DAVID®
LASERSCANNER

Starter-Kit DL-SET01

- Bedienungsanleitung
- Operating Instructions
- Mode d'emploi
- Istruzioni per l'uso

Congratulations,

on your purchase of this DAVID Laserscanner brand product.

The DAVID Laserscanner Starter-Kit will enable you to perform high-precision and detailed three-dimensional scanning. To make sure that you can start using your Starter Kit quickly and safely, please make sure you read the following safety information. These operating instructions are a part of this product. Include these instructions if passing the device on to another user.

Index

1. Safety Information

Purpose: This Laserscanner is designed for scanning the surfaces of objects and works on the basis of the triangulation principle through the structured light projection method.

Warning: This product is a laser scanner with a Class 1 line laser as defined by DIN EN 60825-1:2008-5 (EN 60825-1:2007). If the housing or the lens of the line laser is damaged this may in certain circumstances cause laser radiation higher than laser Class 1 to be emitted and which is dangerous to the eyes. Do not turn the device on if the housing or the lens has been damaged.

For the power source only use batteries of the type CR123A. Note: Remove batteries if you are not using the device for a longer period of time. Do not short-circuit, swallow or throw the batteries into a fire.

- Do not operate your Laserscanner in areas where there is a risk of explosion.
- Only operate your Laserscanner in a dry environment.
- Repairs to the Laserscanner should only be performed by an authorised service centre or the DAVID Laserscanner after-sales service.
- Do not make changes of any kind to your Laserscanner.

2. Contents of package

- high-resolution 2-megapixel webcam (1600 x 1200) with autofocus (Logitech Quickcam 9000 PRO)
- stand for webcam
- red line laser module (650 nm, Class 1 laser) with adjustable focus, including battery
- calibration panels with patterns in four different sizes
- base plate for mounting the calibration panels
- DAVID Laserscanner Professional Edition software on a USB Flash Drive
- user manual

Subject to technical changes – including without prior notice.

3. Description / Mode of operation

Using the calibration panels behind the object produces extremely good scanning results with a hand-held laser and a non-synchronised camera. These instructions are intended to enable you to easily start using the device.

Scanning with DAVID consists of the following procedures:

1. Installation of the software (only when using for the first time)
2. Setting up the scanner and the object to be scanned
3. Set-up and alignment of the camera
4. Calibration of the camera
5. Scanning the object using the line laser
6. Grabbing colour texture (optional)
7. 3D view on the screen and saving the scan as an .OBJ file
8. Repetition of steps 5 to 7 as required for scanning several sides of the object.
9. Alignment and merge of all scans into an all-round model (Shape Fusion)
10. Saving the final result as an .OBJ, .STL or .PLY file

For the main steps the software has a separate dialogue page entitled "Camera calibration", "3D Laserscanner" and "3D Shape Fusion". These can be accessed using the Next and Back buttons.

Step-by-step instructions can be found in Section 5. You can also find a detailed and continuously updated description of all functions in our online instructions:

http://www.david-laserscanner.com/manual

You can access the online instructions by clicking on the Help button in the DAVID window (functioning internet connection required).

4. Start-up

4.1. Insert line laser battery

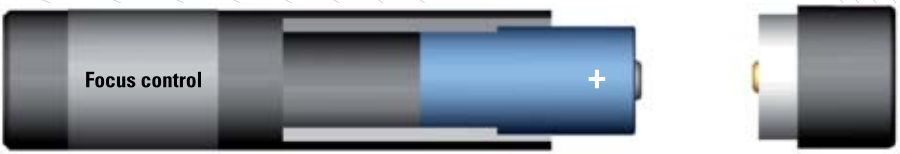


Fig. 1: Inserting the laser battery

1. Remove the battery compartment cover.
2. Insert a battery type CR123A as shown in the figure.
3. Re-attach the battery compartment cover.

4.2. Installation

1. Install the camera driver before attaching the camera to your PC. Please follow the enclosed instructions from Logitech (manufacturer).

2. The DAVID Laserscanner software is not to be installed on the hard drive, it is instead started from the USB flash drive. When Windows has been started, insert the USB flash drive into an available USB port on your computer and wait for a few seconds. Depending on your system's settings, a pop-up window will appear asking you what procedure you require. Choose Display folder. Alternatively navigate in Windows Explorer or via Computer to the drive "DAVID".

   There alongside the three folders you will find the Start_DAVID or Start_DAVID.bat file. We recommend that you create a shortcut for Start_DAVID to your Desktop to make it easier for you to start the program. To do this using the right mouse button click on Start_DAVID and while keeping the mouse button pressed down, drag the icon to a vacant space on your Desktop and then release. Choose "create shortcut here".

   Note: You can install a back-up copy of the software onto your hard drive. However you must always start the software directly from the supplied USB flash drive in order to use the full range of functions (copy protection).

3. To start the DAVID Laserscanner software double click on the icon on your Desktop or on the Start_DAVID file.

4. DAVID requires Microsoft .NET Framework in order to operate. Therefore when starting the software an automatic check is performed to see if it is installed. If not, please follow the on-screen instructions to install .NET Framework. An internet connection may be required for this purpose.

4. Start-up

4.3. Software update

DAVID software is being continuously developed further. All updates within version number 2.x can be downloaded free from the internet. To benefit from functional and operating enhancements you should regularly check to see if downloads of later versions are available:

To update your USB flash drive with a later version, please proceed as follows:

On your DAVID USB flash drive there is a folder entitled "DAVID". This contains all the required files. If you like you can create a back-up copy of this folder on your hard drive.

1. Download the latest version (Setup Installer, Free Edition) from the download page.
2. Insert the DAVID USB flash drive into an available USB port. Then start the installer and choose the option "Update USB". The installer will detect the USB flash drive automatically and update it. Simply follow the instructions on screen.
3. Start DAVID as usual directly from your flash drive.

If you have any problems please contact your supplier.

5. Scanning using the DAVID Laserscanner software

Insert the enclosed USB flash drive into an available port on your PC and wait for a few seconds. Then start the shortcut on your Desktop, or start the Start_DAVID file on the USB flash drive.

The dialogue box of the DAVID Laserscanner software consists of 5 pages between each of which you can switch using the Next and Back buttons:

Fig. 2: DAVID's dialog pages.
Start page with language selection, Camera Calibration (must be performed once for each scan set-up), 3D Laserscanner (for scanning the object and grabbing the colour texture), 3D Shape Fusion (for fusion of several individual scans), Info page (credits and legal notice)

The specific operations are described in detail in the following sections and in the online instructions. Simply click on the Help button of the particular dialogue box to go directly to the appropriate page of the online instructions.

5. Scanning using the DAVID Laserscanner software

5.1. Demo videos

There are two video files stored on the DAVID USB flash drive which can be used directly with the DAVID software for a "virtual scan". These video files can be used as a substitute for the "real" video data usually delivered from the camera during calibration and scanning. If you want you can perform a scan using these files (instead of using a real scanner) to familiarise yourself with the scanning procedure. This will help you in performing your own initial scans.

To use these videos as a scanning source in DAVID, please proceed as follows:

1. Insert the DAVID USB flash drive into an available port.
2. Start the software directly from the flash drive (Start_DAVID).
3. Click on Next to get to the Calibration page.
4. Select Video Grabber as the camera.
5. Select the angel_calib_wmv.avi file as the video. This is located on the flash drive (DAVID) under Examples / Angel.
6. You should see a bright screen with calibration pattern. Your own camera image should also look like this later during calibration. Click on Calibrate Camera.
7. Click on Next to access the scanning page.
8. Click on the Camera Settings button  and then select the angel_scan_wmv.avi file in the same folder.
9. View the video image. Your live camera image should also look like this during scanning: quite dark, with thin distinct laser line that moves rather slowly and evenly through the image and appears in the scene slanting from above or below. The line passes left and right over the calibration panels in the image, in the middle it passes over the object.
10. Click on Start.
11. Observe how the scanning data is collected. 3D data is already being computed here, and is presented in colour-coded form. You will also see this view during your own scans. You will note how the laser line moves slowly and evening but also changes direction occasionally in order to fill in gaps. After the first scan of the object is complete the laser will pass over the

object for a second time, this time shining into the scene from below. This enables it to access surface points that are in shadow when looking down from above (e.g. under the arms). But unlike in this video, it is preferable to perform separate scans from above and from below, and then to merge these afterwards using the Shape Fusion tool.

12. When sufficient 3D data has been collected, click on Stop.

13. Click on Show 3D. In the 3D Window you can rotate the object using the right mouse button and move it with the left. You can also zoom in and out using the mouse wheel.

From our experience the first scan you perform yourself may well be poorer in quality compared to the angel. But with a little practice and a good set-up you will be able to match and even surpass this level of precision!

5. Scanning using the DAVID Laserscanner software

5.2. Preparation / set-up

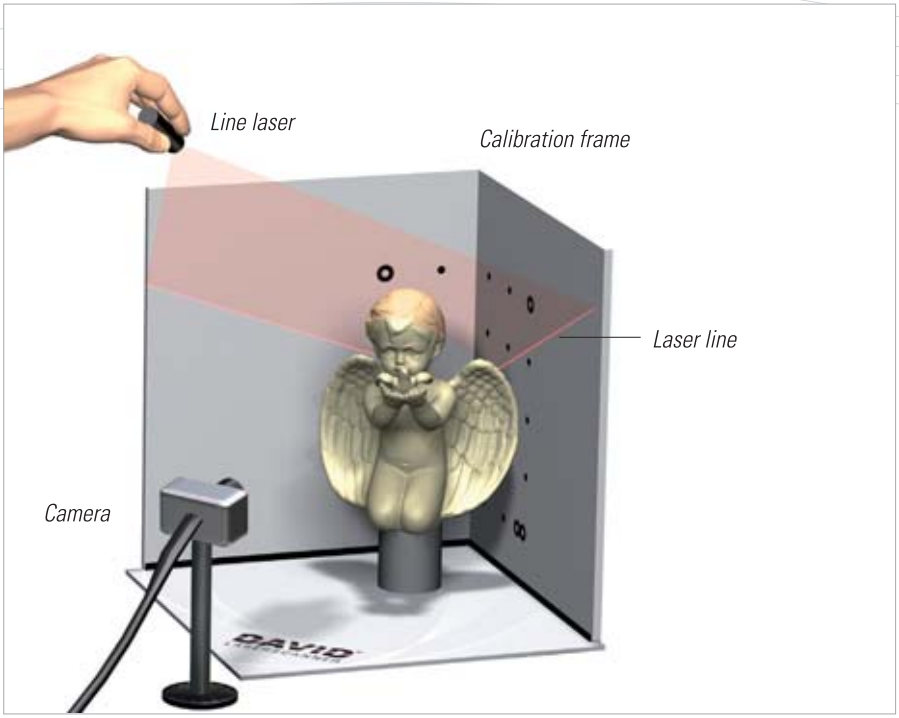


Fig. 3: DAVID Laserscanner setup

- Set the scanner up as shown in the figure. Insert the calibration frame in the aluminium holder.
- For your first scan select an object that is easily scannable (size 10 to 30 cm) with a matt, bright surface which is easily placed within the calibration frame.
- From the four different sized calibration patterns, select the one that best matches the size of your object. The pattern should be somewhat larger than the object.
- Place the object in the middle in front of the calibration pattern and as far back into the corner as possible. Use a small stand if required.

5. Scanning using the DAVID Laserscanner software

5.3. Set-up and calibration of the camera

Using the calibration pattern (up to 70 calibration points) in camera calibration, the precise position and direction of the camera is automatically detected along with its focal length, lens distortion etc. Without the calibration it would not be possible to acquire precise information about the 3D world via the camera image.

1. Start the software DIRECTLY FROM THE USB FLASH DRIVE (Start_DAVID). If you copy the software to your hard drive and start it from there the range of functions will be restricted due to copy protection (Free Edition).

2. Click on Next to move to the Calibration page. Select the Logitech camera. If a window appears offering the "RightLight™" function, switch it off! Then click on Change Format and select the resolution (output size) and frame rate. We recommend that you start with 640 x 480 at 30 frames per second. Only select the highest resolutions once you have become familiar with the software, camera settings and scanning operation.

3. Set-up the camera. Use the supplied camera stand to ensure stability.

4. View the live camera image. Click on Settings and adjust the camera image (brightness in particular) so that you can see it easily. But do not use the zoom. You will find a detailed description of all controls in Section 6.

Fig. 4: Camera Calibration page

5. Scanning using the DAVID Laserscanner software

Position the camera so that the following conditions are satisfied:

- The camera is positioned more or less towards the centre of the calibration panels (approx. 45°) and is pointed more or less level into the scene.
- All 6 ring-shaped calibration markers are fully within view of the camera (some will of course be covered by the object). At least some of the 64 other points should also be within view.
- The camera must not be able to see past the calibration panels. The panels fill the complete area of the camera image.
- The object is visible in the centre of the frame (as large as possible) and will usually therefore be covering most of the calibration points.

5. Once you have placed the camera in its final position, adjust the focus control to get the sharpest possible image of the object's surface. You may use the "automatic" checkbox to find the best setting, but this must be turned off after adjusting the focus!

6. Remove the object temporarily from the scene to afford the camera a clear view of the calibration points. Make sure when doing this that you do not move the camera or the calibration panels.

7. Adjust the camera brightness to a very high level (preferably using the Exposure control under Advanced, also turning up Brightness and Contrast under Device Settings may help), so that the camera image is extremely bright (possibly even white) and all the calibration points are clearly visible as dark round areas. You may find it necessary to brightly illuminate the room. Your camera image will ideally look like this:

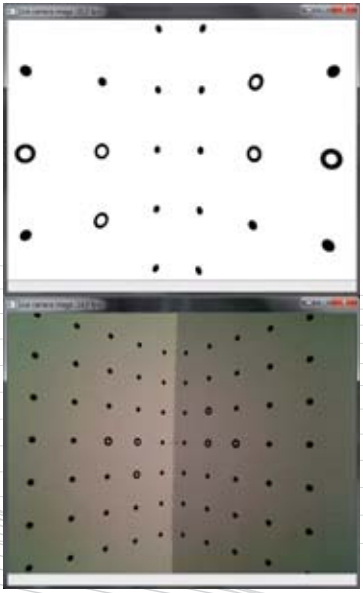


Fig. 5: Possible camera views and brightness settings for camera calibration

8. Close the Settings window with OK.

9. Enter the correct grid spacing (quadruple calibration point distance) in mm into the scale field. You will find this number printed to the side of the calibration pattern on the calibration panels.

10. Click on Calibrate Camera (this may take a few seconds).

11. If the calibration fails, the identified calibration points will be displayed as small red crosses. This enables you to see if the brightness or the contrast needs to be improved. If the frame contains dark objects (e.g. the aluminium bars of the base plate) that the software has mistakenly detected as calibration points, you may remove these with the eraser: Click on Eraser and use the mouse to erase the marks.

12. After calibration has been successfully completed, small red crosses should precisely mark the centre of all the calibration points in the camera image. The camera and calibration panels must not be moved at any time from this point! You should repeat the calibration if you are not sure. As long as nothing is moved you can perform as many scans as you want without having to re-calibrate the camera.

5.4. 3D scanning

1. Click on Next to switch to the 3D Laserscanner page.

2. Put the object back into position without moving the camera or the calibration panels. Place the side that you want to scan towards the camera.

3. Switch on the line laser and project the line from above or below into the scene just as you would do when scanning. Adjust the focus control on the laser housing to make the laser line as distinct and as thin as possible. Please note that the width of the laser line changes with the distance to the object.

4. Click on the camera settings button in the top section of the window to specifically adjust the settings for the scanning operation. As when scanning, project the laser line onto the object and then adjust the camera image so that it is very dark with (almost) only the laser line visible. In particular you should move the Exposure control under Advanced to the left – we recommend 1/500s.

Fig. 6: 3D Laserscanner page

5. Scanning using the DAVID Laserscanner software

It is usually recommended to darken the room somewhat.
Your camera image will ideally now look like this:

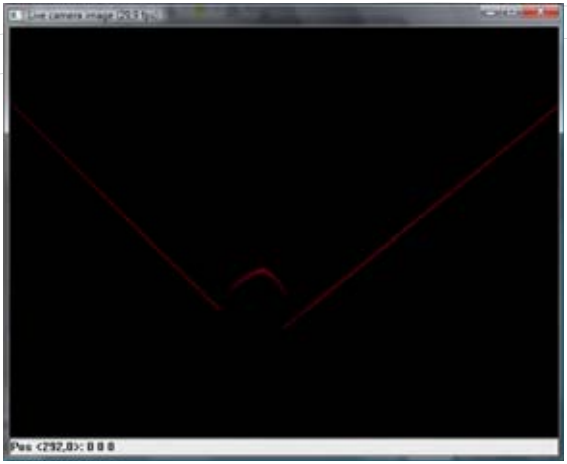


Fig. 7: Optimal camera image during scanning – only the laser line is visible

5. Switch the laser off.

6. Click on Start. At this time the laser line should not be visible in the camera image.

7. Hold the laser at a considerable distance above or below the camera. Turn the laser on again and guide the laser line slowly and evenly over the object. As you do so, view the display in the Scan result window. Sweep the laser line slowly over the object until you are satisfied. A very slow movement of the laser that sweeps over the entire object once is better than frequent up and down strokes. If the software is unable to accurately follow the laser line during the scanning operation, a message will be displayed in the DAVID window (e.g. "line not detected on the left side"). Beware of this and if necessary correct the laser accordingly (position, distance, direction, rotation). For more information see Section 7. Malfunctions / Error Correction.

8. Small gaps that appear in your scan can be automatically rectified later (interpolation). With larger gaps you can simply pass the laser over once more.

9. Click on Stop and switch the laser off.

10. You can continue the scan later by clicking Start again, e.g. in order to fill gaps. Use Delete to discard all data and start a new scan.

5. Scanning using the DAVID Laserscanner software

11. (Optional:) You can also grap a colour texture to achieve a coloured 3D model. This requires different camera settings than with scanning. For this click on the lower camera settings button and adjust the camera image to achieve a well illuminated "photo" of the object. Important: The focus setting must remain unchanged. For grabbing texture you should ensure that there is homogeneous illumination (daylight without direct sunlight, diffuse illumination from all directions, no spotlights). Click on Grab to grab the texture.

12. Click on Show 3D. In the 3D Window you can rotate the object using the right mouse button and move it with the left. Use the mouse wheel to zoom. If you have grabbed a texture the 3D model should be coloured accordingly. For assessing the quality of the scan it is better to use a non-textured view. To do this the texture in the 3D window can be turned off temporarily with the 4th button.

13. The scan can now be saved as a .OBJ file to the hard drive or the USB flash drive. You can also Forward the scan directly to the Shape Fusion window, in order to combine it at a later time with other scans from various perspectives.

14. If you want to scan other surfaces of the object or to create an all-round scan turn the object by hand to make the next side visible to the camera. Delete the scan with the Erase button and repeat steps 5 to 13. In this way you can completely record the object's surface step-by-step. Please note that the individual scans should overlap, as overlaps are important for alignment and merging (Shape Fusion).

5.5. Shape Fusion

By using the DAVID Shape Fusion tool you can merge multiple scans into an all-round model. The procedure is as follows:

1. Load all scans: Add button
2. Align all scans to one another (in pairs): Align button
3. Merge into a model with no overlaps: Fuse button
4. Save the result to the hard drive or USB flash drive: Save button

These steps are largely self-explanatory. The program will guide you through Step 2. More details can be found in our online instructions.

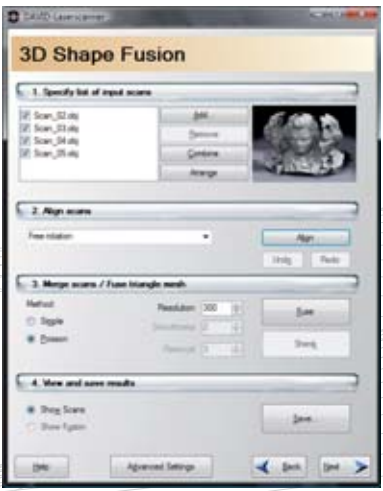


Fig. 8: 3D Shapefusion page

6. The camera settings for the Logitech QuickCam Pro 9000

The optimum settings for the camera depend on many factors, such as colour and properties of the object, size of the set-up, ambient lighting. Therefore for each setting new parameters are required, which DAVID cannot automatically determine. You must assist the program by setting up and adjusting the camera in such a way that DAVID can work optimally with the camera images. Performing the three steps of camera calibration, scanning and texture grabbing will naturally require fully different settings.

DAVID notes the settings that you have set for the camera calibration, scanning and texture grabbing. This enables you to toggle between the three tasks without having to re-adjust the camera settings every time. The software therefore contains three instances of the Camera settings button .

All buttons and controls provided by the Logitech driver are described in the following. Important settings that must be used for every application are red! The other settings can usually be left at the default setting.

6.1. Format settings: Change Format...

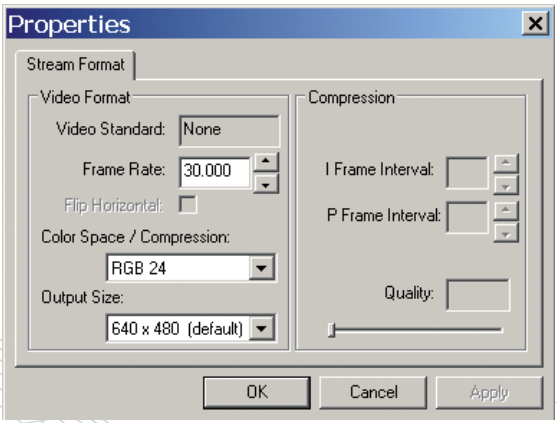


Fig. 9:
Camera properties window

Frame rate: Select the highest setting possible for the output size that is selected.

Colour Space / Compression: Select RGB 24.

Output Size: This is where you select the resolution of the scan. The higher the number the more detailed the scanning result, but this increases the duration of the scanning operation. For your first scans, we recommend to use 640*480. If you change the resolution the camera must be calibrated afterwards.

6. The camera settings for the Logitech QuickCam Pro 9000

6.2. Image settings

6.2.1. Zoom / Face Tracking tab

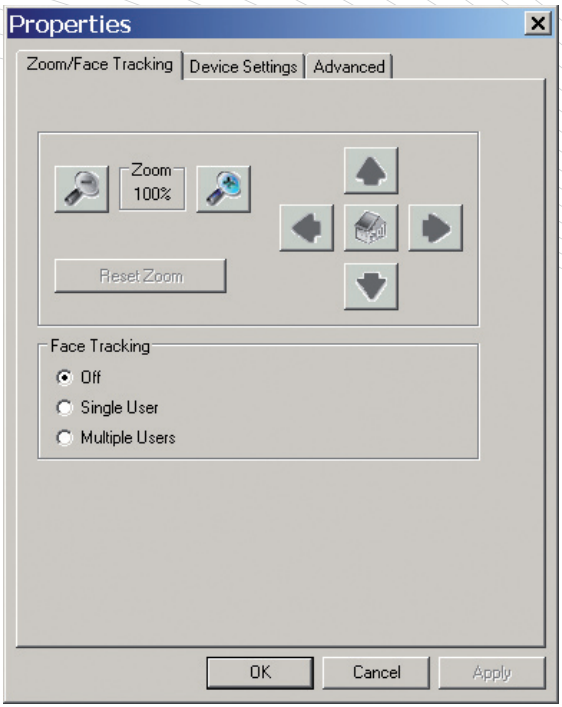


Fig. 10:
Zoom / Face Tracking

Zoom: You should not use this function. Set to 100%.

Face Tracking: Be sure this is turned off!

6. The camera settings for the Logitech QuickCam Pro 9000

6.2.2. Device Settings tab

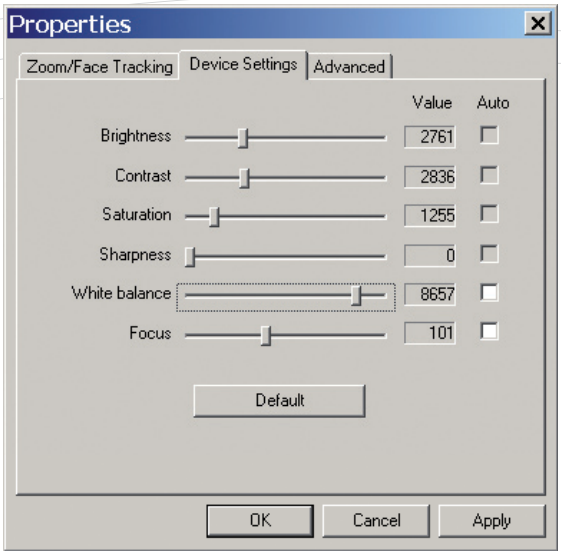


Fig. 11:
Device Settings

Brightness: You should generally choose a lower setting here and instead increase the brightness using the Exposure and Gain settings in the Advanced tab.

Contrast: Leave in the default setting or experiment with it. A higher setting can be useful for camera calibration.

Saturation: Leave in the default setting for scanning and calibrating. For texture grabbing you can set the colour saturation here to what you find best.

Sharpness: Set this to minimum (0)! This concerns an artificial increase of sharpness, which will downgrade the scanning result.

White balance: Tick Auto.

Backlight compensation: Leave at the default setting.

Focus: **Important!** Adjust the focus as clearly as possible on the object – or on the laser line on the object. To do this you can use the Auto setting. But do not place blind faith in the automatic function, try it out yourself instead. As soon as you have found the right focus for the current set-up make sure to turn the Auto function off! The focus setting must be the same for camera calibration, scanning and texture grabbing. If you have changed the setting, you must then repeat the camera calibration!

6. The camera settings for the Logitech QuickCam Pro 9000

6.2.3. Advanced tab

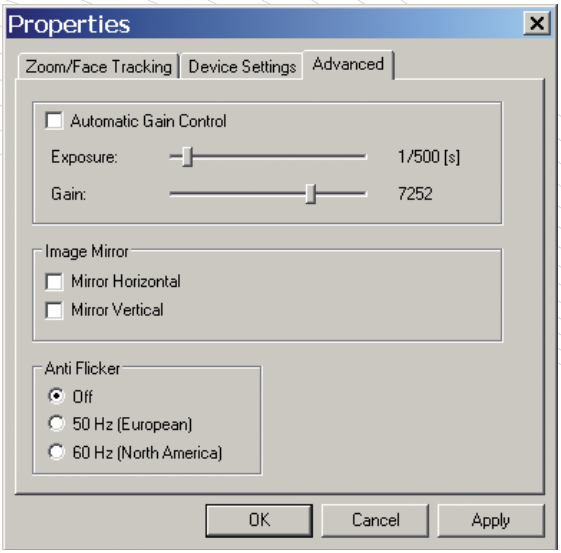


Fig. 12: Advanced

Automatic Gain: Use the Auto function only if you are using the camera as a webcam. For camera calibration and scanning with the DAVID Laserscanner software you should turn off the Auto function and select both of the following settings manually.

Exposure / Gain: Exposure allows you to select the length of time each camera image is exposed.
For calibrating you must use a high setting and, if necessary, have adjusted the Brightness and Contrast settings in the Device Settings tab. The aim is to achieve a very bright even camera image in which only the black calibration points should stand out. These black points should be as dark as possible.
For scanning you should select the lowest possible setting. Adjust the brightness using the gain slider. It is beneficial to increase this setting while reducing the Brightness setting in the Device Settings tab. The aim is to achieve a camera image that is as dark as possible (black if possible) in which the laser line should be as visible as possible while not being too intense.

Image Mirror: Make sure to turn these functions off!

Anti Flicker: You should turn off this function.

Low-Light Amplification: Leave at the default setting, or try out what effect different settings have.

Colour Gain: You should turn this off.

7. Malfunctions / error correction

Camera calibration		
Problem	**Possible cause(s)**	**Remedy**
Calibration unsuccessful (too many or too few markers)	The camera image (illumination, brightness) is not adjusted optimally	Ensure that ambient lighting is as bright as possible and select the correct camera settings (Exposure, Gain, Brightness)
	Too few markers are visible in the camera image	Set the camera up a little further away
		Select a smaller calibration pattern
	Dark objects are visible in the camera image which interfere with the calibration	Optimise the ambient light conditions and camera settings
		Use the Eraser to cover over the erroneous markers
		Set the camera up a little closer
The red crosses are not correctly positioned over the markers	The camera image is mirrored	Switch off the Mirror Horizontal and Mirror Vertical settings in Camera Settings
	The camera or the calibration frame was moved since the last calibration	Repeat the calibration
	The camera's (Auto) Focus was changed since the last calibration	Turn off the Auto Focus, focus the camera clearly onto the object and repeat the calibration
	The calibration pattern is skewed / distorted or not set up in the right-angled holder	Ensure the calibration pattern is precise

7. Malfunctions / error correction

Scanning		
Problem	**Possible cause(s)**	**Remedy**
Error message „Laser line not detected“	The laser line is too weak in the camera image	Provided the laser line is not too short, move the laser closer to the scene
		Increase the brightness of the camera image (Exposure, Gain, Brightness)
	The laser line is indistinct	Focus the laser line clearly on the object by adjusting laser focus control
	The brightness setting of the camera image is too high	Reduce the brightness of the camera image (Brightness, Exposure, Gain)
	The laser line does not extend from the left edge of the image to the right edge	Position the laser a little further away
Error message „Laser line not detected on the left / right side“	The laser line does not extend from the left edge of the image to the right edge	Position the laser a little further away and more centrally
	The object to be scanned is too far left / right in the image	Position it so that the two planes of the calibration image can be seen more or less in the quarters of the camera image both to the left and right
Error message „Left and right laser lines not on a plane“	The object to be scanned is too far left / right in the image	Position it so that the two planes of the calibration image can be seen more or less in the quarters of the camera image both to the left and right
	The two planes of the calibration image do not form a precise 90° angle	Set up the calibration image precisely. Then repeat the camera calibration.
	The camera or background was moved since the last camera calibration	Repeat the calibration
Error message „Intersection angle too low“	The angle between the camera's line of view and the laser light plane is too small to be able to perform a precise measurement	Hold the laser further away from the camera (above or below the camera), i.e. illuminate the scene from a steeper angle (30°-50°)
The scanning data is extremely noisy (heavy interference)	You moved the laser too quickly	Repeat scanning and move the laser slowly and as smoothly as possible
	The brightness setting of the camera is too high	Reduce the brightness of the camera image (Brightness, Exposure, Gain)

7. Malfunctions / error correction

Scanning		
Problem	**Possible cause(s)**	**Remedy**
The scanning data is extremely noisy (heavy interference)	The intersection angle was very small	Repeat the scan and when doing so hold the laser further away from the camera (above or below the camera), i.e. illuminate the scene from a steeper angle (30°-50°)
	Parts of the object's surface are glassy or specular	Coat the surface in a temporary matt, bright paint (washable) or matt spray
The object's surface is too smooth / detailed structures of the object were not mapped	The setting of the camera resolution is too low	Adjust the camera resolution to a higher setting and then repeat the camera calibration
	The laser line is not focused on the object	Focus the laser precisely or adjust the distance of the laser to the object
	The detailed structures are too indistinct to be recognised	Depending on the objective it may be acceptable to cover over the missing details with a colour texture grab.
	The intersection angle was very small	Repeat the scan and when doing so hold the laser further away from the camera (above or below the camera), i.e. illuminate the scene from a steeper angle (30°-50°)
The area in the background is (partially) included in the scan	The camera or background was moved since the last camera calibration	Repeat the calibration
	The camera's (Auto) Focus was changed since the last calibration	Turn off the Auto Focus, focus the camera clearly onto the object and repeat the calibration
There is superfluous scanned data „hanging in the air"	The brightness setting of the camera image is too high	Reduce the brightness of the camera image (Brightness, Exposure, Gain)
	Parts of the object's surface is glassy or specular	Coat the surface in a temporary matt, bright paint (washable) or matt spray

7. Malfunctions / error correction

Scanning		
Problem	**Possible cause(s)**	**Remedy**
There is superfluous scanned data „hanging in the air“	The room lighting is changing (e.g. through cloud movement)	Reduce the brightness of the camera image (Brightness, Exposure, Gain) so that only the laser line is visible
		Ensure the ambient lighting conditions are uniform
	The ambient lighting is too bright	Lower the ambient brightness
	You moved the laser too quickly over the object	Repeat scanning and move the laser slowly and as smoothly as possible

8. Terms of warranty

This device was manufactured using the latest production methods and has been carefully inspected. All DAVID Laserscanner® products are subjected to rigorous quality control. If this device nevertheless fails to perform faultlessly, this is something we regret and we ask you to consult your supplier. The following conditions apply to warranty claims:

*This warranty is valid for a period of **24 months** from the day of purchase. Please keep the receipt carefully as proof of purchase when making a warranty claim.*

The defective product may be returned to your supplier during the warranty period. If the warranty claim is valid you will be entitled to the repair of your device or a new device will be given to you. This is free of charge. Alternatively a warranty claim can be settled through reimbursement of the purchase price. After the warranty period has expired you still have the option of sending the defective device to your supplier or to the DAVID Laserscanner® after-sales service for repair. Repairs made after expiry of warranty will be subject to a charge. Your statutory rights are not affected through this warranty.

Damage caused through improper handling, use, storage, changes to the electronics, lens or housing, or through Acts of God or other external influences or any operation outside of the technical specifications are not covered by this warranty.

Before returning the device please contact your supplier to ensure your warranty claim is processed as efficiently as possible. If it is not possible to process your warranty claim through your supplier, you may as an exceptional case contact the DAVID Laserscanner® after-sales service directly.

DAVID Vision Systems GmbH
Rudolf-Diesel-Str. 2a
D-56070 Koblenz
Germany

Phone **+49(0)261 983 497-70**
Fax **+49(0)261 983 497-77**
Mail **service@david-vision-systems.com**
Web **www.david-vision-systems.com**

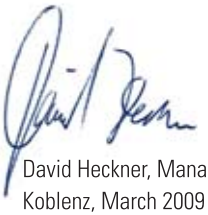
9. CE Declaration of Conformity

DAVID Vision Systems GmbH
Rudolf-Diesel-Str. 2a
56070 Koblenz
Germany

hereby declares that this product is conform with the following standards or standardised documents:

EN 61547:1995, EN 55014-2:1997, DIN EN 60825-1:2008-5 (EN 60825-1:2007)

in accordance with the provisions of the Directives
2004/108/EC , 2006/95/EC, 2002/96/EC, 2002/95/EC

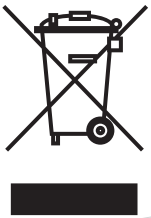


David Heckner, Managing Director
Koblenz, March 2009

We continuously seek to optimise our products and reserve the right to change the product specifications without prior notice.

10. Disposal / Recycling

Waste batteries or accumulators may not be disposed of as household waste. Every consumer has a statutory obligation to properly dispose of these items at officially designated points of disposal. Never discard electronic components of the DAVID Laserscanner in standard household waste. In accordance with the EU Directive 2002/96/EC on waste electrical and electronic equipment this must be disposed of in accordance with local regulations. You can dispose of the product at your local public point for collection of electronic waste.



11. System requirements

- Standard PC (Windows XP, Windows Vista or Windows 7, 32-bit or 64-bit)
- Two available USB ports
- Recommended: 1.6 GHz CPU, 1 GB RAM, 3D Graphics Card (e.g. NVIDIA GeForce or ATI Radeon)

DAVID®
LASERSCANNER

www.david-laserscanner.com