



Z+F IMAGER® 5006i

The new way of scanning –
highly accurate, fast, reliable
and flexible

Z+F IMAGER® 5006i

An improved System based upon the
well established Z+F IMAGER 5006

- Stand alone concept
- Improved point cloud quality
- Reduced range noise
- Temperature range -10°C to 45°C
- increased flexibility due to Wi-Fi
- Full automated panorama RGB
color solution

Z+F IMAGER® 5006i



In 2006 the Z+F IMAGER® 5006 was released.

It impressed due to its innovative stand alone concept, its ability to capture data at an exceptionally high resolution and its ease of use. Now in 2009, The Z+F IMAGER® 5006i maintains and builds upon the high standard of technology which lead to worldwide adoption of the highly regarded Z+F IMAGER 3D Laser scanning series. The Z+F IMAGER® 5006i boasts an increased temperature range and an improvement in the point cloud data captured.

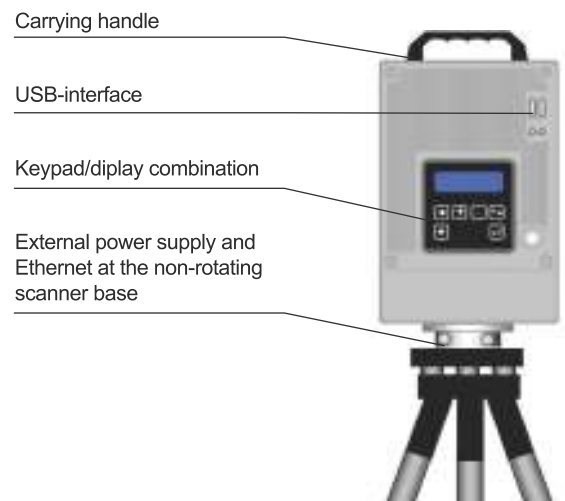
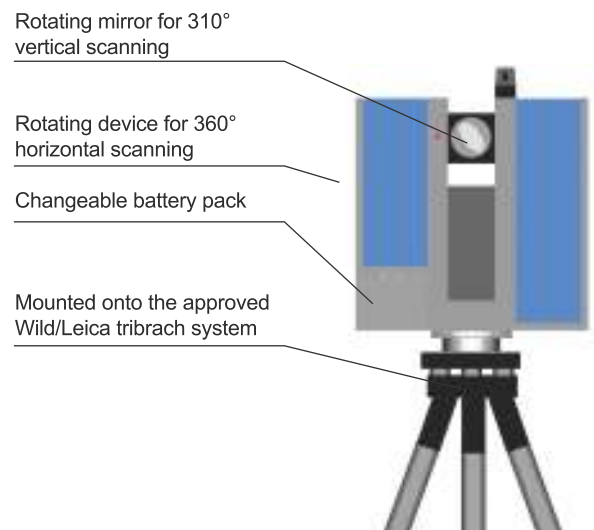
Configuration

Maximum mobility is guaranteed with the Z+F IMAGER® 5006i. The Z+F IMAGER® 5006i like its predecessor follows a stand alone concept featuring an integrated control panel, changeable and rechargeable battery and an internal hard disk. A USB interface is also included as are connections for network links, an additional power supply and Ethernet connection.

Power supply

The Z+F IMAGER® 5006i customer is afforded great flexibility in ease of handling with a choice of power supply options.

- A changeable battery pack allows wireless scanning for at least 2.5 hours. This simplifies the scanning process on site and reduces assembly time considerably.
- Where scanning time is expected to exceed the internal battery life, an external battery pack can be used. This provides the user with an additional four hours of battery life. A notebook computer may also be powered via this battery.
- Unlimited scanning time can be achieved by using a cable connection to AC power supply (90 - 260 V)



Handling

- The Z+F IMAGER® 5006i has been designed with ease of handling, flexibility and intelligent control in mind.
- The Z+F IMAGER® 5006i can be operated via an integrated keyboard-display combination. The captured data is then saved on the internal hard disk.
- For external operation, the Z+F IMAGER® 5006i is equipped with an Ethernet-interface. A PDA or notebook/PC can therefore be used to operate the IMAGER® 5006i from a distance if required. The user can control the Z+F IMAGER® 5006i by 'Scan over IP' via the internet (This can provide operation and software updates) These options further increase the mobility of the system for it's users.

Data capture/Quality

- The Z+F IMAGER® 5006i can now be used in more applications than ever before due to an extended point density and an ambiguity range of 79m.
- The Z+F IMAGER® 5006i gives unrivaled accuracy for this type of system.
- The data is captured at a rapid pace. The acquisition rate of the 5006i is an incredible 508,000 points per second.
- The Z+F IMAGER® 5006i includes a Minimum 60. GB storage capacity. This provides sufficient disk space to allow very intensive scanning.
- Data transfer to a notebook / PC is possible via Ethernet connection.
- Data transfer to an external hard drive is possible via the USB connection.

Compatibility

- All accessories of the Z+F IMAGER® 5006i are compatible with the previous Z+F IMAGER® 3D laser scanners including the Z+F IMAGER® 5006.
- The scanner can be mounted onto the standard Wild / Lieca tribrach system
- The laser scan data captured with the Z+F IMAGER® 5006i is compatible with all Z+F software products such as Light Form Modeller (LFM).

The laser scan data is also compatible with software products supplied by other supported external vendors.



USB 2.0-interface

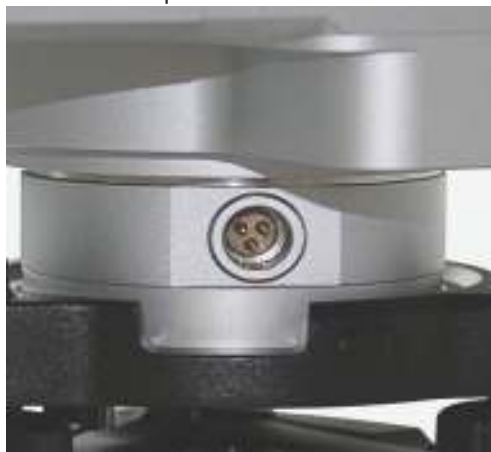


fig. left: Connection for the external power supply and the data download (Ethernet)

fig. right: Keypad and display



Process, Power & Marine



The Process, Power and Marine (PPM) industry is subject to constant change.

Huge investments are being made in implementing health & safety programs along with investments in resources and technology that ensure improvement in productivity and environmental performance. There are increased competitive pressures from both plant operator and engineering contractors to reduce costs and improve on efficiency.



Factory site as 3D model – generated from scanner data

These issues have swept laser data capture into the mainstream.

The Z+F IMAGER® 5006i is able to capture 50 million XYZ data coordinates in a 360° x 310° field of view around and above the 3D laser scanner in less than four minutes. The ability to capture data in a minimum amount of time ultimately means improved efficiency and minimum disruption to site activities.

Our LFM software has been designed to work hand in hand with the high resolution data needed to capture process, power and marine environments. LFM is used to take the data from the field, through registration and viewing, to delivery to the designers or operators desktop.

The time, effort and cost of process plant retrofit engineering and construction projects are reduced by helping engineers take advantage of the accuracy and completeness of point clouds.

The number of operatives required in the field is reduced, minimizing risk. Risk is also reduced by providing the designer with a detailed "as-built" knowledge of the plant, avoiding costly and time consuming mistakes.

The Z+F IMAGER® 5006i can be adopted as an integral part of an owner / operators asset management strategy.

■ Application areas:

- Automotive areas
- Chemical sites
- Power plants
- Oil rigs
- Other plants

Architecture, Engineering & Construction (AEC)



3D Laser scanning is now performing some tasks within the field of AEC that were previously not deemed possible using traditional survey techniques and equipment. Laser scanning adds value where speed of survey and amount of data collected are important and where accuracy requirements are pertinent to their use.

The Z+F IMAGER® 5006i is able to capture 50 million points in less than four minutes, this represents incredibly high resolution data which can be captured extremely quickly. The Z+F IMAGER® 5006i boasts an improved minimum range of 0.4m, therefore even the finest of details can be captured. Reduced noise ensures high quality accurate data and an improved temperature range meaning increased resilience when operating in extreme environments.

Once the data has been captured it can then be taken direct to the user or designers desktop via LFM. Here the data is of such high quality that visits to site hold no advantage over viewing the data via LFM. The number of trips to site are therefore reduced ultimately increasing the efficiency of the project and the speed at which the project can be completed.

Like the Z+F IMAGER® 5006i, LFM Software has been designed with the needs of it's customers in mind. Z+F UK recognises that increased restrictions on new space for civil engineering projects has resulted in a need to manage brownfield projects rather than those that are purely greenfield. Therefore LFM includes an advanced Clash module which allows users to see whether a proposed facility will fit with the existing site easily and intuitively.

LFM also allows the user to view the data using intuitive BubbleView technology. BubbleView allows true 3D 360° rotation of an intensity view from anywhere on site. Users have found this a simple yet effective way of viewing laser scan data. LFM also allows extremely detailed measurements to be made.

Once engineers and architects have access to 3D laser scan data of this quality they have the opportunity to reduce project timescales, costs and risks.



Colourmapping – BubbleView with RGB colour information

Forensics, Security and Accident Documentation



Research studies over 30 years have repeatedly demonstrated that eye witness testimony can not be solely relied upon when reconstructing a crime or an accident. Memory of an event is likely to change over time e.g. when the information is recollected or relayed. With the Z+F IMAGER® 5006i the user is able to capture the data 'as is'.

The data is objective, reliable and non disputable. The Z+F IMAGER® 5006i is able to capture data at a crime scene, a crash scene or an important venue for security purposes, all at an exceptionally high resolution. The Z+F IMAGER® 5006i features an unprecedented minimum range of 0.4m, this means it can comfortably capture the smallest of details at close range for example a spec of blood, a mark on the victims body, vehicle break marks or deformations.



Where the Z+F M-CAM® is used alongside the Z+F IMAGER® 5006i, colour laser data can also be captured. The demand for colour data is increasing due to the importance of matching the dataset to the captured scan scene.

An additional benefit of laser scanning to those working within Forensics & Accident documentation is that the data can be captured incredibly quickly, With the Z+F IMAGER® 5006i more than 50 million points are recorded in less than 4 minutes. Recording the data in a quick and efficient manor can be of exceptional importance in order to ensure minimum disruption to the crime scene and to allow the investigator to progress with the investigation.

For Accident documentation applications the process of capturing important data quickly can represent an incredible cost saving, especially when one considers the cost to the economy where in the absence of this technology an accident results in the closure of a major road or motorway for several hours at a time.

Once the site has been scanned, the data can be brought to the users desktop with laser scanning software such as LFM. For those working within Forensics fewer trips to the crime scene are required. The crime scene or accident is preserved within the data even after the scene has been cleared, allowing the user to revisit the site from the comfort and safety of the office.

The Z+F IMAGER® 5006i can be utilised to capture laser scan data which can then be used to create a 3D model of important venues and buildings to assist in the security of events and in anticipation of potential security breaches.

Laser scanning for Accident Documentation

Cultural Heritage



The use of 3D laser scanning is increasing within Cultural Heritage as the benefits of the technology are realised.

The Z+F IMAGER® 5006i is able to capture data at an extremely high resolution. This allows so far unachievable possibilities for the documentation of items of cultural or historic importance.

The Z+F IMAGER® 5006i has a minimum range of 0.4m, this means it can comfortably capture data at close range documenting even the finest of details.

Once the data has been captured, the information can be transported to the users desktop with the help of laser scanning software, such as LFM.

At this point the data can be viewed as a full 3D point cloud, or the user can specify a particular region of interest and select that area or volume and level of detail required. LFM Server can mine this data and present it at an exceptionally high resolution where required.

The artifact can also be tracked over the years by way of regular scanning and processing of data. Any deterioration that may be present can be recorded. Creating a 3D model can also be achieved with laser scan data.

The 3D model may also help where the item of interest is in a remote location - the data can be captured and studied away from its place of origin.

Some web share laser scanning software packages e.g. LFM NetView allow the user to share their laser scan data with peers from around the globe, data which by its very nature is likely to be of significant historical or cultural interest.



Colourmapping – 3D point cloud with RGB colour information



"Moai" Monumental statues native to Easter Island

Technical data

Laser measurement system

Ambiguity interval:	79 m
Min. range:	0.4 m
Resolution Range:	0.1 mm
Data acquisition rate:	≤508.000 Pixel/sek.
Linearity error up to 50 m ¹ :	≤1mm
Range noise at 10 m ^{1 2} :	
- Reflectivity 10% (black):	1.2 mm rms
- Reflectivity 20% (dark grey):	0.7 mm rms
- Reflectivity 100% (white):	0.4 mm rms
Range noise at 25 m ^{1 2 3} :	
- Reflectivity 10% (black):	2.6 mm rms
- Reflectivity 20% (dark grey):	1.5 mm rms
- Reflectivity 100% (white):	0.7 mm rms
Range noise at 50 m ^{1 2} :	
- Reflectivity 10% (black):	6.8 mm rms
- Reflectivity 20% (dark grey):	3.5 mm rms
- Reflectivity 100% (white):	1.8 mm rms
Temperaturdrift (-10°C – 45°C):	negligible due to internal reference

Optical transceiver

Laser:	visible
Beam divergence:	0.22 mrad
Beam diameter at 1 m distance:	3 mm circular
Laser safety class:	3R (ISO EN 60825-1)

Deflection unit

System vertical/horizontal :	rotating mirror/rotating device
Field of view vertikal/horizontal:	310°/360°
Resolution vertical/horizontal:	0.0018°/0.0018°
Accuracy vertical ¹ /horizontal:	0.007° rms/0.007° rms
Max. Scanning speed vertical:	≤50 rps
Typ. Scanning speed vertikal:	25 rps

Resolution

Resolutions:	Pixel/360° (vertical, horizontal)	Scanning time / 360°
- „preview“:	1,250	25 sec
- „middle“:	5,000	1 min 40 sec
- „high“:	10,000	3 min 22 sec

Resolutions:	Pixel/360° (vertical, horizontal)	Scanning time / 360°
- „super high“:	20,000	6 min 44 sec
- „ultra high“:	40,000	26 min 40 sec
- Max resolution for selections:	100,000	variable

Miscellaneous

Tilt measurement:	
- Resolution:	1/1.000°
- Accuracy:	1/500°
Data interface:	Ethernet/USB 2.0
Data storage::	Internal HDD (>= 60GB)
Communication interface:	WLAN/Ethernet
Integrated operation panel:	
- Keypad:	6 Buttons
- Display:	4 Lines
Power supply:	
- Input voltage:	24V DC (scanner), 90 - 260V AC (power unit)
Power consumption:	65 W max.
Battery life time:	
- Changeable battery pack:	2.5 h
- External battery (TRAPP-15-24):	4 h
Ambient conditions:	
- Calibrated temperature::	-10°C - 45°C
- Storage temperature:	-20°C - 50°C
- Humidity:	non-condensing
- Target reflectivity:	no retro-reflectors
- Illumination:	all conditions from darkness to daylight

Dimensions and weights

Scanner (wxdxh)/:	286 mm x 190 mm x 372 mm/14 kg
Bottom of scanner to horizontal axis	242 mm
Tripod:	
- Height/weight:	approx. 800 mm -1.400 mm/9 kg
- Diameter:	approx. 1,200 mm

¹ detailed explanation on demand - please contact imager5006@zf-laser.com

² data acquisition rate: 127,000 pxl/sec., raw data, in High Power Mode

³ values extrapolated

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