PRODUCT

Arctic 39N Family

Overview

Arctic 39N0 is based on Varioptic's breakthrough liquid lens technology, allowing variable focus with absolutely no moving parts. It has been designed primarily for imaging applications needing a large clear aperture: long focal objectives, large sensors, C-Mount objective lenses. It features 20 diopters dynamic range, guaranteeing 5 cm focus ability.
The Arctic 39N0 is perfectly suited for industrial vision, medical imaging cameras, optical equipment, biometric devices… For more information on this module, please refer to TEDS - Arctic 39N0.

Ordering information

- **Arctic 39N0** : has Anti-Reflective coatings optimized in the visible range.
- **Arctic 39N1** : has Anti-Reflective coatings optimized in the near infrared.
- **Arctic 39N9** : with no Anti-Reflective coating.
- **Arctic 39NX-P-04** : Packaged Arctic 39NX – Bent flex cable
- **Arctic 39NX-P-08** : Packaged Arctic 39NX – Straight flex cable

Performance Summary

- 20 diopters dynamic range
- Low Wave Front Error, 50 nm typical
- Silent
- Low power consumption

Applications

- Machine vision
- Industrial cameras
- Medical imaging
- Lasers

Contents

Opto-Electrical performance

@25°C, @635nm unless otherwise stated.

Parameter	*Unit*	*Symbol*	*Typ*	*Notes*
Aperture size	mm	$Ø_e$	3.5	(1)
Low optical power	m^{-1}	P_L	-5	
Voltage for P_L	V	V_L	38	
High optical power	m^{-1}	P_H	+15	
Voltage for P_H	V	V_H	60	
Optical power @ 0V	m^{-1}	P_o	-15	
Wave Front Error, rms	nm	WFE_{rms}	50	(2) ; (5)
Voltage @ 0 diopter	V	V_{0D}	44	(5)
Hysteresis	m^{-1}	H	0.05	(3) ; (5)
Slope	$(m.V)^{-1}$	S	0.96	(4) ; (5)
Transmission @ 587nm	%	T_{587}	97	

Notes :

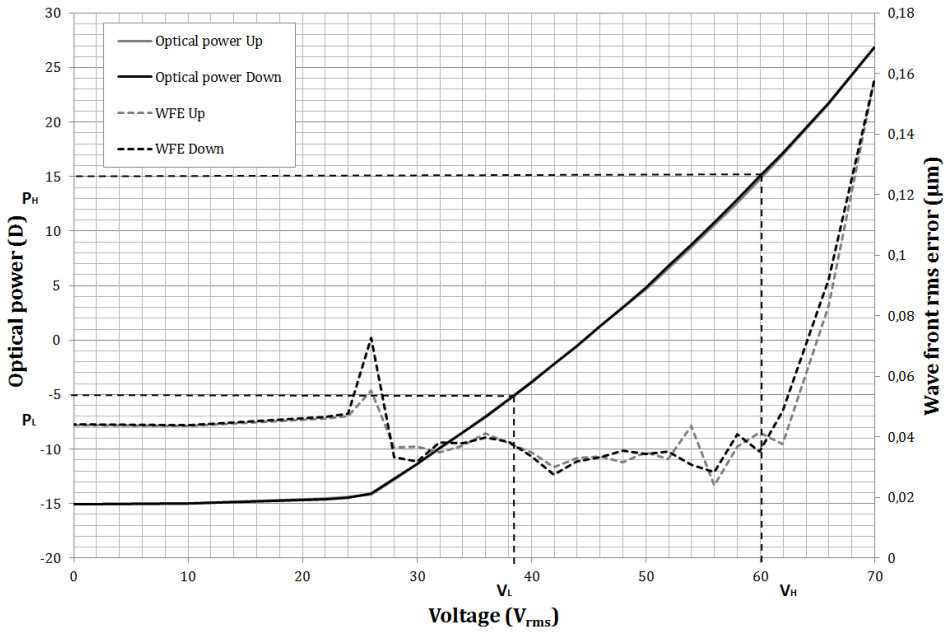
(1): Pupil size on the bottom part of the liquid lens. For more details, please refer to section “optical design information” and “Cosmetic Specification”

(2): Measured on typical pupil size and on [P_L;P_H] – WFE is mainly astigmatism – Above P_H, spherical aberration becomes significant.

(3): Hysteresis in static mode, voltage increasing from 0 to V_{max}, and from V_{max} to 0. Hysteresis is the maximum difference between the rising curve and the falling curve on [P_L;P_H]

(4): Parameter is compiled on [P_L;P_H]

(5): Parameter measured with a 2V sampling



Electrical Specifications

Liquid lens performance is guaranteed only with the use of a driver qualified by Varioptic. Varioptic cannot be liable for failure of liquid lens linked to the use of non-qualified liquid lens drivers.

The following driver ICs have been qualified by Varioptic for Arctic 39N0:

- ✓ Supertex HV892
- ✓ Maxim MAX 14574

However, using the Supertex driver will deliver a reduced dynamic range of the lens, due to a lower voltage range.
When using Maxim driver a 5kΩ resistor should be added, please refer to **MAAN - Maxim integration tips** for details.

Temperature Range

Parameter	Unit	Min	Typ	Max	Notes
Operating temperature range	°C	-20°C	25	+60°C	
Storage temperature range	°C	-40°C	25	+85°C	

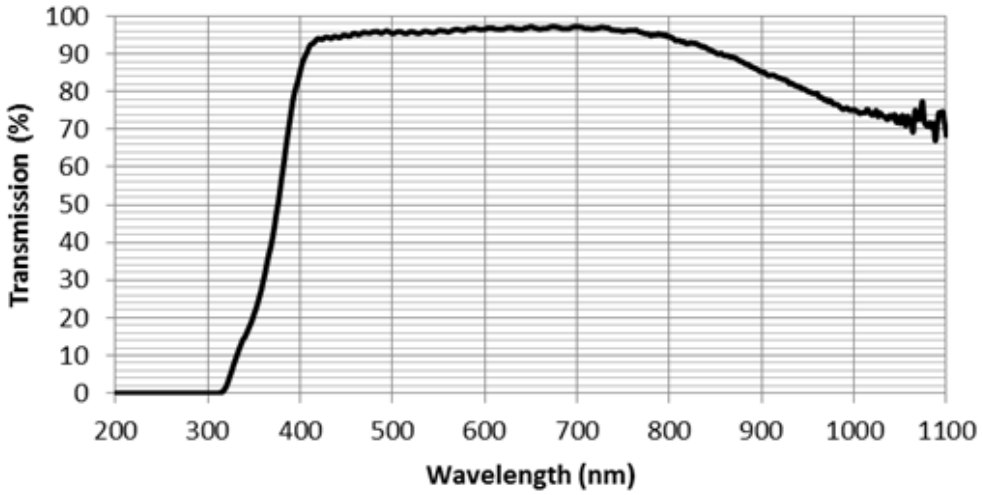
Remarks:

- ✓ Liquid lens is not designed to be soldered. For electrical connection, please refer to Varioptic application notes.
- ✓ Storage above maximum storage temperature will reduce lifetime of the lens. Temporary or permanent damage may occur if the maximum temperature is strongly exceeded.

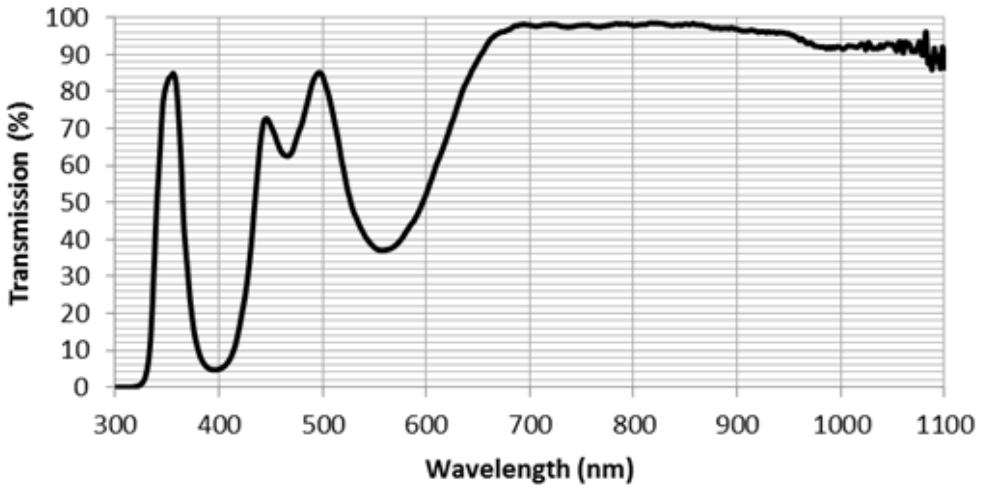
Transmission performance

The two outer surfaces of the glass windows of the liquid lenses have AR coatings. These AR coatings have been optimized for different wavelengths.
Transmission curves of the complete liquid lens, including AR coatings

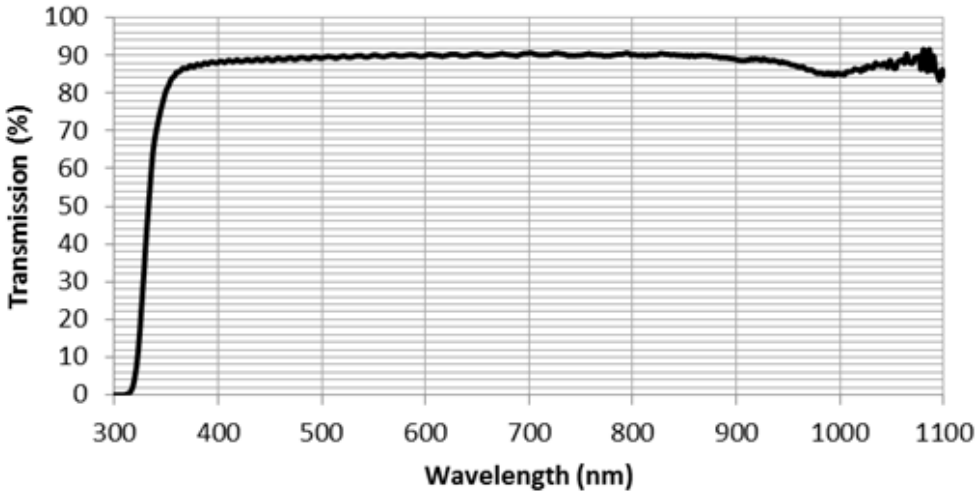
A39N0



A39N1

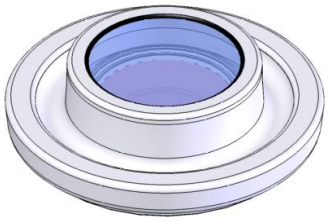


A39N9

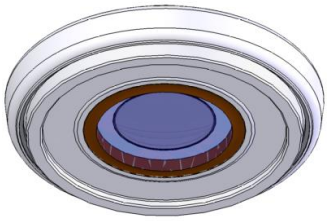


Mechanical dimensions

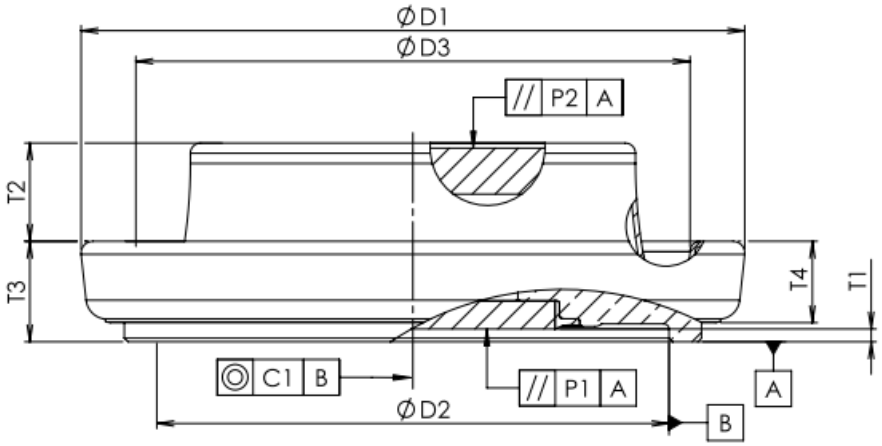
Arctic 39N



Top view of liquid lens



Rear view of liquid lens

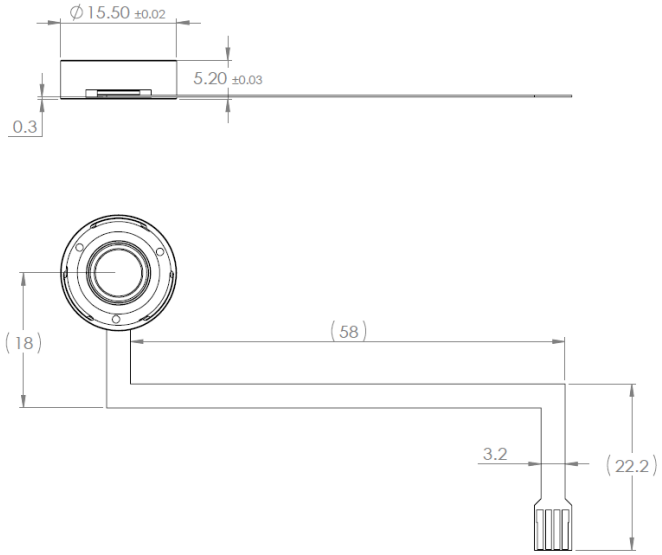


Parameter	Unit	Symbol	Typ	Max	Notes
External diameter	mm	D1	13		
Recess diameter	mm	D2	10		
Internal wave diameter	mm	D3	10.52		
Recess depth	mm	T1	0.25		
Thickness, front area	mm	T2	2.05		(1)
Thickness, flat to bottom	mm	T3	2.2		(1)
Thickness, flat to cap edge	mm	T4	1.75		
Parallelism, rear window to A	mm	P1	0.01		
Parallelism, front window to A	mm	P2	0.04		
Concentricity, optical axis to B	mm	C1		Ø0.03	

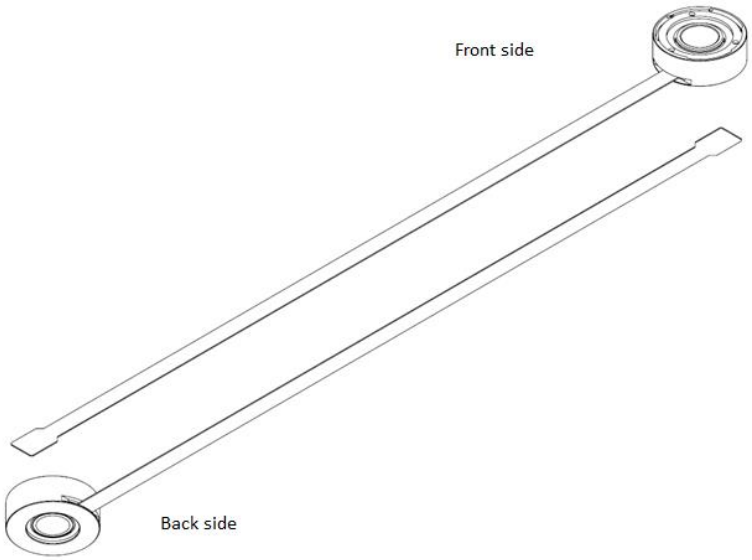
Notes :

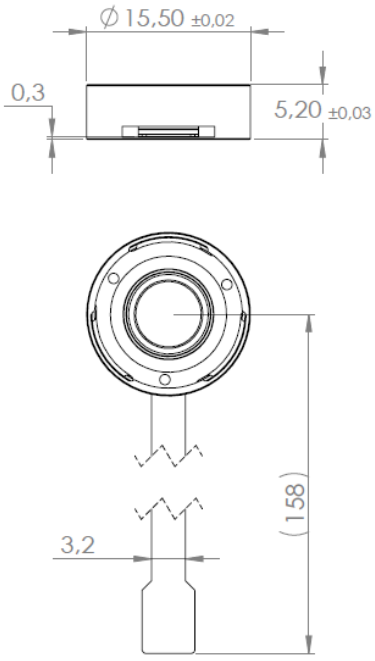
(1): Temperature dependent. A 70 µm minimum free space in front of cap should be left available for thermal expansion Δ_{T2+T3} (T) = 1µm/°C

Arctic 39NX-P04

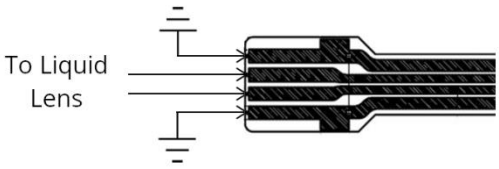


Arctic 39NX-P08





Electrical contact for Arctic 39NX – PXX



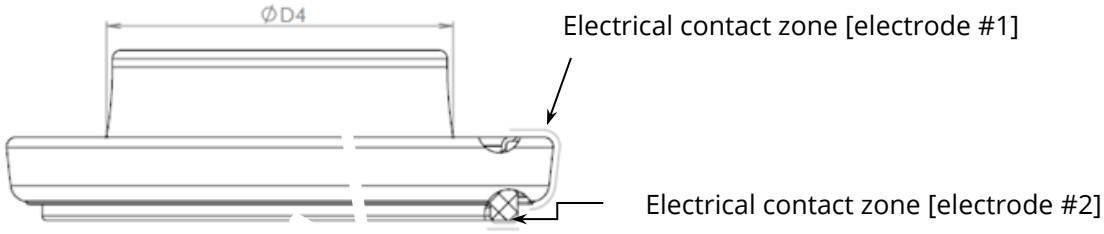
The following FPC connectors are compatible with the FPC tip:

- SFW4S-2STE9LF from FCI
- 04FMN-BTK-A (LF)(SN) from JST

Integration

Integration of Arctic 39N

Electrical connection is done like a coin battery: on top and bottom part of the lens. The location of electrical contacts is shown in the drawing below:



In order to allow a good electrical connection, a 5 Ω max contact resistance is recommended.
For more details about electrical connection, please check Varioptic application notes.
The upper part of the lens acts as a membrane, in order to compensate temperature variations.

Therefore, the central area of the lens inside a ϕD4= 9mm diameter disc / 0.07mm thickness disc should be left free for any mechanical parts. The area outside this disc can be used to maintain the lens, with a maximum force of 40N, uniformly distributed.

Integration of Arctic 39NX-PXX

All surfaces A, B and C can be used as a mechanical reference (see the drawing below).