COGNEX

DS800 SERIES 3D LASER DISPLACEMENT SENSORS

High-Speed, High-Resolution 3D Vision Sensors

The DS800 Series includes a range of 3D vision sensors, designed to optimize quality and solve challenging tasks. These easy-to-use sensors combine laser triangulation with advanced image formation to create three-dimensional renderings of parts under inspection. From these highly-detailed renderings, 3D features can be measured such as length, width, height, and tilt.

Manufacturers, machine builders, and system integrators across all industries deploy DS800 products to automate inspection, guidance, and measurement applications. Able to work in the harshest factory settings, these innovative 3D vision sensors offer high-performance, cost-effective solutions in a rugged, yet compact form factor.

The versatile DS800 series is comprised of several models:

- DS810
- DS820

Features

- Blue laser technology generates high-quality 3D images, up to 1920 3D points and <0.5 µm vertical resolution
- Off-the-shelf, pre-calibrated hardware allows for easy factory integration
- High-speed 3D image acquisition increases production line speed and maximizes throughput
- Full software suite and access to extensive 3D vision libraries enable rapid application setup
- Low operating temperature reduces power consumption and improves metrology performance
- Industrial, compact housing offers better stability and flexibility for machine and robot integration

Core Technologies

Several core technologies differentiate the DS800 Series in the 3D sensor market. These include integrated optics, calibration, resolution, software integration, size, and reflectivity.

Integrated Optics

Embedded optics and laser illumination eliminate the need for lenses and lighting to be evaluated, tested, and purchased for every application.

Software Integration

A flexible toolset and wide-ranging support of communication protocols ensure compatibility with a variety of third-party vision software.

Resolution

Integration of the latest technology enables more precise measurements, detection of smaller defects, and better automation control than other 3D sensors.

Size

Minimization of every hardware component creates a small, lightweight form factor that can easily fit on any production line.

Calibration

Pre-calibrated hardware delivers precise, repeatable measurements, down to the micrometer range.

Reflectivity

Unique filtering process generates highly accurate images of products with complex surface features, such as glass and specular and highly reflective surfaces.

Proprietary Calibration Technique

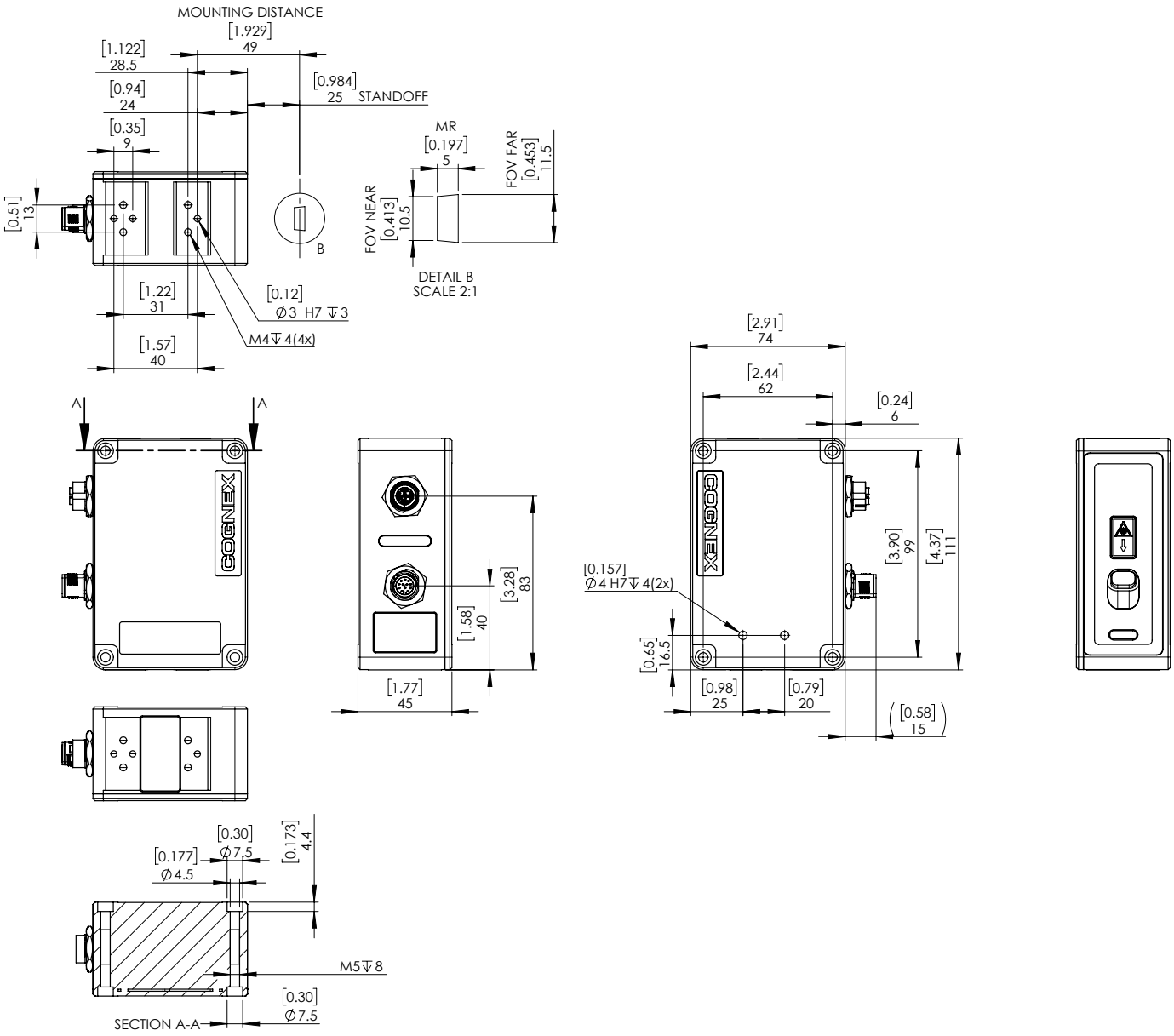
Each sensor unit in the DS800 Series is individually calibrated with a variety of reference points within the field of view and measurement range. Using this unique calibration method provides micron-level accuracy and corrects any kind of distortion and deviation including:

- Perspective distortion
- Lens distortion
- Laser non-linearity
- Manufacturing tolerances

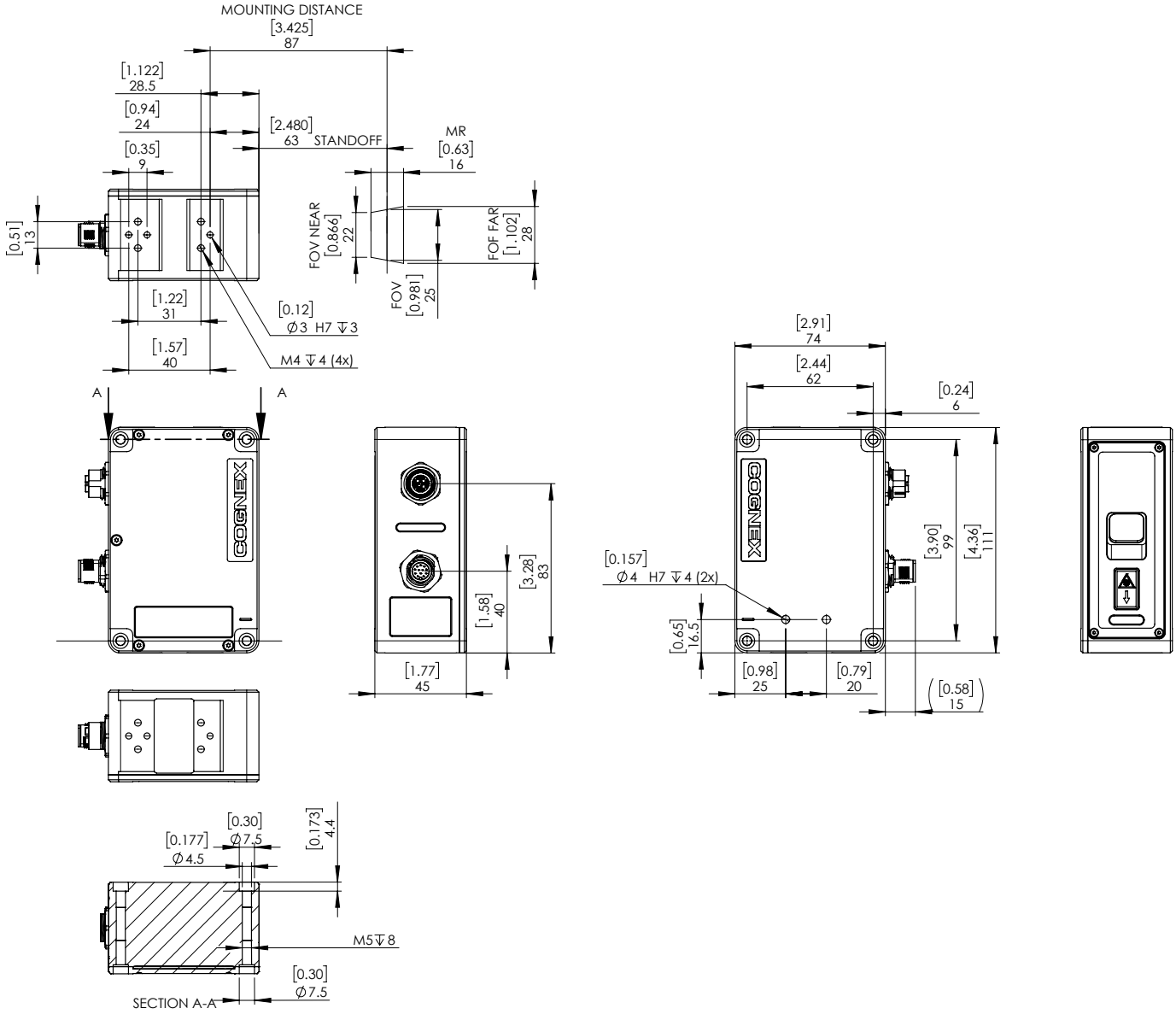
DS800 3D Vision Sensor Models

No matter the model number, DS800 Series vision sensors deliver high-speed, high-resolution 3D imaging for a variety of inspection, guidance, and measurement applications.

DS810



DS820


MOUNTING DISTANCE
[3.425]
87
[1.122]
28.5
[0.94]
24
[0.35]
9
[2.480]
63 STANDOFF
MR
[0.63]
16
[0.51]
13
FOV NEAR
[0.866]
22
FOF FAR
[1.102]
28
FOV
[0.981]
25
[1.22]
31
[1.57]
40
[0.12]
Ø3 H7 ↧3
M4 ↧4 (4x)
A
A
COGNEX
[3.28]
83
[1.58]
40
[1.77]
45
[2.91]
74
[2.44]
62
[0.24]
6
[0.157]
Ø4 H7 ↧4 (2x)
[0.65]
16.5
[3.90]
99
[4.36]
111
[0.98]
25
[0.79]
20
[0.58]
15
[0.30]
Ø7.5
[0.177]
Ø4.5
[0.173]
4.4
M5↧8
[0.30]
Ø7.5
SECTION A-A

Connectors and Display

Ethernet connector; 8-pin female

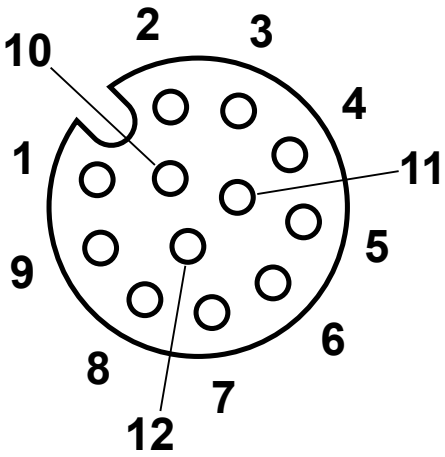
Power LED

Boot status LED | Connection LED

LED reserved for future / internal use

Power-I/O-Encoder connector

Terminal Assignment M12 Connector



Power-I/O-Encoder Cable Pinout Diagram

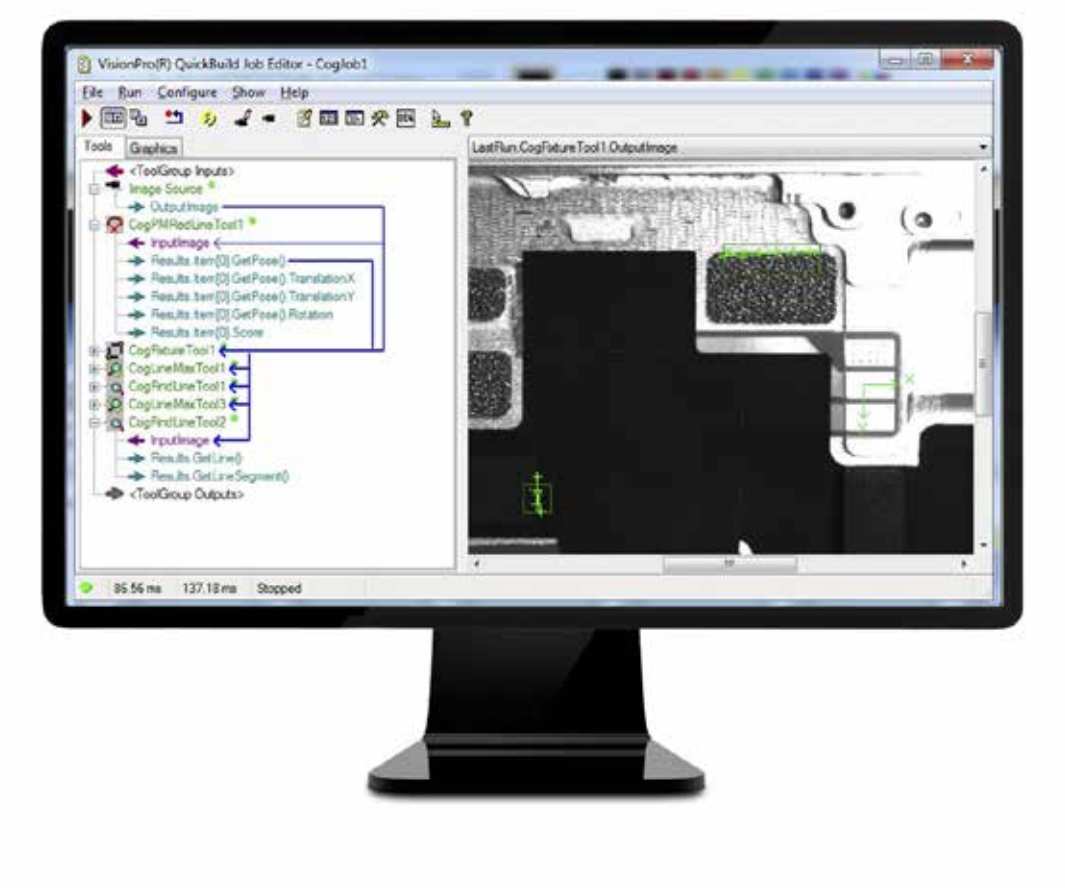
POWER, I/O, ENCODER OPEN-ENDED CABLE WIRING

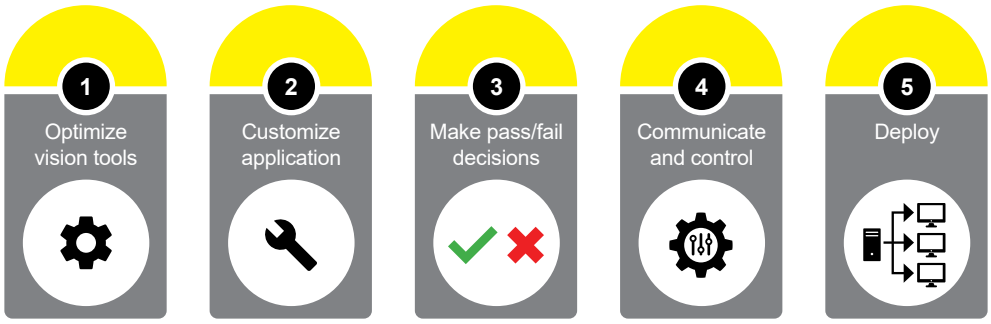
Pin	Function (SmartRay)	Color SmartRay	Color Cognex 185-1231R
1	Ground	Brown-Blue	Yellow
2	VCC (+24V ±15%)	Brown-Red	White-Yellow
3	Input 1	Grey	Brown
4	Output 2	Red	White-Brown
5	Output 1	Orange	Violet
6	Encoder B-	Brown	White-Violet
7	Encoder A+	Green	Red
8	Input 3	Blue	Black
9	Input 4	White-Yellow	Green
10	Input 2	White-Black	Orange
11	Encoder B+	Black	Blue
12	Encoder A-	Yellow	Gray
Shield	Shield	Yellow-Green or thick Black wire	Drain Wire

Software

The DS800 Series runs on Cognex VisionPro® software. VisionPro is a PC-based development environment that enables rapid job configuration through extensive tool prototyping. Using the intuitive graphical interface, developers can visually define and tune their vision applications. Users can also leverage modular tool blocks to easily create and reuse components, simplifying and shortening the setup process. VisionPro provides .NET C# programming options for additional flexibility in building custom applications.

QuickBuild workflow





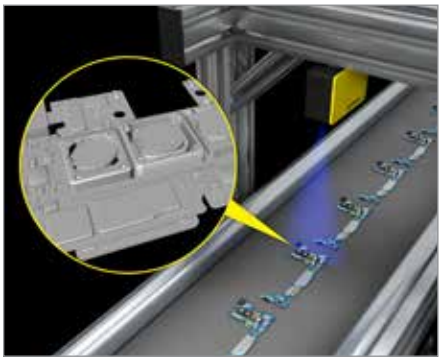
Applications

In nearly every industry, DS800 3D vision sensors improve quality control, reduce operational expenses, and automate production processes. Specifically, the DS800 series enables manufacturers to automate three commons tasks:

- **3D Inspection** – Inspect every stage of the manufacturing process.
- **3D Measurement** – Accurately measure 3D characteristics of objects on the line.

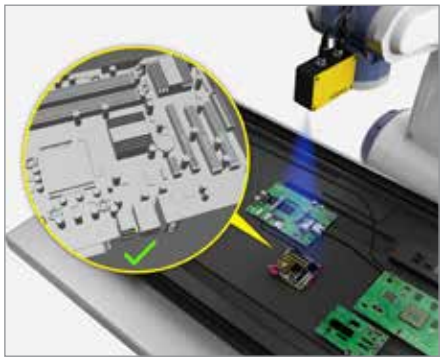
The following examples are just a few of the many inspection, guidance, and measurement applications that DS800 sensors solve.

Electronics



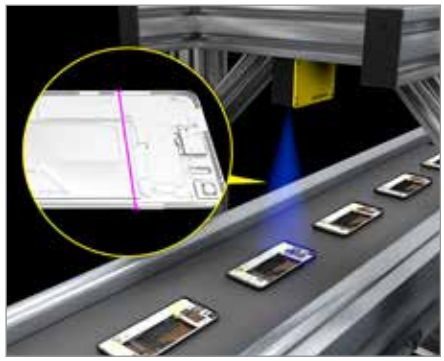
Inspection

Carry out a complete check of the PCB and all components, both before and after soldering.



Measurement

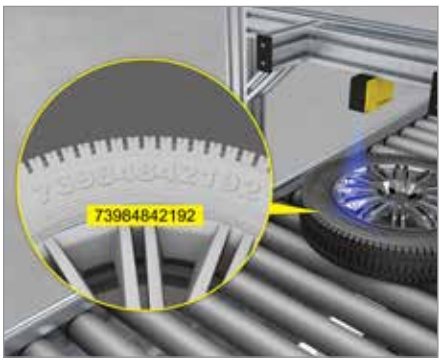
Validate assembly verification of critical PCB components.



Measurement

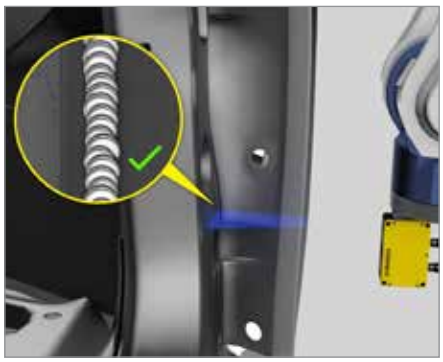
Measure critical gaps and 3D alignment of key components during every step in the phone assembly process.

Automotive



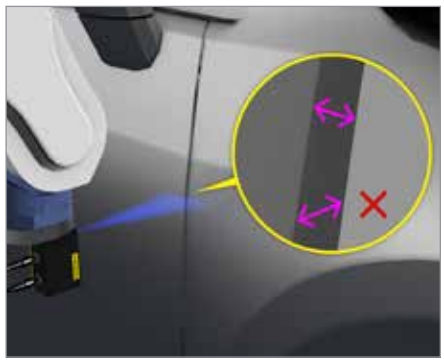
Inspection

Read raised black letters and numbers on a black rubber surface to effectively manage the tire manufacturing and distribution process.



Inspection

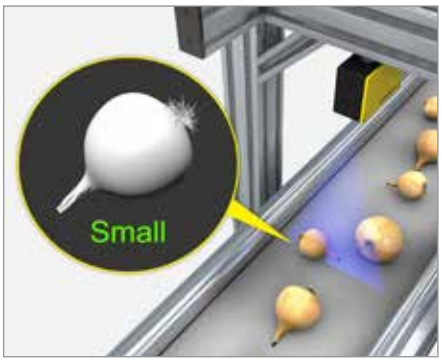
Conduct high-precision geometric inspection and defect detection of complex welded assemblies in vehicles.



Measurement

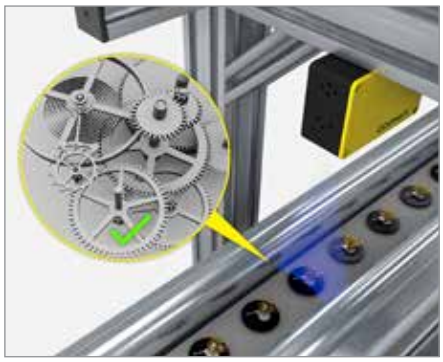
Inspect the flush and gap of complex body panels to detect misalignment and variations in gaps.

Consumer Products



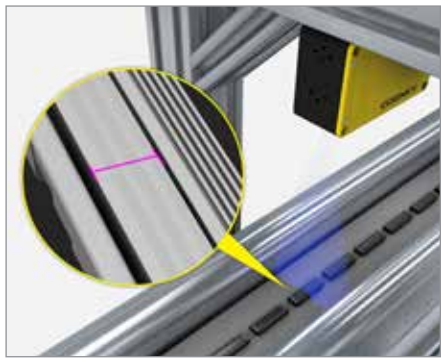
Inspection

Build a 3-dimensional model to control automatic sorting systems.



Inspection

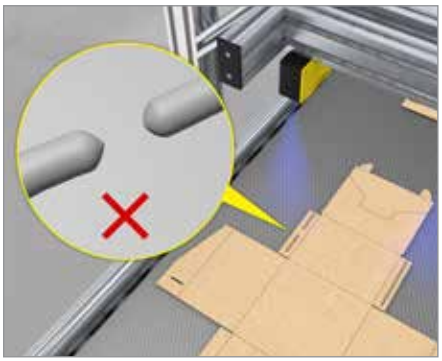
Inspect the position of key components in mechanical watches and guide the mechanisms that control calibration.



Measurement

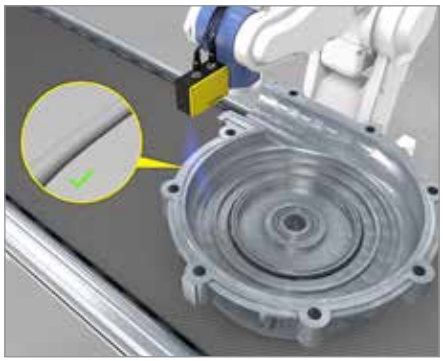
Confirm the height, spacing and angle of razor blades in cartridges to ensure product consistency.

Industrial Products



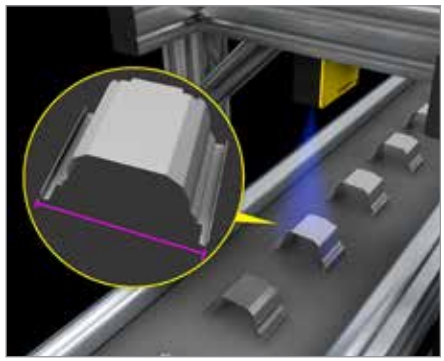
Inspection

Inspect the coverage and volume of transparent glue on a cardboard surface.



Measurement

Measure correct placement of sealant around the entire path of the housing.



Measurement

Check that a metal molding conforms to the original CAD data for the part.

SPECIFICATIONS

			DS810	DS820
Measurement range	Clearance distance		25 mm	63 mm
	Z-axis (height)	Measurement range	5 mm	16 mm
	X-axis (width)	Near field of view	10.5 mm	22 mm
		Middle field of view	11 mm	25 mm
		Far field of view	11.5 mm	28 mm
Laser (light source)	Wavelength		450 nm (blue)	
	Laser class		3R	
	Output power		2x Outputs, 24 VDC (max. 20 mA)	
Spot size (middle field of view)			5.8–6.8 µm	11.5–14.5 µm
Sensor	Data points/profile		1920	
	X resolution	Top	5.8 µm	11.5 µm
		Bottom	6.8 µm	14.5 µm
	Z resolution	Top	0.37 µm	1.1 µm
		Bottom	0.45 µm	1.6 µm
	Z repeatability[1]	Top	0.1 µm	0.2 µm
		Bottom	0.1 µm	0.2 µm
	Z linearity[2]		0.015%	0.005%
	Temperature characteristics		Operating Temp: 0–40 °C (32–104 °F) Storage Temp: -20–70 °C (-4–158 °F)	
Environmental resistance	Housing protection		IP65	
	Operation temperature[3]		0–40 °C (32–104 °F)	
	Storage temperature		-20–70 °C (-4–158 °F)	
	Maximum humidity		20–90%, non-condensing	
Scan rate			up to 10 kHz	
Housing material			Aluminum	
Weight			< 550g	
Dimensions			45 mm x 74 mm x 111 mm	
Power supply requirements			24 VDC | 0 V	
Inputs			2x inputs (5 - 24VDC) | Quadrature Encoder (AB - Channel, RS-422 standard)	
Trigger			START on input 1-2 | DATA on Quadrature Encoder input | DATA Trigger on input 2	
Encoder specifications			RS-422 standard	
Interface			Gigabit Ethernet	

[1] Z repeatability is measured an average of 100 times over a pointcloud using a 4x4 mm area, at the middle of the measurement range.

[2] Z linearity is the maximum deviation of 250 position measurements on the measurement range, where a measurement is the average of 2 profiles using the standard Cognex target.

[3] Mounted to a 400 mm aluminum bar on top of the camera.