Mena 3D
TOP MEASURE

Z+F PROFILER® 9012

2D Laser Scanner

Zoller+Fröhlich

Zoller + Fröhlich GmbH was founded in Wangen in 1963. Initially the company concentrated on the design and implementation of individual control systems for the automobile and engineering industry.

The construction of the companys own switch cabinet was the reason behind the invention of ferrules with plastic sleeves to simplify the wiring of control systems. Due to a constant process of development and innovation, the first machines for the manufacturing of crimp contacts and cable assembly were designed. Because of the complexity of these machines great attention is given to their operation. Ergonomic handling by human operators who ensure a smooth production by permanent control. To achieve this, simulation studies and several specific operator simulations were carried out to create an ergonomic design optimizing the manual working processes and environment. Today Zoller + Fröhlich stands for innovation and quality in the electrical engineering world far beyond the borders of Europe.

The rst compact device: Z+F IMAGER 5003

Apart from these areas, the development and production of sensor systems with personalised CAD software solutions for 3D environment modeling represent a new cornerstone to secure the companys viability in the future.

Already in the 90´s, Zoller + Fröhlich began exploring Laser measurement technology and was awarded to the Dr. Rudolf Eberle prize, Innovations in Baden-Wtl rttemberg in December 1998.

In the early 90s, the first laser system for measuring rail track and tunnels was developed and followed by the first visual 3D laser measurement system for assessing the condition of objects in 1996. By launching the IMAGER 5003 in 2002, Zoller + Fröhlich stepped into the Laserscanner market with the first compact device produced in series with a range of 53.5 m and a maximum data capture rate of 500,000 pixel/sec.

In 2006, the success story of the IMAGER series was continued with the Z+F IMAGER 5006. Thanks to its integrated control panel, a powerful internal PC, hard disk and internal battery, the IMAGER 5006 was the fi rst stand-alone 3D laserscanner worldwide.

Technical Data

The Z+F PROFILER 9012, a compact high-speed phase-based laser scanner with great precision, 119 m range and a 360° fi eld of view. With its scan rate of more than 1 million points per second and maximum scan speed of 200 profi les/sec., very short distances between profiles can be achieved even at high platform speeds.

Laser system			
Laser class	1 (according to EN60825-1 / ANSI Z136.1)		
Beam divergence	< 0.5 mrad		
Beam diameter	Approx. 1.9 mm (at 0.1 m distance)		
Ambiguity distance	119 m (above, range reading restarts at zero)		
Minimum distance	0.3 m		
Range resolution	0.1 mm		
Data acquisition rate	Max. 1.016 million pixel/sec.		
Linearity error	≤1 mm		
Range drift (full -10° C ... +45° C)	< 2 mm (without reference) < 0.3 mm (with ref.)		
Accuracy			
Target Distance	White (80%) [1]	Grey (37%) [1]	Black (14%) [1]
1 Sigma Range Noise, 0.5 m	0.5 mm	0.8 mm	1.3 mm
1 Sigma Range Noise, 2 m	0.3 mm	0.5 mm	0.8 mm
1 Sigma Range Noise, 5 m	0.3 mm	0.4 mm	0.6 mm
1 Sigma Range Noise, 10 m	0.2 mm	0.3 mm	0.5 mm
1 Sigma Range Noise, 25 m	0.4 mm	0.6 mm	1.1 mm
1 Sigma Range Noise, 50 m	0.9 mm	1.4 mm	3.1 mm

Deflection unit	
Deflection system	Completely encapsulated, rotating mirror
Vertical field of view	360° un-obstructed
Angular resolution	0.0088°
Angular accuracy	0.02° rms [2]
Rotation speed	50 Hz up to 200 Hz (max. 12,000 rpm)

Settings			
Spindle Speed	200 Hz (12,000 rpm)	100 Hz (6,000 rpm)	50 Hz (3,000 rpm)
Pixel/360°	Data rate / x noise factor [3]	Data rate / x noise factor [3]	Data rate / x noise factor [3]
20,480	---	---	1016 KHz / x 2.8
10,240	---	1016 KHz / x 2.8	508 KHz / x 2.0
5,120	1016 KHz / x 2.8	508 KHz / x 2.0	254 KHz / x 1.4

Z+F PROFILER 9012

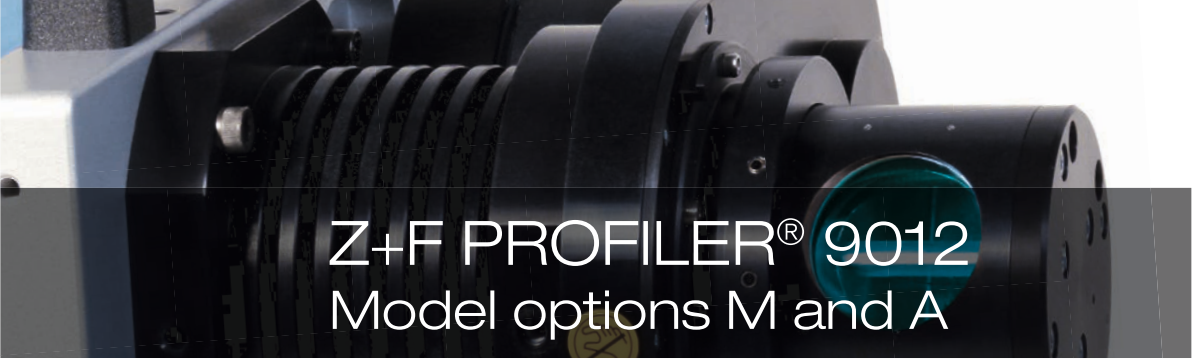
Interfaces	
Data storage	Internal 128 GB SATA, 2 x external 32 GB USB flash drive
Data interface	1 GB Ethernet 2 x USB-2.0 (for removable memory sticks)
Data recording time [4]	1,5h ... 3h for each 32 GB memory [5] 6h ... 12h in total for internal 128 GB memory [6]
Control panel	Remote Controlbox for power on / off, emergency stop and display for status messages
Synchronization interface	External encoder input for wheel sensor (Odometer) GPS input (PPS pulse + UTC message over RS232) Linesync output (TTL pulse per profile) Rotor sync in / out (angular movement of two parallel devices can be synchronized)

Power supply	
Input voltage	PROFILER: 22 - 28 V DC (24 V DC typ.) Power supply: 100 240 V AC
Power consumption (24V)	7.0A @ 200Hz; 3.7A @ 100Hz; 3.0A @ 50Hz; 10.5A during rotor speed up

Ambient conditions	
Operating temperature	-10 °C +45 °C
Storage temperature	-20 °C +50 °C
Lighting conditions	All conditions, from bright sunlight to complete darkness
Humidity	Non-condensing
Protection class	IP 54

Dimensions and weight	
Dimensions (w x d x h) Weight	320 x 260 x 340 mm 13.5 kg
Mounting flanges [7]	Flanges on bottom / left / right sides, consisting of: 2 x 6 mm -0.00 / +0.02 mm holes for orientation pins 6 x M6 x 10 mm threaded holes for mounting screws

1. Range Noise (1-Sigma interval) is specified at 127 KHz data rate, which is the standard data rate for any Z+F noise specs. However, these specs have to be converted to the appropriate data rate in KHz (1000 pixel/sec.), see table settings. Detailed explanation on request please contact info@zf-laser.com
2. RMS (Root Mean Squared): mean value of squared errors
3. The actual data rate in KHz (1000 pixel/sec.) is stated for each available setting. The Range Noise specs have to be multiplied by the stated factors, yielding the actual 1-Sigma range noise for a particular setting
4. Continuous data recording at max. data rate of 1,016 million pixel/sec., (i.e. 200 Hz spindle speed, 5120 pixel/360° or 100 Hz spindle speed 10,240 pixel/360°)
5. Data compression factor depends on scanned scene
6. Data stream is automatically routed to empty memory in case the selected memory stick is full 2 x 32 GB are available in t otal
7. Drawing provided upon request



Z+F PROFILER® 9012
Model options M and A

The Z+F PROFILER® 9012 is a compact, phase based laser scanner with high accuracy, range and a 360° field of view. With its scan rate of 1 million points per second and a maximum scan speed of 200 profiles/sec., very short distances between profiles can be achieved even at high speeds.

Additional technical specifications of the Z+F PROFILER® 9012M

Lasersystem in Marker Mode	
Laser class	3R (according to EN60825-1/ANSI Z 136.1), with active marker mode 1 (according to EN60825-1/ANSI Z 136.1), without marker mode or with active marker mode at distances >2m (NOHD)*
Wave length	635 nm
Pulse duration	185 µs
Repetition rate	49 Hz
Peak output power	< 6 mW
NOHD (Nominal Ocular Hazard Distance)	2 m

All further technical data is similar to the standard Z+F PROFILER® 9012.

* Please contact Z+F for further information

Additional technical specifications of the Z+F PROFILER® 9012A[1]

Z+F PROFILER® 9012A (Advanced)			
Target Distance	White (80%)[2]	Grey (37%)[2]	Black (14%)[2]
1 Sigma Range Noise, 0,5 m	0,5 mm	0,8 mm	1,3 mm
1 Sigma Range Noise, 1 m	0,4 mm	0,5 mm	0,9 mm
1 Sigma Range Noise, 2 m	0,2 mm	0,3 mm	0,4 mm
1 Sigma Range Noise, 5 m	0,2 mm	0,3 mm	0,5 mm
1 Sigma Range Noise, 10 m	0,2 mm	0,3 mm	0,5 mm
1 Sigma Range Noise, 25 m	0,4 mm	0,6 mm	1,1 mm
1 Sigma Range Noise, 50 m	0,9 mm	1,4 mm	3,1 mm

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