BANNER®

more sensors, more solutions

PresencePLUS Pro™

VISION SENSOR

A full-function vision sensor with an eye-opening price.

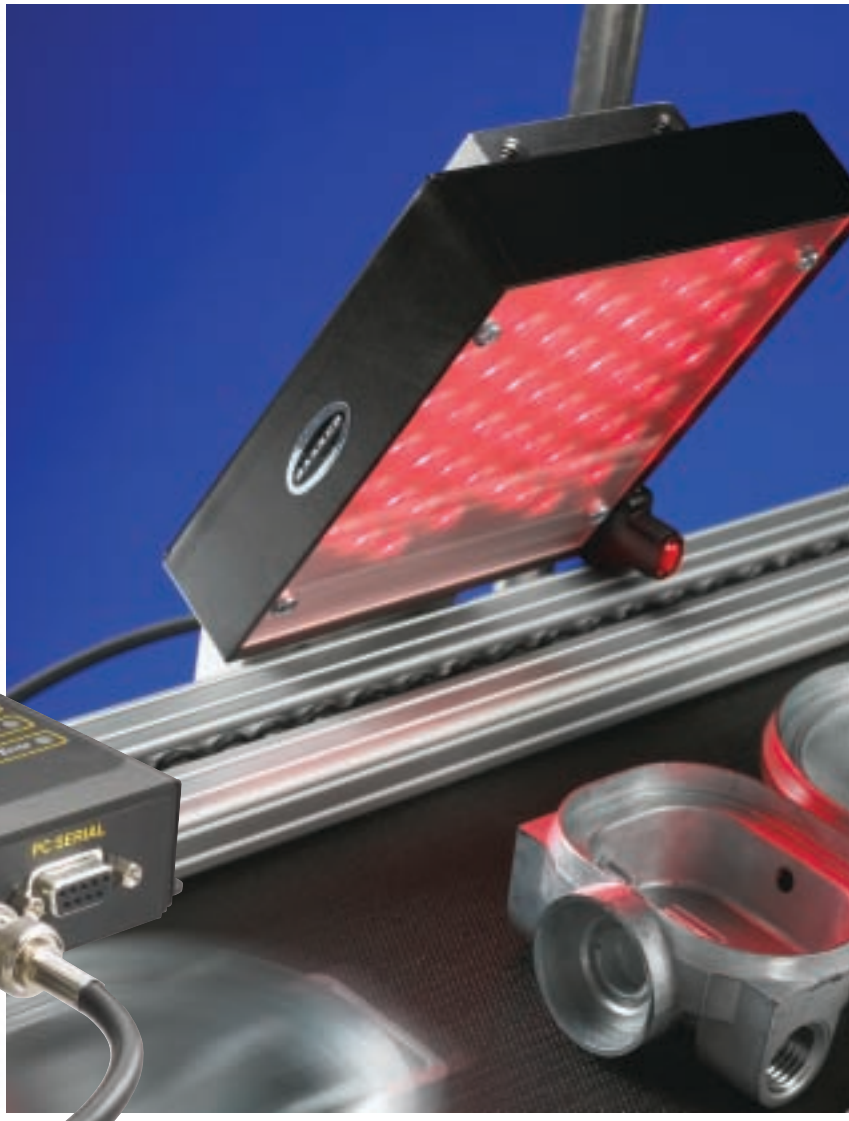
Features that rival more expensive systems.

The all-new *Presence*PLUS *Pro*™ provides advanced, camera-based visual inspections at a price you'll find hard to believe. Banner has transformed costly, complex machine vision systems into a simple, easy-to-use and affordable sensor that solves real-world applications. The sensor captures images and analyzes them using one or more vision tools to generate judgement results.

Ethernet and flexible I/O in the same full-featured sensor.

*Presence*PLUS *Pro*™ features Ethernet, serial and flexible I/O in a single sensor. Data, measurements and information for system process control are communicated both over the Ethernet or standard serial protocols. The sensor's pluggable terminal block accommodates configurable inputs (NPN/PNP), configurable outputs (NPN/PNP) and allows stored inspections to be selected.

Separate video output allows direct connection to optional real-time video display.



Free on-site demonstration with your product or application.

The *Presence*PLUS *Pro*™ is the world's easiest-to-use vision sensor with the power and flexibility to solve your challenging inspections. It can solve most vision applications quickly and inexpensively. Contact Banner for a no-cost, no-obligation demonstration of the capabilities of *Presence*PLUS *Pro*™. Whether you are looking for a single-point or factory-wide inspection solution, we will focus on solving your application.

Simple, straightforward setup makes your job easier.

Compact camera fits in tight spaces.

Easy to install and operate.

With minimal knowledge of vision systems, you can quickly set up an inspection that correctly tests and rejects bad parts on your production line. *Presence*PLUS *Pro*™ sets up using a remote PC; after setup, inspections are stored in the system and can be run without the need for the PC. *Presence*PLUS *Pro*™ inspects multiple features simultaneously and adjusts for both translational and rotational variation. Parts moving down a production line or web are accurately inspected without the need for fixturing.

Menu Toolbar *takes the user through a simple setup sequence, from left to right.*

Configuration Window *allows the user to select options and run inspections.*

Image Window *displays the image and applied tools.*

Navigation/ Results Window *displays settings and inspection results.*

Automatic TEACH or custom setup.

*Presence*PLUS *Pro*™ offers point-and-click setup without programming. Set up an inspection by simply illuminating the target, focusing the camera, and selecting the features to analyze. The inspection tolerances can be taught or manually configured. New users can follow the guided setup sequence, while advanced users can override automatic settings and create customized inspections.

All the tools you need to solve your challenging applications.

✔PASSED
Sign Good

The *Presence*PLUS *Pro*™ can solve most vision applications quickly and inexpensively. The world's easiest-to-use vision sensor does not sacrifice the power or flexibility to solve your most challenging inspections.

Two Locational Tools.

These tools compensate for translational and rotational movement.

- **Locate Tool.** Determines translation and rotation by detecting relative movement of edges.
- **Pattern Find Tool.** Determines translation and rotation by detecting relative movement of a pattern.

Five Vision Tools.

These tools perform the "image analysis" function.

- **Gray Scale Tool.** Determines the average gray scale value.
- **Blob Tool.** Determines the presence, connectivity, and location of selected features.
- **Edge Tool.** Determines the presence, number, classification, and location of edges.
- **Object Tool.** Determines the presence, number, classification, size, and location of objects.
- **Pattern Count Tool.** Determines the presence, number, and location of a pattern(s).

Two Analysis Tools.

These tools measure or evaluate the results of the Vision Tools.

- **Measure Tool.** Measures distance between two prescribed points. These points can be either edges or centroid locations.
- **Test Tool.** Evaluates results of selected vision and analysis tools to determine whether an inspection passes or fails. It also performs logical operations and activates outputs.

✔PASSED
Sign Rotated on Conveyor

Locate Tool

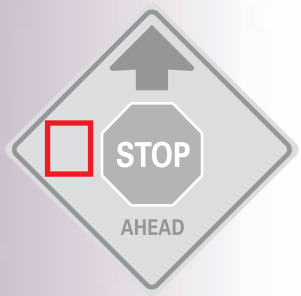
- Finds the edge of the part and adjusts the inspection areas
- Compensates for translation and rotation
- All other Regions of Interest follow the Pattern Find tools

Pattern Find Tool

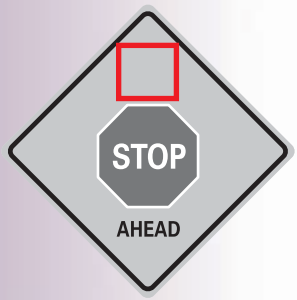
- Locates the target by searching for a taught pattern
- Compensates for translation and rotation
- All other Regions of Interest follow the Locate and Pattern Find tools

Ø REJECTED
Sign Color Change

Gray Scale Tool



- Detects change in color intensity

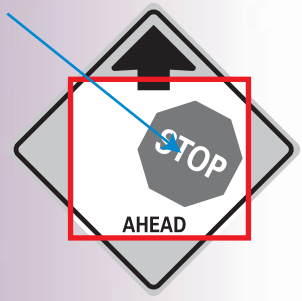


Other uses include:

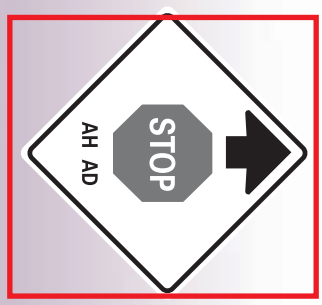
- Spot checking for part presence
- Monitoring for consistent lighting

Ø REJECTED
"STOP" Out of Position

Blob Tool



- Detects and verifies the location of a part

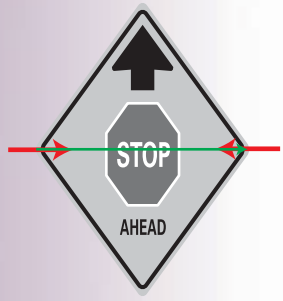


- Detects the missing letter regardless of orientation

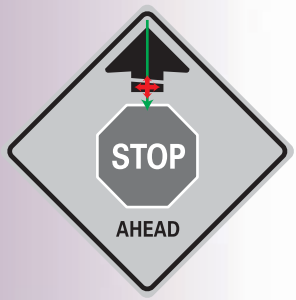
Other uses include:
- Counting the number of parts
- Verifying the correct object size
- Measuring concentricity
- Flaw detection

Ø REJECTED
Sign Too Narrow

Edge Tool



- Finds edges that can be used for measurements

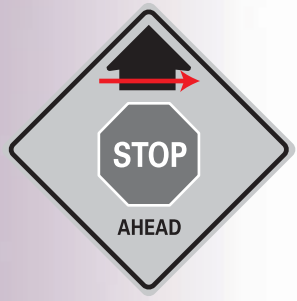


- Inspects for cracks or breaks in a part

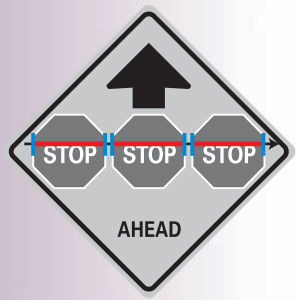
Other uses include:
- Counting parts
- Measuring label orientation

Ø REJECTED
Arrow Too Wide

Object Tool



- Measures the width of an object

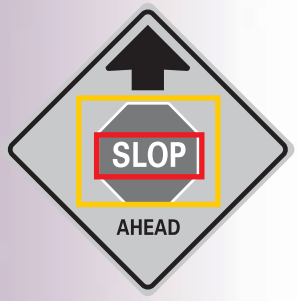


- Finds the midpoint of a feature or target

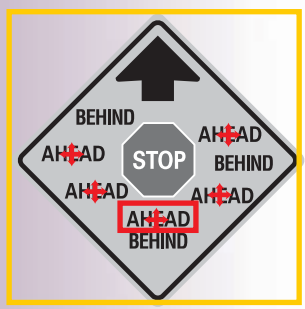
Other uses include:
- Width, pitch, and count measurement with one tool

Ø REJECTED
Wrong Lettering

Pattern Count Tool



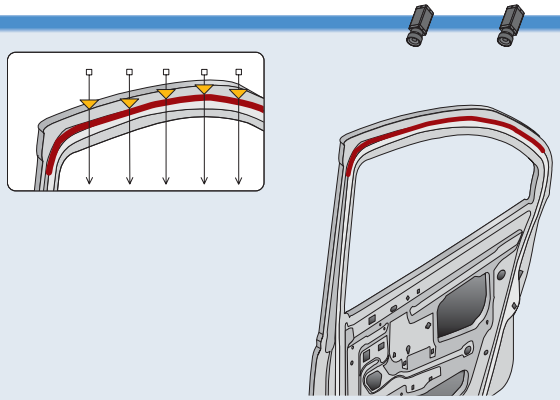
- Verifies correct printing



- Counts features or objects

Other uses include:
- Finding position of a feature or target
- Verifying correct cloth pattern
- Spot checking for electronic components on a circuit board

*Presence*PLUS *Pro*™ Applications

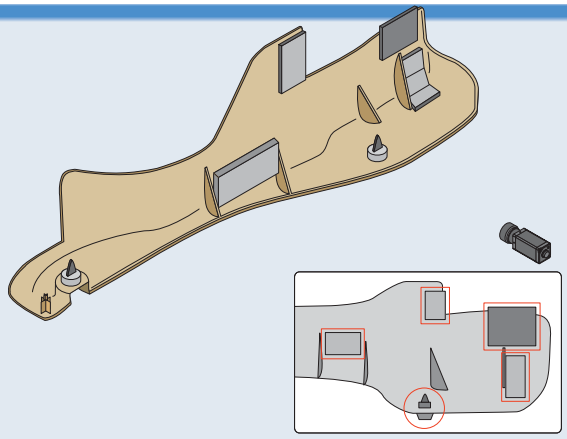


DISPENSED BEAD VERIFICATION

Objective: To verify the continuity, placement and thickness of a bead of sealant on an auto door body panel.

Sensors: Two *Presence*PLUS *Pro* Vision Sensors, LCF16 lens, high-frequency fluorescent light source, PLC used as a trigger.

Operation: In an automobile manufacturing plant, after a robot lays down a bead of sealant around the perimeter of a door panel, the panel is moved to a well-lit inspection station. There, two *Presence*PLUS *Pro* sensors are mounted above the part, looking down, to inspect the sealant. A bank of high-frequency fluorescent lights is mounted above, to illuminate the part. A Locate tool is used to find the edge of the door; multiple Edge and Object tools are used to monitor the width of the sealant bead, its location, and the continuity of the bead (whether there are any skips).

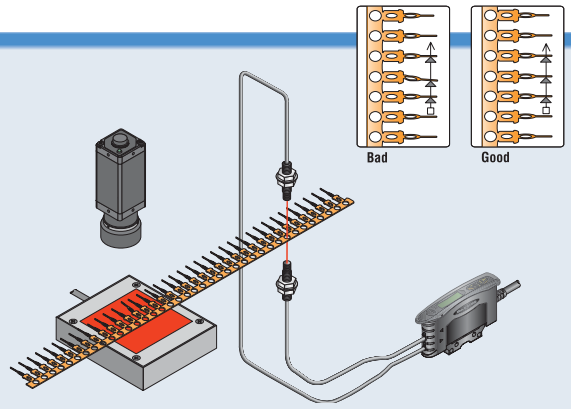


MULTIPLE COMPONENT LOCATION

Objective: To verify the presence and location of foam padding and plastic nuts on an automobile dashboard trim piece.

Sensors: *Presence*PLUS *Pro* Vision Sensor, with LCF16LT lens, high-frequency fluorescent light source, PLC used as a trigger.

Operation: In an automobile manufacturing plant, the *Presence*PLUS *Pro* is mounted to look across at a molded plastic dashboard trim piece. A bank of high-frequency fluorescent lights is mounted above, to illuminate the part. Multiple Blob, Object, and Edge tools are used to detect the presence or absence, orientation and location of pieces of foam padding and plastic components on the trim piece.

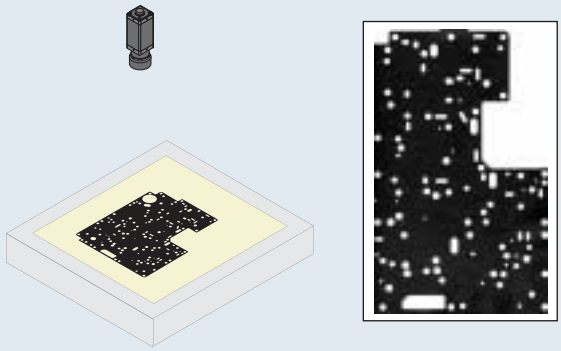


GAP (PITCH) MEASUREMENT

Objective: To inspect stamped metal pins for critical flaws.

Sensors: *Presence*PLUS *Pro* Vision Sensor, with LCF25R lens, LEDRB70X70W light source, opposed-mode fiber optic sensor used as a trigger.

Operation: A roll of thin metal stock passes through a stamping machine, where it is stamped into individual, but connected, pins. It is critical that the pins be straight and spaced at specified intervals, for later steps in the manufacturing process. A fiber optic sensor detects the guide holes along one side of the metal stock, and triggers the *Presence*PLUS *Pro* camera to capture an image. Using the Object Tool, the *Presence*PLUS *Pro* System locates the last edge of one pin and the leading edge of the next pin, and measures the gap (or "pitch"). If a pin is bent or positioned incorrectly, the gap between adjacent pins will change.



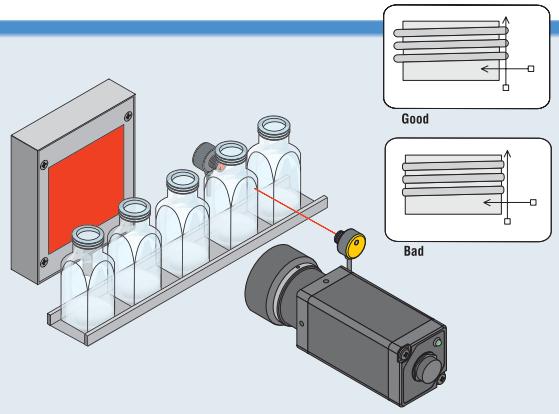
GASKET INSPECTION

Objective: To verify all required holes in a complicated gasket are completely punched out.

Sensors: *Presence*PLUS *Pro* Vision Sensor, with LCF08 lens, high-frequency fluorescent back light, PLC used as a trigger.

Operation: After all required holes are punched out of a gasket, it is moved to the inspection station. A PLC triggers the *Presence*PLUS *Pro* to start its inspection upon entry of the gasket into the inspection zone. Using multiple "Blob" tools, the vision sensor counts and measures each hole. If a hole is missing or is partially formed, the *Presence*PLUS *Pro* issues a failed inspection signal, thus indicating to the operator that the gasket is not good. The operator then removes the gasket and determines if it can be reworked.

*Presence*PLUS *Pro*™ Applications

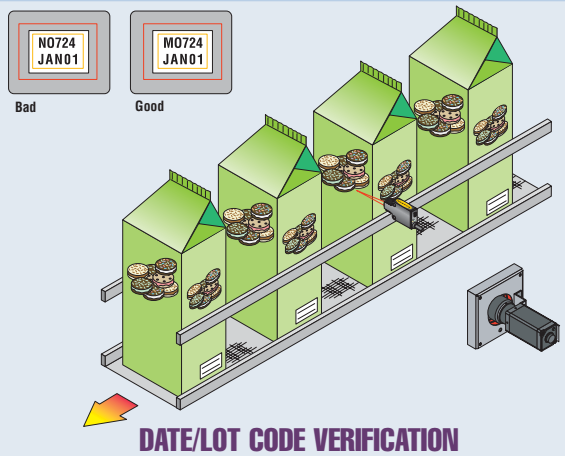


THREAD SIZE DETECTION

Objective: To verify that threads on the necks of bottles are formed completely.

Sensors: *Presence*PLUS *Pro* Vision Sensor, with LCF16 lens, LEDRB70X70W light source, photoelectric sensor used as a trigger.

Operation: Bottles on an assembly line sometimes have neck threads that do not form completely, making their bottle caps unable to seal properly. The *Presence*PLUS *Pro* Vision Sensor finds the neck of the bottle using the Locate tool, and using the Edge tool, checks that the threads are present at a predetermined distance from the neck surface. If the threads are too short, the Edge tool will not detect the threads and the *Presence*PLUS *Pro* will fail the part.

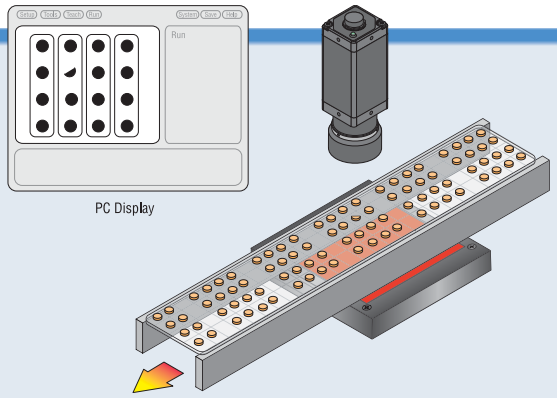


DATE/LOT CODE VERIFICATION

Objective: To verify that the correct date/lot code is printed on cookie boxes.

Sensors: *Presence*PLUS *Pro* Vision Sensor, with LCF16 lens, LED LEDRR80X80W ring light source, convergent photoelectric sensor used as a trigger.

Operation: An ink jet printer prints a date code and lot number to a designated location on each cookie box. When triggered by a convergent beam sensor, the *Presence*PLUS *Pro* inspects the printed characters and compares them to the date code and lot number that it was taught as "good." If any character is different or is missing (in this case, the sensor detects that the "M" changed to an "N"), the sensor rejects the box.

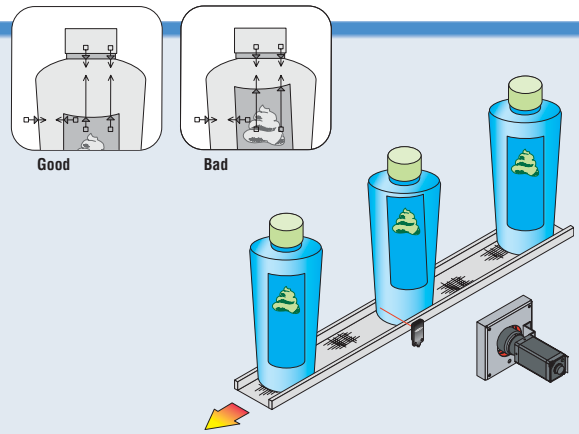


BLISTER PACKAGE VERIFICATION

Objective: To verify that a tablet is present in each blister pocket, and that no broken tablets or foreign material are in the web.

Sensors: *Presence*PLUS *Pro* Vision Sensor, LDRB100X200N backlight, PLC for trigger.

Operation: Tablets are positioned into blister pockets on a web. The *Presence*PLUS *Pro* vision sensor is used to verify that each blister pocket contains an unbroken tablet, and no foreign material. Four Blob tools are used, each examining a row of four tablets. A good image is taught to be four identically shaped and sized tablets. If the image is any condition other than the good images being taught, the *Presence*PLUS *Pro* vision sensor sends a signal to the PLC, which stops the machine, allowing the operator to intervene.



LABEL POSITIONING

Objective: To verify the correct placement of the label on a bottle of shaving gel.

Sensors: *Presence*PLUS *Pro* Vision Sensor, with LCF16 lens, LEDRR70X70W light source, photoelectric sensor used as a trigger.

Operation: Bottles of shaving gel are conveyed past the *Presence*PLUS *Pro* sensor, which will verify that the label is present, and that it is positioned correctly. Using the Edge and Measure tools, the *Presence*PLUS *Pro* measures the distance from the top of the label to the neck of the bottle in two locations, verifying height and straightness, and measures the distance from one side of the label to the side of the bottle, verifying side-to-side location.

PresencePLUS Pro™ Lenses & Solution Kits

PresencePLUS Pro™ Solution Kits

Solution Kits include camera, controller, interconnect cable, lens, light, PC interface cable, CD ROM and Quickstart Guide. Partial listing of kits below; see Model Key to order other kits.

Model Number	Part Number	Interconnect Cable, Camera to Controller	Lens	Light	PC Interface Cable, Controller to PC
PPK0608BE	69650	2 m* (6.5')	8 mm	Backlight	Cat5e 2 m (6.5') Crossover RJ45 Ethernet
PPK0612BE	56384		12 mm		
PPK0616BE	61251		16 mm		
PPK0608AE	69658	2 m* (6.5')	8 mm	Area Light	Cat5e 2 m (6.5') Crossover RJ45 Ethernet
PPK0612AE	69662		12 mm		
PPK0616AE	69666		16 mm		
PPK0608RE	69670	2 m* (6.5')	8 mm	Ringlight	Cat5e 2 m (6.5') Crossover RJ45 Ethernet
PPK0612RE	69674		12 mm		
PPK0616RE	69678		16 mm		

*For 7 m (23') cable, change fourth and fifth numbers in Model Number from "06" to "23"; see below.

Solution Kit Model Key

Camera and Controller			Interconnect Cable Length		Lens		Light	Controller to PC Interface
P	P	K	0	6	0	8	A	E

Cable Length
06 = 2 meters
23 = 7 meters

Lens
08 = LCF08 (Lens 8 mm)
12 = LCF12 (Lens 12 mm)
16 = LCF16 (Lens 16 mm)

Lights
A = LEDRA80X80W (Area Light, 80 mm x 80 mm)
B = LEDRB70X70W (Backlight, 70 mm x 70 mm)
R = LEDRR80X80W (Ringlight, 80 mm x 80 mm)

Interface
S = Serial DB9P06 Cordset 2 m (6.5'), DB9 Male to DB9 Female
E = Ethernet STPX07 Cordset Cat5e Crossover Shielded RJ45 2.1 m (7')

Basic Sensor Kit, Controller and Camera

Model Number	Part Number	Description
PPK06	69657	Kit: Camera, Controller, 2 m (6.5') Interconnect Cable, CD ROM and Quickstart Guide
PPK23	69651	Kit: Camera, Controller, 7 m (23') Interconnect Cable, CD ROM and Quickstart Guide
PPCTL	62937	Controller
PPCAM	62568	Camera

Standard Lenses

Model Number	Part Number	Description
LCF04	68884	4 mm Lens
LCF08	57298	8 mm Lens with Focus Locking
LCF12	57299	12 mm Lens with Focus Locking
LCF16	56522	16 mm Lens with Focus Locking
LCF25R	68885	25 mm Lens
LCF25LR	68886	25 mm Lens with Focus Locking
LCF50L1R	68887	50 mm Lens with Focus Locking
LCF50L2R	68888	50 mm Lens with Focus Locking, Metal Housing
LCF75LR	70545	75 mm Lens with Focus Locking, Metal Housing
LEK	69052	C-mount Lens Extension Kit

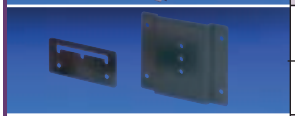
High-Performance Lenses

Model Number	Part Number	Description
LCF06LT	70031	6.5 mm Lens with Focus Locking
LCF08LT	70032	8 mm Lens with Focus Locking
LCF12LT	70033	12 mm Lens with Focus Locking
LCF16LT	70034	16 mm Lens with Focus Locking
LCF25LT	70035	25 mm Lens with Focus Locking
LCF50LT	70036	50 mm Lens with Focus Locking
LCF75LT	70546	75 mm Lens with Focus Locking
LEK	69052	C-mount Lens Extension Kit
FLTUV	02987	UV Lens Filter, Clear Glass*

*Fits 8 mm-75 mm High-Performance Lenses.

*Presence*PLUS *Pro*™ Lighting & Accessories

*Presence*PLUS *Pro*™ Basic Lights

	Type	Model Number	Part Number	Description
	Direct Ring	LEDRR80X80W	70015	24V dc Bright Red LED Ringlight (80 mm x 80 mm)
	Direct Ring	LEDIR80W80W	02779	24V dc Infrared LED Ringlight
	Direct Ring	HFFW5100	57388	110V ac Fluorescent Ringlight
	Direct Ring	HFFW5100A220	63237	220V ac Fluorescent Ringlight
	Direct Ring	HFFBB	63238	110V ac UV Fluorescent Ringlight
	Back	LEDRB70X70W	69904	24V dc Evenly Diffused LED Backlight (70 mm x 70 mm)
	Area	LEDRA80X80W	69905	24V dc Bright LED Area Light (80 mm x 80 mm)
	Area	LEDIA80X80W	02902	24V dc Infrared LED Area light
	Accessory	RFLW5100	59391	Replacement Bulb—Fluorescent Ring Light
	Accessory	RFLBB	63669	Replacement Bulb—UV Fluorescent Ring Light
	Accessory	SMBACM	63040	Bracket—Column-Mounting for Lights**
	Accessory	SMBABM	63041	Bracket—Base-Mounting for Lights**
	Accessory	FLTI	69530	IR filter kit
	Accessory	FLTR	69627	Red filter kit

**Used with LEDRA80X80W, LEDIA80X80W and LEDRB70X70W

*Presence*PLUS *Pro*™ Specialty Lights

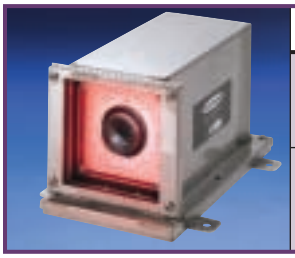
	Type	Description
	On-axis Lighting	Diffuse, uniform illumination for flat reflective surfaces; light rays reflect off a beam splitter to the target at nearly 90°. Reflective surfaces perpendicular to the camera appear illuminated, while surfaces at an angle to the camera appear dark. Non-reflective surfaces absorb light and appear dark.
	Highly Diffused Lighting	Domed indirect LED lights plus a combination of dome and LED on-axis LED lights for critical applications involving highly specular surfaces where extraneous reflections or "seams" in the field of view could cause the *Presence*PLUS to see defects where none exist.
	Indirect Lighting	Low-angle or dark-field illumination enhances the contrast of surface features such as laser embossed or engraved marks or surface defects.

PresencePLUS Pro™ Sensor Components

Monitor

Model Number	Part Number	Description
PPM9	68366	9" Black and White NTSC Video Monitor

Enclosures



Model Number	Part Number	Description
PPE4-P	02695	NEMA 4 stainless steel camera enclosure polycarbonate window
PPE4-G	02803	NEMA 4 stainless steel camera enclosure glass window

Brackets

Model Number	Part Number	Description
SMBPPU	69380	Mounting Bracket Assembly, Camera U Bracket
SMBPPLU	70549	Mounting Bracket Assembly, Camera Long U Bracket
SMBPPRA	69381	Mounting Bracket Assembly, Camera Right Angle
SMBPPDH	66813	DIN Rail Mounting Bracket
SMBPPDE	02767	Narrow DIN Rail Mounting Bracket

Cables

Model Number	Part Number	Description
PPC06	62409	Cordset 2 m (6.5'), Camera to Controller
PPC23	62410	Cordset 7 m (23'), Camera to Controller
DB9P06	67455	Cordset 2 m (6.5'), DB9 Male to DB9 Female for Serial Communication
DB9P15	67456	Cordset 5 m (15'), DB9 Male to DB9 Female for Serial Communication
DB9P30	67457	Cordset 9 m (30'), DB9 Male to DB9 Female for Serial Communication
BNC06	67458	Cordset 2 m (6.5'), Coaxial with Male BNC on Both Ends
BNC15	67459	Cordset 5 m (15'), Coaxial with Male BNC on Both Ends
BNC30	67460	Cordset 9 m (30'), Coaxial with Male BNC on Both Ends
STP07	69985	Cordset Cat5e Shielded RJ45 2.1 m (7') for Ethernet Communications
STP25	69986	Cordset Cat5e Shielded RJ45 7.6 m (25') for Ethernet Communications
STPX07	69987	Cordset Cat5e Crossover Shielded RJ45 2.1 m (7') for Ethernet Communications
STPX25	69988	Cordset Cat5e Crossover Shielded RJ45 7.6 m (25') for Ethernet Communications

PresencePLUS Pro™ Specifications & Dimensions

PresencePLUS Pro™ Controller PPCTL

Construction: Steel with black zinc plating.

Dimensions: 158 x 127 x 30.9 mm (6.22" x 5.0" x 1.22").

Weight: Approx. 0.55 kg (1.2 lbs).

Environmental Rating: IEC IP20; NEMA 1.

Operating Temperature: 0° to +50° C (+32° to +122° F).

Maximum Relative Humidity: 90%, non-condensing.

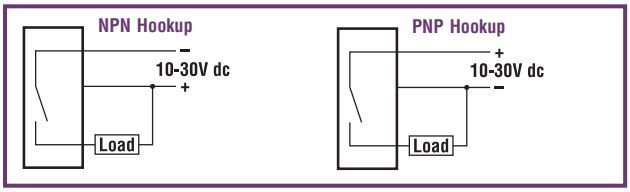
Display Options: PC and NTSC video (9 m [30'] max. cable length).

Discrete I/O: 1 Trigger IN (pin 3).
1 Strobe OUT (pin 4).
6 Programmable I/O (pins 9 - 14).
1 Product Change (pin 15).
4 Product Select (pins 16 - 19).

Input Specifications: NPN: ON, <3V; OFF-State Voltage, >10V at 4 mA max.
PNP: ON, >(+V -2)V at 1 mA max; OFF-State Voltage, <3V at 6 mA max.

Output Configuration: NPN (sinking) or PNP (sourcing) software selectable.

Output Rating: 150 mA (each).
ON-State Saturation Voltage: <1V at 50 mA max. NPN; <2V at 50 mA max. PNP.
OFF-State Leakage Current: <100 µA NPN or PNP.



Communication: 1 RJ-45 Ethernet port, 1 RS232 DB-9 port and
1 RS232 port on terminal block

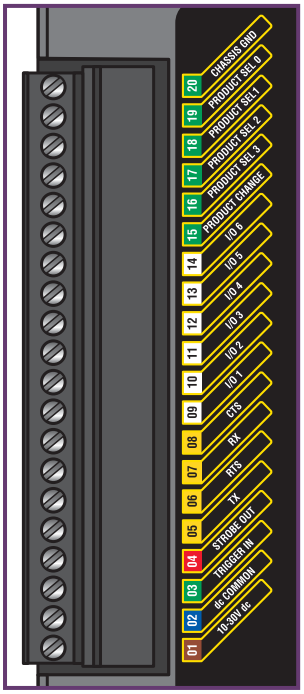
Memory: Stores up to 12 inspection files (jobs).

Power: Voltage: 10-30V dc. Current: 1.5 amps max. (exclusive of load).

Supply Protection Circuitry: Protected against reverse polarity and transient voltages.

Indicators: 6 LEDs: Trigger, Ready, Power, Pass, Fail, Error,
Ethernet Connection, Ethernet Data Transfer.

Controller Terminal Block

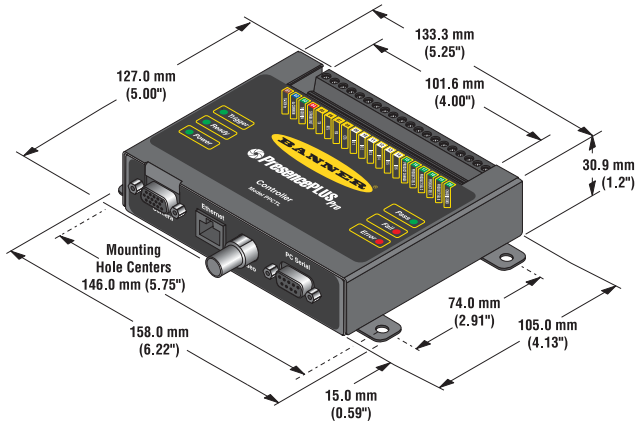


Pluggable Terminal Block Pin-Out Diagram

Number	Pin Function
20	Chassis ground
19	Product Select 0
18	Product Select 1
17	Product Select 2
16	Product Select 3
15	Product Change
14	Programmable I/O 6
13	Programmable I/O 5
12	Programmable I/O 4
11	Programmable I/O 3
10	Programmable I/O 2
09	Programmable I/O 1
08	CTS (Clear To Send)*
07	RX (Receive Data)*
06	RTS (Request To Send)*
05	TX (Transmit Data)*
04	Strobe Out
03	Trigger In
02	dc Common
01	10-30V dc

**Future function.Contact factory for availability.*

PresencePLUS Pro™ Controller Dimensions



PresencePLUS Pro™ Camera PPCAM

Construction: Black anodized aluminum.

Dimensions: 32 x 30 x 78.2 mm (1.26" x 1.18" x 3.08").

Weight: Approx. 0.09 kg (0.2 lbs).

Environmental Rating: IEC IP20; NEMA 1.

Operating Temperature: 0° to +50° C (+32° to +122° F).

Maximum Relative Humidity: 90%, non-condensing.

Imager: 4.8 x 3.6 mm, 6 mm diagonal (1/3" CCD).

Acquisition: Frames per second: 30 max.

Exposure Time: 0.10 ms to 3600 ms.

Image Size: 307,200 (640 x 480) pixels.

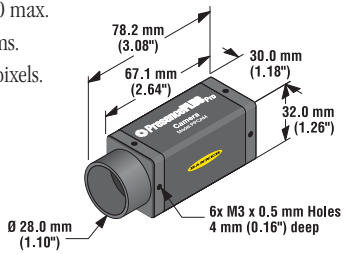
Pixel Size: 7.4 x 7.4 microns.

Levels of Gray Scale: 256.

Interface: LVDS.

Max. Cable Length: 7 m (23').

Lens Mount: Standard C-mount (1"-32 UN).



Monitor PPM9 (optional)

Construction: Metal case.

Dimensions: 220 x 240 x 267 mm (8.66" x 9.45" x 10.51").

Weight: Approx. 6 kg (13.2 lbs).

Operating Temperature: -10° to +55° C (+14° to +130° F).

Maximum Relative Humidity: 95%, non-condensing.

System: NTSC compatible.

Picture Tube: 9" measured diagonally.

Horizontal Resolution: >1000 TV lines (center), >800 TV lines (corners).

Power Requirement: 100~240V ac, 50/60 Hz.

Power Consumption: 0.5A.

Certifications: UL Listed TV/Video Product 8K37, E133441. CE certified.

Controls/Connectors: Horizontal Hold (rotary knob), Vertical Hold (rotary knob), Brightness (rotary knob), Contrast (rotary knob), Video IN-OUT (BNC), Impedance High/Low Switch (75 Ohms).

Product Information

Literature & Resources

www.bannerengineering.com

Applications & Tutorials

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