

Machine Vision Cameras for GigE Vision

Basler Scout Series for GigE Vision **NEW!**

Camera Features

- Machine vision cameras by Basler Vision Technologies
- Up to 100 m cable lengths
- High-quality Sony CCD sensors
- Easy connection with NI gigabit Ethernet interfaces
- Precise sensor alignment
- GigE Vision compatibility
- Resolutions from VGA to 2 megapixels
- Supported by NI-IMAQdx
- Configurable in NI Measurement & Automation Explorer

Recommended NI Software

- Vision Acquisition software¹
- Vision Builder for Automated Inspection (AI)
- Vision Development Module for LabVIEW

Recommended Accessories

- C-mount lens
- Power supply for GigE Vision cameras
- Gigabit Ethernet interfaces
 - NI PCIe-8235 (quad-port)
 - NI PXIe-8234
 - NI PCIe-8231
- Trigger and I/O cables

Included Accessory

- Tripod mount



¹Not needed if camera is purchased with an NI frame grabber or a development seat of the NI Vision Development Module or NI Vision Builder AI.

| Camera | Resolution | Max Frame Rate (at full resolution) | Monochrome/Color | Sensor Size (in.) | Sensor Type | Typical Power Consumption at 12 V (W) |
|--------------|-------------|-------------------------------------|------------------|-------------------|-------------|---------------------------------------|
| scA640-70gm | 659 x 490 | 70 | Monochrome | 1/3 | Sony ICX424 | 3 |
| scA640-70gc | 659 x 490 | 70 | Color | 1/3 | Sony ICX424 | 3 |
| scA1390-17gm | 1392 x 1040 | 17 | Monochrome | 1/2 | Sony ICX267 | 3.5 |
| scA1390-17gc | 1392 x 1040 | 17 | Color | 1/2 | Sony ICX267 | 3.5 |
| scA1600-14gm | 1628 x 1236 | 14 | Monochrome | 1/1.8 | Sony ICX274 | 3.4 |

Table 1. GigE Vision Camera Comparison

Overview

National Instruments offers GigE Vision cameras from Basler Vision Technologies. These cameras incorporate the highest-quality Sony CCD sensors with resolutions from VGA to 2 megapixels and feature a small, rugged design to offer easy integration into your machine vision system for your industrial applications. These GigE Vision cameras use the gigabit Ethernet bandwidth to achieve full-frame speeds up to 70 fps. They also support long cable lengths (up to 100 m) for maximum flexibility. Basler cameras are thoroughly checked for quality and calibrated for consistent performance and reliability. In addition, they are compatible with NI vision hardware and NI Vision Acquisition software.

Basler Hardware and NI Software

The Basler scout cameras offered by National Instruments are tested with NI GigE Vision frame grabbers and NI Vision Acquisition software to ensure full compatibility and performance. NI Vision Acquisition software includes all the functions for enumerating and setting up the camera's capabilities, such as programmable shutter speed. It also provides a single API to support all GigE Vision and IEEE 1394 cameras. By using NI Vision Acquisition software functions, you can acquire and save images from GigE Vision or IEEE 1394 cameras without changing

your program, therefore reducing your development time. You can easily integrate these GigE Vision cameras into PCI- and PXI-based systems using NI gigabit Ethernet interfaces or directly through the gigabit Ethernet port on existing PCs and PXI controllers. The NI Vision Acquisition software takes full advantage of NI gigabit Ethernet interfaces, minimizing CPU usage for image acquisition from GigE Vision cameras. With Basler cameras and NI Vision Acquisition software, National Instruments provides all the tools you need for your machine vision applications.

GigE Vision Benefits

Gigabit Ethernet is a camera bus technology for machine vision systems. With relatively high bandwidth, long cable lengths, and wide usage in consumer and industrial applications, gigabit Ethernet shows promise for security and long-distance vision applications. The GigE Vision standard helps regulate plug-and-play behavior, device discovery, error handling, and secure image transfer. It also offers the ability to reach 100 m with inexpensive cabling. In addition, GigE Vision works well for machine vision applications requiring multiple cameras. With the use of Ethernet hubs or the NI PCIe-8235 quad-port gigabit Ethernet interface, you can control many cameras from a single PC or PXI system.

Machine Vision Cameras for GigE Vision

NI Vision Acquisition Software

You can easily configure and control GigE Vision cameras offered by National Instruments using the NI-IMAQdx driver, which is included with NI Vision Acquisition software. NI-IMAQdx is more than just a driver because it features all of the tools you need to acquire, save, and display images from thousands of cameras. The easy-to-use functions and example programs offer quick setup with NI Measurement & Automation Explorer and development of image acquisition applications in NI LabVIEW and LabWindows™/CVI, Visual Studio .NET, ANSI C, or Visual Basic.

- Included with all NI vision hardware, Vision Builder AI, and the Vision Development Module; also sold separately for IEEE 1394 and GigE Vision cameras
- Wide variety of functions for quick development in LabVIEW, LabWindows/CVI, Visual Studio .NET, ANSI C, or Visual Basic
- Detailed example programs
- Compatibility with scout IEEE 1394 and GigE Vision cameras
- NI-IMAQ, NI-IMAQdx, and NI-IMAQ I/O drivers included

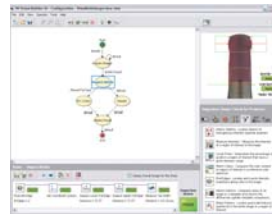
Software – Configure or Program



Vision Development Module

This powerful machine vision application development software features hundreds of image processing and machine vision functions for LabVIEW, ANSI C/C++, Visual Basic, and .NET.

- Hundreds of image processing functions including pattern and geometric matching, OCR, bar code readers, object classification, and particle analysis
- Tools to enhance images, check for presence, locate features, identify objects, and gauge parts
- Fast application prototyping and code generation with the included NI Vision Assistant
- Subpixel accuracy down to 1/10 of a pixel and 1/10 of a degree



Vision Builder for Automated Inspection (AI)

Vision Builder AI is a configurable machine vision development environment that requires no programming. With Vision Builder AI, you can:

- Build, benchmark, and deploy complete machine vision applications without programming
- Configure more than 40 powerful machine vision tools including pattern matching, OCR, and particle analysis
- Create custom user interfaces for display and control purposes
- Host user interfaces on a built-in Web server
- Communicate with industrial protocols over serial and Ethernet

Ordering Information

Basler Scout Cameras for GigE Vision

| | |
|--------------------|-----------|
| scA640-70gc | 780884-01 |
| scA640-70gm | 779983-01 |
| scA1390-17gc | 780885-01 |
| scA1600-14gm | 780886-01 |
| scA1390-17gm | 779981-01 |

Image Acquisition Hardware

| | |
|--------------------|-----------|
| NI PCIe-8231 | 779813-01 |
| NI PXIe-8234 | 780263-01 |
| NI PCIe-8235 | 780400-01 |

Accessories

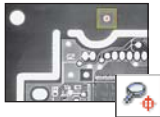
| | |
|-------------------------------|-----------|
| Basler power supply | |
| for GigE Vision cameras | 779986-01 |
| Basler trigger and I/O cable | |
| for GigE Vision cameras | 779985-01 |

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to ni.com/vision.

Machine Vision Cameras for GigE Vision

National Instruments vision software includes hundreds of image processing and analysis functions. A subset of the tools available in the Vision Development Module and Vision Builder AI are shown below.



Pattern and Geometric Matching

Learn and locate objects and patterns in your images. The National Instruments patented matching algorithms locate patterns fast with very high accuracy.



Optical Character Recognition/Verification

NI OCR functions use a trainable OCR algorithm specifically designed to identify and verify all types of fonts, characters, and symbols despite poor and inconsistent image quality.



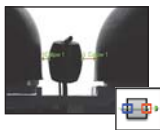
Particle Analysis

Use particle analysis to detect connected regions or groupings of pixels in an image and make selected measurements of those regions. Choose from more than 80 unique measurements that return data in both real-world and pixel values.



Color Inspection

Color matching quantifies which colors and how much of each color exist in a region of an image and uses this information to check if another image contains the same colors in the same ratio.



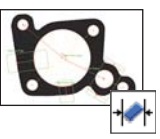
Edge Detection

Use the edge detection tools to identify and locate discontinuities in the pixel intensities of an image. Find edges to align, measure, or detect features in the image.



Object Classification

Classification is a tool for identifying an unknown object by comparing its significant features to a set of features that represent known samples.



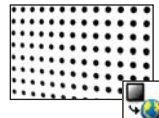
Gauging

Use dimensional measurement or gauging tools to obtain quantifiable, critical distance measurements such as distances, angles, areas, line fits, circular fits, and counts.



Bar Code Reader and Grader

Read 1D bar codes as well as 2D codes like Data Matrix and PDF 417. You can decipher codes applied through ink jets, thermal transfer, laser etching, or dot peen.



Spatial Calibration

Using spatial calibration functions, you can calibrate your image to take accurate, real-world measurements from images, regardless of camera perspective or lens distortion.

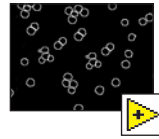
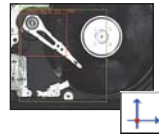


Image Arithmetic and Logic Functions

Operators perform basic arithmetic and logical operations on images. Use operators to add, subtract, multiply, and divide an image with other images or constants.



Coordinate Systems

Set up coordinate systems to ensure that all your measurements move with the object within the field of view.

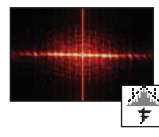


Image Filters and Frequency Analysis

Frequency filters, such as the fast Fourier transform (FFT), alter pixel values with respect to the periodicity and spatial distribution of the variations in light intensity in the image.



Image Segmentation

NI vision software comes with several options to segment and partition images into related components. Segmentation is an important part of many imaging applications that need to extract certain features or objects in order to process them further.



Golden Template Comparison

Find defects in an image by comparing a perfect (golden) sample to all subsequent samples. Golden template comparison detects surface defects, label misprints, and overall quality issues.

Machine Vision Cameras for GigE Vision

Specifications



| | |
|-------------------------------------|--|
| Mono/Color | Yes/Yes |
| Video Output Type (Interface) | Gigabit Ethernet (GigE Vision compatible) |
| Video Output Format | Mono 8: 8 bits/pixel Mono 16: 12 bits/pixel YUV 4:2:2: 16 bits/pixel average YUV 2:2:2: (YUYV): 16 bits/pixel average Raw 8: 8 bits/pixel (R, G, or B) Raw 16: 12 bits/pixel (R, G, or B) |
| Synchronization | Via external trigger or free run |
| Exposure Control | Programmable via GigE Vision |
| Power Requirements | 12 to 24 V via Hirose 12-pin connector (max 10 m cable lengths) |
| Lens Mount | C-mount |
| Housing Size (L by W by H) | 73.7 by 44 by 29 mm |
| Conformity | CE, FCC, GigE Vision, RoHS, IP 30 |
| I/O Ports | 2 optoisolated input ports, 4 optoisolated output ports |
| GenICam Compatible | Yes |
| Weight (typical) | 150 g |

Hardware

| | |
|-----------------|--|
| 780400-01 | NI PCIe-8235 quad-port gigabit Ethernet interface |
| 780263-01 | NI PXle-8234 gigabit Ethernet interface |
| 779813-01 | NI PCIe-8231 gigabit Ethernet interface |



Figure 1. NI PXle-8234 Gigabit Ethernet Interface

Accessories

| | |
|-----------------|---|
| 779986-01 | Basler power supply for GigE Vision cameras |
| 779985-01 | Basler trigger and I/O cable for GigE Vision cameras |
| 778413-01 | NI Vision Acquisition software |
| 182219-01 | E1 Ethernet cable, twisted-pair, 1 m |
| 182219-05 | E1 Ethernet cable, twisted-pair, 5 m |
| 780024-01 | Lens, 8 mm, F1.4, megapixel, Computar |
| 780025-01 | Lens, 12 mm, F1.4, megapixel, Computar |
| 780026-01 | Lens, 16 mm, F1.4, megapixel, Computar |
| 780027-01 | Lens, 25 mm, F1.4, megapixel, Computar |

Machine Vision Cameras for GigE Vision

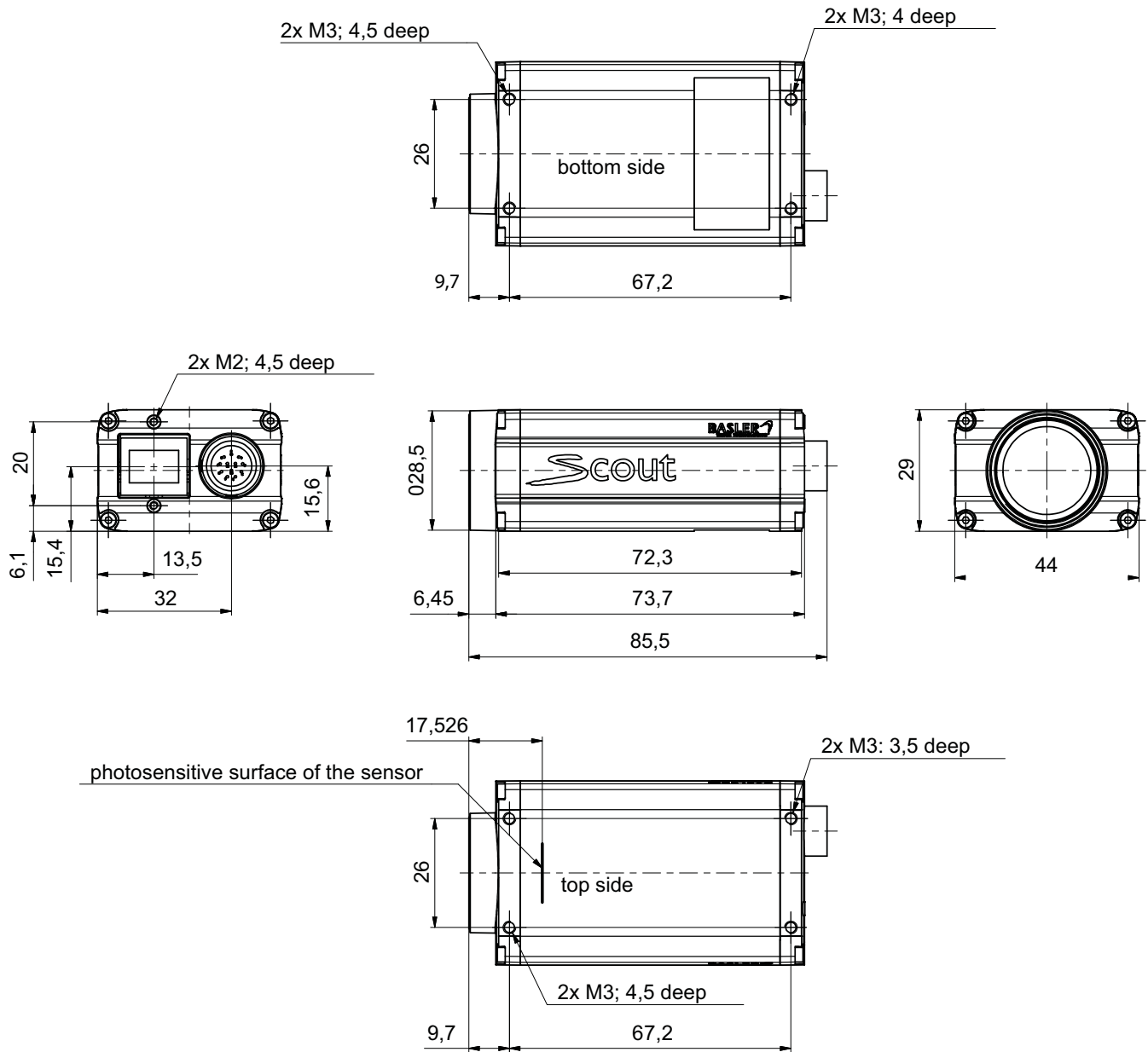


Figure 2. GigE Vision Camera Dimensional Drawings

NI Services and Support



NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit ni.com/services.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit ni.com/training.

Professional Services

Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services



range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Calibration Services

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