Dial-Tester Retrofit Kit - User Guide

Release 8.1

L&W Gesellschaft für Fertigungsmesstechnik und Qualitätssicherung mbH

Jan 15, 2026

Contents

QMSOFT® Retrofit kit for fully automated testing with dial indicator test devices

L&W GmbH

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Microsoft Windows registered trademark of Microsoft Corporation, Redmond

QMSOFT® registered trademark of L&W GmbH

CodeMeter® registered trademark of WIBU-SYSTEMS AG

CHAPTER 1

Scope of delivery

The **QMSOFT® Retrofit kit for fully automated testing with motorized dial indicator test devices** (hereinafter referred to as **"retrofit kit"**) consists of the following components:

- 1 base unit with adjustable support for height/distance adjustment of the camera and the lighting unit
- 1 pre-assembled USB camera with lens, extension ring and suitable USB-3 cable (cable included),
- 1 pre-assembled lighting unit complete with plug-in power supply,
- 1 QMSOFT® installation set consisting of: booklet, DVD and CodeMeter® license stick (or electronic license extension). The Codemeter® stick contains a single license for **QMSOFT®/QM-DIAL image processing** or, in case of an already existing "QMSOFT®/QM-DIAL"-license, the license extension **QMSOFT®/QM-DIAL bv** (extension for image processing).

When the retrofit kit is delivered together with other QMSOFT®-software components, the QMSOFT® installation set (DVD and CmStick) might be delivered in a separate package.

Note

When you open the package, please check that the delivery is complete! Contact your supplier in case of deviations from the scope of delivery!

Should your supplier not be available, please contact directly:

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Gostritzer Str. 67a
01217 Dresden
Germany
Tel: +49 351 871 7474
Fax: +49 351 871 7480
Email: support@lw-gmbh.com
Website: www.lw-gmbh.com

CHAPTER 2

Transport instructions

The **QMSOFT® retrofit kit** is delivered pre-assembled in a robust transport packaging (special carton box with foam inserts and handles) [Fig. 2.1].

Fig. 2.1: Transport box with handles.

The box is intended exclusively for the transport and/or storage of the retrofit kit. It is expressly NOT designed to hold the retrofit kit together with a mounted dial indicator test device! The transport box has the following dimensions (slight deviations due to technical development are possible):

Length: 57,8 cm
Width: 39,5 cm
Height: 62,5 cm

The entire delivery unit has a weight of approx. 16 kg.

Note

At delivery, please check the transport packaging for any shipping damage which might have damaged the delivered goods. Should this be the case, please document any such damages in a suitable manner (photo) and only open the package after having contacted your supplier!

CHAPTER 3

Safety instructions

The **QMSOFT® retrofit kit** is in compliance with the relevant safety provisions and has been assembled and packed with care. Nevertheless, please observe the following safety instructions:

- Before connecting and starting the retrofit kit, please read all the enclosed documents carefully.
- Keep this manual close to the point of use of the retrofit kit, in order to have it handy in case of need.
- The retrofit kit must only be used in accordance with its intended use for the measuring tasks described in this manual. Any different or further use is considered to be improper use. L&W GmbH shall not be liable for any damage resulting from improper use. The proper and intended use also includes the observation of all the safety instructions of this manual.
- Before connecting the power supply of the lighting unit, please check if the supply voltage indicated on the type plate of the plug-in power supply corresponds with the local voltage. Should they not correspond, do not connect the power supply!
- Always disconnect the power supply of the lighting unit before starting any maintenance works on the lighting unit.
- Assembly works on the retrofit kit must only be carried out by trained service personnel. Unauthorized interventions or modifications of the retrofit kit result in exclusion of warranty and exclusion of liability of L&W GmbH.
- The retrofit kit is not protected against the penetration of liquids. Please avoid any contact of the kit - in particular of the camera and the lighting unit - with liquids!
- All the connections and power supply cables must be checked to be in proper operating condition (visual inspection) prior to their use. In case of damages, the cables have to be changed immediately by trained personnel.

Should you have any further questions, please contact your supplier or L&W GmbH.

CHAPTER 4

General information

The visual reading of the pointer position of dial indicators, dial comparators and dial test indicators can be a strenuous and monotonous task for the operator of the test device, leading to fatigue and therefore also to subjective errors in positioning the pointer or the numeric display of the dial gauges to be tested. Thanks to the application of modern camera technology, this testing process can be optimized so as to avoid subjective influences and tedious operating steps.

The calibration of dial indicators, dial test indicators and dial comparators with QMSOFT® and image processing differs from the conventional calibration method only by the technology used for reading the display of the test objects, while still respecting the basic metrologic principle to calibrate testing equipment according to the way it is used.

The **QMSOFT® retrofit kit** enables you to complete your motorized dial indicator test device with the possibility of a fully automatic reading of the displayed values of the test objects (pointer or numeric display) by camera and image processing, which makes the testing process considerably easier. The QMSOFT® software system controls the dial indicator test device and processes the camera image (pointer or numeric display of the test object) and the reference measuring values of the dial indicator test device; it also performs all the subsequent processes related to gauge management.

The license “QMSOFT®/QM-DIAL image processing” (for new customers) or “QMSOFT®/QM-DIAL bv” (for QMSOFT® customers already possessing a compatible QMSOFT®/QM-DIAL” license) contains the software functions to allow the reading of the test object’s display by camera.

The advantages of the retrofit kit for fully automated testing at a glance:

- Measured values are read out in an objective manner, free from random errors which might be committed by the operator.
- For digital dial gauges, the usually low data transfer rate via data cable can be replaced by a notably higher reading frequency by camera.
- The calibration process can be carried out without fatigue or loss of concentration, allowing for a considerably higher performance of the dial indicator test station in comparison to the conventional method.
- During the automated testing process, the released capacities of the operator can be used for other working tasks.
- Thanks to the integration of the dial indicator test station in the QMSOFT® system, the use of other software systems is not necessary since all the available QMSOFT® functions for creating, transferring and saving test certificates can be used.

You can find a detailed description of the possibilities offered by the QMSOFT® gauge management system on the website of L&W GmbH and on the DVD included in the delivery package.

CHAPTER 5

Assembly and set-up

This chapter shall help you to answer any questions which might arise before or during the assembly and set-up of the retrofit kit. Please go through the described steps one after the other.

5.1 Assembly of the base unit

When choosing the position of the test station, the ambient conditions required by the manufacturer of the dial indicator test device have to be observed.

The base unit has to be placed upon a stable structure which is free from vibrations and is sufficiently able to take load (weight of the base unit plus weight of the dial indicator testing device). When choosing the position for the test station, you should also consider the necessary space for computer equipment (keyboard, mouse, screen). Please also pay attention to the glare effect of the lighting unit - we recommend to place the testing station facing a wall, or to install an optical screen between adjacent work stations, e.g. by means of a vertical partition.

Take the base unit out of the transport packaging. Please remove the foam inserts very carefully to avoid any deformation or damage of the pre-assembled camera and lighting unit [Fig. 5.1.1].

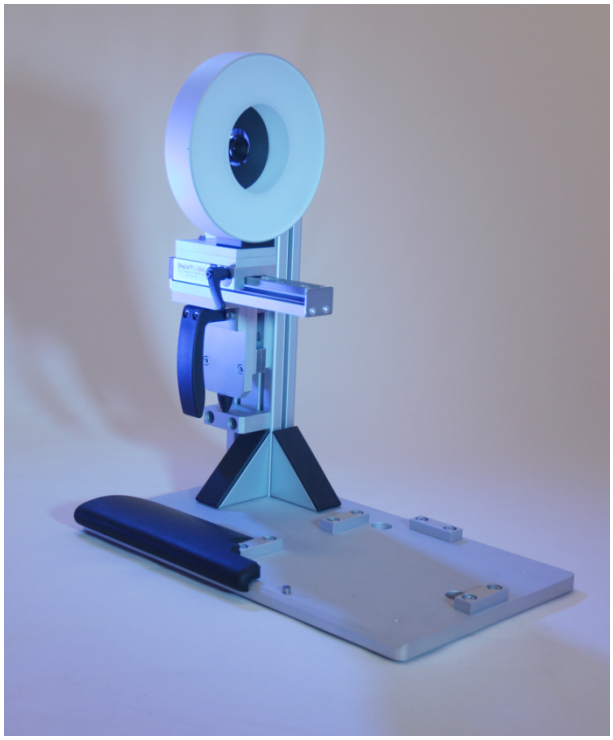


Fig. 5.1.1: Base unit with pre-assembled camera with lens and lighting unit.

Place the base unit on the chosen workplace. The column with the camera and lighting unit should be on the front side close to the operator.

5.2 Assembly of the dial indicator test device

The retrofit kit consists of the following components [Fig. 5.2.1].

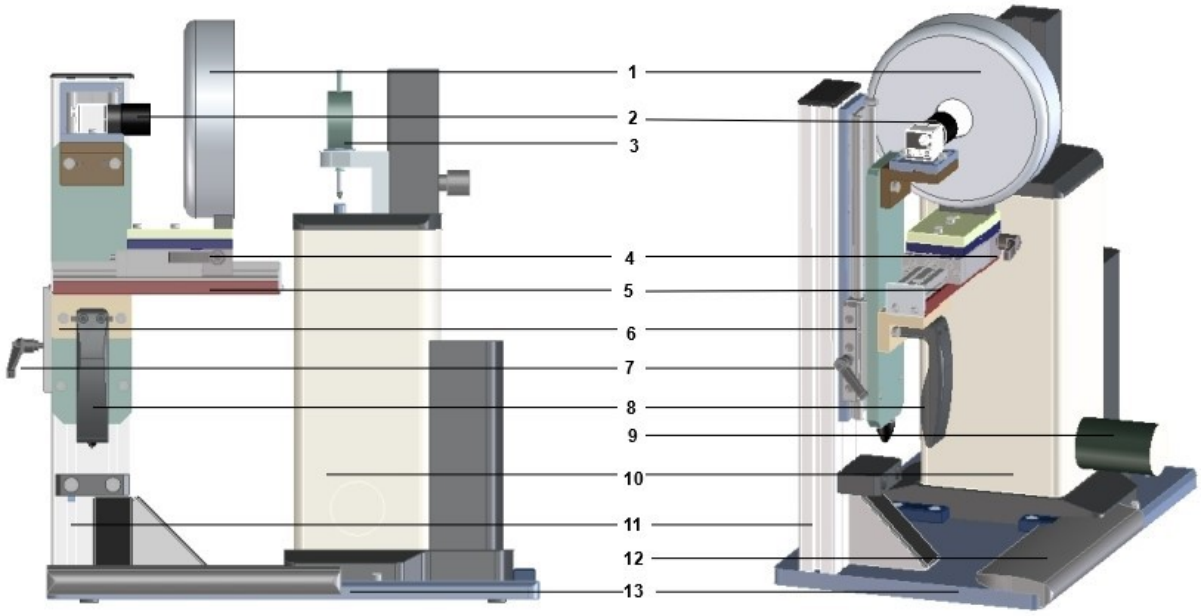


Fig. 5.2.1: Base unit with mounted dial indicator testing device.

1. lighting unit
2. USB camera with lens
3. test object
4. clamp for horizontal positioning of the slide with the lighting unit
5. slide with lighting unit (horizontally adjustable)
6. camera/lighting unit slide (vertically adjustable)
7. clamp for vertical positioning of the camera/lighting unit
8. handle for horizontal positioning of the camera/lighting unit
9. hand wheel for manual testing with the Optimar-device
10. testing device (dial gauge test device Optimar - not included in the retrofit kit)
11. column
12. hand rest (for manual testing)
13. base plate

The base plate (13) of the retrofit kit is equipped with one fixed stop bolt and four adjustable stops in the form of aluminum blocks [Fig. 5.2.2] with fixing screws, which can be fitted (within a limited range) to the socket of the dial gauge test devices.

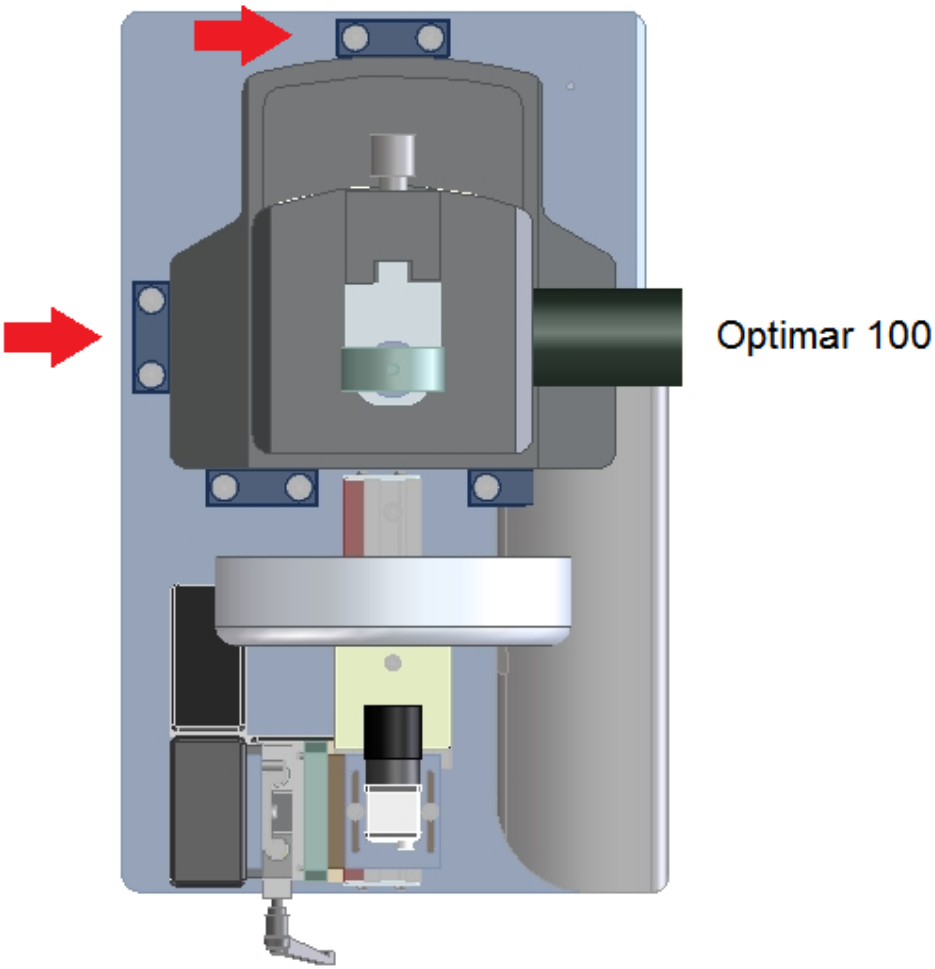


Fig. 5.2.2: Assembly scheme (top view).

First, unfasten the fixing screws of the rear and left stop [Fig. 5.2.3] and remove them.

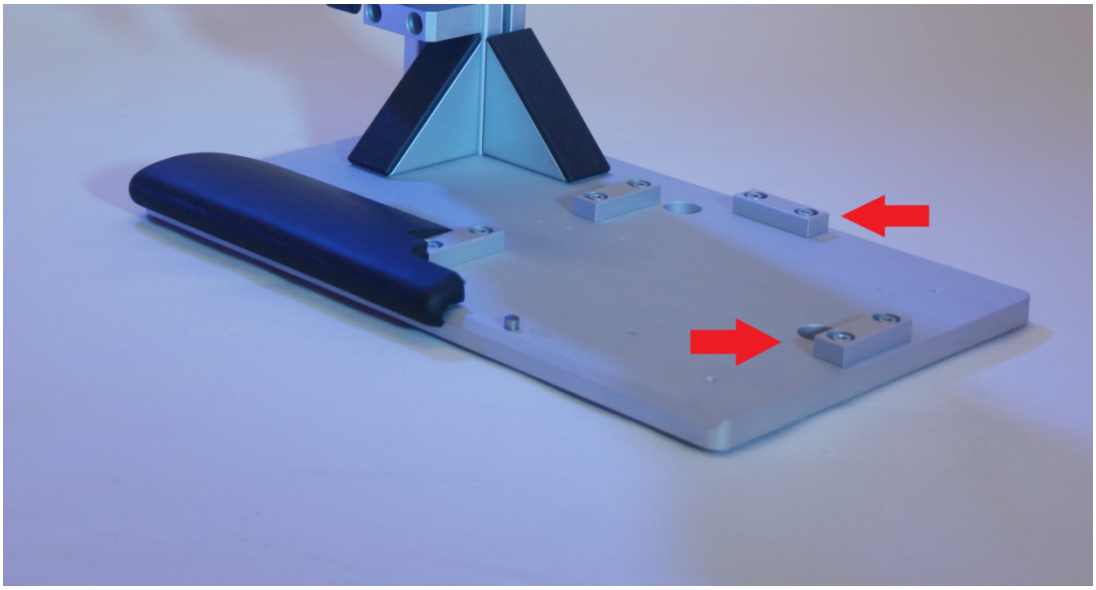


Fig. 5.2.3: Stops to be unfastened.

Now carefully position the dial indicator test device in the designated area of the base plate (“between” the stops).

Warning

Observe the relevant safety regulations when lifting the dial indicator test device! Avoid any collision with the lighting unit and the camera!

Position the dial indicator test device on the base plate, making sure that the base of the test instrument fits well in between the stops on the front [Fig. 5.2.4] and on the right side of the base plate. Now replace the unfastened stops and fix the position of the dial indicator test device by fitting the stops tightly to the socket of the test device and re-fasten the fixing screws.

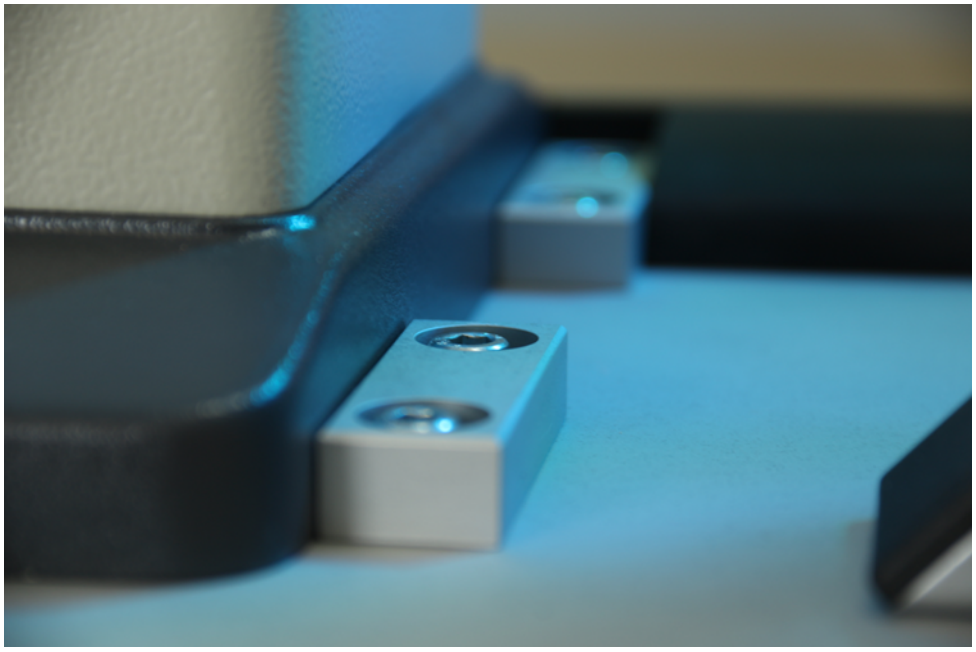


Fig. 5.2.4: Front stops.

To position the lighting unit [Fig. 5.2.5], loosen the clamp (1) of the horizontal slide of the lighting unit (2) and move the slide horizontally until the rear side of the lighting unit is positioned in a distance of 1 - 2 mm from the camera lens (see Fig. 8). Fix the slide in this position by tightening the clamp (1).

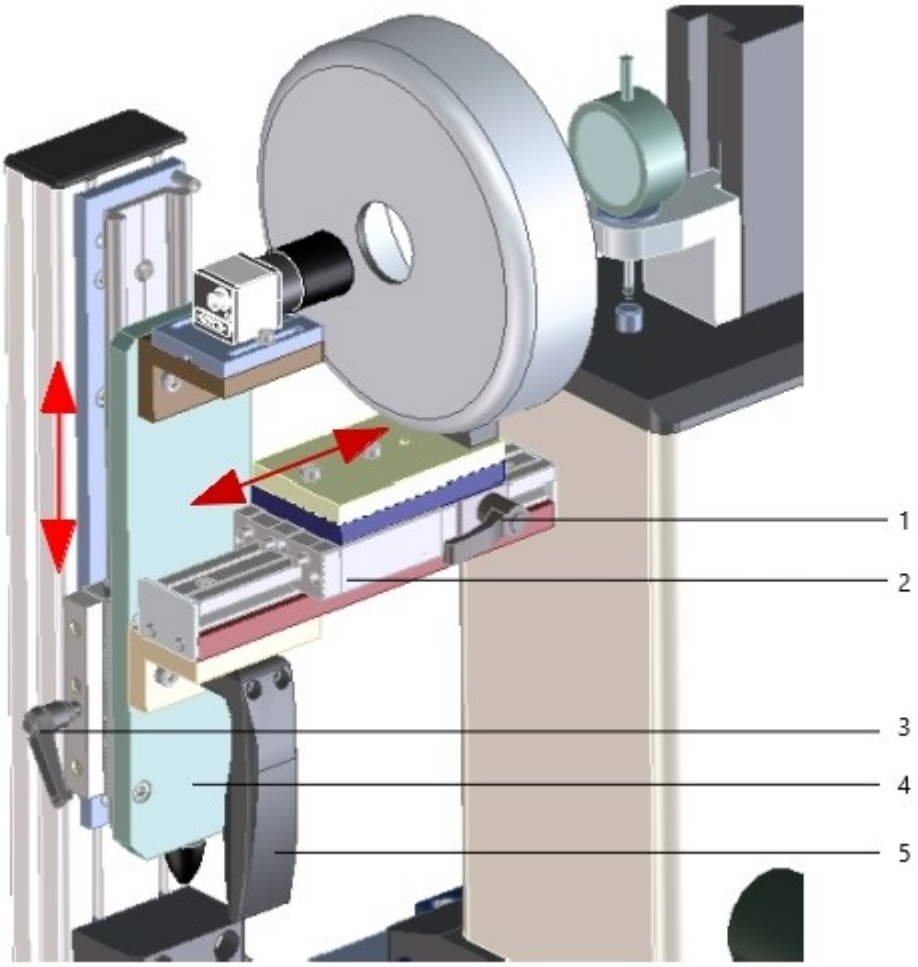


Fig. 5.2.5: Positioning of camera and lighting unit.

Finally, you may already do a first vertical positioning of the camera/lighting unit slide (4):

Take hold of the handle (5) with your right hand, and loosen the clamp (3) with your left hand. Now you can move the slide in vertical direction, finding a position where camera, lighting unit and the dial gauge to be tested are all in line. Fix the slide in this position by tightening the clamp (3).

Warning

Do not let go of the handle while the clamp is unfastened to avoid the risk of a collision of the slide with the stopper!

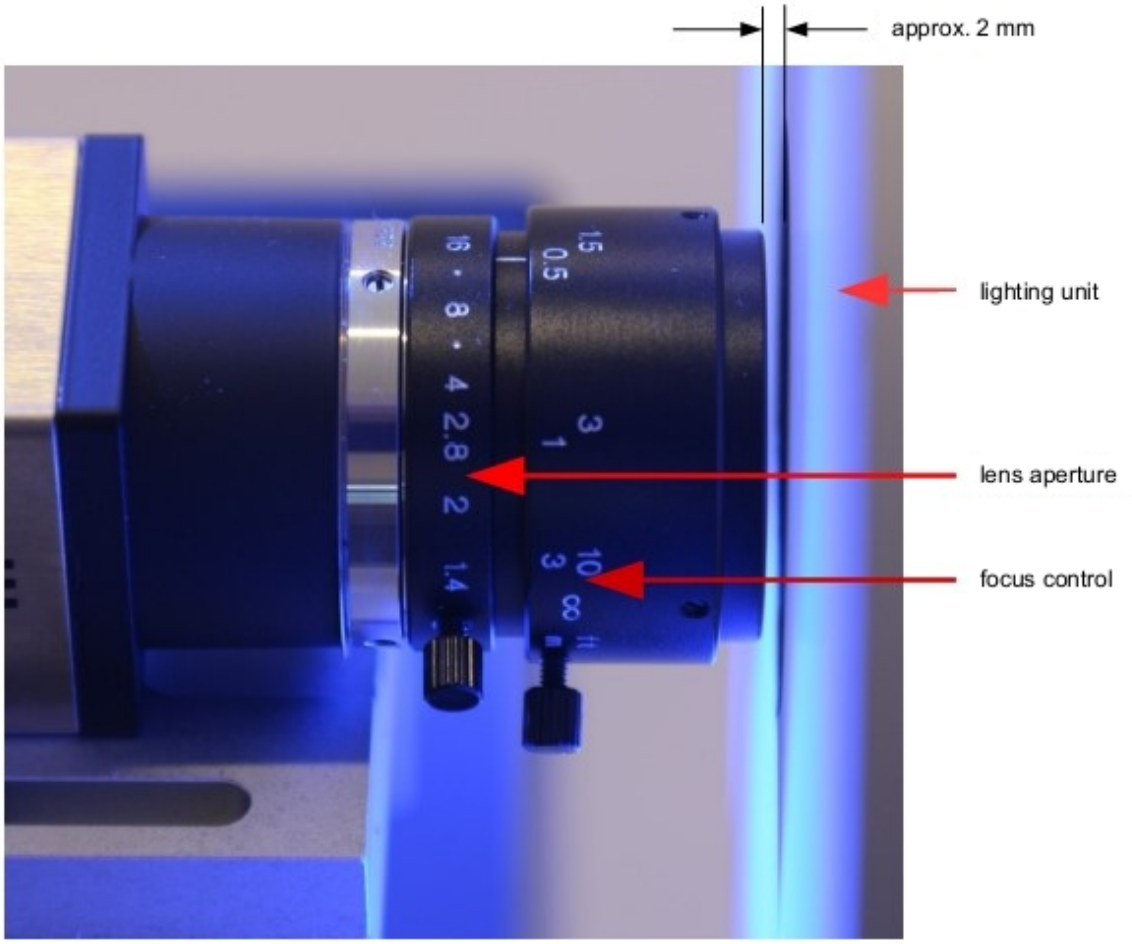


Fig. 5.2.6: Lens with operating elements for lens aperture and focus.

5.3 Set-up of the dial indicator test device

Follow the instructions of the manufacturer of the dial indicator test device to connect the test device to the power supply and to the computer.

Warning

Please check in the Windows Device Manager if all the necessary interfaces (serial/USB or virtual ports) are working properly and are not marked with error icons. Make sure that all the driver components are updated and all the necessary Windows-updates are installed correctly. Only then continue with the set-up.

Now start the dial indicator test device and carry out all the operating steps for starting the testing device required by the manufacturer to put it in operating condition.

5.4 Set-up of the lighting unit

Warning

Before setting up the lighting unit, always check that the supply voltage indicated on the type plate of the plug-in power supply corresponds with the local voltage!

The lighting unit is supplied with energy via the plug-in power supply included in the scope of delivery. Plug the supply cable into the socket on the rear side of the lighting unit. Now connect the lighting unit to the power supply.

5.5 Set-up of the camera

The retrofit kit includes a pre-assembled USB 3-camera [Fig. 5.5.1] of the uEye-series of the manufacturer IDS Imaging Development Systems GmbH (Website: www.de.ids-imaging.com)

Note

Please consider that a free USB-3 port is necessary for the connection of the camera! You can check the available USB ports of your computer beforehand by clicking "Check USB bus" in the dialog box (the check is self-explanatory).

Fig. 5.5.1: Camera (without lens).

These cameras are operated with a driver library provided by the manufacturer. To install the software, please log on to your computer with local administrator rights. You can either download the current driver version from the manufacturer's website (registration required), or you can install the driver version included on the der QMSOFT®-DVD. For this, open the folder `\Additional\IDS`, where you can find the program file `ids_peak_2.1.0.0.exe`. Double-click to start the file, select "install driver" and follow the instructions (we recommend the setup type "complete" for the installation of the driver). Take over the default settings for the target directory and for the program folder. To finalize the installation process you may choose to install the shortcut icons for the camera software also on the desktop or the quick start bar. We recommend in any case to select the option "Show quick start HTML", as it provides detailed information about the camera and the proprietary software.

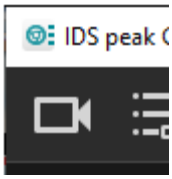
Once you have successfully installed the camera software, you can connect the camera with the included USB-3 cable to a free USB-3 port of the computer.

Warning

Only use a USB-3 port (blue socket), slower ports do not reach the image transmission rate required for real-time control!

Now test the functioning of the camera and the computer. Start the program **"IDS peak-Cockpit"** by clicking on the shortcut icon on your desktop or quick start bar.

When the main window of the camera software opens [Fig. 5.5.2], please click on the upper left button "Open first available camera".



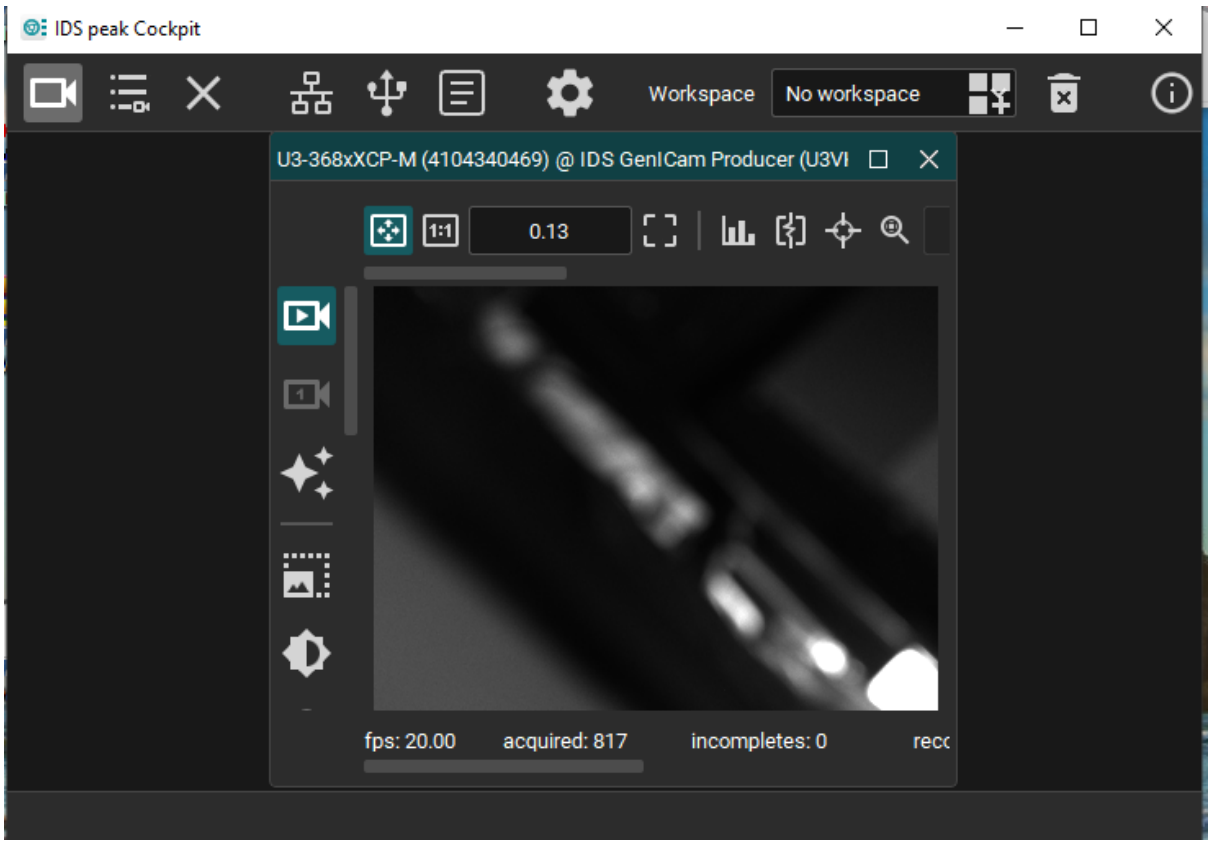


Fig. 5.5.2: Window of the camera software with real time image.

You should now be seeing a black-and-white real-time image on your screen (do not forget to remove the protective cap from the lens of the camera). Depending on the position of the lens, the brightness of the computer image might be too high or too low: in this case you can correct the brightness by adjusting the lens aperture on the camera (see Fig. 810). You can vary the zoom factor of the image with the help of the icons in the tool bar.

5.6 QMSOFT® configuration

You can find a detailed description of the basic QMSOFT® installation scenarios and further information on other installation types (update of pre-existing QMSOFT® installations, use of the database in the network, floating-license server, silent installation, etc.) in the QMSOFT® manual on the DVD in the subdirectory \Doc.

For the configuration of the Optimar 100 please carry out the following steps:

5.6.1 Create the test device in the QMSOFT®/QM-DeviceServer

Before you can start using the dial indicator test device in the QMSOFT® system, the device has to be created in the QMSOFT®/QM-DeviceServer.

Open the main window “QMSOFT®/GaugeMan” and click on the first button in the section “Measuring devices” [Fig. 5.6.1].

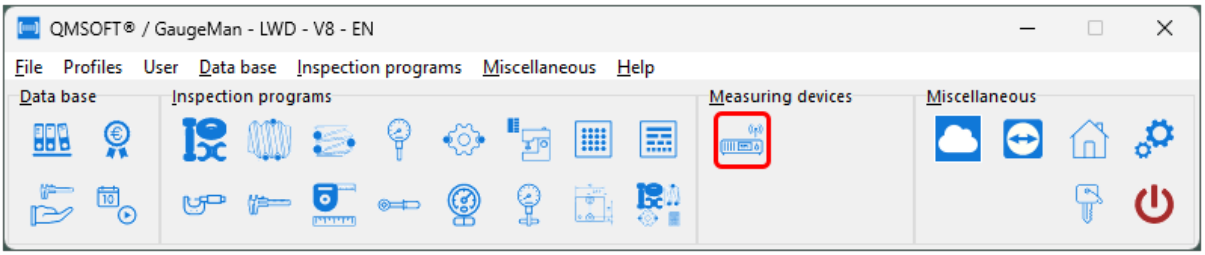


Fig. 5.6.1: Starting of the QMSOFT®/QM-DeviceServer.

Now the main window of QMSOFT®/QM-DeviceServer opens. Please click on the button “Add device” [Fig. 5.6.2].

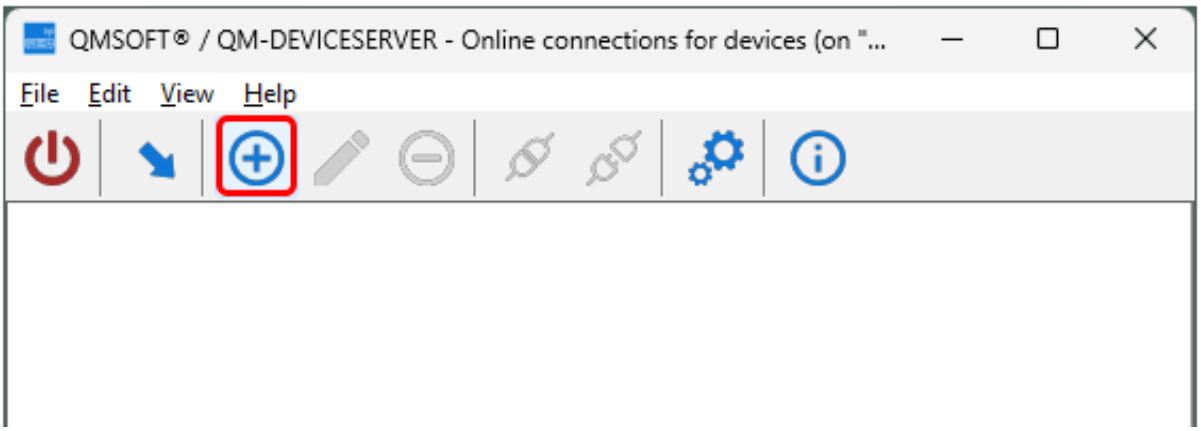


Fig. 5.6.2: Button to add new devices in the QMSOFT®/QM-DeviceServer.

Select the manufacturer (e.g. Mahr GmbH) and the device name (e.g. Optimar 100) from the lists [Fig. 5.6.3].

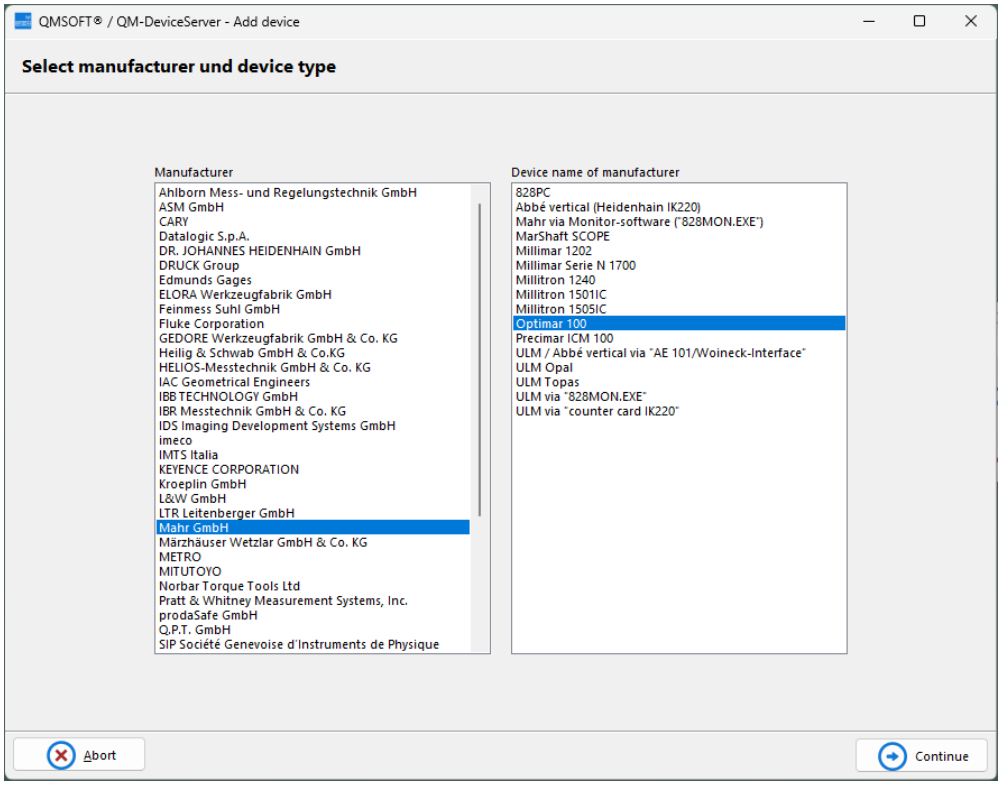


Fig. 5.6.3: Select manufacturer and device name.

Now you can enter a name for the testing device. Complete the process with the “Close”-button. The dial indicator test device has now been created in the QMSOFT®/QM-DeviceServer.

5.6.2 Configuration of the test device in the QMSOFT®/QM-DeviceServer

Select the testing device in the program window. By clicking on the right mouse button, you open a menu where you choose the function “modify device properties” [Fig. 5.6.4].

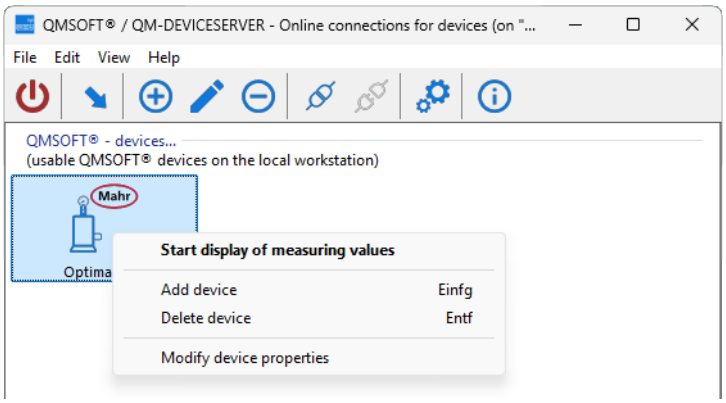


Fig. 5.6.4: Menu “Modify device properties”.

For Optimar 100 devices, it is only necessary to configure the connection to the computer either by serial cable (RS232) or USB cable, and to select the USB-camera to be used for reading the measured values on the display of the test object [Fig. 5.6.5].

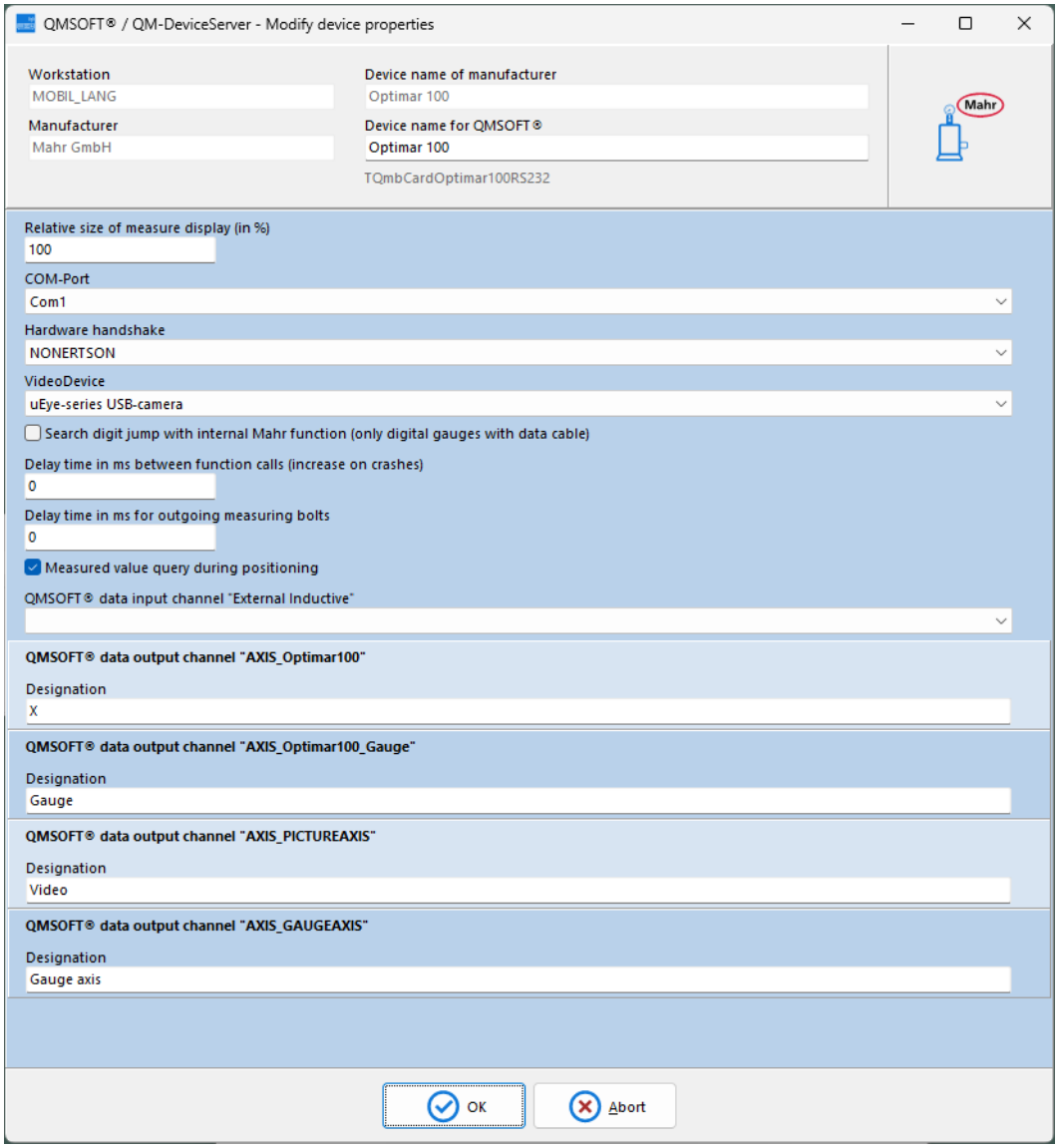


Fig. 5.6.5: Modify device properties.

The default settings for the axis designations shown in the window can remain unchanged. Further settings are not required, and you can confirm the configuration with “OK”.

In the main window of the QMSOFT®/QM-DeviceServer you now click on the button

to minimize the QMSOFT®/QM-DeviceServer and leave it running in the background. Thus, it can be reactivated quickly in case of measurement value requests of the QMSOFT® inspection programs during measurement.

5.6.3 Configuration of the inspection program QMSOFT®/QM-DIAL

When you start the dial gauge inspection program QMSOFT®/QM-DIAL for the first time, you are asked to configure the connection with the test device you created. Start by clicking on the QM-DIAL symbol (indicated by the red dart in Fig. 5.6.6):

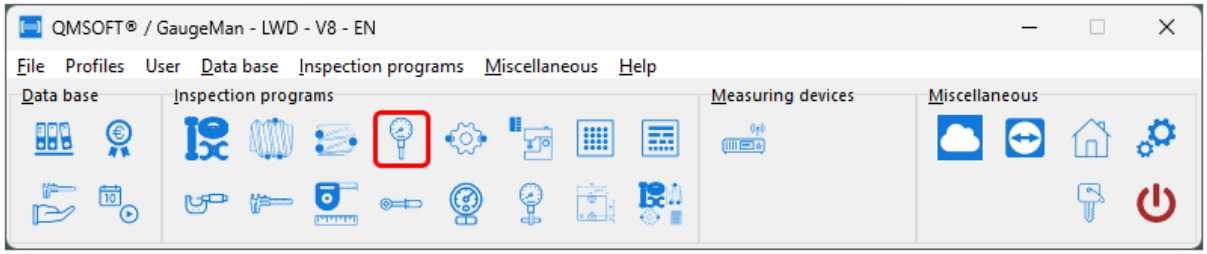


Fig. 5.6.6: Starting the dial gauge inspection program QMSOFT/QM®-DIAL.

Open the menu “Settings - Program settings”, where you select program settings [Fig. 5.6.7]. Select the device connection to the dial gauge test device and confirm with “OK”.

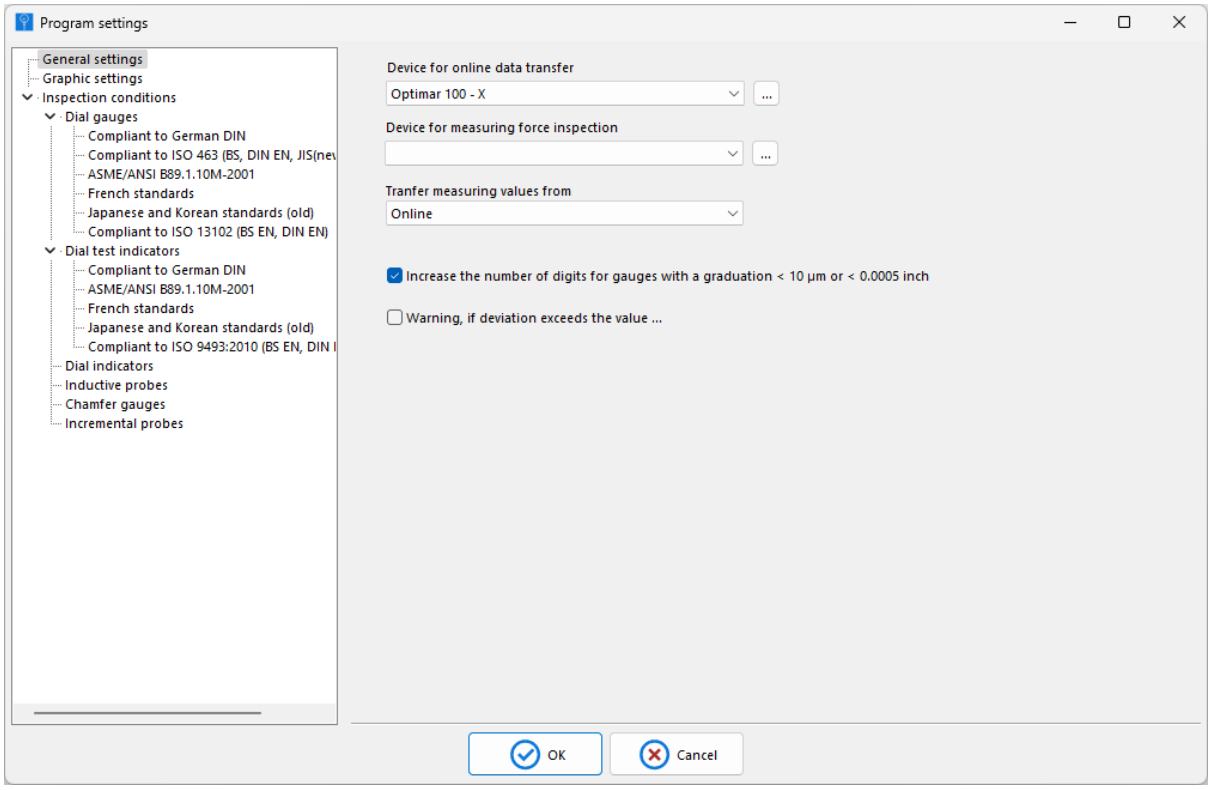


Fig. 5.6.7: Configuration of the connection to the test device.

You may choose specific settings for each type of gauge (dial gauge, dial test indicators, etc.) and the respective group of standards. These settings are then applied to all gauge types of a certain group, or only to a specific gauge inspection method (e.g. “dial gauges according to VDI...”).

Should the dial indicator test station mostly be used for fully automated inspection, we recommend to pre-set the inspection mode on fully automated inspection [Fig. 5.6.8].

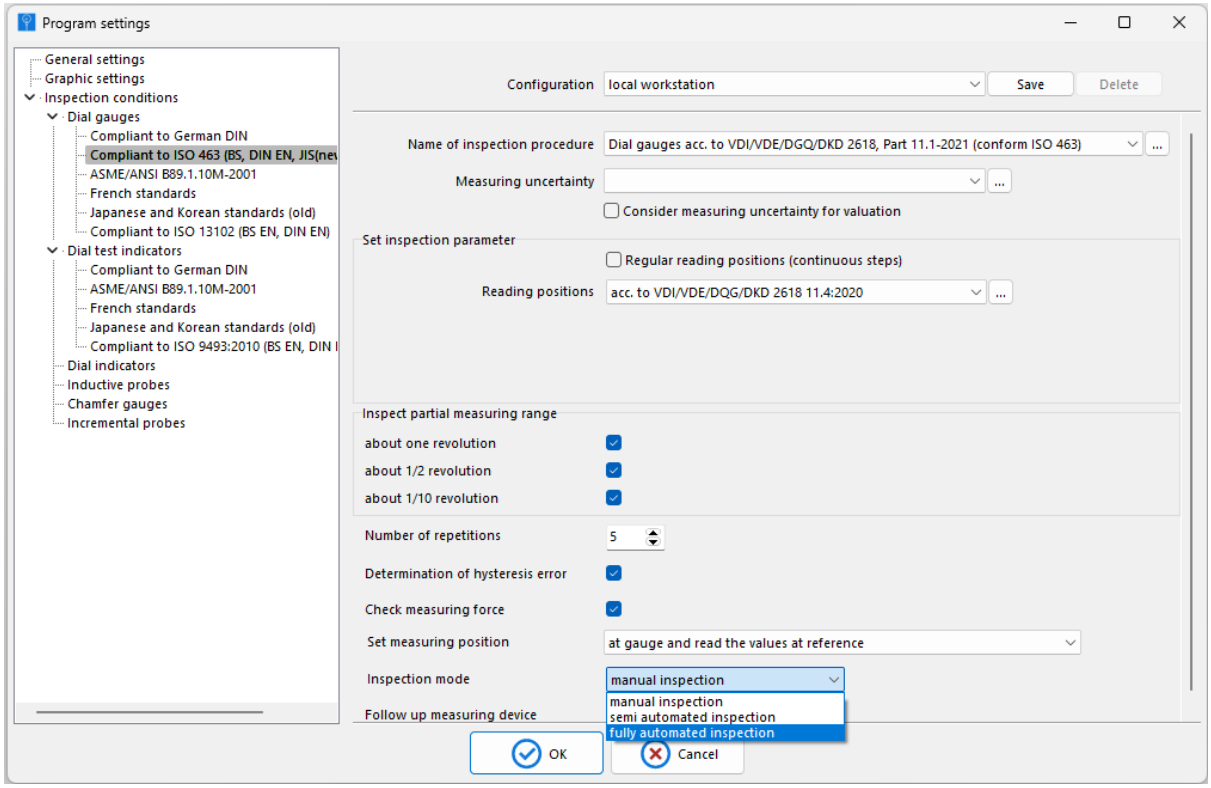


Fig. 5.6.8: Activation of fully automated inspection.

QMSOFT® recognizes automatically whether the connected test device is linked to a camera. No further settings are necessary.

For detailed information on the functions and configuration options in QMSOFT® please refer to the QMSOFT® manual.

CHAPTER 6

Image processing in QMSOFT®/QM-DIAL

6.1 User interface of the QMSOFT® camera functions

Fig. 6.1.1 shows the test device visualization of an Optimar 100 device with active camera function. With respect to conventional devices, you will find new control elements here, which are shortly described on the following pages.

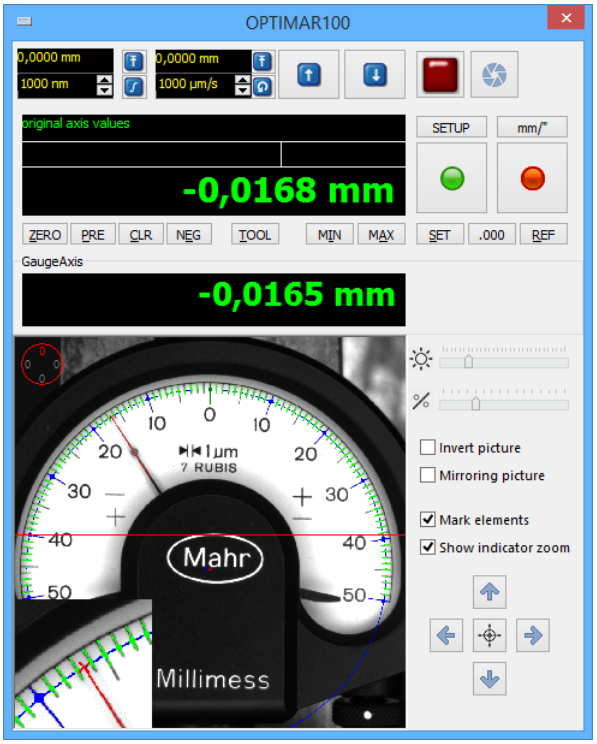


Fig. 6.1.1: Test device visualization Optimar 100.

To facilitate the positioning of the camera, you can add the red line as shown in Fig. 6.1.1 by selecting “mark elements” on the right of the image. Bring the red line into alignment with the center of the test object’s scale by

using the buttons  for positioning.

6.1.1 Motion control of the dial indicator test device

Button 
One click on this button sets the resolution of the hand wheel of the dial indicator test device to the value entered in the input field left of the button (only for manual inspection).

Button 
One click on this button sets the positioning speed of the dial indicator test device to the speed which has been entered in the input field left of the button. This setting only applies to manual operation; when running in automatic mode, the system selects the optimal positioning speed by itself.

Button 
Click and hold this button to move the quill of the dial indicator test device up or down.

Button 
With this function, the quill can be precisely positioned. One click on this button moves the quill of the dial gauge test device to the position set in the input field left to the button.

Button 
This button is the “emergency-stop” in case the movement of the quill has to be interrupted quickly, e.g. to avoid collision.

6.1.2 Settings for the camera image

Button 
One click on this button activates the camera image (which automatically enlarges the test device visualization). In the automatic mode, the camera image starts without intervention of the operator. With this function, the reading via camera can be activated also during manual positioning.

Button 
This button closes the camera mode (in case it was activated manually before). The test device visualization on the screen is reduced.

Slide control  (brightness)
This control regulates the brightness (exposure time) of the image, in addition to the brightness regulation with the lens of the camera.

Slide control  (zoom)

This control regulates the size of the image section (AOI, Area Of Interest) of the camera image.

Buttons 

The dart buttons pointing left/right, up/down can be used to move the AOI in the live-video image. You can also use your mouse to drag and drop the AOI in the video image. To quickly center the scale of the test object in the camera image, press SHIFT and click on the middle of the scale shown in the image.

6.2 Inspection procedure

Before you start testing, make sure that the lighting unit and the test device are switched on and ready for operation, and that the test object is inserted in the test device and correctly positioned in front of the lighting unit and the camera. Make sure that the test object is not damaged or dirty.

When QMSOFT®/QM-DIAL recognizes the camera connection, the live image of the test object opens.

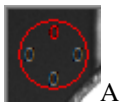
6.2.1 Optical settings

- Set the brightness (exposure time) as low as possible (approx. between a value of 3 and 10). This can reduce the overall duration of the inspection procedure.
- The scale of the test object should fill the camera image.
- Make sure that the camera image is neither too dark nor too bright. Use the lens of the camera to regulate the brightness; if necessary, make further adjustments with the slide control for brightness.
- Avoid disturbing lighting sources, which could cause reflections on the surface of the test object. Make sure that the scale is always well illuminated and shadow-free.
- Adjust the definition of the image with the focus regulation on the camera (Fig. 8).

6.2.2 Positioning of the tested dial gauge

6.2.2.1 Analogue dial gauges

Position the quill of the dial indicator test device, so that the test object is in a position shortly before its mechanical pointer's zero point and make sure there is a contact between the quill of the test device and the test object.

 A symbol in the top left corner of the camera image shows the expected position of the "0" (top, bottom, left or right). By clicking on this symbol the expected zero-position can be changed (this setting remains also after closing the software).

The pointer has to be positioned in an area between a quarter turn before the "0" and a quarter turn after the "0". There has to be a movement range of at least 30 scale units until the end of the measuring range of the test object (dial comparator).

6.2.2.2 Digital dial gauges

To test digital dial gauges, set the display of the test object to zero close to the mechanical start of the measuring range. Bring the quill to a position where the test object shows a value smaller than zero. The dial gauge test device has to be in contact with the dial gauge to be tested.

The “0” always has to be within the measuring range of the test object.

There have to be at least 5 digits before the “0” in the measuring range (usually it is possible to set digital measuring devices to zero at any point).

There has to be a movement range of at least 30 digits until the end of the measuring range.

6.2.2.3 Fully automated inspection

Once you have optimized the optical settings and the position of the test object, you can start the fully automated testing by clicking on the button “Start fully automated inspection” in the QMSOFT®/QM-DIAL program window.

The software now first starts trying to recognize the scale of the test object or to evaluate the numeric display. In doing this, the test object is being moved slightly by the movement of the quill of the test device. After this short recognition process starts the inspection of the test object in automatic mode.

CHAPTER 7

Maintenance

The entire retrofit kit has been designed to allow a virtually maintenance-free operation under normal laboratory conditions.

From time to time, remove any dust deposits on the components, especially on the camera.

Pay attention to possible dirt deposits on the guide elements of the positioning slides.

CHAPTER 8

Troubleshooting

In this section you can find some of the most frequent problems:

- **Lighting unit does not work**
  Has the power supply of the lighting unit been connected correctly? If there is a cord switch, has it been activated? Try if the power supply of the lighting unit works when using another power outlet.
- **No camera image**
  Make sure that the driver software of the camera manufacturer has been installed correctly. If you also do not see any image in the manufacturer's software (uEye-Cockpit), please refer to the technical documentation of the camera manufacturer.
- **The camera image appears, but remains black**
  Have you removed the protective cap from the lens? Adjust the lens aperture to a smaller value (this enhances the brightness of the image) and increase the brightness with the slide control in QMSOFT®.
- **The camera image flickers**
  Increase the brightness (exposure time) in QMSOFT®, and decrease the brightness on the lens of the camera
- **QMSOFT/QM-DIAL does not show the test device visualization**
  Has the connection between QM-DIAL and QMSOFT®/QM-DeviceServer been configured? Is the QMSOFT®/QM-DeviceServer active? Can the test device be called up in the QMSOFT®/QM-DeviceServer? Are the settings for the communication with the test device correct?
- **Test object is not recognized**
  Should the test object not be recognized at the beginning of the inspection, the message "scale not recognized" is shown. In this case please check if the focus and brightness are properly set, and make sure that the testing device is in contact with the test object. Should the problem persist, you can use the following error dialog to save the relevant data and/or images in order to send them to L&W GmbH for an external problem analysis.

Should you have any problems or special questions regarding the maintenance or repair of the retrofit kit, please do not hesitate to contact us.