



Corning® Varioptic® A-25H Variable Focus Lens

Overview

The Corning® Varioptic® A-25H variable focus lens uses adjustable lens technology enabling variable focus with absolutely no moving parts. Its low power consumption, high shock resistance, and fast focus ability make it used as a component in auto focus and continuous auto focus applications in portable devices, where it will deliver outstanding performance, as well as in laser applications, where it will enable variable focus control. For more information on this lens, please refer to the A-25H Technical Data Sheet (TEDS).

Ordering Information

- **Corning® Varioptic® A-25H0 variable focus lens:** has anti-reflective (AR) coatings optimized in the visible range
- **Corning® Varioptic® A-25H1 variable focus lens:** has AR coatings optimized in near infrared range
- **Corning® Varioptic® A-25H9 variable focus lens:** has no AR coatings
- **Corning® Varioptic® A-P-25HX-33 variable focus lens:** Packaged A-25HX – 6-pin, 0.5 mm pitch straight flex cable (X=0,1,9) with on-flex thermistor

Performance Summary

- 18 diopters dynamic range
- Low wave front error, 30 nm typical
- Low power consumption: 20 to 40 mW typical depending on driver

Applications

Corning Varioptic A-25H liquid lenses have been used in:

- Barcode readers
- Machine vision
- Biometrics
- Lasers
- ...



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Opto-Electrical Performance

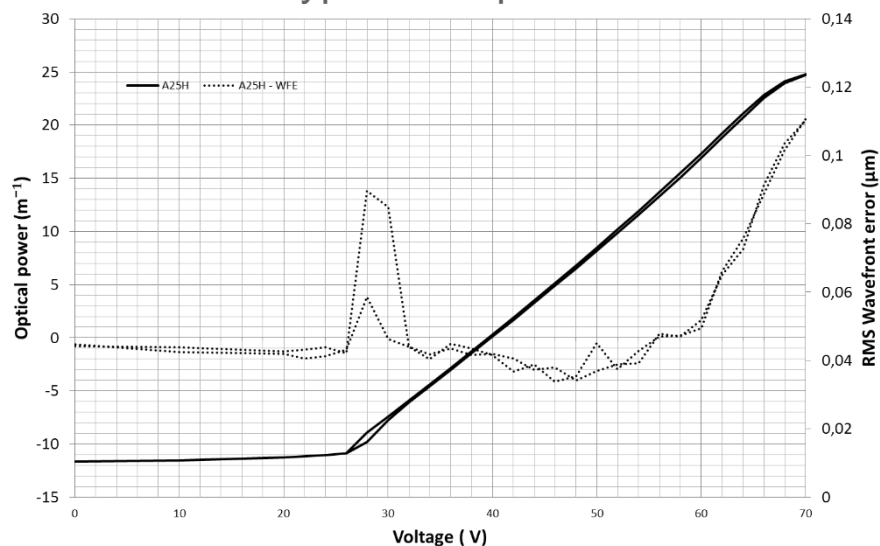
@25°C, @635 nm unless otherwise stated

Parameter	Unit	Symbol	Typ	Notes
Aperture size	mm	\varnothing_e	2.5	(1)
Low optical power	m^{-1}	P_L	-5	
Voltage for P_L	V	V_L	34	
High optical power	m^{-1}	P_H	+13	
Voltage for P_H	V	V_H	54	
Optical power @ 0V	m^{-1}	P_o	-12	
Wave Front Error, rms	nm	WFE_{rms}	30	(2); (3); (4)
Voltage @ 0 diopter	V	V_{0D}	39.5	(4)
Slope	$(m.V)^{-1}$	S	0.85	(4)
Transmission @ 587 nm	%	T_{587}	97	

Notes:

- (1) Pupil size on the bottom part of the adjustable lens.
- (2) Measured on pupil size and on $[P_L; P_H]$ – WFE is mainly astigmatism.
- (3) Parameter is compiled on $[P_L; P_H]$.
- (4) Parameter measured with a 2 V sampling.

Typical Response



The optical response is a linear function of voltage on $[P_L; P_H]$: $P = S(V_{rms} - V_{0D})$.

Electrical Specifications

<i>Parameter</i>	<i>Unit</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Notes</i>
Capacitance	pF	C		100	175	
Q Factor	-	Q		26		
Driving Frequency	kHz	f		1	5	(1)
Current consumption	μA	I _{max}			200	
AC input Voltage, rms	V	V _{rms}			60	

Notes:

- (1) All parameters in the data sheet are specified for a 1 kHz sine wave front.

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

For laboratory tests, a square signal can be applied using a laboratory function generator, providing the fact that the signal contains no DC voltage. Use of DC voltage or DC/AC voltage combinations will lead to abnormal behavior and limited lifetime of the adjustable lens.

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.

Temperature Range

<i>Parameter</i>	<i>Unit</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Notes</i>
Operating temperature range	°C	-30°C	25	+85°C	
Storage temperature range	°C	-40°C	25	+85°C	

Remarks:

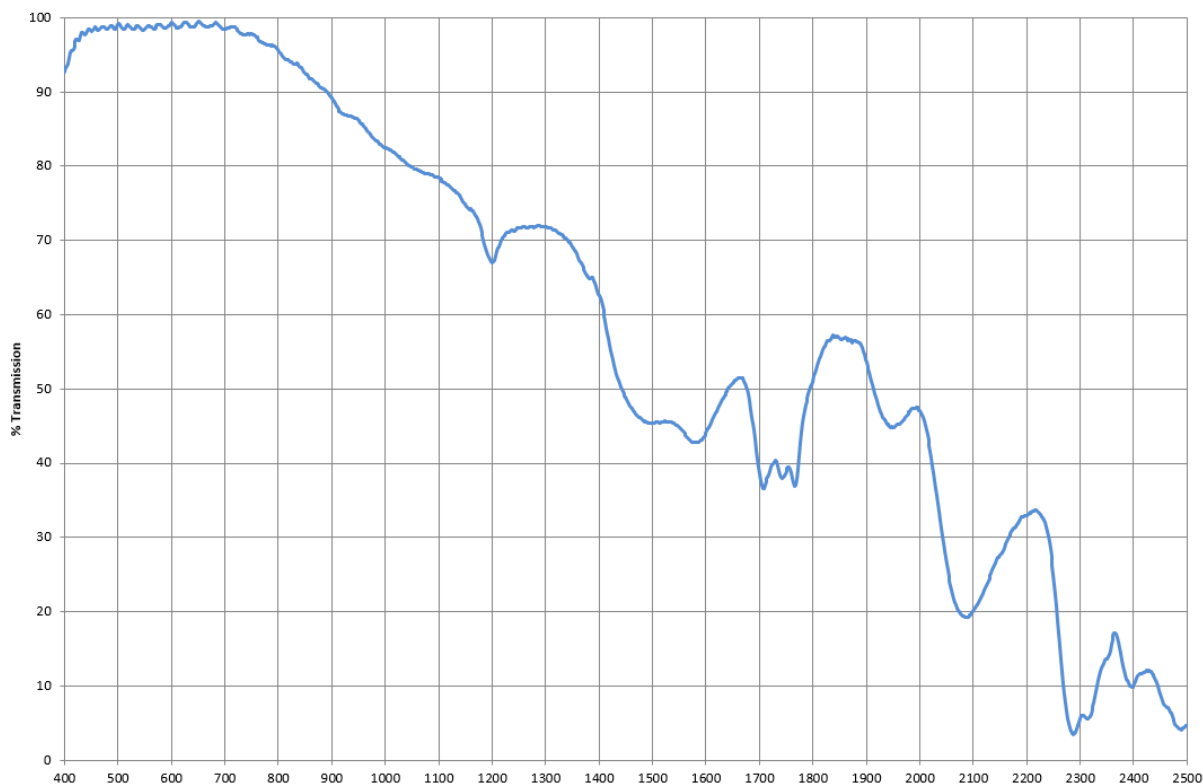
- Corning Varioptic Lenses are not designed to be soldered. For electrical connection, please refer to the application notes.
- Storage above maximum storage temperature will reduce lifetime of the lens. Temporary or permanent damage may occur if the maximum temperature is exceeded.

Transmission Performance

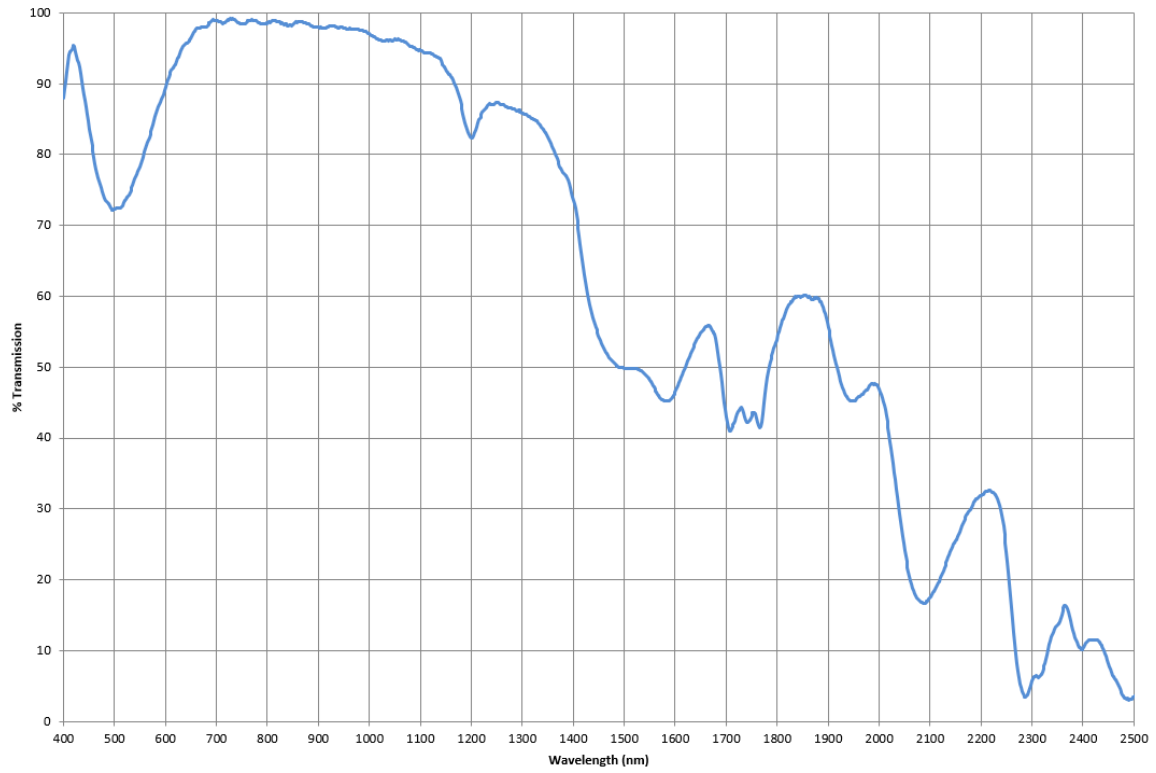
The two outer surfaces of the glass windows of the adjustable lenses have AR coatings. These AR coatings have been optimized for different wavelengths.

Transmission curves of the complete adjustable lens including AR coatings:

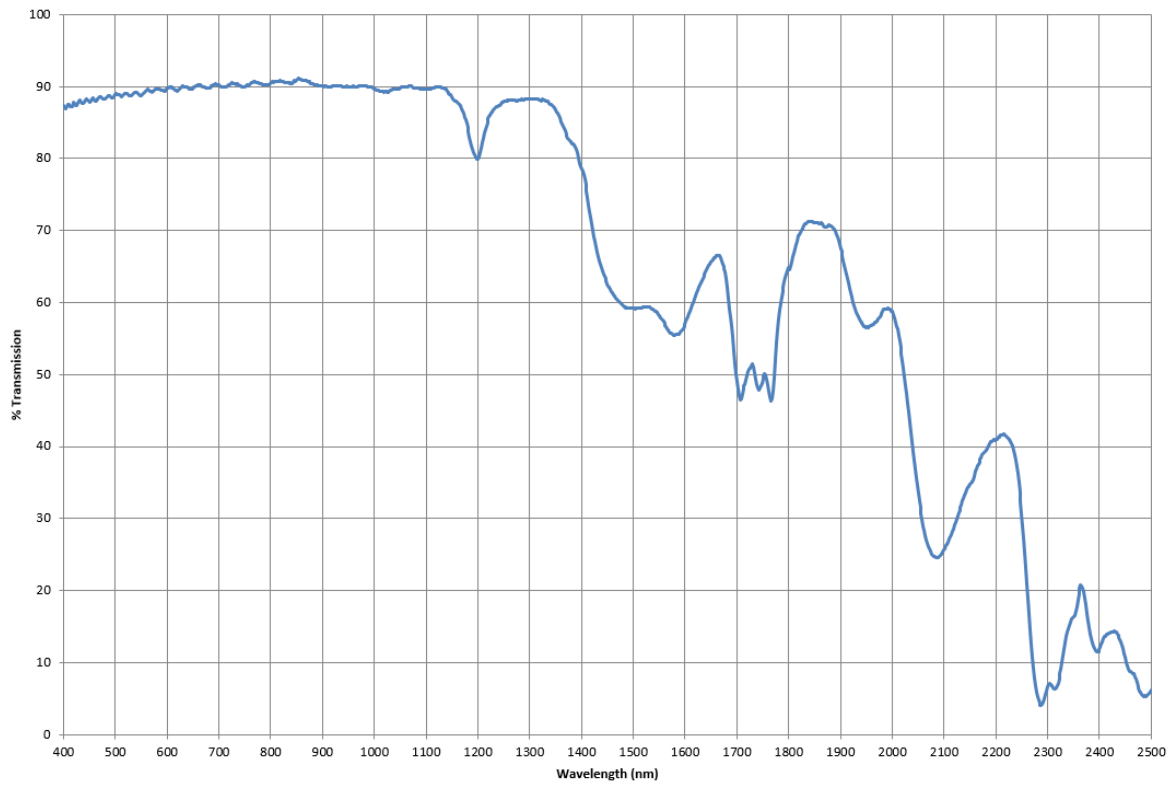
A-25H0



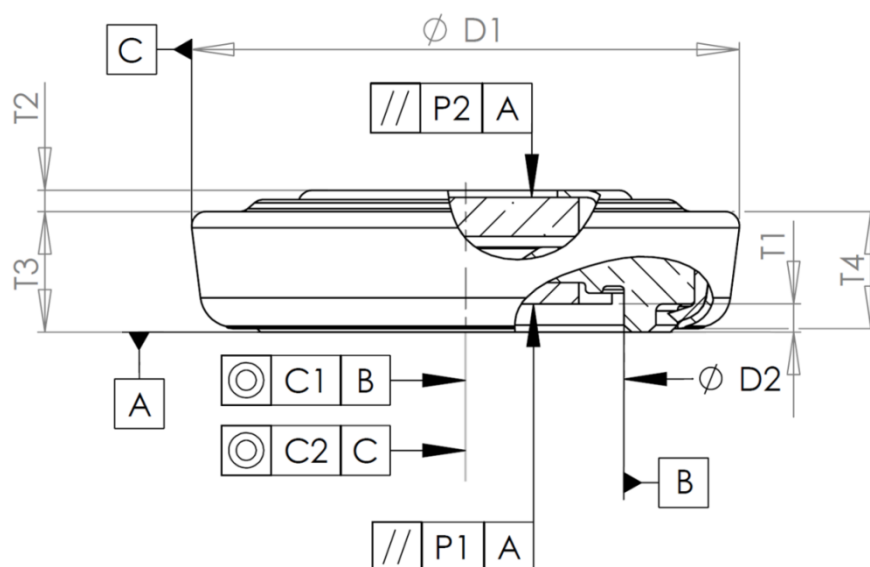
A-25H1



A-25H9



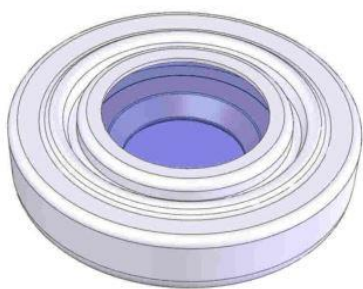
Mechanical Dimensions



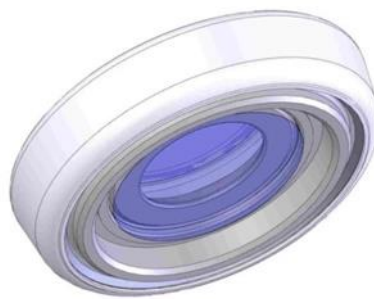
Parameter	Unit	Symbol	Typ	Max	Notes
External diameter	mm	D1	7.72		
Recess diameter	mm	D2	5.2		
Recess depth	mm	T1	0.4		
Thickness, front area	mm	T2	0.4		(1)
Thickness, flat to bottom	mm	T3	1.75		
Thickness, flat to cap edge	mm	T4	1.6		
Parallelism, rear window to A	mm	P1		0.06	
Parallelism, front window to A	mm	P2		0.05	
Concentricity, optical axis to B	mm	C1		0.03	(2)
Concentricity, optical axis to C	mm	C2	0.015		(2)

Notes:

- (1) Temperature dependent. A 50 μ m free space in front of cap should be left available for thermal expansion.
- (2) Optical axis decenter is half of the concentricity value.

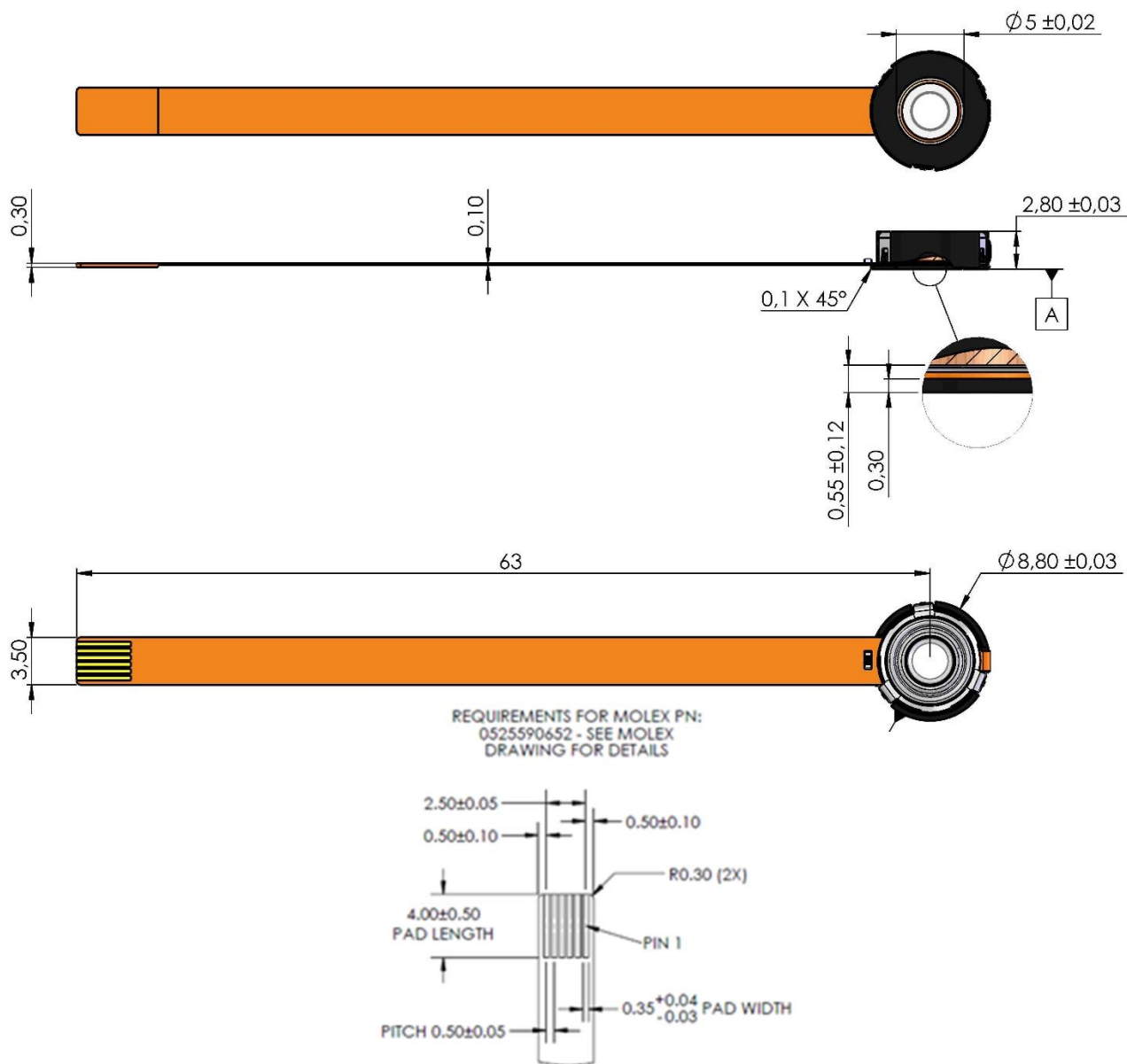


Top view of lens

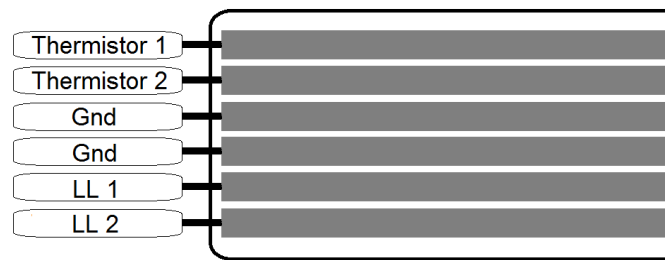


Rear view of lens

A-P-25HX-33



Electrical Contact for A-P-25HX-33



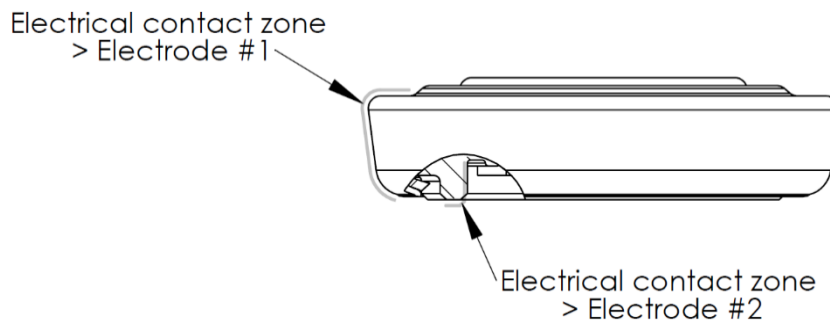
The following 0.5 mm pitch, 6-pin FPC connectors are compatible with the FPC tip:

- 525590652 from Molex
- 5034800600 from Molex

FPC-A-33 is populated with a 0402 thermistor (Reference: ERTJ0ES104F from Panasonic).

Integration of A-25H

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:

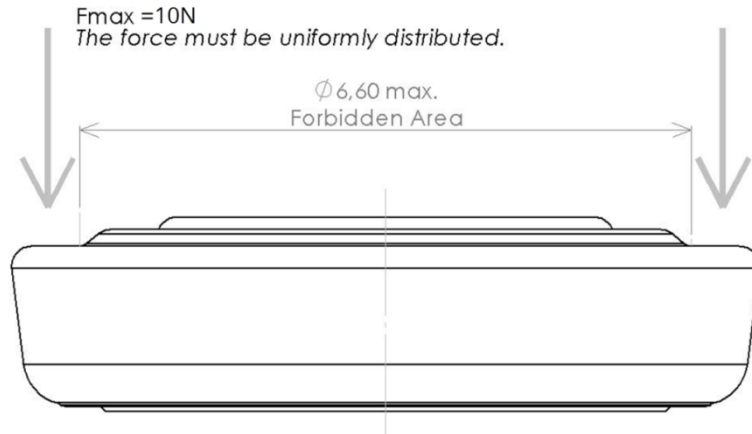


A 5 Ω max contact resistance is recommended to allow appropriate electrical connection.

For more details about electrical connection, please refer to the Corning Varioptic Lenses application notes.

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

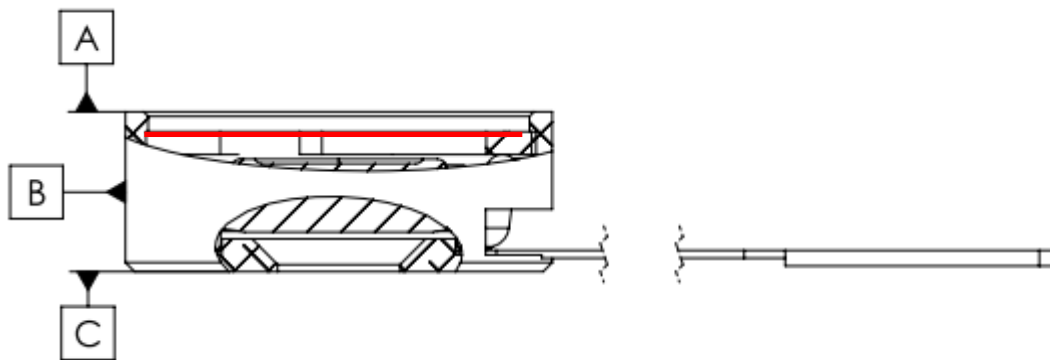
The central area of the lens inside a 6.6 mm diameter and 0.05 mm thickness disc should be left free for any mechanical parts. The area outside this disc can be used to maintain the lens with a maximum force of 10 N uniformly distributed.



Integration of A-P-25HX-33

Only the datums A, B and C must be used as a mechanical reference (see drawing below).

Avoid mechanical contact with other surfaces (especially the surface in red on the drawing below).



Note: In packaged A-P-25HX-YY, the flex cable inputs are directly on the bottom side (Surface 6 in previous schematic) of the adjustable lens.

Corning reserves the right to change its product specifications at any time without notice. Please ensure you have the latest applicable specification before purchasing a Corning product. Corning does not provide any warranty of merchantability or fitness for a particular purpose. Additionally, the products sold by Corning are not designed, intended or authorized for use in life support, life sustaining, medical device, healthcare, nuclear, military, or any applications in which the failure of such products could reasonably be expected to result in personal injury, loss of life or catastrophic property or environmental damage. Corning does not make any claims or statements that our products have been approved for such applications. Further, Corning has not tested its products for safety and efficacy in any such applications. The customer is responsible for determining the suitability of Corning's product for its application, including any testing, validation, and/or regulatory submissions that may be required to support the safety and efficacy of its intended use. Product specifications are available upon request at varioptic@corning.com