Checker Vision Sensors

Product Guide
Looking for the easiest, most affordable way to error-proof your manufacturing process?

The original Checker® vision sensor defined the category, taking the best attributes of photoelectric sensors and adding so much more for manufacturers and machine builders. Today, Checker has a complete product family—spanning from lower-resolution, extremely fast sensors to high-resolution models.

What Checker Is
The Checker vision sensor is an award-winning, all-in-one vision sensor with built-in camera, processor, lighting, optics, and I/O capable of detecting and inspecting up to 6,000 parts per minute—all in an industrial IP67 enclosure small enough to fit into the tightest of spaces.

How Checker Works
Checker detects a part by finding an actual part feature, such as the apple graphic on top of a juice box. This provides extremely reliable part detection, unattainable with photoelectric sensors. The optional SensorView® 2 display lets users see exactly what’s being inspected, as well as production statistics, right on the factory floor with no PC required!

Checker Advantages

**Inspects features that other sensors cannot.**
Because Checker understands what it sees, it can inspect features that other sensors can’t, such as a code printed on a label.

**Overcomes varying part positions.**
Parts on a line typically vary in position, and Checker tracks all of them without requiring precise part handling.

**Inspects multiple part features simultaneously.**
There’s no limit to the number of part features you can inspect with a single Checker!
The ROI of Vision Sensors

Wouldn’t it be great if you could use the same sensor for all your product verification tasks? The Checker product family has the ability to be used for presence, measurement and position applications. Checker can perform multiple “checks” on each product you manufacture. And now that Cognex offers a full range of vision sensors, including Ethernet connectivity, you have the opportunity to choose the right Checker for your application.

Whether it’s price, resolution, or speed that is important to you, Cognex offers a sensor to fit your needs.

**Checker 4G Series**
- Easy setup through your PC
- Patented part detection technology
- Solves both presence and measurement applications
- High Speed and High Resolution models available
- Unlimited Image storage
- Remote setup and display
- PLC Communication with Ethernet
- Logic for custom outputs
- Up to 32 job changes
- Up to 4 discrete outputs

**Model Highlights**
Checker 4G7 delivers 752 x 480 inspection with Ethernet support for industrial protocols and high-intensity white LED illumination for detecting and inspecting small parts and part features at up to 800 parts per minute. It’s also available with an integrated color lighting option.

Checker 4G7X is the most comprehensive vision sensor and allows production managers to check for the presence, size and position of features simultaneously on a single part.

Checker 4G1 is the fastest model and provides high-speed inspection for fast moving lines up to 6,000 parts per minute.

Checker 4G7C provides color software tool provides intelligent selection of the desired color to be verified with a single click. Capable of inspection speeds of up to 800 parts per minute, the Checker 4G7C also incorporates Ethernet support with industrial protocols.

**A partial list of the benefits that a vision sensor brings to a manufacturing operation include:**
- Reducing scrap
- Simplifying the overall system design
- Eliminating the need for costly fixturing
- Reducing downtime and maintenance
- Displaying and recording images
- Eliminating PLC programming
- Providing easy setup and maintenance by factory personnel
- 100% parts-inspection initiative

**CASE STUDY**
Checker Helps Automate High-Speed Loading of Transparent Cartons

A beverage manufacturer uses transparent cartons to package its bottled drinks so that their distinctive branded labels are visible to consumers. The need to orient the bottles so that the right part of the label is visible makes automated packaging a challenge. Recently, this producer became the first to successfully automate high-speed carton loading with the use of a bucket autoload cartoner, using Cognex Checker® vision sensors.

AFA Nordale, a leading producer of cartoner machines, evaluated several sensors from leading companies but each seemed to have problems with one or more label types. “For example, one sensor worked with the red labels but not with the black or blue labels,” said Sergiu Dinescu, from Nordale. “Another sensor worked with the red and blue labels but not the black. Then we tried the Cognex Checker and found that it was able to read all the labels without difficulty.”
Reliable Error-Proofing for All Industries

**Verifying component thickness**
Automotive products

- Determines metal part thickness after machining
- Outperforms photoelectric sensors
- No need for constant adjustment
- No need for precise fixturing
- Improves quality
- Reduces manufacturing costs

**Detecting missing bottles**
Consumer products

- Confirms required 12 bottles per case
- Replaces 13 photoelectric sensors
- No need for precise fixturing
- Improves quality & yield
- Increases line speed

**Checking component orientation**
Electronics products

- Checks SMT component orientation
- Outperforms photoelectric sensors
- Reliable readings even with variable positions and sizes
- Reduces downtime by eliminating position adjustments & minimizing resets
- Maintains high line speeds

**Detecting missing caps and lot codes**
Beverage applications

- Confirms caps & codes on milk jugs
- Outperforms photoelectric sensors
- Reliable readings even with variable jug positions
- Reduces scrap & maintenance costs
- Increases line speed by elimination of fixturing
No Matter What Industry, Checker Delivers

Verifying threads in hole
Automotive applications

- Detects presence of threads in engine block
- Outperforms eddy current probes
- Consistent accuracy vs. photoeyes
- Reliable, repeatable results
- No need for precise fixturing
- Lowers cost of ownership

Matching device product number
Medical products

- Inspects for correct product number on medical devices
- Eliminates manual inspection
- Improves quality
- Drastically cuts rework costs
- Decreases errors during faster line changeovers

Verifying seal and cap presence
Consumer products

- Detects caps & safety seals on bottles
- Outperforms photoelectric sensors
- No need for precise fixturing
- Minimizes setup & changeover
- Improves output & decreases scrap
- Reduces downtime by elimination of sensor adjustments

Verifying label presence
Beverage applications

- Checks presence of three labels on beer bottle on high-speed (1100 bpm) line
- Replaces unsatisfactory photo sensor
- Eliminates constant readjustment
- Drastically cuts changeover time
- Improves quality
- Reduces manufacturing cost

• Thread Present
• Thread Absent
• Safety Seal Present
• Safety Seal Missing

• Correct Product Number
• Wrong Product Number
• Label Present
• Label Missing
Reliable Inspection Results for Manufacturers

Verifying part orientation
Automotive products
- Detects incorrect orientation of automotive parts in feeder bowl
- Outperforms photoelectric sensors
- Much less expensive than traditional vision system
- Allows 100% correct orientation
- Dramatically reduces scrap & rework

Correct Orientation  Wrong Orientation

Inspecting seal and bushing in battery
Consumer products
- Confirms presence and positioning of seals & bushings on batteries
- Reliable readings even with variable battery positions
- Eliminates inspection part fixturing
- Increases quality & decreases return rates
- Enables faster line speeds

Good Part  Missing Bushing

Verifying pill presence
Medical products
- Detects presence of pills in bottle
- Outperforms photoelectric sensors
- Reliable readings even with variable bottle positions
- Maintains high line speed without fixturing
- Minimizes inspection errors
- Improves quality

Pill Bottle Full  Pill Bottle Empty

Verifying registration
Consumer products
- Pattern-based registration
- Eliminates the need for registration marks
- Eliminates material waste
- Flexible working distance
- For high-speed production lines... up to 6 m/sec
- Better than 100 μsec output repeatability

Mark Detected
Verifying device assembly
Medical products

- Identifies dowel pins & plastic cover
- Replaces error-prone manual inspection
- Increases product quality
- Drastically reduces rework costs
- Increases line speed

Verifying correct bulb
Consumer products

- Checks for correct-sized light bulb
- Replaces photoelectric sensors
- Allows fewer & smoother changeovers
- Improves quality
- Reduces scrap costs
- Increases yields
- Minimizes customer complaints

Detecting missing box insert
Food products

- Confirms flavor pack presence
- Outperforms photoelectric sensors
- Reliable readings even with translucent insert & variable positions
- Cuts rework costs
- Reduces downtime by elimination of sensor adjustments

Verifying slug ejection
Consumer products

- Detects plastic slug presence in bottle
- Eliminates multiple photoelectric sensors
- No expensive fixturing
- Reliable readings even with variable bottle positions
- Maintains line speed
- Handles colors without adjusting

All Parts Present
All Parts Missing

Correct Size in Package
Wrong Size in Package

Insert Present
Insert Missing

Slug Ejected
Slug Present
Checker is an all-in-one vision sensor with built-in lighting and a variable working distance, capable of inspecting over 6000 parts per minute—all in a package small enough to fit into tight spaces.

Checker 4G with Ethernet easily integrates into your factory network. From one PC, you can remotely setup and monitor Checker(s) on your network, communicate to your PLC and FTP transfer an unlimited amount of images for storage and/or review.
Cognex has expanded the Checker product family to ensure that we offer a sensor for every application. Whether it’s resolution, price, or speed that is the most important attribute to you, Cognex offers it all.

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<td>752 x 480</td>
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Checker is simple to set up and operate with One-Click Setup™. Even a first-time user can have it up and running in minutes—without training and with no PC required. Simply select the built-in part finding sensor… place inspection sensors on the features to inspect… then check it with Checker!

**Checker**

- **SensorView 2:** Fully configure, test and monitor Checker 4G vision sensors—no PC required!
  - Large 8.9" (225mm) smart display
  - Built-in Ethernet based communication
  - Same user interface as Checker PC software

**Checker’s unique inspection sensors provide the most reliable way to inspect your part:**

**PRESENCE**
- **Brightness sensors** look for dark or light areas on the part.
- **Contrast sensors** look for areas on the part that contain both bright and dark areas: date codes, threads, and many other part features.
- **Edge-based and area pattern sensors** understand what your part features look like and let you know when the feature appears.
- **Edge presence sensors** verify the presence of edge features.
- **Color Presence Sensors** provide intelligent selection of the desired colors to be verified.

**MEASUREMENT**
- **Height sensors** measure the height of a part, component, or feature.
- **Width sensors** measure the width of a part, component, or feature.
- **Diameter sensors** measure the diameter of a part, component, or feature.

**POSITION**
- **Edge position sensors** verify the correct location of edges up to 20 degrees rotation.
- **Object position sensors** verify the correct location of objects (blobs).
- **Pattern position sensors** verify the correct location of patterns up to 360 degree rotation.

**The Checker part finding sensor has three important advantages:**

1. Detects a part by locating a feature on the part, not just an edge.
2. Tracks parts in varying positions along the production line, overcoming imprecise part positioning.
3. Does not require additional sensors to determine if a part is present.
### SensorView 2 Specifications

#### Mechanical
- **Dimensions:** 8.9in (225mm) square
- **Diagonal Screen Size:**
  - 8.9in (225mm)
  - 10.4in (265mm)
- **Weight:**
  - 468g (16.51oz)

#### Power
- **Operating voltage:** +24VDC (22-26VDC)
- **Power consumption:** +5V @ 1.3A

#### Environmental
- **Operating temperature:**
  - 0°C to 50°C (32°F to 122°F)
- **Operating humidity:**
  - 0 to 90%, non-condensing
- **Operating altitude:**
  - 4000m maximum
- **Shock:** 80Gs x 5ms (IEC 68-2-2)
- **Vibration:**
  - EN61373 including IEC 60068-2-6, 60068-2-64 6.4, and 60068-2-27
- **Altitude:** 4000m
- **Protection:** IP65

#### Certifications
- CE, cCSA us, FCC, RoHS, VCCI

#### SensorView 2 Part Numbers
- **Part Number:** SV-890-000
- **Description:** SensorView
- **Part Number:** SV-CF-000
- **Description:** Compact Flash Card

### Checker Vision Sensors Specifications

#### Lighting & Filter Options
- 4G1, 4G7, 4G7S, 4G7X:
  - Integrated red, blue, green, and infrared LEDs
  - Integrated bright white LEDs

#### External Trigger Input
- **Input ON:** > 10VDC (> 6mA)
- **Input OFF:** < 2VDC (< 1.5mA)

#### Outputs
- **Output:** Solid state switch
- **Rating:** 100mA, 24VDC
- **Max Voltage Drop:** 3.5VDC @ 100mA
- **Max Load:** 100mA

#### Encoder Inputs
- **Differential:** A+/B+: 5-24V (50 kHz max)
  - A-/B-: Inverted (A+/B+)
- **Single Ended:**
  - A+/B+: 5-24V (50 kHz max)
  - A-/B-: VDC = ½ (A+/B+)

#### Job Control Inputs
- **Jobs supported:** 32
- **Input ON:** > 10VDC (> 6mA)
- **Input OFF:** < 2VDC (< 1.5mA)

#### Power
- **Voltage:** +24VDC (22-26VDC)
- **Current:** 250mA max

#### Environmental
- **Operating temperature:**
  - 0°C to 50°C (32°F to 122°F)
- **Operating humidity:**
  - 0 to 90%, non-condensing
- **Storage temperature:**
  - -10°C — 60°C (-14°F — 140°F)
- **Storage humidity:**
  - 0 to 90%, non-condensing
- **Shock:** 80G x 5ms (IEC 68-2-2)
- **Vibration:**
  - EN61373 including IEC 60068-2-6, 60068-2-64 6.4, and 60068-2-27
- **Altitude:** 4000m
- **Protection:** IP65

#### Certifications
- CE, CSA us, FCC, RoHS, VCCI

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### Notes
- A complete SensorView 2 consists of these two part numbers.
SensorView 2 Smart Display
The SensorView 2 display has a large 8.9 inch (225mm) touch screen, making it easy to use and view on the factory floor. With built-in Ethernet based communication, SensorView 2 can be installed anywhere Checkers are connected to a network. The SensorView software has the same familiar user interface as the standard Checker PC software, so no additional training is required to use it.

Adjustable Mounting Bracket
With metric, imperial, and through-hole mounting. It provides an easy way to adjust the mounting angle of Checker for optimal lighting.

Cables
Power & I/O and Ethernet are available in straight and right angle.

Lenses
The Checker lens kit includes 3.6, 8, 16, and 25mm lenses.

Colored Filters
Bandpass filters for both visible and IR wavelengths (470, 525, 590, 635 and 850nm).

Color Lighting and Polarization Options
Optional lighting accessories include red, blue, green, infrared and bright white LED lights which can be directly integrated into Checker. A polarization window is available for specular reflection or “glare” reduction.