Apo-Rodagon, Rodagon and Rogonar-S

Versatile Large-Format Lenses

Qioptiq, an Excelitas Technologies Company, designs and manufactures photonic products and solutions that serve a wide range of applications across the medical, life sciences, industrial manufacturing, defense, semiconductor, aerospace, and scientific sectors.

Qioptiq customers benefit from the integrated knowledge and expertise of Avimo, Gsänger, LINOS, Optem, Point Source, Rodenstock, Spindler & Hoyer and others.

In October 2013, Qioptiq was acquired by Excelitas Technologies Corp., a global photonic technology leader focused on delivering innovative, customized solutions to meet the high-performance illumination, optical and, detection technology demands of OEM customers worldwide. Today, the Excelitas team proudly includes more than 7,500 employees across North America, Europe and Asia.

Visit www.excelitas.com for more information.

| 1877	1898	1969	1991	1996	2005	2009
RODENSTOCK	**SPINDLER & HOYER**	*Gsänger*	**POINT SOURCE**	**LiNOS**	**QIOPTIQ** Optics with intelligence	**QIOPTIQ** Photonics for Innovation
Rodenstock founded	Spindler & Hoyer founded	Gsänger Optoelektronik founded	Point Source founded	Linos is founded merging together Spindler & Hoyer, Steeg & Reuter, Franke Optik and Gsänger Optoelektronik. LINOS acquires Rodenstock Präzisionsoptik in 2000	Qioptiq founded as a spin off from Thales High Tech Optics Group	Qioptiq acquires Linos and Point Source establishing a new and consolidated brand

EXCELITAS
TECHNOLOGIES®

BIOMEDICAL

CONSUMER PRODUCTS

SEMICONDUCTOR
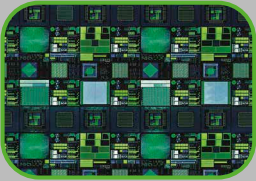
INDUSTRIAL

DEFENSE & AEROSPACE

SCIENTIFIC & ANALYTICAL

Content

2010   **2013**   **2018**   **2019**   **2021**

EXCELITAS
TECHNOLOGIES®

Excelitas Technologies Corp. is founded, spinning-off of PerkinElmer Analytical Instrumentation Division which sprung from EG&G founded in 1947

QIOPTIQ
Photonics for Innovation

LUMEN DYNAMICS
PUTTING YOU IN CONTROL

Excelitas acquires Qioptiq and Lumen Dynamics

REO
precision optical solutions

Excelitas acquires Research Electro Optics (REO)

AXSUN
TECHNOLOGIES

Excelitas acquires Axsun Technologies

pco.

Excelitas acquires PCO AG

Apo-Rodagon-HR

High-Resolution Lenses for Line- and Area-Scan Applications

The new Apo-Rodagon-HR is designed to close the gap between the high-resolution lenses of the inspec.x L Series, and the Apo-Rodagon-D lenses, both in terms of imaging quality and price.

The robust mechanics of this lens make it suitable for applications in the harshest environments. Thanks to the use of a fixed aperture there are no moving parts to shake out of adjustment due to vibrations in extreme applications. The standard aperture of 5.6 is the value at which the lens achieves the optimum performance. Other apertures are available on request.

The high resolution of 80 lp/mm at the sensor side in combination with the large image circle of 62 mm makes the Apo-Rodagon-HR 0.5x a very good match with the popular 12k / 5 μm line-scan cameras.

The Apo-Rodagon-HR 0.5x features the same focal length as the Apo-Rodagon-D 4.5/75 2x and can therefore replace this lens if higher resolution is needed.

- Ideal for 12 k / 5 μm sensors
- Compact and robust mechanics
- High performance / price value
- Large image circle up to 62 mm

Apo-Rodagon-HR 5.6/75 0.5x

- Magnification range: -0.35 … -0.65
- Camera mount: V-groove
- Iris diaphragm: fix
- Filter thread: M37x0.75
- Lens length: 47 mm
- Lens diameter: 46 mm
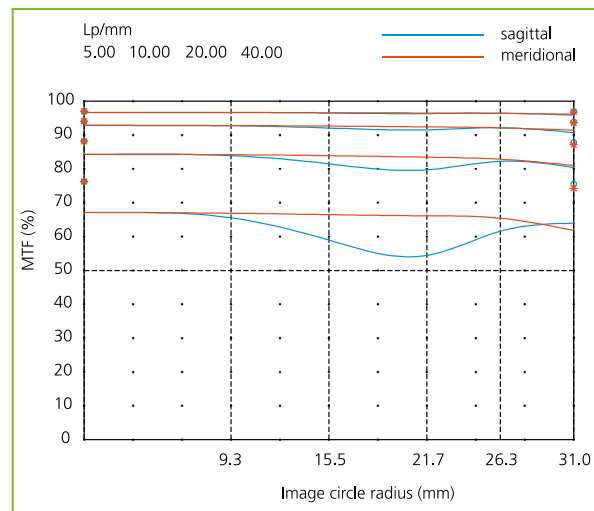
MTF of Apo-Rodagon-HR 5.6/75 0.5x @ β'= -0.5 and f-stop = 5.6

Apo-Rodagon-HR

Product	Focal length (mm)	F-number	Magnification range	Image circle (mm)	Interface	Part No.
Apo-Rodagon-HR 5.6/75 0.5x	75	5.6	-0.65 … -0.35	62	V-groove	0703-109-000-20
Apo-Rodagon-HR 8/75 0.5x	75	8	-0.65 … -0.35	62	V-groove	0703-109-000-21

APO-Rodagon-D

High-Performance Lenses for Large Imaging Sensors

The high resolution of the Apo-Rodagon-D lenses makes them an optimum solution for cameras with a pixel size down to 7 µm. The high resolution is accompanied by ultra-low distortions and negligible color fringing. The lenses are optimized for a magnification range from 1:2 to 2:1

The 6-element, apochromatically corrected lenses feature high contrast and sharpness right up to the picture corners with practically no color fringes.

Distortion is corrected to near zero and cannot be seen even in critical subjects with straight-lined structures. The optimum working aperture is between f/5.6 and f/8. This is important because the effective aperture of a lens focused for a scale of about 1:1 is approximately two f-stops smaller than the nominal aperture and therefore stopping down to smaller apertures than nominal f/8 would result in visible blur due to diffraction.

All standard models are fitted with click-stop aperture rings.

- Specially designed for scanning applications and large imaging sensors
- Optimized for 1:2 to 2:1 imaging
- Large image circle up to 102 mm

Apo-Rodagon-D 4.0/75 1x
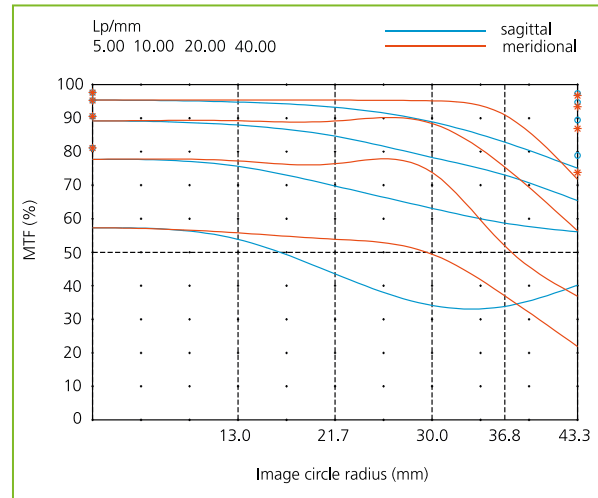
MTF of Apo-Rodagon-D 4.5/75 2x @ β'= -0.5 and f-stop = 5.6

- Focal length: 75, 120 mm
- Magnification range: -0.33 ... -3.0
- Spectral range: 400-750 nm
- Iris diaphragm: manual, click-stop
- Mount: M39x1/26" (Leica)
- Filter thread: M40.5x0.5
- Wide range of mechanical accessories

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	-1.2 ... -0.8	82	M39x1/26"	0703-005-000-40
Apo-Rodagon-D 4.5/75 2x	75	4.5	-0.8 ... -0.4	86.8	M39x1/26"	0703-028-000-21
Apo-Rodagon-D 5.6/120 2x	120	5.6	-0.8 ... -0.33	102	M39x1/26"	0703-043-000-20

Rodagon-F

Precision Optics for F-Mounts

The Rodagon-F Series was developed by Qioptiq to adapt precision industrial-grade optics to an F-Mount camera, with a great price/performance ratio. Now, for the first time, users can integrate world re-knowned 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 of these lenses is 44 mm and is therefore large enough for sensors with 35 mm format and the popular 41 mm line sensors.

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

- 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	-0.5 ... 0	44	F-Mount	0703-090-000-25
Rodagon-F 5.6/40	40	5.6	-0.5 ... 0	44	F-Mount	0703-090-000-26
Rodagon-F 8/40	40	8	-0.5 ... 0	44	F-Mount	0703-090-000-27
Rodagon-F 2.8/50	50	2.8	-0.5 ... 0	46	F-Mount	0703-089-000-24
Rodagon-F 4/50	50	4	-0.5 ... 0	46	F-Mount	0703-089-000-25
Rodagon-F 5.6/50	50	5.6	-0.5 ... 0	46	F-Mount	0703-089-000-26
Rodagon-F 4/60	60	4	-0.5 ... 0	44	F-Mount	0703-087-000-25
Rodagon-F 5.6/60	60	5.6	-0.5 ... 0	44	F-Mount	0703-087-000-26
Rodagon-F 8/60	60	8	-0.5 ... 0	44	F-Mount	0703-087-000-27

Rodagon-M42

Precision Optics for M42 Mounts

The Rodagon lenses are successfully implemented in many different machine vision applications for many years already. Now, the Rodagon family grows further and Qioptiq sets a new standard with the Rodagon M42 series in terms of price-performance-ratio.

The new Rodagon M42 series is available with 40, 50 or 60 mm focal length. The lenses feature integrated manual focusing that can be adjusted precisely and fixed by a locking ring and additional clamping screws. Even strong vibrations will not cause defocusing of the setup. The flange focal distance of the M42 mount is specifically optimized for industrial line scan cameras like UNIIQA, Linea or Racer made by leading camera manufacturers to cover the complete magnification range of typical machine vision applications. The fixed aperture of the Rodagon M42 lenses further enhances the robustness as no accidental change of aperture setting is possible. The result is a simple and robust as well as cost-effective system comprising of camera and lens without any moving parts.

Rodagon-M42 with 40, 50, 60mm focal length

- Integrated manual focusing
- Large image circle up to 41 mm
- High numerical aperture
- Compatible to cameras from leading manufacturers
- Excellent price-performance ratio

- Focal length: 40 ... 60 mm
- Magnification range: -0.03 … -0.5
- Spectral range: 400-750 nm
- Iris diaphragm: fix
- Mount: M42x1
- Filter thread: M40.5x0.5

Rodagon-M42

Product	Focal length (mm)	F-number	Magnification range	Image circle (mm)	Interface	Part No.
Rodagon-M42 4/40	40	4	-0.5 ... 0.05	41.2	M42x1	0703-118-000-25
Rodagon-M42 5.6/40	40	5.6	-0.5 ... 0.05	41.2	M42x1	0703-118-000-26
Rodagon-M42 8/40	40	8	-0.5 ... 0.05	41.2	M42x1	0703-118-000-27
Rodagon-M42 2.8/50	50	2.8	-0.5 ... 0.03	40.0	M42x1	0703-119-000-24
Rodagon-M42 4/50	50	4	-0.5 ... 0.03	40.0	M42x1	0703-119-000-25
Rodagon-M42 5.6/50	50	5.6	-0.5 ... 0.03	40.0	M42x1	0703-119-000-26
Rodagon-M42 4/60	60	4	-0.5 ... 0.03	39.6	M42x1	0703-120-000-25
Rodagon-M42 5.6/60	60	5.6	-0.5 ... 0.03	39.6	M42x1	0703-120-000-26
Rodagon-M42 8/60	60	8	-0.5 ... 0.03	39.6	M42x1	0703-120-000-27

Apo-Rodagon-N

Measuring Lenses for Large Imaging Sensors

The Linos measuring lenses developed by Qioptiq feature the highest resolution, excellent contrast, minimum distortion and color neutrality. Apo-Rodagon-N Lenses produce crisp, sharp images to the extreme edges of the object.
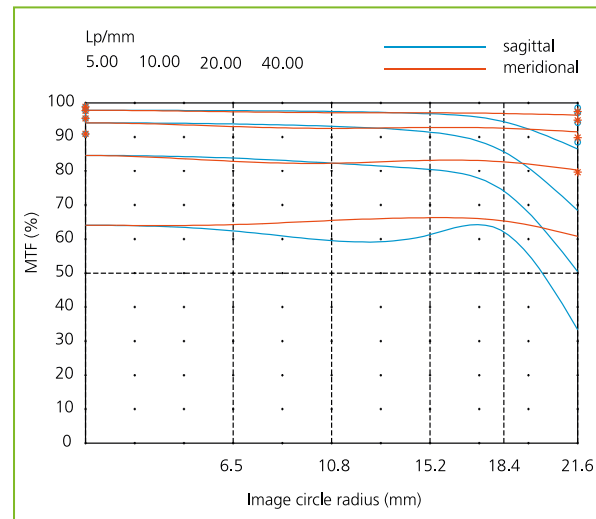

Apo-Rodagon-N 2.8/50

Apo-Rodagon-N

Apochromatically corrected lens designed to meet the highest requirements in an especially broad magnification range.

- Suitable for line-scan cameras and large imaging sensors
- Large image circle up to 100 mm
- High numerical aperture
- Adapter available for all common camera interfaces

- Focal length: 50 ... 105 mm
- Magnification range: -0.05 … -0.5
- Spectral range: 400-750 nm
- Iris diaphragm: manual, click-stop
- Mount: M39x1/26" (Leica)
- Filter thread: M40.5x0.5
- Wide range of mechanical accessories

MTF curve of Apo-Rodagon-N 2.8/50 @ β'= -0.1 and f-stop = 2.8

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	-0.5 ... -0.05	44	M39x1/26"	0701-349-000-40
Apo-Rodagon-N 4.0/80	80	4.0	-0.5 ... -0.067	86	M39x1/26"	0703-092-000-40
Apo-Rodagon-N 4.0/90	90	4.0	-0.5 ... -0.066	90	M39x1/26"	0703-094-000-20
Apo-Rodagon-N 4.0/105	105	4.0	-0.5 ... -0.06	100	M39x1/26"	0703-096-000-40

Rodagon, Rodagon-WA

Measuring Lenses for Large Imaging Sensors

The Linos measuring lenses developed by Qioptiq 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
High-performance lens featuring a highly consistent imaging quality and broad magnification range.

Rodagon   Rodagon-WA

Rodagon-WA
High-performance lens with extended-field viewing angle and a large resulting image circle.

- 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

- Focal length: 35 … 135 mm
- Magnification range: -0.03 … -0.5
- Spectral range: 400-750 nm
- Iris diaphragm: manual, click-stop
- Mount: M39x1/26" (Leica)
- Filter thread: M40.5x0.5

Rodagon

Product	Focal length (mm)	F-number	Magnification range	Image circle (mm)	Interface	Part No.
Rodagon 4.0/35	35	4.0	-0.2 ... -0.03	30	M39x1/26"	0701-357-000-20
Rodagon 2.8/50	50	2.8	-0.5 ... -0.07	44	M39x1/26"	0701-345-000-40
Rodagon 4.0/60	60	4.0	-0.5 ... -0.06	56	M39x1/26"	0701-393-000-40
Rodagon 4.0/80	80	4.0	-0.5 ... -0.06	62	M39x1/26"	0701-391-000-40
Rodagon 4.0/80 azimuth	80	4.0	-0.5 ... -0.06	62	M39x1/26"	0701-391-000-42
Rodagon 5.6/105	105	5.6	-0.5 ... -0.06	104	M39x1/26"	0701-394-000-40
Rodagon 5.6/105 azimuth	105	5.6	-0.5 ... -0.06	104	M39x1/26"	0701-394-000-41
Rodagon 5.6/135	135	5.6	-0.5 ... -0.1	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	-0.25 ... -0.066	46	M39x1/26"	0701-399-000-40
Rodagon-WA 4.0/60	60	4.0	-0.25 ... -0.066	82	M39x1/26"	0701-276-000-40

Rogonar-S

Measuring Lenses for Large Imaging Sensors

The Linos measuring lenses developed by Qioptiq 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.

Rogonar-S

Inexpensive lens with good imaging performance. Optimal price / performance ratio

Rogonar-S

- Suitable for line-scan cameras and large imaging sensors
- Large image circle up to 82 mm
- High numerical aperture
- Adapter available for all common camera interfaces

- Focal length: 50 ... 90 mm
- Magnification range: 0.075 … -0.4
- Spectral range: 400-750 nm
- Iris diaphragm: manual, click-stop or continuous with set screw
- Mount: M39x1/26" (Leica)
- Filter thread: M40.5x0.5

Rogonar-S

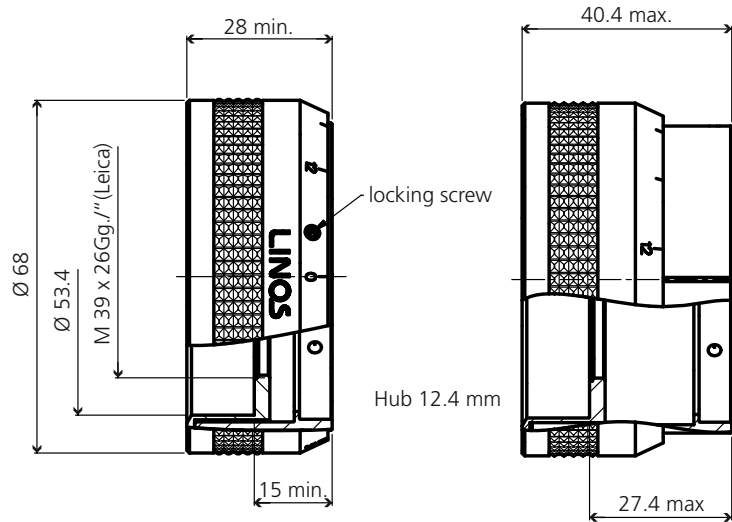| Product	Focal length (mm)	F-number	Magnification range	Image circle (mm)	Interface	Part No.
Rogonar-S 2.8/50	50	2.8	-0.4 ... -0.075	44	M39x1/26"	0801-397-000-40
Rogonar-S 4.5/60	60	4.5	-0.5 ... -0.1	56	M39x1/26"	0801-324-000-40
Rogonar-S 4.5/75	75	4.5	-0.5 ... -0.1	44	M39x1/26"	0801-325-000-40
Rogonar-S 4.5/75 metal	75	4.5	-0.5 ... -0.1	44	M39x1/26"	0801-325-000-41
Rogonar-S 4.5/90	90	4.5	-0.5 ... -0.125	82	M39x1/26"	0801-398-000-41

Mechanical Accessories

Mechanical Adaptions

The LINOS Machine Vision Lenses from Qioptiq have different threads and most have no focusing device. Therefore, we offer a complete range of mechanical accessories to adapt the lenses to all types of applications and camera systems.
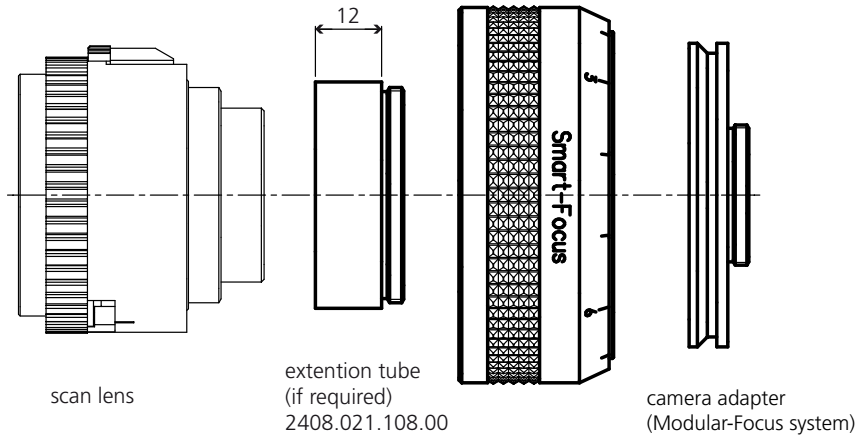
Modular Focus

A helical mount with locking screw and travel range of 25 mm. Lenses are mounted via an M45 thread using the various lens adapters and extension tubes that Qioptiq offers. A large variety of camera adapters is mounted directly with 3 set screws. The complete setup can be rotated freely for best azimuth or convenient access to aperture and locking screw. Smart mechanical design of the Modular Focus prevents the lens from rotating during focusing.

Modular Focus

Locking screw (3x)

Hub 25 mm

28.8 min.

53.8 max.

∅ 72

∅ 53.4

M 45 x0.75

three screws to take the lens aperture display in the best readable position

Example of application

lens adapter

Modular Focus S

scan lens

extention tube
(if required)

camera adapter
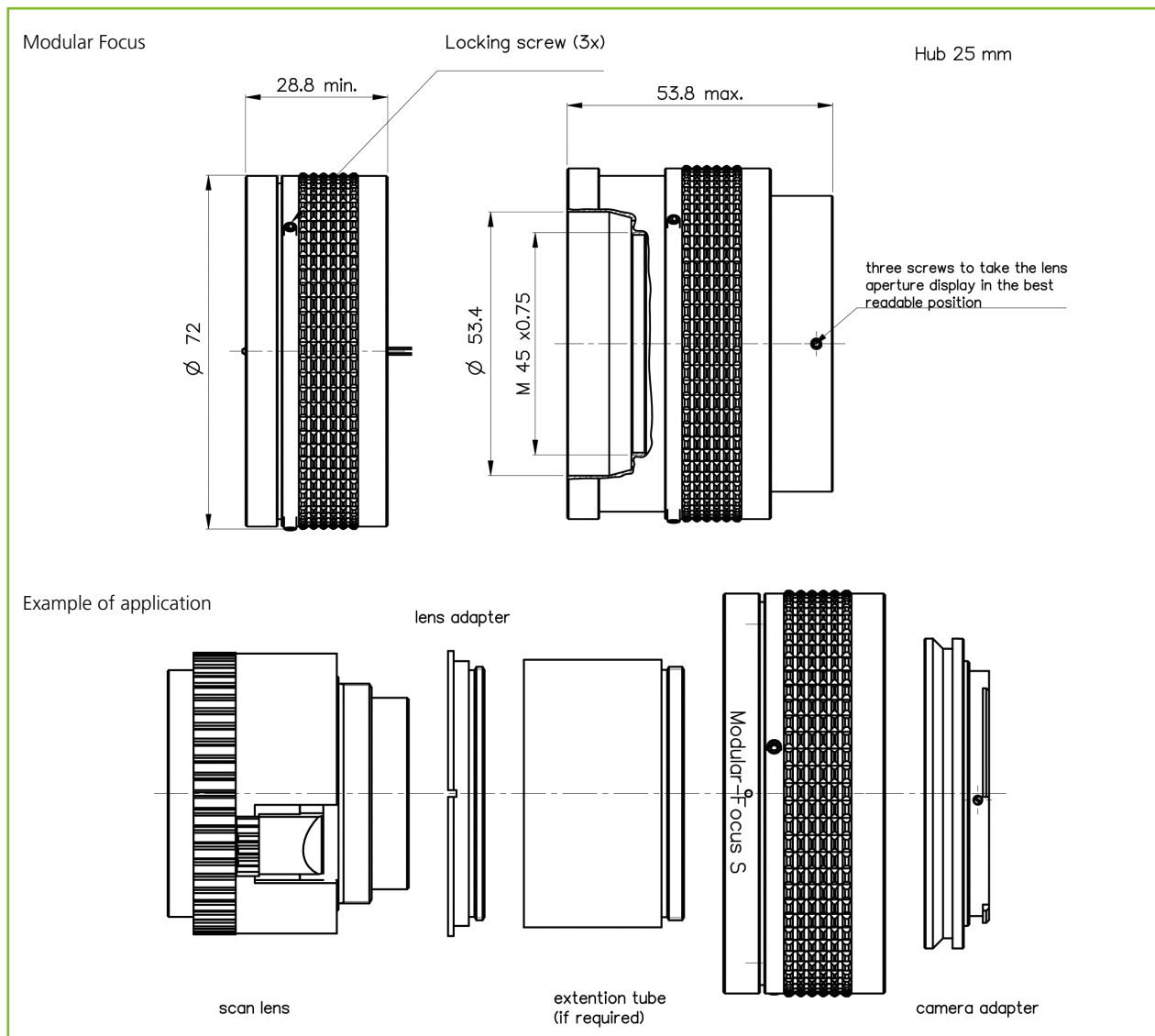
Mechanical Accessories

Mechanical Adaptions

Qioptiq's LINOS Machine Vision Lenses have different threads and most have no focusing device. Therefore, we offer a complete range of mechanical accessories to adapt the lenses to all types of applications and camera systems.

Smart Focus

A low cost version of the Modular Focus with an M39x1/26" (Leica) lens thread. This enables direct mounting of the lens without lens adapter. A large variety of camera adapters is mounted directly with 3 set screws. The complete setup can be rotated freely for best azimuth or convenient access to aperture and locking screw. The travel range of the Smart Focus is 12.4 mm and the lens is rotating during focusing.

Smart Focus

28 min.

40.4 max.

Ø 68

Ø 53.4

M 39 x 26Gg./"(Leica)

LINOS

locking screw

Hub 12.4 mm

15 min.

27.4 max

Example of application

12

Smart-Focus

scan lens

extention tube
(if required)
2408.021.108.00

camera adapter
(Modular-Focus system)

Modular Focus

Product	Part No.
Modular Focus Helical mount	2408-009-000-42
Extension tube 24.5 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

Modular focus

Smart Focus

Product	Part No.
Smart focus	2408-021-000-43
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

Smart focus

Camera Adapter

Product	Part No.
Camera adapter C-Mount	2408-009-106-00
Camera adapter F-Mount	2408-009-142-00
Camera adapter TFL-I Mount	2408-009-174-00
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 M95x1.0	2408-009-155-00

Camera adapter M42

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

Extension tube M72

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" [1]	2408-009-112-00
Lens adapter M45-V-groove	2408-009-147-00

[1] To be used with Rodagon 5.6/135; Apo-Rodagon-D 4.5/75 2x;
Apo-Rodagon-D 5.6/120 2x; Apo-Rodagon-N 4.0/105

Retro Rings

Product	Part No.
Retro ring M40.5x0.5 - M39x1/26"	2408-009-158-00
Retro ring M37x0.75 - M45x0.75 [2]	2408-009-152-00

[2] To be used with Apo-Rodagon HR 75mm

Retro ring

MachVis Software

Lens Selection and Configurator Software

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:

All necessary optical components as well as mechanical accessories, are directly downloadable of the 3D data for a smooth integration into the project are available with a single click. Configurators are available for the more complex microscope systems, where e.g. the motorization, the installation of zoom systems, beam splitters, filters and, last but not least, the coupling of the illumination open up a virtually unlimited range of possibilities and flexibility. With this features, MachVis reaches a new level from selection to an optical configuration software.

In addition to the LINOS® Machine Vision Lenses, the OPTEM® Fusion Micro-imaging System and the Qioptiq mag.x® Microscope system, the PCO® Scientific Cameras are also available from Excelitas now.

MachVis: Example of the user face

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.

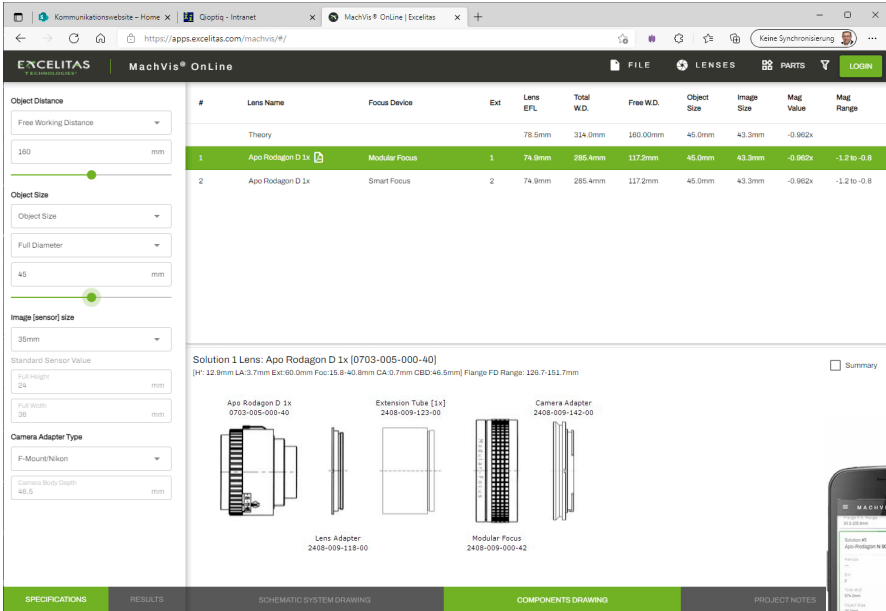With **MachVis Online** it is possible to access MachVis directly without the need to download and install any software. Let MachVis online convince you and receive more flexibility and independence. MachVis not only helps to identify the perfect lens solution, it saves your time in the lens selection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

For access or download and further information, please go to www.excelitas.com/product/machvis-lens-configurator.

MachVis Online: Example of the user face

QIOPTIQ
Photonics for Innovation
An Excelitas Technologies Company

Discover the capabilities, knowledge, equipment
and technology of Qioptiq

The Vision Technology product area covers the
whole range of industrial magnification tasks from
Macro to Micro and Line-Scan to Area-Scan.

Enabling the future through light.

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