

iVu Image Sensor Touch Screen Bar Code Reader



iVu Image Sensor Solves Complex Bar Code Reading Applications.

The iVu Bar Code Reader (BCR) reads eleven industry-standard bar codes to facilitate advanced traceability—a critical strategy for ensuring the highest product quality in packaging, material handling, automotive, pharmaceutical and many industrial applications. The iVu BCR, with an integrated or remote touch screen, and intuitive interface allows users to efficiently configure, monitor and modify an inspection without a PC or external controller.

- ▶ First-time users can have it up and running in minutes, without training.
- ▶ Using the touch screen and intuitive interface, inspection parameters are easily configured and quickly deployable without a PC or external controller.
- ▶ Intuitive functions allow inspections to be applied and staff-supported right on the factory floor.
- ▶ Sensor is available with a remote touch screen for setup and inspection monitoring when the sensor is difficult to access.
- ▶ Software emulator lets users perfect their application and preload parameters offline.
- ▶ Sensor will read up to ten bar codes and a variety of bar code types at one time.
- ▶ Compact, rugged IP67-rated housing is available with or without an integrated ring light.
- ▶ RS-232 serial communication port is provided for exporting bar code data.
- ▶ Three different trigger modes are available to determine how the sensor captures and processes images.

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High-performance reading of industry standard bar codes

**Reads and compares
1D and 2D bar codes
in all industries**

- ▶ Data Matrix (ECC 200)
- ▶ Code 128
- ▶ Code 39
- ▶ Codabar
- ▶ Interleaved 2 of 5
- ▶ EAN-13
- ▶ EAN-8
- ▶ UPCE
- ▶ Postnet
- ▶ IMB
- ▶ Pharmacode



*Integrated Touch
Screen Models*

*Touch Screen
for Remote Monitoring*

40-plus years of sensor design experience, quality control, sales support and cost-effective solutions

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- ▶ Rapid customization with most products shipping in 3 days or less
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- ▶ More than 3,000 factory and local field representatives to serve you

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BANNER®
more sensors, more solutions



iVu Series Image Sensor

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- Integrated or remote touch screen and intuitive interface to easily configure and quickly deploy without a PC or external controller
- Easy configuration: install/connect iVu, select sensor or bar code type (depending on model), acquire image and set inspection parameters
- Menu-driven tools to guide you as you set up your inspection
- Models with four sensors in one rugged package: Match, Blemish, Area and Sort
- Bar Code Reader (BCR) models to solve a variety of 2D and 1D bar code applications
- Compact, rugged housing with or without an integrated light



PresencePLUS® Pro & P4 Vision Sensor

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- A complete family of multi-application or application-specific sensors for a wide range of applications
- Full-featured two-piece or one-piece models
- Universal PresencePLUS software for the entire Pro & P4 series
- Gray scale, color, VGA and high-resolution 1.3 megapixel models
- Sealed, IP68-rated housings available
- Optional bar code tool for locating, reading and grading 2D and 1D linear bar codes
- Optional OCR/OCV tool for optical character reading and verification
- Optional Bead tool for material tracking



Lighting

page 413

- A complete selection of lighting, including IP68-rated lights
- Rugged, maintenance-free LED lighting in red, green, blue, white and infrared
- High-intensity lighting with built-in universal strobe control and power regulation; no external controller or power supply required



Lens

page 381

- Microvideo lenses for use with iVu Series Image Sensors
- Standard, high-performance and megapixel C-mount lenses for use with PresencePLUS Vision Sensors



Accessories

page 380

- Cordsets for sensor, serial, Ethernet and video connection
- Broad offering of brackets, fixtures and mounting systems
- Monitors for viewing PresencePLUS inspections
- Enclosures for protecting sensors and lights
- A variety of power supplies and interface modules for sensors and lights

Photoelectrics
Sensors
Fiber Optic
Sensors
Special Purpose
Sensors
Measurement &
Inspection Sensors

Vision

Wireless

Lighting &
Indicators

Safety
Light Screens

Safety
Laser Scanners

Fiber Optic
Safety Systems

Safety Controllers &
Modules

Safety Two-Hand
Control Modules

Safety Interlock
Switches

Emergency Stop &
Stop Control

iVu Sensors

PresencePLUS

LENSES

LIGHTING

Vision Sensors

Vision sensing is electronic imaging, applied in a manufacturing setting for the purpose of control. Process, machine, robotic and quality control are typical applications on the plant floor. Vision is comprised of two major elements:

A **hardware** element (camera, controller and lighting) and a **software** element (control system, image algorithms and graphical user interface).

Inspection

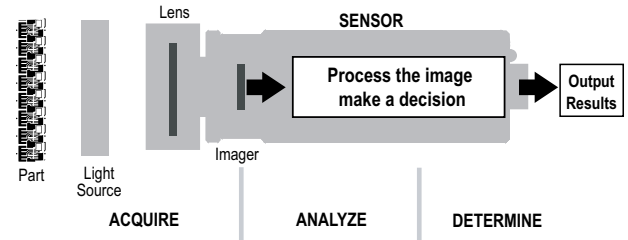
"Visual inspection" refers to the process of acquiring an image, analyzing that image based on set parameters and reporting the results. A digital camera captures images and the sensor software analyzes the images using vision tools to pass or fail the product.

Vision tools are specific software algorithms used to analyze an image. Each vision sensor uses a specific **tool set** to extract and isolate certain features within the image in order to determine whether a part passes or fails an inspection.

Process

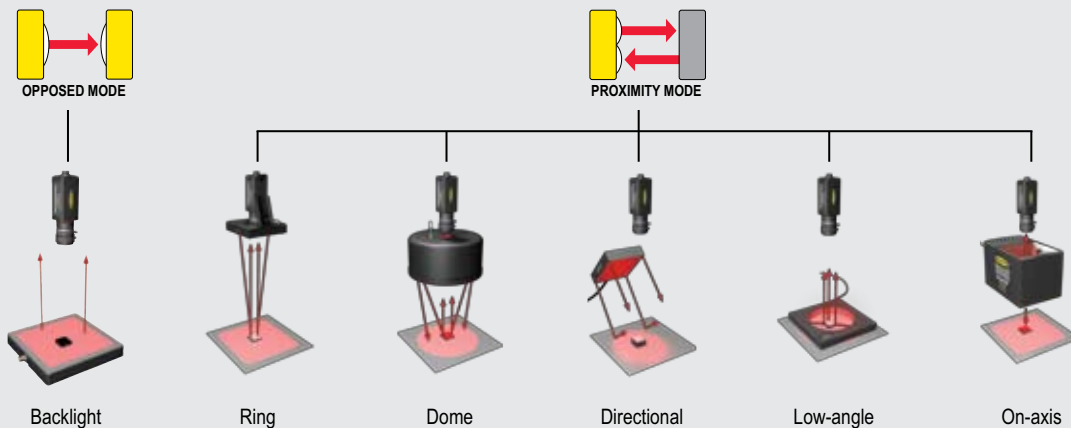
Visual inspection is a three-step process:

1. The sensor **acquires** an image of the part.
2. The microprocessor **analyzes** the image.
3. The microprocessor **determines** if the inspection passes or fails based on a set of parts, and reports the results to the manufacturing line. The part is then either passed to the next process, or it is rejected and removed.



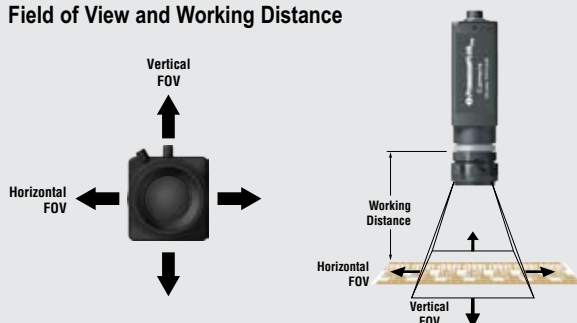
Parts

1. **Light Source:** The light source is a critical component of any vision inspection system. Lighting is the most powerful tool for creating contrast to amplify the feature of interest, while minimizing other features of the part. Selecting the best light source depends on the shape, surface texture, color and opacity of the part.



2. **Lens:** The lens focuses the light onto the sensor's imager. The main consideration for selecting a lens is focal length. To determine the focal length, the field-of-view and working distance must be determined. The field-of-view is the area of the inspection captured on the sensor's imager. The working distance is the distance between the back of the lens and the target object.

Field of View and Working Distance



3. **Sensor:** The sensor contains the imager, microprocessors and I/O.

The **imager** has an array of tiny light-sensitive cells that converts the target into an image.

Microprocessors analyze the image and make determinations about it based on user-determined tolerances and criteria.

The sensor exports the inspection results through some type of I/O (example, Discrete or Ethernet).

Vision Tools

Vision tools are software algorithms used to analyze an image. A vision sensor uses a set of tools to create an inspection. Using one or several tools, a user can extract and isolate certain features of an image in order to determine whether a part passes or fails an inspection. Several inspections involving different vision tools can be performed on a single image.

LOCATION TOOLS

compensate for translational and rotational movement.



GEO Find: Determines translation and rotation movement of a part up to 360° by detecting relative movement of a pattern



Locate: Determines translation and rotation by detecting relative movement of edges



Pattern Find: Determines translation and rotation by detecting relative movement of a pattern



Blob Find: Determines translation and rotation by detecting the presence, connectivity, size, shape and location of selected features

ANALYSIS TOOLS

measure and evaluate the results of the vision tools.



Communication: Sends images or results of selected location, vision and analysis tools over the Ethernet or RS-232 serial communication ports to industrial Ethernet or PC networks



Math: Performs arithmetic functions using tool outputs or constants



Measure: Measures distance and angles between two prescribed points, lines or curves



Test: Evaluates results of selected vision and analysis tools to determine whether an inspection passes or fails and activates outputs



String: Performs string comparison and substring search operations on string constants and tools that produce string results

VISION TOOLS

analyze the image.



Average Color: Tests or communicates color content values sensed in a selected area



Color Blob: Determines the presence, connectivity, size and location of selected features with one or more colors



Color Match: Inspects for matching hue and intensity



Average Gray Scale: Determines the gray scale value of an area



Bar Code: Finds, decodes and grades 2D and 1D linear bar codes



Bead Tool: Monitors a track of material for width, consistency and location



Blob Detect: Determines the presence, connectivity, size and location of selected features



Edge: Determines the presence, number, classification and location of edges



GEO Count: Detects the presence and location of a target pattern in any orientation



Object: Determines the presence, number, classification, size and location of objects



OCR/OCV: Reads and verifies optical characters



Pattern Count: Determines the presence, number and location of pattern(s)

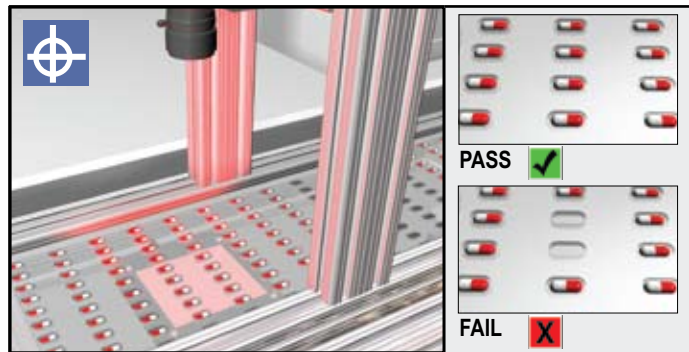
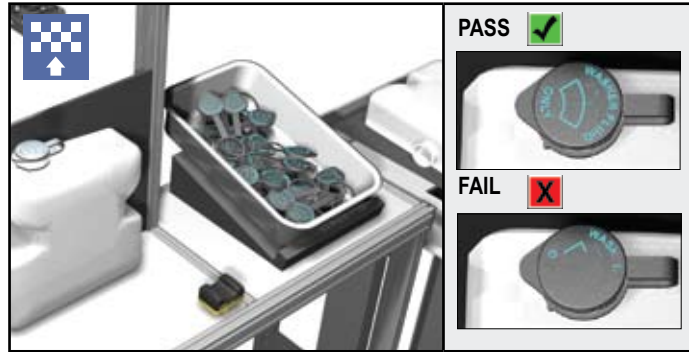


Circle Detect: Determines radius, center point and other characteristics of a circle or arc



Line Detect: Determines length, end points and other characteristics of a line segment

Applications Examples



Photoelectrics
Sensors
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Special Purpose
Sensors
Measurement &
Inspection Sensors

Vision

Wireless

Lighting &
Indicators

Safety
Light Screens

Safety
Laser Scanners

Fiber Optic
Safety Systems

Safety Controllers &
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Safety Two-Hand
Control Modules

Safety Interlock
Switches

Emergency Stop &
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LIGHTING

Vision Lighting

A vision sensor captures and then analyzes an electronic image. The quality of the inspections depends on the image's contrast. Dedicated lighting can guarantee constant, consistent light conditions that can be manipulated to create a high-contrast image.

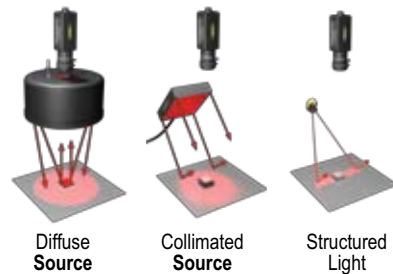
Here are some factors to consider when choosing lighting:

1. Lighting geometry
2. Techniques
3. Optical properties of the part

Lighting Geometry

The geometry of propagation refers to how light energy leaves the source. Light can come from a point, diffuse or collimated source. When you understand how to manipulate lighting geometry, you can:

- Maximize contrast
- Eliminate glare
- Eliminate hot spots
- Minimize unimportant features

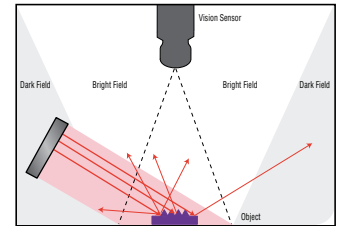


Lighting Techniques

Lighting techniques refer to how the light source is mounted in relation to the target object and the sensor.

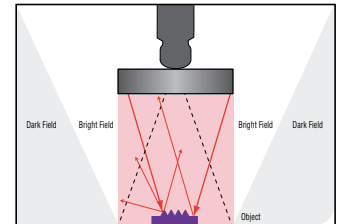
Dark-Field: Illuminate objects with indirect light.

- Casts shadows
- Highlights height changes
- Textured surfaces are bright



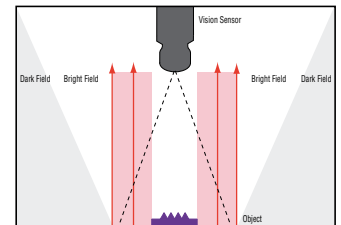
Bright-Field: Illuminate objects with direct light.

- Detect color change
- Smooth surfaces are bright



Backlight: Transmit light from behind the object.

- Highlights outlines and profiles
- Highest contrast



Optical Properties of a Target

Optical properties of a part can be used in conjunction with lighting to highlight features.

<p>The main goal of lighting in a vision application is to create contrast between the features and the background.</p>		Backlight	Directional	Ring	Low-Angle	Diffused	On-Axis	Structured
Shape	Notches Stampings Embossing	Highlights outlines and profiles	Casts shadows to highlight height changes	—	Height changes are bright Flat surfaces are dark	Lowers contrast between shapes	Flat surfaces are bright Height changes are dark	Highlights changes in height of part
Surface Texture	Polished metal Sandpaper	—	Textured surfaces are bright Smooth surfaces are dark	—	Diffuse surfaces are brighter than reflective	Lowers contrast between reflective and textured surfaces	Reflective surface are brighter than diffuse	—
Color	Wires Printing Plastic UV Coatings	—	Based on target color	Based on target color	—	Based on target color	Based on target color	—
Translucency	Drilled hole Plastics	Solid parts block light, clear parts transmit light	—	—	—	—	—	—

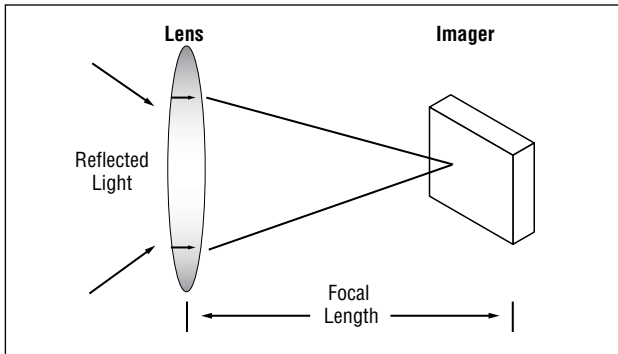
Vision Lenses

The sensor's lens focuses the reflected light onto the imager chip. The quality of the lens will influence the quality of the image.

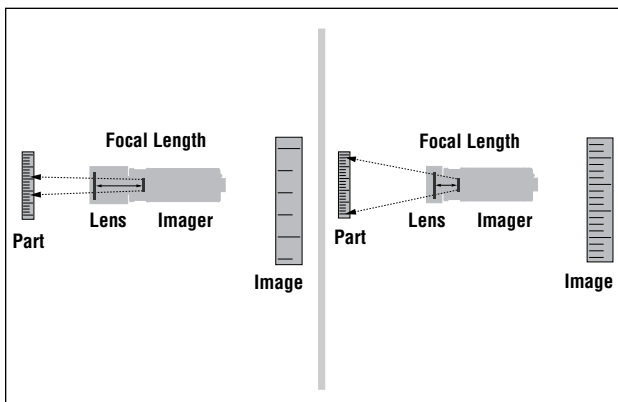
Lenses have one main function: To create a 2D image of the scene, by focusing the entire field-of-view (FOV) on the imager chip.

Lens Basics

Focal Length: The distance from the lens to the camera's imager. It is specified in millimeters. Focal length determines the relationship between working distance and the angle of view. Shorter focal length results in wider FOV.



Angle of View: Angle of view indicates how much of the visual scene can be captured by the lens at a given distance.



Working Distance: The distance from the camera to the target object under inspection.

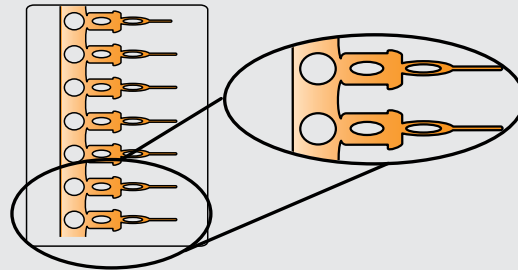


Image Quality

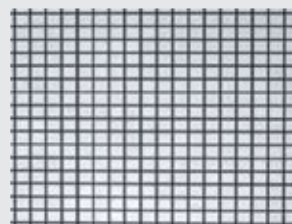
A camera that captures a high quality image assures the most accurate information for later analysis. To insure a high image quality, choose a lens that:

- Magnifies the feature of interest to fill the FOV
- Captures required FOV without adding distortion to the image
- Optimizes your FOV based on working distance
- Focuses entire scene of inspection

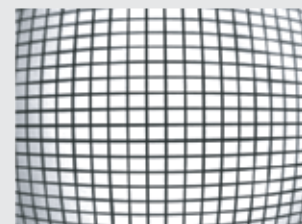
Resolution: The ability of a vision sensor to differentiate between two features that are close together. If the features blur together, a higher resolution lens is required.



Distortion: The lens can influence image quality by how it collects and focuses light on the imager chip. Different lenses have different degrees of optical distortion, or undesired change in the shape of an image.

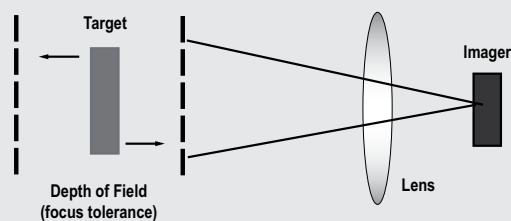


25 mm Lens



4 mm Lens

Depth of Field: The in-focus range of a vision system that includes the areas which remain in focus behind and in front of the target.



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iVu Sensors
PresensePLUS
LENSES
LIGHTING

iVu Image Sensors

- The first touch screen image sensor brings the simplicity of a photoelectric sensor and the intelligence of a vision sensor, providing high-performance inspection capabilities at your fingertips.
- Powerful and affordable inspection solution solves a wide variety of complex applications, including:
 - Label alignment inspection
 - Date/lot code inspection
 - Blister pack inspection
 - Stamped hole inspection
 - Part sorting
 - Packaging verification
 - Vial cap inspection
 - Injection molding verification
 - End-of-mail indication
 - 1D and 2D bar code reading
- First-time users can have it up and running in minutes, without training.
- Using the touch screen and intuitive interface, inspection parameters are easily configured and quickly deployable without a PC or external controller.
- Intuitive functions allow inspections to be applied and staff-supported right on the factory floor.
- iVu Plus models offer Ethernet capabilities to control and communicate with the sensor for better system visibility and enhanced control.
- The multiple inspection option of the iVu Plus provide the capability of storing and controlling up to 30 inspections for fast product change over.
- Software emulator lets you perfect your application offline.



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No PC required to configure, change or monitor

- Built-in or remote touch screen
- Self-contained sensor with easy configuration and convenient monitoring right on the sensor



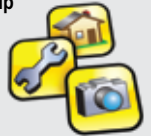
Installation and configuration in 4 easy steps

1. Install and connect the sensor
2. Select the sensor or bar code type, depending on model
3. Acquire a good image
4. Set inspection parameters



Intuitive operation with menu driven tools to guide you through setup

- Define region of interest
- Adjust intensity/contrast
- Define the pass criteria



iVu TG & iVu Plus TG

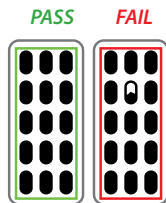
- Up to four advanced sensors in one compact and rugged package
- Monitors parts for type, size, orientation and shape in four broad application categories:

A **Match** sensor that compares a part to a reference to determine if there is a match



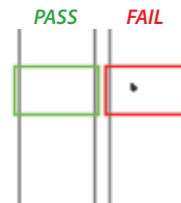
Match
(pattern, shape or orientation)

An **Area** sensor that detects whether a particular feature (features) is present



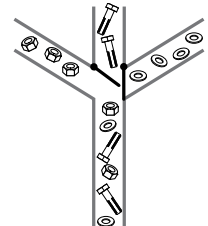
Area
(feature presence and size)

A **Blemish** sensor to find flaws on parts



Blemish
(presence and absence)

A **Sort** sensor (Plus only) to recognize and sort up to ten different patterns in the same inspection



Sort
(recognize and sort)



iVu & iVu Plus Bar Code Readers (BCR)

Conducts high-performance reading of industry standard bar codes.
Reads up to ten 1D linear and 2D bar codes at one time.

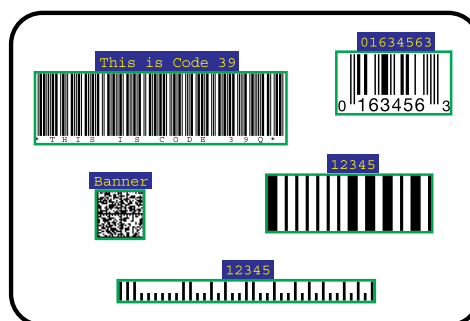
2D Bar Codes

Data Matrix (ECC200)

1D Bar Codes

Code 128	EAN-8
Code 39	UPCE
Codabar	IMB
Interleaved 2 of 5	Postnet
EAN-13 (UPC-A)	Pharmacode

- Includes four trigger modes to determine how the sensor captures and processes images: External (Single), External (Gated), Continuous and remote command
- Includes ability to compare barcode with user set constant or remotely set compare data



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Emergency Stop &
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ACCESSORIES

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iVu Sensors

PresensePLUS
LENSES
LIGHTING

iVu & iVu Plus Image Sensors



iVu Image Sensor Model Key, 10 to 30V dc

Platform	Model*	I/O	Ring Light	Lens
IVU	TG	N	R	04
		N = NPN P = PNP		
TG = Gray scale with integrated touch screen RG = Gray scale with remote touch screen* TB = Bar Code Reader (BCR) with integrated touch screen RB = Bar Code Reader (BCR) with remote touch screen*			R = Red B = Blue G = Green I = Infrared W = White X = No Ring Light	04 = 4.3 mm 06 = 6 mm 08 = 8 mm 12 = 12 mm 16 = 16 mm 25 = 25 mm

* Remote display RD35 is required for set up and viewing of sensors with a remote touch screen. Display and cordsets ordered separately.

iVu Plus Image Sensor Model Key, 10 to 30V dc

Platform	Model*	I/O	Ring Light	Lens
IVU	P TG		R	04
P = Plus		Blank = NPN/PNP selectable		
TG = Gray scale with integrated touch screen RG = Gray scale with remote touch screen* TB = Bar Code Reader (BCR) with integrated touch screen RB = Bar Code Reader (BCR) with remote touch screen*			R = Red B = Blue G = Green I = Infrared W = White X = No Ring Light	04 = 4.3 mm 06 = 6 mm 08 = 8 mm 12 = 12 mm 16 = 16 mm 25 = 25 mm

* Remote display RD35 is required for set up and viewing of sensors with a remote touch screen. Display and cordsets ordered separately.


Remote Display Touch Screen



Description	Model	
3.5" diagonal remote touch screen	RD35	
Swivel mounting platform for SMBRD35	SMBKS	
Remote Display Accessory Kit†	Straight	Right-Angle
1 m cordset, SMBRD35 bracket/docking station, stylus and hardware	IVURD-MXK-803	IVURD-MXK-803RA
2 m cordset, SMBRD35 bracket/docking station, stylus and hardware	IVURD-MXK-806	IVURD-MXK-806RA
5 m cordset, SMBRD35 bracket/docking station, stylus and hardware	IVURD-MXK-815	IVURD-MXK-815RA
9 m cordset, SMBRD35 bracket/docking station, stylus and hardware	IVURD-MXK-830	IVURD-MXK-830RA
16 m cordset, SMBRD35 bracket/docking station, stylus and hardware	IVURD-MXK-850	IVURD-MXK-850RA

† SMBRD35 bracket/docking station and cordsets are sold individually (see page 368).

iVu & iVu Plus Specifications

General	
Supply Voltage	10-30V dc
Demo Mode	Full tool functionality on canned images
Sensor Lock	Optional password protection
Integrated Ring Light	Red, IR, Green, Blue, White or no integrated ring light
Imager	1/3 inch CMOS 752 x 480 pixels; adjustable Field-of-View (FOV)
Lens Mount	M12 X 1 mm thread; microvideo lens 4.3, 6, 8, 12, 16, 25 mm
Output Rating	150 mA
Exposure Time	0.1 milliseconds to 1.049 seconds
Construction	Black Valox™ sensor housing; acrylic window iVu Plus Integrated: Die cast zinc and Black Valox™
External Strobe Output	+ 5V dc
Environmental Rating	IP67
Model Specific	
Power Connection	iVu TG (integrated touch screen): 8-pin Euro-style (M12) male connector iVu TG (remote touch screen) & iVu BCR (integrated and remote touch screen): 12-pin Euro-style (M12) male connector iVu Plus TG & iVu Plus BCR (integrated and remote touch screen): 12-pin Euro-style (M12) male connector Accessory cordset required for operation; QD cordsets are ordered separately. See page 368.
Supply Current	iVu TG and iVu BCR: 800 mA max. (exclusive of I/O load) iVu Plus TG: 850 mA max. (exclusive of I/O load) iVu Plus BCR: 850 mA max. (exclusive of I/O load)
USB 2.0 Host	iVu TG and iVu BCR (integrated touch screen): 8-pin Euro-style (M12) female connector iVu TG and iVu BCR (remote touch screen): 4-pin Pico-style (M8) female connector iVu Plus TG and iVu Plus BCR (integrated and remote touch screen): 4-pin Pico-style (M8) female connector Optional USB cordset required for operation of USB Thumb Drive. QD cordsets are ordered separately. See page 368.
Ethernet Connection	iVu Plus TG & iVu Plus BCR: 4-pin Pico-style (M8) male connector. Ethernet cordsets are ordered separately. See page 368.
Output Configuration	iVu TG & iVu BCR: NPN or PNP determined by model iVu Plus TG & iVu Plus BCR: NPN or PNP, software selectable
Tools	iVu TG: Area, Blemish and Match iVu Plus TG: Area, Blemish, Match and Sort iVu BCR and iVu Plus BCR: Bar Code
Display	Integrated touch screen: 68.5 mm (2.7") LCD Color Integrated Display 320 x 240 pixels Remote touch screen: See RD35 Remote Display specifications (page 368).
Acquisition	iVu BCR (integrated touch screen): 50 fps (frames per second) max. iVu BCR (remote touch screen): 50 fps (frames per second) max. iVu TG (integrated and remote touch screen): 100 fps (frames per second) max. iVu Plus TG & iVu Plus BCR (integrated and remote touch screen): 100 fps (frames per second) max.
Operating conditions	Stable Ambient Temperature: iVu TG & BCR: 0° to + 50° C iVu Plus TG (integrated touch screen): 0° to +50° C iVu Plus TG (remote touch screen): 0° to +40° C iVu Plus BCR (integrated touch screen): 0° to +50° C iVu Plus BCR (remote touch screen): 0° to +40° C
Remote Display connection (Remote Touch Screen Models Only)	8-pin Euro-style (M12) female connector Accessory cordset required for remote display; QD cordsets are ordered separately. See page 368.
Certifications	 NOTE: iVu Plus remote must use Euro QD power cordset for CE compliance. See page 368.
Hookup Diagrams	iVu Plus: NPN: VS01 (p. 766) PNP: VS02 (p. 766) iVu (Integrated Touch Screen): NPN: VS05 (p. 767) PNP: VS06 (p. 767) All others: NPN: VS03 (p. 766) PNP: VS04 (p. 766)

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iVu Remote Display Specifications

Screen Size	3.5" diagonal
LCD Aspect Ratio	4:3
Display Resolution	320 x 240 RGB
Viewing Angle	60 degrees left, and 60 degrees right, 50 degrees up, and 55 degrees down
Housing Material	Polycarbonate
Bracket Material	Delrin
Stylus	Delrin
Display Weight	4.8 oz
Bracket & Stylus Weight	1.1 oz
Connection	Molex HandyLink connector
Operating Temperature	0° to + 50° C

Cordsets

Euro QD—Power			
See page 690		See page 696*	
Length	Threaded 8-Pin (Open Shield)		Threaded 12-Pin (Open Shield) Used with iVu Plus for CE compliance
	Straight	Right-Angle	Straight
1.83 m	MQDC2S-806	MQDC2S-806RA	MQDC2S-1206
4.57 m	MQDC2S-815	MQDC2S-815RA	MQDC2S-1215
9.14 m	MQDC2S-830	MQDC2S-830RA	MQDC2S-1230
15.2 m	MQDC2S-850	MQDC2S-850RA	MQDC2S-1250
22.9 m	—	—	MQDC2S-1275

* Required for CE compliance

Power		
See page 696		
Length	Threaded 12-Pin QD	
	Straight	Right-Angle
1.83 m	IVUC-1206	IVUC-1206RA
4.57 m	IVUC-1215	IVUC-1215RA
9.14 m	IVUC-1230	IVUC-1230RA
15.2 m	IVUC-1250	IVUC-1250RA
22.9 m	IVUC-1275	IVUC-1275RA







Ethernet Communication	
See page 705	
Length	RJ45 to 4-Pin Pico QD
	Straight
2.00 m	IVUC-E-406
5.00 m	IVUC-E-415
9.00 m	IVUC-E-430
16.00 m	IVUC-E-450
23.00 m	IVUC-E-475

Remote Display		
See page 694		
Length	8-Pin Euro QD to Molex	
	Straight	Right-Angle
0.91 m	IVURD-MX-803	IVURD-MX-803RA
1.83 m	IVURD-MX-806	IVURD-MX-806RA
4.57 m	IVURD-MX-815	IVURD-MX-815RA
9.14 m	IVURD-MX-830	IVURD-MX-830RA
15.2 m	IVURD-MX-850	IVURD-MX-850RA

Additional cordset information available.
See page 679.


USB			
See page 693		See page 681	
Length	8-Pin Euro QD to USB		4-Pin Pico QD to USB
	Used with: iVu TG & BCR (Integrated Touch Screen)		Used with: iVu TG & BCR (Remote Touch Screen) and iVu Plus
	Straight	Right-Angle	Straight
0.15 m	MQDEC-8005-USB	MQDEC-8005RA-USB	PSG-4M-4005-USB
0.30 m	MQDEC-801-USB	MQDEC-801RA-USB	PSG-4M-401-USB
0.90 m	MQDEC-803-USB	MQDEC-803RA-USB	PSG-4M-403-USB
3.00 m	MQDEC-810-USB	MQDEC-810RA-USB	PSG-4M-410-USB

Brackets


iVu & iVu Plus				Remote Display	
					
pg. 654	pg. 655	pg. 654	pg. 655		
SMBIVURAL	SMBIVURAR	SMBIVUB	SMBIVUU	SMBRD35	SMBKS

Additional bracket information available.
See page 620.

Lenses

iVu & iVu Plus		
	Description	Model
	4.3 mm Lens	LMF04
	6 mm Lens	LMF06
	8 mm Lens	LMF08
	12 mm Lens	LMF12
	16 mm Lens	LMF16
	25 mm Lens	LMF25

Filter Kits[†]

iVu & iVu Plus		
	Description	Model
	Red	FLTMR
	Blue	FLTMB
	Green	FLTMG
	Infrared	FLTMI*


* Infrared pass filters are preinstalled on infrared ring light models.

[†] Filter kits include 1 color and two sizes of filter rubber caps.

Replacement Windows

iVu & iVu Plus Replacement Windows	
Description	Model
Focusing ring with optically clear glass	IVUW-G
Focusing ring with plastic window	IVUW
Replacement cover for touch screen	IVUBC


Sensor Interface Module

See page 739	
	Sensor interface module for simplified wiring of iVu sensors in an electrical box

USB Drive

2 Gb USB Drive	
	Model
	IVU-USBF02

Stylus

Stylus	
	Model
	STYLUS-1 (Qty 1)
	STYLUS-10 (Qty 10)

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Safety
Light Screens
Safety
Laser Scanners
Fiber Optic
Safety Systems
Safety Controllers &
Modules
Safety Two-Hand
Control Modules
Safety Interlock
Switches
Emergency Stop &
Stop Control

iVu Sensors

PresensePLUS
LENSES
LIGHTING

PresencePLUS® Pro and P4 General-Purpose Sensors

- Full-featured sensor with a complete suite of location, inspection, analysis and geometric tools; all can be used simultaneously for inspecting multiple features and solving complex applications
- Premium tools for enhanced inspection capabilities; including Bar Code Reading (BCR), Optical Character Reading and Verification (OCR/OCV), and Bead inspection
- Standard or high-resolution 1.3 megapixel gray scale, and color models for nearly any inspection challenge
- Sealed IP68-rated models for machine vision inspections in dirty or washdown environments
- Proven user interface common to all PresencePLUS sensors
- Intuitive Wizard-like setup procedure and common graphical interface; supports nine languages
- Ethernet, serial and flexible discrete I/O in the same full-featured sensor
- ActiveX utilities for exporting inspections, images and results
- Real-time video output for direct connection to a conventional monitor without a PC
- A choice of a two-piece system with compact camera and separate DIN-mountable controller or economical one-piece design
- Complete selection of lenses lighting, brackets and accessories



ACCESSORIES
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PresencePLUS® Pro

- Compact camera with separate DIN-mountable controller
- A choice of standard or Mini anodized aluminum camera, or IP68-rated nickel-plated aluminum or stainless steel cameras
- VGA, color and high-resolution models
- Convenient 20-pin removable terminal block
- 14 configurable discrete I/O (NPN/PNP)
- Six bright bicolor LED indicators



PresencePLUS® P4

- Economical one-piece design
- In-line or right-angle housing
- A choice of anodized aluminum or IP68-rated nickel-plated aluminum housing
- VGA, color and high-resolution models
- 7 configurable discrete I/O (NPN/PNP)
- Three bright bicolor LED indicators



Software Tools

One Advanced Software Platform

- Seamless functionality across the entire *Pro* and *P4* vision sensor series
- Remote TEACH input similar to a photoelectric sensor self-learns the inspection tolerances of your application
- Easy, menu-driven, point-and-click interface on a PC
- Free ActiveX utilities for linking and embedding images and results
- Direct connectivity to EtherNet/IP and Modbus TCP industrial networks
- In nine languages including English, Simplified Chinese, Traditional Chinese, French, German, Japanese, Portuguese and Spanish with translated text, buttons, commands and icons in the respective language
- Free web download or CD-ROM; includes all Banner vision sensor manuals, troubleshooting guides, and lens and lighting selection guides
- Free firmware and software upgrades

Photoelectrics
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Inspection Sensors

Vision

Wireless

Lighting &
Indicators

Safety
Light Screens

Safety
Laser Scanners

Fiber Optic
Safety Systems

Safety Controllers &
Modules

Safety Two-Hand
Control Modules

Safety Interlock
Switches

Emergency Stop &
Stop Control

VISION TOOLS analyze the image.



Average Color: Tests or communicates color content values sensed in a selected area



Color Blob: Determines the presence, connectivity, size and location of selected features with one or more colors



Color Match: Inspects for matching hue and intensity



Average Gray Scale: Determines the gray scale value of an area



Bar Code: Finds, decodes and grades 2D and 1D linear bar codes



Bead Tool: Monitors a track of material for width, consistency and location



Blob Detect: Determines the presence, connectivity, size and location of selected features



Edge: Determines the presence, number, classification and location of edges



GEO Count: Detects the presence and location of a target pattern in any orientation



Object: Determines the presence, number, classification, size and location of objects



OCR/OCV: Reads and verifies optical characters



Pattern Count: Determines the presence, number and location of pattern(s)



Circle Detect: Determines radius, center point and other characteristics of a circle or arc



Line Detect: Determines length, end points and other characteristics of a line segment

LOCATION TOOLS compensate for translational and rotational movement.



GEO Find: Determines translation and rotation movement of a part up to 360° by detecting relative movement of a pattern



Locate: Determines translation and rotation by detecting relative movement of edges



Pattern Find: Determines translation and rotation by detecting relative movement of a pattern



Blob Find: Determines translation and rotation by detecting the presence, connectivity, size, shape and location of selected features

ANALYSIS TOOLS measure and evaluate the results of the vision tools.



Communication: Sends images or results of selected location, vision and analysis tools over the Ethernet or RS-232 serial communication ports to industrial Ethernet or PC networks



Math: Performs arithmetic functions on any tool or constant



Measure: Measures distance and angles between two prescribed points, lines or curves



Test: Evaluates results of selected vision and analysis tools to determine whether an inspection passes or fails and activates outputs



String: Performs string comparison and substring search operations on string constants and tools that produce string results

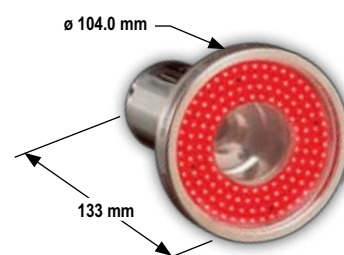
IVu Sensors

PresensePLUS

LENSES

LIGHTING

PresencePLUS® Pro Series



PresencePLUS® P4 OMNI Series



PROII Controllers, 10-30V dc

Model	PPROCTL	PPROCTL1.3	PPROCTL1C	—	Add premium tools to model (example, PPROCTL-BCBDOC)		
Resolution	640 x 480 Gray Scale	1280 x 1024 Gray Scale	752 x 480 Color & Gray Scale		BC = Bar Code Reader BD = Bead Tool OC = OCR/OCV		
					BCBD = Bar Code Reader & Bead Tool		
					BCOC = Bar Code Reader & OCR/OCV		
					BDOC = Bead Tool & OCR/OCV		
					BCBDOC = Bar Code Reader, Bead Tool & OCR/OCV		
	Pro Camera Model Numbers				Ring Light	Window	Housing
Gray Scale	Gray Scale 1.3	Color					
	PPROMCAMQ	PPROMCAM1.3Q	PPROMCAMCQ	—	—	Black Anodized Aluminum	
	PPROCAMQ	PPROCAM1.3Q	PPROCAMCQ	—	—	Black Anodized Aluminum	
	IP68 Pro Camera Model Numbers			Ring Light	Window*	Housing	
	Gray Scale	Gray Scale 1.3	Color				
	PPROCAMSC-G	PPROCAM1.3SC-G	PPROCAMCSC-G	50 mm† long Lens Cover (No Light)	Glass	Nickel-plated Aluminum	
	PPROCAMSC-P	PPROCAM1.3SC-P	PPROCAMCSC-P		Plastic		
	PPROCAMSSC-G	PPROCAM1.3SSC-G	PPROCAMCSSC-G		Glass	Stainless Steel	
	PPROCAMSSC-P	PPROCAM1.3SSC-P	PPROCAMCSSC-P		Plastic		
	PPROCAMSR-G	PPROCAM1.3SR-G	—	Red	Glass	Nickel-plated Aluminum	
	PPROCAMSR-P	PPROCAM1.3SR-P			Plastic		
	PPROCAMSSR-G	PPROCAM1.3SSR-G			Glass	Stainless Steel	
	PPROCAMSSR-P	PPROCAM1.3SSR-P			Plastic		
	PPROCAMSI-G	PPROCAM1.3SI-G	—	Infrared	Glass	Nickel-plated Aluminum	
	PPROCAMSI-P	PPROCAM1.3SI-P			Plastic		
	PPROCAMSSI-G	PPROCAM1.3SSI-G			Glass	Stainless Steel	
	PPROCAMSSI-P	PPROCAM1.3SSI-P			Plastic		
	PPROCAMSB-G	PPROCAM1.3SB-G	—	Blue	Glass	Nickel-plated Aluminum	
	PPROCAMSB-P	PPROCAM1.3SB-P			Plastic		
	PPROCAMSSB-G	PPROCAM1.3SSB-G			Glass	Stainless Steel	
	PPROCAMSSB-P	PPROCAM1.3SSB-P			Plastic		
	PPROCAMSG-G	PPROCAM1.3SG-G	—	Green	Glass	Nickel-plated Aluminum	
	PPROCAMSG-P	PPROCAM1.3SG-P			Plastic		
	PPROCAMSSG-G	PPROCAM1.3SSG-G			Glass	Stainless Steel	
	PPROCAMSSG-P	PPROCAM1.3SSG-P			Plastic		
	PPROCAMSW-G	PPROCAM1.3SW-G	PPROCAMCSW-G	White	Glass	Nickel-plated Aluminum	
	PPROCAMSW-P	PPROCAM1.3SW-P	PPROCAMCSW-P		Plastic		
	PPROCAMSSW-G	PPROCAM1.3SSW-G	PPROCAMCSSW-G		Glass	Stainless Steel	
	PPROCAMSSW-P	PPROCAM1.3SSW-P	PPROCAMCSSW-P		Plastic		

* Windows are factory replaceable, contact factory at 1-888-373-6767.

† Camera without lens cover and 75 mm long lens covers are available. Contact factory at 1-888-373-6767 for additional information.

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IVu Sensors

PresensePLUS



Pro

P4

LENSES

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P4 OMNI Sensors, 10-30V dc

Vision Tools		Housing	Resolution (pixels)	Model Number
	OMNI Gray Scale	Right-Angle	640 x 480	P4OR
		In-Line		P4OI
		Right-Angle	1280 x 1024	P4O1.3R
		In-Line		P4O1.3I
	COLOR OMNI	Right-Angle	752 x 480	P4COR
		In-Line		P4COI

Add premium tools to model
(example, P4OR-BC)

BC = Bar Code Reader

BD = Bead Tool

OC = OCR/OCV


BCBD = Bar Code Reader & Bead Tool

BCOC = Bar Code Reader & OCR/OCV

BDOC = Bead Tool & OCR/OCV

BCBDOC = Bar Code Reader, Bead Tool & OCR/OCV

Sealed P4 OMNI (IP68) Sensors, 10-30V dc

Vision Tools		Housing	Resolution (pixels)	Model Number
	OMNI Gray Scale	Right-Angle	640 x 480	P4ORS
	OMNI Gray Scale		1280 x 1024	P4O1.3RS
	COLOR OMNI		752 x 482	P4CORS

Add premium tools to model
(example, P4ORS-BC)

BC = Bar Code Reader

BD = Bead Tool

OC = OCR/OCV

BCBD = Bar Code Reader & Bead Tool

BCOC = Bar Code Reader & OCR/OCV

BDOC = Bead Tool & OCR/OCV


BCBDOC = Bar Code Reader, Bead Tool & OCR/OCV

PresencePLUS® P4 OMNI Specifications

Supply Voltage and Current	10 to 30V dc (24V dc $\pm 10\%$ if the sensor powers a light source) P4OR, P4OI & P4ORS: less than 650 mA (exclusive of lights and I/O load) P4O1.3R, P4O1.3I, P4COR, P4COI, P4CORS & P4O1.3RS: less than 550 mA (exclusive of lights and I/O load)	
Memory	32 MB Inspection (jobs): 999 max.	
Input/Output Configuration	NPN (sinking) or PNP (sourcing) software selectable	
Output Rating	150 mA max. each output OFF-state leakage current: less than 100 μ A ON-state saturation voltage: NPN—less than 1V @ 150 mA max. PNP—greater than V+ -2V	
Bicolor Status Indicators	PASS/FAIL: Green ON steady—PASS POWER/ERROR: Green ON steady—POWER READY/TRIGGER: Green ON steady—READY Red ON steady—FAIL Red ON steady—ERROR Yellow ON steady—TRIGGER	
Display Options	PC or NTSC video (uses 9 m max. BNC cordset)	
Discrete I/O	1 Trigger IN 1 Strobe OUT 4 Programmable I/O 1 Product Change IN 1 Remote TEACH IN	
Communications	10/100 Ethernet connection for running PresencePLUS P4 software and/or output inspection results P4OR, P4OI, P4O1.3R, P4O1.3I, P4COR & P4COI: RJ-45 connector P4ORS, P4O1.3RS & P4CORS: 8-pin M12/Euro-style (female) connector RS-232 connection for output of inspection results	
Imager Resolution	P4OR, P4OI & P4ORS: 640 x 480 pixels P4O1.3R, P4O1.3I & P4O1.3RS: 1280 x 1024 pixels P4COR, P4COI & P4CORS: 752 x 480 pixels	

More
on next
page

PresencePLUS® P4 OMNI Specifications (cont'd)

Pixel Size	P4OR, P4OI, P4COR, P4COI & P4ORS: 7.4 x 7.4 μm P4O1.3R, P4O1.3I & P4O1.3RS: 6.7 x 6.7 μm P4CORS: 6.0 X 6.0 μm
Imager Size	P4OR, P4OI & P4ORS: 4.8 x 3.6 mm, 5.9 mm diagonal (1/3 inch CCD) P4O1.3R, P4O1.3I & P4O1.3RS: 8.6 x 6.9 mm, 11 mm diagonal (2/3 inch CMOS) P4COR, P4COI & P4CORS: 4.5 x 2.9 mm, 5.4 mm diagonal (1/3 inch CMOS)
Levels of Gray Scale or Color	P4OR, P4OI, P4O1.3R, P4O1.3I, P4ORS & P4O1.3RS: 256 Gray Scale P4COR, P4COI & P4CORS: 256 Red, Green and Blue
Exposure Time	P4OR, P4OI & P4ORS: 0.1 to 2830 milliseconds P4O1.3R, P4O1.3I & P4O1.3RS: 0.1 to 1670 milliseconds P4COR, P4COI & P4CORS: 0.1 to 1000 milliseconds
Full Image Acquisition	P4OR, P4OI & P4ORS: 48 frames per second max.* P4O1.3R, P4O1.3I & P4O1.3RS: 26.8 frames per second max.* P4COR, P4COI & P4CORS: 17 frames per second max.*
Lens Mount	Standard C-mount (1 inch—32 UN)
Construction	P4OR, P4OI, P4O1.3R, P4O1.3I, P4COR & P4COI: Black anodized aluminum housing, glass lens P4ORS, P4O1.3RS & P4CORS: Die-cast nickel-plated aluminum housing, glass or acrylic window
Weight	P4OI, P4O1.3I & P4COI: 293 g P4OR, P4O1.3R & P4COR: 385 g P4ORS, P4O1.3RS & P4CORS: 430 g
Environmental Rating	P4OR, P4OI, P4O1.3R, P4O1.3I, P4COR & P4COI: IEC IP20; NEMA 1 P4ORS, P4O1.3RS & P4CORS: IEC IP68
Operating Conditions	Stable ambient temperature: 0° to +50° C Stable ambient lighting: No large, quick changes in light level; no direct or reflected sunlight Relative humidity: P4OR, P4OI, P4O1.3R, P4O1.3I, P4COR & P4COI: 35-90% (non-condensing)
Certifications	
Hookup Diagrams	NPN: VS09 (p. 768) PNP: VS10 (p. 768)

* A reduced Field-of-View (FOV) dramatically increases acquisition rates.

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Safety Two-Hand
Control Modules
Safety Interlock
Switches
Emergency Stop &
Stop Control


iVu Sensors

PresencePLUS


LENSES

LIGHTING

PresencePLUS® Pro—PROII Controller Specifications

Supply Voltage and Current	PPROCTL: 10 to 30V dc @ less than 1.5 A (exclusive of load) PPROCTL3 & PPROCTL3C: 10 to 30V dc @ less than 1.2 A (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Memory	Storage: 64 MB Inspections (jobs): 999 max.
Input/Output Configuration	NPN (sinking) or PNP (sourcing) software selectable
Output Rating	150 mA max. each output OFF-state leakage current: less than 100 μA ON-state saturation voltage: NPN—less than 1V @ 150 mA PNP—greater than V+ -2V
Input Specifications	NPN: ON—less than 3V PNP: ON—greater than (+V -2)V @ 1 mA max. OFF-state voltage—greater than 10V @ 4 mA max OFF-state voltage—less than 3V @ 6 mA max.
Indicators	6 LED indicators: Trigger, Ready, Power, Pass, Fail, Error
Display Options	PC or NTSC video (uses 9 m max. BNC cordset)
Discrete I/O	1 Trigger IN (pin 3), 1 Strobe OUT (pin 4), 1 Remote TEACH IN (pin 6), 6 Programmable I/O (pins 9-14), 1 Product Change IN (pin 15), 4 Product Select IN (pins 16-19)
Communications	1 RJ-45 10/100 Ethernet connection for running PresencePLUS Pro software and/or output inspection results 1 RS-232 DB-9 port for output of inspection results
Construction	Steel with black zinc plating
Weight	Approx. 0.55 kg
Environmental Rating	IEC IP20; NEMA 1
Operating Conditions	Stable Ambient Temperature: 0° to +50° C Relative Humidity: 90% (non-condensing) Stable Ambient Lighting: No large, quick changes in light level; no direct or reflected sunlight
Certifications	

PresencePLUS® PROII Camera Specifications

Image Resolution	PPROCAMPQ & PPROCAMS(S): 640 x 480 pixels PPROMCAMQ, PPROMCAMCQ, PPROCAMCQ & PPROCAMCS(S): 752 x 480 pixels PPROMCAM1.3Q, PPROCAM1.3Q & PPROCAM1.3S(S): 1280 x 1024 pixels
Pixel Size	PPROCAMPQ & PPROCAMS(S): 7.4 x 7.4 μ m PPROMCAMQ, PPROMCAMCQ, PPROCAMCQ & PPROCAMCS(S): 6.0 x 6.0 μ m PPROMCAM1.3Q, PPROCAM1.3Q & PPROCAM1.3S(S): 6.7 x 6.7 μ m
Imager Size	PPROCAMPQ & PPROCAMS(S): 4.8 x 3.6 mm, 6 mm diagonal (1/3 inch CCD) PPROMCAMQ, PPROMCAMCQ, PPROCAMCQ & PPROCAMCS(S): 4.5 x 2.9 mm, 5.4 mm diagonal (1/3 inch CMOS) PPROMCAM1.3Q, PPROCAM1.3Q & PPROCAM1.3S(S): 8.6 x 6.9 mm, 11 mm diagonal (2/3 inch CMOS)
Levels of Gray Scale or Color	PPROMCAMQ, PPROCAMPQ, PPROMCAM1.3Q, PPROCAM1.3Q, PPROCAMS(S) & PPROCAM1.3S(S): 256 Gray Scale PPROMCAMCQ, PPROCAMCQ & PPROCAMCS(S): 256 Red, Green and Blue
Exposure Time	PPROCAMPQ & PPROCAMS(S): 0.10 to 2830 milliseconds PPROMCAMQ, PPROMCAMCQ, PPROCAMCQ & PPROCAMCS(S): 0.10 to 1040 milliseconds PPROMCAM1.3Q, PPROCAM1.3Q & PPROCAM1.3S(S): 0.10 to 1670 milliseconds
Full Image Acquisition*	PPROMCAMQ, PPROCAMPQ & PPROCAMS(S): 48 frames per second PPROMCAMCQ: 55 frames per second max. PPROCAMCQ & PPROCAMCS(S): 17 frames per second max. PPROMCAM1.3Q, PPROCAM1.3Q & PPROCAM1.3S(S): 18 frames per second max.
Interface	LVDS
Lens Mount	Standard C-mount (1 inch—32UN)
Construction	PPROMCAMQ, PPROCAMPQ, PPROMCAM1.3Q, PPROCAM1.3Q, PPROMCAMCQ & PPROCAMCQ: black anodized aluminum and black painted die cast zinc PPROCAMS, PPROCAM1.3S & PPROCAMCS: nickel-plated aluminum (Lens covers and ring lights are nickel-plated aluminum with glass or polycarbonate window) PPROCAMSS, PPROCAM1.3SS & PPROCAMCSS: 316 stainless steel (Lens covers and ring lights are stainless steel with glass or polycarbonate window)
Max. Cordset Length	10 m
Weight	PPROMCAMQ, PPROCAM1.3Q & PPROMCAMCQ: approx. 96 g PPROCAMPQ, PPROCAM1.3Q & PPROCAMCQ: approx. 113 g PPROCAMS, PPROCAM1.3S & PPROCAMCS: Camera only—approx. 288 g Camera with cover—approx. 348 g Camera with ring light—approx. 585 g PPROCAMSS, PPROCAM1.3SS & PPROCAMCSS: Camera only—723 g Camera with cover—904 g Camera with ring light—1480 g
Environmental Rating	PPROMCAMQ, PPROCAMPQ, PPROMCAM1.3Q, PPROCAM1.3Q, PPROMCAMCQ & PPROCAMCQ: IEC IP20; NEMA 1 PPROCAMS, PPROCAM1.3S & PPROCAMCS: IEC IP68; NEMA 6P PPROCAMSS, PPROCAM1.3SS & PPROCAMCSS: IEC IP68; NEMA 6P and NEMA 4X
Outside Temperature	0° to +50° C
Relative Humidity	PPROMCAMQ, PPROCAMPQ, PPROMCAM1.3Q, PPROCAM1.3Q, PPROMCAMCQ & PPROCAMCQ: 90% (non-condensing)
Certifications	
Hookup Diagrams	NPN: VS07 (p. 767) PNP: VS08 (p. 767)

* A reduced Field-of-View (FOV) dramatically increases acquisition rates.



PresensePLUS® P4 Dedicated-Function Sensors

- Four models with Locate, Measure, Math, Test, Communications and simplified suite of vision tools
- High-performance vision inspections in self-contained in-line or right-angle housing styles that fit in the palm of your hand
- Standardized GUI supports nine languages
- Remote TEACH function for inspection changeovers without a PC
- Connects directly to real-time video display without a PC
- Communicates over Ethernet, configurable discrete I/O and RS-232 serial lines
- Provides direct connectivity to EtherNet/IP and Modbus TCP industrial networks
- ActiveX utilities for custom operator controls
- Available with a variety of mounting brackets, lenses and lighting accessories

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Safety
Laser Scanners

Fiber Optic
Safety Systems

Safety Controllers &
Modules

Safety Two-Hand
Control Modules

Safety Interlock
Switches

Emergency Stop &
Stop Control

ACCESSORIES

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PresensePLUS® P4 AREA

- Uses Blob and Gray Scale tools for basic inspections of defined areas
- High-speed analysis up to 10,000 parts per minute
- Standard resolution: 128 X 100
- High-resolution: 1280 X 1024



PresensePLUS® P4 GEO

- Uses GEO Count tool to detect presence, location and rotation of a target pattern (360°)
- Standard resolution: 128 X 100
- High-resolution: 1280 X 1024



PresensePLUS® P4 EDGE

- Uses Edge and Object tools to validate height, width, location and edges
- High-speed analysis faster than 10,000 parts per minute
- Standard resolution: 128 X 100
- High-resolution: 1280 X 1024



PresensePLUS® P4 BCR

- Finds and decodes 2D and 1D linear bar codes
- Industry standard bar code metrics and grading
- Standard resolution: 640 X 480
- High-resolution: 1280 X 1024



In-line Sensor Models
(shown with lens—sold separately)



Right-Angle Sensor Models
(shown with lens—sold separately)

iVu Sensors

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Pro

P4

LENSES

LIGHTING

P4 Sensors with Dedicated-Function Tool Set, 10-30V dc

Vision Tools		Housing	Resolution	Model Number
	AREA Blob & Gray Scale	Right-Angle	128 x 100	P4AR
		In-Line		P4AI
		Right-Angle	1280 x 1024	P4A1.3R
		In-Line		P4A1.3I
	GEO Geometric Pattern Count & Find	Right-Angle	128 x 100	P4GR
		In-Line		P4GI
		Right-Angle	1280 x 1024	P4G1.3R
		In-Line		P4G1.3I
	EDGE Edge & Object	Right-Angle	128 x 100	P4ER
		In-Line		P4EI
		Right-Angle	1280 x 1024	P4E1.3R
		In-Line		P4E1.3I
	BCR Bar Code Reader	Right-Angle	640 x 480	P4BCR*
		In-Line		P4BCI*
		Right-Angle	1280 x 1024	P4BC1.3R*
		In-Line		P4BC1.3I*


* To add the OCR/OCV premium tool to any P4 BCR model, add suffix -OC to the model number (example, P4BCR-OC).

PresencePLUS® P4 Dedicated-Function Specifications

Supply Voltage and Current	10 to 30V dc (24V dc $\pm 10\%$ if the sensor powers a light source) BCR: less than 650 mA (exclusive of lights and I/O load) AREA, GEO & EDGE: less than 500 mA (exclusive of lights and I/O load) AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3: less than 550 mA (exclusive of lights and I/O load)	
Memory	Storage: AREA, GEO, EDGE & BCR—8 MB AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3—32 MB	Inspection (jobs): 999 max. Inspection (jobs): 999 max.
Input/Output Configuration	NPN (sinking) or PNP (sourcing) software selectable	
Output Rating	150 mA max. each output OFF-state leakage current: less than 100 μ A ON-state saturation voltage: NPN—less than 1V @ 150 mA max. PNP—greater than V+ -2V	
Bicolor Status Indicators	PASS/FAIL: Green ON steady—PASS POWER/ERROR: Green ON steady—POWER READY/TRIGGER: Green ON steady—READY	Red ON steady—FAIL Red ON steady—ERROR Yellow ON steady—TRIGGER
Display Options	PC or NTSC video (uses 9 m max. BNC cordset)	
Discrete I/O	1 Trigger IN 1 Strobe OUT 4 Programmable I/O 1 Product Change IN 1 Remote TEACH IN	
Communications	1 RJ-45 10/100 Ethernet connection for running PresencePLUS P4 software and/or output inspection results RS-232 connection for output of inspection results	
Imager Resolution	BCR: 640 x 480 pixels AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3: 1280 x 1024 pixels AREA, GEO & EDGE: 128 x 100 pixels	
Pixel Size	BCR: 7.4 x 7.4 μ m AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3: 6.7 x 6.7 μ m AREA, GEO & EDGE: 20 x 20 μ m	



PresencePLUS® P4 Dedicated-Function Specifications (cont'd)

Imager Size	BCR: 4.8 x 3.6 mm, 6 mm diagonal (1/3 inch CCD) AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3: 8.6 x 6.9 mm, 11 mm diagonal (2/3 inch CMOS) AREA, GEO & EDGE: 2.6 x 2.0 mm, 3.3 mm diagonal (1/5 inch CMOS)
Levels of Gray	256 Gray Scale
Exposure Time	BCR: 0.1 to 2830 milliseconds AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3: 0.1 to 1670 milliseconds AREA, GEO & EDGE: 0.1 to 20.47 milliseconds
Full Image Acquisition	BCR: 48 frames per second max.* AREA, GEO & EDGE: 500 frames per second max. AREA 1.3, GEO 1.3, EDGE 1.3 & BCR 1.3: 27 frames per second max.*
Lens Mount	Standard C-mount (1 inch—32 UN)
Construction	Black anodized aluminum housing, glass lens
Weight	In-line: 293 g Right-angle: 385 g
Environmental Rating	IEC IP20; NEMA 1
Operating Temperature	Stable ambient temperature: 0° to +50° C Stable ambient lighting: No large, quick changes in light level; no direct or reflected sunlight Relative humidity: 90% (non-condensing)
Certifications	
Hookup Diagrams	NPN: VS09 (p. 768) NPN: VS10 (p. 768)

* A reduced Field-of-View (FOV) dramatically increases acquisition rates.

Photoelectrics
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Fiber Optic
Sensors
Special Purpose
Sensors
Measurement &
Inspection Sensors
Vision
Wireless
Lighting &
Indicators
Safety
Light Screens
Safety
Laser Scanners
Fiber Optic
Safety Systems
Safety Controllers &
Modules
Safety Two-Hand
Control Modules
Safety Interlock
Switches
Emergency Stop &
Stop Control

iVu Sensors

PresencePLUS

LENSES

LIGHTING

PresencePLUS Pro & P4 Cordsets

Pro Camera-to-Controller		
	See page 696	
	12-Pin Euro QD to DB15	
Length	Straight	Right-Angle
1.83 m	PPC06SHF	PPC06SRAHF
3.96 m	PPC13SHF	PPC13SRAHF
7.01 m	PPC23SHF	PPC23SRAHF
9.75 m	PPC32SHF	PPC32SRAHF



P4 Power	
	See page 697
	12-Pin QD
Length	Straight
1.83 m	P4C06
7.01 m	P4C23
9.75 m	P4C32
15.2 m	P4C50
22.9 m	P4C75
34.0 m	P4C110



Sealed P4 Power	
	See page 6970
	12-Pin Euro QD
Length	Straight
1.83 m	MQDC2S-1206
5.57 m	MQDC2S-1215
9.14 m	MQDC2S-1230
15.2 m	MQDC2S-1250
22.9 m	MQDC2S-1275



Pro & P4 Video	
	See page 702
	BNC to BNC
Length	Straight
1.83 m	BNC06
5.57 m	BNC06
9.14 m	BNC30
14.6 m	BNC48



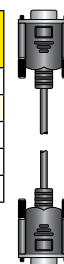
Pro & P4 Ethernet Communication		
	See page 705	
	RJ45 to RJ45	
Length	Shielded	Shielded Crossover
2.13 m	STP07	STPX07
7.62 m	STP25	STPX25
15.2 m	STP50	STPX50
22.9 m	STP75	STPX75



Sealed P4 Ethernet Communication	
	See page 705
	RJ45 to 8-Pin Euro QD
Length	
1.83 m	STP-MAQDC-806
4.57 m	STP-MAQDC-815
9.14 m	STP-MAQDC-830




Pro Serial Communication	
	See page 703
	DB9 to DB9
Length	
1.83 m	DB9P06
4.57 m	DB9P15
9.14 m	DB9P30













Sealed P4 Video	
	See page 703
	Pico QD to BNC
Length	
2.00 m	PKG4M-2/CS
5.00 m	PKG4M-5/CS
9.00 m	PKG4M-9/CS



 Additional cordset information available.
See page 679.

Brackets


Pro Controller		Pro Cameras		
				
pg. 662	pg. 661	pg. 662	pg. 663	pg. 664
SMBPPDH	SMBPPDE	SMBPPLU	SMBPPRA	SMBPPU

Pro Mini Camera	Sealed Pro Camera	P4		Sealed P4
				
pg. 663	pg. 664	pg. 660	pg. 661	pg. 661
SMBPPROMRA	SMBPPSU	SMBP4RAB	SMBP4RAS	SMBP4SRAF




Additional brackets and information available.
See page 620.



Lens Covers

Sealed Pro & P4 Lens Covers				
Length			Works with	Model
	50 mm	Nickel-plated aluminum	P4	P4SLC50-G
				P4SLC50-P
	75 mm		Pro	PPSLC50-G
				PPSLC50-P
		50 mm	Pro & P4	PPSLC75-G
				PPSLC75-P
	Stainless Steel		Pro	PPSSLC50-G
				PPSSLC50-P

Sensor Interface Modules and Power Supplies


See page 739	
	<ul style="list-style-type: none"> • Sensor interface modules for simplified wiring of P4 sensors in an electrical box • Lighting interface for strobe operation of Banner lighting with any vision sensor • Strobe control module for control of specialty strobe lights

Monitors


See page 676		Model*
	9" Black and White NTSC Video Monitor	PPM9
	8" Flat Panel NTSC Video Monitor	PPM8

* Monitors require a BNC cordset for connection to a PresencePLUS Sensor (see page 702).


Adjustable Mounting System

See page 722	
	<ul style="list-style-type: none"> • 3" and 6" column, base and knuckle kits for positioning of sensor and lights • Bogen arm with clamp for added flexibility in mounting • 2" pivoting knuckle assembly for positioning spot light


Enclosures

See page 728	
	<ul style="list-style-type: none"> • Offers models for sensors and lights • Provides protection in rugged or harsh environments • Prevents tampering


Accessories for C-Mount Lenses

	Description	Format Size	Model	Used With
	Extension Kit (0.5, 1.0, 5.0, 10, 20 and 40 mm)	—	LEK	All Lenses
	Extension Kit (0.25 and 0.5 mm)		LEKS	
	Lens Extender (increases focal length 2X)		LCF2X	
	UV Lens Filter, Clear Glass	2/3"	FLTUV	Tamron Megapixel Lenses


PresencePLUS® Standard Lenses

	Description	Format Size	Model	Used With
	4 mm	1/3"	LCF04	All (except 1.3 megapixel models)
	8 mm		LCF08	
	12 mm with Focus Locking		LCF12	
	16 mm with Focus Locking		LCF16	
	25 mm with Focus Locking (Rainbow)	1"	LCF25R	
	25 mm with Focus and Aperture Locking, Metal Housing (Rainbow)		LCF25LR	
	50 mm with Focus and Aperture Locking (Rainbow)	2/3"	LCF50L1R*	
	50 mm with Focus Locking, Metal Housing (Rainbow)	1"	LCF50L2R*	
	75 mm with Focus and Aperture Locking, Metal Housing (Rainbow)		LCF75LR*	

PresencePLUS® Specialty Lenses

	Description	Format Size	Model	Used With
	3.5 mm with Focus and Aperture Locking (Kowa)	1/2"	LCF03LT	All (except 1.3 megapixel models)
	6 mm with Focus and Aperture Locking (Kowa)		LCF06LK	
	10 – 40 mm with Zoom, and Focus and Aperture Locking (Tamron)		LCF1040LT*	
	50 mm Telecentric (Navitar)	2/3"	LCF50TELN	

PresencePLUS® Megapixel Lenses with Focus and Aperture Locking

	Description	Format Size	Model	Used With
	8 mm (Tamron)	2/3"	LCF08LTMP	All
	16 mm (Tamron)		LCF16LTMP	
	25 mm (Tamron)		LCF25LTMP	
	50 mm (Tamron)		LCF50LTMP†	
	16 mm (Pentax)	2/3"	LCF16LMP	
	25 mm (Pentax)		LCF25LMP	
	35 mm (Pentax)		LCF35LMP	
	50 mm (Pentax)		LCF50LMP	
	5 mm (Computar)	1/2"	LCF05LCMP	
	8 mm (Computar)	2/3"	LCF08LMP	
	12 mm (Computar)		LCF12LMP	
	16 mm (Computar)		LCF16LCMP	
	25 mm (Computar)		LCF25LCMP	
	35 mm (Computar)		LCF35LCMP†	
	50 mm (Computar)		LCF50LCMP†	
	75 mm (Computar)		LCF75LCMP†	
	8.5 mm (Edmund Optics)	2/3"	LCF08LEMP	
	12 mm (Edmund Optics)		LCF12LEMP	
	16 mm (Edmund Optics)		LCF16LEMP	
	25 mm (Edmund Optics)		LCF25LEMP	
	35 mm (Edmund Optics)		LCF35LEMP†	

* Lens models will not fit in opening of Banner Ring Lights.

† Lenses require a 75 mm cover when used with a Sealed Pro or P4 Camera (see page 380)

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LENSES

LIGHTING

Vision Lighting

Critical Role in Successful Vision Sensing

No matter how powerful or robust a sensor is, successfully solving challenging vision applications relies heavily on matching the vision application with appropriate lighting. A properly chosen light can guarantee constant, consistent light conditions and can be used to create an optimally contrasted image. The correct light will highlight the features under inspection, disregard background objects and overpower any ambient light in the mix.

Banner offers a wide selection of high-intensity LED lights with built-in current and strobe control. A variety of specialty lights are available, including fluorescent lights. A complete selection of polarizing filter kits, colored filters and lighting diffusers are offered to improve lighting quality.

The innovation leader with more than 40 years of sensor development, Banner understands the challenges of the factory floor. Banner has over 3,000 factory and field representatives worldwide, as well as the largest force of application engineers in the industry who solve thousands of the most challenging applications every year. Banner offers one of the industry's most extensive selections of vision lighting solutions and continues its commitment of providing solutions for a variety of sensing needs.



Ring Lights page 416
Mounts directly to the sensor for easy setup and illuminates any object directly in front of the sensor



Area Lights page 418
Provides even illumination in a concentrated area



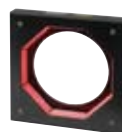
Backlights page 420
Installs behind the target, directly facing the sensor; has a highly diffused surface and uniform brightness



Linear Array Lights page 421
Provides high-intensity illumination of large areas, at long distances



On-Axis Lights page 422
Provides collimated illumination along the same optical path as camera



Low-Angle Ring Lights page 422
Illuminates nearly perpendicular to the direction of an inspection



Spot Lights page 423
Provides even illumination in a small concentrated spot



Tubular Fluorescent Lights page 424
Features flicker-free high-intensity illumination of large areas



Structured Lights page 424
Uses Class 2 laser line for 3-dimensional sensing