

Large Format Sensor Lenses



- Larger format design for line scan and area scan cameras.
- Low distortion center to edge.
- Wide field design for close-up imaging.
- Large depth of field.
- Diffraction limited.
- Exceptional contrast.

Large Format

Sensor Lenses



Raptar, Raptar Pro and Platinum Series Lenses

Responding to Changing Customer Needs

Navitar continues to develop specific products for defined markets. Our customers have asked us for a range of lenses to work with the current and future line and area scan sensors. Camera manufacturers continue to increase sensor size while they simultaneously reduce pixel size.

Navitar has responded to these industry trends with the introduction of our Raptar Pro and Platinum series of lenses. These lenses meet the demands for high center to edge resolution, low distortion, and application specific F-numbers. These lenses are not modified video lenses. We have designed these lenses to match the performance abilities of cameras with high pixel counts and fast line rates.

Raptar Lenses



Navitar's newest edition to the Raptar family is our 50 mm large format machine vision lens. This lens is the perfect solution to machine vision applications that require a large format sensor and lens combination. The 50 mm Raptar is an alternative to the traditional SLR camera lenses which are not manufactured to withstand environments traditionally found in industrial applications.

Our 50 mm lens exceeds industry requirements for MTF, relative illumination, and low distortion - all important characteristics when working with high cost, large format cameras.

The 50 mm Raptar lens is widely used in these and other applications:

- Veterinarian Digital X-ray
- Food and Plastics Sorting and Inspection
- Film, Paper and Plastics Defects Inspection
- Lumber/Wood Inspection
- Solar Wafer and Cell Inspection



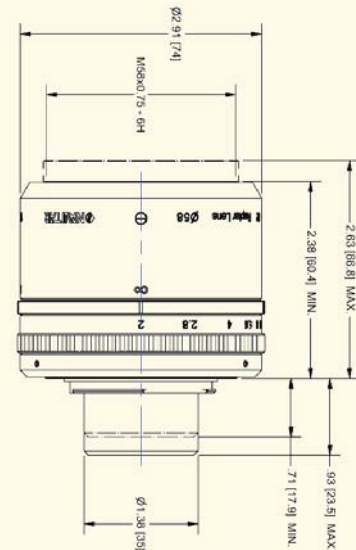
Available Raptar Series Lenses

| Part # | Lens Mount | Focal Length (mm) | Aperture Range | Focusing Range | Angular Field (Diag. / Horiz.) | Filter Thread Size | Iris Control |
|---------|------------|-------------------|----------------|-----------------|--------------------------------|--------------------|--------------|
| 1-18820 | F | 50 | f/2 - f/22 | 0.5m - infinity | 46.0° / 37.0° | M58 x 0.75 | Manual |
| 1-18890 | M42 | 50 | f/2 - f/22 | 0.5m - infinity | 46.0° / 37.0° | M58 x 0.75 | Manual |

Features of the 50mm Raptar Lens

- Ideal for use with full frame 11 and 16 mega pixel sensors.
- Manual iris and focus control.
- Covers 43 mm diagonal sensor.
- Robust mechanical design.
- Less than 0.1% distortion.
- F/2.0 designs.
- Positive, single point focus and iris locks.
- Standard F-bayonet with option of a M42 or C-mount.

50mm Raptar Lens (1-18820)



Charts showing MTF vs Field Angle, Relative Illumination and Distortion Percentage can be found on our web site at www.machinevision.navitar.com.

Raptar Pro Lenses

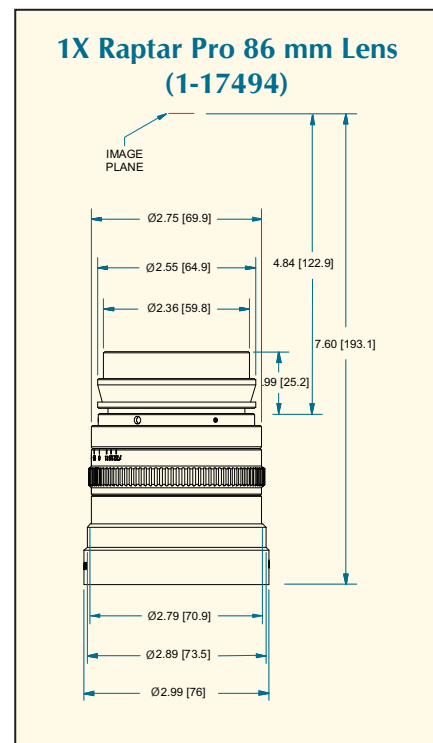
The Raptar Pro large format lens series has been specifically designed for the line scan and large area sensor market. The first lens in the series is the 1X Raptar Pro 86 mm (1-17474). With a nominal magnification of 1.0X, this high resolution lens can image on to sensors up to 90 mm with less than 0.1% distortion - resulting in superior sharpness and exceptional contrast at apertures ranging from F4-22. Sized for 12k line scan sensors, the 1X Raptar Pro produces up to 100 lp/mm image space resolution and is optimized for working distances of 95 mm.

Mechanically, the lens is designed with a T-mount rear coupler and is available with adapters that convert to a C, F, or SLR format. An optional clamp can be added to the exterior of the T-mount for mounting to a flat surface. Additionally, to accommodate the new larger format cameras with the larger non-standard threads, an M72 x 0.75t mounting system is available. For those cameras with a thread smaller than M72, a "step-up" ring must be used. These rings may be found at www.photo-filter.com. There are two varieties of M72 mounts with flange distances of 6.56 and 30.8 mm. Any user fabricated custom mount must maintain these distances for the Raptar Pro to perform satisfactorily. A special rear coupler is available for Dalsa 12K Piranha series cameras. The rear dovetail interface provides a means of rotating a line scan camera to the maximum performance axis of the lens. A special rear coupler is available for Dalsa line scan cameras. The rear dovetail interface of the lens provides a means of rotating a line-scan camera to the maximum performance axis of the lens.

Raptar Pro lenses can be used for inspection and viewing of objects in numerous applications including machine vision, Q/C inspection, web inspection, biomedical imaging, product manufacturing, and more.

Features of the 1X Raptar Pro Lens

- Covers up to 90 mm sensors.
- Manual iris.
- Covers up to 90 mm FOV.
- High resolution - 100 lp/mm.
- Less than 0.1% distortion.
- F/4.0 design.
- Sized for 12K line sensor.
- Optimized for 95 mm WD.
- Ideal for machine vision, Q/C inspection, Web inspection, biomedical imaging, product manufacturing, and more.



Navitar is currently developing new focal lengths for the Raptar Pro Series. Please call for more information.

Available Raptar Pro Series Lenses

| Part # | Lens | f/Stop Range | Magnification Range | Lens Dimensions | Sensor Coverage Size | Angle of View (degrees) | Focus Control | Zoom Control | Iris Control |
|---------|-------------|--------------|---------------------|-----------------|----------------------|-------------------------|---------------|--------------|--------------|
| 1-17494 | 86 mm f/4.0 | 4.0 - 22 | 1X | 76Ø X 95 | 90 mm | 28 | Manual | NA | Manual |

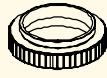
*Measurements are in millimeters unless otherwise specified.

Raptar Pro System Diagram

Camera Couplers



1-17482
T-F Mount

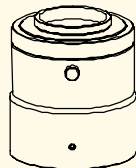


1-17483
T-SLR Mount

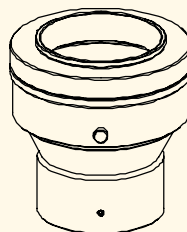


3-63266
T-C Mount

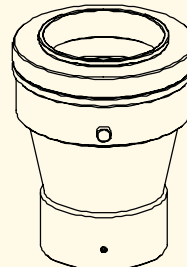
Adapters



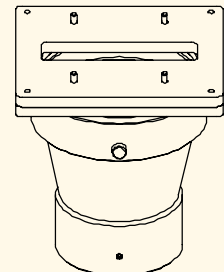
1-17236
Fine Focus
T-Mount



1-17706
Fine Focus
M72X0.75 Line Scan Mount
NED XCM80 CAMERA

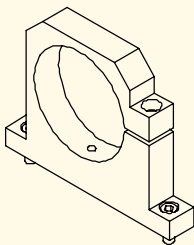


1-17681
Fine Focus
M72X0.75 Line Scan Mount

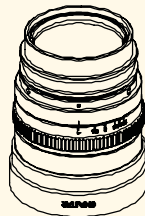


1-17237
Fine Focus
12k Dalsa Line Scan Mount

Large Format Lens



1-17495
Mounting Clamp



1-17494
F/4 1x Raptar Pro

Platinum Lenses



25 mm Platinum Lens Features

- Magnification from 0.1X to 0.5X.
- Focusable from 2" to infinity.
- 0.13% distortion on edges.
- Wide field design for close-up imaging.
- Large depth of field.
- Diffraction limited.
- Exceptional clarity and contrast.

25 mm Multi-Magnification Platinum Lens

42 mm Image Format with Low Distortion from Center to Edge

Our innovative 25 mm multi-magnification lens (1-15838) works with F-mount or C-mount cameras and offers 180 line pairs per millimeter resolution. It is specifically optimized to shift between any magnification from 0.1X to 0.5X while maintaining diffraction-limited image quality with less than 0.13% distortion. Ideal for vision system applications, this wide-angle lens is designed to allow cameras to inspect large areas without the great distance required by a typical lens.

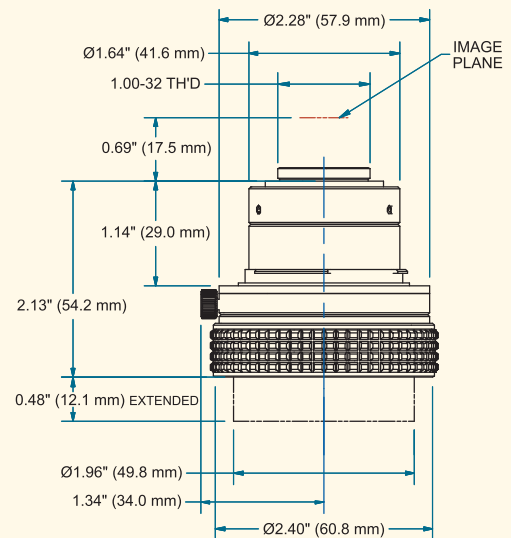
Navitar's 25 mm lens features a fixed F/8 aperture which allows for a balance between depth of field and resolution while maintaining significant light-gathering power. It has 42 mm image coverage and a depth of field ranging from 15.4 mm at 0.1X to 1.1 mm at 0.5X. Its low distortion permits cameras to determine dimensional measurements without the need for software calibration on vision systems.

25 mm Lens Magnification Specifications

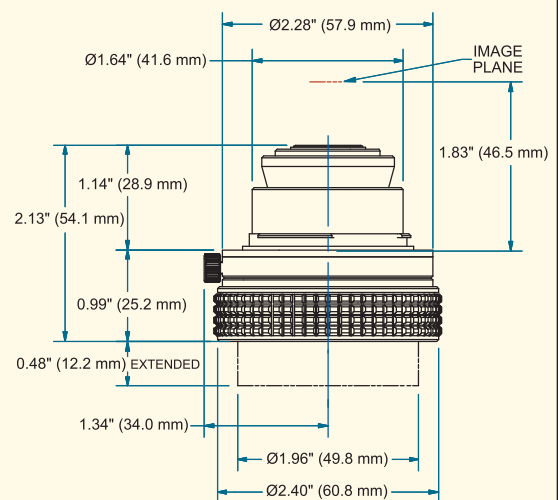
| Mag. | Object Size | W.D. | Spot Size | Image MTF Cut-off | Object MTF Cut-off | Object N.A. | Image N.A. | Object Side Depth of Field |
|-------|-------------|------|-----------|-------------------|--------------------|-------------|------------|----------------------------|
| 0.50X | 84.8 | 45 | 6.5 μ | 140 | 70 | 0.0212 | 0.0425 | 1.1 |
| 0.34X | 127.2 | 70 | 5.6 μ | 160 | 50 | 0.0159 | 0.0476 | 1.9 |
| 0.20X | 212 | 120 | 5.2 μ | 190 | 38 | 0.0105 | 0.0526 | 4.5 |
| 0.14X | 318 | 183 | 4.8 μ | 200 | 25 | 0.0074 | 0.0556 | 9.1 |
| 0.10X | 424 | 245 | 4.8 μ | 200 | 20 | 0.0057 | 0.0572 | 15.4 |

*Measurements are in millimeters unless otherwise specified.

25 mm Platinum Lens with C-Mount



25 mm Platinum Lens with F-Mount



Charts showing Field Curvature/Distortion, Relative Illumination, and Polychromatic Geometric MTF at F#1 can be found on our web site at www.machinevision.navitar.com.

50 mm Platinum Lenses

Challenging customer demands and a great engineering team are what delivers new, exciting products. Since the beginning of the biotech revolution, Navitar has been working with leading-edge companies to develop solutions to their problems. Our customers required a high performance lens to view contents in microtiter plates. These requirements demanded a new level of optical performance not previously found in the market.

As a result of these collaborations, Navitar developed a new, ultra high resolution, high speed lens. The Navitar 50 mm lens for 16 mm sensor size (1-16652) is designed to work with the larger style CCDs to provide the ultimate in image quality, relative illumination and low light performance. It provides outstanding contrast, as well as low distortion from center to edge. Contact Navitar's engineering staff with your requirements.



50 mm Platinum Lens for 16 mm Sensor

50 mm Lens (16 mm Sensor) Magnification Specifications

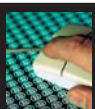
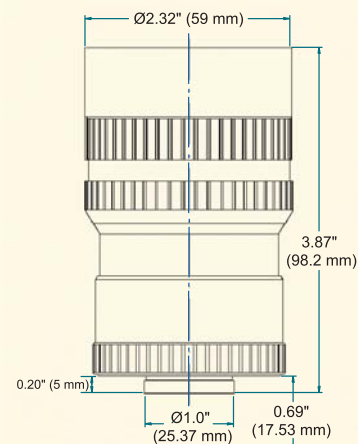
| Mag. | Object Size | Object W.D. | Object MTF at 40% Contrast Lp/mm | Image MTF at 40% Contrast Lp/mm | Object N.A. | Image N.A. | Object Side Depth of Field (microns) |
|--------|-------------|-------------|----------------------------------|---------------------------------|-------------|------------|--------------------------------------|
| -1/7X | 112 | 318 | > 7 | > 50 | 0.063 | 0.438 | +/- 70 |
| -1/10X | 160 | 466 | > 5 | > 50 | 0.045 | 0.455 | +/- 135 |
| -1/14X | 224 | 660 | > 3.6 | > 50 | 0.033 | 0.467 | +/- 250 |

**Measurements are in millimeters unless otherwise specified.*

Features of 50 mm Platinum Lens for 16 mm Sensor

- Specifically designed for F/1.0.
- Magnifications between 1/7X and 1/14X.
- MTF greater than 40% contrast at 50 lp/mm.
- 0.1% distortion on edges.
- 65% relative illumination center to edge.
- Wide field design for close-up imaging.
- Large depth of field.
- Diffraction limited.
- Exceptional contrast.

50 mm Platinum Lens for 16 mm Sensor Size (1-16652)



To view chartes showing Field Curvature Distortion, Relative Illumination, and Polychromatic Geometric MTF at f/1 for the 50 mm Platinum lens visit www.machinevision.navitar.com.

Zeiss Lenses

Zeiss ZF lenses offer the image quality associated with professional photography for technical and industrial applications. The ZF lenses are compatible with the Nikon F-Bayonet, the globally recognized standard for high-resolution industrial cameras with large format image sensors.

With focal lengths of 25, 35, 50, 85 and 100 mm these lenses are suitable for use in “Machine Vision”, automation, quality inspection and measuring tasks. Thanks to the large image format, the optics are ideal for the constantly increasing number of high-resolution image sensors with sizes over one inch.

Zeiss ZF lenses feature manual focusing of the highest precision and the robust design. High image definition, color purity, stray light absorption, and excellent distortion correction.



| Part # | Format (mm) | Effective Focal Length (mm) | f # | Iris |
|---------|-------------|-----------------------------|-----|--------|
| 1-17882 | 45 | 25 | 2.8 | Manual |
| 1-17883 | 45 | 35 | 2.0 | Manual |
| 1-17884 | 45 | 50 | 1.4 | Manual |
| 1-17885 | 45 | 85 | 1.4 | Manual |
| 1-17886 | 45 | 50 | 2.0 | Manual |
| 1-17887 | 45 | 100 | 1.4 | Manual |

Rodenstock Lenses

- Supports Large Format CCDs
- Several Camera Adapter Options Available
- Ideal for Line Scan Cameras
- Close Focus Distance

Rodagon lenses by Rodenstock, with focal lengths from 28mm to 135mm, are excellent choices for use with camera sensors over 1” format. They are ideal for use with area and line scan cameras. The 6 element design provides for high relative resolution, low distortion and high contrast from center to edge. These lenses traditionally perform better than standard CCTV-type optics.



| Part # | Effective Focal Length (mm) | f # | Min Focus Distance (mm) | F-Mount Mag Range | Non F-Mount Mag Range |
|---------|-----------------------------|-----|-------------------------|-------------------|-----------------------|
| 1-17170 | 28 | 2.8 | 36 | NA | 0.58 - 1.49 |
| 1-17171 | 36 | 4.0 | 44 | NA | 0.24 - 1.67 |
| 1-17172 | 50 | 2.8 | 155 | 0.62 - 1.12 | 0 - 1.49 |
| 1-17173 | 60 | 4.0 | 655 | 0.27 - 1.14 | 0 - 1.39 |
| 1-17174 | 80 | 4.0 | 580 | 0 - 0.96 | 0 - 0.86 |
| 1-17175 | 105 | 5.6 | 974 | 0 - 0.71 | 0 - 0.40 |
| 1-17176 | 135 | 5.6 | 2128 | 0 - 0.35 | 0 - 0.12 |