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Checker Vision Sensors

Product Guide

COGNEX

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The Smart Vision Sensor

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 the juice boxes. This provides extremely reliable part detection, unattainable with photoelectric sensors. The optional SensorView display lets users see exactly what's being inspected, as well as production statistics.

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.

Inspects multiple part features simultaneously.

There's no limit to the number of part features you can inspect with a single Checker!





Overcomes varying part positions.

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



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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/Absence applications and/or for Measurement 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 3G Series

- No PC required
- Solves both presence and measurement applications
- Configurable as either presence or measurement sensor
- Standard and high-resolution sensors available
- Patented part detection technology



Checker 4G

- 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



A partial list of the benefits that a vision sensor brings to a manufacturing operation include:

- Reducing scrap
- Reducing downtime and maintenance
- Providing easy setup and maintenance by factory personnel
- Simplifying the overall system design
- Displaying and recording images
- Eliminating the need for costly fixturing
- Eliminating PLC programming
- 100% parts-inspection initiative



Because Checker vision sensors are so simple to set up and easy to install, they offer a very cost-effective solution for inspections where traditional sensors are not reliable and a full-blown vision system is too expensive.

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."

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Reliable Error-Proofing for All Industries

Verifying component thickness

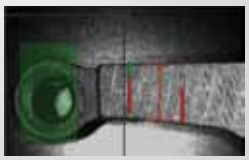
Automotive products



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



Correct Thickness



Incorrect Thickness

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



Case Full



Bottle Missing

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



Capacitor Oriented Correctly



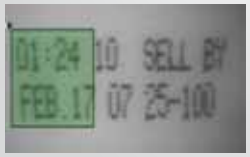
Capacitor Oriented Backwards

Detecting missing caps and lot codes

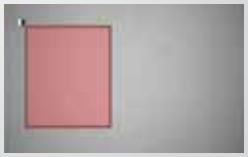
Beverage applications



- 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



Date Code Present



Date Code Missing

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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



Thread Present



Thread Absent

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



Safety Seal Present



Safety Seal Missing

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



Correct Product Number



Wrong Product Number

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



Label Present



Label Missing

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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



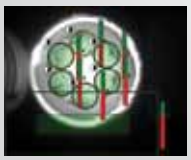
Wrong Orientation

Verifying pill presence

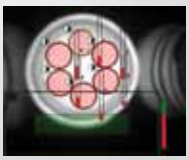
Medical products



- 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



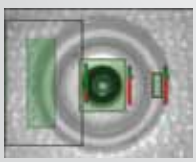
Pill Bottle Empty

Inspecting seal and bushing in battery

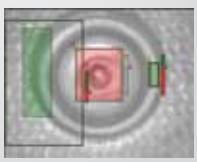
Consumer products



- 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 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

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and Machine Builders.

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



All Parts Present



All Parts Missing

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



Correct Size in Package



Wrong Size in Package

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



Insert Present



Insert Missing

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



Slug Ejected



Slug Present

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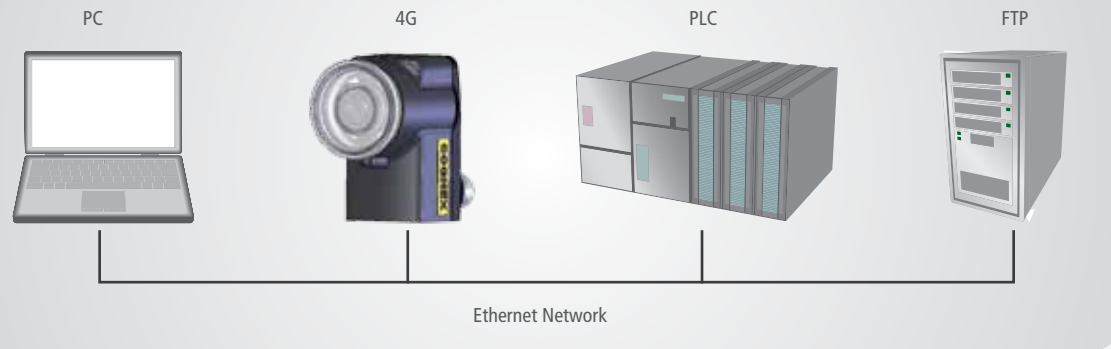
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Powerful Things Come in Small Packages

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.



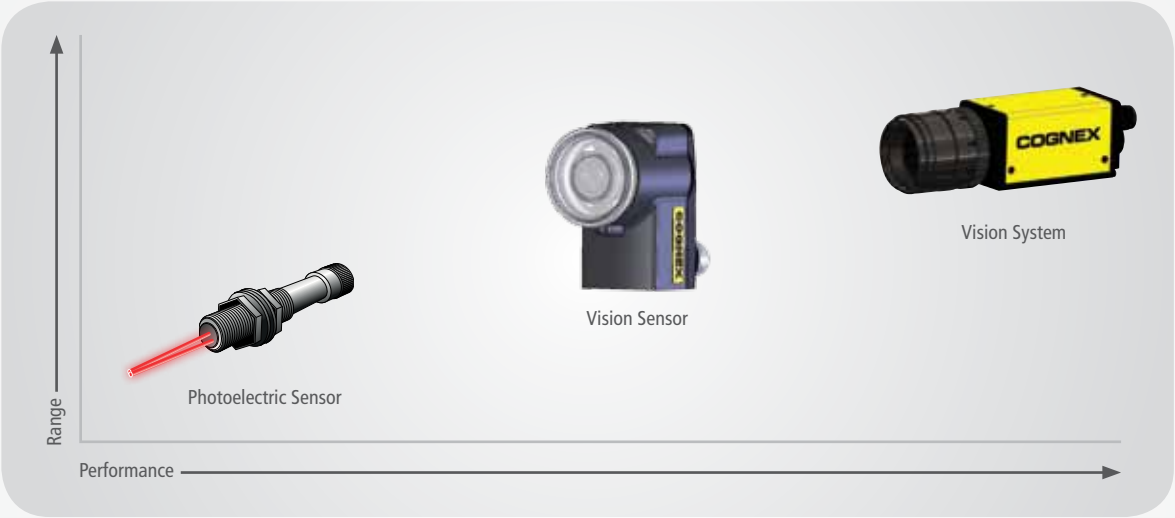
Checker 4G with Ethernet easily integrates into your factory network. From one PC, you can remotely setup and monitor Checker(s) on your network, communicate to your PLC and FTP transfer an unlimited amount of images for storage and/or review.



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A Wide Range of Checker

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.



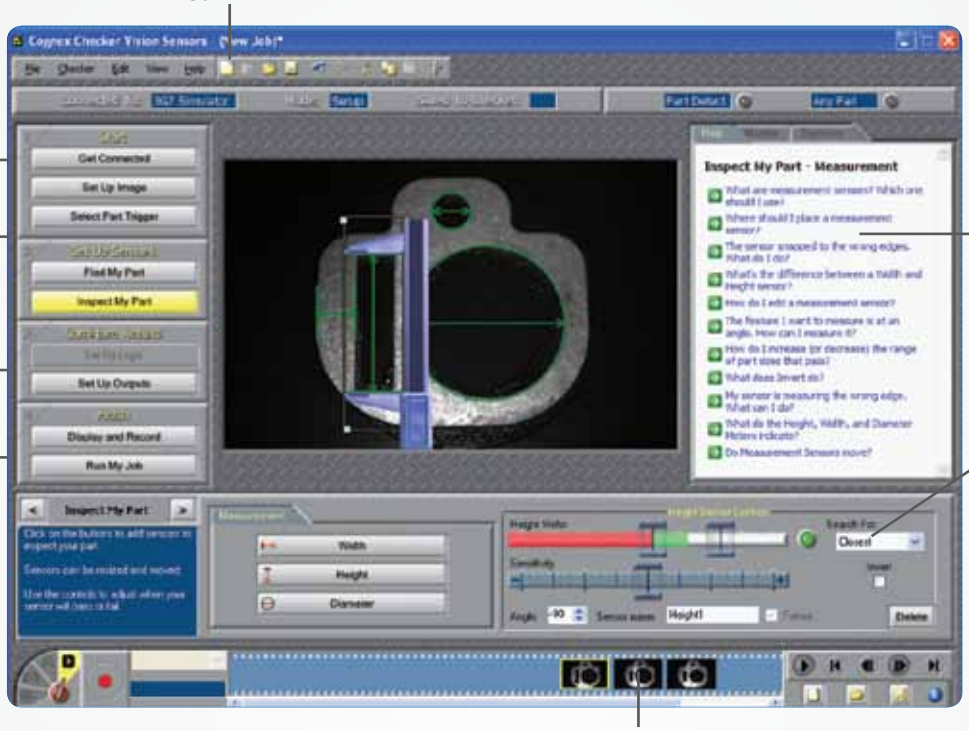
Model Features	3G1	3G7	4G1	4G7
Part Finding Sensor	✔	✔	✔	✔
Inspection Sensors: Presence	✔	✔	✔	✔
Inspection Sensors: Measurement	✔	✔	✔	✔
Internal Triggering	✔	✔	✔	✔
Pattern Retrain	✔	✔	✔	✔
Job Change	8	8	32	32
PC Software Setup	✔	✔	✔	✔
SensorView Setup & Display	✔	✔		
Encoder-Based Part Tracking			✔	✔
Logic for Custom Outputs			✔	✔
Fast Inspection – 800 ppm	✔	✔	✔	✔
Ultrafast Inspection – over 6000 ppm	✔		✔	
Highest Resolution (752 x 480)		✔		✔
PLC Communication – EtherNet/IP with AOP			✔	✔
PLC communication - PROFINET			✔	✔
Store images to FTP			✔	✔

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One-Click Setup

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. Simply select the built-in part finding sensor… place inspection sensors on the features to inspect… then check it with Checker!

The **image display** simplifies setup by enabling you to see what the sensor sees.



Four simple steps walk you through setup.

Dynamic help is always available.

Simple sensor controls are pass/fail–no data or parameters to enter.

Play a filmstrip back in slow motion, or review recent part failures. Like a video recorder, Checker actually records video of parts!

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

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.

Pattern sensors understand what your part features look like and let you know when the feature appears.

Width sensors measure the width of a part, component, or feature.

Height sensors measure the height of a part, component, or feature.

Diameter sensors measure the diameter of a part, component, or feature.

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.

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Specifications

CHECKER VISION SENSORS

LIGHTING

3G1	Integrated red, green, and cyan LEDs
3G7, 4G1, 4G7	Integrated bright white LEDs

EXTERNAL TRIGGER INPUT

Input ON	> 10VDC (> 6mA)
Input OFF	< 2VDC (< 1.5mA)
Protection	Opto-isolated, polarity-independent

OUTPUTS

Output	Solid state switch
Rating	100mA, 24VDC
Max voltage drop	3.5VDC @ 100mA
Max load	100mA
Protection	Opto-isolated, protected from short circuit, overcurrent, and reverse polarity

ENCODER INPUTS

Encoder type	300 kHz (max) quadrature encoder. Open collector and differential output.
ON/OFF	50% nominal
Load	50% encoder maximum

JOB CONTROL INPUTS

Jobs supported	8 (3G Series)
	32 (4G Series) minimum pulse width - 1 mSec
Input ON	> 10VDC (> 6mA)
Input OFF	< 2VDC (< 1.5mA)
Protection	Opto-isolated, polarity-independent

POWER

Voltage	+24VDC (22-26VDC)
Current	250mA max

ENVIRONMENTAL

Operating temperature	0° to 50°C (32° to 122°F)
Storage temperature	-30° to 80°C (-22° to 176°F)
Operating humidity	0%-90%, non-condensing
Operating altitude	4000m maximum
Shock	80Gs for 5ms on each axis (per IEC 68-2-2)
Vibration	10Gs (10-500Hz) per IEC 68-2-6
Protection	IP67

MECHANICAL

Dimensions	67mm (2.64in) H x 41mm (1.61in) W x 60mm (2.36in) D
Weight	148g (4.2oz)

MODES OF OPERATION

Internal part trigger, external part trigger, free running

CERTIFICATIONS

3G Series	CE, cCSA us,FCC,RoHS, KCC
4G Series	CE,FCC,RoHS,KCC and BureauVeritas

MINIMUM PC REQUIREMENTS

(Only required for setup)

Operating systems	XP™, Vista™, Microsoft® Windows 7® 32&64 bit
RAM	128 MB RAM
Interface USB (3G Series)	USB 1.1 (2.0 recommended for best performance)
Interface Ethernet (4G Series)	10/100
Screen resolution	1024 x 768 (96 DPI) or 1280 x 1024 (120 DPI) display

CHECKER SENSORS

Model	Part Number
4G1	C4G1-24G-E00
4G7	C4G7-24G-E00
3G1	C3G1-21G-U00
3G7	C3G7-24G-U00

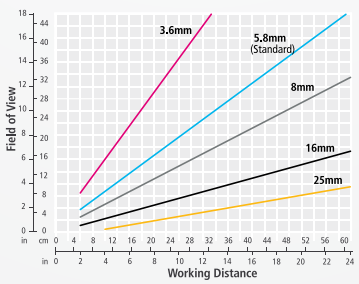
INCLUDED ACCESSORIES

- 5.8mm lens
- Standard USB cable 3G only
- Quick Start Guide
- Allen wrench (for focus lock)
- Checker software CD
- Mounting screws

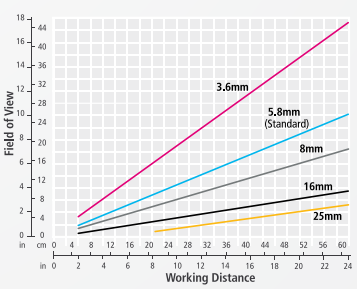
OPTIONAL ACCESSORIES

C3G-CBL-001	Flying lead I/O cable (5m)
CKR-200-CBL-RT-003	Right angle I/O cable (1m)
CCB-84901-100X-XX	Ethernet Cable(s)
CCB-84901-6001-05	Right angle Ethernet Cable (5m)

Field of View for Checker 3G7 and 4G7 Vision Sensors
Curves show the field of view for standard and optional lenses.
Each grid square = 1in (2.54cm)



Field of View for Checker 3G1 and 4G1 Vision Sensors
Curves show the field of view for standard and optional lenses.
Each grid square = 1in (2.54cm)



SENSORVIEW

Handheld programmer models supported	3G Series only
User-selectable languages	English, German, Italian, French, Spanish, Portuguese, Japanese, Chinese (Simplified), Chinese (Traditional), Korean

POWER

Operating voltage	+24VDC (22-26VDC)
Power consumption	275mA @ +24VDC

ENVIRONMENTAL

Operating temperature	0°C to 50°C (32°F to 122°)
Operating humidity	0 to 90%, non-condensing
Storage temperature	-20°C to 80°C (-4°F to 176°F)
Storage humidity	0 to 90%, non-condensing
Shock	80G x 5ms (IEC 68-2-2)
Vibration	10Gs (10-500Hz per IEC 68-2-6
Altitude	4000m
Protection	IP65

CERTIFICATIONS

CE, c **CSA** us, FCC, RoHS

MODELS

Part Number	Description
SV-350-001	SensorView 350 panel-mount display

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Accessories



SensorView Teach Pendant

A compact, rugged, panel-mount display 3G series of vision sensors. More than just a display, SensorView provides production statistics and a user-definable view of the parts that Checker is inspecting. This enables operators to easily monitor their production process, change jobs, or retrain patterns without a PC.



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, Ethernet and USB cables 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).

COGNEX **Companies around the world rely on Cognex vision and ID to optimize quality, drive down costs and control traceability.**

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