CORNING

Varioptic® Lenses

Marketing Datasheet

Corning® Varioptic® A-39N Variable Focus Lens

Overview

The Corning® Varioptic® A-39NX variable focus lens is based on Corning's breakthrough adjustable 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 A-39NX is used as a component in industrial vision, optical equipment, and biometric devices. For more information on this lens, please refer to the A-39N Technical Data Sheet (TEDS).

Ordering Information

- **Corning® Varioptic® A-39N0 variable focus lens**: has anti-reflective (AR) coatings optimized in the visible range.
- **Corning® Varioptic® A-39N1 variable focus lens**: has AR coatings optimized in near infrared range.
- **Corning® Varioptic® A-39N9 variable focus lens**: has no AR coating.
- **Corning® Varioptic® A-39NX-P37 variable focus lens**: Packaged A-39NX – 6-pin, 0.5 mm pitch straight flex cable (X=0,1,9) with on-flex thermistor.
- **Corning® Varioptic® A-39NX-PW065 variable focus lens**: Packaged A-39NX with 65 mm wire length.
- **Corning® Varioptic® A-39NX-PW0YY variable focus lens**: Packaged A-39NX with customized wire length.

Performance Summary

- 20 diopters dynamic range
- Low wave front error, 50 nm typical
- Functions quietly
- Low power consumption

Applications

Corning Varioptic A-39N liquid lenses have been used in:

- Barcode readers
- Machine vision
- Industrial cameras
- …

Contents

ESD

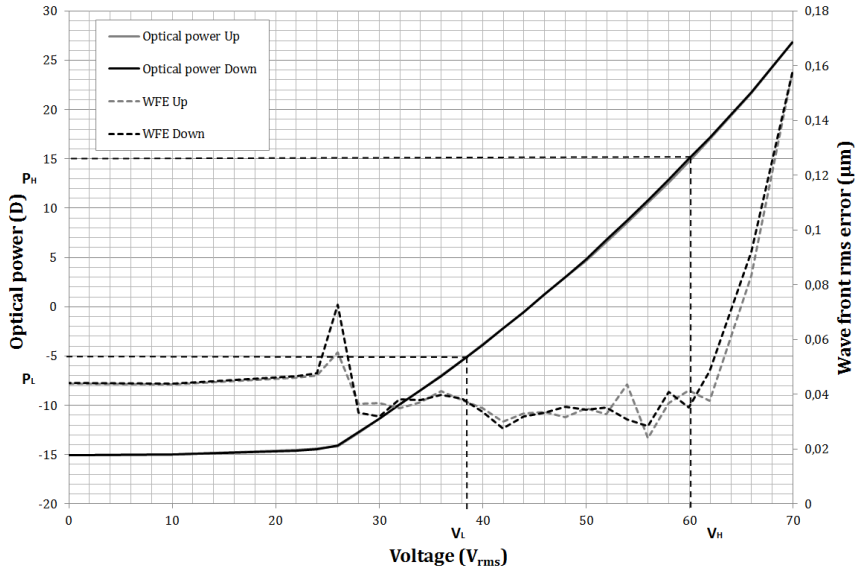
Opto-Electrical Performance

@25°C, @635 nm 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 PL	V	V_L	38	
High optical power	m^{-1}	P_H	+15	
Voltage for PH	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 @ 587 nm	%	T_{587}	97	

Notes:

(1) Pupil size on the bottom part of the lens. For more details, please refer to “Optical Design Information” and “Cosmetic Specification” sections.
(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 2 V sampling.



Electrical Specifications

It is recommended that the lens be used only with a qualified driver.

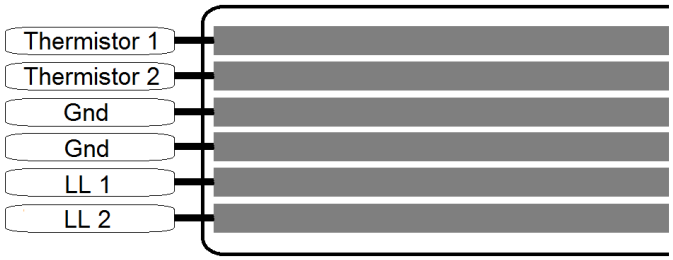
A dedicated compact IC has been designed to drive Corning Varioptic Lenses, namely the Maxim MAX14574. For details, please contact your local sales channel.

Important note:

Corning Varioptic Lenses are sensitive to electrostatic discharge (ESD). Use caution when handling.

When using Maxim driver, a 5 kΩ resistor should be added. Please refer to **MAAN - Maxim integration tips** for details.

Electrical Contact for A-39NX–P37



The following 0.5 mm pitch, 6-pin FPC connectors are compatible with the FPC tip:

- 525590652 from Molex
- 5034800600 from Molex

FPC-A-37 is populated with a 0402 thermistor (Reference: ERTJ0ES104F from Panasonic).

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:

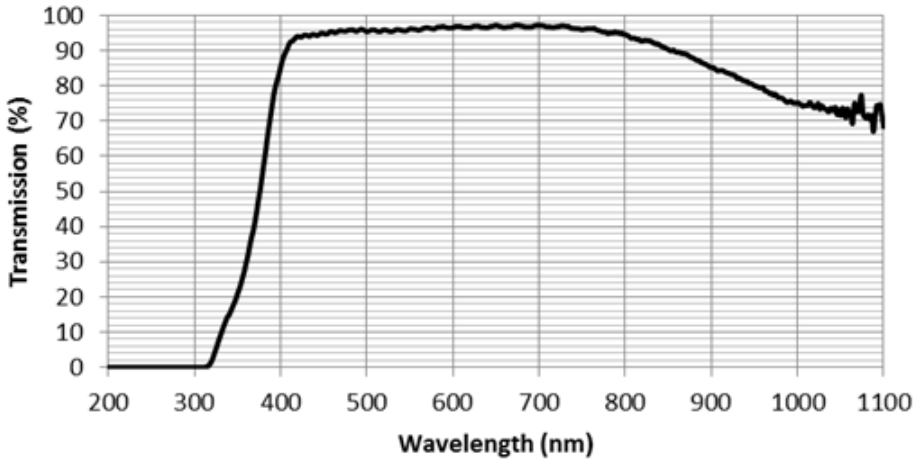
- Corning Varioptic Lenses are not designed to be soldered. For electrical connection, please refer to the application notes.
- Storage above maximum storage temperature will reduce lifetime of the lens. Temporary or permanent damage may occur if the maximum temperature is exceeded.

Transmission Performance

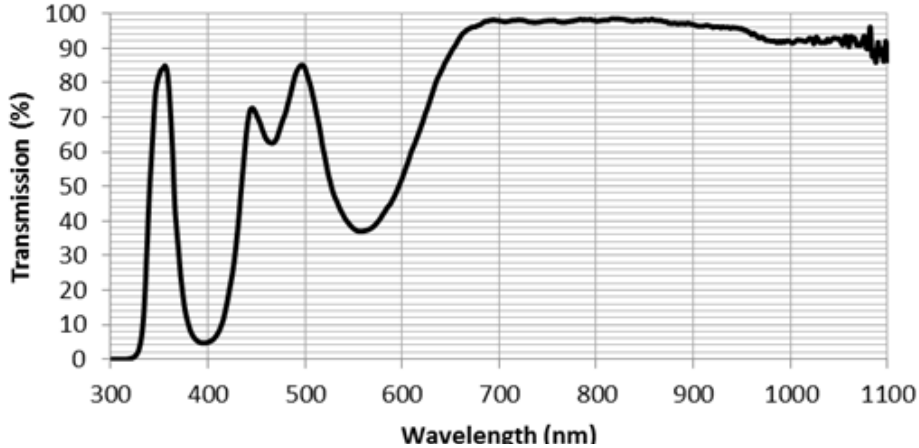
The two outer surfaces of the glass windows of the adjustable lenses have AR coatings. These AR coatings have been optimized for different wavelengths.

Transmission curves of the complete adjustable lens including AR coatings:

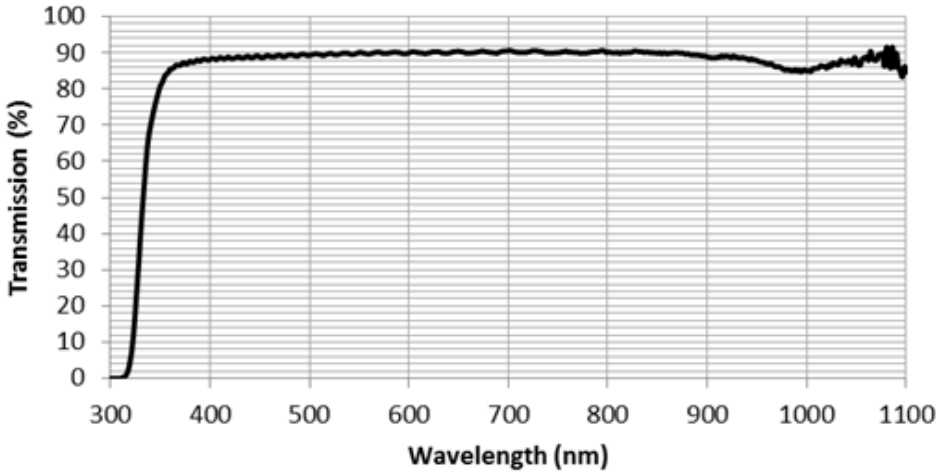
A39N0



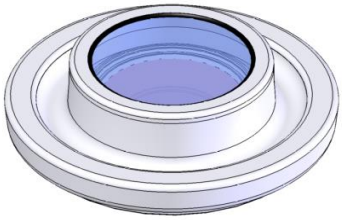
A39N1



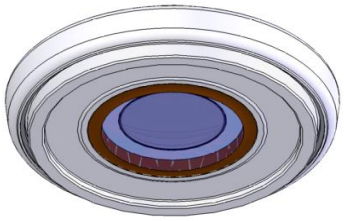
A39N9



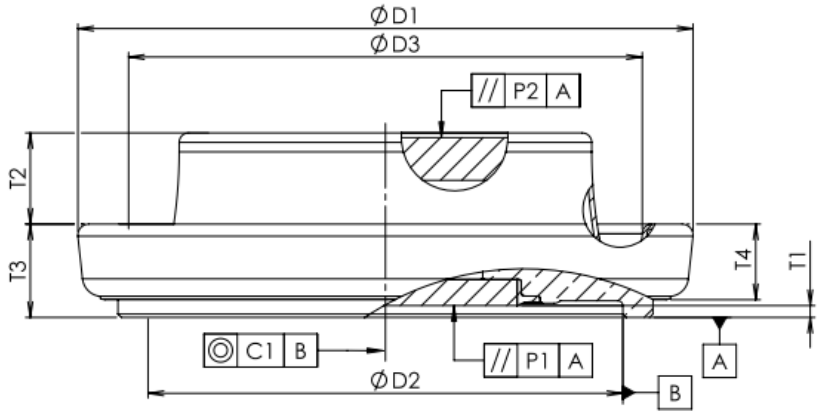
Mechanical Dimensions
A-39N



Top view of lens



Rear view of lens

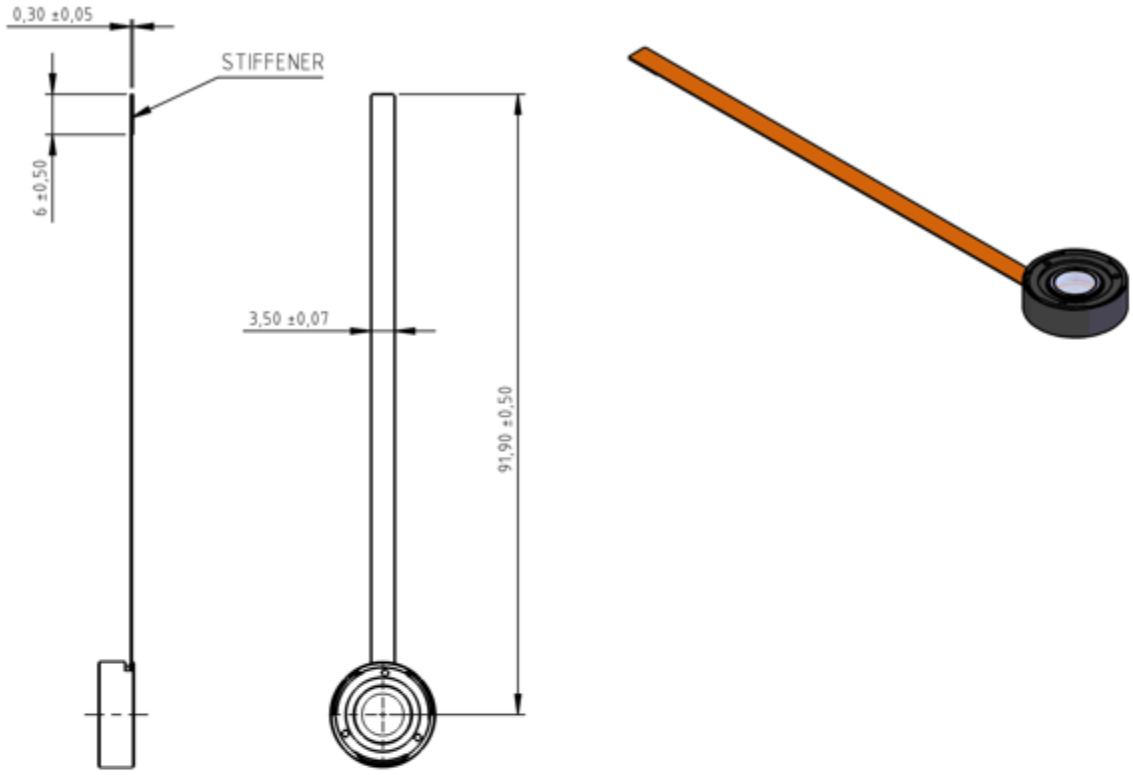


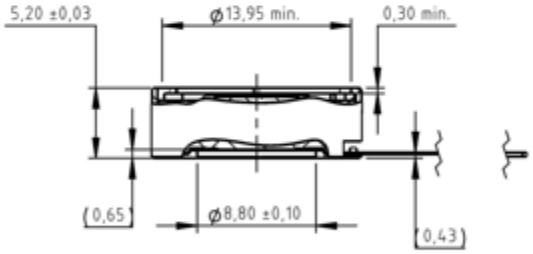
Parameter	*Unit*	*Symbol*	*Typ*	*Max*	*Notes*
External diameter	mm	D1	13		
Recess diameter	mm	D2	10		
Internal wave diameter	mm	D3	10.52		
Recess depth	mm	T1	0.25		
Thickness, front area	mm	T2	2.05		(1)
Thickness, flat to bottom	mm	T3	2.2		(1)
Thickness, flat to cap edge	mm	T4	1.75		
Parallelism, rear window to A	mm	P1	0.01		
Parallelism, front window to A	mm	P2	0.04		
Concentricity, optical axis to B	mm	C1		0.03	

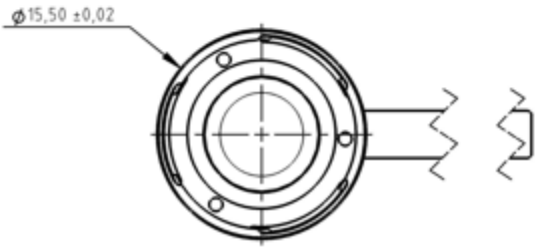
Notes:

(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.

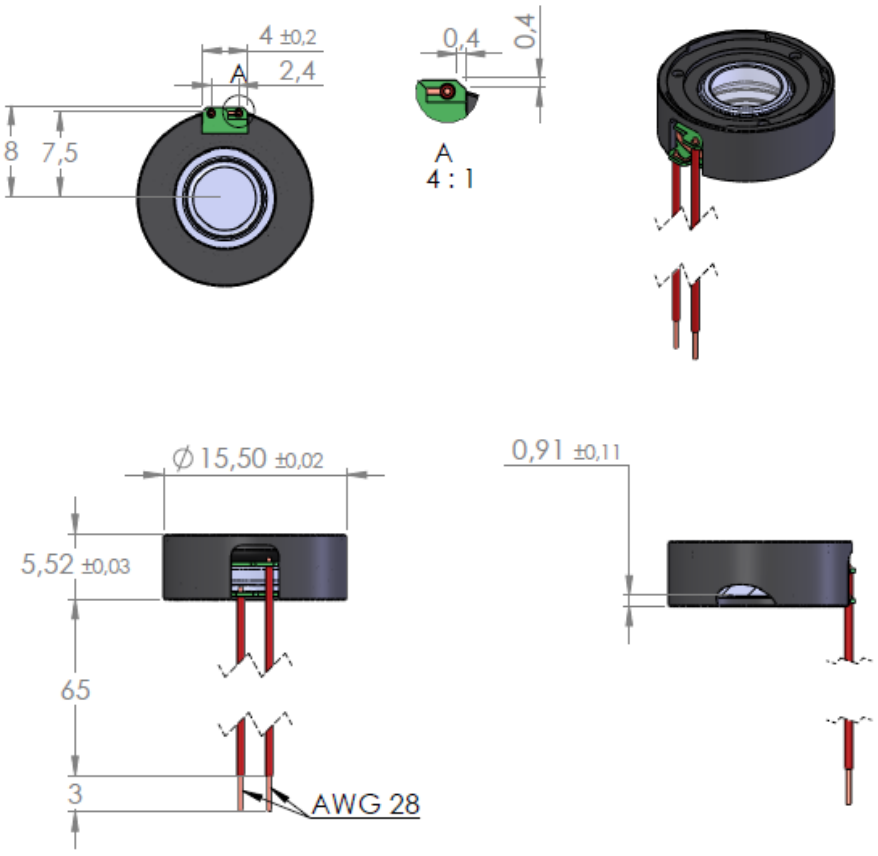
A-39NX-P37


0,30 ±0,05
STIFFENER
6 ±0,50
3,50 ±0,07
91,90 ±0,50


5,20 ±0,03
ø13,95 min.
0,30 min.
0,65
ø8,80 ±0,10
0,43


ø15,50 ±0,02

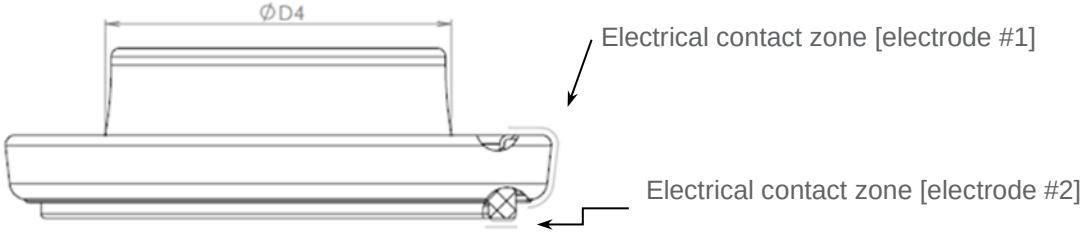
Mechanical Dimensions A-39NX-PW-65 or PW-YY



Integration

Integration of A-39N

Electrical connection is done like a coin battery on the top and bottom parts of the lens. Locations of electrical contact are shown in the drawing below:

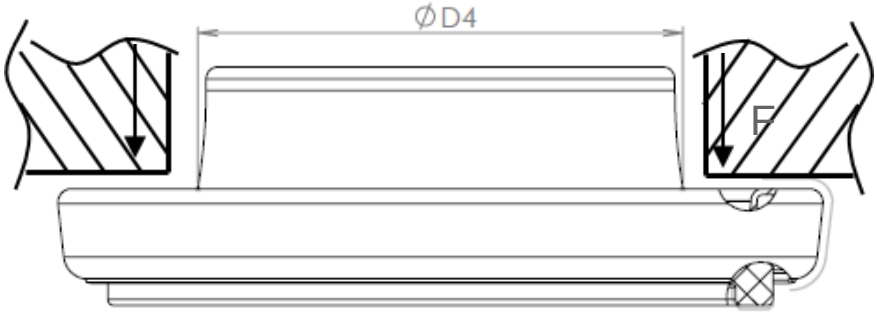


A 5 Ω max contact resistance is recommended to allow appropriate electrical connection.

For more details about electrical connection, please check Corning Varioptic Lenses application notes.

The upper part of the lens acts as a membrane to compensate temperature variations.

The central area of the lens inside a ØD4= 9 mm diameter disc / 0.07 mm 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 40 N uniformly distributed.



Integration of A-39NX-P37

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