec sensors have been used to monitor speeds and rotor displacements in a variety of pressurized cryogenic fluids, such as:

- Liquid Hydrogen, -300°F, 1000 psi max. pressure
- Liquid Oxygen, -297°F, 5000 psi max. pressure
- Liquid Methane, -297°F, 7500 psi max. pressure

At the factory, sensors can be calibrated in air or water. The XY calibration data can be mathematically mapped for performance in the cryo fluid.

Medium	Refractive Index
Vacuum	1.00000
Air	1.00004
Liquid Helium	1.026
Liquid Hydrogen	1.0974
Liquid Nitrogen	1.2053
Liquid Oxygen	1.221
Methane (LCH4)	1.286
Water at 35°	1.3316
Propane (LPG)	1.34
Kerosene	1.44

- If the medium is vacuum, calibration in air is the best approximation
- If the medium is liquid hydrogen, calibration in air is the best approximation
- If the medium is methane, calibration in water is the best approximation

Mapping Example

mm in air	Volts	mm in LOX	Volts
1	1	1.221*mm in air	1
2	2	1.221*mm in air	2
3	3	1.221*mm in air	3
4	4	1.221*mm in air	4