



Now capable
of up to 11,000
profiles/sec

Matrox Altiz

High-fidelity 3D profile sensors

Overview

High-fidelity 3D scanning

Matrox® Altiz¹ is a series of high-fidelity 3D profile sensors. Each sensor features a dual-camera single-laser design that greatly lessens the scanning gaps often encountered at critical surface junctures because of optical occlusions. Unique algorithms running inside the sensor automatically generate various types of reliable 3D data—individual profiles, depth maps, or point clouds—obtained by smartly combining or selecting the pixel data from the two integrated image sensors, which is automatically sampled for a constant horizontal resolution.

Flexible operation and intuitive setup

The two cameras within a Matrox Altiz can operate either synchronously or in alternation. The former provides maximum reproduction quality and robustness; the latter delivers a scanning rate twice that of the former while still providing some defense against occlusion. The scanning volume—affecting the scanning rate—is set in convenient real-world units. An internal object detection mechanism is available to automatically and optimally start and stop scanning to simplify operation by eliminating the need to supply an external trigger to inform of the presence of an object.

Standard interface, discrete I/Os, and power

The command and data interface of a Matrox Altiz is done via a Gigabit Ethernet port with the GigE Vision communication protocol. The sensors' 24 V-compatible digital I/Os are present for connecting to an incremental encoder and synchronizing multiple 3D sensors, which is useful when there is need to scan different sides of an object or surfaces larger than can be covered by a single 3D sensor. Matrox Altiz supports PoE for simpler cabling but also features an alternate 24 V power input.

Available as a separate accessory, the Matrox I/O Breakout Box simplifies the connection of a Matrox Altiz by giving convenient access to the digital I/Os through terminal blocks. The I/O breakout box comes with push buttons and switches for testing connections; it can also power one Matrox Altiz if PoE is unavailable, and be mounted on a standard DIN rail. This accessory is also included in the Matrox Altiz starter kit, a bundle of all the accessories needed to get going quickly with the Matrox Altiz.

Solid construction and varied mounting

Matrox Altiz features a sturdy IP67-rated² aluminium housing with M12 connectors that make it perfectly suited for harsh industrial environments. Isolated discrete I/Os provide protection against improper electrical hookup. Back, side, and top attachment points accepting M4-threaded screws are available for fixing a Matrox Altiz to gantries and robots. Through-hole guides are also included to enable higher-accuracy installation and the alignment of neighboring Matrox Altiz units.

Matrox Altiz at a glance

Leverage dual-camera single-laser design to deliver exceptionally high 3D reproduction fidelity

Scan scenes quickly with profiling rates of up to 11,000 per second

Gain from unique embedded algorithms to generate consistent profiles, depth maps, or point clouds

Benefit from truly standard GigE Vision® interface to work directly with Matrox Imaging and third-party vision software

Simplify cabling with Power-over-Ethernet (PoE) support

Deploy confidently in tough industrial settings thanks to a solid IP67-rated² aluminum housing and M12 connectors

Benefit from several fastening points to facilitate fixing one or more sensors to gantries and robots

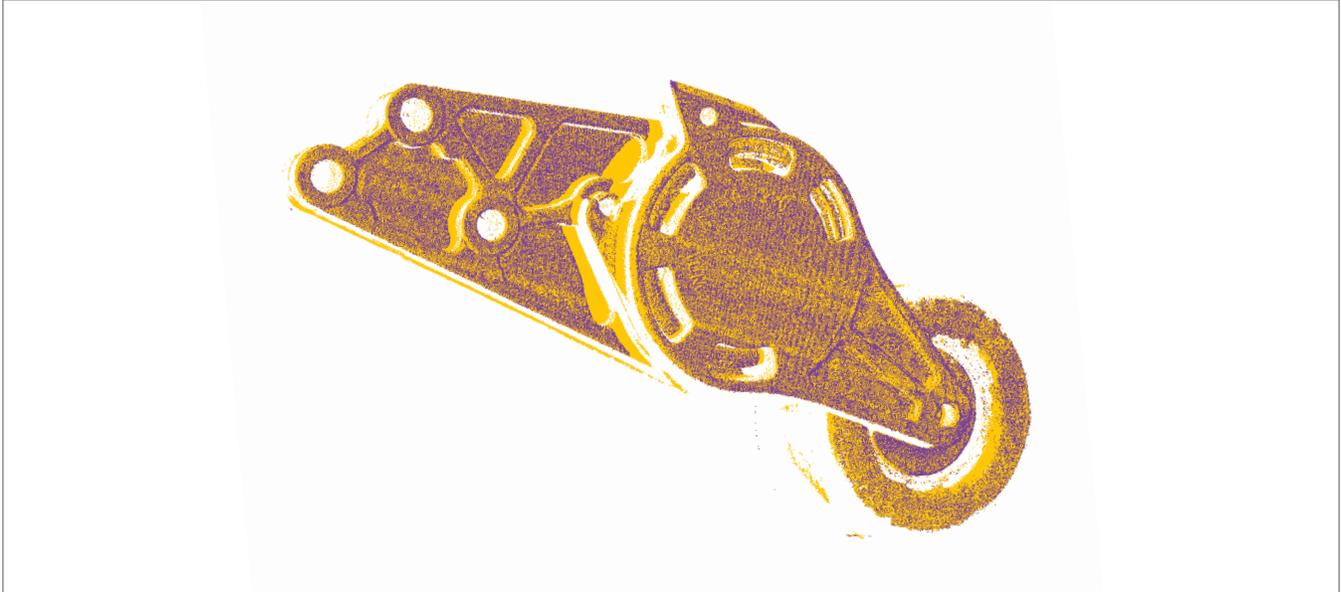
Streamline sensor setup and verification via the Matrox Capture Works utility for Windows® and Linux®

3D line profiling

3D line profiling is a long-standing and well-established technique for generating a three-dimensional representation of an object. It uses the principle of laser triangulation whereby an image sensor views a laser line that projects onto an object. The laser line bends to follow the contour of the object, which results in a profile; this profile is analyzed to compute the depth or height along the width of the laser line. Object length is determined by accumulating profiles at regular intervals by either moving the 3D device over the fixed object or the object below the fixed 3D device.

Overview (cont.)

Sample part scan



Merged point cloud showing the higher scanning fidelity obtained when using two cameras instead of just one. Zones in solid yellow are only visible when scanning with the two opposed cameras.

Software Environment

Field-proven application development software

Matrox AltiZ pairs well with [Matrox Imaging Library \(MIL\) X](#)—a comprehensive software development kit (SDK) for Windows and Linux with a more than 25-year history of reliable performance. This toolkit features interactive software and programming functions for image capture, processing, analysis, display, and archiving. Refer to the MIL X datasheet for more information.

The 3D sensors also work with [Matrox Design Assistant X](#), a Windows-based integrated development environment (IDE) based on MIL X, where vision applications result from the construction of flow-charts and their human-machine interface (HMI) from the creation of web pages. Refer to the Matrox Design Assistant X datasheet for more information.

Interactive profiler setup

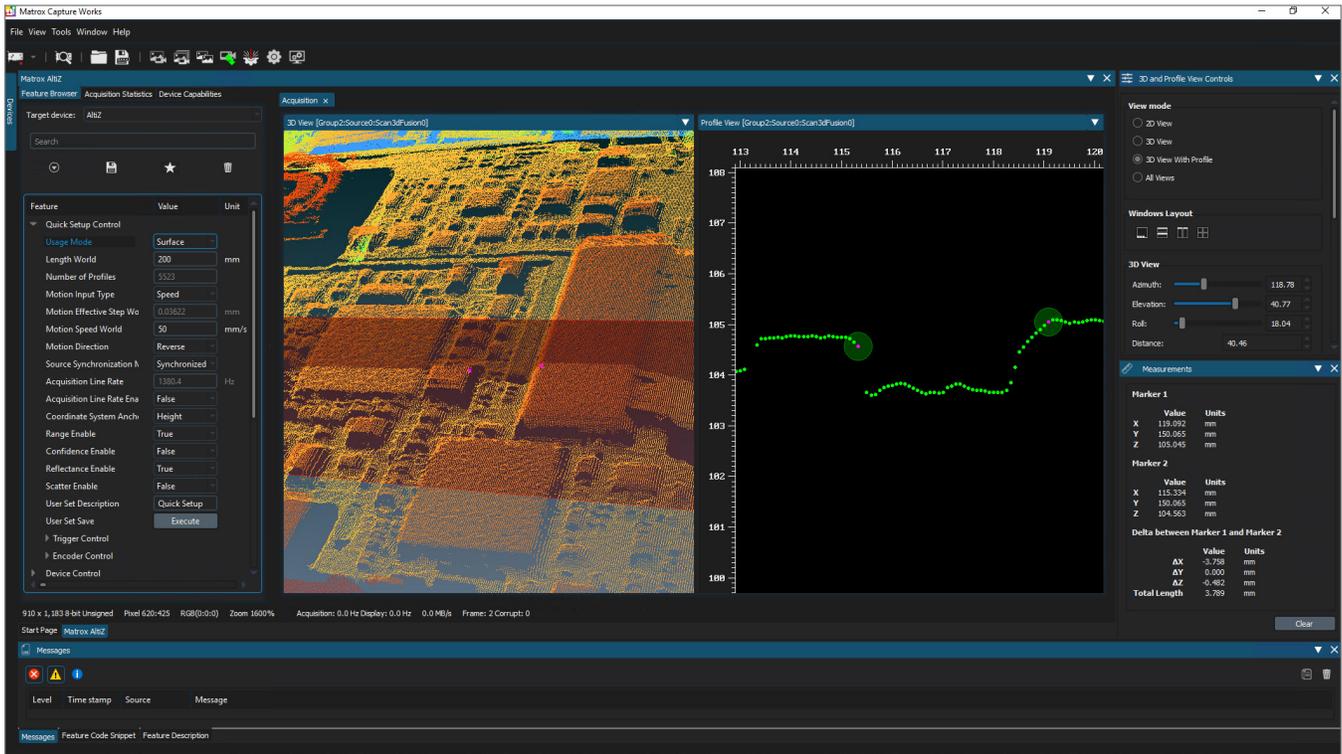
Included in MIL X and Matrox Design Assistant X is Matrox Capture Works, an interactive utility for Windows and Linux that enables users to conveniently verify the connection to, as well as configure and test acquisition from, cameras and devices using a GenICam™-based interface standard such as Matrox AltiZ. Matrox Capture Works contains views specific to the Matrox AltiZ for tuning peak (laser line) extraction, configuring the scanning volume, and setting up device triggering.

Third-party software support

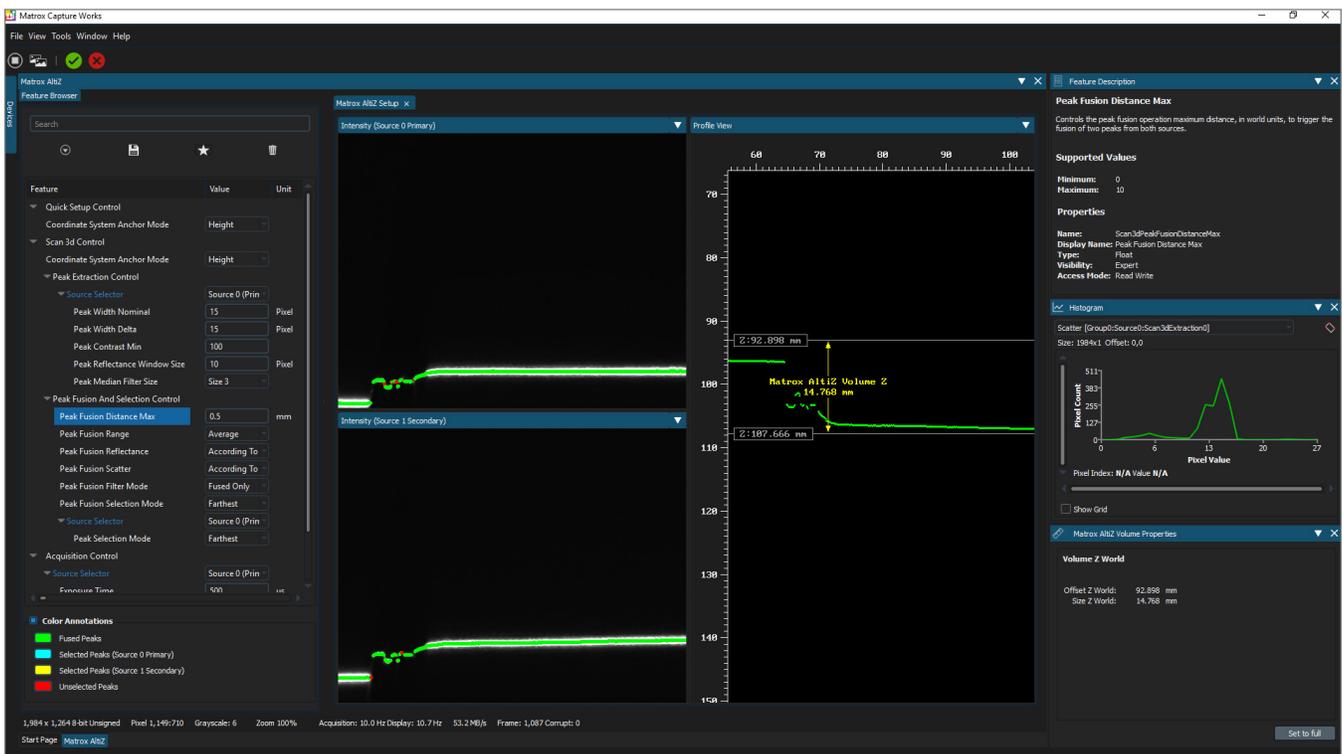
Matrox AltiZ is also compatible with third-party vision software that implements support for the GigE Vision standard, GenICam GenDC specification, and GenICam PFNC 3D pixel formats.

Software Environment (cont.)

Matrox Capture Works interactive utility



3D (point cloud) view with profile at intersecting plane and measurement markers within the Matrox Capture Works interactive utility.



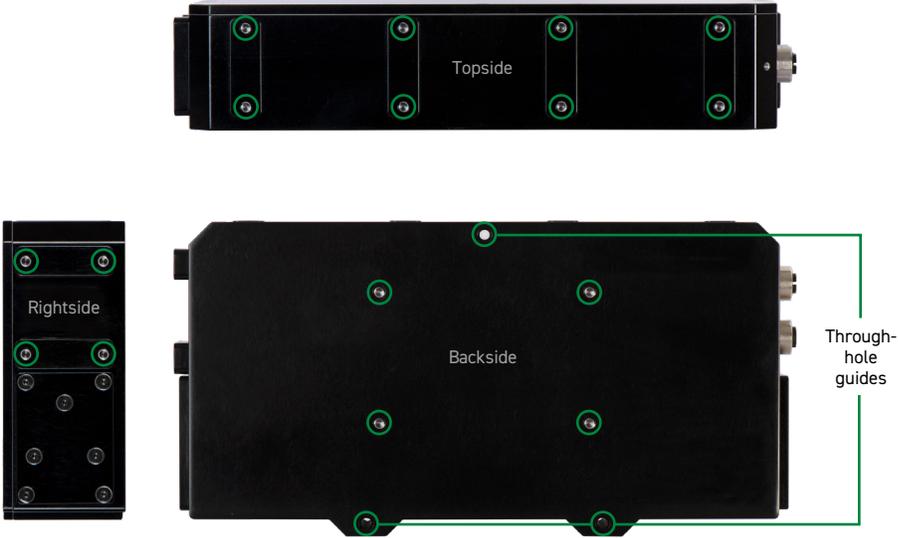
Peak (laser line) extraction, fusion, and volume (Z) adjustment within the Matrox Capture Works interactive utility.

Specifications

Matrox Altiz dimensions



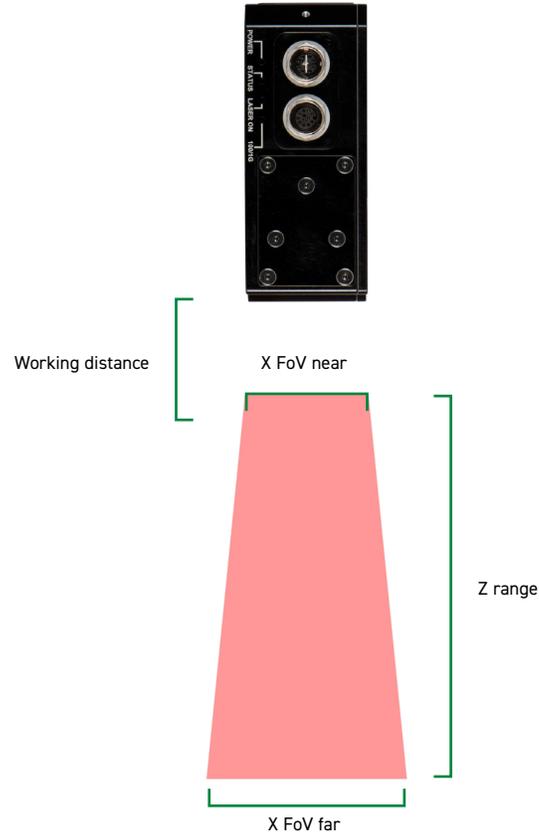
Matrox Altiz fixation points



All holes (except though-holes) are for M4-threaded screws.

Specifications (cont.)

Matrox AltiZ sensing cross-section



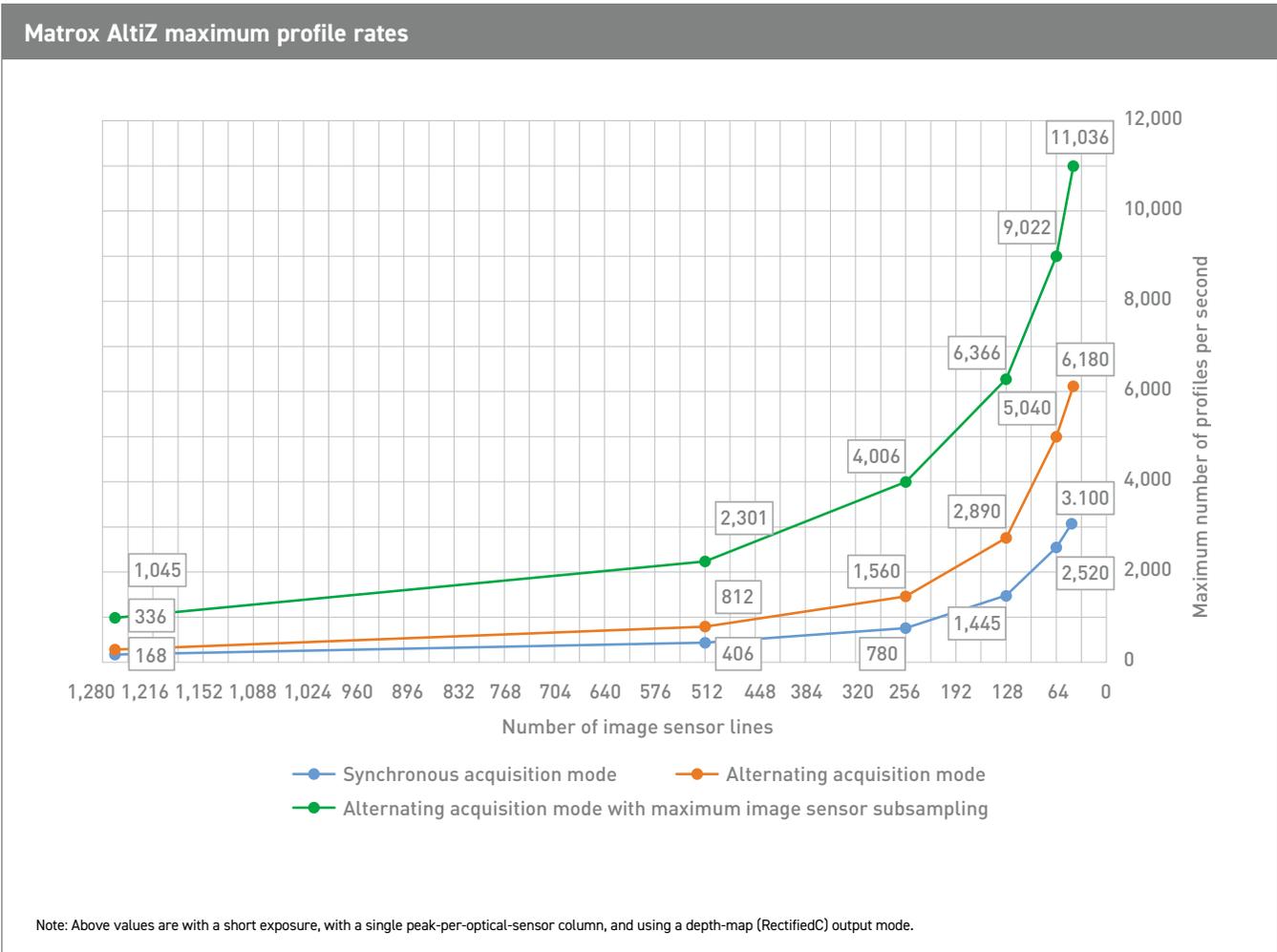
Characteristic / Model	AZ1D4SR	AZ1D4SB	AZ1D4MR	AZ1D4LR
Laser color	Red (660 nm)	Blue (405 nm)	Red (660 nm)	Red (660 nm)
Working distance (from reference point)	100 mm	100 mm	185 mm	160 mm
Z range	70 mm	70 mm	225 mm	385 mm
Z resolution (near-far)	4-8 μm	4-8 μm	9.5-34 μm	10-89 μm
X FoV (near-far)	55-75 mm	55-75 mm	85-165 mm	110-310 mm
X resolution	38 μm	38 μm	82 μm	157 μm

- Notes:
- Values are approximate and may vary slightly between 3D sensors of a given model.
 - Z resolution values include sub-pixel processing whose effect depends on imaging conditions.
 - Subsequent surface analysis can yield accuracy that is a (further) fraction of resolution.

Specifications (cont.)

Matrox Altiz	
3D profile sensor	
Profiling characteristics	1984 points per profile
	Refer to maximum profile rates chart
Network interface	Gigabit Ethernet
Data and command interface	GigE Vision 2.2 ³ with GenDC 1.1
3D data output (SFNC/PFNC)	Profile (RectifiedC/Coord3D_C16 or CalibratedABC_Grid/Coord3D_ABC32f)
	Depth map (RectifiedC/Coord3D_C16)
	Point cloud (CalibratedABC_Grid/Coord3D_ABC32f)
Digital I/Os	Four (4) 24 V isolated inputs
	Two (2) 24 V isolated outputs (5 KHz maximum)
Trigger source(s)	Quadrature encoder with A/B channels
	External input trigger
	Internal object detection trigger
	Internal timers, counters, and/or logic blocks
	External software trigger
Scan type	Single-profile scan
	Fixed-length scan (frame start)
	Variable-length scan (frame active)
Connectors	M12-X 8-pin for network interface and power input
	M12-A 12-pin for digital I/Os and alternate power input
Indicator LEDs	Power, status, laser, and network speed
Power	PoE: connect IEEE 802.3af compliant PSE, 44–57 Vdc, 12 W (default)
	Vaux: connect 24 Vdc +/- 10%, 0.5 A-rated power supply
Dimensions	233 x 121 x 48 mm (9.17 x 4.76 x 1.89 in)
Weight	1.5 Kg (3.3 lbs)
Operating temperature	0°C to 45°C (32°F to 113°F)
Ventilation requirements	Natural convection
Certifications	Refer to certifications table
Compatible software	MIL X
	Matrox Design Assistant X

Specifications (cont.)



Matrox Altiz conversion table for number of image-sensor lines to height (mm)

Model / Number of lines	48	64	128	256	512	1,264
AZ1D4SR/AZ1D4SB	0.8	2	6.5	15.1	30.5	70
AZ1D4MR	2	7	26	59	112	225
AZ1D4LR	N/A	8	55	130	230	385

Notes:

- Measured at the far end of Z range, using default peak extraction parameters.
- Values are approximate and may vary slightly between 3D sensors of a given model.

Certifications

Matrox Altiz	
3D profile sensor	
Electromagnetic compatibility	47 CFR Part 15 Class A
	ICES-001 Class A
	EN 55011/EN 61326-1 industrial environment, Class A
Electrical safety	CAN/CSA-C22.2 No. 61010-1-12, UL Std. No. 61010-1 (Third Edition)
Ingress protection	IP67 ² as per IEC 60529:1989+AMD1:1999+AMD2:2013
Laser safety	AZ1D4SR model 
	AZ1D4SB model 
	AZ1D4MR and AZ1D4LR models 

Ordering Information

Part number	Description
Hardware	
AZ1D4SR	Matrox Altiz 3D profile sensor with a near FoV of 55 mm, range of 70 mm, far FoV of 75 mm, and red (660 nm) laser
AZ1D4SB	Matrox Altiz 3D profile sensor with a near FoV of 55 mm, range of 70 mm, far FoV of 75 mm, and blue (405 nm) laser
AZ1D4MR	Matrox Altiz 3D profile sensor with a near FoV of 85 mm, range of 225 mm, far FoV of 165 mm, and red (660 nm) laser
AZ1D4LR	Matrox Altiz 3D profile sensor with a near FoV of 110 mm, range of 385 mm, far FoV of 310 mm, and red (660 nm) laser
Accessories	
AZ-STARTER-KIT	Matrox Altiz starter kit. Includes Matrox Altiz mounting bracket, Ethernet cable, power and I/O cable, and I/O breakout box with its power supply
AZ1/4-20M6MOUNT	Matrox Altiz mounting bracket. Includes four (4) M4 screws
M12-CBL-PWRIO/3	9.8 ft or 3 m cable to connect alternate power and discrete I/Os. M12 to open end
M12-CBL-ETH/5	16.4 ft or 5 m Ethernet cable. M12 to RJ45 connector
IO-BREAKOUT-BOX	Matrox I/O Breakout Box for digital I/O and power connector for Matrox Altiz
IO-BOB-AC	60 W AC/DC power adapter for the Matrox I/O Breakout Box
Software	
Included with AZ1D4SR, AZ1D4SB, AZ1D4MR, and AZ1D4LR	Licensed for the Matrox Design Assistant X/MIL X Interface (GigE Vision) run-time package. See Matrox Design Assistant X and MIL X datasheets for more information. MIL-Lite software available for download from www.matrox.com/imaging Support MIL-LITE X DOWNLOAD.

Ordering Information (cont.)

Matrox Altiz Starter Kit



Note: Matrox Altiz Starter Kit includes a mounting bracket, Ethernet cable, power and I/O cable, and I/O breakout box with its power supply.

- Endnotes:
- 1. The product may be protected by one or more patents; see www.matrox.com/patents for more information.
 - 2. Matrox Altiz functionality limited under IP67 rating conditions.
 - 3. Updated standard pending official release.

The Matrox Imaging advantage



Assured quality & longevity

Adhering to industry best practices in all hardware manufacturing and software development, product designs pay careful attention to component selection to secure consistent long-term availability. Matrox Imaging is able to meet Copy Exact and Revision Change Control procurement requirements in particular circumstances, backed by a dedicated team of QA specialists.



Trusted industry standards

Matrox Imaging champions industry standards in its design and production. Leveraging these standards to deliver quality compatible products, Matrox Imaging protects its customers' best interests by ensuring hardware and software components work with as many third-party products as possible.



Comprehensive customer support

Devoted front-line support and applications teams are on call to offer timely product installation, usage, and integration assistance. Matrox Professional Services delivers deep technical assistance to help customers develop their particular applications in a timely fashion. Services include personalized training and device interfacing as well as application feasibility, prototyping, troubleshooting, and debugging.



Tailored customer training

Matrox Vision Academy comprises online and on-premises training for Matrox Imaging vision software tools. On-premises intensive training courses are regularly held at Matrox headquarters, and can also be customized for onsite delivery. The Matrox Vision Academy online training platform hosts a comprehensive set of on-demand videos available when and where needed.



Long-standing global network

Matrox Imaging customers benefit from a global network of distributors who offer complementary products and support, and integrators who build customized vision systems. These relationships are built on years of mutual trust and span the globe, ensuring customer access to only the best assistance in the industry.

ABOUT MATROX IMAGING

Matrox Imaging, now a part of Zebra Technologies, is an established and trusted supplier to top OEMs and integrators involved in machine vision, image analysis, and medical imaging industries. The components consist of smart cameras, 3D sensors, vision controllers, I/O cards, and frame grabbers, all designed to provide optimum price-performance within a common software environment. For more information, visit <https://www.matrox.com/imaging/en/>

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