



# Ranger

3D and MultiScan technology for advanced industrial applications

## Fast and Versatile

With its high speed and flexible configuration possibilities, the Ranger camera is a key vision component in 3D systems worldwide. It can be used to measure object height, shape and volume; to detect shape and contrast defects; or to provide all measurements needed for quality grading.

The Ranger generates 3D data at up to 35,000 profiles per second using laser triangulation and an external laser light source. The complete 3D calculation is done inside the camera and the ready-to-use 3D coordinates are sent directly to a PC. The field-of-view and height resolution are user-configurable by the selection of lens and laser arrangement. With an easy off-line procedure, the Ranger can be calibrated to deliver 3D measurements in millimeters for high-speed production.

The MultiScan technology allows one Ranger to do the job of several other cameras as it can measure a multitude of object features such as 3D, color, intensity, and laser scatter – all at the same time!

## Typical applications

- Food portioning and grading
- Electronics assembly verification
- Components inspection
- Robot guidance
- Weld and glue bead inspection
- Tire inspection
- Road and railway inspection
- Board grading in sawmills



3D VISION

## The Ranger family



### Ranger C

High-speed 3D and MultiScan camera with CameraLink interface. Up to 30,000 profiles/s with 1,536 px resolution in 3D mode. Several 3D algorithms and MultiScan measurements with up to 3,072 px resolution available. Highly configurable via software parameters.



### Ranger D

Pure 3D camera with Gigabit Ethernet interface with mid-speed performance of up to 1,000 profiles/s and 1,536 px resolution. Uses a high precision 3D algorithm with few parameters.



### Ranger E

High-speed 3D and MultiScan camera with Gigabit Ethernet interface. Up to 35,000 profiles/s with 1,536 px resolution in 3D mode. Several 3D algorithms and MultiScan measurements with up to 3,072 px resolution available. Highly configurable via software parameters.



### ColorRanger E

High-speed 3D, Color, and MultiScan camera with Gigabit Ethernet interface. Simultaneous 3D and RGB color measurements at up to 11 kHz. Several 3D algorithms and MultiScan measurements with up to 3,072 px resolution available. Highly configurable via software parameters.

## ColorRanger – High-speed 3D and color in one camera

The ColorRanger provides more information about inspected parts than ever before. Knowing not only the 3D shape and the contrast of parts, but also their colors, allows for more reliable decisions and improved production quality. The ColorRanger combines the functionalities of a 3D camera and a LineScan color camera with on-chip white balancing and spatial correction for high-quality color images.

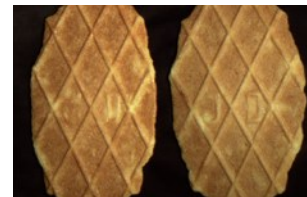


3D & COLOR

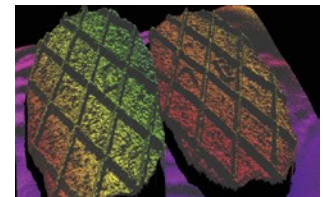
With the ColorRanger, all data needed comes from one single camera, which reduces hardware and integration costs. The ColorRanger is the ideal choice for applications where both 3D shape and color texture matter.

## Application examples

### Baked goods



RGB color



3D image

### Fruits and vegetables



RGB color



3D image

### Electronics



RGB color



3D image

**Fastest 3D and MultiScan for advanced industrial solutions**



Position

Inspect

Measure

**Additional information**

Detailed technical data. . . . .G-115

Ordering information. . . . .G-117

**Product description**

Ranger offers full flexibility and can be configured for the most versatile needs. With its unsurpassed 3D measurement speed combined with high data quality, and flexible MultiScan functionality, it serves as a key vision component in inspection systems worldwide. Ranger extracts the true 3D shape of an object, regardless of its contrast or color. It is used to measure object height and

volume, to detect shape defects, and for quality grading and size sorting. With its unique MultiScan tool, a multitude of object features, such as contrast, gloss, and scatter can be measured at the same time. This enables reliable inspection results and more cost-efficient solutions since it only takes one Ranger to perform it all!

**At a glance**

- High speed 3D at unmatched speed and quality
- MultiScan technology to measure 3D, contrast, color and scatter at the same time
- Sensor resolutions of up to 1,536 pixels in 3D and 3,072 pixels in gray scale and color
- Full flexibility in configuration, working distance, and field-of-view
- In-machine 3D calibration tool
- Gigabit Ethernet and CameraLink interfaces

**Your benefits**

- High-speed and high-resolution measurement allow you to increase production throughput and still ensure product quality
- Get accurate size and position measurements in 3D regardless of an objects' height or color, ensuring reliable solutions
- Fully flexible field-of-view in combination with in-machine 3D calibration, provides dimensions in millimeters
- Unique MultiScan technology lets one camera do the job of many, reducing costs for integration, maintenance, and accessories, creating cost-efficient solutions
- The high level of flexibility and versatility of Ranger makes it an ideal choice for the most challenging tasks

→ [www.mysick.com/en/Ranger](http://www.mysick.com/en/Ranger)

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



## Detailed technical data

## Features

|                               | Ranger C   | Ranger D     | Ranger E                | ColorRanger E  |
|-------------------------------|--|--------------|-------------------------|--|
| <b>Task</b>                   | Positioning, inspection, measuring               |              |                         |  |
| <b>Technology</b>             | 3D, LineScan, MultiScan                          | 3D, LineScan | 3D, LineScan, MultiScan | 3D, LineScan, MultiScan, Color   |
| <b>Example field of view</b>  | Free of choice by lens selection                 |              |                         |  |
| <b>Data synchronization</b>   | Free running, encoder triggered, external enable |              |                         |  |
| <b>Grayscale measurements</b> | ✓  | -            | ✓                       |  |
| <b>Scatter measurement</b>    | ✓  | -            | ✓                       |  |
| <b>Color measurements</b>     |  |              |                         |  |
| No IR pass filter             | -  |              |                         | Red, green, blue, monochrome (without IR content)  |
| IR pass filter                | -  |              |                         | Red, green, blue, monochrome (without IR content), near infrared (approx. 750 nm ... 950 nm) |
| <b>Spectral range</b>         | 400 nm ... 950 nm                                |              |                         |  |

## Performance

|                                     | Ranger C  | Ranger D            | Ranger E                              | ColorRanger E                                 |
|-------------------------------------|---|---------------------|---------------------------------------|---|
| <b>Bit depth</b>                    | 8 bit   |                     |                                       |   |
| <b>Image sensor</b>                 | CMOS  |                     |                                       |   |
| <b>Maximum performance</b>          | 30,000 3D profiles/s                                    | 1,000 3D profiles/s | 35,000 3D profiles/s                  |   |
| <b>Maximum color performance</b>    | -   |                     |                                       | 13,000 RGB lines/s                            |
| <b>Maximum 3D and color rate</b>    | -   |                     |                                       | 11,000 scans/s                                |
| <b>Maximum Hi-Res color rate</b>    | -   |                     |                                       | 10,000 RGB lines/s                            |
| <b>Sensor rows available for 3D</b> |   |                     |                                       |   |
| No IR pass filter                   | 0 ... 511   |                     |                                       | 35 ... 511                                    |
| IR pass filter                      | 100 ... 511   | -                   | 100 ... 511                           |   |
| <b>Sensor resolution</b>            | 512 px x 512 px / 1,536 px x 512 px (depending on type) |                     |                                       |   |
| <b>3D profile resolution</b>        | 512 px / 1,536 px (depending on type)                   |                     |                                       |   |
| <b>Scatter resolution</b>           | 512 px / 1,536 px (depending on type)                   | -                   | 512 px / 1,536 px (depending on type) |   |
| <b>Standard color resolution</b>    | -   |                     |                                       | 3 x 512 px / 3 x 1,536 px (depending on type) |
| <b>Pixel size</b>                   | 9.5 µm x 9.5 µm   |                     |                                       |   |
| <b>Standard color row pitch</b>     | -   |                     |                                       | 38 µm   |
| <b>Pixel matrix fill factor</b>     | 60 %  |                     |                                       |   |
| <b>Maximum 3D height resolution</b> | 13 bits 1/16 pixel                                      |                     |                                       |   |
| <b>Optical center (row, column)</b> |   |                     |                                       |   |
| C-Mount, 1/2"                       | (227, 256)  |                     |                                       |   |
| C-Mount, 1"                         | (227, 768)  |                     |                                       |   |
| <b>Gray line resolution</b>         | 512 px / 1,536 px (depending on type)                   |                     |                                       |   |

|                                 | Ranger C   | Ranger D          | Ranger E   | ColorRanger E                        |
|---------------------------------|--|-------------------|--|--------------------------------------|
| IR filter                       | No IR pass filter / IR pass filter <sup>1)</sup> (depending on type) | No IR pass filter | No IR pass filter / IR pass filter <sup>1)</sup> (depending on type) |                                      |
| Hi-Res Gray resolution          | 3,072 px / - (depending on type)                                     | -                 | 3,072 px / - (depending on type)                                     |                                      |
| Hi-Res pixel size (H x V)       | 4.75 µm x 9.5 µm   | -                 | 4.75 µm x 9.5 µm   |                                      |
| Hi-Res pixel fill factor        | 80 %   | -                 | 80 %   |                                      |
| Hi-Res color resolution         | -  |                   |  | 3 x 3,072 px / - (depending on type) |
| Color Hi-Res pixel size (H x V) | -  |                   |  | 4.75 µm x 20 µm                      |
| Color Hi-Res row pitch          | -  |                   |  | 42 µm                                |

<sup>1)</sup> Pass filter, cutoff at 740 nm; on rows 100-511.

## Interfaces

|                                  | Ranger C                     | Ranger D                                     | Ranger E | ColorRanger E |
|----------------------------------|------------------------------|--|----------|---------------|
| Configuration software           | Ranger Studio                |  |          |               |
| Communication interface          | CameraLink                   | Gigabit Ethernet                             |          |               |
| Operating system                 | Windows XP Pro               | Windows 7, Windows XP Pro                    |          |               |
| Development environment          | C++ (VS 2005/2008/2010) or C |  |          |               |
| Programming interface            | iCon API                     |  |          |               |
| Digital inputs                   | 5 x TTL                      | 4 x HIGH = 10 V ... 28.8 V                   |          |               |
| Digital outputs                  | 1 x TTL                      | 1 x TTL level, 2 x B-type, < 100 mA in total |          |               |
| Encoder interface                | 5 V TTL                      | RS-422                                       |          |               |
| Maximum encoder frequency        | 2 MHz                        |  |          |               |
| Control of external illumination | 5 V TTL                      |  |          |               |

## Mechanics/electronics

|                        | Ranger C  | Ranger D   | Ranger E | ColorRanger E |
|------------------------|---|--|----------|---------------|
| Connectors             | Power I/O: Lemo 14-pin female, Camera-Link: Mini D Ribbon (MDR, 26 pin), female | Power I/O: M12, 8 pin male, Encoder: M12, 8 pin female, Ethernet: RJ45 |          |               |
| Connector material     | -   | M12: nickel-plated brass   |          |               |
| Supply voltage         | 12 V DC ... 24 V DC   | 24 V DC, ± 20 %  |          |               |
| Ripple                 | < 5 V <sub>pp</sub>   |  |          |               |
| Power consumption      | 8 W   | 7 W  |          |               |
| Current consumption    | 1.25 A  | 0.8 A  |          |               |
| Standards (ROHS)       | -   | ✓  |          |               |
| Enclosure rating       | IP 20   |  |          |               |
| Housing material       | Aluminum  |  |          |               |
| Housing color          | Gray, varnished   |  |          |               |
| Weight                 | 390 g   | 360 g  |          |               |
| Dimensions (L x W x H) | 109 mm x 50 mm x 50 mm  | 125 mm x 52 mm x 52 mm   |          |               |
| Optics                 | C-Mount, 1/2" / C-Mount, 1" (depending on type)                                 |  |          |               |

## Ambient data

|                                      | Ranger C                          | Ranger D | Ranger E                      | ColorRanger E |
|--------------------------------------|-----------------------------------|----------|-------------------------------|---------------|
| <b>Shock load</b>                    | 15 g, 3 x 6 directions            |          |                               |               |
| <b>Vibration load</b>                | 5 g, 58 Hz ... 150 Hz             |          |                               |               |
| <b>Ambient operating temperature</b> | +5 °C ... +50 °C <sup>1) 2)</sup> |          | 0 °C ... +45 °C <sup>1)</sup> |               |
| <b>Ambient storage temperature</b>   | -20 °C ... +70 °C <sup>1)</sup>   |          |                               |               |

<sup>1)</sup> Non-condensing.

<sup>2)</sup> Camera housing temperature.

## Ordering information

Accessories available at [www.mysick.com/en/Ranger](http://www.mysick.com/en/Ranger)

| Sub product family | Maximum performance  | MultiScan Technology | Sensor resolution | Scatter measurement  | Hi-Res Gray resolution | IR filter         | Product name       | Type          | Part no.          |
|--------------------|----------------------|----------------------|-------------------|----------------------|------------------------|-------------------|--------------------|---------------|-------------------|
| Ranger C           | 30,000 3D profiles/s | ✓                    | 512 px x 512 px   | ✓                    | -                      | No IR pass filter | Ranger C40         | Ranger-C40412 | 1014218           |
|                    |                      |                      | 1,536 px x 512 px | ✓                    | 3,072 px               | No IR pass filter | Ranger C50         | Ranger-C50412 | 1014216           |
|                    |                      |                      |                   |                      |                        | IR pass filter    | Ranger C50 IR      | Ranger-C50422 | 1014223           |
|                    |                      |                      |                   |                      |                        | No IR pass filter | Ranger C55         | Ranger-C55412 | 1014217           |
|                    |                      |                      |                   |                      |                        | IR pass filter    | Ranger C55 IR      | Ranger-C55422 | 1014224           |
|                    |                      |                      | Ranger D          | 1,000 3D profiles/s  | -                      | 512 px x 512 px   | -                  | -             | No IR pass filter |
| 1,536 px x 512 px  | -                    | -                    |                   |                      |                        | No IR pass filter | Ranger D50         | Ranger-D50213 | 1040384           |
| Ranger E           | 35,000 3D profiles/s | ✓                    | 512 px x 512 px   | ✓                    | -                      | No IR pass filter | Ranger E40         | Ranger-E40414 | 1040378           |
|                    |                      |                      | 1,536 px x 512 px | ✓                    | 3,072 px               | No IR pass filter | Ranger E50         | Ranger-E50414 | 1040379           |
|                    |                      |                      |                   |                      |                        | IR pass filter    | Ranger E50 IR      | Ranger-E50424 | 1040381           |
|                    |                      |                      |                   |                      |                        | No IR pass filter | Ranger E55         | Ranger-E55414 | 1040380           |
|                    |                      |                      |                   |                      |                        | IR pass filter    | Ranger E55 IR      | Ranger-E55424 | 1040382           |
|                    |                      |                      | ColorRanger E     | 35,000 3D profiles/s | ✓                      | 512 px x 512 px   | ✓                  | -             | No IR pass filter |
| 1,536 px x 512 px  | ✓                    | 3,072 px             |                   |                      |                        | No IR pass filter | ColorRanger E50    | Ranger-E50434 | 1050267           |
|                    |                      |                      |                   |                      |                        | IR pass filter    | ColorRanger E50 IR | Ranger-E50444 | 1050269           |
|                    |                      |                      |                   |                      |                        | No IR pass filter | ColorRanger E55    | Ranger-E55434 | 1050268           |
|                    |                      |                      |                   |                      |                        | IR pass filter    | ColorRanger E55 IR | Ranger-E55444 | 1050270           |