d.fine HR Lenses

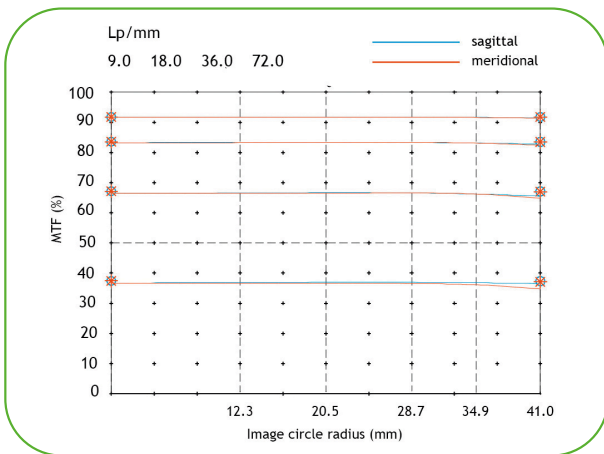## Extreme High Resolution
Inspection Lenses for Large Sensors

d.fine HR Lens

Optimized for a magnification of 3.33X, the d.fine HR 2.4/128 lens delivers unparalleled imaging performance, achieving object side resolution of up to 300 lp/mm across image circle diameters as large as 82mm. 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. An aperture of 2.4 combined with an extremely low distortion of 0.1% make the d.fine HR 2.4/128 the perfect choice for the most demanding high throughput imaging applications.

Typical Inspection Tasks

- FPD
- OLED
- PCB
- Flip Chip
- Semiconductor

MTF at ratio 3.33 f/2.4

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

- Focal length 128 mm
- Aperture 2.4 … 8 (design value)
- Numerical aperture 0.13
- Magnification: -3.33 (-3.2 … -3.5)
- Large image circle of 82 mm
- Total track length 694 mm (680 ... 715 mm)
- Working distance
  with prism module 59.9 mm (58 ... 61.4 mm)
  with area scan module 91 mm (89.2 ... 92.5 mm)
- Spectral range: 400 ... 750 nm
- Distortion < 0.1% (design value)
- V-Groove Ø 66 mm mounting interface
- Filter threads available

High Resolution Inspection Lens d.fine HR 2.4/128

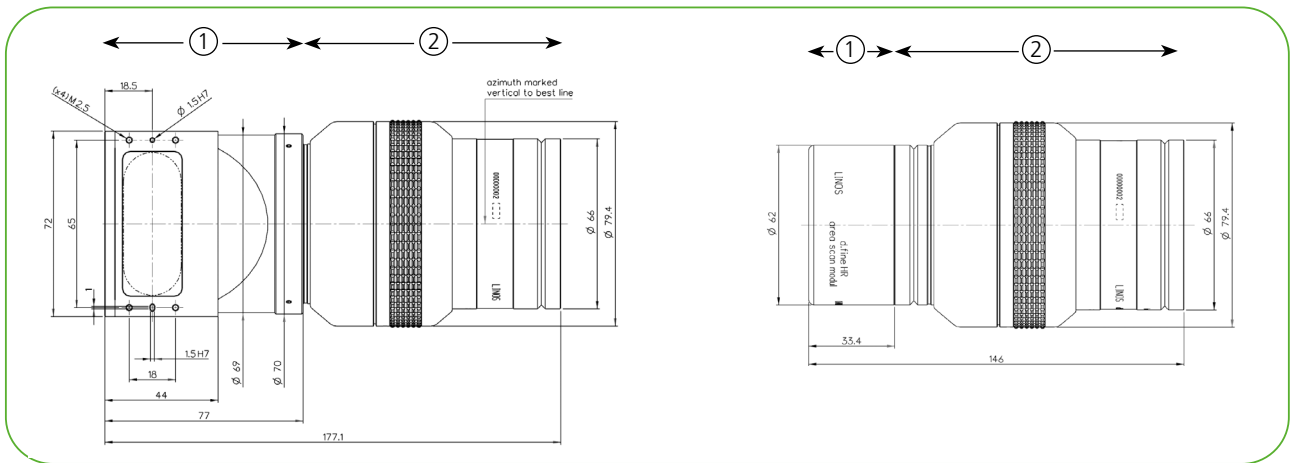| Product	Focal length (mm)	F-number	Magnification range	Image Circle (mm)	Interface	Part No.
d.fine HR 2.4/128*	128	2.4	3.2 ... 3.5	82	V-groove	0703-134-000-20

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

The d.fine HR 2.4/128 3.33x lens is a perfect match for modern, high resolution cameras supporting 3.5 and 5 µm pixel sensors. 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. Mechanical focusing units and accessories belong to a modular construction system which is readily available to adapt the d.fine HR lens to M72, M90 or M95 camera mounts. The precision-engineered focusing units provide fast coarse alignment as well as exact fine tuning of the lens' focal position.
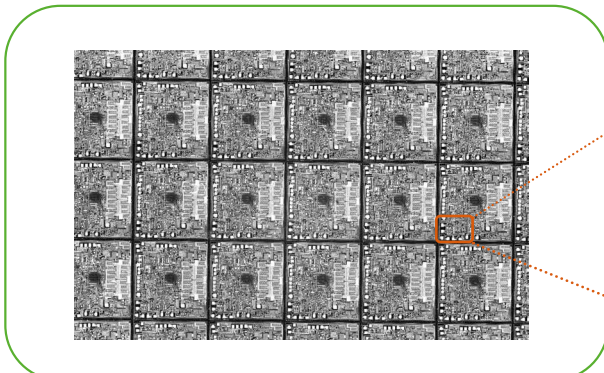

d.fine HR Essential Accessories

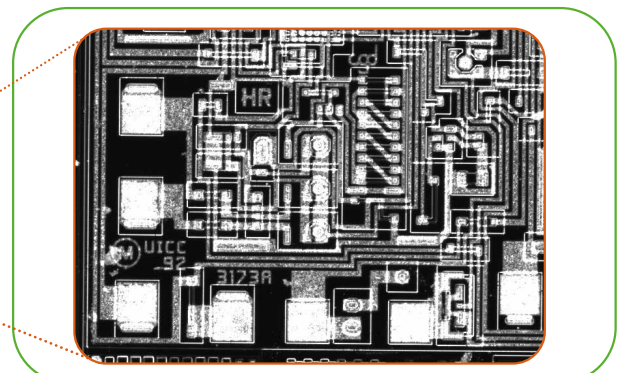| Product	Part No.
d.fine HR prism module	0703-130-823-00
d.fine HR area scan module	0703-130-825-00

① d.fine HR prism module ② d.fine HR 2.4/128 3.33x

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

Circuits on silicon wafer grabbed with d.fine HR 3.33x lens + area scan module, camera: 86 MP

Detail of the same picture shows premium resolution quality of d.fine HR 3.33x lens

d.fine HR-M Lens Series

The new LINOS d.fine HR-M lens series combines the latest technological advancements with an entirely new optical design concept to provide ultra-precision imaging performance across large fields of view. Designed with efficiency and throughput in mind, the large aperture optimizes light throughput to minimize cycle times which are critical in industrial environments. Ultra fine resolution out to the extreme corners of the field of view ensure consistent imaging performance across full format sensors and long line 16K format sensors with pixels sizes down to 3.5µm.

In combination with our new flexible focusing and mounting modules, the lens series can be connected to almost any industrial camera, enabling optimal performance for a wide range of machine vision applications.
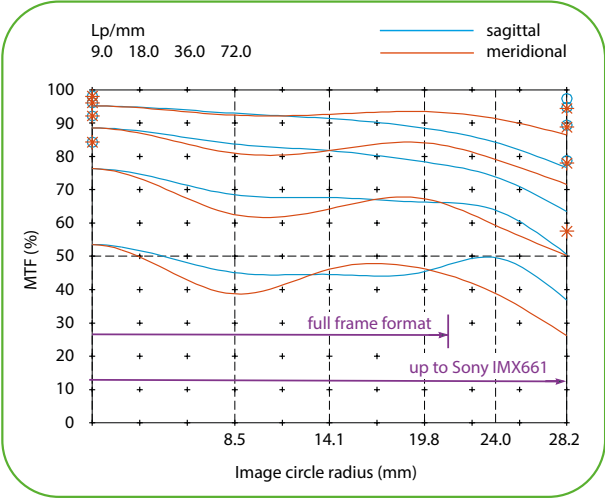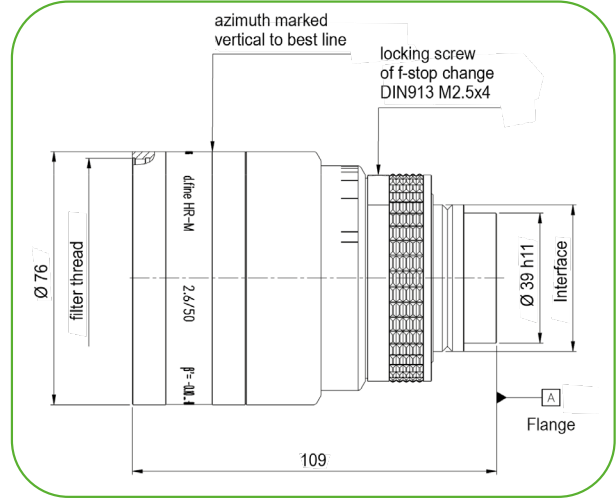
d.fine HR-M 2.6/50

d.fine HR-M 2.8/80

- 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

- Focal length: 50 and 80 mm
- Aperture 2.6 … 16
- Image circle: up to 62.4mm
- Working distance: 252 ... 2016mm
- Magnification range: 0.025 … 0.27
- Spectral range: 400 ... 750 nm

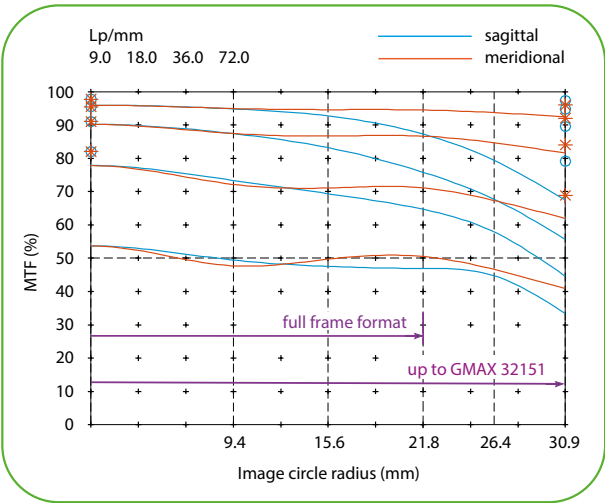## High Resolution Inspection Lens d.fine HR-M 2.6/50 and 2.8/80

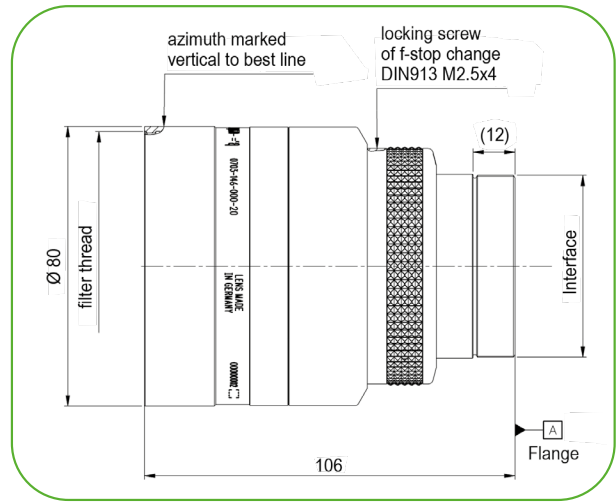| Product	Focal length (mm)	F-number	Magnification range	Image Circle (mm)	Interface	Part No.
d.fine HR-M 2.6/50 0.15x	50	2.6	-0.1 .. -0.2	56.8	V-groove ø44	0703-145-000-20
d.fine HR-M 2.6/50 0.063x	50	2.6	-0.025 .. -0.1	56.8	V-groove ø44	0703-145-000-30
d.fine HR-M 2.8/80 0.2x	80	2.8	-0.14 .. -0.27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

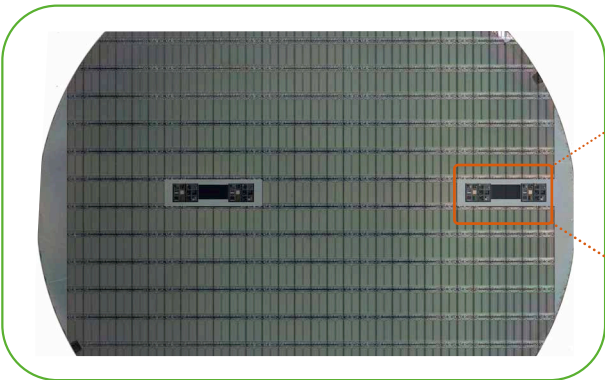d.fine HR-M 2.6/50: MTF at ratio 0.15 f/2.6

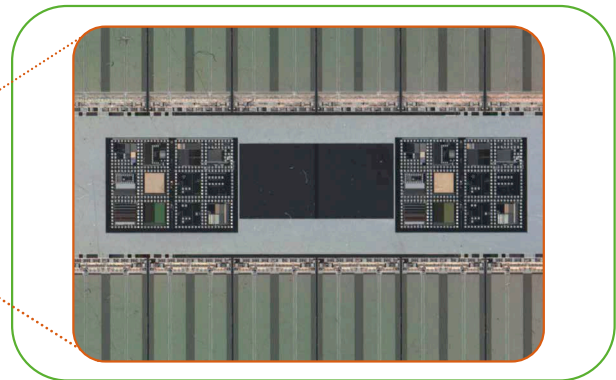Dimensions d.fine HR-M 2.6/50

d.fine HR-M 2.8/80: MTF at ratio 0.2 f/2.8

Dimensions d.fine HR-M 2.8/80

Circuits on silicon wafer grabbed with a d.fine HR-M 2.8/80 0.2x lens,
aperture: 2.8, camera: 150 MP

Detail of the same picture shows premium
resolution quality of d.fine HR-M 2.8/80 0.2x lens

Mechanical Accessories

d.fine HR

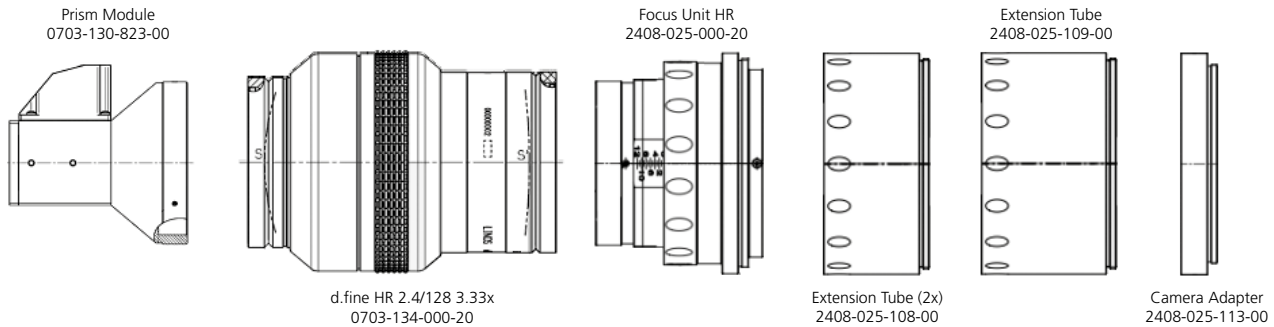| Focus Unit	Part No.
Focus Unit d.fine HR	2408-025-000-20
Extension Tube 20mm	2408-025-106-00
Extension Tube 50mm	2408-025-107-00
Extension Tube 100mm	2408-025-108-00
Extension Tube 200mm	2408-025-109-00

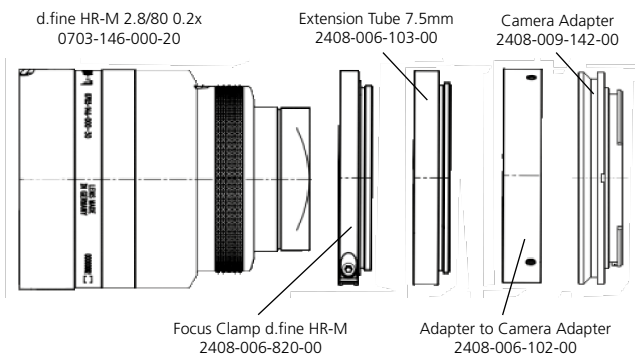| Camera Adapter	Part No.
Camera Adapter M72x0.75	2408-025-111-00
Camera Adapter M90x1	2408-025-113-00
Camera Adapter M95x1	2408-025-115-00

Mounting Example

Prism Module
0703-130-823-00

d.fine HR 2.4/128 3.33x
0703-134-000-20

Focus Unit HR
2408-025-000-20

Extension Tube
2408-025-109-00

Extension Tube (2x)
2408-025-108-00

Camera Adapter
2408-025-113-00

d.fine HR-M

Modular Focus	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

Smart Focus HR-M	Part No.
Smart focus HR-M	2408-021-000-46
Extension tube 15 mm	2408-021-117-00
Extension tube 24 mm	2408-021-118-00
Extension tube 48 mm	2408-021-119-00

Focus Clamp	Part No.
Focus Clamp d.fine HR-M	2408-006-820-00
Extension Tube 7.5mm Focus Clamp	2408-006-103-00
Adapter to Camera Adapter	2408-006-102-00

Lens Adapter	Part No.
Lens Adapter M45 - M52 (ModFoc) to be used with d.fine HR-M 2.8/80	2408-009-176-00
Lens Adapter M45 - M52 - V-groove to be used with d.fine HR-M 2.6/50	2408-009-177-00

Camera Extension Tubes	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

Camera Adapter	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

Mounting Example

d.fine HR-M 2.8/80 0.2x
0703-146-000-20

Extension Tube 7.5mm
2408-006-103-00

Camera Adapter
2408-009-142-00

Focus Clamp d.fine HR-M
2408-006-820-00

Adapter to Camera Adapter
2408-006-102-00

Driven by your Application Parameters ...

Do You know about MachVIS? Our MachVis Lens 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:
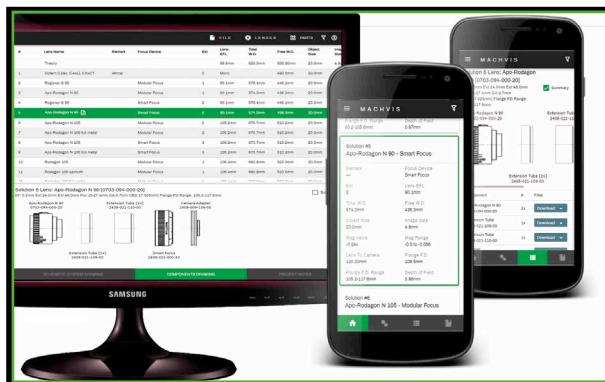
- Working distance
- Object size or magnification
- Sensor size
- Camera mount

MachVis specifies all necessary accessories (e.g. focusing units, extension tubes, magnifying objectives, camera mount adapters, objective lenses, etc.) and generates an itemized list of all part numbers with a schematic drawing in the order of assembly.

Datasheet PDFs are also available for detailed analysis, as well as downloadable 3D CAD data with a single click to build into your system drawings as needed.

All specifications, along with your own project notes, can be easily saved for archiving and future reference.

MachVis or MachVis Online: Access for FREE!

For futher information about our Lens Selection Software MachVis, please scan or click the QR-Code.

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