

## Benefits of Variable Focus Technology

### Introduction

Variable focus liquid lens technology can simplify installation, setup and maintenance by eliminating the need to manually touch the lens. It is also ideal for applications with reading distances that change from part to part or during part changeover.

Relative to other autofocus mechanisms, the liquid lens has extremely fast response times and provides the ability to focus over a larger range of working distances than standard fixed-focus lenses.

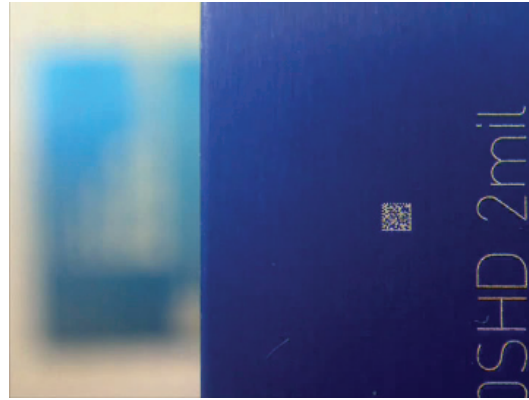
Cognex was the first company to release this new technology integrated into both DataMan® industrial fixed-mount ID readers and DataMan industrial handheld ID readers.

### When Focal Ranges Vary

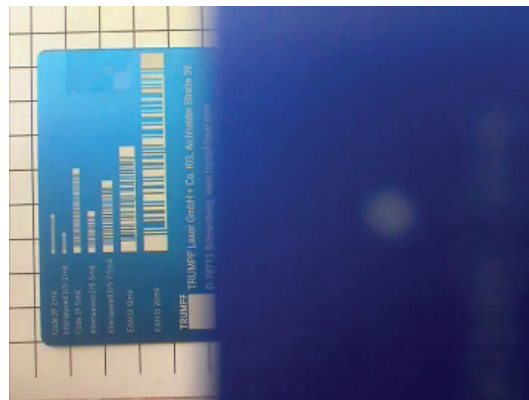
Variable focus is required in applications such as reading barcodes on different sized boxes or parts moving along a conveyor causing varying focal distances from a fixed-mount reader. It does not matter if the code appears near or far, focus is achieved from contact to distances of up to 500 mm (20 inches) in less than 100 milliseconds. There is no need to manually adjust the focus on the line. When focal ranges are unknown, autofocus can be achieved by a software command over Ethernet or serial in under one second.

For the highest speed material handling systems the liquid lens allows the reader to change focus from box to box quickly enough for the image-based reading algorithms to scan the entire box for barcodes.

In handheld barcode reading applications, variable focus technology provides one reader the ability to read small direct part marks (DPM) close up and then read large 1-D codes far away with the same reader. Typically, this type of application requires two readers: one to read the smallest 2-D codes and one to read wide 1-D barcodes. With variable focus technology, one reader's lens can toggle between two or more focal distances providing the ultimate in depth of field flexibility. You can set different step functions so that the reader will focus at, for example, 25 mm away from the reader and then the next focus could be as far as 150 mm or 300 mm.



The liquid lens adjusts for a small close up Data Matrix code, above, and can focus on barcodes at a distance, below.



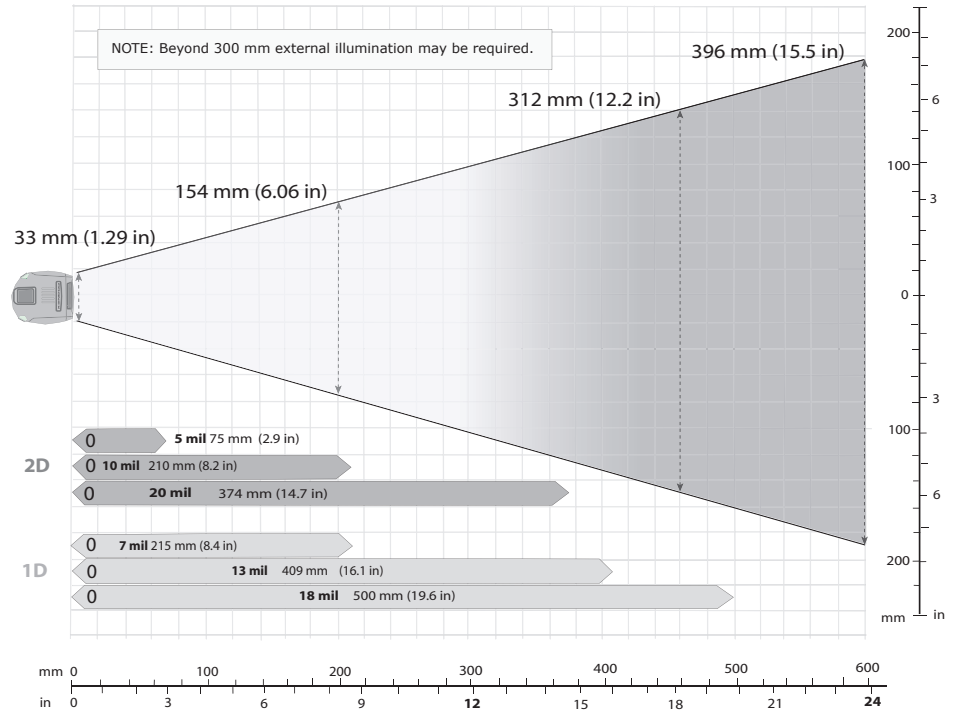
### Benefits of Liquid Lens Variable Focus Technology

- Large focal length range
- Read symbologies both close up and far away with the same reader
- Rugged, industry proven technology
- No moving parts for extended product life
- Fast response
- Field installable option
- Very good optical quality
- Wide operating temperature range
- Extremely low electrical consumption

## DataMan 8000 Field of View and Reading Distances

This scan map shows what size codes can be read at what distance from the DataMan 8000 handheld reader. The scale on the bottom shows the depth of field for 2-D and 1-D codes of different sizes. For example, an 18 mil 1-D code can be read from 500 mm.

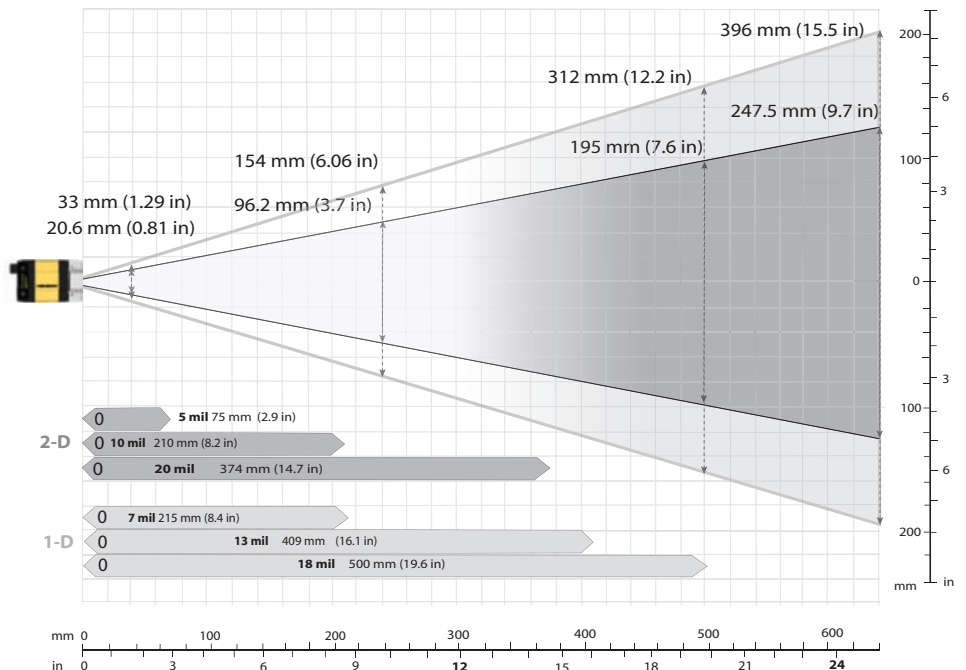
### Installed Liquid Lens



## DataMan 300 Field of View and Reading Distances

This scan map shows what size codes can be read at what distance from the DataMan 300 fixed-mount reader. The outer values show the field of view of the DataMan 302 with 1280x1024 pixel resolution, while the inner values show the field of view of the DataMan 300 with 800x600 pixel resolution. The scale on the bottom shows the depth of field for 2-D and 1-D codes of different sizes. For example, a 20 mil 2-D code can be read from 374 mm with the 10.3 mm lens.

### 10.3 mm Liquid Lens Module Option



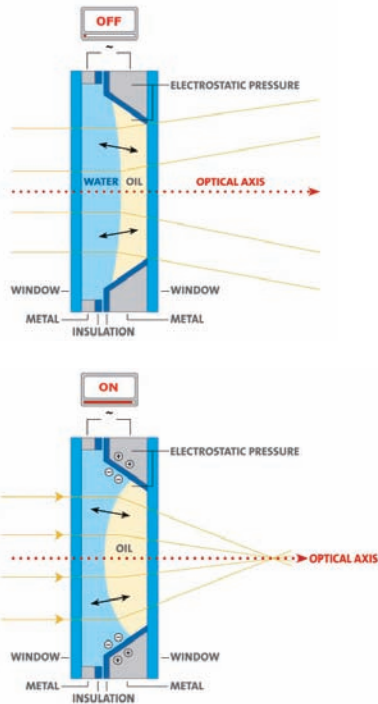
## DataMan 500 Field of View and Reading Distances

These scan maps show what size codes can be read at what distance from the DataMan 500 fixed-mount reader. The 18.8 mm lens is most suitable for reading distant objects, while the 13.3 mm lens is best for reading codes at close distances. The scale on the bottom shows the depth of field for 2-D and 1-D codes of different sizes. For example, an 20 mil 1-D code can be read from 60-695 mm with the 18.8 mm liquid lens.

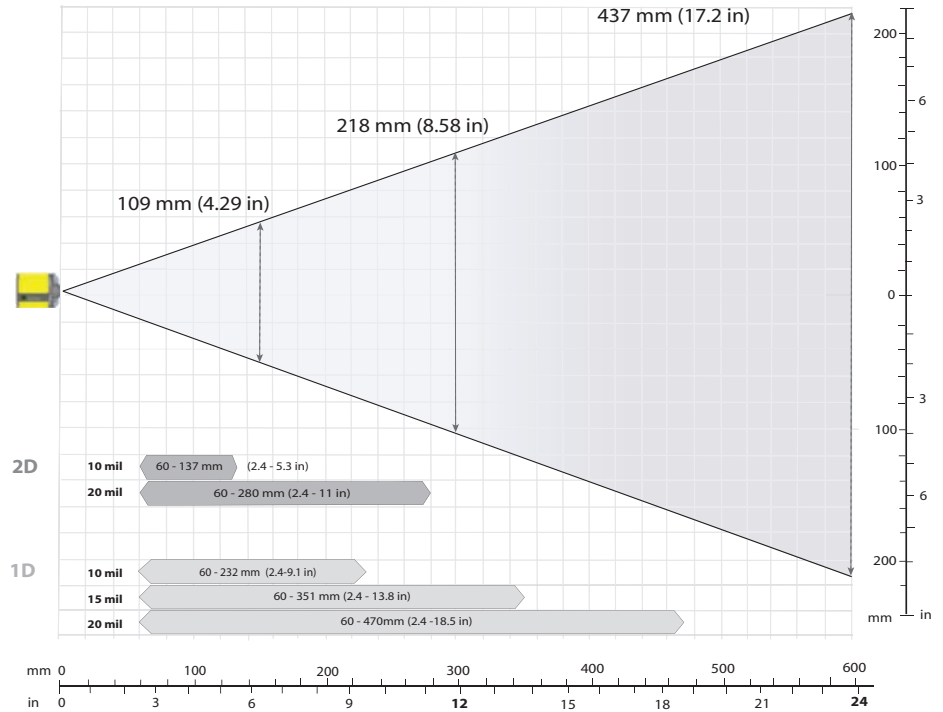
### Liquid Lens Technology

The liquid lens module is an electronically controllable variable focus system.

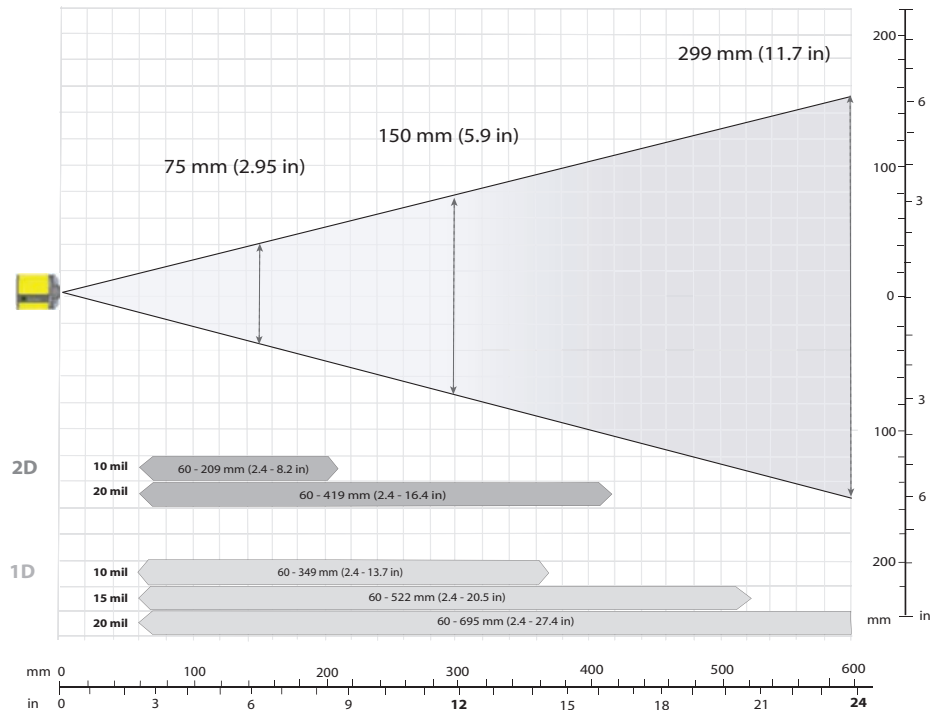
The liquid lens uses two iso-density liquids—oil is an insulator while water is a conductor. The variation of voltage leads to a change of curvature of the liquid-liquid interface, which in turn leads to a change of the focal length of the lens.



### 13.3 mm Liquid Lens Module Option



### 18.8 mm Liquid Lens Module Option



## Intelligent Tuning for Simple Setup

For DataMan readers with the intelligent tuning feature, you can automatically adjust the settings of the integrated lighting to find the optimal light setup for your part. When the liquid lens is installed, tuning also automatically adjusts the focal settings to accommodate the full range of variability of your application's part sizes, positions and attributes.



Many DataMan barcode readers take advantage of liquid lens technology. The table below briefly outlines the DataMan optics options.

Series	Installed Lens	Lens Options
<b>DataMan 8000</b>	<i>Liquid Lens</i>	N/A
<b>DataMan 500</b>	Choose from options	<i>Liquid Lens, C-/CS-Mount</i>
<b>DataMan 300</b>	Choose from options	<i>Liquid Lens, S-Mount, C-Mount</i>
<b>DataMan 200</b>	Three-position adjustable, S-Mount	<i>Liquid Lens, large aperture S-Mount, C-Mount</i>
<b>DataMan 100</b>	Three-position adjustable, S-Mount	C-Mount adapter, super high density or large aperture S-Mount

### Americas

United States, East +1 508 650 3000  
 United States, West +1 650 969 8412  
 United States, South +1 615 844 6158  
 United States, Detroit +1 248 668 5100  
 United States, Chicago +1 630 649 6300  
 Canada +1 905 634 2726  
 Mexico +52 81 5030 7258  
 Central America +52 81 5030 7258  
 South America +1 909 247 0445  
 Brazil +55 47 8804 0140

### Europe

Austria +43 1 23060 3430  
 Belgium +32 2 8080 692  
 France +33 1 4777 1550  
 Germany +49 721 6639 0  
 Hungary +36 1 501 0650  
 Ireland +353 1 825 4420  
 Italy +39 02 6747 1200  
 Netherlands +31 208 080 377  
 Poland +48 71 776 0752  
 Spain +34 93 445 67 78  
 Sweden +46 21 14 55 88  
 Switzerland +41 71 313 06 05

Turkey +90 212 371 8561  
 United Kingdom +44 1327 856 040

### Asia

China +86 21 5050 9922  
 India +9120 4014 7840  
 Japan +81 3 5977 5400  
 Korea +82 2 539 9047  
 Singapore +65 632 55 700  
 Taiwan +886 3 578 0060

# COGNEX

[www.cognex.com](http://www.cognex.com)

Corporate Headquarters  
 One Vision Drive Natick, MA 01760 USA  
 Tel: +1 508 650 3000 Fax: +1 508 650 3344