



**LLG3-4Z**

### Description

Thorlabs' Liquid Light Guides offer outstanding transmission from 420 to 2000 nm for high power visible and near infrared radiation in the multi-watt range. The yellow-marked end must be used as the light input because it contains a filter to protect the light guide from radiation below 420 nm. These light guides are recommended for use with tungsten halogen, xenon light sources, diode lasers and Nd-YAG lasers. The long-term temperature range for the liquid light guides is from +5 to 35 °C. This light guide is 4 feet in length with a core diameter of 3 mm. The light guide can also be offered with custom core diameters or in custom lengths up to 4 m. Please contact [techsupport@thorlabs.com](mailto:techsupport@thorlabs.com) with inquiries.

### Specifications

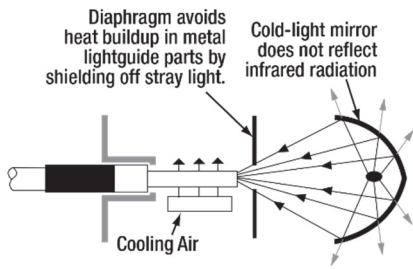
LLG3-4Z	
Wavelength Range	420 - 2000 nm
Numerical Aperture	0.52
Half Angle ( $\theta$ )	31°
Minimum Bend Radius	40 mm
Core Diameter	3 mm

LLG3-4Z	
Temperature Range	
Continuous, Long Term	+5 to 35 °C (41 to 95 °F)
Few Days, Maximum	+5 to 50 °C (41 to 122 °F)

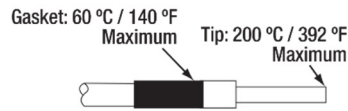
### Lifetime and Stability

Liquid light guides can operate under normal conditions for many years without degradation of transmission properties. The life of the light guide depends on the type of light source and filter being used. The liquids inside this light guide are stable over years if the light guide is not exposed to wavelengths below 420 nm or above 2000 nm. Depending on the input power, shorter wavelengths may destroy the transmission properties of the liquid, while longer wavelengths may overheat the liquid and cause bubbles.

Under normal temperatures (i.e. +5 °C up to 35 °C), there is no degradation of transmission to be expected. Exceeding these limits, i.e. below +5 °C, may cause bubbles, which usually will disappear after storing at room temperatures for a few days. Temperatures over 35 °C and below 50 °C are usually no problem for a few hours. Exceeding this limit does not destroy the liquid itself but may cause degradation of the sealing, resulting in bubbles that will permanently damage the light guide. However, the tip may be hotter as long as the temperature does not exceed 60 °C at the gasket of the light guide, which is measured where the fitting changes from chrome metal to black color. The liquid light guide is an optical instrument and has to be handled with care. Sharp bending (tighter than the minimum bend radius) may cause the tube to kink, making transmission drop by a minimum of 20%.

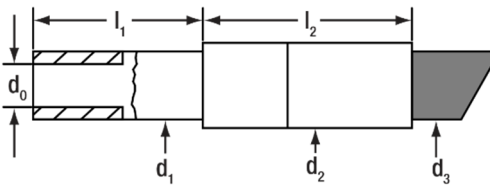


Optimum Light Source Design



Temperature Limitations of Light Guide

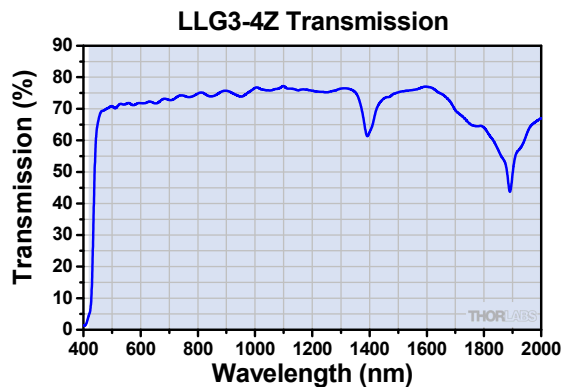
## Drawing



Active Core Diameter	Standard End Fittings				Protective Sleeve	Minimum Bend Radius
	$d_0$	$d_1$	$l_1$	$d_2$		
Ø3 mm	Ø5 +0/-0.1 mm	20 ± 0.1 mm	Ø9 ± 0.1 mm	24 ± 0.1 mm	Ø7 mm	40 mm

**Note:** It is recommended to secure the liquid light guide by the ferrule (dimension  $d_1$  above) with a set screw. Two set screws will help for better centering if placed at 180°. It is not recommended to secure the light guide at the thickest part (dimension  $d_2$  above) because the gasket is sealed within this section.

## Transmission



The blue-shaded region denotes the spectral range over which we recommend using this liquid light guide. The transmission was measured using an input light source with an aperture  $2a = 50^\circ$ .