

C5-CS Series

High Speed 3D Compact Sensors

- 3D Sensor Heads based on Laser Triangulation
- Profile Resolution up to 4096 Points / Profile
- Profile Speed up to 25 kHz
- Integrated High Precision 3D Profile Algorithms
- Enhanced 3D Imaging with HDR-3D Technology
- Ruggedized Enclosure (IP67)
- GigE Vision and GenICam Compliant
- Flexible Trigger Interface
- Sophisticated 3D Scan Features like Autostart, Automatic AOI-Tracking, Multiple AOIs, etc.



C5-CS Series

High Speed 3D Imaging with Ultra-High Resolution

C5 compact sensors (CS) scan objects by means of the laser triangulation method. This occurs through a projected laser line that migrates along the surface. By scanning the laser line, the 3D profile of the object is captured in the sensor image.

Through an internal processing of the line images performed by different evaluation algorithms, the C5-CS generates the 3D scan data. Using state-of-the-art FPGA technology, the C5 sensors can operate at profile speeds of up to 25 kHz, independently of the chosen algorithm.

C5 compact sensors (C5-CS) are available with resolutions starting from 648 points per profile up to a 4k Ultra-HD version with 4096 points per profile. The C5-CS models enable measurement-ranges of up to 1060mm (width) and 800mm (height).

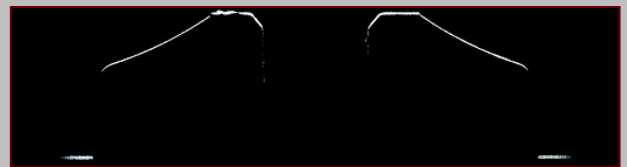
A special effort was made to enhance the industrial capabilities of the enclosures. This is why the C5-CS series has a rugged design with protection class IP67. To assure a reliable power supply and data transfer, all cable connections are equipped with M12 tensile- and tear-resistant connectors.

Apart from that, all other characteristics of our CX series have been adopted. Therefore, the C5-CS series feature also a Gigabit Ethernet interface and comply with the GigE-Vision standard. In combination with the GenICam standard, the configuration of the new 3D sensors is done by Plug n' Play.

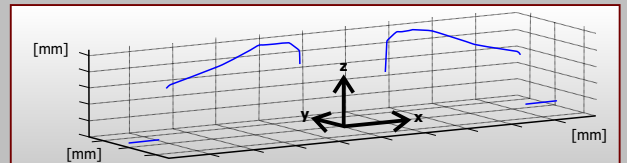
3D Measurement by Means of Laser Triangulation



The C5-CS Sensor records the Shape of the Laser Line.



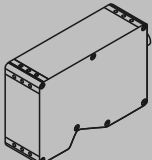
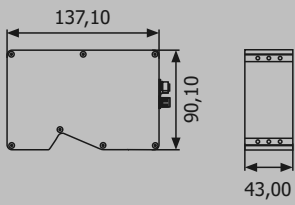
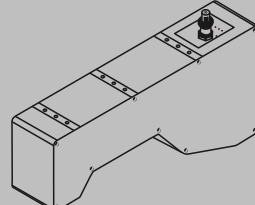
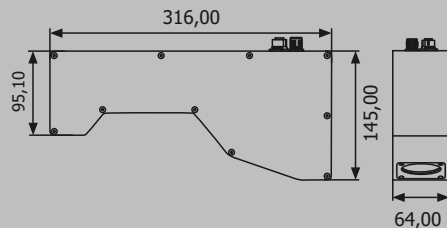
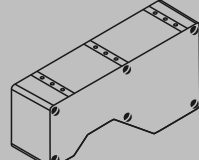
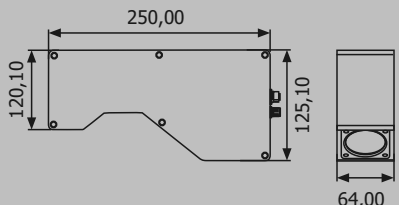
Captured Laser Line in the Sensor Image



Display of 3D Data in a Vision Software

C5-CS Features



Modell 1	Modell 2	Modell 3
 	 	 

C5-CS Series

Model Overview with Specifications

General Specifications				Specification Description			
Profile Speed	Up to 25000 Hz (Depending on the Model)			<p>The diagram illustrates the sensor's operational parameters. On the left, a top-down view shows the sensor's footprint with a central point and a radius labeled 'Working Distance (∅)'. On the right, a side view shows the sensor's height and the 'FOV (Field of View)' as a cone originating from the sensor's lens. The 'Z-Range' is indicated as the vertical distance from the sensor to the measurement plane.</p>			
Profile Resolution	Up to 4096 Points / Profile (Depending on the Model)						
Interface	GigE Vision / GenICam						
Dynamic Range	90 dB (with HDR-3D)						
Connectors	M12						
Protection Class	IP67						
Laser Safety Class	2M, 3R, 3B						
Sensor Algorithm	MAX, TRSH, COG, FIR-PEAK						
Digital I/Os	Opto-Isolated Inputs (2x) / Outputs (2x), Laser Safety, Trigger, Encoder (RS442)						
Power Supply	10 - 24V DC						
PC Requirements	Gigabit Ethernet NIC						
Software Environments	Configuration Tool CX-Explorer, GenICam API, CVB, NI-IMAQ, HALCON, MIL, VisionPro, MATLAB, etc.						
Model Name	FOV [mm]	Z-Range [mm]	Working Distance (∅) [mm]				
C5-640CS 23-27	27	±20	106	1.7	42	648	Model 1
C5-1600CS23-30	30	±20	106	0.8	19	1600	Model 1
C5-2040CS23-38	38	±20	106	0.8	19	2048	Model 1
C5-640CS23-43	43	±20	106	2.6	66	648	Model 1
C5-1600CS23-49	49	±20	106	1.2	31	1600	Model 1
C5-2040CS23-63	63	±20	106	1.2	31	2048	Model 1
C5-3360CS39-67	67	±7,5	172	0.5	20	3360	Model 3
C5-1600CS23-78	78	±20	106	2.0	49	1600	Model 1
C5-2040CS23-100	100	±20	106	2.0	49	2048	Model 1
C5-3360CS30-150	150	±100	400	1.4	45	3360	Model 2
C5-4090CS30-182	182	±125	400	1.4	44	4096	Model 2
C5-3360CS30-236	236	±150	400	2.2	70	3360	Model 2
C5-3360CS19-248	248	±250	700	3.6	74	3360	Model 2
C5-1600CS30-260	260	±150	400	5.1	163	1600	Model 2
C5-4090CS30-288	288	±150	400	2.2	70	4096	Model 2
C5-4090CS19-302	302	±250	700	3.6	74	4096	Model 2
C5-2040CS30-330	330	±150	400	5.0	161	2048	Model 2
C5-3360CS18-402	402	±400	744	6.1	120	3360	Model 2
C5-3360CS30-406	406	±150	400	3.8	121	3360	Model 2
C5-4090CS18-490	490	±400	744	6.1	120	4096	Model 2
C5-4090CS30-495	495	±150	400	3.8	121	4096	Model 2
C5-1600CS19-500	500	±250	700	15.0	313	1600	Model 2
C5-2040CS19-640	640	±250	700	15.0	313	2048	Model 2
C5-3360CS18-691	691	±400	744	10.4	206	3360	Model 2
C5-1600CS18-795	795	±400	744	25.1	497	1600	Model 2
C5-4090CS18-842	842	±400	744	10.4	206	4096	Model 2
C5-2040CS18-1015	1015	±400	744	25.1	496	2048	Model 2

3D Imaging Applications

Examples of Typical Applications with CX Sensors

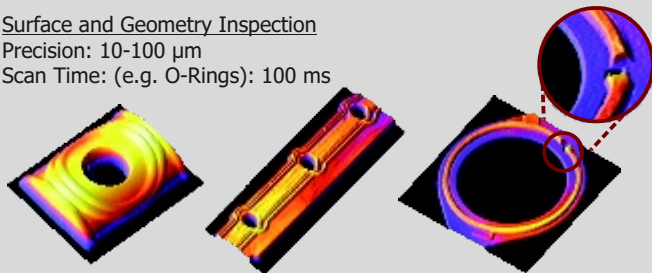
Inspection of Elastomer Parts

(e.g. Radial Shaft Seals, Gaskets, Tyres)

Surface and Geometry Inspection

Precision: 10-100 μm

Scan Time: (e.g. O-Rings): 100 ms



Inspection of Metal Parts

(e.g. Brake Discs, Conrods, Pistons)

Surface and Geometry Inspection

Precision: 10-100 μm

Scan Time: (e.g. Brake Discs): 1 s



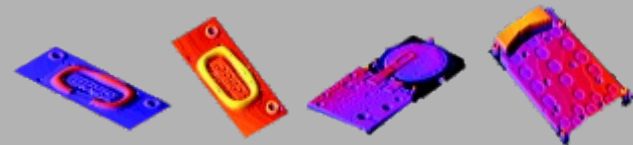
In-Line Inspection in Assembly Lines

(e.g. Glue Beads, Rivets, Screws, PCBs, Batteries, Contacts)

Assembly Verification, Flatness & Geometry Inspection

Precision: 20 μm

Scan Time: <1 s



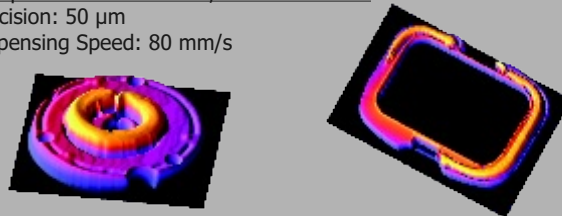
Inspection of Adhesive and Sealing Beads

(e.g. Automotive Parts)

Online inspection During Dispensing, Volumetric Measurement, Completeness Verification, Robot Guidance

Precision: 50 μm

Dispensing Speed: 80 mm/s



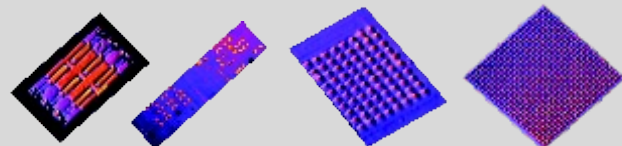
Inspection of Electronic Components

(e.g. PCBs, BGAs, Connectors)

Inspection of Solder Paste, Assembly Verification, Coplanarity Inspection, Pin Inspection

Precision: 5 μm

Scan Speed (e.g. BGA): 300 mm/s



Weld Seam Inspection

(e.g. Steel Blank Welding)

Surface and Geometry Inspection

Precision: 10 μm

Weld Speed: 250 mm/s



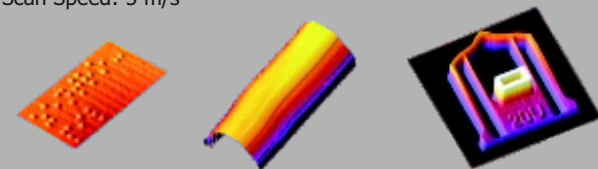
Automatic Text Recognition

(e.g. Tyre Specification, Braille Characters)

OCR (Optical Character Recognition)

Precision: 10-100 μm

Scan Speed: 5 m/s



Inspection of Wood Surfaces

(e.g. Plywood)

Surface Inspection, Detection of Branch Holes, Detection of Glue Stains, Texture inspection

Precision: 100 μm

Scan Speed: 250 m/min

