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Checker Vision Sensors

Product Guide

COGNEX vision

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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 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.

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.



COGNEX vision

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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, 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



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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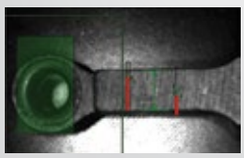
Reliable Error-Proofing for All Industries

Verifying component thickness

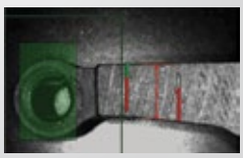
Automotive products



- 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

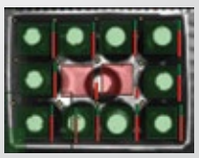
Consumer products



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



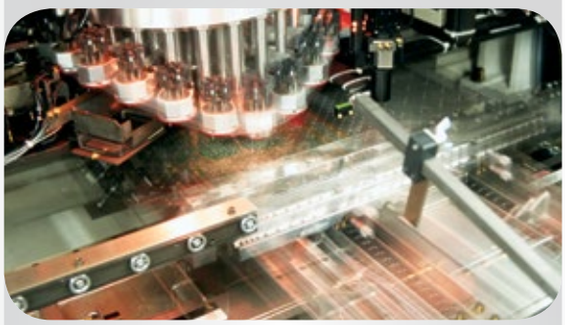
Case Full



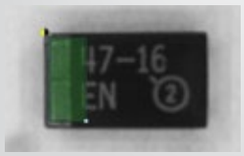
Bottle Missing

Checking component orientation

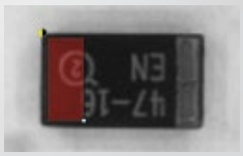
Electronics products



- 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



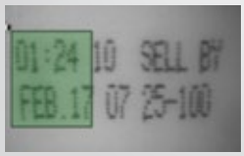
Capacitor Oriented Backwards

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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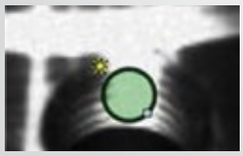
No Matter What Industry, Checker Delivers

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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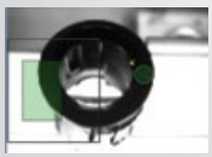
Reliable Inspection Results for Manufacturers

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



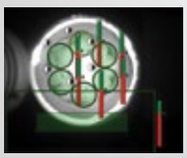
Wrong Orientation

Verifying pill presence

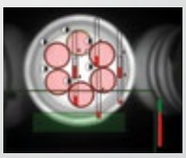
Medical products



- 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



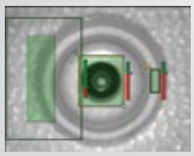
Pill Bottle Empty

Inspecting seal and bushing in battery

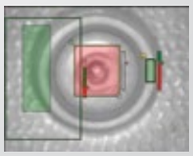
Consumer products



- 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



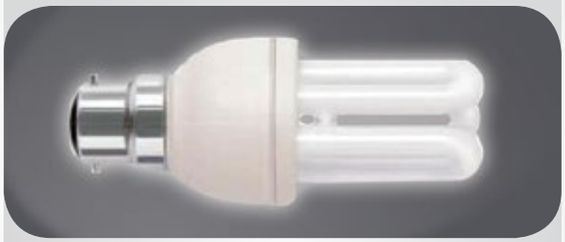
All Parts Present



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



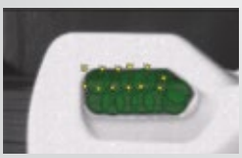
Insert Missing

Verifying slug ejection

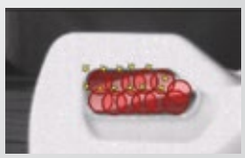
Consumer products



- 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

COGNEX vision

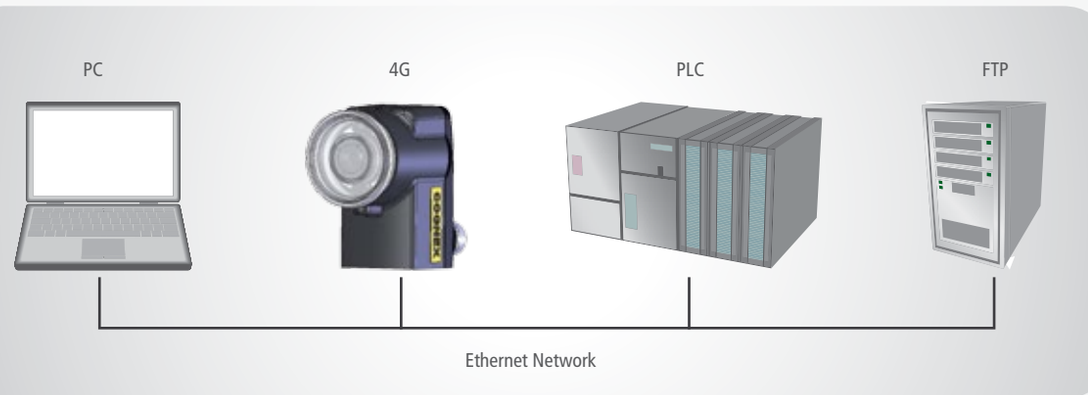
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Powerful Things Come in Small Packages

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.

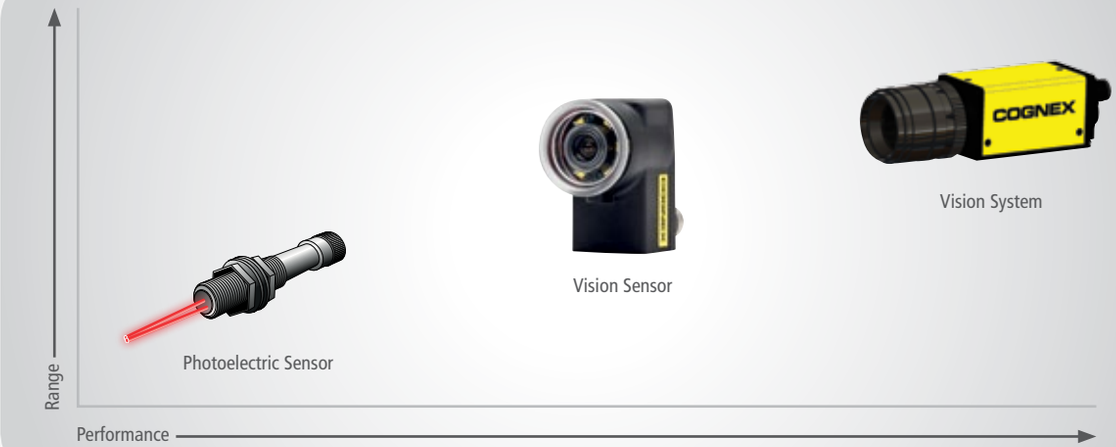


COGNEX vision

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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	4G7C	4G1	4G7	4G7X
Part Finding Sensor	✔	✔	✔	✔
Inspection Sensors: Presence, Measurement or Position		✔	✔	
Inspection Sensors: Presence, Measurement and Position				✔
Inspection Sensors: Color Presence	✔			
Internal Triggering	✔	✔	✔	✔
Pattern Retrain	✔	✔	✔	✔
Job Change	32	32	32	32
PC Software Setup	✔	✔	✔	✔
SensorView Setup & Display	✔	✔	✔	✔
Encoder-Based Part Tracking	✔	✔	✔	✔
Logic for Custom Outputs	✔	✔	✔	✔
Number of Inspection Sensors	No limit	No limit	No limit	No limit
Maximum Inspection Rate	60Hz	400Hz	60Hz	60Hz
Resolution	752 x 480	128 x 101	752 x 480	752 x 480
PLC Communication – EtherNet/IP with AOP	✔	✔	✔	✔
PLC communication - PROFINET	✔	✔	✔	✔
Store images to FTP	✔	✔	✔	✔

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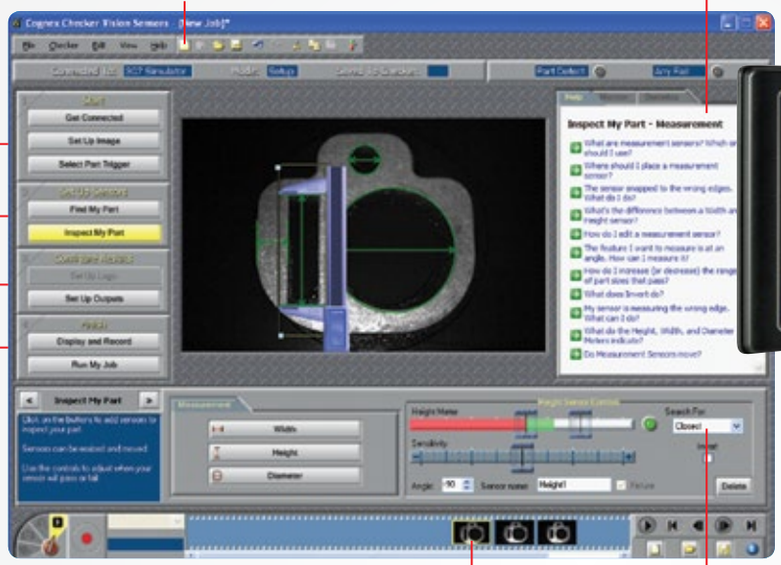
One-Click Setup

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 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!

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

Dynamic help is always available.

Four simple steps walk you through setup.





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

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

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

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.

COGNEX vision

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Specifications

CHECKER 4G VISION SENSORS

LIGHTING & FILTER OPTIONS

4G1, 4G7, 4G7S, 4G7X	Integrated red, blue, green, and infrared LEDs Integrated bright white LEDs Polarization
4G7C	White only

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

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)
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

PLC COMMUNICATION

EIP w/AOP, PROFINET, TCP/IP, UDP/IP

FTP Image

SYSTEM RESOLUTIONS

Full or Half FOV Options

4G7C	752 x 480 or 376 x 240

Binned Resolution Options

4G7/4G7X	752 x 480, 376 x 240, 188 x 120

MECHANICAL

Dimensions	2.64in (67mm) H x 1.61in (41mm) W x 2.72in (69mm) D
Weight	148g (4.2oz)

MODES OF OPERATION

Internal part trigger, external part trigger, free running

CERTIFICATIONS

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 Ethernet (4G Series)	10/100
Screen resolution	1024 x 768 (96 DPI) or 1280 x 1024 (120 DPI) display

CHECKER SENSORS

Model	Part Number
4G7S	C4G7-24S-E00
4G1	C4G1-24G-E00
4G7	C4G7-24G-E00
4G7X	C4G7-24X-E00
4G7C	C4G7C-24C-E00

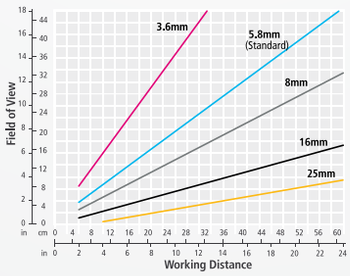
Note:
The 5.8mm lens ships standard with Checker.

OPTIONAL ACCESSORIES

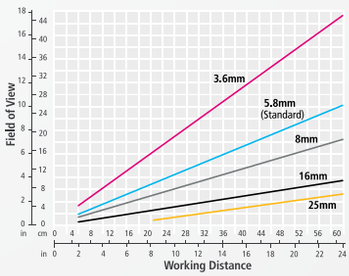
CKR-4G-CBL-001	Flying lead I/O cable (5m)
CKR-200-CBL-RT-003	Right angle I/O cable (1m)
CCB-84901-100X-XX	Ethernet Cable(s)
CCB-84901-6001-05	Right angle Ethernet Cable (5m)
C4G-BAK-000	Basic Accessory Kit
CKR-200-LENSKIT	Lens Kit

Notes:
Basic Accessory Kit includes Quick Start Guide, Checker software CD and mounting screws.
The Lens Kit includes 3.6, 8, 16 and 25mm lenses.

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



SENSORVIEW 2

MECHANICAL

Diagonal screen size	8.9in (225mm)
Dimensions	9.31 x 5.75 x 1.38in (236.6 x 146 x 35mm)
Weight	468g (16.51oz)

USER-SELECTABLE LANGUAGES

English, German, Italian, French, Spanish, Portuguese, Japanese, Chinese (Simplified), Chinese (Traditional), Korean

POWER

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

ENVIRONMENTAL

Operating temperature	0°C to 50°C (32°F to 122°)
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, c **CSA** us, FCC, RoHS, VCCI Vibration

SENSORVIEW 2 PART NUMBERS

Part Number	Description
SV-890-000	SensorView Smart Display
SV-CF-000	Compact Flash Card

Note:
A complete SensorView 2 consists of these two part numbers.

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Accessories



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.



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