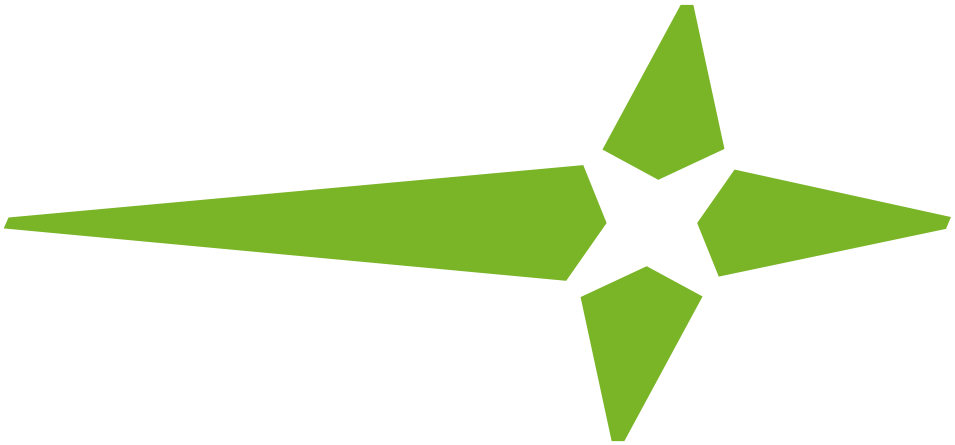
LINOS®

OPTEM®

# Optical Inspection
## Machine Vision Lenses and Modular Microscope Systems



excelitas®



# About Excelitas

Excelitas is a leading industrial technology company enabling precision instrumentation, sensing and controls, advanced automation and performance materials that deliver current and next-generation innovations that enrich lives. Headquartered in Pittsburgh, PA, Excelitas partners with market-leading OEMs across attractive end markets. The company's mission-critical sensing, detection, imaging, optics, specialty illumination solutions and high-performance materials are engineered into applications where precision, reliability and performance are essential. With a global footprint and a history of deep technical expertise and next-generation innovation, Excelitas is positioned at the intersection of powerful secular demand growth trends, including AI, semiconductor equipment and data center connectivity, industrial automation, minimally invasive & advanced diagnostic healthcare, aerospace, global defense and security systems.

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# Introduction

Our Optical Inspection products cover the broad spectrum from classical Machine Vision to non-industrial imaging with applications in e.g. life science and biometrics. All these different applications have their very unique set of requirements that often result in application specific products. With the ever increasing range of different imaging tasks and the enormous diversity of requirements for this multitude of applications it is a huge challenge for manufacturers of inspection components to keep up and offer components that meet the latest requirements. Excelitas with its brands LINOS®, and OPTEM® is determined to support as many of these requirements as possible and as a result we constantly add new products to our portfolio.

This brochure provides an overview of our product portfolio and shows the wide range of applications and requirements that is covered with a product offering which spans from traditional LINOS® Machine Vision lenses which support large image sensors to super flexible OPTEM® micro imaging solutions with integrated liquid lens focusing and high speed zooming.

The bracket around this product offering is our MachVis software that is available for more than 10 years and proved to be a reliable guide for finding the optimum solution as well as a comprehensive product database in thousands of cases.

## MAG.X

MAG.X system 125 - modular system for high resolution micro-inspection



## MACHVIS, SELECTION EXAMPLE



## FUSION

OPTEM® fusion setup mounted on a X95 profile



The huge part of the Optical Inspection portfolio that cannot be shown in any brochure is the vast array of customer specific products. From custom variants of standard lenses to fully integrated turnkey sub-modules this collection of specifically designed products is built with the same attention to detail using top notch optical manufacturing technologies and decades of experience in optical and mechanical design as well as patented mounting technologies for performance that matches requirements – not above, not below – just as required.

The basis for custom as well as off-the-shelf products however is a profound understanding of market and application needs. Close collaboration with customers around the world helps us to understand what is really needed and to provide the right solution with the right performance.

For further information about our optical inspection systems please scan or click the QR-Code.

## INSPEC.X L

inspec.x L serie, one of our premium lens programs to meet all conceivable high resolution applications in image processing



## OPTEM® FUSION

Components of the comprehensive OPTEM® FUSION system with highest versatility



# LINOS® Machine Vision Lenses

## d.fine HR 2.4/128 3.33x

Optimized for a magnification of 3.33X, the d.fine HR 2.4/128 lens delivers unparalleled imaging performance. With modular accessories, the d.fine HR 2.4/128 enables dual-support for both 12k/16k line sensors and large format area sensors, providing the versatility to handle countless imaging tasks. The d.fine HR 2.4/128 is the perfect choice for the most demanding high throughput imaging applications.





Prism module



Area scan module

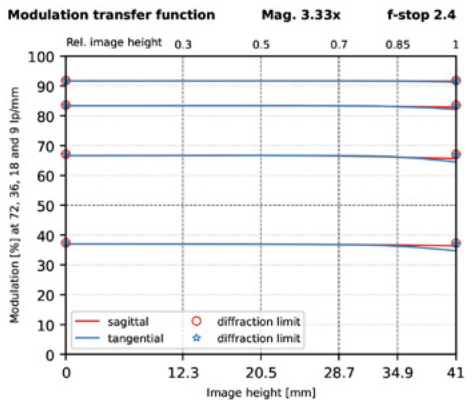
### YOUR BENEFITS

- Resolution up to 300 lp/mm (object side)
- For 12k and 16k line sensors and coaxial illumination
- Suitable for large area sensors such as 150 MP
- Optimized for visible spectrum
- Small chromatic focal shift

### APPLICATION EXAMPLES

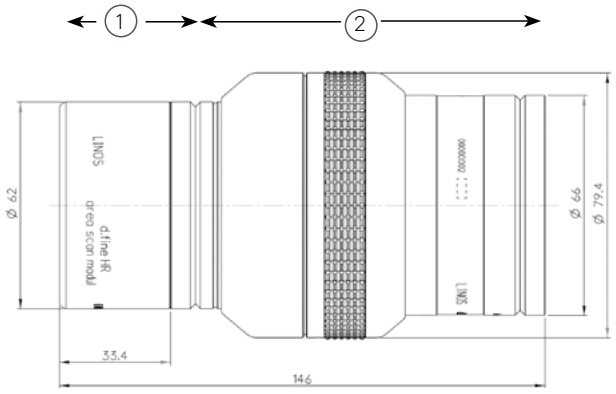
- FPD
- OLED
- PCB
- Flip Chip
- Semiconductor

### MTF




MTF @ ratio 3.33, f-stop = 2.4

### D.FINE HR WITH AREA SCAN MODULE




(1) d.fine HR area scan module (2) d.fine HR 2.4/128 3.33x

### D.FINE HR 2.4/128

| Product | Focal length (mm) | F-number | Magnification range | Image Circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| d.fine HR 2.4/128 3.33x * | 128 | 2.4 | 3.2 ... 3.5 | 82 | V-groove Ø 66 mm | 0703-134-000-20 |

* d.fine HR 2.4/128 3.33x lens must be combined with either d.fine HR prism module or d.fine HR area scan module for proper operation

### D.FINE HR ESSENTIAL ACCESSORIES

| Product | Part No. |
|---|---|
| d.fine HR prism module | 0703-130-823-00 |
| d.fine HR area scan module | 0703-130-825-00 |

In line scan applications, the prism module accessory enables the addition of coaxial illumination alongside high performance imaging. For area scan applications, the compensating area scan module is compatible with the same lens.

# d.fine HR-M

The LINOS® d.fine HR-M lens series delivers ultra-precise imaging across large fields of view. Its large aperture maximizes light throughput for higher efficiency, while high resolution up to the image corners ensures outstanding performance with full-frame and 16K line-scan sensors down to 3.5 µm pixel size.

Combined with flexible focusing and mounting modules, the lenses integrate with almost any industrial camera, making them ideal for a wide range of machine vision applications.



d.fine HR-M 2.6/50



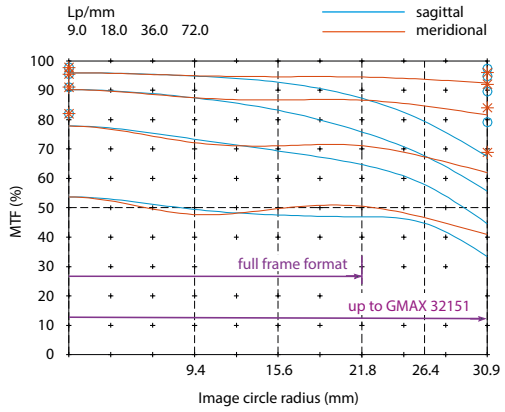
d.fine HR-M 2.8/80

## YOUR BENEFITS

- Ultra fine resolution lens
- Large aperture maximizing light throughput
- For large area sensors and line sensors up to 16k/3.5µm
- Precision alignment for consistent full field of view imaging performance

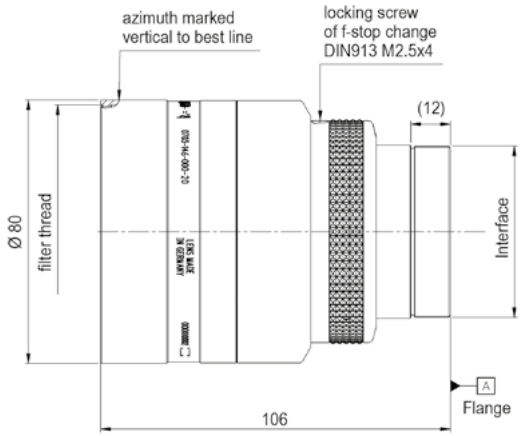
Are you interested, which award this lens series won?

## MTF




MTF of d.fine HR-M 2.8/80 @ ratio 0.2 and f-stop = 2.8

## D.FINE HR-M 2.8/80




## D.FINE HR-M 2.8/50 AND 80

| Product | Focal length (mm) | F-number | Magnification range | Image Circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| d.fine HR-M 2.6/50 0.15x | 50 | 2.6 | 0.1 ..-0.2 | 56.8 | V-groove ø44 | 0703-145-000-20 |
| d.fine HR-M 2.6/50 0.063x | 50 | 2.6 | 0.025 .. 0.1 | 56.8 | V-groove ø44 | 0703-145-000-30 |
| d.fine HR-M 2.8/80 0.2x | 80 | 2.8 | 0.14 .. 0.27 | 62.4 | M52x0.5 | 0703-146-000-20 |
| d.fine HR-M 2.8/80 0.09x | 80 | 2.8 | 0.04 .. 0.14 | 62.4 | M52x0.5 | 0703-146-000-30 |

# inspec.x L 105/120 mm

The inspec.x L Series was developed to meet the highest requirements in industrial image processing with very large sensors. This Lens Series shows even contrast and resolution over an image circle of up to 82 mm. The field-proven performance makes these lenses a perfect match for sensors like the popular 12k/5µm and 16k/5µm line-scan sensors. Very large area-scan sensors also benefit from the high resolution, low distortion and excellent color correction of these lenses.



inspec.x L prism lens with prism module

## YOUR BENEFITS

- Outstanding MTF performance
- Diffraction limited optical design
- Perfect match with 5 µm and useable down to 3.5 µm pixel size
- Full-metal barrel with lockable aperture

## SPECIFICATIONS

- Focal length: 105 mm and 120 mm
- Aperture: 3.5 ... 22
- Spectral range: 400-750 nm
- Large image circle up to 82 mm
- Camera mount: V-groove / Float 5.6/120: M42

## INSPEC.X L 5.6/105

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| inspec.x L 5.6/105 1.0x | 105 | 5.6 | 0.85 ... 1.2 | 82 | V-groove ø46 | 0703-082-000-20 |
| inspec.x L 5.6/105 0.76x | 105 | 5.6 | 0.6 ... 0.9 | 82 | V-groove ø46 | 0703-083-000-20 |
| inspec.x L 5.6/105 0.5x | 105 | 5.6 | 0.4 ... 0.65 | 82 | V-groove ø46 | 0703-084-000-20 |
| inspec.x L 5.6/105 0.33x | 105 | 5.6 | 0.25 ... 0.45 | 82 | V-groove ø46 | 0703-085-000-20 |

## INSPEC.X L FLOAT 5.6/105 AND 5.6/120

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| inspec.x L 5.6/105 float | 105 | 5.6 | 0.3 ... 3.0 | 82 | V-groove ø46 | 0703-114-000-20 |
| inspec.x L 5.6/120 float | 120 | 5.6 | 0.06 ... 0.52 | 82 | M42x0.75 | 0703-116-000-21 |

## INSPEC.X L 4/105

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| inspec.x L 4.0/105 3.5x | 105 | 4.0 | 3.3 ... 3.7 | 82 | V-groove ø46 | 0703-095-000-21 |
| inspec.x L 3.5/105 5.0x | 105 | 3.5 | 4.8 ... 5.2 | 82 | V-groove ø46 | 0703-102-000-20 |
| inspec.x L 4.0/105 3.5x prism | 105 | 4.0 | 3.3 ... 4.0 | 82 | V-groove ø46 | 0703-107-000-20 |
| inspec.x L 3.5/105 5.0x prism | 105 | 3.5 | 4.8 ... 5.2 | 82 | V-groove ø46 | 0703-108-000-20 |

## PRISM MODULE

| Product | Part No. |
|---|---|
| Prism module | 0703-107-824-00 |

The prism module is designed for the following lenses:

- inspec.x L 4/105 3.5x prism
- inspec.x L 3.5/105 5x prism

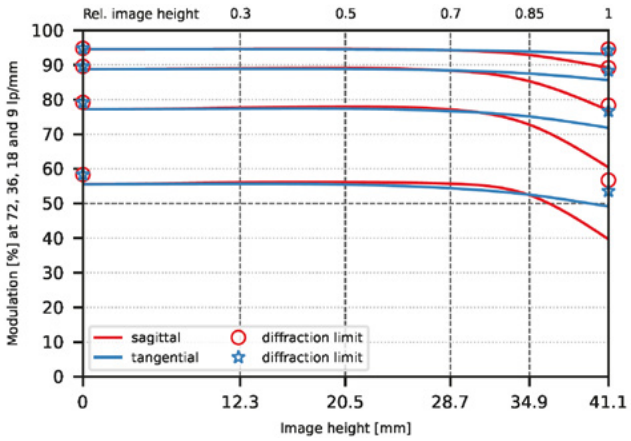
## APPLICATION EXAMPLES

- PCB inspection
- Display inspection
- Film and slide digitization
- High-end book scanning
- Glass inspection
- High-resolution web inspection
- 3D imaging

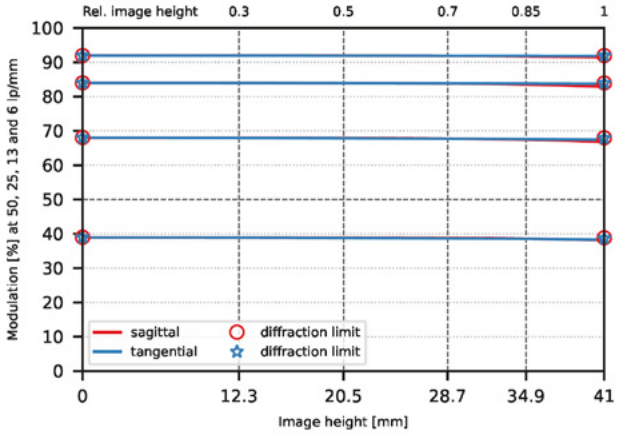
## MACHVIS

For further information about our web-based configurator, please scan or click the QR-Code.

## MTF

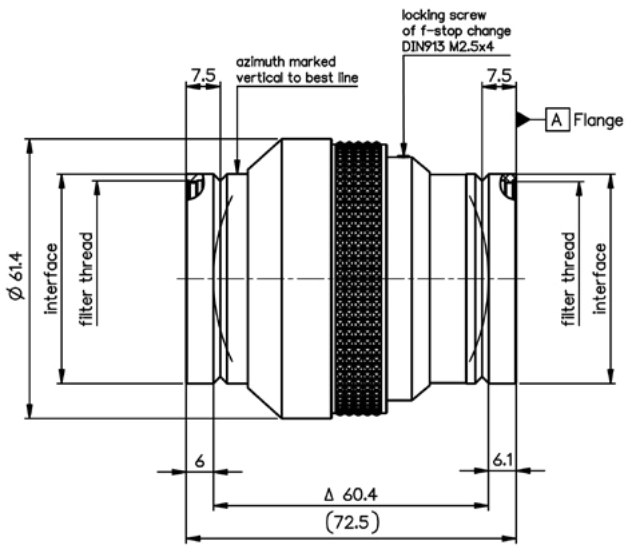



MTF of inspec.x L 5.6/105 0.5x @ β'= -0.5 and f-stop = 5.6

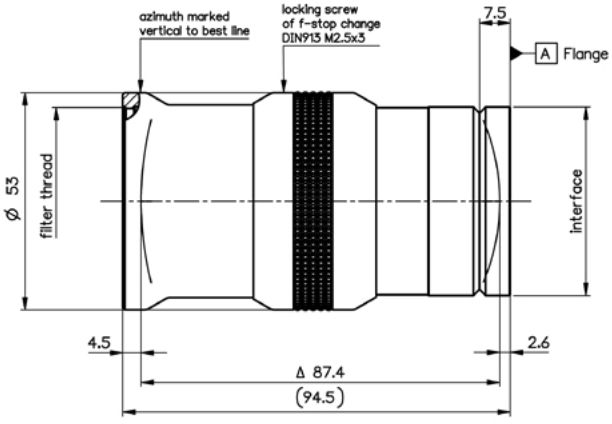



MTF of inspec.x L 4.0/105 3.5x @ β'= -3.5 and f-stop = 4

## INSPEC.X L 5.6/105 0.5X




## INSPEC.X L 4/105 3.5X



# inspec.x L 5.6/105 VIS-NIR

The inspec.x L VIS-NIR lens series sets a new benchmark for visual and non-visual inspection. Covering wavelengths from 400 to 1150 nm, its apochromatic, diffraction-limited design delivers ultra-sharp, high-contrast images across the entire field without refocusing.

The series comprises four lenses optimized for different magnifications and equipped with the proven V-groove interface. All models are compatible with the Excelitas Modular Focus System, providing maximum flexibility for a wide range of inspection applications.



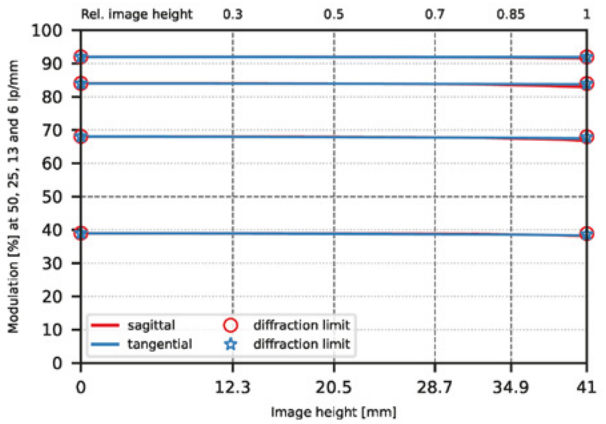
## YOUR BENEFITS

- VIS-NIR scan without refocus
- Apochromatically corrected lens
- Diffraction limited design for superior performance
- Ultra high resolution for large area and line sensors
- Flexible mounting system for almost any image processing camera
- Excellent price performance ratio

## APPLICATION EXAMPLES

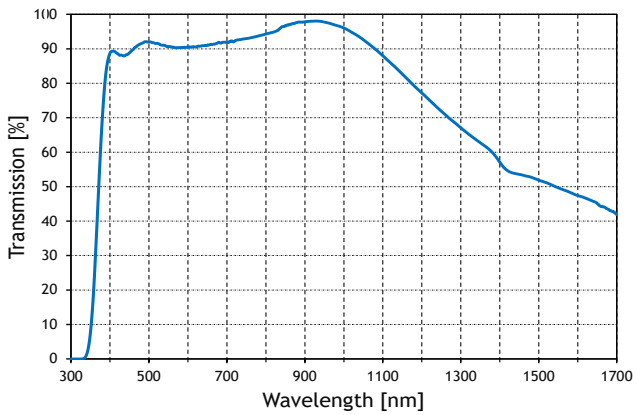
- PCB inspection
- Print inspection
- Surface inspection
- Waste inspection
- Battery inspection
- Food inspection

## MTF




MTF of inspec.x L 5.6/105 VIS-NIR 1x @ β'= -1 and f-stop = 5.6

## TRANSMISSION




Transmission of inspec.x L 5.6/105 VIS-NIR

## INSPEC.X L 5.6/105 VIS-NIR

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| inspec.x L 5.6/105 VIS-NIR 1.0x | 105 | 5.6 | 0.85 ... 1.2 | 82 | V-groove ø46 | 0703-082-000-30 |
| inspec.x L 5.6/105 VIS-NIR 0.76x | 105 | 5.6 | 0.6 ... 0.9 | 82 | V-groove ø46 | 0703-083-000-30 |
| inspec.x L 5.6/105 VIS-NIR 0.5x | 105 | 5.6 | 0.4 ... 0.65 | 82 | V-groove ø46 | 0703-084-000-30 |
| inspec.x L 5.6/105 VIS-NIR 0.33x | 105 | 5.6 | 0.25 ... 0.45 | 82 | V-groove ø46 | 0703-085-000-30 |

# inspec.x L 4/60

The inspec.x L 4/60 is optimized for magnifications from 0x down to 0.2x. In this range, the lens shows exceptional contrast over a large sensor size of up to 70mm. High contrast goes along with very good color correction and low distortion. The 60mm lens provides unusually high performance for such a short focal length and enables imaging of large objects in space constrained environments with large sensors.

The inspec.x L4/60 features a threaded interface for use with the popular Modular Focus helical mount that provides access to virtually all existing cameras via different camera adapters.



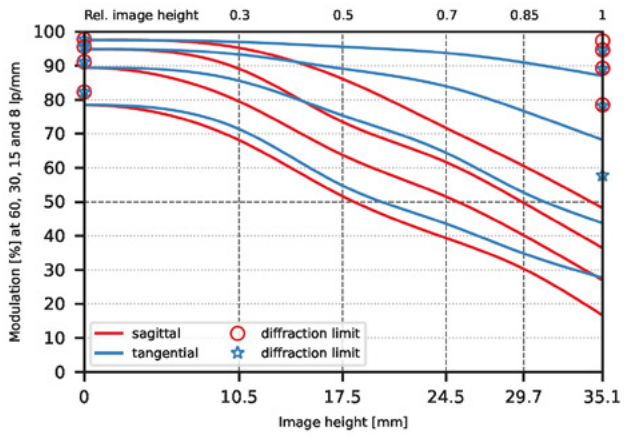

## YOUR BENEFITS

- High contrast for small magnifications
- Excellent color correction

## SPECIFICATIONS

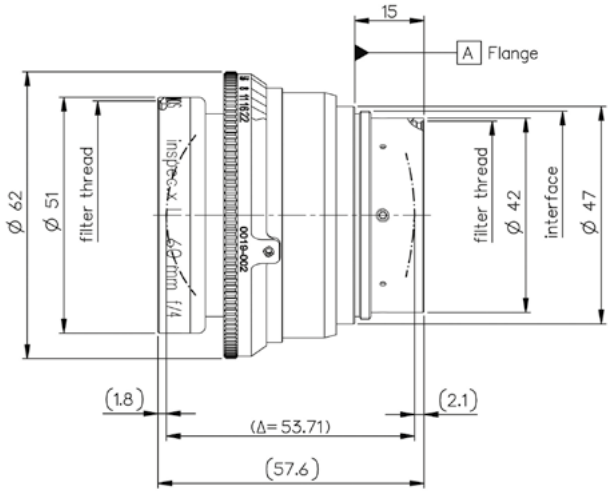
- Focal length: 60 mm
- Magnification range: 0 ... 0.2
- Image circle up to 70 mm
- Spectral range: 400-750 nm
- Iris diaphragm: manual, continuous with set screw
- Mount: compatible to Modular Focus
- Wide range of mechanical accessories

## MTF




MTF of inspec.x L 4/60 @ β'= -0.03 and f-stop = 5.6

## INSPEC.X L 4/60




## INSPEC.X L 4/60

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| inspec.x L 4.0/60 | 60 | 4.0 | 0 ... 0.2 | 70.8 | M45x0.75 | 0019-002-000-50 |

# inspec.x M

The inspec.x M Series closes the gap between the outstanding C-Mount MeVis-C lenses and the large format inspec.x L lenses.

Equipped with lockable manual focus and manual iris these F-Mount lenses are the ideal choice for sensors up to 35 mm format when a fast f/# is required. The 1.4/50 mm lens is available for visible spectral range or near-infrared. The NIR version lens features a coating for the range from 900 to 1350 nm, making it an ideal choice for applications like electro- and photoluminescence



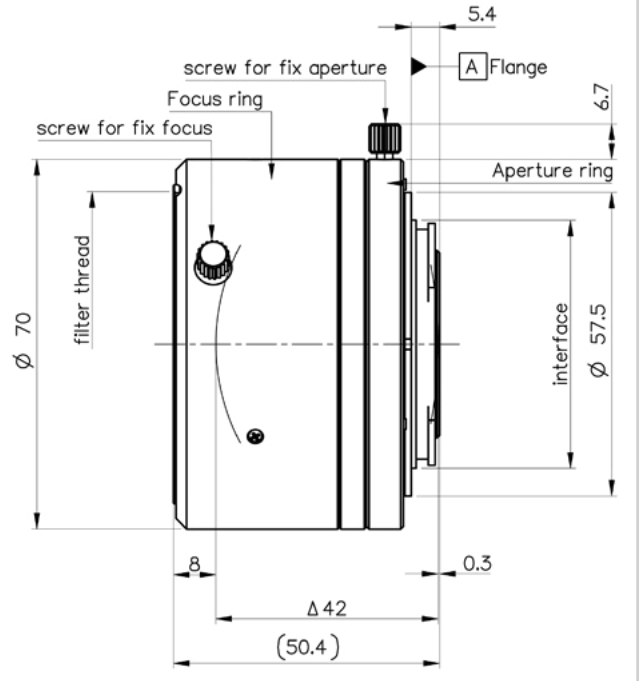
## YOUR BENEFITS

- Large magnification range
- Very high numerical aperture
- Low distortion
- VIS and NIR version

## SPECIFICATIONS

- Optimal magnification: 0.07
- Image circle: 43.3 mm
- Max. sensor size: 35 mm format
- Camera mount: F-Mount
- Focusing: manual, lockable
- Iris diaphragm: manual, lockable

## INSPEC.X M




## DRIVEN BY YOUR APPLICATION PARAMETERS ...

Do You know about MachVIS? Our web-based configurator is designed to help you find the right lens for your machine vision application.

Based upon four key parameters of your application, MachVis will provide the lens solutions that are most suitable to your specification:

- Working distance
- Object size or magnification
- Sensor size
- Camera mount

**MachVis, also available as Web-App. Have a look at page 30 for more details!**

## INSPEC.X M

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| inspec.x M 1.4/50 | 50 | 1.4 | 0 ... 0.15 | 43.3 | F-Mount | 0009-243-000-40 |
| inspec.x M NIR 1.4/50 | 50 | 1.4 | 0 ... 0.15 | 43.3 | F-Mount | 0009-243-000-42 |

# MeVis-C

The LINOS® MeVis-C lenses are specifically developed to be used with the highest resolution sensors available on the market.

Exceptionally high resolution across the entire sensor ensures optimal performance for the most demanding applications. High resolution is paired with low distortion, minimal light falloff and excellent chromatic correction across the entire spectral range of 450-950 nm.

Premium glass and specialized coatings further combine to deliver very good color rendition. These lenses can resolve up to 200 lp/mm, even to the extreme corners of a 1“ sensor. The combination of these key features is unique to our MeVis-C and represents the perfect match for modern high-resolution sensors with up to 1” diameter.



## APPLICATION EXAMPLES

- Pharmaceutical package control
- Rail and wheel inspection
- 3-D measurement
- Solar cell inspection – visible and NIR
- Inspection of contact lenses
- Wood inspection
- Forensics

## YOUR BENEFITS

- Highest optical performance
- Large image circle up to 1 inch
- For pixel size even below 2 µm
- High numerical aperture

## SPECIFICATIONS

- Focal length: 25 ... 50 mm
- Magnification range: 0 ... 0.1
- Spectral range: 450-950 nm
- Focusing: manual, lockable
- Iris diaphragm: manual, lockable
- Filter thread: M35.5x0.5
- Lens diameter: 42 mm

## MEVIS-C

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| MeVis-C 1.6/25 | 25 | 1.6 | 0 ... 0.1 | 16 | C-Mount | 0020-002-000-40 |
| MeVis-C 1.6/35 | 35 | 1.6 | 0 ... 0.1 | 16 | C-Mount | 0020-001-000-40 |
| MeVis-C 1.8/50 | 50 | 1.8 | 0 ... 0.075 | 16 | C-Mount | 0020-003-000-40 |

# Rodagon 2.0/25 SWIR

The new LINOS® Rodagon 2.0/25 SWIR sets a new standard for short-wave infrared imaging. Featuring high transmission from 840 to 1900nm and a fast f/2.0 aperture, it delivers high-contrast images and reliable performance for demanding SWIR inspection and measurement applications.

Optimized for 1.1" sensors with image circles up to 18 mm, the lens provides uniform image quality, eliminates focus shift between NIR and SWIR, and enables precise detection of fine details. Its integrated filter thread, robust design, and compatibility with the LINOS® Modular Focus system ensure seamless integration and flexible focusing options for industrial and scientific applications.



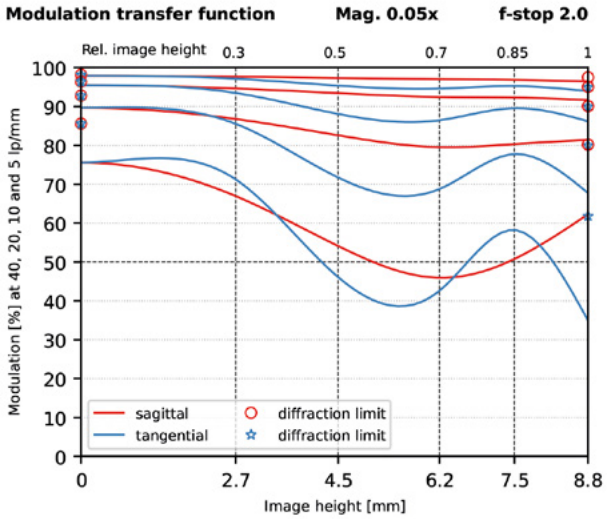

## YOUR BENEFITS

- Large image circle up to 1.1"
- No focus shift from 840-1900 nm
- Large aperture of f/2.0
- Robust design (full metal housing)
- Integrated filter thread
- Iris diaphragm: fix
- Filter thread: M30.5x0.5

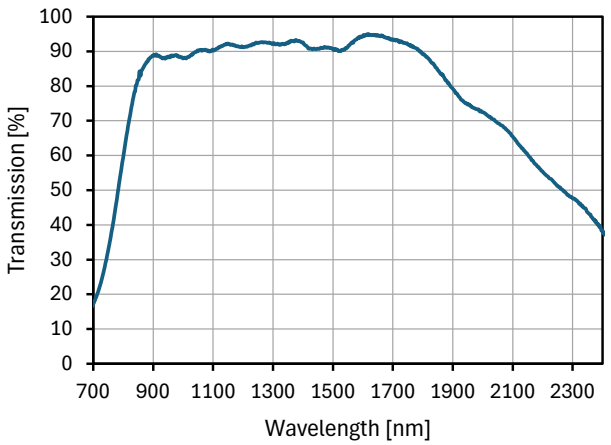
## APPLICATION EXAMPLES

- Smart farming
- Food and agriculture
- Pharmaceuticals
- Solar cell defect inspection
- Through-silicon inspection
- Hyperspectral and multispectral imaging
- Waste sorting

## MTF




## TRANSMISSION




## RODAGON 2.0/25 SWIR

| Product | Focal length @ 1400nm (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| Rodagon 2.0/25 SWIR | 25.0 | 2.0 | 0.1 ... 0.00 | 18 | M32.5x0.5" | 0703-406-000-20 |

# APO-Rodagon

The high resolution of the Apo-Rodagon lens series makes them an optimum solution for cameras with a pixel size down to 5 µm. The high resolution is accompanied by ultra-low distortions and negligible color fringing.

Distortion is corrected to near zero and cannot be seen even in critical subjects with straight-lined structures.



Apo-Rodagon-D 4.0/75 1x

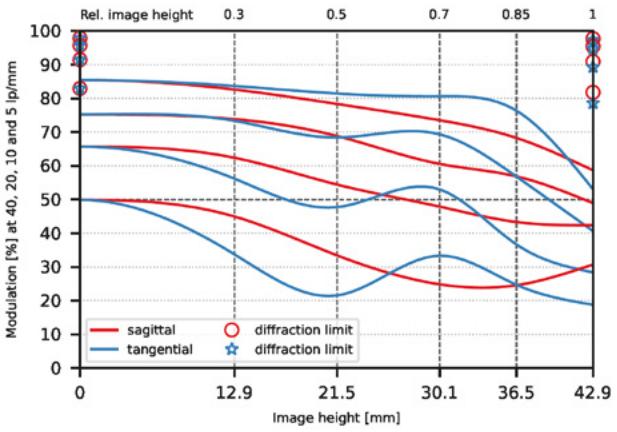
## YOUR BENEFITS

- Specially designed for scanning applications and large imaging sensors
- Large image circle up to 102 mm

## SPECIFICATIONS

- Focal length: 50 ... 120 mm
- Magnification range: 0.05 ... 3.0
- Spectral range: 400-750 nm
- Iris diaphragm: manual, click-stop

## MTF




MTF of Apo-Rodagon-D 4.5/75 2x @ β'= -0.5 and f-stop = 5.6

## APO-RODAGON-D

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| Apo-Rodagon-D 4.0/75 1x | 75 | 4.0 | 0.8 ... 1.2 | 82 | M39x1/26" | 0703-005-000-40 |
| Apo-Rodagon-D 4.5/75 2x | 75 | 4.0 | 0.4 ... 0.8 | 86.2 | M39x1/26" | 0703-101-000-40 |
| Apo-Rodagon-D 5.6/120 2x | 120 | 5.6 | 0.33 ... 0.8 | 102 | M39x1/26" | 0703-043-000-20 |

## APO-RODAGON-N

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| Apo-Rodagon-N 2.8/50 | 50 | 2.8 | 0.05 ... 0.5 | 44 | M39x1/26" | 0701-349-000-40 |
| Apo-Rodagon-N 4.0/80 | 80 | 4.0 | 0.067 ... 0.5 | 86 | M39x1/26" | 0703-092-000-40 |
| Apo-Rodagon-N 4.0/105 | 105 | 4.0 | 0.06 ... 0.5 | 100 | M39x1/26" | 0703-096-000-40 |

# Rodagon, Rodagon-WA

The LINOS® measuring lenses feature the highest resolution, excellent contrast, minimum distortion and color neutrality. They sharply reproduce images all the way to the very edges of the object.




Rodagon

Rodagon-WA

## YOUR BENEFITS

- Suitable for line-scan cameras and large imaging sensors
- Large image circle up to 105 mm
- High numerical aperture
- Adapter available for all common camera interfaces

## SPECIFICATIONS

- Focal length: 28 ... 135 mm
- Magnification range: 0.03 ... 0.5
- Spectral range: 400-750 nm
- Iris diaphragm: manual, click-stop
- Filter thread: M40.5x0.5

## RODAGON

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| Rodagon 2.8/28 | 28 | 2.8 | 0.03 ... 0.2 | 32 | M32x0.5 | 0701-389-000-20 |
| Rodagon 4.0/35 | 35 | 4.0 | 0.03 ... 0.2 | 40 | M39x1/26“ | 0701-401-000-40 |
| Rodagon 2.8/50 | 50 | 2.8 | 0.07 ... 0.5 | 44 | M39x1/26“ | 0701-345-000-40 |
| Rodagon 4.0/60 | 60 | 4.0 | 0.06 ... 0.5 | 56 | M39x1/26“ | 0701-393-000-40 |
| Rodagon 4.0/80 | 80 | 4.0 | 0.06 ... 0.5 | 62 | M39x1/26“ | 0701-391-000-40 |
| Rodagon 5.6/105 | 105 | 5.6 | 0.06 ... 0.5 | 104 | M39x1/26“ | 0701-394-000-40 |
| Rodagon 5.6/135 | 135 | 5.6 | 0.1 ... 0.5 | 105 | M39x1/26“ | 0701-398-000-40 |

## RODAGON-WA

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| Rodagon-WA 4.0/40 | 40 | 4.0 | 0.066 ... 0.25 | 46 | M39x1/26“ | 0701-399-000-40 |
| Rodagon-WA 4.0/60 | 60 | 4.0 | 0.066 ... 0.25 | 82 | M39x1/26“ | 0701-276-000-40 |

# Rodagon-F



The Rodagon-F Series is developed to adapt precision industrial-grade optics to an F camera, with a great price/performance ratio. Now, for the first time, users can integrate world reknowned Rodenstock image quality in 40-60 mm focal lengths directly onto F-Mount cameras. A revolutionary design eliminates all moving parts to offer exceptionally robust performance. The smooth focusing is locked with a massive retaining ring that is fixed with additional screws.

The Rodagon-F lenses are available in different versions with fixed apertures. The fixed aperture prevents accidental misadjustment of the iris or slowly shifting aperture values due to vibrations. The image circle is large enough for sensors with full format and the popular 41 mm line sensors.

## YOUR BENEFITS

- Integrated manual focussing
- Suitable for line-scan cameras and large imaging sensors
- Large image circle up to 46 mm
- High numerical aperture

## SPECIFICATIONS

- Focal length: 40 ... 60 mm
- Magnification range: 0 ... 0.5
- Spectral range: 400-750 nm
- Iris diaphragm: fix
- Mount: F-Mount
- Filter thread: M40.5x0.5

## RODAGON-F

| Product | Focal length (mm) | F-number | Magnification range | Image circle (mm) | Interface | Part No. |
|---|---|---|---|---|---|---|
| Rodagon-F 4/40 | 40 | 4 | 0 ... 0.5 | 44 | F-Mount | 0703-090-000-25 |
| Rodagon-F 5.6/40 | 40 | 5.6 | 0 ... 0.5 | 44 | F-Mount | 0703-090-000-26 |
| Rodagon-F 8/40 | 40 | 8 | 0 ... 0.5 | 44 | F-Mount | 0703-090-000-27 |
| Rodagon-F 2.8/50 | 50 | 2.8 | 0 ... 0.5 | 46 | F-Mount | 0703-089-000-24 |
| Rodagon-F 4/50 | 50 | 4 | 0 ... 0.5 | 46 | F-Mount | 0703-089-000-25 |
| Rodagon-F 5.6/50 | 50 | 5.6 | 0 ... 0.5 | 46 | F-Mount | 0703-089-000-26 |
| Rodagon-F 4/60 | 60 | 4 | 0 ... 0.5 | 44 | F-Mount | 0703-087-000-25 |
| Rodagon-F 5.6/60 | 60 | 5.6 | 0 ... 0.5 | 44 | F-Mount | 0703-087-000-26 |
| Rodagon-F 8/60 | 60 | 8 | 0 ... 0.5 | 44 | F-Mount | 0703-087-000-27 |

# Mechanical Accessories

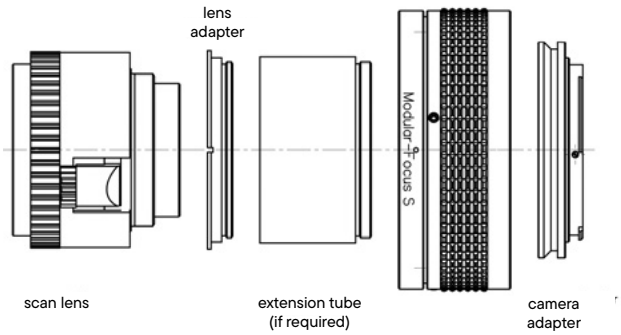
The mechanical accessories are designed to mount the LINOS® Machine Vision lenses to almost every camera in industrial environments. The various focus modules work reliably and with high precision. The large selection of lens systems and their modular design enables a multitude of different applications.

## HELICAL MOUNTS

| Product | Part No. |
|---|---|
| Modular Focus | 2408-009-000-42 |
| Smart focus | 2408-021-000-43 |
| Smart focus HR-M | 2408-021-000-46 |

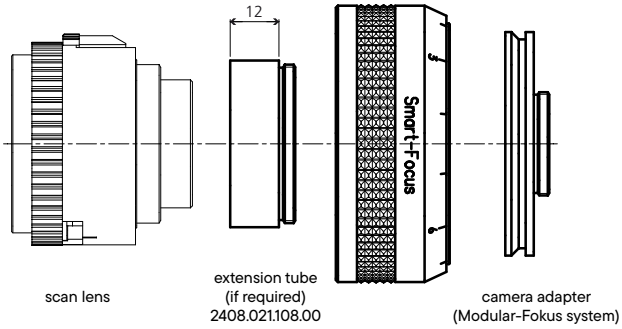
## EXAMPLES OF APPLICATIONS

### Modular Focus






### Smart Focus






## EXTENSION TUBES MODULAR FOCUS

| Product | Part No. |
|---|---|
| Extension tube 25 mm M45x0.75 | 2408-009-113-00 |
| Extension tube 60 mm M45x0.75 | 2408-009-123-00 |
| Extension tube 87.5 mm M45x0.75 | 2408-009-122-00 |

## EXTENSION TUBES SMART FOCUS HR-M

| Product | Part No. |
|---|---|
| Extension tube 15 mm | 2408-021-117-00 |
| Extension tube 24 mm | 2408-021-118-00 |
| Extension tube 48 mm | 2408-021-119-00 |

## EXTENSION TUBES SMART FOCUS

| Product | Part No. |
|---|---|
| Extension tube 12 mm M39x1/26" | 2408-021-108-00 |
| Extension tube 24 mm M39x1/26" | 2408-021-109-00 |
| Extension tube 48 mm M39x1/26" | 2408-021-110-00 |
| Extension tube 120 mm M39x1/26" | 2408-021-111-00 |

## LENS ADAPTER

| Product | Part No. |
|---|---|
| Lens adapter M32.5x0.5 | 2408-009-111-00 |
| Lens adapter M39x1/26" | 2408-009-118-00 |
| Lens adapter M39x1/26" | 2408-009-112-00 |
| Lens adapter M45 - V-groove (ModFoc) | 2408-009-147-00 |
| Lens adapter M45 - M42 (ModFoc) | 2408-009-173-00 |
| Lens adapter M45 - M52 V-groove | 2408-009-176-00 |
| Lens adapter M45 - M52 (ModFoc) | 2408-009-177-00 |

## CAMERA ADAPTER

| Product | Part No. |
|---|---|
| Camera adapter C-Mount | 2408-009-106-00 |
| Camera adapter TFL-Mount | 2408-009-174-00 |
| Camera adapter F-Mount | 2408-009-142-00 |
| Camera adapter M42x1 | 2408-009-119-00 |
| Camera adapter M48x0.75 (TFL-II Mount) | 2408-009-148-00 |
| Camera adapter M58x0.75 | 2408-009-132-00 |
| Camera adapter M72x0.75 | 2408-009-134-00 |
| Camera adapter M90x1.0 | 2408-009-166-00 |
| Camera adapter M95x1.0 | 2408-009-155-00 |

## CAMERA EXTENSION TUBES

| Product | Part No. |
|---|---|
| Extension tube M72x0.75-24mm | 2408-009-135-00 |
| Extension tube M90x1.0-24mm | 2408-009-167-00 |
| Extension tube M95x1.0-24mm | 2408-009-156-00 |

## RETRO RINGS

| Product | Part No. |
|---|---|
| Retro ring M37x0.75 - M45x0.75 | 2408-009-152-00 |
| Retro ring M40.5x0.5 - M39x1/26" | 2408-009-158-00 |

## FOCUS UNIT D.FINE HR

| Product | Part No. |
|---|---|
| Focus unit HR | 2408-025-000-20 |

## EXTENSION TUBES D.FINE HR

| Product | Part No. |
|---|---|
| Extension tube 20mm | 2408-025-106-00 |
| Extension tube 50mm | 2408-025-107-00 |
| Extension tube 100mm | 2408-025-108-00 |
| Extension tube 200mm | 2408-025-109-00 |

## CAMERA ADAPTER D.FINE HR

| Product | Part No. |
|---|---|
| Camera adapter d.fine HR M72x0.75 | 2408-025-111-00 |
| Camera adapter d.fine HR M90x1.0 | 2408-025-113-00 |
| Camera adapter d.fine HR M95x1.0 | 2408-025-115-00 |

## FOCUS TUBE INSPEC.X L 105

| Product | Part No. |
|---|---|
| Focus tube M72 for inspec.x L 105 mm 0.33x and 0.5x | 2408-012-000-31 |
| Focus tube M72 for inspec.x L 105 mm 0.76x and 1.0x | 2408-012-000-30 |
| Focus tube M72 for inspec.x L 105 mm 3.0x and 3.5x | 2408-012-000-47 |
| Focus tube M72 for inspec.x L 105 mm 5.0x | 2408-012-000-33 |
| Focus tube M95 for inspec.x L 105 mm 0.33x and 0.5x | 2408-012-000-41 |
| Focus tube M95 for inspec.x L 105 mm 0.76x and 1.0x | 2408-012-000-43 |
| Focus tube M95 for inspec.x L 105 mm 3.0x and 3.5x | 2408-012-000-46 |
| Focus tube M95 for inspec.x L 105 mm 5.0x | 2408-012-000-45 |

## FOCUS CLAMP D.FINE HR-M

| Product | Part No. |
|---|---|
| Focus Clamp | 2408-006-820-00 |

## EXTENSION TUBE FOCUS CLAMP

| Product | Part No. |
|---|---|
| Extension tube 7.5mm | 2408-006-103-00 |

## ADAPTER FOCUS CLAMP

| Product | Part No. |
|---|---|
| Adapter focus clamp | 2408-006-102-00 |

# OPTEM® FUSION

## EXTREME MICRO-IMAGING VERSATILITY

The OPTEM® FUSION Lens System incorporates expanded functionality, bi-directional infinity optics, and a uniform modular matrix to provide OEMs with the ideal lens solution for streamlined integration of high-magnification imaging across they key VIS (400-700 nm), NIR (700-1100 nm) and **SWIR (900-1700 nm)** wavelength ranges.

Simply change-out modules to modify the form, function and performance of your OPTEM® FUSION Lens System to meet the exact wavelength range, spatial, functional, mounting and imaging requirements of your system.




## OEM-OPTIMIZED TO STREAMLINE TIME-TO-MARKET

A FUSION imaging solution can be designed and configured in minutes... not hours. And FUSION's modular offering of universally interchangeable components means your prototype is in place in days... not months.

## CONFIGURED TO YOUR APPLICATION

Using standard FUSION Lens matrix components, Excelitas has the optical design prowess and manufacturing expertise to incorporate virtually any optical microscopy feature into your OPTEM® FUSION Lens System. Specialized components and custom-tailored configurations are simple, expedient and cost effective.

### 40 YEARS OF EXPERIENCE

We coalesce 40 years of OPTEM® Lens manufacturing expertise into the perfect fusion of performance, simplicity and flexibility.

## UNMATCHED MODULAR IMAGING FLEXIBILITY

- Configure for versatile 7:1 or 12.5:1 zoom optics or for a wide range of economical fixed magnifications
- Plug-n-play system controller ensures seamless integration of motorized zoom, focus and illumination



- OPTEM® FUSION enables extreme broadband imaging support across the visible and **SWIR** wavebands (400-1700 nm)
- Swap out lower lenses or LWD objectives to configure a wide range of imaging envelopes
- Interchange Camera Mounts and Camera Tubes to optimize sensor coverage for virtually any camera format or mount
- Integrate coaxial or ringlight LED illumination and automate focus and/or zoom with stepper motors
- Incorporate accessories at virtually any point of the lens assembly
- Space-efficient inline multi-point mounts ensure added imaging stability



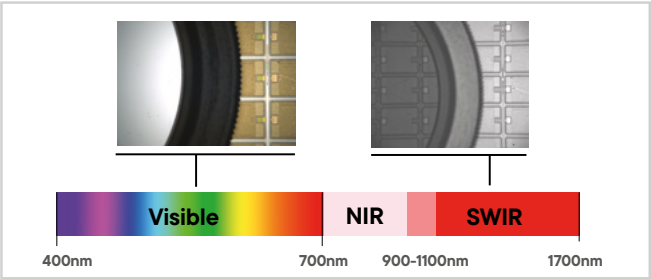

### Camera Mount
Mates FUSION with C, CS, F, EOS, 4/3-mount cameras and more

### Camera Tube
Modifies magnification to your camera optimizing chip coverage & performance

### Core Optical Module
Determines optical function: Fixed, 7:1 or 12.5:1 zoom magnification — motorized or manual

### Lower Function Module
Integrates internal focus — motorized or manual — and coaxial LED illumination options

### Lower Lens
Modifies taking magnification to affect field of view, NA and working distance




Broad wavelength support makes FUSION the perfect solution for:

- Through silicon defect inspection and alignment
- Hyperspectral imaging
- Metrology
- Fluorescence imaging

# FUSION PERFORMANCE

## Fixed Magnification

**MINIMUM CONFIGURATION**

| | |
|---|---|
| Magnification | 0.16X |
| NA | 0.005 |
| Resolution | 15.0 lp/mm |
| Depth-of-Field | 23 mm |
| Field-of-View* | 41 x 55 mm |
| Working Distance | 490 mm |

**MAXIMUM CONFIGURATION**

| | |
|---|---|
| Magnification | 12X |
| NA | 0.18 |
| Resolution | 540 lp/mm |
| Depth-of-Field | 0.018 mm |
| Field-of-View* | 0.55 x 0.73 mm |
| Working Distance | 32 mm |

## 7:1 Zoom Magnification

**MINIMUM CONFIGURATION**

| | Low Zoom | High Zoom |
|---|---|---|
| Magnification | 0.067X | 0.46X |
| NA | 0.0047 | 0.016 |
| Resolution (lp/mm) | 14 lp/mm | 47 lp/mm |
| Depth-of-Field (mm) | 25 mm | 2.4 mm |
| Field-of-View* (mm) | 131 x 98 mm | 19 x 14 mm |
| Working Dist. (mm) | 490 mm | 490 mm |

**MAXIMUM CONFIGURATION**

| | Low Zoom | High Zoom |
|---|---|---|
| Magnification | 5X | 35X |
| NA | 0.047 | 0.16 |
| Resolution (lp/mm) | 142 lp/mm | 465 lp/mm |
| Depth-of-Field (mm) | 0.25 mm | 0.024 mm |
| Field-of-View* (mm) | 1.7 x 1.3 mm | 0.25 x 0.19 mm |
| Working Dist. (mm) | 32 mm | 32 mm |

## 12.5:1 Zoom Magnification

**MINIMUM CONFIGURATION**

| | Low Zoom | High Zoom |
|---|---|---|
| Magnification | 0.045X | 0.55X |
| NA | 0.0036 | 0.019 |
| Resolution (lp/mm) | 11 lp/mm | 58 lp/mm |
| Depth-of-Field (mm) | 44 mm | 1.5 mm |
| Field-of-View* (mm) | 196 x 147 mm | 16 x 12 mm |
| Working Dist. (mm) | 490 mm | 490 mm |

**MAXIMUM CONFIGURATION**

| | Low Zoom | High Zoom |
|---|---|---|
| Magnification | 3.4X | 41X |
| NA | 0.036 | 0.19 |
| Resolution (lp/mm) | 108 lp/mm | 576 lp/mm |
| Depth-of-Field (mm) | 0.44 mm | 0.015 mm |
| Field-of-View* (mm) | 2.6 x 1.9 mm | 0.21 x 0.16 mm |
| Working Dist. (mm) | 32 mm | 32 mm |

* All field-of-view data calculated for 2/3" camera

# OPTEM® FUSION Features

OPTEM® FUSION is engineered to deliver unprecedented configuration and performance flexibility. A wide array of interchangeable components affords OEMs with forward flexibility to evolve imaging capability with the life cycle of their system, and affords researchers with quick swap-out flexibility for benchtop video microscopy applications.




## EXTREME IMAGING VERSATILITY

FUSION delivers three distinct optomechanical capabilities within a single Lens System. Specify economical Fixed Magnification imaging modules or 7:1 and 12.5:1 Zoom Optical Modules to meet your exact micro-imaging needs. Infinity Optics and uniform fitting components streamline swap-out and maximize flexibility in the development and forward evolution of your system.



## OPTOMECHANICAL FLEXIBILITY

Integrate 90° Mirror Cubes and 50/50 Cubes at most any point along the optical path to modify the shape and fit of FUSION to your specific integration requirements. Combinations of multiple Cube Modules permit multiple cameras and lens functions to be integrated over a single optical subject.





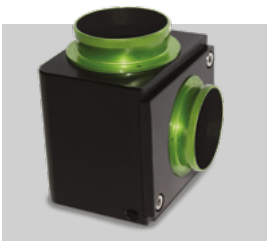

## ACHIEVE HIGHER MAGNIFICATION

FUSION is optimized to image through OPTEM® Long-Working Distance Objectives. Select from 2X to 50X in High-Resolution and M-Plan APO and Objectives.

## TUNABLE LENS MODULE

Space saving liquid lens module allows the integration of autofocus without cumbersome motorized focus drives. Simply inserts directly above the chosen Lower Function Module.





## FLUORESCENCE IMAGING

Two modules utilizing user supplied Zeiss type 91029 cubes. Lower module provides system fluorescence illumination and imaging. The upper module will allow two different wavelengths to be directed to separate cameras.



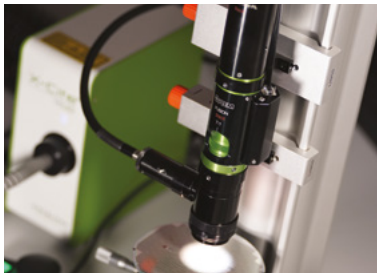
## FETURA+ HIGH SPEED ZOOM

Replace the standard 12.5:1 FUSION core zoom module with Fetura+ for increased speed and durability. Fetura+ travels through the entire zoom range in less than 1sec and offers service life in excess of 1-million cycles. Motorization and control is already built in.




## SWIR COMPATIBILITY

When the most detailed information is critical to your application, broad 400-1700 nm wavelength support facilitates multi-modality imaging and is perfect for advanced imaging techniques including hyperspectral imaging and image fusion.





## SEAMLESS MOTORIZATION

The unified system controller ensures seamless integration of motorized zoom, focus and illumination for high-throughput applications. Featuring an intuitive GUI and feature-rich SDK.

## IMAGE STABLE DESIGN

Enlarged barrel diameters and wall thickness combine with a 3-point dovetail coupling interface to promote robust lens assembly. Additionally, low profile, Inline Mount Blocks allow multiple mounting points along the assembly length to ensure maximum integration stability.



# OPTEM® FUSION Component Matrix

## ACCESSORIES

**35-07-01-000**
50/50 Cube

**35-07-00-000**
Mirror Cube

**35-07-02-000**
Mirror Cube Adapter

Note: 35-07-11 uses 65mm working distance When used below lower lens. Use this combination when placing right Angle below system. Remove dovetail to Increase working distance.

**35-07-11-000**
Inline Mount

**35-07-21-000**
25.4mm Filter Holder

**35-07-20-000**
Aperture Set

NOTE: Not every combination will present desired results.

**35-07-25-000**
Adjustable Iris

**35-07-04-000**
Fluoresence Cube Holder Upper
(Note: uses Zeiss type 91029 cube)

**35-03-50-000**
Tunable Lens Focus Module
(Note: attach directly above Lower function module only)

**35-07-12-000**
X95 System Stand

**35-07-10-000**
Camera Tube Clamp

**35-07-14-000**
Tube Clamp Mount, 76mm Dia.

**35-07-15-000**
Tube Clamp Mount, 82mm Dia.

**35-07-16-000**
Tube Clamp Mount, 83mm Dia.

**35-07-17-000**
Tube Clamp Mount, 84mm Dia.

## CAMERA

## CAMERA MOUNTS

**25-60-23-000**
EOS Camera Mount

**25-60-24-000**
F Camera Mount

**35-08-70-000**
C \ CS Camera Mount

**25-60-26-000**
4/3 Camera Mount

ACCESSORIES

## CAMERA TUBES

**35-08-00-000**
Camera Tube
0.4x \ 80 FL

**35-08-01-000**
Camera Tube
0.5x \ 100 FL

**35-08-02-000**
Camera Tube
0.6x \ 120 Fl

**35-08-04-000**
Camera Tube
0.8x \ 160 FL

**35-08-11-000**
Mini Camera Tube
0.8x \ 160 FL

**35-08-06-000**
Camera Tube
1x \ 200 FL

ACCESSORIES

## FIXED MAGNIFICATION

7:1 Zoom

**35-31-10-000**
7:1 Zoom Manual

**35-31-40-000**
7:1 Zoom Manual Detent

**35-31-60-000**
7:1 Zoom Stepper Motorized

**35-07-20-000**
**Aperture Set**
Required For Fixed Magnification Systems

A CONTROL

## LOWER FUNCTION MODULES

**35-03-10-000**
15mm Focus Manual

**35-07-03-000**
Fluoresent Cube Holder Lower

**Note:** Uses ZEISS Type 91029 cube. Use with 35-01-00-000 Basic Lower Function Module recommended

**35-01-00-000**
Basic

ILLUMINATION

**35-00-03-000**
2X \ 100 FL

**42-35-41-000**
Infinity Macro Lens

## LOWER LENSES

**35-00-11-000**
0.4X \ 500 FL

**35-00-10-000**
0.5X \ 400 FL

**35-00-09-000**
0.67X \ 300 FL

**35-00-08-000**
1X \ 200 FL

**35-00-06-000**
1.25X \ 160 FL

**NOTE:**

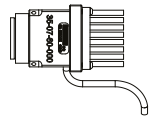
- Products listed in **RED TYPE** Indicate **SWIR** version available.
- For ordering purposes, VISIBLE components are identified by a "35" prefix, while **SWIR** components use a **"45"** e.g. 35-XX-XX-XXX VISIBLE, and **45**-YY-YY-YYY **SWIR**
- All "35-XX" modules are compatible with one another; and all "**45**-YY" modules are compatible with one another.
- Using "35-XX" and **"45-**YY**"** modules with one another is not recommended.
- Non-optics mounts/modules are cross-compatible between VISIBLE and **SWIR**

excelitas®

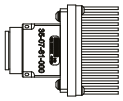
## LIGHTING ACCESSORIES

ILLUMINATION

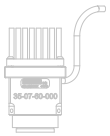
35-07-60-000
1.5A High Power LED



35-07-61-000
3.0A Ultra
High Power LED



A CONTROL



29-69-02-000
Polarizer



29-69-13-000
Led Coax
Right Angle



30-16-02-000
Fiber Optic
Lamphouse



30-16-01-000
10mm Fiber
Optic Adapter



30-16-60-000
60" Flexible
Fiber Optic

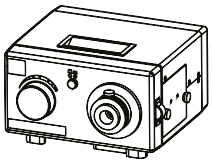


### COAX

### OBLIQUE

29-60-83-000
110V Halogen
Illuminator

29-60-84-000
230V Halogen
Illuminator



ACCESSORIES

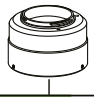
29-69-21-000
53mm O.D.
Ring Light
Adapter



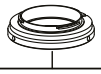
35-07-40-000
65mm O.D.
Ring Light
Adapter



25-60-27-000
Micro 4/3
Camera Mount



25-60-28-000
Sony Alpha
Camera Mount



25-60-29-000
Pentax K
Camera Mount



## MINI CAMERA TUBES

35-08-12-000
Mini
Camera Tube
1x \ 200 FL



35-08-13-000
Mini Camera Tube
1.5x \ 300 FL



35-08-14-000
Mini Camera Tube
2x \ 400 FL



35-08-15-000
Mini Camera Tube
2.5x \ 500 FL



35-08-16-000
Mini Camera Tube
3x \ 600 FL



12.5:1 Zoom

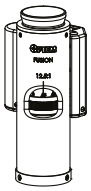
35-41-10-000
12.5:1 Zoom
Manual



35-41-40-000
12.5:1 Zoom
Manual
Detent



35-41-60-000
12.5:1 Zoom
Stepper
Motorized



4401-592-000-22
Fetura+
12.5:1 Zoom
(Self-Controlled)




ACCESSORIES

A CONTROL

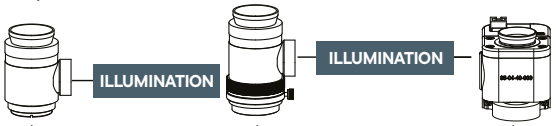
35-04-00-000
Coax
Illumination

35-04-10-000
Coax Illumination 5mm Focus
Manual

35-04-03-000
Coax
Illumination With
Analyzer

35-04-13-000
Coax Illumination 5mm Focus
Manual W/Analyzer

35-04-40-000
Coaxial Illumination 10mm Focus
Stepper Motorized



ILLUMINATION

ILLUMINATION

B CONTROL

ACCESSORIES

ILLUMINATION

35-00-05-000
1.43X \ 140 FL

35-00-04-000
1.67X \ 120 FL

35-00-03-000
2X \ 100 FL

35-00-01-000
3X \ 67 FL

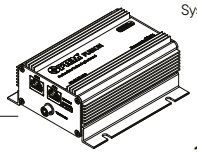
35-00-02-000
4X \ 50 FL



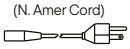
**NOTE:** Coax Illumination has limited field illumination with large FOVs.

A CONTROL

35-05-50-000
System Controller



30-17-37-000
(N. Amer Cord)



30-17-36-000
(Euro Cord)

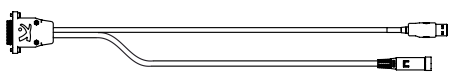


350550-803
24V Power Supply

30-17-33-000
(U.k. Cord)



BB-284031-01
Power/Comms Cable



30-17-03-000
Objective
Adapter



**LWD OBJECTIVES**
28-21-02-001 2X M PLAN APO
28-21-05-001 5X M PLAN APO
28-21-10-000 10X M PLAN APO
28-21-11-001 20X M PLAN APO
28-21-50-001 50X M PLAN APO

28-20-44-000 5X HI-RES
28-20-45-000 10X HI-RES
28-20-46-000 20X HI-RES
Certain limitations apply with Hi-Res Objectives.
See brochure for details.

30-16-50-000
Objective Ringlight 40 Inches



# OPTEM® MAG.X 125 Micro-Inspection System

## Modular System

High resolution inspection is being used in many applications. Each application has its own requirements and constraints. In order to cater for all these diverse needs the MAG.X system 125 is as modular as possible. Integration of customized elements is easy and enables a system that integrates seamlessly into the surrounding equipment.



### BASE UNITS

Heart of the system is always the base unit which is available in different variations. All other components are attached to these base units. Mounting of the system to the surrounding equipment is also provided by the base unit.

### OBJECTIVE LENSES

The optical performance of the system is mainly defined by the objective lenses. These are the components that make the MAG.X system 125 really unique. All of Excelita's highest end technology is being used in manufacturing and testing of these lenses.



### TUBE LENSES

System magnification and maximum sensor size are the result of the combination of tube lens and objective lens. The current selection of tube lenses allows the use of sensors with a diagonal of up to 57 mm. All tube lenses are also telecentric on image side.

### ILLUMINATION

For coaxial bright field illumination Koehler illumination optics are included that can be interfaced to light sources via optical fibers or directly to LED sources. Darkfield illumination can be added easily with an optional adapter.

### AUTOFOCUS SOLUTION

Focusing in an automated environment is simplified by the MAG.X system 125 modular, integrated autofocus solution. The motorized z-axis actuator enables high-precision focusing in fractions of a second. The AF base unit couples the laser from an autofocus sensor into the beam path. The autofocus sensor and the actuator constitute a closed-loop system that ensures optimum focus in the object plane. Since no stitching is needed, high-resolution sensors can be used to create significantly shorter tact times without compromising the resolution of the inspection system.

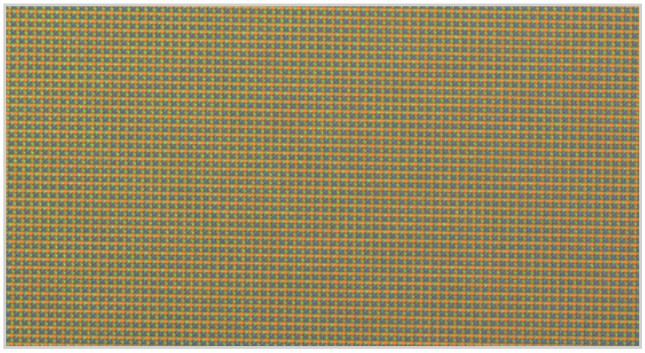
Excelitas cooperates with WDI Wise Device Inc. - the world's leading manufacturer of industrial autofocus sensors.

### ACCESSORIES

No system is complete without an array of accessories. The wide selection ranges from camera and fiber adapters to mounting plates. Camera adapters are precisely matched to the camera and tube lens. Various camera adapters can be additionally created on request.

# Applications

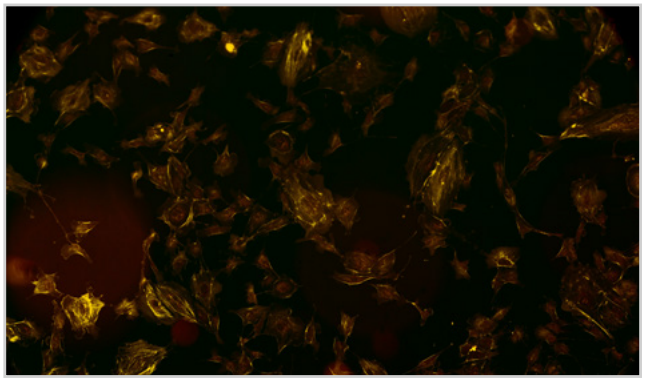
Numerous applications benefit from the versatility and the high optical performance of the MAG.X system 125. The large field-of-view increases throughput of inspection installations as more object space is imaged at once and the number of images that need to be acquired to image an object in its entirety is reduced drastically – in the best case only one image is necessary by maintaining sub-µ resolution.



Color CCD sensor with 5.5µm pixel size

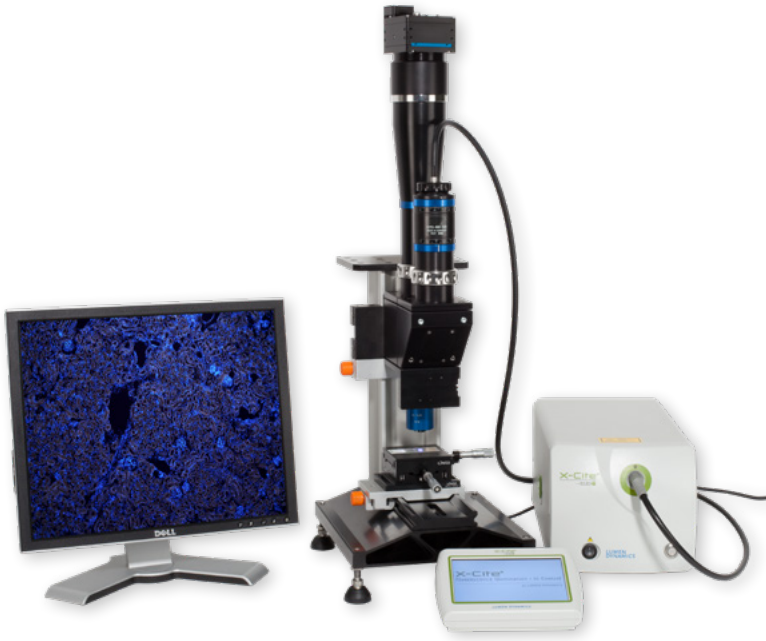
Typical applications include the inspection of large objects like

- Display panels
- Printed circuit boards
- Glass panels



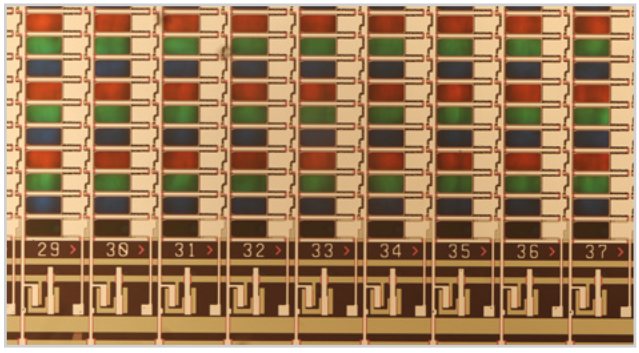
Bovine Pulmonary Artery fluorescence sample

These objects are usually inspected with line scan cameras to achieve maximum resolution and throughput. Smaller objects can often be imaged at once or with only few images with an area scan camera.

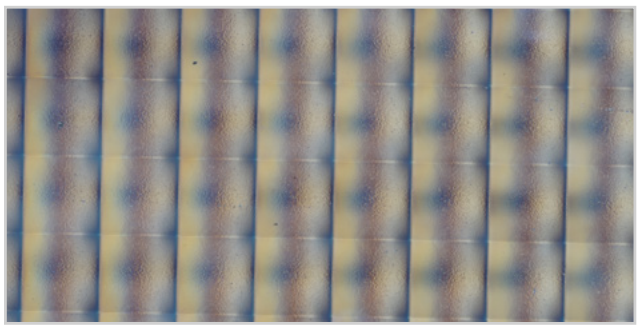


Typical applications are:

- Semiconductor inspection
- Biochip reading
- Fluorescence microscopy
- Digital pathology/histology
- High precision non-contact measurement machines
- Cleanliness of optical components

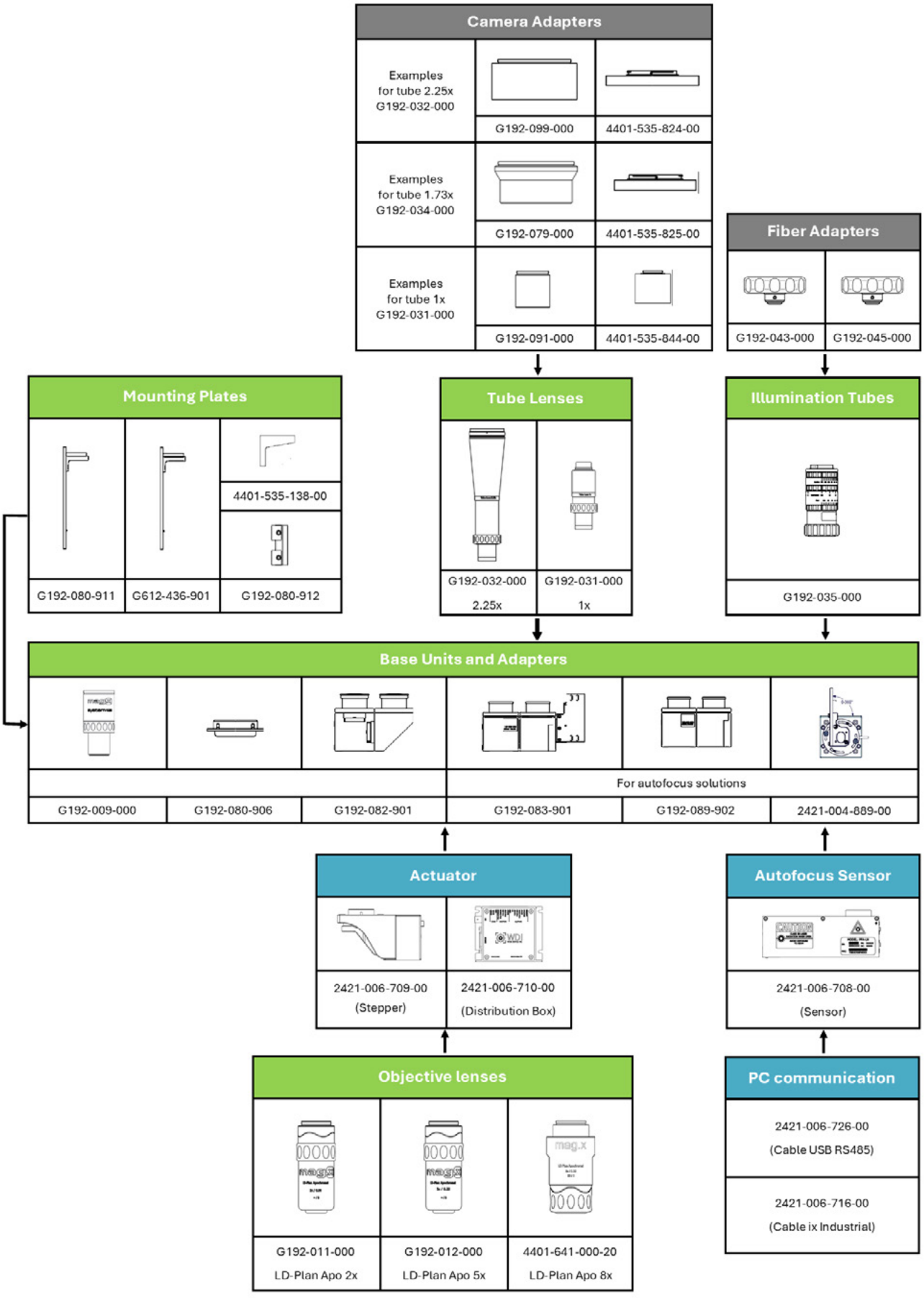



Color TFT display



Micro lens arra

# Overview of the MAG.X Micro-Inspection System



# Designed for Large Sensors

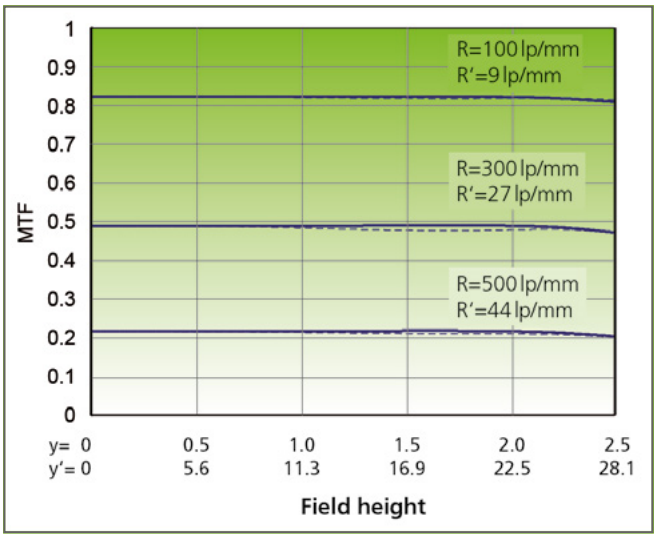
The MAG.X system 125 is the first microscope system that is specifically designed for the use with large sensors to achieve true wide field imaging with high resolution. With a supported sensor diameter of 57 mm popular line scan sensors like 8k TDI sensors as well as modern super high-resolution array sensors can be used. These sensors fully utilize the high optical bandwidth of the MAG.X system 125 that supports up to 50 MPixel sensor resolution.

# Optical Performance

Mag.x system 125 stands out from conventional microscope systems by numerical aperture (NA) values considerably higher than those of other systems. High optical quality is not only ensured on the optical axis, but also is maintained over the entire sensor format. The MTF chart below shows the polychromatic MTF versus field height. Values for object y and image heights y' are given under the horizontal axis. Note that the high contrast values close to the diffraction limit are maintained over the entire field!

The complete system is chromatically corrected in the spectral range of 430–700 nm. High contrast is maintained over the entire spectrum and no refocusing is required if the illumination wavelength is changed. Multispectral imaging becomes possible without any additional focus needs.

To enable even the most demanding measurement tasks the MAG.X system 125 features precise object space telecentricity to prevent flawed measurements of objects with varying height.




Polychromatic MTF vs. field height
LD Plan Apo 5x/0.2 + TL2.25x; 2y=5 mm, 2y'=56.3 mm

# Specifications

| Objective Plan Apochromat | | | | | Tube Lens System | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1x | | | | 2.25x | | | |
| | | | | | $f'_{tub}$ = 250 mm | | | | $f'_{tub}$ = 563 mm | | | |
| | | | | | 2y' = 25 mm | | | | 2y' = 57 mm | | | |
| Magn. / NA | WD | $f'_{obj}$ | $\delta_{obj}$ | $R_0$ | M | 2y | NA' | $R'_0$ | M | 2y | NA' | $R'_0$ |
| | mm | mm | µm | lp/mm | | mm | | lp/mm | | mm | | lp/mm |
| 2x / 0.08 | 24.8 | 125.0 | ±42.7 | 293 | 2 | 12.5 | 0.04 | 147 | 4.5 | 12.5 | 0.018 | 65 |
| 5x / 0.20 | 13.0 | 50.0 | ±6.8 | 733 | 5 | 5.0 | 0.04 | 147 | 11.25 | 5.0 | 0.018 | 65 |
| 8x/0.32 | 23.0 | 31.3 | ± 2.7 | 1172 | 8 | 3.1 | 0.04 | 147 | 18.0 | 3.1 | 0.018 | 65 |

NA Numerical aperture in the object space = n · sin (σ)
WD Working distance
$f'_{obj}$ Focal length of the objective
$f'_{tub}$ Focal length of the tube lens
$\delta_{obj}$ Depth of field at 546 nm $\delta_{obj} = \pm n \cdot \lambda/(2 \cdot NA^2)$
$R'_0$ Cut off frequency in image space at 546 nm
$R_0$ Cut off frequency in object space at 546 nm $R_0 = (2 \cdot NA) / \lambda$
2y' Image field size (maximum detector diagonal)
2y Object field size
M Magnification of the overall system; $M = M_{obj} \cdot M_{tub}$

# MachVis Software

## WEB-BASED CONFIGURATOR FOR IMAGING APPLICATION

Excelitas has developed a software tool that simplifies your tasks for imaging and machine vision needs.

MachVis is specifically designed to help you identify and select the most suitable lenses and accessories. Your benefit is a high-resolution and stable image on your sensor. With MachVis, Excelitas offers you a software with a user-friendly interface for quick and comprehensive solutions.

Based upon four key parameters of your application,

- Working distance
- Object size (or magnification)
- Sensor size
- Camera mount

MachVis will provide the lens solutions that are most suitable to your specification:

3D files for all optical components as well as mechanical accessories can be downloaded directly from within MachVis for smooth integration into your project with a single click. Configurators are available for the more complex microscope systems for which motorization, zoom modules, beam splitters, filters and numerous illumination options open up a virtually unlimited range of possibilities and flexibility. With these features, MachVis offers a new level of support to make it the most versatile optics configuration software on the market.

In addition to the LINOS® Machine Vision Lenses, OPTEM® Fusion Micro-imaging System and MAG.X 125 microscope system, the PCO® Scientific Cameras are also included in MachVis for even more streamlined system configuration.



Apart from the geometric optical calculation based on the parameters provided by the user, the software also acts as a product database, providing quick and easy access to all product data and presenting an instant schematic representation of the entire optical system.

With **MachVis Online** it is possible to access MachVis directly without the need to download and install any software. Let MachVis online convince you and receive more flexibility and independence. MachVis not only helps to identify the perfect lens solution, it saves your time in the lens selection and configuration process.



Try our new online application today and create your own user profile so you can access your individual configurations on any mobile device!

**MACHVIS**

Further information about our MachVis™ System Configurator:

Enabling the future

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(+65) 6499-7777

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For a complete listing of our global offices, visit www.excelitas.com/locations

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